National Association of Medical Examiners

Abstracts of the 59th Annual Meeting

October 17 – 21, 2025

Louisville Marriott Downtown

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1.1 The Advancement of Forensic Pathology: A History

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Unlike most of medicine and surgery, a comprehensive history of forensic pathology remains to be published. Some of its history is tersely scattered within secondary sources, mostly focusing on the legal, political, and societal aspects of developing a coroner or medical examiner system. The medical aspect has largely been passed over, or must be gleaned from publications on narrower topics such as docimasia or infanticide. The rest remains to be mined from antiquarian books and articles, many in Latin, having never been translated or republished after the 18th century. While we continue to wait for a comprehensive history of the subject, an episodic history is provided here as a survey of forensic pathology's development. Important (and unimportant) people, ideologies and methods, the nature of the source material, the challenges faced by the historian, and the breadth of the subject are highlighted, with high hopes that it inspires future medical historians to write the full history of forensic pathology.

1.2 Mass Fatality Response in Practice: Experience, Challenges, and Lessons Learned from the District of Columbia Office of the Chief Medical Examiner

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Mass fatality incidents (MFIs) demand a comprehensive and coordinated response from forensic professionals, requiring the integration of logistical, technical, and psychological strategies to address the challenges posed by such large-scale disasters. In this presentation, we will share our office's direct experiences in managing a recent MFI, providing insights into the operational and forensic complexities encountered and the lessons learned throughout the process at the District of Columbia's Office of the Chief Medical Examiner.

We will discuss what defines a mass disaster in our office, the critical role of activating mass disaster protocols, coordinating with Unified Command, and the immediate actions taken to ensure timely recovery, identification of decedents, and communication with families. Emphasis will be placed on the importance of interagency collaboration, with particular attention to the integration of mental health support for responders and the effective management of personnel fatigue.

Through our experience, we will highlight the use of advanced forensic identification methods, including friction ridge analysis and rapid DNA profiling, particularly in the context of vulnerable decedent populations, including youth. We will also share the operational logistics of establishing a temporary morgue, including case triage decisions and the utilization of postmortem radiography for documentation, especially when dealing with commingled remains.

A dedicated section of the presentation will focus on the types of injuries observed during the fatality, techniques used for reassimilating commingled remains, communicating with family representatives, dealing with the media, and the coordinated efforts of the Disaster Mortuary Operational Response Team (DMORT). The organized release of remains and the Medical Examiner's presence in community memorial services will also be discussed.

In addition, we will reflect on the process of death certification and forensic reporting under high-pressure conditions, stressing the importance of maintaining accuracy, organizational efficiency, and effective

communication among all team members. Our reflections aim to offer valuable insights for forensic professionals and emergency response teams engaged in similar large-scale disaster responses.
The objective of this presentation is to provide a practical perspective on managing the complex intersection of forensic science, interagency coordination, and the emotional resilience required in the aftermath of mass fatality events.

1.3 Fatalities due to Hurricane Beryl in Texas

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Hurricane Beryl was the earliest-forming category 5 hurricane on record, making landfall in Southeast Texas on July 8, 2024 with sustained winds of over 90 miles per hour, impacting multiple counties as it moved northeast, including the most populous county in the state – Harris county; and Fort Bend, Galveston, and Montgomery counties. Rainfall totals measured up to 17 inches; daytime temperatures reached a high of 97 °F; and sixteen tornadoes were generated. Due to power lines being knocked down, 2.7 million Southeast Texas residents lost power, which was not fully restored until July 20.

Forty-seven fatalities related to the storm were examined at Harris, Fort Bend, Galveston, and Montgomery counties from July 10th 2024 to January 15th 2025. Of which, 23 had a full autopsy, two had partial autopsies, 21 were externally examined, and one was a record review. Causes of death were hyperthermia/heat stroke (16), natural disease - such as cardiovascular disease (15), blunt force trauma (10), drowning (4), compression asphyxia (3), carbon monoxide and drug toxicity (2), and undetermined (1). Nine cases listed hyperthermia as a contributory cause of death. The manner of death was accident (39), natural (7) and undetermined (1). Drowning deaths included those in submerged vehicles and bayous. Deaths resulting from blunt force trauma included being struck by falling trees, and falling from ladders.

Thirty-one decedents were male, 16 were female; and the average age was 63 years (range: 5 to 110 years). Thirty-three deaths were on scene, and fourteen were hospital deaths - where the interval to death ranged from 2 minutes to 11 days.

Hyperthermia is a major preventable cause of mortality during severe storms, and global climate change will likely make these weather events more common. The prolonged loss of electrical power can lead to improper use of portable generators with carbon monoxide exposure; and severely impacting individuals with chronic medical conditions who rely on functional medical equipment and access to dialysis. There are no pathognomonic findings at autopsy for hyperthermia. Examination findings include accelerated postmortem changes, intrathoracic visceral petechial hemorrhage, and cardiovascular disease - which increases the risk of death. The most useful determining factors remain a review of the circumstances of death with a thorough scene investigation; although it is likely these deaths remain underreported.

Identification of these groups and correct classification of these deaths by medical examiners are important for public health data, targeted education, intervention, and emergency response planning.

1.4 Out of the Depths: Prompt Forensic Identification of 54 Victims After a 60-Meter Bus Plunge in Guatemala City

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On February 10, 2025, at approximately 04:00 am, a public transportation bus plunged from the bridge “Belice” located in Guatemala City, falling approximately 60 meters into a ravine through which a stream of polluted water flows. The crash site borders a densely populated settlement of low-income families who inhabit the steep slopes of the ravine. Despite the proximity, no homes were damaged. The neighbors were the first to alert authorities, enabling the activation of Guatemala’s National Response Plan, in which

the National Institute of Forensic Sciences (INACIF) is mandated to manage and identify deceased individuals.

The accident resulted in the death of 54 out of the 63 people on board. Our Human identification Mass disaster team arrived at the site at 09:00 am. The bodies had already been recovered by rescue personnel and were placed in a type of community hall that was adapted into a temporary morgue. The location presented significant logistical challenges, as the morgue was situated at the bottom of the ravine, approximately 50 meters downhill from the main road, accessible only through narrow alleys that were not suitable for vehicles. For this reason, we established the Family Assistance Center at the top of the hill. Environmental conditions were difficult—extreme heat, lack of ventilation, and a deteriorated roof at the temporary morgue. Our advantages were that the bodies were recovered intact and showed no signs of decomposition, allowing us to get effective information.

Each body was examined individually, documenting external injuries and personal belongings. Fingerprints were collected and processed through the national civil AFIS. This allowed us to directly identify 37 individuals by 5 pm and remains returned to families at the site that same day.

The other 17 bodies, including 3 minors, were transferred to the Metropolitan Morgue for further forensic analysis. Odontological evaluations to confirm age and new fingerprint comparisons—some based on presumed identities obtained through antemortem interviews—enabled full identification. All victims were identified and returned to their families by 02:00 am the following morning.

This case exemplifies the effectiveness of having a Mass disaster committee with a multidisciplinary forensic team, in which the coordinated efforts of fingerprint analysis, forensic odontology, forensic pathology, and antemortem interviews ensured the identification of all victims within 24 hours. Timely and respectful identification of the deceased provides answers to families and contributes to the restoration of dignity and the fulfillment of legal and humanitarian obligations.

2.1 Advances in Medicolegal Death Investigation Data Modernization: Interoperability, Artificial Intelligence, Data Visualization, and Other Novel Projects

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Medicolegal death investigation (MDI) offices are helping shape the future of MDI data as they participate in a variety of pilot projects resulting in cutting-edge advances in data modernization. MDI Connect is a collaborative effort of the Center for Disease Control and Prevention (CDC) Collaborating Office for Medical Examiners and Coroners (COMEC), the CDC Foundation, Georgia Tech Research Institute, the Association of State and Territorial Health Officials (ASTHO) and the medical examiner and coroner community. Through MDI Connect, MDI offices and their data sharing partners adopt, build and test MDI data standards for Fast Healthcare Interoperability Resources (FHIR). With the completion of a third round of awarded sites, eighteen MDI offices have benefitted from a decrease in errors and data entry redundancies saving time.

In some MDI Connect projects, MDI offices focus on improving access to their data for analyses and internal and public-facing dashboards. These projects allow MDI offices to transform their case management system (CMS) data into analytics, visualizations and actionable insights and are successfully demonstrating the power of MDI and mortality data to improve their communities.

Other projects supported by MDI Connect are addressing data sharing challenges unique to MDI offices, such as the ability to analyze and share toxicology laboratory results in a timely manner. Current solutions for sharing data involve pdfs, pdf scraping and creating application program interfaces (APIs) that utilize HL7 V2 (Health Level Seven Version 2) messaging or system specific, non-reusable APIs. These solutions can be costly and time consuming in a dynamic environment.

To address this barrier, MDI Connect has partnered with MDI offices to demonstrate the use of Artificial Intelligence (AI) to consume toxicology information from pdfs and report directly into the CMS. More than simply scraping and parsing the pdf, AI can discover new patterns and be trained to respond to these insights, providing auditing and provenance services in an environment where these data are mission critical for clinical, public health and legal personnel. As a result, data will become easily searchable and more accessible for analysis and sharing. Improvements include more timely reporting and enhanced data quality through reduction of manual data entry. Ultimately, the use of AI will enable streamlined tracking and auditing of data that supports collaboration across sectors including medical examiners, toxicology laboratories, public health and law enforcement.

2.3 Reimagining Autopsy Documentation using Artificial Intelligence

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Autopsy documentation of external examinations, internal findings, and traumatic injuries remains one of the most critical and time-consuming components of forensic pathology. Most forensic pathologists still rely on handwritten notes or post-procedure dictation, which is then transcribed—an inefficient process prone to delays, omissions, and inconsistency. Existing digital documentation tools, while widespread in clinical medicine, are not optimized for autopsy workflows. They lack support for hands-free input, real-time structured data capture, and autopsy-specific templates.

To address these challenges, we developed AutopsyAI, an application that enables real-time, structured autopsy documentation with embedded artificial intelligence (AI) support for generating and organizing autopsy reports. Designed for the unique constraints of the autopsy suite—including gloved hands and noisy environments—AutopsyAI aims to streamline documentation, reduce cognitive load, and promote standardization across reports.

Since its initial deployment, AutopsyAI has been used to document over 150 autopsies in multiple offices across the U.S., under the supervision of a board-certified forensic pathologist. This qualitative feedback suggests a substantial reduction in documentation time, especially during routine autopsies, as well as improved legibility and report completeness. By enabling structured digital input during or immediately after the examination, the platform helps eliminate delays associated with traditional transcription workflows.

Formal evaluation is currently underway across offices with varying case volumes, staffing models, and facility types (e.g., hospital-based vs. standalone medical examiner offices). We present early findings from initial use and outline a protocol for broader usability testing. We aim to understand how contextual variables affect adoption, efficiency, and perceived utility.

Initial feedback suggests the platform is especially beneficial in under-resourced offices and those relying on locum forensic pathologists. AutopsyAI enables same-day documentation, ensuring findings are captured immediately post-procedure—improving continuity and reducing administrative overhead.

In this presentation, we will demonstrate core platform features, share early user insights, and outline strategies for evaluating impact across diverse forensic settings. As the field of forensic pathology embraces digital transformation, tools like AutopsyAI have the potential to modernize routine workflows, support consistency in reporting, and reduce barriers to timely case closure.

2.4 Machine Learning for the Assessment of Gunshot Wounds

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With the advent of machine learning for the interpretation, and creation, of images, it is surprising that there is not much published literature on the interpretation of injuries for forensic purposes. The injuries

that lend themselves most easily to deep learning techniques are gunshot wounds since they are, at first glance, a perforation with a readily defined morphology. In reality, these perforations can differ in their shape, and features such as edge irregularity, asymmetry of a marginal abrasion, muzzle imprints and stippling can alter their interpretation. Other kinds of injuries, such as stab wounds, can also be confused with firearm injuries, e.g., some exit wounds. Tissue protruding through the injury can also confuse the evaluation of the injury by partially obscuring its edge. The images uploaded to the machine learning model are subject to other confounders, such as the sharpness of the image, which in turn depend on whether the image is in focus or blurred due to camera motion, over- or underexposure, and even if the injury is parallel to the focal plane of the camera. There are also differences in the results obtained from different convolution-based neural networks and vision transformers, often used for visual datasets. Although there seems to be good accuracy and precision in the results published so far, there are too few datasets to conclude machine learning is a valuable adjunct to gunshot wound interpretation. The data set used by Cheng et al consisted of individual, cropped gunshot injuries. To date, there is one other paper that used pictures from human injuries, another in an animal model and another using the pattern of stippling dispersed on paper. There are also references on the inter-observer variability of gunshot injury evaluation between forensic pathologists, which may affect the injuries used for training and evaluation of machine learning models. Potential uses for technology like this include quality assurance as well as challenging a report's description of injury. The theoretical background for this already exists, and forensic pathologists should at least have a passing acquaintance with the tools available to automate injury evaluation.

2.5 Artificial Intelligence and Forensics: Application of AI to the Classification of Gunshot Wounds

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Introduction: Classification of entrance versus exit gunshot wounds (GSWs) is a key aspect of postmortem examinations and subsequent medicolegal inquiry. While GSWs are easily distinguishable, a subset of atypical wounds presents diagnostic challenges. There has been growing innovation in the application of artificial intelligence (AI), particularly convolutional neural networks (CNNs), to assist clinicians in image-intensive specialties such as radiology and pathology. These AI models, trained on large datasets of labeled images, have demonstrated strong performance in image classification tasks. The purpose of this presentation is to show the utility of AI in forensic pathology, specifically for the classification of GSWs and demonstrate a prototype of a potential user interface (WoundX) where such technology could be used in the future.

Methods: We retrospectively reviewed GSW cases from 2020 to 2025 at the Jefferson County Medical Examiner's Office. Wounds with obstructing foreign objects, advanced postmortem decomposition changes, or evidence of close-range fire were systematically excluded from analysis. Standardized regions of interest containing the wounds were manually cropped and subsequently processed to a uniform dimension of 224 × 224 pixels, conforming to the standardized input tensor requirements of pre-trained CNNs. Dataset partitioning followed an 80:20 stratified random sampling protocol for training and validation cohorts, respectively, maintaining proportional representation of each wound classification. MobileNet V3 architecture was chosen for parameter efficiency and reduced computational demands, specifically targeting those amenable to deployment on mobile or edge-computing platforms.

Results: The curated image repository comprised 1,897 high-resolution wound photographs (1,265 entrances and 632 exits). Evaluation of lightweight CNN architectures revealed that MobileNet V3, employing depth-wise separable convolutions and an inverted residual structure with linear bottlenecks, demonstrated superior classification metrics with an accuracy of 0.89, precision of 0.87 and area-under-the-receiver-operating-characteristic curve (AUC-ROC) of 0.91 after just ten epochs of training with a batch size of 32 and learning rate of 0.001. The statistical significance and forensic application of these performance metrics will be explained and demonstrated through the user interface (WoundX) specifically designed for the study.

Discussion: Our findings align with prior studies that have demonstrated the feasibility of using AI to interpret characteristics of GSWs. We additionally show that lightweight CNNs like MobileNet V3 can achieve reliable classification performance. Although the use of AI in forensic pathology remains in its early stages, its potential utility is promising. This presentation will also address key challenges and ethical considerations in developing and implementing AI models in medicolegal casework.

2.6 The Fox Hollow Murders

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In April 1996, investigators began unearthing a nightmare beneath the quiet woods of Fox Hollow Farm. The property, owned by suspected serial killer Herb Baumeister, held thousands of bone fragments belonging to multiple victims—remains that had been scattered, burned, and weathered for decades.

In October 2022, prompted by a phone call from a possible relative of a potential victim, Hamilton County Coroner Chief Deputy Jeff Jellison reopened the case vowing to identify the victims. Elected Coroner the following month, he began assembling a team after taking office in 2023 that could select, test, process and identify remains in an orderly fashion; a coalition of medical examiners, law enforcement, and private and state laboratories,

This session pulls back the curtain on how agencies collaborated to triage and prioritize skeletal fragments, integrate family reference samples, and maintain the integrity of evidence as it moved across jurisdictions. Attendees will gain practical strategies for structuring agreements, obtaining funding, preserving chain-of-custody, and ensuring transparency with both investigative partners and grieving families.

Fox Hollow Farm is more than a case study—it's a blueprint for how to navigate the scientific, logistical, and emotional weight of large-scale identifications. Participants will leave with lessons they can adapt to their own labs when cases cross agency, state, or even national boundaries.

3.1 Small Uncrewed Aircraft Systems (sUAS): The Innovation of Drone Technology into the Medical Examiner System of Medicolegal Death Scene Investigations, and Human/Skeletal Remains Searches and Recovery

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Introduction: The United States national airspace system defines an sUAS as a small uncrewed aircraft system, including its communication and control components. These systems, also known as drones, are less than 55 lbs. and can be operated by a remote pilot. With the rapid changes in advanced technology, the Oklahoma Office of the Chief Medical Examiner (OCME) implemented a Drone Program in 2020. The Innovation of the program was to utilize drones in collecting aerial data of medicolegal death scenes, and examine the impact, benefits, and limitations of scenes.

Methods: Data collection began in 2021 using 2 separate sUAS that were equipped with photographic and videographic payloads capable of producing advanced imagery including thermal options. The sUAS was operated by an FAA certificated Part 107 pilot, and when deemed necessary, utilizing the LAANC (Low Altitude Authorization and Notification Capability), and COA (Certificate of Authorization) Waiver awarded to the OCME by the FAA (Federal Aviation Administration). Collected data was processed using a Comprehensive Drone Management Platform, as well as Next Generation Photogrammetry Software to transform the data into 2D and 3D digital evidence. Encrypted live streaming was also utilized in certain scenarios providing a first-person view from scene-to-appropriate personnel.

Results/Discussion: In 2023 the Innovation of the OCME Drone Program was found to be advantageous, principally for documentation purposes including recording of GPS coordinates, and measurements at centimeter accuracy. This furnished investigators a unique overview of their death scenes to identify crucial evidentiary parts, and helped make preliminary determinations. In most cases the data aided forensic pathologists and anthropologists with a clearer understanding of what transpired, ultimately strengthening their supporting evidence of a cause and manner of death. Drones were deployed in various all-weather scenes but were not limited to the following: motor vehicle and aircraft accidents, water related deaths, structural/non-structural fires, weather related deaths, skeletal remains, dismembered bodies, clandestine graves, explosions, areas with hazardous materials, and scenes in austere conditions prior to a specialized recovery of decedent. Advantages were not only in the form of documentation but saved time and increased overall safety. It also allowed for assessment of scenes without disturbance to them, including searches for key evidence, missing persons, and skeletal remains in multi-faceted areas with use of a laser range finder, recording of air and surface temperatures, and use of thermal imaging with spotlight during night operations. In final, the OCME Forensic Air Unit was officially established.

3.2 Synoptic Autopsy Reporting: A Response to the Opioid Crisis

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To optimize data mining, particularly to meet the demands of the opioid crisis amidst a national shortage of forensic pathologists, the authors aimed to create a synoptic autopsy reporting system within the office's web-based case management system (CMS). The Medical Examiner's Office at Western Michigan University Homer Stryker M.D. School of Medicine, funded by the CDC Foundation's "Medicolegal Death Investigation Novel Data Modernization Initiatives", partnered with the CMS development team to formulate a thorough yet user-friendly synoptic reporting function within the currently existing software. Overarching goals include the ability to generate fully minable data to improve the consistency and timeliness of data sharing to public health partners, specifically those focused on harm reduction and prevention. The authors also aimed to streamline data entry and reduce time spent by the forensic pathologist composing the final autopsy report.

Headings and comprehensive dropdown menus were assembled from a robust vocabulary aggregated from forensic pathologists and related textbooks. In-house testing lasted 10 months and involved progressively increasing the number of users and case types eligible for inclusion within the staging site. The focus group phase amid in-house testing demonstrated that the initial version was far too extensive for intuitive use, causing it to be unwieldy and overwhelming. Reference guides were crafted to help our team of forensic pathologists and forensic autopsy technicians navigate the menus and reduce the burdensome learning curve.

Feedback from our team of forensic pathologists was mixed, with some finding utility for certain case types or with certain portions of the system, and some stating they would be unlikely to use this form of report-writing tool long-term. All participants acknowledged a learning curve.

Pilot testing with collaborating offices across the country has been initiated. Feedback from collaborators will be used to refine the synoptic autopsy reporting interface in hopes of smooth, widespread implementation of this tool for enhanced information exchange supported by the CMS.

3.3 Development of a Digital Whole Slide Image Database as a Learning Tool for Forensic Histopathology

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Gross and histologic examinations are the twin pillars of a thorough pathologic evaluation. Forensic pathologists are frequently masters of the gross examination, with the majority of diagnoses being made at the autopsy table. Although it is not an imperative aspect of every autopsy, histology remains a critical, ancillary expertise available to the forensic pathologist. Histology is a vital component of a resident's

autopsy education. Autopsy histology is inherently different from the histology of surgical pathology, with distinct samples, different diagnostic questions, and unique challenges—including distinguishing autolysis and postmortem changes from bona fide histopathology. Despite the importance of learning autopsy histology, academic resources on the topic are extremely limited. Those that do exist are rarely updated and frequently approach the instruction of histology by printing single image files in textbooks. This strategy is valuable but does not adequately simulate the physical practice of microscopy. With the advances of digital pathology, the creation of a database of autopsy histology slides as a powerful educational tool has become a possibility.

In order to improve the instruction of autopsy histology, we have employed a Philips Digital Pathology System to create a database of over 70 annotated whole slide images from over 50 forensic cases, representing topics that range from common to rare. Our goal is to improve the experience and skills of pathology trainees at our institution during their autopsy rotations. We have started to apply this resource in our resident autopsy rotation and are beginning to assess the validity of the resource via pre- and post-database utilization quizzes. Our team is concentrating on assessing diagnostic success rate and correct identification of histologic findings. We are also investigating overall effects on resident experience, confidence in autopsy histologic diagnostic ability, and on their sense of board and career preparedness. Our project is in the early implementation phase. Volunteers from our residency program are taking the pre-quiz and performing a self-guided review of each case in the database. Next, they will take a post-quiz. Among residents actively rotating on autopsy service, the resource's success will be further evaluated each month. Scores will be compared and analyzed to assess improvement. We expect diagnostic success— as well as resident confidence in overall ability and preparedness— to improve. This tool will exist as a living resource for our institution, able to be expanded and improved. Ultimately, the goal will become database publication for interdisciplinary contribution and use.

3.4 Future Forensics: When Man and Machine Merge

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Humankind has for centuries looked to supplement, replace, and beautify bodily parts and functions, ranging from external "wearables" to transplants and, more recently, implants. The earlier steady progress from external devices (e.g., spectacles) to modern electronic devices (e.g., cochlear/retinal implants) has now become a flat race with more than 100,000 "med tech" companies and agencies competing - but also complementing each other in the unstoppable march to the "singularity" predicted by Ray Kurzweil in 2005.

The almost exponential advance towards integration on both the physical and functional level (e.g., "neural lace" and nanorobotics) now necessitates a far more critical and participative approach from lawmakers, ethicists and, indeed, medical professionals who inevitably are (or will be) at the interface (coal face!) of these endeavors. The question arises whether forensic pathologists and death investigators are paying attention to these developments and, more particularly, contemplating the impact that such technologies may have in our professional environment.

This presentation seeks to provide a brief introductory and "targeted" overview of these matters from the perspective of the forensic pathologist - and will begin to explore the need for understanding and evaluating medical devices such as "piggyback hearts" and ventricular assistive devices, cardiac patches, transistor implants, "nanobots" and nanopumps for drug delivery, and electroplastics embedded within tissues. Will our conventional training in histology/pathology be sufficient to investigate and diagnose pathophysiological and morphological derangements in these "everyday cyborgs" of the (near) future? Or should we be taking a more active approach towards incorporating elements of the emerging field of "device pathology" and diagnostic applications of BMI (body machine interface) technologies in our training programs?

Lastly, the potential for utilizing readily available "cloud" data (derived from wearables and implants) in diagnosing the cause and mechanism of death, and clarifying aspects around the external circumstance of death presents huge opportunities – but will probably only be realized if we (or at least, trainee and younger forensic pathologists) actively begin to engage and direct such possible applications in our field

- having regard also for the multiple practical, legal, and ethical challenges. This will be - or is - is the world of innovative, cutting-edge, and future forensics!

3.5 Spatial Computing in Forensic Pathology
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Computing headsets have made meaningful technological advancements in size-to-weight ratios, on-board computing power, and peripheral hardware and software integration. Improvements in these areas have lowered the threshold necessary for incorporation of these devices into everyday use within professional settings.

As forensic pathologists, work is centered on the physical performance of postmortem examinations but often involves the adjunct manipulation of physical interfaces to document findings, review and relay results, and integrate data in the development of a cause of death. Spatial computing takes place within a virtual environment but is perceived by the user—or virtual participant—as taking place in reality. While augmented reality, virtual reality, and mixed reality are terms encompassed within this framework, wearable computing headsets capable of spatial computing allow users to manipulate virtual features, decreasing reliance on physical interfaces. Through the adoption of such devices, forensic pathologists can streamline workflows and meaningfully change how they interact with students, trainees, medicolegal authorities, and others.

In this presentation, attendees will learn about the various methods in which spatial computing can be used within the everyday practice of forensic pathology, with particular emphasis on augmentation of autopsy procedure, formal and information education, and client interaction.

3.6 From Scalpel to Stylus: Implementing a Paperless Workflow in a Forensic Pathology Office Using iPads and Lean Process Improvement
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Introduction: Modernizing forensic workflows by eliminating paper-based processes can streamline operations, improve documentation accuracy, and reduce administrative burden. This project describes the design and implementation of a paperless system at a midsized medical examiner's office, guided by Lean Six Sigma methodology and real-time user testing.

Methods: The implementation began with formal Lean Six Sigma Yellow Belt certification to understand workflow mapping and waste reduction. A detailed process audit followed, with the lead physician working side-by-side with autopsy technicians for three days, from early setup through evisceration of a case for another physician, documentation, and cleanup. Paper-reliant steps were identified across each stage. Software and hardware selections followed extensive user-focused research. *GoodNotes* was selected as the primary annotation tool due to its cost-effectiveness and functionality. The office chose the iPad 10th generation—despite Apple's talent for confusing product names—and paired it with water resistant cases and USB-C Apple Pencils, which can be used while charging.

Results: A phased rollout began with technician testing on simulated cases, followed by live case trials. Early enthusiasm led to rapid adoption. Technicians leveraged iPads in novel ways, including photographing physical documents and uploading directly into the case management system. In several cases, the iPad was used exclusively for external exam documentation, including photography. All six office physicians, including a part-time locum pathologist and staff ranging in age from their 30s to 70s, now actively use iPads for external examinations, body diagrams, and injury documentation. Paper output decreased from 12–14 sheets per case to just 1–2, with weekly scanning reduced from 4–6 hours to near zero. Multicolor diagramming and seamless annotation further improved data quality and clarity.

Discussion: Transitioning to a digital documentation process in a forensic pathology setting is not only feasible, but embraced across all age groups and comfort levels with technology. As Dr. Michael Henniger,

one of our most senior pathologists, put it: “When I first was introduced to the iPads I found them extremely intimidating because I did not grow up with this technology—but after two weeks, I had a solid command of the iPad. And if I CAN DO THIS, ANYONE CAN!”

3.7 Robots, Death, and Forensic Pathology

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A “robot” is a machine that is able to replicate certain human functions. Drones can be considered to be flying robots. Robots are becoming more commonplace in crime investigations. We present several cases where robots were used to either secure the scene or neutralize violent suspects.

Case 1 – A badly-injured older man’s body was found in his rural back yard. A suicide note was found in his home, indicating that he was going to kill himself with explosives. The man was known to express antigovernment sentiments in the past. Law enforcement deployed a robot to ensure that the body and surroundings did not pose a threat to responding officers or death investigators.

Case 2 – A man called 911, making statements suggesting that his wife had been shot. He answered the door wielding a gun, and a stand-off ensued. “Tear-gas” canisters were discharged into the home, with no response. During the hours-long stand-off, a drone was employed to surveil the entire scene from the air. Eventually, a smaller drone was used to fly into the home through a broken window and visualize the man with a lethal self-inflicted gunshot wound.

Case 3 – A man became involved in a stand-off with police, when he barricaded himself in his apartment. Shots were exchanged and he retreated into his bathroom. The SWAT team responded and deployed a robot into the bathroom, where it appeared that the man was either dead or feigning death in the bathtub. The robot was then used to grasp the suspect’s handgun, when the firearm inadvertently discharged, possibly into the suspect.

Case 4 –After a suspect opened fire and killed several police officers in an urban environment, responding officers tracked him to and “cornered” him within an office building, at which time a stand-off ensued. After numerous attempts at de-escalation, a decision was made to arm a robot with C4 explosives and position the robot near a wall, the opposite side of which was near the suspect. Detonation of the explosives resulted in the death of the suspect.

Robots are becoming more common within the forensic sciences and law enforcement arenas. As such, it is likely that forensic pathologists and medicolegal death investigators will eventually encounter deaths where robots/drones play a role in injury or in the evaluation and/or security of crime scenes. The cases presented serve to highlight some of the important issues accompanying such death investigations.

3.8 Fiberoptic Technology at Autopsy

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Incorporation of minimally invasive technologies at autopsy can provide valuable information for confirming a cause of death. Such technology may be especially useful in situations where the performance of a complete autopsy is not possible, either for workforce/caseload reasons or when families

object to autopsy. Fiberoptic devices, such as medical endoscopes or digital otoscopic endoscopes, may be used to visualize the upper airway, the upper gastrointestinal tract, or other bodily structures. We present multiple cases where the use of fiberoptic devices has allowed for confident cause of death rulings without performing a full autopsy.

Case 1 - A 43-year-old male was found deceased at home after reportedly choking on pizza. The man was a quadriplegic following a traumatic brain injury sustained four years previously. Fiberoptic endoscopic visualization of the posterior oropharynx using a digital otoscope revealed a food bolus, confirming a fatal accidental choking event.

Case 2 – A 76-year-old man was found dead in his residence after a housefire. There was extensive fire damage in the home, and the fire was considered accidental. The decedent's clothing and exposed skin were covered with soot. No external evidence of injury was identified other than rare superficial burns. Full body radiographs were negative for injury. Examination of the internal airway using a digital otoscope device revealed the presence of soot within the larynx and trachea. A partial dissection of the airways confirmed this finding. The postmortem blood carbon monoxide level was elevated. The cause of death was smoke and soot inhalation.

Case 3 – A previously healthy 68-year-old man was found dead in his residence in mid-December. He had not been seen in weeks. The house was extraordinarily messy, with a "hoarder" appearance, and there was no operating heat or electricity. The body was found on top of debris, with piles of other items surrounding him. The outdoor temperatures had been very cold during the previous few weeks. An external examination was performed, along with endoscopic visualization of the gastric mucosa, which demonstrated numerous Wischnewski spots. The cause of death was "hypothermia."

These cases highlight the application of fiberoptic endoscopy as an alternative or complimentary technology for autopsy in select cases. Under circumstances where a full autopsy examination may not be possible, this approach offers another option for acquiring the evidence necessary to determine a cause of death. Ideally, fiberoptic endoscopy devices that provide photography ability best positions forensic pathologists for optimal documentation.

3.9 Phosphatidylethanol (PEth) as a Postmortem Blood Test for Chronic/Recent Alcohol Use

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Medical examiners are familiar with deaths apparently caused by heavy and chronic alcohol use (e.g., reported social history, containers at scene investigation, and/or hepatic cirrhosis or steatosis as the most compelling autopsy finding), but where alcohol is absent on toxicological analysis. These cases may present several challenges for the ME/C investigating the cause of death.

ME/C investigations utilize social history, medical records review, scene investigation and interviews to elicit patterns, volume and frequency of alcohol consumption. However, social histories are often unreliable, recent abstinence may have occurred, and the decedent may have hidden the extent of their alcohol use. Scene indicators may be equivocal or absent. Autopsy findings alone can suggest chronic alcohol use, but there are many diverse etiologies of steatosis and cirrhosis other than alcohol. A lack of objective and specific evidence of chronic alcohol use calls the diagnosis into question for forensic pathologists, families, and other stakeholders.

Phosphatidylethanol (PEth) is a direct alcohol biomarker which may be detectable in blood up to 4 to 5 weeks after heavy alcohol consumption. It is used as a clinical laboratory test for verifying abstinence in potential liver transplant recipients. Molecularly, PEth refers to a group of phospholipids that form on the surface of red blood cells when ethanol is present in the blood. PEth concentrations reflect recent alcohol use, generally correlating with the quantity and frequency of ingestions occurring during the previous 2 weeks.

PEth may be well-suited for use in postmortem investigations to assess recent alcohol use due to previously established interpretive criteria and stability studies in the living, as well as the specimen type (whole blood in a gray top tube).

We conducted a series of experiments and studies examining PEth as a practical postmortem toxicology test for ME/C investigations. Our stability studies prove PEth is reliably detected in postmortem samples. Postmortem redistribution, postmortem – antemortem correlations and sensitivity and specificity studies are discussed. Application of PEth to varied ME/C investigations is discussed, along with interpretive criteria and limitations.

3.10 Time and Distance in Death investigation: Cryptogenic Cause and Manner of death: Two Cases and a Literature Review

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Excellence in medicolegal death investigation requires trained professional investigators and a multidisciplinary team approach. One of the most challenging aspects of death certification is assigning the proximate cause of death. With the difficulty increases with significant temporal delay between the initiating event and ultimate death. This process is further complicated when the immediate cause of death is not clearly directly related to the original initiating event – when there is a physiologic distance between the earlier trauma and the ultimate cause of death. In some instances, the relation of the ultimate terminal mechanism may not be obviously linked to a prior event.

Delayed homicides – occurring weeks, months, and even years following the initiating trauma – are commonly encountered by the forensic setting. Less familiar may be delayed deaths traceable to an earlier trauma, such a long prior motor vehicle collision with sequela directly relatable back to the initial crash. Even more challenging would be such an event subsequently presenting with a supervening new but related mechanism but ultimately linkable to the older trauma (for example a drug overdose linked to chronic pain following the initiating collision). In this latter case, the linkage and relative contribution of the various elements may be debatable and establishing a consensus opinion regarding cause and manner may prove challenging.

Motor vehicle collisions (MVCs) regularly cause serious trauma and death. The National Highway Traffic Safety Administration (NHTSA), documents over 39,000 United States traffic fatalities in 2023. In most cases, the cause is straight-forward and some variant of blunt force injury, although other mechanisms can be encountered, such as various types of asphyxia and the like. MVC-induced trauma can be a contributing factor to death years after the initial event. Two cases of initially cryptogenic causes of death eventually linked to prior MVC-induced trauma are presented. Case 1 presented as a 70-year-old male sudden death at home. At autopsy, a left chylothorax was eventually linked to two prior MVCs with (4 and 5 years before death). Case 2 involves a 45-year-old female suspected drug overdose. An unsuspected finding at autopsy was hepatocolic transdiaphragmatic subtotal herniation. Records review documented a remote history of an MVC (some 25 years earlier).

These cases and the accompanying literature review highlight how initially forgotten trauma can be an important consideration in determining the correct cause and manner of death.

4.1 A Practical Approach to the Utilization of Forensic Pathologists' Assistants at the DeKalb County Medical Examiner's Office

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"It is strange that pathologists have tolerated this situation for so long. In every other discipline a cadre of well-trained individuals has been developed to assist the physician." These words were written in an article published about the emerging pathologists' assistant profession in September of 1975 by Dr. Thomas

Kinney, the founder of the first pathologists' assistant training program at Duke University. Now, 50 years later, this statement still holds true. In the modern age, the role of the pathologists' assistant in medical examiner and coroner (ME/C) offices is an ever-evolving discussion focused on alleviating the prominent workforce shortage within forensic pathology.

The DeKalb County Medical Examiner's Office (DCMEO) is the first office in Georgia to utilize pathologists' assistants (PAs) in the forensic setting. The role and implementation of PAs varies widely between ME offices across the country. At the DCMEO, their utilization is interdisciplinary and includes many responsibilities beyond their main obligation of assisting with medicolegal autopsies. Approximately 50% of their time is spent on various other administrative, managerial, and educational responsibilities within the office which contributes to our innovative and education-centric environment. These additional responsibilities have greatly alleviated physician administrative burdens.

Much like many other specialties that utilize physician extenders, the PAs work closely alongside the forensic pathologists. There must be mutual trust as well as proper policies, procedures, and expectations in place, which the DCMEO has developed over time in accordance with the needs of the office. This includes an office-specific Statement of Policy, Procedure, and Practice which was submitted as official policy for review during the most recent successful NAME accreditation cycle of the DCMEO.

This presentation intends to highlight the innovative usage of PAs at the DCMEO, and present to the audience feasible applications for utilizing and incorporating these highly trained midlevel providers in their own workforce. Carefully understanding the benefits of incorporating PAs in the medicolegal setting will help ME/C offices enhance the physician experience, alleviate high physician workload, and supplement existing initiatives to combat the forensic pathologist workforce shortage, much like how all medical specialties have adopted the modern physician extender.

4.2 A Tale of Incompetency

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Factitious Disorder Imposed on Another (FDIA), formerly known as Munchausen Syndrome by Proxy, represents a covert and often lethal form of child abuse characterized by the deliberate production or falsification of symptoms by a caregiver. This case series details the deaths of three previously healthy female siblings over a two-year period, all under the exclusive care of their mother at the time of unexplained medical episodes or death. Despite repeated hospitalizations and extensive evaluations yielding inconclusive results, each episode was initially attributed to natural or rare causes, including hepatic failure, agenesis of cardiac conduction structures, and sudden cardiac death. Inconsistencies in the mother's accounts, her defensive demeanor, fabricated personal and medical histories, and her persistent presence during critical episodes raised concerns that were not adequately addressed by healthcare providers or investigators. A subsequent multidisciplinary re-evaluation revealed a striking pattern of suspicious circumstances surrounding each death, further compounded by failures in scene investigation, autopsy protocols, and inter-agency communication. The mother was initially convicted of the murders of all three children, as well as the attempted murder of the eldest child prior to that child's eventual death. A second series of trials following the initial convictions is pending. This case underscores the critical need to consider FDIA in instances of recurrent, unexplained pediatric deaths and highlights the essential role of comprehensive forensic investigation, careful clinical vigilance, and substantial law enforcement involvement. Failure to recognize and act on early warning signs can result in repeated fatalities, as tragically illustrated in this case.

4.3 Strengths and Challenges in Autopsy Training for Pathology Residents: A Survey of Forensic Pathology Fellows – Follow-up to a Survey of Autopsy Directors

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Training in autopsy pathology is an important experience for pathology residents, serving as a foundation for normal histology and pathology as well as introducing trainees to a possible future in autopsy and/or forensic pathology. A prior survey of autopsy directors found that low trainee and faculty engagement and reduced case requirements by the Accreditation Council for Graduate Medical Education contributed to significant challenges in autopsy training. Building on this, a voluntary survey of the 2024 to 2025 forensic pathology fellow cohort was performed to identify strengths and weaknesses of their autopsy education during residency and whether this impacted their choice of forensic pathology fellowship.

Twenty-five fellows responded to the survey, of which 11 reported choosing to pursue forensic pathology prior to medical school, five during medical school, and nine fellows during residency. Of these nine, seven decided after their residency autopsy rotation. The number of both hospital and forensic autopsy cases performed during residency varied considerably (0 to > 90 hospital cases, 0 to >40 forensic cases), and six respondents performed more forensic than hospital autopsies during residency.

Trainee supervision included attending pathologists, pathologist assistants, other residents or fellows, autopsy technicians, and fellows. Attending pathologist backgrounds included 44% surgical pathologists, 28% dedicated autopsy pathologists, and 28% mixed surgical and autopsy pathologists. Of the dedicated autopsy pathology staff, backgrounds included surgical pathologists with an interest in autopsy, forensic pathologists, neuropathologists, and/or pediatric pathologists.

Teaching at the time of autopsy was the most common method of autopsy instruction (92%) and the method perceived as most valuable (68%), followed by teaching at the microscope (76% and 16%, respectively). Although a majority reported specific education on generating clinicopathologic correlations (84%), jurisdiction (76%), prosection (68%), and evisceration (64%), only 40% reported specific education on death certification (40%). The level of support and enthusiasm of others (attending pathologists, autopsy technicians, and program leadership) were the most frequently cited positive or negative contributors to autopsy education: dedicated and engaged autopsy technicians (78%) and attendings (64%) were the most common positive factors, while lack of engagement of faculty (32%) or support by leadership (28%) were the most common negative factors.

Voluntary follow-up surveys upon graduation (phase two) and one year after graduation (phase three) will seek to establish how well their autopsy resident education prepared them for forensic pathology fellowship, and how well their forensic pathology fellowship prepared them for post-graduation practice.

4.4 Addressing the Forensic Pathology Shortage in the United States: Empowering International Forensic Pathologists to Bridge the Gap: A Perspective from the NAME Visa Applicant Advisory Committee

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Forensic pathology was officially recognized as a subspecialty of pathology by the American Board of Pathology in 1959. To specialize in forensic pathology, a pathologist must first complete general pathology training followed by a forensic pathology fellowship.

Outside the U.S., forensic pathology may be considered a distinct specialty, requiring a dedicated residency program in legal medicine or forensic pathology. Foreign medical graduates are fully trained in their home countries but must become board certified to practice in the U.S. This process involves completing a U.S. pathology residency—at a minimum, anatomic pathology—followed by a forensic pathology fellowship, totaling at least four additional years of training.

Even after completing this pathway, many physicians are on a J-1 visa, which comes with the “two-year home residency requirement” (*Section 212(e)*). This rule mandates that individuals on a J-1 visa return to their home country for two years before they are eligible to apply for permanent residency, change visa status, or work in the U.S. To address this, applicants must either fulfill the two-year requirement or obtain a J-1 visa waiver: this process is lengthy, challenging, and costly. Once a J-1 waiver is secured, the applicant can change their status to an H-1B visa (“*Specialty Occupations*”) and must work for the sponsoring office for three years, after which the “two-year rule” no longer applies. The H-1B visa can be renewed for up to six years, after which applicants must pursue alternative options to remain in the U.S. The most common pathway is to obtain a Green Card through one of several employment-based categories.

This workshop is intended for international medical graduates and pathologists interested in pursuing a career in forensic pathology in the U.S., fellowship program directors, as well as for Chief Medical Examiners and Coroners who wish to better understand the complex immigration regulations to facilitate hiring foreign medical graduates.

The presenters serve on the NAME Visa Applicant Advisory Committee and are personally engaged in visa application processes. They will provide detailed information on the Educational Commission for Foreign Medical Graduates process for residency and fellowship applications, the J-1 visa, J-1 visa waiver, H-1B visa, and common Green Card options (EB-1A, EB-1B, EB-2, NIW). They will also highlight lesser-known alternatives such as the O-1 visa. This workshop aims to offer practical information and solutions to help integrate trained forensic pathologists into the U.S. workforce in response to the critical shortage.

4.5 Forensic Pathology for the Ages: Tarrant County Medical Examiner's Office's Approach to Introducing Forensics from Grade School to Grandparents

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Forensic pathology is rarely, if ever, mentioned in grade school as “what I want to be when I grow up.” Even among medical students, awareness of forensic pathology as a subspecialty of pathology is limited, and those who are aware may not understand its scope and all that it entails. With the ever-increasing need for forensic pathologists, prioritizing efforts to attract future professionals is imperative.

Tarrant County Medical Examiner’s Office (TCME) has expanded its efforts to foster interest in forensic science among future professionals not only aspiring physicians, but also individuals pursing other forensic science careers. A multifaceted approach has become popular with the local (and not so local) community. TCME seeks out opportunities to visit local grade schools for career days, hosting high school and college forensic science classes for career information and facility tours, and attends high school and college career fairs. TCME also offers internship programs to meet the graduation requirements for college students earning a Forensic Science concentration or degree. A day of shadowing and one-month rotations are available for medical students and residents of any specialty, occasionally resulting in a switch to a career in pathology. The office has also gone into the community to meet at senior centers to explain the purpose of the office and what to expect if a loved one dies.

The outreach TCME has instituted can easily be applied to most offices throughout the United States. This effort can increase the interest in forensic pathology and other forensic science positions. Early exposure and education should result in more higher quality applicants to fill future needs in our offices.

4.6 Educational Outreach in Forensic Pathology: A Framework for Strategic Social Media Use and Policy Development in ME/C Offices

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As the role of medical examiner and coroner (ME/C) offices expands to include public education and community engagement, social media offers a well-documented opportunity to increase exposure to forensic pathology and strengthen community partnerships. In the ongoing effort to address the workforce shortage, social media engagement also serves as a potentially powerful tool for workforce development by cultivating diverse talent and sparking interest in the field among students and trainees across generations. However, the field currently lacks clear guidance on professional, ethical social media use in forensic pathology.

In 2015, Kind proposed professional guidelines for social media use in medicine, citing critical discussion points from the American Medical Association, American College of Physicians, and the Federation of State Medical Boards. Since then, the exploration of social media in both medicine and pathology has continued to grow in the academic literature, extending more recently into autopsy and forensic pathology.

This presentation offers a practical framework for ME/C offices interested in launching educational outreach initiatives and developing social media policies. Topics covered will include platform selection, content strategy, case de-identification, audience engagement, professional collaboration, ethical considerations, and metrics for analyzing impact.

With over 5.2 billion people—approximately 64% of the world's population—currently using social media, it is critical to engage in this important conversation as an academic community of medicolegal professionals. In doing so, ME/C offices can be empowered with resources to help shape the digital narrative, maximize their organization's impact, and ensure alignment with the future generations of physicians who continue to intertwine social media into their daily personal and professional lives.

4.7 Enhancing Public Understanding: The Establishment of a Public Education Specialist Position at DeKalb County's Medical Examiner's Office

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This presentation will focus on the establishment of a newly created, innovative Public Education Specialist position at the DeKalb County Medical Examiner's Office (DCMEO). This role was created to enhance community outreach and understanding of Georgia's ME/C system.
The Public Education Specialist (PES) serves as a community and partnership liaison, disseminating information about DCMEO's operations, education initiatives, and the importance of the ME/C system to the public. As a result, there is a greater level of transparency and trust between our office and the community.

As part of the outreach process, it is a key objective to communicate overlooked behind-the-scenes projects to enhance awareness of public health trends and issues, increase engagement, collect information, and provide available resources and services to those in need. Additionally, engaging with the community can encourage collaboration with law enforcement, health organizations and other agencies. This can lead to more effective investigations, partnership opportunities, and a healthier, better-informed public. Engaging in prevention activities and events equips the community with the skills and confidence to make the right decisions and take action in critical situations, ultimately contributing to a safer environment.

Taking part in career-oriented events from elementary schools to higher education is essential for combating the physician shortage and recruiting ME/C professionals. As a result of speaking with students, we are able to educate them about career opportunities within our field that they were not aware of beforehand. The PES works in conjunction with DCMEO's thriving educational program, as additional support for rotating pathology residents, medical students, and interns.

The creation of the PES position ensures our mission is understood and supported. This presentation will highlight how your office can implement similar initiatives

5.1 Prison 101: Conversation with a Correctional Medicine Physician on Deaths in Carceral Facilities

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People who die while deprived of liberty are among those in greatest need of a medical examiner to speak for them. In the words of Linda Franks, medical examiner investigation of the incarcerated “is absolutely essential for the continuation of our civilization, our civilized living together with one another.” 4 in 5 deaths in custody occur in a custodial facility (jail, prison, detention facility). These cases frequently call for thorough if not exhaustive investigation, and can be complicated, difficult, and time consuming for the ME. Accurate analysis requires an understanding of the custodial setting, but put simply, jails and prisons are unusual, often idiosyncratic venues that most physicians do not understand because they have not been given training or experience in understanding them.

Additionally, while MEs know how their determinations of cause and manner of death are used/misused by the legal system (prosecutions and trials), most are less familiar with how these determinations are used/misused internally by correctional systems. In the absence of such understanding, MEs may miss seeking key data or face difficulty obtaining them.

This presentation aims to familiarize MEs with elements of correctional operations that can be helpful in identifying, obtaining, and analyzing data useful for investigation of deaths during incarceration. These include, for example: the heterogeneity of correctional facilities; how health care is delivered and by whom; and potential data sources within the facility, e.g., x-ray body scans, radar-based vital sign monitoring logs, urine and blood tests, custody logs, custody-generated and medical staff-generated health records, and video logs. A second goal is to familiarize MEs with how custodial facilities analyze deaths in parallel to the ME/coroner system, and the role ME reports play in such analysis.

The format of this presentation represents a collaboration between the fields of forensic pathology and carceral medicine. The primary presenter is a correctional health care physician with extensive experience evaluating deaths in jails, prisons, and ICE detention facilities. The on-stage “interviewer” is a forensic pathologist and NAME fellow. The session will include snippets of lecture, case presentations, and interview-style questions to maximize educational value for the audience.

5.2 An Evolving Novel Synthetic Opioid Drug Market with Impacts on Medicolegal Death Investigations and Forensic Toxicology Interpretation

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Novel synthetic opioids (NSO) are a subclassification of novel psychoactive substances (NPS) with high public health significance due to their involvements in adverse events and death. The trajectory of NSOs changed in 2018 with the DEA’s class-wide control of fentanyl analogues. A new structural class emerged, termed the nitazene analogues after prototype etonitazene. In subsequent years, new nitazene analogues (e.g., isotonitazene, metonitazene, N-pyrrolidino etonitazene, N-pyrrolidino protonitazene) emerged, triggering research efforts to evaluate them and their potential harms.

To better understand NSO and NPS markets, our laboratories are collaborating with medical examiners, coroners, and public health departments to comprehensively test drug materials and toxicology specimens. At the Center for Forensic Science Research and Education (CFSRE), postmortem blood specimens are subjected to qualitative drug testing by liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QTOF-MS) and quantitative analysis by liquid chromatography tandem quadrupole mass spectrometry (LC-QQQ-MS). Novel methods are continually updated to include the latest emerging drugs in fatal and non-fatal overdoses.
Most fentanyl analogues disappeared from casework following domestic and international control efforts; however, some remained (e.g., carfentanil) while others have emerged (e.g., *para*-fluorofentanyl [pFF], *ortho*-methylfentanyl [oMF]). A large increase in fentanyl analogue detections was noted in our data from

2022 (n=444) to 2023 (n=1,360), largely driven by pFF; however, there was a leveling off in 2024 (n=1,448), following oMF emergence and pFF displacement. pFF and oMF exhibit potencies similar to fentanyl itself and in more than 80% of cases were found alongside fentanyl.

Since the appearance of the first nitazene analogue in 2018 (isotonitazene), the emergence of at least 16 additional drugs in this structural subclass have been reported. Potencies vary greatly, with some more similar to morphine, while others are 25+ times more potent than fentanyl. In contrast to fentanyl analogues, a large increase in nitazene analogue detections was noted from 2023 (n=126) to 2024 (n=435). Individual drug scheduling efforts have nearly eliminated some nitazene analogues from the supply, while others (e.g., metonitazene) have continued to proliferate after control. Nitazene analogues were less frequently found alongside fentanyl (55%) and were more commonly co-reported with NPS benzodiazepines (62%).

NSOs remain of high public health concern, especially those with higher potency than fentanyl. Toxicology testing for nitazene and fentanyl analogues in death investigations should be pursued, even in the presence of fentanyl to appropriately explain the cause of death. Case history and autopsy findings will be included in this presentation.

5.3 Truth, Trauma, and the Death Certificate: Overdose Deaths, Postconviction Amendments, and Implications for Missing and Murdered Indigenous People and Indian Country

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Washington State House Bill 1478 (2025–26) proposes allowing families to request amendments to the manner of death listed on a loved one’s death certificate following a conviction for controlled substance homicide. While intended to provide justice and closure, such legislation raises complex medicolegal and ethical questions: Who determines the "truth" of a death? What role should forensic pathologists play when legal outcomes or family narratives challenge certified findings? These questions become especially urgent in underserved communities, including Indian Country, where overdose and violent deaths are frequently under-investigated or misclassified due to jurisdictional complexity and resource disparities.

This presentation examines the implications of post-conviction amendments to death certificates through the lens of the Missing and Murdered Indigenous Persons (MMIP) crisis and the broader pattern of premature deaths among American Indian and Alaska Native (AI/AN) populations. Drawing on legislative examples, medicolegal case studies, and public health disparities data, we explore the evolving responsibilities of forensic pathologists and the broader sociopolitical forces that shape death certification practices. We argue that this intersection of legislation, family advocacy, forensic integrity, and Tribal sovereignty demands urgent attention and nuanced guidance for the medicolegal community.

We will outline the legal and forensic frameworks governing cause and manner-of-death amendments, and discuss how family-driven reclassification efforts challenge the evidentiary standards of forensic pathology. Particular attention will be given to the role of jurisdictional complexity, historical mistrust, and sovereignty in Tribal communities, where death certificates often fail to capture the realities of systemic violence and structural inequity. In such cases, amendments to death certification may be both a means of seeking justice and a source of potential conflict with established forensic norms. Forensic pathologists must navigate these tensions while upholding their scientific integrity and maintaining trust with families, law enforcement, and the public.

This talk provides a framework for understanding the multifaceted implications of death certificate amendments, particularly in relation to MMIP and Indian Country. We offer practical tools and guiding principles for forensic professionals, including trauma-informed communication strategies, the importance of interdisciplinary consultation, and awareness of Tribal sovereignty and jurisdiction. By examining how these scenarios impact public trust, legal accountability, and public health data integrity, this presentation equips attendees with a more nuanced approach to contested deaths in an era of increasing legal and community scrutiny. The insights offered are grounded in an Indigenous-led perspective and are intended to support equity, transparency, and justice in medicolegal practice.

5.4 Can 4-ANPP Concentrations Differentiate Illicit from Licit Fentanyl?

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Despropionyl-fentanyl (4-ANPP) is found in toxicology samples that are fentanyl positive but there is a lack of certainty about its significance and interpretive value. While 4-ANPP is a byproduct of fentanyl synthesis and may be present as an impurity in illicit and pharmaceutical preparations, evidence shows it is also a minor fentanyl metabolite. Can 4-ANPP concentrations in blood be used as a marker of illicit fentanyl? To answer this question, fentanyl and 4-ANPP results from postmortem cases were evaluated and categorized into three different fentanyl-use categories: hospital (inpatient) (n=25), patch (n=11), and illicit (n=794). Fentanyl was positive in 100% of the hospital cases, 91% of the patch cases, and 99% of the illicit use cases.

Fentanyl concentrations in the positive hospital, patch, and illicit cases ranged from 0.8– 33 ng/mL (mean: 7.7; median: 3.9 ng/mL), 1.6 – 29 ng/mL (mean: 9.0 ng/mL; median: 5.7 ng/mL), and 0.39 – 930 ng/mL (mean: 30.7 ng/mL; median: 12.5 ng/mL), respectively. Most cases (92%) of the 36 combined hospital and patch cases were “none detected” for 4-ANPP. Only three cases were positive in the hospital and patch categories – one at 0.27 ng/mL in the hospital category and two at 0.23 and 0.27 ng/mL in the patch category.

In the illicit cases, 4-ANPP was positive in 733 cases (92%) with positive concentrations ranging from 0.11–190 ng/mL (mean: 5.1; median: 1.7 ng/mL). Within these positive cases, 27 (3.7%) had less 4-ANPP than the highest concentration found in the hospital and patch cases (0.27 ng/mL) with 706 cases (96.3%) having the same amount or more.

One conclusion from the evaluation of the medical-use fentanyl cases is that 4-ANPP concentrations greater than about 0.5 ng/mL is a good marker of illicit fentanyl use. Other variables, however, include postmortem redistribution of 4-ANPP and potentially altered pharmacokinetics in healthy versus diseased or chronic illness states. Setting a 4-ANPP concentration threshold that differentiates illicit from licit fentanyl use is not necessarily straightforward, but data evaluations like this contribute to the decision.

6.1 Certification of Pediatric Deaths

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Certification of pediatric deaths is challenging. Even after an autopsy with ancillary and toxicologic testing, neuropathology and pediatric consultations and scene investigation, often the cause of death is not identified. The environment the infant or child was placed and/or found in plays a critical role in these deaths. Unfortunately, many of these babies and children are placed in unsafe sleep environments, introducing the possibility of an asphyxial component to the death. It is important that any environmental factors present be captured for statistical purposes and implementation of safety and preventative measures. In 2016, NAME organized a multidisciplinary panel on Sudden Unexpected Death in Pediatrics to develop guidance for investigating and certifying unexplained pediatric deaths, as well as recommendations for interacting with family members and meeting their needs. The current and previous terminology for unexplained infant and child deaths was reviewed and felt to be inadequate to address non-lethal autopsy findings, unsafe sleep environments and the potential for an as of yet unidentified physiologic cause for the death. Therefore, a new classification system was developed to encompass these factors when a cause of death cannot be determined. The terminology “Unexplained Sudden Death” is preferred over previous phrasing as it allows for the deaths to be coded with the intent of the certifier, improving data collection and surveillance. When a natural condition or risk factor concerning for contributing to the death, but insufficient for cause, the phrase “Intrinsic Factors Identified” is added. When conditions exist in the child’s immediate environment that are a potential threat to life but not deemed the cause of death with reasonable certainty, the phrase “Extrinsic Factors Identified” is added. When both are identified, the phrase “Intrinsic and Extrinsic Factors Identified” is utilized. The specific factors are not named on the death certificate. This presentation will provide an overview of and the evolution of previous classification terminology as well as provide guidance through case examples on how to use the new system. Widespread usage of the new classification system will improve certification uniformity thereby

improving surveillance and trends in intrinsic and extrinsic factors identified. Proper certification and classification of deaths plays a significant role in injury and disease prevention, highlighting the important role we play in public health.

6.2 Autopsy of the Pregnant Woman: A Protocol for Postmortem Pregnancy Testing and the Pitfalls of Jurisprudence

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This presentation presents a step-by-step protocol for the determination of early pregnancy at autopsy using over-the counter (OTC) urine pregnancy tests. Previous work has demonstrated the utility of OTC pregnancy tests at autopsy using urine and vitreous fluid as substrates, and this talk will codify their use, explain how a positive result allows a forensic pathologist to alter autopsy procedure in real time, and discuss subsequent appropriate documentation, specimen collection, validation, further testing, and reporting.

The rise of fetal personhood laws has made pregnancy status at the time of death a hot-button issue; in some states, the death of a pregnant woman at any time after conception triggers two criminal charges regardless of gestational age. Even so, there is extraordinarily poor correlation between the information that is or can be captured at autopsy and the jurisprudence surrounding death during pregnancy. (For instance, laws predicated on gestational age fail to delineate the method by which development will be evaluated.) This presentation seeks to review state laws pertaining to such cases, outline the pitfalls of the current legal climate for forensic pathologists, and offer suggestions for techniques and language to address this issue.

Recent restrictions on access to abortion and contraception in some parts of the country strongly suggest that the frequency deaths temporally associated with pregnancy, both natural and unnatural, are likely to rise in the immediate future. As such, the development of a standard protocol for the autopsy of a pregnant woman becomes more and more germane. This work is part of that project.

6.3 Placental and Neuropathologic Correlations in Perinatal Forensic Autopsies

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In forensic investigations of perinatal deaths, placental and neuropathologic examination are an integral component of the autopsy. Often, underlying placental pathology may be correlated with neuropathologic findings, clarifying causative or contributory factors involved in fetal demise.
We present multiple autopsy cases, ranging from intrauterine fetal demise (at 13 weeks gestation) to term neonate. Following a concise review of relevant placental and brain anatomy and histology, a range of real-world cases will be presented. Case discussion will incorporate clinical context, postmortem imaging, and stepwise integration of gross and microscopic findings from both the placenta and brain.
We will explore how common placental pathologies, such as meconium pathology, maternal and fetal inflammatory response, and maternal and fetal vascular malperfusion, can intersect with neuropathologic changes such as intracranial hemorrhage and neurodevelopmental anomalies. Strategies for sampling and documentation will be discussed, along with the role of special stains and immunohistochemistry, with a focus on practical applications for general forensic pathologists.

By the end of the session, attendees will be better equipped to approach perinatal deaths with consideration of high-yield placental pathology and neuropathology diagnoses.

Learning Objectives:

1. Correlate specific placental lesions with characteristic neuropathologic findings in perinatal deaths.

2. Apply a systematic approach to sampling and documentation of the brain and placenta in perinatal autopsies.

6.4 Amniotic Fluid Embolism: A Diagnosis in Need of a Mechanism

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Amniotic fluid embolism is a leading cause of peripartum death in the United States, with an estimated rate of 1.9 to 6.1 per 100,000 deliveries and a mortality rate ranging from 20-60%. Despite this high burden of disease, the underlying mechanism of how amniotic fluid embolisms occur is not well understood. To that end, a new protocol for investigating these deaths including taking specific samples of the uterus and collecting premortem blood samples is recommended to assist in elucidating the etiology of this condition.

The diagnosis of amniotic fluid embolism is suspected when the clinical picture meets certain criteria and an autopsy fails to disclose a competing cause of death. Symptoms often include anxiety, agitation, confusion, nausea, shortness of breath, chest pain, coagulopathy, and an impending sense of doom. Vital signs show hypoxia and hypotension, and the patient often quickly progresses to loss of consciousness, seizures, and cardiopulmonary arrest. An autopsy will often disclose no abnormalities aside from those associated with resuscitation.

When an amniotic fluid embolism is suspected, sections of the heart, lungs, and brain are the recommended minimum in order to make the diagnosis. In addition to these usual sections, this new protocol recommends sections of the ectocervix, endocervix, and full-thickness transmural sections of the lower uterine segment. Samples of the decedent’s blood taken before and after the symptoms started (for example hospital admission blood and postmortem specimens) are also collected and retained.

At the current time the pathophysiology of amniotic fluid embolism is not well understood. Through this protocol it is hoped that the underlying mechanism of how these deaths occur will be found and that this information will be used to prevent deaths from this condition in the future.

7.1 Pediatric Neuropathology in Forensic Autopsy

Jolee Suddock DO[1], Lorraina Robinson DO, MS[1], Jared Ahrendsen MD, PhD[2], Heather Jarrell MD[3], Rebecca Folkerth MD[4], Melissa Blessing DO[5]
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Pediatric neuropathology is a critical yet often underemphasized and sometimes intimidating aspect of forensic autopsy. This workshop aims to equip forensic pathologists with the practical tools needed to approach pediatric brain examination with confidence and clarity.

The workshop will begin with a review of Developmental Neuroanatomy, emphasizing brain maturation across gestational and postnatal ages evaluable by gross examination and on standard histologic sections. It will introduce specialized dissection techniques easily integrated into practice that enhance diagnostic yield in pediatric cases. Next, we will address Seizure Disorders and Sudden Pediatric Death, focusing on histologic changes, the role of hippocampal sclerosis, and practical strategies for evaluating potential SUDEP and other epilepsy-related deaths.

Our third presentation delves into the Forensic Neuropathology of Pediatric Trauma, with emphasis on characteristics of inflicted, accidental, and birth-related injuries. We will then tackle the complexities of “Cerebral Palsy” and Hypoxic-Ischemic Brain Injury across the pediatric age spectrum, outlining approaches to understanding neurodevelopmental consequences relevant to death certification.
The fifth presentation introduces Postmortem Pediatric Neuroimaging, offering forensic pathologists tools to interpret common findings on radiographs and computed tomography (CT), triage subtle abnormalities, and leverage imaging in guiding dissection. We will conclude with a look toward The Future of Pediatric

Neuropathology, covering molecular testing and emerging technologies reshaping how we diagnose neurodevelopmental and syndromic conditions, as well as strategies to utilize these tools in resource-limited settings.

The workshop will emphasize efficient workflows, practical sampling strategies, and reporting language that supports defensible and well-informed cause-of-death statements. Segments will include case examples, key histologic images, and take-home handouts to empower participants regardless of prior neuropathology training.

Objectives:
1. Recognize key features of normal and abnormal developmental neuroanatomy across gestational and postnatal ages, and implement practical, age-appropriate techniques for dissection, sampling, and documentation of the pediatric brain.
2. Identify common histologic and pertinent imaging findings associated with seizure disorders, hypoxic-ischemic injury, and traumatic brain injury in pediatric decedents.
3. Apply practical strategies for examining the pediatric brain at autopsy, incorporating ancillary studies and producing clear, well-supported cause-of-death determinations.

7.2 Manner of Death and Ethical Dilemmas in Perinatal Pediatric Deaths
Sam Cunniff BA, Joseph Prahlow MD
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Proper death certification is an essential component of public health, providing important data regarding the cause of death. Death certificates frequently provide answers and closure for surviving friends and family members. In addition to listing the “cause of death” (COD), which is defined as the disease or injury responsible for the termination of life, death certificates must also list the “manner of death” (MOD), which provides information regarding the means or circumstances by which the cause of death occurred. Manners of death are typically classified as natural, accident, suicide, homicide, or undetermined. Unfortunately, strict delineation into the aforementioned MOD categories can prove to be inadequate to categorize the complex circumstances of a person’s death. MOD dilemmas are not infrequent for forensic pathologists and can be particularly problematic when dealing with neonatal deaths. In addition to such MOD dilemmas, the forensic pathologist investigation of certain neonatal deaths may reveal ethical dilemmas regarding the culpability for the death, the responsibility of healthcare workers to disclose their mistakes, and the duties of the medical examiner or coroner when faced with such situations. This case series describes four neonatal deaths that illustrate such dilemmas. The first case involves the challenge of selecting a manner of death in the case of an elective abortion where the fetus initially survived the procedure. The second case raises the question of the healthcare team’s responsibility to disclose mistakes when the care of a woman in labor failed to detect that the fetus had already died in utero, resulting in a futile (and “fake”) attempt to resuscitate the obviously macerated fetus. The third case demonstrates the ethical responsibility of full transparency regarding an errant medication-induced fatal closure of a patent ductus arteriosus in a neonate with an unrecognized coarctation of the aorta. The final case highlights the difficulties encountered when a “discarded fetus” is discovered. It is not uncommon for the COD and MOD to remain undetermined in such cases; however, in the case presented, the mother confessed to having killed her newborn child after it had been born alive, thus providing sufficient support for a MOD ruling of homicide. These examples showcase the limitations of the categorical system for MOD and some of the ethical dilemmas surrounding neonatal death investigations. Clinicians and pathologists must be aware of these dilemmas so that appropriate referrals can be made for medicolegal death investigation and proper death certification can occur.

7.3 Interagency Collaboration, Medicolegal Investigation, and Postmortem Genetic Testing in the Evaluation of Suspicious Pediatric Deaths
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As forensic pathologists, we specialize in trauma-related pediatric deaths. We want to underscore the importance of inter-agency collaboration and genetic counseling in two pediatric fatalities initially reported by law enforcement as suspicious.

A 16-month-old female was reported to have "choked" while drinking from a sippy cup and pronounced dead in the emergency department. The death was immediately treated as a potential homicide with concerns for sexual assault. Law enforcement requested the presence of a forensic sexual assault nurse during the autopsy to assist with evidence collection. External genital examination revealed no abnormalities. On internal examination a large exophytic mass was within the left ventricle of the heart, partially obstructing outflow which on histology was a benign lipoma infiltrating the myocardium. The cause of death was invasive intracardiac lipoma and manner of death was natural. Though intracardiac lipomas are rare and typically non-genetic, genetic counseling was pursued. Testing revealed a pathogenic variant in the *FLCN* gene, associated with autosomal dominant Birt-Hogg-Dubé Syndrome, which is linked to lung cysts, renal tumors, and lipomas.

An 11-year-old male was found unresponsive in bed, described by family as "blue in the face" and cold to the touch when they went to wake him for school. Law enforcement suspected a drug overdose, as prescriptions medications of trazodone, Xanax, and bupropion were found in the home, some located on top of a kitchen microwave. The child had not exhibited any prior symptoms aside from a previous arm fracture months earlier. At autopsy, findings included bilateral pleural effusions, frothy pulmonary edema, and subtle dusky discoloration of the brain. The heart was submitted for detailed cardiac pathology exam, despite an initial suspicion of a toxicological cause. Toxicology results were negative. Additional ancillary studies were unremarkable. Cardiac pathology showed a structurally normal heart. Molecular genetic testing revealed pathogenic variant in the *KCNH2* gene, which is associated with autosomal dominant cardiac arrhythmia syndromes. The cause of death was sudden cardiac death due to a genetic arrhythmia disorder. The family was advised to undergo genetic counseling.

Accurate determination of cause and manner of death in pediatric fatalities initially treated as suspicious requires robust inter agency cooperation, investigation, comprehensive ancillary testing, and a structured approach to differential diagnosis. These cases highlight the vital role of forensic pathology in uncovering natural but rare causes of sudden pediatric death and the importance of integrating genetic counseling into postmortem investigations.

7.4 Are Non-natural Deaths Underreported? A Preliminary Comparison of Non-natural Deaths in Coroner Counties, Medical Examiner Counties, and Coroner Counties with a State Medical Examiner

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Introduction: In the United States, medicolegal death investigation systems are generally classified as either coroner, medical examiner, or mixed state systems. Coroners are typically elected officials and may not possess medical training, whereas medical examiners are generally forensic pathologists. These differences in training may lead to discrepancies in the certification of manner of death, especially in cases of non-natural deaths.

Methods: We used county-level, non-natural mortality data from the CDC WONDER database between the years 1999 and 2020. This data was matched with the type of medicolegal death investigation system reported by the Collaborating Office for Medical Examiners and Coroners. We then compared the number of non-natural deaths per capita across 1,352 counties using a generalized linear model with year (1999 [reference]-2020) and group (coroner [reference] vs. medical examiner vs. coroner with state medical examiner) entered as fixed-effects, along with an interaction term (year*group).

Results: There were significantly higher rates of non-natural deaths between 2012-2020 and 2022-2007 versus 1999 ($p<0.05$ for all years). There were significantly higher non-natural deaths in the coroner counties with a state medical examiner (0.086%, 95% CI 0.085%-0.089%) versus the coroner counties (0.075%, 95% CI 0.074%-0.076%), $p=0.03$. There were significantly higher non-natural deaths in medical

examiner counties versus coroner counties in 2013 (p=0.04), 2014 (p=0.02), 2015 (p=0.01), 2016 (p<0.001), 2018 (p=0.009), and 2020 (p=0.02).

Discussion: We found medical examiner counties and coroner counties with a state medical examiner report significantly more non-natural deaths compared to coroner counties. One potential mechanism for this discrepancy is the lack of medical training required to be a coroner, leading to difficulty discerning between natural and non-natural deaths.

7.5 Improving Community Health through Drug Overdose Dashboards: Insights from STORM and TRUST

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Drug overdose dashboards led by medical examiner or coroner offices play a vital role in improving community health by providing timely, actionable information on drug overdose deaths and the emergence of new or dangerous drugs. These dashboards can help empower medical examiner and coroner offices, public health stakeholders, law enforcement, harm reduction programs, and policymakers to act swiftly and effectively in response to emerging drug trends.

In 2017, the Western Michigan University Homer Stryker M.D. School of Medicine (WMed) launched the Swift Toxicology of Overdose-Related Mortalities (STORM) Project. The project was designed to deliver faster and more detailed toxicology data to better understand drug-involved deaths, particularly those related to opioid use. As of 2024, STORM tests for 69 different drugs, drug analogs, and metabolites, providing near real-time insight into specific substances present at the time of death. While STORM does not provide a comprehensive picture of overdose rates across Michigan or individual counties, it serves as a powerful tool for identifying ongoing and emerging drug trends.

Inspired by the WMed model, the Arkansas State Crime Laboratory (ASCL) is preparing to launch its own system in 2025, the Toxicology Realtime Updated Surveillance Tracker (TRUST). Like STORM, TRUST aims to equip Arkansas stakeholders with the data needed to deeply understand and respond to drug overdose deaths in their jurisdictions.

These dashboards offer a range of critical information for stakeholders working to reduce overdose deaths: weekly drug positivity trends; monthly drug positivity rates; demographics of overdose decedents, including age, sex, and race; county-level drug positivity data; and most common drug combinations identified in toxicology reports. In addition to routine reporting, dashboards can issue alerts about noteworthy patterns, such as a spike in deaths related to a specific drug or the detection of a new drug in multiple cases. These alerts are accompanied by resources to help communities respond effectively.
This presentation will share two example templates for drug overdose dashboards, providing models for those considering similar initiatives, highlight key partnerships necessary for successful dashboard implementation, and discuss success stories and lessons learned from the development and deployment of STORM and TRUST. By adopting data-driven strategies like these, communities can be better positioned to reduce overdose deaths and respond rapidly to shifting drug landscapes.

7.6 Are We at The End of the Opioid Epidemic? A Challenging Public Health Question

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Over the last approximately 30 years the United States has seen epidemic levels of opioid fatalities. The longevity of the epidemic is unusual and reflects distinct phases within the epidemic with a variety of opioids assuming major roles. The epidemic began in the 1990s with the overprescribing and diversion of prescription opioid pain relievers (OPR). This was followed by a heroin phase which gave way to the ongoing fentanyl/fentanyl analogue phase. Each phase was characterized by escalating mortality and it is estimated that all opioids have claimed the lives of at least 800,000 people over this period. This paper

examines mortality trends in Cuyahoga County through all phases of the opioid epidemic and supplements our previous analyses.

We examined all opioid related overdose deaths (n=7672) from 2009 to 2024 in Cuyahoga County (metropolitan Cleveland, Ohio). We also tabulated drug seizure data from the Cuyahoga County Regional Forensic Science Laboratory from 2010 to 2024. These data were compared to understand recent changes in drug overdoses and its relationship to the drug supply to determine future directions of the drug epidemic.

Since late 2023, opioid deaths have been declining throughout the country as well as in our county. In 2024 we saw a 34% decline in all drug overdose deaths (n= 419), including a notable 42% decrease in deaths related to fentanyl (n= 272). Seizures of fentanyl declined 31% in 2024 suggesting the possibility of a shift in the illicit drug market and the advent of a sustained decline in fentanyl mortality.

However, there was not a strong correlation between historical drug seizure and mortality trends during the entirety of the epidemic. Seizures of diverted OPR and heroin did not mirror the shifts away from mortality related to these substances with seizures remaining elevated after declines in mortality began. While drug seizure surveillance may suggest emerging threats, our research implies it is difficult to predict future mortality trends on this basis. The continued incorporation of death investigation information remains an essential component of the public health response to substance use disorder.

7.7 Legionnaires' Disease and SARS-CoV-2/COVID-19 Disease Outbreaks at Two Illinois Veteran's Nursing Homes: The Public Health and Medicolegal Implications for Death Investigation

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Public health is a critical mission in forensic pathology. In August and September of 2015, the Illinois Veteran's Home in Quincy, IL suffered an outbreak of Legionnaires' Disease. Fourteen veterans living at the facility died. The Illinois Department of Public Health (IDPH), and the Centers for Disease Control (CDC) requested complete autopsies with extensive fluid and tissue samples. The autopsies grossly showed degrees of ischemic heart disease and emphysema, and recent bronchopneumonia. There was serious concern regarding the postmortem infectious nature of *Legionella pneumophilia* and autopsy transmissibility, necessitating a single forensic pathologist and autopsy assistant performing the autopsies in the evenings. Over several days there were more deaths, and the lungs showed early organizing and ongoing bronchopneumonia. Reportedly urine was positive for Legionella antigen several days before the deaths, consistent with the timing of the initial outbreak. The next fatalities and autopsies were a week later with severe organizing pneumonia and diffuse alveolar damage with underlying ischemic heart disease, with the final autopsy 6 weeks later in a 66-year-old resident who showed older diffuse alveolar damage and overlying newer bronchopneumonia, and urine positive for Legionella antigen. In total there were ten autopsies, ages 66 to 94 years, all confirmed by the CDC as having Legionnaires' Disease pneumonia. At that point autopsies were no longer deemed necessary, and medical reviews with blood and urine tests were performed to confirm the diagnoses, with a total of 14 deaths. Investigations, political fallout at state government, and litigation followed. Families of the deceased received a legal settlement of $12 million after a delayed response to the outbreak was founded. The causes of the Legionella outbreak were ineffective water repairs within an aging facility. History repeated itself in 2020 during the SARS-CoV-2/COVID-19 outbreak at a separate Illinois Veteran's Home in LaSalle County, IL with a cluster of 36 COVID-19 related veteran resident deaths with recent pneumonia and underlying heart and lung disease. Allegations of negligence and delayed care were again made. After investigation, it was determined that basic known COVID-19 protections were not implemented. Veteran's Nursing Homes in IL fall under the authority and regulation of the state Department of Public Health and are not a federal responsibility. The investigation of deaths at state Veteran's Nursing Homes is a responsibility of local medical examiners/coroners and forensic pathologists as their duty to the larger public health and individually for military veterans' service to our country.

8.2 Innovation Meets Investigation: Elevating Medicolegal Death Investigation Through the Bureau of Justice Assistance's Forensics Training and Technical Assistance Program

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Medical examiner and coroner (ME/C) offices play a critical role in the forensic science and criminal justice fields by conducting medicolegal death investigations (MDI) while often contending with varying levels of staffing, budgets, and resources. To help address these challenges, the Bureau of Justice Assistance (BJA) offers federal funding through initiatives such as the Missing and Unidentified Human Remains (MUHR) Program, Paul Coverdell Forensic Science Improvement Grants (Coverdell) Program, and Strengthening the Medical Examiner-Coroner (ME/C) System Program.

Funded by BJA and led by a team of forensic science subject matter experts at RTI International, the Forensics Training and Technical Assistance (Forensics TTA) Program provides specialized support to grantees of these BJA Forensic Programs, aiming to enhance the quality and timeliness of MDI. Through comprehensive training programs, information sharing, and actionable guidance, Forensics TTA equips ME/C offices with the tools needed to navigate the evolving landscape of MDI. Informed by the 2019 Report to Congress: Needs Assessment of Forensic Laboratories and Medical Examiner/Coroner Offices and the 2018 Census of Medical Examiner and Coroner Offices, as well as communications with ME/C stakeholders, Forensics TTA develops tailored materials and resources to ensure support is responsive, relevant, and impactful.

This presentation will offer an overview of BJA's Forensic Programs, focusing on MUHR and ME/C, outlining their scope and objectives. Attendees will gain insight into the role of the Forensics TTA Program, including its role in supporting grantees through a range of publicly available resources including an archived Discussion Forum session on the ME/C grant program's loan repayment option and the Accreditation Document Repository for Medical Examiner and Coroner Offices. This session will also highlight details on existing and forthcoming training and technical assistance offerings, designed to help ME/C offices address current challenges in MDI effectively.

8.3 The Medical Examiner Improvement in Oregon Workgroup

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Medical Examiner's Offices work extensively with a variety of external partners, including public health officials, law enforcement officials, prosecutors, clinicians, families of the deceased, and the community. Despite the essential services provided, medical examiner's offices may not be as visible as other public agencies. This may contribute to lost opportunities to meaningfully engage with governing structures at the state or county level, which may ultimately impair long term strategic planning and budgeting. In the contemporary era of high caseloads, the visibility of medical examiner programs, as well as their struggles, is helpful to keep governing authorities aware of the needs of ME programs. In 2023, a multidisciplinary workgroup was convened in Oregon that met throughout 2024. The goal of the workgroup was to examine systemic problems in Oregon's medical examiner system and propose solutions. In this presentation we will describe the structure of Oregon's medical examiner system, discuss the composition of the workgroup, and share its work product and recommendations.

8.4 American Femicide as a Function of Gun Ownership: A Comparison of Two States

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Femicide is defined as the intentional killing of a girl or women with a gender-related motivation. It is the fatal outcome of violence against women and is often committed by intimate partners or family members. Using the established United Nation's criteria for categorizing femicides, the cause of death, the relationship of the perpetrator, and the circumstances of the death were compared between Connecticut

(CT) and New Hampshire (NH). While both states are part of New England and share many demographic attributes, they differ significantly with respect to gun laws. Connecticut is perhaps one of the most rigorous states when it comes to gun control, while NH emphasizes gun rights in the state constitution. Per capita gun ownership in NH is nearly double that of CT. The purpose of this study is to examine the rate of femicide as a function of firearm involvement and access. Of total female homicides from 2012-2024, 70% (n=101) in NH were categorized as femicides while 69% (n=329) were in CT. The rates in each state did not statistically differ (p=0.5981). Gunshot wounds were the most common singular cause of death in femicide for each cohort, but higher in NH (56% in NH and 40% in CT, p=0.009). The perpetrator was the woman's intimate partner in the majority of cases for both states. However, it was found that in CT, femicides were less likely to be committed with a firearm (p=0.011) when compared to non-femicide female homicides but far more likely to involve sharp force injury (p<0.001) and asphyxia (p<0.001), while no difference was seen for blunt force trauma (p=0.439). No such differences were observed for cause of death in NH: femicides and non-femicides both had similar distributions of firearm, sharp force, asphyxial, or blunt force injury causes of death. These data imply that legislating firearm access or removing a firearm from a potential perpetrator does not prevent fatal violence against women. Effectual public health interventions should emphasize modifying the inter-relational dynamic between perpetrator and would-be victim by increasing resources for women to leave abusive partnerships and enhance legal protections for victims

8.5 Dead Wrong: Is Flawed Case Screening Masking the Next Public Health Crisis?
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Medicolegal death investigators (MDIs) serve as the critical first point of contact in the death investigation process. Their jurisdictional case screening decisions fundamentally shape the trajectory of investigations and directly impact the quality of mortality data. The screening of calls and obtaining key information to make appropriate jurisdictional decisions is a vital filtration mechanism for initiating field investigations to provide essential scene and contextual information to forensic pathologists. The consequences of screening decisions extend far beyond individual cases, with the integrity of public health data resting substantially on accurate death certification. Improperly screened deaths can result in misclassifications that propagate through mortality data, potentially obscuring emerging public health threats. With significant variations in jurisdictional practices, resources, and MDI experience, agencies are vulnerable to missed cases and incorrect causes and manners of death. This presentation will focus on the role of standardized screening protocols, tools, and training to provide MDIs with foundational knowledge and skills to enhance screening accuracy and reduce bias. Attendees will be provided with a toolkit to build agency-specific procedures and decision matrices.

8.6 The SUDC Registry and Research Collaborative: Lessons learned, Future opportunities
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Aims: To understand the epidemiology of sudden unexplained deaths in childhood (SUDC), characterize cases using the SUDC Registry and Research Collaborative (SUDCRRC) blinded review process and certification guidance from the NAME Panel on Sudden Unexpected Pediatric Deaths and understand underlying mechanisms of SUDC through genetic, proteomic, febrile seizure and image analysis studies.

Methods: Multi-disciplinary clinical specialists and board-certified pathologists conducted blinded reviews of cases enrolled in the SUDCRRC at NYU Langone Health from 2014-2022. Data included family interviews, medical records, studies during life, home videos, whole exome sequencing, neuropathology, neuroimaging, biospecimens, photographic evidence and death investigation records. Case control studies were performed, including proteomics, neuroimaging, hippocampal histopathology image analysis and febrile seizures.

Results: Among our cohort (N=271), 58% were male, 86% were white and mean age was 41.6 months (IQR: 17-35). The SUDCRRC review concluded 81% were unexplained, 13% natural, 1% accidents, and 4% with incomplete information. 28% had a febrile seizure (FS) history. Convulsive events identified in

100% (5/5) continuously recorded crib videos. 93% of deaths were associated with sleep periods. 64% were discovered prone and face-down; the most common extrinsic factor. Pathogenic variants on trio exome sequencing were identified in ~9%. The panel's review disagreed with the original pathologist's cause of death in 32% of cases. Ex-vivo neuroimaging identified increased volume of caudate nuclei among cases with FS history (FS 4.1±0.3; noFS 3.5±0.7, t=2.5, df=14, p=0.025, t-test). Compared to living controls, SUDC+FS experienced febrile seizure onset >2 months younger (p=.013), reported developmental concerns (OR= 2.32, CI95[1.14,4.71], p=.03), and less frequent night awakenings (OR=.34, CI95[0.18,0.65], p=.001). Compared to explained deaths, altered proteins were most significant in SUDC frontal lobe related to activated oxidative phosphorylation ($p = 6.3 \times 10–15$, $z = 4.08$) and inhibited EIF2 signaling ($p = 2.0 \times 10–21$, $z = -2.56$). Self-supervised learning of whole slide images of SUDC and explained death hippocampal histopathology identified clusters more prevalent in association with case history (i.e. febrile seizure history, terminal findings).

Discussion: Despite comprehensive autopsies and whole exome sequencing, most cases remained unexplained after multidisciplinary review, demonstrating current limitations of forensic evaluations to determine cause of death. Imaging, omics and febrile seizures studies offer potential clues or answers to causation and warrant further study. 1/3 discordance with original pathologists' determinations suggests tendency to certify cause of death when insufficiently supported by evidence, undermining consistent surveillance and leading to underestimation of SUDC cases.

8.7 Interactive Discussion of Cases with Challenging Manners of Death

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Manner of death (MOD) refers to the circumstances surrounding the cause of death, typically categorized as natural, accident, suicide, homicide, or undetermined. It is a required component of death certification, plays a critical role in public health statistics, and is often used (or misused) for other purposes. While the classification may be straightforward for most cases, the determination of MOD can be complex, especially when investigative findings are incomplete, circumstances are ambiguous, or the decedent has significant comorbidities. Even when information is complete and circumstances are verifiable, some cases have unique features that present a conflict between two MOD categories. The National Association of Medical Examiners has published guidelines for the certification of some, but not all, of these scenarios. In such cases, the MOD reflects the professional judgment of the forensic pathologist and may differ among practitioners.

This interactive presentation will discuss the challenges in MOD determination through a review of up to ten complex cases. Each case will include succinct information necessary to reach a MOD determination. Following each case, attendees will be invited to anonymously vote on the manner of death using a free, real-time online polling platform accessible via their personal devices. Live results will be displayed.

A focused discussion will follow each case, highlighting the rationale behind different interpretations, the thought process of the case pathologist, and jurisdictional considerations. The presentation will underscore the complexity and subjectivity that can surround MOD certification, particularly when the available information does not point definitively in one direction.

This session offers a unique and engaging opportunity for forensic professionals to critically evaluate difficult cases and discuss alternative perspectives. Through audience participation and real-time data sharing, the presentation aims to highlight how challenging MOD determinations can be - even among experienced forensic pathologists. Ultimately, the session seeks to encourage professional dialogue and deepen understanding of this essential yet often subjective aspect of medicolegal death investigation.

8.8 New Technology applied to timeless Principles: The nexus between crime scene analysis and autopsy findings

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We present a case report detailing the investigation of a complex scene involving five fatalities at the victims' workplace. The scene was analyzed by a multidisciplinary team of forensic pathologists, forensic investigators and quality officers. Using advanced three-dimensional models and animations, we were able to correlate autopsy findings, scene observations, and postmortem CT scan images to accurately reconstruct the events. Data from the CT scans of the deceased were integrated with 3D models of the scene using specialized software. This allowed us to create and visualize a unified virtual 3D environment combining both the victims' bodies and the crime scene. The scene processing software facilitated the real-time registration of scan data, automatic object recognition, and precise positioning. Additionally, Zone 3D software was employed to generate detailed animations.

In summary, this case illustrates the use of multiple digital imaging techniques, collectively referred to as "postmortem imaging." While these technologies enhance forensic investigations, they cannot replace the core principles of medicolegal death investigation. Instead, they serve as valuable tools that support the application of these principles and bridge the gap between forensic pathology and other forensic disciplines. To be effective, innovation must be balanced with the time-tested principles that ensure reliable death investigations—principles such as coordination, cooperation, and communication. State-of-the-art scientific tools should be used to reinforce the foundational work laid by the pioneering professionals who shaped the forensic sciences.

Through this case, we demonstrate the synergy between enduring principles and cutting-edge technology. Furthermore, we highlight the role of quality officers in promoting a holistic approach to the investigation, balancing standardized processes with professional discretion, and fostering positive collaboration among the team members.

9.1 Eight-Year Review of the Swift Toxicology of Opioid-Related Mortalities (STORM) Project

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The Swift Toxicology of Overdose-Related Mortalities (STORM) project is an ongoing surveillance system at Western Michigan University Homer Stryker M.D. School of Medicine. It provides rapid, qualitative toxicology for postmortem samples from 36 participating Medical Examiner Offices throughout Michigan. On average, STORM returns results within one week while quantitative toxicology results take at least 30 days, enabling near real-time surveillance of substance use trend changes. Currently, STORM identifies 46 opioids and 22 non-opioid substances in their system.

Data were obtained using all STORM results collected from September 2017 to April 2025, broken down yearly for direct comparison. Thirty-four counties in Michigan and two counties in northern Indiana participate in this project. STORM tests postmortem blood from not only suspected overdose deaths, but also non-drug related deaths involving infants, children, and even suspected homicides. STORM tests at lower limits for substances compared to other quantitative forensic toxicology services, identifying lower concentration substances not always deemed contributory to death.

At the beginning of the project in 2017, a total of 50 substances were tested, which increased to 68 total substances in 2024. When the STORM project first started in 2017, only 15 counties were being tested, and it has grown to 34 counties over its duration. As of April 2025, 8,574 postmortem samples have been tested in STORM. Of these samples, 3,473 (40.5%) tested positive for an opioid. The first year of STORM (October 2017 to September 2018) had the most opioid positive samples at 465 (46%). The sixth year of STORM (October 2022 to September 2023) had the most samples tested at 1,312 (15.3%). Fentanyl positives represented 1,879 (22%) of all samples, with the sixth year of STORM being the highest at 337 (25.7%) samples. The age of decedents across all STORM data ranges from 6 days to 102 years old. The

majority of the decedents were male (75%) representing 6,434 cases, while females represented 24.9% (2,140 cases) and transgender individuals represented <0.1% (one case).

The STORM project is in its eighth year of ongoing surveillance, having tested over 8,000 postmortem samples for illicit and non-illicit substances. The prevalence of opioid-related overdoses creates a need to quickly identify decedents with suspected opioid use. The quick turnaround time of STORM results in identifying and reporting overdose-related deaths helps to improve public health services and with implementation of timely harm reduction interventions.

9.2 We Can Work It Out? A Lawyer's Proposal to the Problems Associated with Forensic Conclusions of Cause and Manner of Death

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Cause and manner of death opinions are often offered at criminal homicide trials. However, there are dangers that this evidence will be improperly considered by the fact-finder, incorporating inadmissible evidence and usurping the role of the jury. By identifying these and other potential dangers from a defense perspective, this author proposes modifications to medical examiner documentation and testimony to avoid misleading and improper evidence. Regardless of the ongoing controversy and disagreement surrounding cognitive bias in forensic pathology, it is critical that these downstream hazards be acknowledged and addressed.

It is a bedrock principle that medical examiner findings incorporate medical *and* non-medical contextual information in autopsy findings. Circumstantial information, provided primarily from law enforcement and scene investigators, is considered essential to rendering a diagnosis and determining the cause and manner of death. When incorporating contextual facts in their findings, the medical examiner weighs facts, assesses the evidence and… deliberates.

It is also legally axiomatic that a "jury of one's peers" hears evidence against the accused, determining whether guilt is proven beyond a reasonable doubt before a person is convicted, imprisoned or put to death. The Constitution mandates that the jury weighs the facts, assesses the evidence and…deliberates.

Deliberation, however, is where the similarities between medical examiners and juries end.

Before being presented to a jury, evidence must be thoroughly vetted by the courts according to the rules of evidence and Constitutional constraints. The medical examiner, however, may consider anything presented to them. A jury may convict the accused only when convinced of guilt beyond a reasonable doubt. In contrast, the medical examiner is free to use a much lower, often undefined standard of proof. In an adversarial criminal trial, evidence is subject to cross-examination and rigorous argument on both sides. The medical examiner, however, receives information almost exclusively from law enforcement.

While many proposals for systemic modification of autopsy proceedings have been rejected as unworkable, this abstract proposes three relatively minor but meaningful changes in how medical examiners report cause and manner of death: (1) document all information considered, detailing its impact on the final opinion, (2) indicate a level of certainty to accompany their opinion and (3) refrain from offering manner of death in testimony. This presentation will also examine how and why the courts nationally have varied in their legal approach to these expert voices in criminal trials.

9.3 Doing Time: Expert Witness Testimony

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The Georgia Bureau of Investigation Medical Examiner Office provides autopsy services for 155 of 159 counties in the state of Georgia. The three regional offices are located in the metropolitan regions of Atlanta, Macon, and Savannah with staff medical examiners (ME) periodically performing examinations for all regions. Many recent changes have impacted the forensic pathology community regarding expert

witness testimony including a backlog of cases during the COVID-19 pandemic from court closures, regional fluctuations in criminal cases, emerging prosecution in special circumstances (e.g., fentanyl-related deaths), and the recent Supreme Court decision regarding Smith v. Arizona. Our study aims to evaluate the time burden of court testimony to the modern ME, including virtual expert witness testimony. In this study, we queried our laboratory information management system for all logged court activity from 2018-2024 to include a two-year period pre-, during, and post- the COVID-19 pandemic and the 6 months since Smith v. Arizona. We excluded MEs that were not employed during the entirety of the study dates. Court data for 5 MEs were entered into an Excel spreadsheet logging the times for travel, waiting, and testimony by quarter hour, any instances of repeat testimony, criminal or civil proceedings, and in-person or virtual testimony. Cases where travel and waiting were logged and no testimony was given, were also included.

We identified 367 unique cases with 400 testimonies given. Nine cases were for civil proceedings. Eleven cases allowed virtual testimony; four in 2023 and seven in 2024. There was no overlap in these two groups. No testimony was required in 41 cases. The average travel time was approximately 3 hours with an average wait time of approximately 1.5 hours while approximately 70% of expert testimony was completed within 1.5 hours on the stand. There was a significant decrease in the number of cases during 2020 as well as a significant increase in 2024.

Our data demonstrates that a large amount of time in this jurisdiction is spent on travel and waiting relative to court testimony. The recent changes in criminal proceedings have also impacted the frequency of expert witness testimony in our jurisdiction. Virtual testimony in select cases has had a large time saving impact and allowed for more availability of MEs to perform daily tasks and even offer testimony in multiple jurisdictions in the same day, which was previously precluded by travel distances exceeding normal business hours.

9.4 Electronic Death Certificate Workflows and the Busy Forensic Pathologist: A Thought Experiment

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Nearly all death certificates in the United States are currently generated in an electronic death registration system. Despite the shift from paper to electronic records, workflows to generate a death certificate in many ways have not changed. This informal study sought to examine how much time a full-time equivalent forensic pathologist (FP) needs to complete an electronic death certificate (EDC) and estimate how much time per year is spent on such activities. Through measurements of a single forensic pathologist's work in different settings using a variety of different workflows and software, an understanding of the time costs to an FP in service of generating an EDC were created. Estimates on the time in minutes for an FP to complete their portion of an EDC and the annual time in hours spent on EDC tasks were calculated. Insights as to best practices were elucidated. These data may help offices optimize the best use of FP time spent on EDC tasks and may help craft procedures to reduce the overall time needed to generate an EDC.

9.5 Self-Monitoring Your Practice: The Forensic Pathology Journey

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Evidence-based medicine is arguably the most transformative phrase put to practice in the history of medicine. It has given birth to several movements that have transformed the medical curriculum, including likely being the impetus of the lesser-known self-monitoring your practice. Self-monitoring your practice is a confusing title that suggests it is about keeping logs of professional activities but instead it is about putting honest reflections into practice. It is the ongoing curiosity to examine the true effects of a practitioner's decision making to ultimately improve behavior for the future and therefore maintain competence and occasionally achieve excellence. Self-monitoring your practice is a grueling and humbling endeavor that is essential for all physicians but is not often engaged in a systematic way. The application in forensic pathology is no different than the clinical setting but has the unique challenge of no

immediate feedback with decision-making steps that may incorporate the 'safest' route and certainly can cause mental anguish from prolonged hesitation to completing a challenging report. This presentation will review the major tenets of self-monitoring your practice including self-assessment techniques, the role of feedback, meta-awareness and engaging those that disagree with you. The influence of schadenfreude (pleasure felt when something bad happens to someone else) will also be discussed along with a challenging case that illustrates a real-life example of what self-monitoring your practice looks like in forensic pathology. A complete report is always missing something but with a little practice this will always be acceptable when self-monitoring your practice is your guide.

9.6 Causes of Death with Undetermined Manners

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Deaths with an unknown cause often have an undetermined manner, however, there are deaths with a known cause in which the manner remains undetermined. All deaths in Connecticut over a 10-year period (2014-2023) in which the cause was determined but the manner was certified as undetermined were reviewed (excluding unexpected infant deaths). There was a total of 329 such deaths (32.9 average per year) accounting for approximately 1.3% (range: 0.94 to 1.8%) of all certified deaths each year. On average, each year 4,370 deaths were certified by the OCME and 2,610 (range: 1,717 to 3,252) underwent autopsy examination. The major categories for causes of death with undetermined manners were blunt force injury [including descents from height (127), isolated blunt injuries of the head (67), and motor vehicle related (23)], intoxications (77), drownings (37), and firearm injuries (20). In some instances, the manner was narrowed down to two possibilities. For *adult* intoxication deaths, the vast majority involved a manner conflict of accident vs. suicide (64 of 73). For deaths due to blunt force injury, the majority (91 of 126) involved a manner conflict of accident vs. homicide with 51 involving isolated subdural hematomas (SDH). In 42 of the traumatic SDH deaths, ethanol use (37) and/or liver disease (32) were found. In 18 deaths the etiology of the immediate cause of death (i.e., disease vs. injury) could not be discerned (e.g., etiology of subdural hemorrhage, pulmonary thromboembolism, abdominal hemorrhage, and fracture). Common themes emerged in the circumstances where manner of death could not be determined, including presence/reliability of a witness, decedent conditions of psychiatric illness and/or substance/alcohol use disorders, toxicological interpretation, and concern for elder neglect. Since the manner of death is based on the cause of death and the circumstances in which the death occurred, there will be deaths in which the manner is undetermined despite knowing the cause of death. Examining a large number of these deaths revealed patterns that may help explain and justify an undetermined manner. By recognizing common scenarios of contention, forensic pathologists may avoid incorrectly certifying a death and also be comforted to know that some deaths are best certified as undetermined. Specific case examples will be presented to illustrate common themes and allow the audience to reflect on the rationale for undetermined manners.

10.1 Biomechanical Analysis of Hyoid Bone Fractures in Fresh Cadaveric Specimens

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In death investigations of suspected manual strangulation, common questions posed to the forensic pathologist concern the force required to fracture the hyoid bone. Hyoid fractures are more frequently linked to manual strangulation than to suicidal hanging or accidental trauma, and are thus regarded as potential indicators of homicidal trauma.

Accurately determining the amount of force required could assist in distinguishing accidental injuries from those resulting from deliberate neck compression - a distinction that frequently plays a critical role in legal proceedings.

Previous research has attempted to simulate manual strangulation to quantify the force needed to fracture the hyoid, but these efforts have been limited by the use of hyoid bones preserved in 4% formaldehyde, which, while primarily affecting soft tissues, may also alter the biomechanical properties of bone.

To address this limitation, the current study employs fresh, unfixed hyoid bones collected during autopsies at the Cook County Medical Examiner's Office in Chicago, Illinois. Cases suspicious for foul play (e.g. potential homicides), pediatric cases, and decomposed cases are excluded. Following postmortem examination, the hyoid bones are roughly cleaned of the excessive soft tissue, measured, and side-positioned in a testing system capable of recording compression forces. A Material Testing Machine - Mxmoonfree HP-500N Digital Force Gauge mounted on an HLD Manual Test Stand - is used to apply controlled compressive forces to the specimens, which are held in place by a robust bench vise. The force gauge, accurate to ±0.5% with a resolution of 0.1N, begins a progressive compression 1.0 cm above the greater horn of the hyoid at a fixed speed rate. Mechanical compression continues until a fracture or disunion of the hyoid occurs, with all force data recorded on dedicated proprietary software and later analyzed using Microsoft Excel to identify peak compression values.

To enhance public understanding and provide practical context, the same testing methodology is applied to common household objects, facilitating intuitive comparisons of hyoid fracture forces and object breaking forces. Although the study has limitations, that will be discussed with the attendees, it represents the first of its kind using fresh human hyoid bones and lays critical groundwork for future research.
The study is currently ongoing; a detailed analysis of the results will be presented to the attendees.

10.2 Seeing Eye to Eye? Comparing Forensic Pathologist and Radiologist Interpretations of Cervical Spine Injuries on Postmortem Computed Tomography

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Introduction: The cervical spine comprises 21.2% of the vertebral anatomy, with 40% of cervical fractures involving C1 and C2. Clinically, computed tomography (CT) scans have reported sensitivity and specificity of 88.6% and 89.8%. In the postmortem setting, CT examination is a valuable tool for supplementing, and in some instances, supplanting autopsy. One of the greatest strengths of PMCT is its high sensitivity for skeletal trauma. A valuable application of PMCT is in the evaluation of select blunt trauma injuries predominantly involving motor vehicle collisions, and the ability to supplant autopsy. We evaluate the diagnostic accuracy of cervical spine fractures by board certified PMCT experienced forensic pathologist review of PMCT, compared to that of board certified PMCT experienced radiologists, in a statewide, centralized medical examiner's office that has utilized PMCT for decades.

Methods: This is a two-part study: reviewers are comprised of three groups: 1. seven forensic pathologists utilize PMCT on a daily basis, two forensic pathologists who received PMCT training during fellowship, but don't use PMCT routinely in their current practice, and two radiologists who routinely interpret PMCT. Firstly, the forensic pathologists and radiologists will interpret 100 anonymized head and neck image sets, blinded to the case history. The image sets consist of axial, coronal, and sagittal views, with the ability to create 3-dimensional volume rendering. Secondly, the forensic pathologists and radiologists will interpret the cases, utilizing the identical image sets in a different order, unblinded to case history.

During interpretation, the forensic pathologists and radiologists will: 1. document if a cervical spine injury is present or absent, 2. if present, document the details of the injury, and 3. if present, document whether the cervical spine injury was fatal or contributory to the cause of death. All data will be recorded in Excel spreadsheet format.

Data analysis includes:

1. Comparing the sensitivity and specificity of interpretation findings for each group for the blinded data sets.
2. Comparing the sensitivity and specificity of interpretation findings for each group for the unblinded data sets.
3. Comparing interobserver agreement for each group when attributing cervical spine injury as fatal or contributory to the cause of death.

We predict that forensic pathologists trained and experienced to utilize PMCT can provide accurate interpretations, descriptions, and cause of death determinations for cervical spine fractures in trauma-related deaths.

10.3 That Cranium is Strange Looking: Human Variation, Congenital Development, and Scavenging of Human and Hydrocephalic Calf Craniums

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Medical Examiners and coroners every now and then are confronted with a cranium which upon initial examination can result in a bit of bewilderment as to what they are looking at. This most commonly occurs when the forensic practitioner views a scene photo of a cranium which is isolated in an outdoor environment in the absence of post cranial skeletal elements. The cranium can appear as unusually elongated with a large bulbous protrusion or hook like horn on the occipital bone. *Homo neanderthalensis* skulls had a slightly larger brain than modern man. A key feature of the Neanderthal skull was the presence of a large occipital bun. It is hypothesized that this elongation of the skull allowed for development of the posterior portion of the brain which controls vision. Neanderthals are believed to have had more acute vision than modern humans especially in regard to the ability to see objects in low light, an evolutionary advantage for a hunter. The presence of an occipital bun still exists today in a small percentage of the human population. A cranial oddity that is not frequently encountered is that involving the congenital anomaly of Chiari malformation which is followed by suboccipital craniectomy. This condition can present itself as a cranium with a large irregular shaped defect along the base of the skull with smooth edges. Another questionable oddity includes canid savaging of a cranium which results in a calvaria form which can be modified further by rodent scavenging resulting in straight edges. Even more complexing is the same postmortem scavenging pattern associated with the cranium of a hydrocephalic calf (bovine) which is certainly suspect when hair remains or in the absence of hair involves greater difficulty in identification. Such cases involve expertise in calvarium morphology and require radiological imaging to differentiate the specimen as human or non-human. This presentation will demonstrate examples of such questionable looking craniums.

10.4 Multidisciplinary Approaches to Dismemberment Cases: Integrating Forensic Pathology and Anthropology

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The recovery and analysis of dismembered human remains, though relatively rare in forensic medicine, presents unique challenges requiring specialized techniques at the intersection of forensic pathology and anthropology. Dismemberments are typically performed with various sharp tools as a method of concealing evidence of homicide and/or to aid in disposal of the deceased. Proper analysis of dismembered remains requires meticulous multidisciplinary approaches to address identification challenges, tool mark examination, and mechanism, manner and cause of death determinations.

This presentation brings together experts to provide a comprehensive overview of current best practices, methodological approaches, and emerging techniques in the investigation of dismemberment cases, emphasizing the integration of routine pathological examination with specialized anthropological analyses presented through a collaborative case approach to demonstrate how these approaches work in concert to reconstruct dismemberment scenarios, identify tools used, and provide critical investigative information.

Our forensic pathologist will discuss autopsy procedures specific to dismembered remains, including documentation of cut surfaces, preservation of tool marks, and techniques for preventing postmortem examination markings at dismemberment margins during examination and collection. Special attention will be given to scene investigation best practices, case numbering and tracking , organization of and preparation for the examination, preservation of evidence, DNA and evidence collection practices, toxicological specimen selection, and cause and manner of death determination.

Our first forensic anthropologist will present on previous research into intentional body dismemberment including case frequencies, types of tools used for body dismemberment, typical body dismemberment locations, and common disposal patterns associated with dismembered bodies. He will review the important role of a forensic anthropologist in dismemberment cases including specimen retention for tool mark analysis, anthropological reassociation of dismembered body parts at cut locations, and evaluation for possible commingling as well as assistance with identification through analysis of age-at-death, sex, and population affinity.

Our second forensic anthropologist will focus on best practices for macroscopic and microscopic examination techniques associated with tool mark analysis resulting from dismemberment trauma to bone and cartilage, including discussion of both metric and morphological kerf features associated with certain types of implements (e.g., knives, saws, machetes). Class characteristics will be discussed as they relate to the dimensions and shape of the tool, how the tool was powered, and how the tool was utilized. Methods of preserving cut mark evidence will also be discussed, including casting, 3D scanning, and 3D printing.

10.5 Body and the Beast: Investigating Animal-Related Trauma through Postmortem Imaging

Jamie Marie Elifritz MD[1,2], Emily Helmrich DO[2], Pramod Gumpeni MD[3], Jennifer Weaver MD[4], Heather Jarrel MD[2]

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Animal encounters represent a complex and often under-recognized aspect of forensic casework, impacting both living and deceased populations. This presentation will explore the imaging evaluation of animal interactions, highlighting their clinical and medicolegal significance across a spectrum of scenarios — from nuisance-level contact to fatal trauma and postmortem predation.

This presentation will highlight the advancing discipline of forensic imaging, which provides valuable diagnostic documentation of traumatic animal encounters. Cases are drawn from hospitals and medical examiner's offices across various regions of the country. Each case is enriched with clinical vignettes and high-yield forensic insights. Emphasis will be placed on postmortem cases, where animal-related findings can complicate or clarify cause and manner of death. Through an image rich format, attendees will engage with a diverse range of illustrative cases, including both expected and atypical presentations of animal-related trauma.

By the end of the presentation, participants will have a deeper appreciation of the imaging features of animal-related trauma and a heightened awareness of the evolving role of imaging in this domain.

10.6 Reassessing Forensic Significance through Radiocarbon Dating: A Cautionary Tale from the Oklahoma Office of the Chief Medical Examiner

Timothy P. Gocha PhD[1], Sara M. Getz PhD[2], Carlos J. Zambrano PhD[2], Angela K. Berg MA[1]

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As of April 2025, there are 25,600 missing persons in the National Missing and Unidentified Persons System (NamUs). The vast majority of these individuals (22,606 ~88%) were last known alive more than two years ago and therefore may be represented only by skeletal remains if they are found deceased. Per statute, the Oklahoma Office of the Chief Medical Examiner (OCME) must be informed when human remains are discovered in Oklahoma. Historically, the OCME did not employ full-time forensic anthropologists, and the forensic significance of human skeletal remains was sometimes evaluated by forensic pathologists or contract anthropologists, though other times such determinations were made by local doctors, archaeologists, or museum specialists. This was done through gross observation of bones (e.g., color, texture, and density) in combination with discovery location information including proximity to known archaeological sites or cemeteries. However, due to the variety of ecoregions in Oklahoma, coupled with poor documentation of many older cases, the forensic anthropologists now employed by

the OCME grew concerned that modern, unidentified individuals may have been incorrectly classified in the past as being not forensically significant.

In the summer of 2023, the OCME forensic anthropologists began to reassess forensic significance of all retained skeletal cases that were originally deemed “historic” or “archaeological” that had not yet been reburied or had the repatriation process initiated, with the goal of using radiocarbon testing to help ascertain forensic significance from temporal information. Between the fall of 2023 and spring of 2025, 123 cases were selected for additional testing, and cortical bone samples (~1-2g) were cut and submitted for AMS radiocarbon testing.

Based on calibrated radiocarbon data, 59 individuals (48%) were determined to have died prior to 1650 AD, while 47 individuals (38.2%) were determined to have died between 1650 AD and the mid-twentieth century. Critically, 17 individuals (13.8%) were determined to have died after 1950 and were therefore re-classified as medicolegal cases and investigations re-opened. These efforts have resulted in two positive, personal identifications of decedents, one of whom had been missing since 1981, the other of whom had been missing since 1990. Based on our findings, we strongly encourage other medicolegal agencies and forensic anthropologists to use caution when using gross observations to assess taphonomically altered skeletal remains, and in the absence of unequivocal archaeological contexts, make use of radiocarbon testing as part of the scientific evaluation of forensic significance.

10.7 Digging into Forensic Investigative Genetic Genealogy: Transforming the Identification of Unidentified Human Remains

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Since the landmark 2018 arrest of the Golden State Killer—made possible by forensic investigative genetic genealogy (FIGG)—this methodology has rapidly gained traction and worldwide recognition as a transformative force in forensic investigations. Although widely known for solving cold case violent crimes, FIGG holds tremendous and often underutilized potential for medicolegal death investigators. Its application in identifying unidentified human remains (UHRs) provides critical resolution to families and closure to long-standing cases.

By merging traditional forensic DNA analysis with advanced genomic technologies and genealogical research, FIGG offers a proven, multidisciplinary advantage in postmortem contexts. This convergence transforms even severely degraded skeletal remains into viable sources of DNA. Whether handling a recent decedent or decades-old remains, FIGG serves as a powerful investigative lead generator particularly when conventional methods of identification—even traditional DNA-based methods—have been exhausted.

In this presentation, we will explore each stage of the FIGG process to understand its origin, evolution, and specific value in the identification of UHRs. We will examine how FIGG integrates with medical examiner postmortem investigative strategies and highlight why it should be a core component of the investigative toolbox. Attendees will learn how to assess candidate sample suitability, apply case selection criteria, and identify opportunities where FIGG can serve as a force multiplier alongside other forensic techniques.

Finally, we will provide an inside look at the advanced genomics laboratory process, walking through the investigative pipeline, from bone extraction to development of genealogical leads, and demonstrate how laboratory workflows combine with genealogical research to support identification.

Designed for forensic pathologists, medicolegal death investigators, and coroners, this presentation offers a practical, ethically-grounded understanding of how FIGG can unlock identifications once deemed impossible. By fostering collaboration among medicolegal professionals, forensic DNA laboratories, and genealogical researchers, FIGG paves the way for new interdisciplinary research and innovative investigative models in UHR identification

11.1 Systematized International Capacity Development for Forensic Pathology in Low-Resource Jurisdictions: A Proposed Model

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Most international jurisdictions (inclusive of USA and Canada) do not have enough forensic pathologists (FPs) for their medicolegal death investigation workloads. The USA has < 50% of the required forensic pathologists and the NAME has embarked on medical student education and recruitment drive to remedy this. The salary gap between FPs and anatomical pathologists (APs) in the US mostly responsible for chronic inability to recruit and retain FPs.

Some jurisdictions (especially low-resource countries) do not have postgraduate training programs in either anatomical pathology and/or forensic pathology and those so inclined have to seek training opportunities overseas in better-resourced regions (e.g., UK, Australia, USA, Canada, etc.). However, International Medical Graduates (IMGs) face numerous obstacles in being able to either pursue overseas postgraduate specialty training or attain recognized qualification/certification in anatomical pathology and/or forensic pathology. Navigating the respective medical qualifying examinations in the US and Canada to get in as a resident or fellow and the inability to sit their examination without having trained there are the main hurdles. Only the United Kingdom offers the opportunity for external candidates to challenge the exams.

This presentation will cover a proposed two-pronged approach that will aim to alleviate this shortfall in both the short and long terms by utilizing the training, examining and certifying bodies that are currently in existence internationally and bringing their collective experience in this area under one internationally accredited training, examining and certifying body that can provided a recognized postgraduate qualification that can be used in low-resourced jurisdictions but would be equal in international standard.

Short Term Objectives:

•Targeted training of autopsy pathologists in forensic pathology.
•Development and delivery of an accredited online didactic curriculum in forensic pathology via an already established platform known as the Medicolegal Death Investigation International Community of Practice (MLDI ICOP)
•Facilitation of Clinical Observerships and Elective Attachments (US, Canada, UK, Australia, South Africa).
•Preparation of candidates to challenge the UK exams in forensic pathology

Long Term Objectives:

•Creation of a new, accredited, internationally recognized training, examination and certification body in forensic pathology, with input from academics drawn from the existing international examining bodies* (RCPath UK, ABPath, RCPSC, RCPA, CMSA, etc.).

It will provide a workable solution to an international problem that negatively affects the criminal justice system in low resourced jurisdictions.

11.2 A Bloody Surprise: Case Report of Fibrinous Pericarditis in a Patient with Elevated Vitreous Urea Nitrogen (VUN)

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Fibrinous pericarditis is a form of pericarditis, characterized by a rough, granular appearance with fibrous adhesions and a shaggy, "bread and butter" appearance. The pericardial surface becomes inflamed and covered with fibrin, a protein that normally plays a role in blood clotting. It can be caused by trauma to the

chest, heart surgery, an acute myocardial infarct, uremia (kidney failure), infections, and malignancies. In some cases, pericarditis can lead to pericardial effusion, constrictive pericarditis, and cardiac tamponade. While not a direct cause, fibrinous pericarditis can create conditions where bleeding into the pericardial sac is more likely to occur. Hemopericardium due to fibrinous pericarditis, also known as hemorrhagic pericarditis, occurs when blood accumulates within the pericardial sac, often due to bleeding from inflamed or damaged tissue in areas of fibrinous pericarditis, potentially leading to cardiac tamponade, circulatory shock, and death.

We report a case of a 45-year-old female patient with a history of a motor vehicle collision two (2) months prior to death. She suffered splenic and skeletal injuries and underwent a splenectomy and open reduction internal fixation of the pelvis, right radius and ulna, and right tibia and fibula. At the time of her death, she was using a wheelchair and a walker for ambulation. Past medical history is significant for congestive heart failure, diabetes mellitus, chronic alcohol use, and cirrhosis.

At autopsy, 1150 milliliters of hemopericardium were present. The abdominal cavity contained 4350 milliliters of reddish-brown ascites. The heart was enlarged (570 grams) and the liver, 3140 grams, was yellow, hard, and had a micronodular surface. Microscopic examination of the heart revealed hypertensive changes, as well as a fibrinous exudate admixed with blood. Toxicology was negative for drugs and alcohol. Analysis of the vitreous fluid reveled a creatinine level of 2.40 mg/dL and a urea nitrogen level of 56.5 mg/dL, indicating kidney failure. In uremia, a complication of advanced renal failure, toxins build up in the blood and can inflame the pericardium, leading to uremic pericarditis, which is often fibrinous in nature. The cause of death was determined to be hemopericardium due to fibrinous pericarditis (severe) due to renal failure with hypertensive cardiovascular disease, cirrhosis, diabetes mellitus, and heart failure as other significant contributing conditions. The manner of death was natural.

11.3 Victims of the Volcano: A Survey of Fatalities in Mount Rainier National Park that Challenge Medicolegal Death Investigation and Death Certification

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Introduction: Mount Rainier National Park (MRNP) became the fifth National Park in the United States in 1899. Its 369 square miles are located predominantly within the bounds of Pierce County, Washington. An average of 1.9 million visitors has entered MRNP each year over the last 25 years to hike, climb, snowshoe, ski, fish, bike, kayak, camp, or to simply take in the views. Mount Rainier itself is an active volcano and the tallest glaciated peak in the contiguous United States. While beautiful, MRNP is also considered one of the deadliest National Parks with at least 450 deaths since 1897. These deaths often make national, and sometimes international, news.

This presentation aims to provide an overview of the fatalities that occur in MRNP, discuss the challenges these death investigations face, and provide a framework on how to approach similar cases including death certification where a body is not recovered.

Methods: A search query was performed in the Pierce County Medical Examiner's Office's database, MEDIS, using the query function. A query was performed searching for "Mt. Rainier National Park" in the law enforcement agency field with an output including case number, decedent age, death date, death location, and exam type. The data was restricted to cases in which jurisdiction was accepted and further information was collected including cause of death, manner of death, how injury occurred (if applicable), and location of event in MRNP (if available). Additional cases were identified via an online search of news headlines involving Mount Rainier deaths.

Discussion: MRNP deaths have remained relatively stable with approximately 5 deaths per year between 2000 and 2024. The cases were often complicated by delayed recovery and complete lack of or minimal photos of the incident scene. Potential remedies to improve visualization of the scene, including utilization of a countywide geographic information system (GIS), are discussed. There were multiple cases of presumed death (when a body cannot be located or recovered) identified. The certification of these cases is the responsibility of the medical examiner/coroner in Washington. The

approach to this dilemma will also be discussed. The data collected will be generated into a report to be shared with the National Park Service Rangers. The challenges faced during these investigations have provided lessons learned to apply to the MRNP death investigations and presumed death certifications of the future.

11.5 Human Spaceflight: Unique Considerations for Medicolegal Death Investigations

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Cosmonaut Yuri Gagarin became the first human to achieve space flight on April 12, 1961. On July 20, 1969 Apollo 11 Astronauts Neil Armstrong and Edward “Buzz” Aldrin landed on the moon. For the past twenty-five years, astronauts have continuously occupied and operated the International Space Station in low Earth Orbit. Since the U.S. Commercial Space Launch Act of 2015, multiple spaceflight companies have successfully launched civilian individuals into space. Although there have been relatively few human spaceflight mishaps that have resulted in the loss of crew, the increase in number of flights by both government and civilian companies increases the risk. Additionally, the medicolegal death investigation of past mishaps has been performed primarily by governmental organizations. With the increase in commercial crewed spaceflights operating under a FAA license, it is likely that local medicolegal systems will have primary jurisdiction over the medicolegal death investigation. Thus, it is paramount that medicolegal systems understand the unique aspects of spaceflight, the applicable regulations, and the available resources.

This presentation will review the various stages of human spaceflight, including launch/ground, ascent, earth orbit, outbound, lunar orbit, lunar surface, earth return, entry and landing. In each stage of spaceflight, there are unique conditions and hazards that may result in death of the astronaut. Understanding these hazardous and the changes the human body undergoes during various phases of flight is critical for comprehensive human spaceflight death investigations. Current and applicable regulations, protocols and documents pertaining to death during human spaceflight, including the National Aeronautics and Space Act, Operational Considerations for Crew Fatalities on the International Space Station, and the Physiologic Changes, Injuries and Forensic Considerations with Human Spaceflight Reference Guide will be discussed. Lastly, the collaborative efforts between NAME’s Aeronautics and Space Ad-hoc committee and NASA’s Office of the Chief Medical Officer will be highlighted.

11.6 The Smoking Gun: A Potentially Significant Contributor to Evidence of Close-Range Firing

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Range of fire determination is consequential in deaths involving firearm wounds, particularly cases in which shots may allegedly be self-inflicted. However, the deposition, density, and distribution of soot, gunpowder tattooing, and/or gunpowder particles can be markedly variable even when a close range of fire is definitively established by circumstances or investigation. In some cases where contact-range, self-inflicted gunshot wounds present little or limited grossly visible soot at autopsy, subsequent investigation reveals that the gun was recently purchased, suggesting that evidence of close-range firing seen at postmortem examination does not solely originate from the propellant load in the latest cartridge fired, but may also derive from fouling within the gun from past firings. To evaluate this possibility, 1,000 rounds were fired sequentially from a new semiautomatic pistol, with no cleaning performed during the firing regimen through shot #999. Selected rounds were fired against cloth witness panels, and the deposition and distribution of soot and gunpowder were compared. Shots later in the firing regimen generally deposited more residue than the first shot from the new pistol. Thorough cleaning of the pistol prior to shot #1,000 decreased the amount of residue deposited relative to shot #999. The results demonstrate that the antecedent state of cleanliness (or fouling) of a firearm can influence the deposition of evidence of close-range firing.

12.1 Cases Comparisons of Blood, Vitreous Fluid, and Urine (Where Available): Update of Drug Screen Findings in Over 200 Cases

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Vitreous fluid is located in the eye between the retina and the lens. It is made up of ~ 99% water but 2 to 4 times more viscous. Vitreous fluid is commonly tested for electrolytes, glucose, creatinine, urea nitrogen, heroin exposure, recent cocaine use, and to determine the absorption state of ethanol. It can also be tested as a second specimen to confirm drug findings from another matrix. Depending upon the circumstances of a death, vitreous fluid may be the best or only specimen available for toxicology testing. Data regarding the presence and concentration of drugs in vitreous fluid as compared to whole blood is limited. Drug penetration in to vitreous fluid depends on various factors: blood concentration, physicochemical and pharmacological properties, distribution volume, protein binding and blood retinal barrier (BRB) permeability. Drugs may diffuse passively or be actively transported across the BRB. Confirmed drug findings in over 200 cases were compared between blood, vitreous fluid, and urine, where available. These data are important to help determine if a specific drug would be expected to be detected in vitreous fluid. Knowledge of the limitations of using vitreous fluid as a matrix in which to perform general drug screening is necessary for the proper interpretation of the results.

The blood, vitreous fluid, and urine were screened by liquid chromatography-quadrupole time of flight mass spectrometry (LC-QTOF-MS) for approximately 350 drugs in 24 drug classes. The three matrices were sent to confirmation for those drugs that screened positive. The screening and confirmation methods were fully validated in all three matrices per the requirements of ABFT and ISO 17025. Commonly encountered drugs did confirm in vitreous fluid with the exception of cannabinoids. In fact, a lingering opioid death may be able to be determined by comparing blood and vitreous fluid concentrations. Two cases involving fentanyl will be presented as an example. Vitreous fluid can be useful in the detection of some drugs but not all drugs. In an acute overdose, drugs may not have had enough time to pass into the vitreous fluid before death occurred, an example of such a case will be presented. Also drugs at lower concentrations in blood may not be detectable in vitreous fluid, as well as those drugs that are lipophilic like benzodiazepines. Vitreous fluid has its place in toxicology testing, however due to its' limitations, using it as a specimen for general drug screening should be avoided.

12.2 Novel Autopsy Method for the Rapid Detection of Calcium Oxalate Crystals in Two Cases of Ethylene Glycol Poisoning: Scrape Smear May be a More Sensitive Method Compared to Kidney Histology

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Introduction: Ethylene glycol poisoning results in numerous biochemical and pathophysiologic changes, one of which is formation of calcium oxalate crystals which are typically found in the kidney. The crystals have a characteristic morphology and are birefringent on polarization microscopy. Described is a new method to visualize crystals at the time of autopsy. Case 1: 47-year-old man ingested antifreeze fluid at his place of employment. Case 2: 62-year-old woman was found dead at her residence. A bottle of antifreeze fluid was found in her kitchen sink.

Methods: Complete autopsies were performed with comprehensive toxicologic analysis including special testing for ethylene glycol. As a part of the autopsy, the kidneys were bivalved, as usual. A new scalpel blade was then used to scrape the renal cortex and medulla multiple times. The blade edge was then smeared across the surface of a glass slide. The smeared material on the slide was left to dry and then cover slipped. The unstained smears were examined using a standard light microscope with polarized light. Formalin fixed paraffin embedded sections of kidney were stained with hematoxylin and eosin and examined.

Results: Examination of the kidney scrape smears from cases 1 and 2 under polarized light showed numerous to a moderate number of dumbbell and fan-shaped crystals, typical of calcium oxalate (monohydrate). Interestingly, no crystals were identified by kidney histology in Case 2.

Case 1: Postmortem blood ethylene glycol 81.2 mg/dL.
Kidney scrape smear: Numerous crystals present.
Kidney histology: Numerous crystals present.
Manner: Suicide.

Case 2: Postmortem blood ethylene glycol 117 mg/dL.
Kidney scrape smear: Moderate number crystals present.
Kidney histology: No crystals present.
Manner: Suicide.

Discussion: Presented is an easy, fast, and minimal cost method for the rapid intra-autopsy detection of kidney calcium oxalate crystals. This could represent an indirect screening test for ethylene glycol poisoning. This study shows the following findings: 1) Both cases show that crystals can be detected during autopsy utilizing kidney scrape smears examined by polarization microscopy. 2) Case 2 illustrates a case of ethylene glycol poisoning with no crystals detected by kidney histology; however, crystals were demonstrated by kidney scrape smear examination. Therefore, the scrape smear method may be more sensitive than histology for the detection of crystals. Scrape smears of the kidney at the time of autopsy could offer a rapid screening test that may enable more informed decision making at the time of toxicology test ordering.

12.3 The Utility of UV/IR Photography in Identification of Hidden Elements to Aid in Identification and Investigation

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Ultraviolet (UV) and infrared (IR) photography have long served forensic science by revealing otherwise hidden details such as latent tattoos, gunshot residues, and other obscured evidence. These imaging techniques operate beyond the visible spectrum, capturing the reflectance of materials—such as tattoo pigments or gunpowder residues—that respond to UV or IR wavelengths. Our team, along with other forensic professionals, have successfully applied UV/IR photography to identify latent tattoos in decomposed or mummified remains, where visual inspection is limited due to postmortem skin darkening. The preserved tattoo pigments within the epidermis reflect non-visible light, which can be recorded using cameras equipped with appropriate lenses and filters. Similarly, we have utilized this technique to detect gunpowder residues on dark or soiled clothing, aiding in the interpretation of atypical entrance and exit wounds and the estimation of firing range. While these applications are well-established, widespread adoption has been hindered by the cost and complexity of traditional imaging equipment. However, more recent developments in digital single-lens reflex (DSLR) technology have made it possible to convert standard, commercially available cameras—common in many autopsy suites—into UV/IR-capable systems with minimal training required for their use. In this presentation, we highlight the forensic utility of UV/IR photography through multiple case studies and provide practical guidance on affordable equipment options and user-friendly techniques suitable for professionals familiar with basic photography.

12.4 Synthetic Cannabinoid Prevalence in Prison Deaths

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Synthetic cannabinoids are the largest subclass of novel psychoactive substances and present high public health risks due to severe adverse effects which can lead to death. The synthetic cannabinoid market has rebounded in the last year after a shift caused by class-wide control implemented by China in mid-2021. The current landscape remains unpredictable and volatile; however, some high potency synthetic cannabinoids continue to dominate the market, being identified in an increasing number of fatal intoxications. Pathologists may not be aware that synthetic cannabinoids are not included in routine drug testing panels, due to their complex chemistry and can be overlooked.

In collaboration with NMS Labs and the University of Texas Medical Branch, 45 postmortem cases from the Texas Department of Criminal Justice with no initial significant toxicological findings and no other notable cause of death were submitted to the Center for Forensic Science Research and Education (CFSRE) for comprehensive synthetic cannabinoid testing. Drug identification was performed using liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QTOF-MS) and quantitation of MDMB-4en-PINACA was performed using liquid chromatography tandem quadrupole mass spectrometry (LC-QQQ-MS). Basic demographic and case information were provided.

Synthetic cannabinoids were detected in 100% of submitted cases. Specimens were collected between August 2023 and March 2025. Individuals were 23 to 71 years of age (median 43) and primarily male (93%). From case histories, 64% were described as “individual found unresponsive in cell”, or similar. 5F-ADB 3,3-dimethylbutanoic acid, the primary metabolite and degradation product of 5F-ADB, was identified in most cases (80%), followed by MDMB-4en-PINACA 3,3-dimethylbutanoic acid (31%), and a combination of both drugs (17%). Parent synthetic cannabinoids 5F-ADB and MDMB-4en-PINACA were detected in 4.4% and 11% of cases, respectively. MDMB-4en-PINACA was quantitated in four cases with a median concentration of 0.16ng/mL (mean: 0.17±0.03ng/mL, range: 0.14-0.22ng/mL). Additional toxicology findings included naloxone (40%) and methamphetamine (9%); however, synthetic cannabinoids were identified as the primary drugs of interest in all cases.

Synthetic cannabinoids continue to cause and contribute to intoxications and deaths in prisons due to the ease with which contraband can be smuggled, and difficulties in detection by prison officials. Forensic toxicology testing for synthetic cannabinoids should be pursued in fatal overdoses, especially among high-risk populations where there is no apparent anatomical cause of death or no significant toxicology results. Forensic laboratories should be aware of the analytical difficulties that come with identifying synthetic cannabinoids, including sub-ng/mL concentrations, structural variety, and instability.

12.5 The Role of Autopsy in Alcohol Use Disorder: A Retrospective Review

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Many Americans are affected by alcohol use disorder. According to 2023 National Study on Drug Use and Health, 28.9 million people have alcohol use disorder. Health care costs in 2023 were approximately $27 billion. Medical examiner/coroner offices have long felt the burden of handling alcohol related deaths. Offices exist where policy is to autopsy all decedents with alcohol use disorder. This study evaluates if a full autopsy is a good use of the medical examiner/coroner’s budget and time.

A retrospective study of alcohol-related deaths between January 2007 to December 2024 was performed among 3 institutions. The study was undertaken to review unwitnessed alcohol-related deaths and assess if there were benefits to performing an autopsy just because the decedent had alcohol use disorder. There were 772 deaths to include 38 head-only autopsies. We compared the parameters of sex, cause of death, place of death, where found, and the presence of cirrhosis. If trauma was present, we then determined if the decedent had any external head trauma, if a head only autopsy was performed, where was the place of death and what was the found position.

The decedents were overwhelming male, 612, compared to 160 females and 421 decedents had cirrhosis of the liver. Cause of death attributed to alcohol-related/liver disease was 421, heart disease 166, other 137 and trauma 28 (27 head trauma and 1 other trauma). The most common place of death was home/hotel in 572, outside in 155, motor vehicle in 24, other in 7 and unknown in 14 cases. Individuals were found on the floor (266), the ground (147), the bed (136) and various unknown places (173). Ten (10) of the 27 decedents with trauma as the cause of death also had external head trauma; with 3 head only autopsies displaying trauma. Of the trauma group, 19 died at home/hotel, 6 died outside and 2 died in a motor vehicle. In addition, the trauma group had 11 decedents found on the floor, 6 found on the ground and the remaining 10 were found in unknown other areas.

Due to the shortage of board-certified forensic pathologists, this study demonstrates it is not beneficial to perform an autopsy just because there is a history of alcohol use disorder. There are many other

parameters that should be evaluated. In summary, each office will have to determine their level of comfort and exam type for these cases.

12.6 Postmortem Formation of Ethanol in Vitreous Fluid

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Introduction: Interpretation of ethanol results in postmortem blood samples has numerous known limitations. After death has occurred, ethanol can form in the blood if sufficient glucose and bacteria are present to facilitate the chemical reaction. This postmortem formation of ethanol has led to the best practice technique of verifying ethanol concentrations in a secondary matrix, typically vitreous fluid. Vitreous fluid has a similar water content to blood, which means that ethanol will distribute at a ratio close in comparison to blood. In addition, the enclosed eyeball provides a protective barrier to external bacteria. Objectives: This objective of this study was to evaluate the prevalence of postmortem ethanol formation in vitreous fluid while trying to identify underlying trends and/or causes.

Methods: Cases selected for inclusion were submitted between January 2022 and January 2025 to NMS Labs and had ethanol testing performed in both blood and vitreous fluid. In addition, the vitreous was tested for glucose. Alcohol testing was performed by headspace gas chromatography on a dual column, with a flame ionization detector. The test method included the following compounds in scope (reporting limit): ethanol (10 mg/dL), acetone (5 mg/dL), isopropanol (5 mg/dL) and methanol (5 mg/dL). Glucose was tested by chemical analyzer, with a reporting limit of 10 mg/dL.

Results: In total, 463 cases were identified that had a positive vitreous ethanol result, but ethanol was not reported in blood. The vitreous ethanol concentrations ranged from 10-624 mg/dL. From those identified: 320 cases (69%) had low-range vitreous ethanol concentrations (10-50 mg/dL), 341 cases (73%) also had acetone and/or isopropanol detected. Vitreous glucose concentrations ranged from 10-797 mg/dL (n=196).

Discussion: Vitreous fluid is often assumed to be protected from postmortem ethanol formation. However, if sufficient glucose and bacteria are present, this matrix is also susceptible to neogenesis of ethanol. If vitreous is the only available matrix, testing for acetone, beta-hydroxybutyrate, and/or glucose is recommended as they may provide more context for ethanol interpretation.

12.7 Sodium Azide: Death and Risk in 700mg

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Attendees will learn about the extremely hazardous nature of Sodium Azide, and their potential to come into contact with it. This presentation will build on the limited knowledge and growing popularity of suicides utilizing Sodium Azide. A literature review with case trends, decedent demographics, information about the potential for exposure at the scene and at autopsy, methods of exposure, and other hazardous circumstances that can arise when encountering Sodium Azide will be included. Suggested mitigation methods will be presented, one being the newer research showing Sodium Azide is able to be detected in postmortem blood. This eliminates the need for further invasive procedures to acquire required tissue samples as previously believed for toxicology testing that can elevate the risk of exposure.

Sodium Azide is an odorless, colorless, white powder chemical commonly found in air bags of vehicles, pesticides, and in laboratories as a specimen preservative. However, it is exceedingly dangerous, and intoxication can occur through several methods. It can be ingested, inhaled, or absorbed through the skin. It can be ingested in powder form or dissolved in a liquid, usually water. Some individuals will inhale the Hydrazoic Acid that develops from the mixture. 700mg is the amount needed to be fatal.
It is also especially reactive with heat, water, and metals, exploding when contact is made. This presents unique challenges when disposing of this substance that must be handled very carefully to avoid injury to

personnel and damage to property. Due to these dangerous characteristics, response by a hazardous materials team is standard procedure for these scenes.

Personnel working in coroner/medical examiner offices must handle decedents that have ingested or been exposed with extreme caution. There is potential for an explosive reaction when metal instruments come into contact with gastric content containing Sodium Azide. Hydrazoic Acid can also be released when the stomach is opened. First responders have reported feeling effects of exposure within minutes of arrival into a scene. These effects can quickly arise in the autopsy suite.

Until recent years, these cases were rare. To date, there is only one successful treatment of intentional ingestion at a dose above the lethal amount in the literature. Sodium Azide has gained popularity among online suicide "self-help" groups and books as well as "self-euthanasia" communities. Awareness of this extremely volatile substance, its quickly incapacitating qualities and difficult treatment are the only way to prevent harm to those in our field.

12.8 Utilizing In-Suite Immunoassay Screening as a Triage Tool for Autopsy Caseload Management

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In recent years, the increase in opioid deaths and the lack of adequate numbers of forensic pathologists has caused increased turnaround time for certified autopsy results, increased workplace stress, and burnout among forensic pathologists, with a negative impact on medical examiner offices nationwide. In an effort to efficiently utilize resources and personnel available, the Alabama Department of Forensic Sciences (ADFS) has deployed Randox Evidence MultiSTAT benchtop analyzers in each of our three regional medical laboratories. The Randox MultiSTAT uses the same immunoassay screening technology as in the ADFS Toxicology Laboratory (Randox Evidence Analyzer Plus). Between March and October 2023, 91 postmortem blood samples were collected from non-decomposed suspected drug overdose cases examined at the Montgomery Medical laboratory. Peripheral and/or central blood was drawn from each case during the external examination phase of the autopsy, and was tested on the MultiSTAT. A full forensic autopsy was then completed and all blood samples were forwarded to the ADFS Toxicology laboratory for confirmation testing. Following confirmation testing, statistical analysis was conducted to assess the sensitivity, specificity, false positive rate, false negative rate, and the accuracy of the results generated from the 20 drug/drug classes on the Randox MultiSTAT Drugs of Abuse (DOA) biochip. Most significantly, AB-PINANCA, Fentanyl, and Methamphetamine each had a sensitivity and specificity of 99%. Overall, there were 15 false positive tests (1.0%) and two false negative tests (1.4%) in the 91 samples tested; the accuracy was calculated at ≥ 99%. Using the results from the Randox MultiSTAT, ADFS has utilized this medical information to triage suspected drug overdose cases to external examination with confirmatory toxicology testing; saving time, increasing autopsy throughput, and reducing the full forensic autopsy workload from 63% in 2023 to 54% in 2024, a 9% percentage point decrease.

12.9 "Tranq-Dope," "Benzo-Dope," and Modern "Speedballs": Adulteration of the Illicit Fentanyl Supply Complicates Postmortem Investigations

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Drug overdoses have become more complex over time to properly investigate, as the illicit drug market continues to evolve and expand. Illicit fentanyl has been the primary driver of overdose fatalities since the mid-2010s. However, the illicit fentanyl or "dope" supply has become increasingly adulterated over time, with the addition of novel synthetic opioids (NSOs), designer benzodiazepines (DBZDs), alpha-2 agonist sedatives like xylazine, and central nervous system (CNS) stimulants. Seized drug testing of counterfeit pills and powders have demonstrated the increasingly polysubstance composition of street products and toxicology testing has accordingly expanded to account for these changes.

A review of postmortem blood toxicology results was conducted for samples that underwent comprehensive screening using high resolution mass spectrometry in 2024 with reporting of fentanyl and commonly encountered adulterants. Fentanyl was reported in 22,543 postmortem blood specimens under the studied population. Xylazine, added to illicit fentanyl and colloquially referred to as “tranq-dope”, was reported in 15% of those cases. Cocaine and methamphetamine were co-reported in 25% and 19% of studied cases; although misused independently, they also can be mixed with fentanyl in “speedball” type formulations. Mixtures of synthetic opioids with benzodiazepines have been referred to as “benzo-dope”. DBZDs, dominated by bromazolam, were reported in approximately 8% of these cases. Combinations of opioids have been routinely reported for years, especially when fentanyl started to appear in heroin samples. This has subsequently been reversed, with heroin adulterating some fentanyl exhibits; morphine and 6-MAM were reported in approximately 7% and 2% of the studied cases. At least one fentanyl analogue was found in 15% of cases, with *para*-fluorofentanyl and acetylfentanyl reported in 9% and 7% of cases. The “nitazene” subclass of NSOs were also detected in 94 fentanyl-positive cases. However, an important caveat for the nitazenes and specific novel DBZDs is that they are underreported due to variable testing protocols.

The polysubstance nature of today’s illicit drug landscape has far-reaching implications. Additional substances with CNS activity should be monitored and reported in death certificate data, especially when involved in drug-related deaths. Seized drug testing should work in concert with postmortem toxicology testing, as identifying concurrent vs contemporaneous use of illicit drugs can be impactful, particularly in drug delivery resulting in death investigations. Monitoring for an increasing number of substances, including medetomidine, BTMPS, and *ortho*-methylfentanyl, in postmortem toxicology will also assist in regional differentiation of illicit fentanyl supplies, but continues to challenge toxicology stakeholders.

P1 *In Utero* Assault Could Prove Fatal After 36 Years: An Unusual Case of Epileptogenic Porencephaly

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Porencephaly refers to two extremely rare types of cerebrospinal fluid-filled intracranial cavities that almost always develop from some inciting event such as hypoxia, ischemia, or trauma. Distinguishing between the two types of porencephaly—agenetic versus encephaloclastic—is chiefly a matter of determining when the inciting event occurred and is also helpful in conceptualizing how the cavity formed. Agenetic porencephaly, also called schizencephaly, is a developmental problem in which injury to the germinal matrix prior to about 24 weeks gestation leads to impaired neuroblast migration and the formation of a cystic cavity lined with dysplastic gray matter, usually in communication with the ventricular system. Encephaloclastic (“pseudo”) porencephaly arises after 24 weeks gestation from a broader range of insults that destroy parenchyma and replaces it with a cyst lined with spongiotic white matter that may become walled off or exhibit gliosis. Clinical manifestations of porencephaly are highly variable, but commonly include epilepsy, paresis, and neuropsychiatric disturbance. We report a 36-year-old man who died from anoxic brain injury in the setting of status epilepticus. His epilepsy began at age 17, when a large left-sided parietooccipital cyst was discovered and radiographically misdiagnosed as a congenital arachnoid cyst. His seizures proved refractory to neurosurgical fenestration and numerous antiepileptic medications. An alternative diagnosis of porencephaly was considered by a neuroradiologist one year prior to his death. At autopsy, neuropathologic examination of the brain showed a peri-ventricular cystic lesion adjacent to white matter with no signs of pericystic gliosis, consistent with encephaloclastic porencephaly arising within a narrow window of time, around 26–29 weeks gestation, prior to extensive astrogenesis. Postmortem toxicological analysis of blood detected therapeutic levels of the patient’s prescribed antiepileptic drugs. Subsequent interviews with the decedent’s family revealed that his mother was the victim of a physical assault including strangulation during the late second or early third trimester of pregnancy with the decedent. Given this additional case history, one must consider homicide as a possible manner of death. To our knowledge, this is the first reported case of fatal seizures in an adult secondary to previously mischaracterized porencephaly. It is also the first known report of porencephaly occurring decades after an *in utero* assault and may represent an underappreciated way by which ischemic insults to the developing embryological brain can have lifelong and potentially lethal consequences.

P2 Left Dominant Arrhythmogenic Cardiomyopathy, Active Phase: Two Case Reports Highlighting Genetic and Pathologic Insights

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Arrhythmogenic cardiomyopathy (ACM) is a genetic heart muscle disease that commonly presents in adolescence or young adulthood. Historically considered a pathology originating from the right ventricle ("Arrhythmogenic Right Ventricular Cardiomyopathy" [ARVC]), recent advancements in postmortem investigations, genotype-phenotype studies and myocardial tissue characterization have shown this pathology can affect both ventricles. This broader understanding has paved the way for the recognition of left-dominant forms of the disease. Histologically, ACM presents with fibrofatty replacement of the myocardium. However, in the active or "hot" phase of the disease, inflammation and myocardial remodeling predominate, mimicking infectious or inflammatory conditions such as myocarditis. This report presents two cases of left-dominant ACM in the active or "hot" phase.

The first case involves a previously healthy 23-year-old male who, prior to his death, had initiated a new exercise regimen, dietary changes, supplementation with workout products, and the consumption of energy drinks containing caffeine. At autopsy, the posterior wall of the left ventricle and interventricular septum exhibited mottled discoloration. Histology revealed subepicardial fibrosis, active myocardial remodeling with band-like distribution, lymphohistiocytic inflammation, and myocardial injury. This constellation of findings was consistent with the active phase of ACM, a form of the disease that is characterized by ongoing myocardial injury and remodeling. Genetic testing revealed a heterozygous variant of uncertain significance in the *MRAS* gene.

The second case involved a 40-year-old male with no significant medical history who was witnessed to become suddenly unresponsive during a meeting. The decedent was reportedly active and intentionally lost 20 pounds the month prior to death. His autopsy revealed cardiomegaly, inflammation with myocardial injury/remodeling, and fibrofatty replacement involving the left ventricular wall and interventricular septum, indicative of the active phase of ACM. The genetic panel revealed a heterozygous variant of uncertain significance in the *EYA4* gene.

These cases underscore the critical importance of considering left-dominant forms of ACM and recognizing the active phase of ACM when lymphohistiocytic myocardial inflammation is identified. Furthermore, they highlight the necessity of further research into the clinical significance of genetic variants identified in ACM patients, particularly those of uncertain significance, and their potential implications for family members who may be at risk. Correct diagnosis is imperative, as ACM has different treatment protocols and implications for family than its infectious and inflammatory mimics. The investigation of both genetic and pathological factors remains essential for advancing our understanding of ACM and improving patient care, including genetic counseling and family screening.

P3 Death due to Arthrogryposis and Associated Comorbidities: A Case Report

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Arthrogryposis describes a variety of congenital conditions that involve multiple joint contractures, and it can be caused by over 400 different genetic conditions. These contractures can be seen in joints of the limbs, jaw, and spine. Both orthopedic surgery and physical therapy have been shown to improve joint mobility and function, with specific focus on progression towards independence, however many of the genetic disorders underlying these conditions may cause dysfunction in other systems of the body. Here we present a case of arthrogryposis and associated comorbidities that resulted in death. The purpose of this presentation is to shed light on conditions associated with arthrogryposis and the diagnostic features found at autopsy.

A 7-year-old female with congenital arthrogryposis was found dead at home 45 minutes after being put to bed. She was nourished by a gastric tube, because of frequent mucus plugs and choking, believed to be related to chest wall mobility issues related to her arthrogryposis. A medicolegal autopsy was performed. Internal examination revealed dilation of both ventricles of the heart, focal areas of extravasated blood and mucous plugging in the lungs, and congestion of hepatic parenchyma. There were also healed scars along the anterior neck, midline of the abdomen, and several on the lower extremities, evidence of past surgical intervention. Microscopic examination revealed bronchitis with inflammatory cell infiltrate and extension into pulmonary interstitial, bronchial wall thickening with hypertrophic smooth muscle, hepatic steatosis, and muscle atrophy with fat infiltration. Bronchitis, interstitial pneumonitis, cardiomegaly, and underlying arthrogryposis were determined to be the cause of death, and the manner of death was natural.

While arthrogryposis is a relatively common condition, it presents differently in almost every patient. Despite patients seeing improved function with surgical procedures and physical therapy, the comorbidities and complications associated with arthrogryposis can be fatal. This case highlights the importance of understanding the complex nature arthrogryposis and improving awareness of associated pulmonary complications. Recognition of potential respiratory compromise in children with arthrogryposis is crucial in ensuring proper care and preventing fatality. This case also displays the importance of both gross and microscopic exams at autopsy, as they revealed changes seen in the lungs, liver, and musculature that otherwise would not have been noted. It is important for forensic pathologists to consider arthrogryposis as a contributing cause of death, especially in cases where thoracic involvement and pulmonary compromise is seen clinically or historically.

P4 When Sore Throats Turn Deadly: Two Fatal Cases of *Streptococcus constellatus* with Deep Neck and Mediastinal Spread

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Streptococcus constellatus, a member of the *Streptococcus anginosus* group, is a facultative anaerobe commonly found in the oropharynx, gastrointestinal tract, and genitourinary tract. While typically low-virulence, it can cause severe purulent infections. We present two fatal cases of *S. constellatus* infection in previously ambulatory adults without documented medical history, both of whom rapidly decompensated following a brief prodrome of sore throat and difficulty swallowing. Both cases demonstrate the rare but catastrophic progression of deep neck space infection with mediastinal and pulmonary involvement.

The first decedent was a 58-year-old man found unresponsive at home after three to four days of sore throat and dysphagia. External examination revealed accelerated decomposition changes of the neck including diffuse green discoloration of the anterior neck and palpable subcutaneous emphysema. The neck appeared markedly swollen. Autopsy revealed extensive fibrinopurulent material in the oropharynx, anterior neck, trachea, proximal esophagus, and subcarinal soft tissues, consistent with descending necrotizing mediastinitis; in addition, there were pleural effusions with fibrinopurulent exudate. Blood culture grew *S. constellatus*.
The second case involved a 60-year-old woman found deceased in bed after thirteen days of sore throat, low-grade fever, and progressive facial swelling. External examination showed facial and submandibular edema with diffuse green discoloration of the anterior neck. Internal findings included bilateral tonsillar and submandibular necrosis with extension into the anterior neck musculature. Purulent fluid tracked into the upper mediastinum and lungs. Postmortem blood cultures identified *S. constellatus*, with co-detection of SARS-CoV-2 and adenovirus on respiratory viral panel.

Both deaths were certified as natural and attributed to complications of *S. constellatus* infection. These cases underscore the organism's potential for rapid and fatal disease progression, particularly in individuals with limited access to medical care. In both instances, external signs - such as facial and neck swelling and accelerated decomposition of the neck with skin discoloration and subcutaneous emphysema - served as clues to a deep-seated infection. Internally, the extent of purulence, necrosis, and mediastinal and pulmonary extension underscored the full extent of disease that may not be clinically apparent. Forensic pathologists should maintain a high index of suspicion for *S. constellatus* in sudden deaths

preceded by infectious symptoms, particularly sore throat, dysphagia, neck swelling, and fever, in conjunction with early or rapid decomposition changes of the anterior neck. These cases reinforce the diagnostic and medicolegal value of thorough external examination alongside comprehensive head, neck, and thoracic dissection in evaluating suspected infectious deaths.

P5 Little Bullets but Big Impacts

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Firearms are a leading cause of violent injury and death. Most crime-related shootings and fatalities within the United States involve low-velocity, medium- or large-caliber firearms, such as .380 ACP, 9 mm, .40 S&W, or .45 ACP handguns, or high-velocity firearms, such as AR-15 self-loading rifles. Low-velocity, small-caliber rounds, such as the ubiquitous .22 long-rifle cartridge, are occasionally encountered in crime-related shootings, but are less common than incidents involving center-fired cartridges. A lesser-known small-caliber cartridge is the .17 HMR. Like the .22 cartridge, the .17 cartridge is rim-fired, being contained in a casing that is of similar diameter as a normal .22; however, the neck of the casing is tapered-down to contain the .17 diameter projectile. In contrast to the .22, the .17 HMR is considered a high-velocity round and is touted as an excellent choice for hunting small game and eliminating varmints. There is limited literature documenting deaths and wounds from these high-velocity, rim-fired, small-caliber bullets. Herein, we describe two homicide cases where .17 HMR caliber bullets were involved in the lethal outcomes.

Case 1: A 28-year-old male was found outdoors frozen and deceased, two days after having been reported missing. He was discovered with multiple stab wounds and five gunshot wounds. He sustained stab wounds to the right side of his head, right temple, anterolateral left neck, and bilateral cheeks. He had multiple gunshot wounds from a .17 HMR caliber firearm, including entrance wounds of the lower left and right back, the upper left and right arms, and the right forearm. Radiography revealed the classic “lead snowstorm” appearance of fragmented high-velocity projectiles, along with fracture of both humeri. The cause of death was sharp force injuries of the head and neck, with multiple gunshot wounds being a contributing cause.

Case 2: A 17-year-old male sustained a gunshot wound during a “drive-by shooting” scenario and later passed away from his injuries. At autopsy, he had a single entrance wound on his lower left chest, produced by a .17 HMR projectile. Radiography revealed a deformed projectile along with multiple fragments. The projectile injured multiple organs. The cause of death was a gunshot wound of the chest. These two cases provide insight into the .17 HMR projectile. Although currently uncommon, this small-caliber, rim-fired, high-velocity ammunition has the potential to become more commonly encountered by those dealing with traumatic gunshot injuries and deaths.

P7 Fatal Case of Severe Meconium Aspiration Syndrome in a Neonate Following Out-of-Hospital Water Birth

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Meconium aspiration syndrome (MAS) is a disease of mature newborns associated with increased infant morbidity. MAS is the result of inhalation of meconium-stained amniotic fluid (MSAF) near the time of birth and often signals fetal distress. MSAF occurs in about 14% of pregnancies, with 3–12% developing MAS. Severe cases may require ventilation, and <1% result in death. Advanced gestation and out-of-hospital births have been associated with an increased risk of MAS. We present a case of severe MAS overlooked at birth, highlighting the importance of including MAS in the differential diagnosis of sudden natural death in infancy—particularly in the presence of MSAF, even when initial APGAR scores are reassuring.

A 1-day-old male is born at 42 weeks gestation following an uncomplicated pregnancy with regular midwife-led prenatal care at a birthing center. Labor lasted 12 hours and delivery was via spontaneous vaginal water birth. MSAF was noted. At birth, he showed no immediate distress, with APGAR scores of

8 and 9. No initial respiratory difficulties were observed. However, he was noted to have difficulty latching during breastfeeding and to be lethargic. He became apneic while feeding 16 hours after birth. Resuscitation by emergency services was unsuccessful and the infant was pronounced deceased. Postmortem examination revealed diffuse meconium staining of fetal surfaces and the placenta. The heart showed right ventricular hypertrophy and dilation. Pulmonary histologic demonstrated diffuse alveolar damage with hyaline membranes, meconium-laden macrophages, airway obstruction by fetal squamous cells, and features of pulmonary hypertension.

MAS is a recognized complication of term deliveries. Characteristic findings include green discoloration of fetal skin or placenta. However, confirmation of MSAF at autopsy can be challenging, as postnatal bathing often obscures external signs of meconium exposure. Out-of-hospital deliveries further complicate diagnosis and timely management of perinatal complications, making postmortem histologic examination essential for diagnosing MAS. In cases of sudden natural death in infancy, a thorough review of the perinatal history—including any suspicion of MSAF—is crucial. The absence of overt signs of meconium exposure at autopsy or reassuring APGAR scores at birth should not exclude MAS from the differential diagnosis.

This case underscores the need for heightened clinical vigilance in the postnatal period, especially when MSAF is present, and recognition of early signs of feeding and respiratory difficulties in neonates. This case demonstrates the critical role of forensic pathology in investigating sudden unexpected infant deaths and in informing safer perinatal practices.

P8 When Lungs Don't Work: Fatal Renal Pathology in Neonates

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Potter sequence, caused by renal agenesis and congenital renal malformations such as multicystic dysplastic kidney disease (MCDK) results in oligohydramnios and pulmonary hypoplasia, leading to respiratory distress and neonatal death. MCDK arises when the ureteric bud fails to fuse with the renal mesenchyme, producing a non-functioning kidney characterized by multiple separated cysts without a renal cortex or ureter. Bilateral MCDK results in two non-functional kidneys. Its clinical course is that of Potter sequence, culminating in respiratory distress and neonatal demise.

This report examines two cases of these severe kidney pathologies and early reported death. The first involves a neonate born at 37 weeks, 3 days with bilateral renal agenesis, pulmonary hypoplasia, and dysmorphic facies characteristic of Potter sequence. The second case is that of a neonate born at 34 weeks, 1 day, with bilateral MCDK and hypoplastic lungs. Placental and cardiovascular findings for both cases are presented. This report highlights the distinct etiologies of these disorders and their shared trajectory of neonatal demise, emphasizing the importance of understanding these conditions when there is not adequate prenatal care. These cases may present as sudden and unexplained death in an infant requiring a forensic pathologist's evaluation.

P9 Thick Blood: Fatal Budd-Chiari Syndrome in the Setting of Dehydration

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Budd-Chiari syndrome (BCS) is a condition characterized by obstruction of hepatic venous outflow tracts, not due to cardiac disease or sinusoidal obstruction syndrome. The diagnosis is independent of the severity or cause of obstruction. The thrombosis is often caused by myeloproliferative disorders, hormone induced hypercoagulability, or inherited thrombophilias. Additionally, malignancies such as hepatocellular carcinoma and renal cell carcinoma, as well as benign tumors and cysts, can lead to outflow obstruction by direct invasion or compression of hepatic veins. BCS can lead to acute liver failure developing over several days, requiring quick diagnosis and aggressive therapy to prevent severe morbidity or mortality.
We present a case of an 81-year-old woman who presented to the emergency department after being found down at home for an unknown period of time. Per family, her last known time to be well was 2 days

prior, when she was experiencing nausea and abdominal pain. Upon arrival to hospital, she had waxing and waning mentation and was severely dehydrated. Laboratory work-up revealed dehydration with elevated hemoglobin and hematocrit due to volume depletion and liver failure with elevated total bilirubin and markedly elevated ALT. Pan CT scan revealed no acute abnormalities. Her family made her comfort measures only and she died shortly thereafter.

At autopsy, the patient was jaundiced and had scleral icterus. The liver had a “nutmeg” appearance with multifocal, organizing thrombi throughout the hepatic veins. The thrombi completely occluded the veins, with widespread necrosis, hemorrhage, and congestion of the perivascular and transitional zones of the liver. Multiple organizing thromboemboli were identified in the right lower lung lobe. These findings, combined with the laboratory work-up done in the Emergency Department and the patient’s known health history, were diagnostic for acute Budd-Chiari syndrome. The patient’s onset of abdominal pain appears to correlate with venous occlusion by organizing thrombi, ultimately sending her into fulminant liver failure, leading to her death several days later.

Dehydration is believed to cause narrowing of blood vessels and thickening of blood, leading to the development of thromboemboli. This autopsy case seeks to highlight the importance of recognizing dehydration as a risk factor for developing Budd-Chiari syndrome.

P10 Sudden Cardiac Death from an Anomalous Origin of a Coronary Artery: A Rare but Critical Diagnosis

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Introduction: The coronary circulation supplies the heart with the oxygen and nutrients it needs to function. Therefore, when the coronaries are narrowed, the heart may not receive adequate blood flow to meet its high metabolic demand, leading to cardiovascular events and even sudden cardiac death. Sudden cardiac death (SCD) is defined as an unexpected death occurring within one hour of symptoms onset or within 24 hours after last being seen healthy, resulting from a presumed cardiac event in an otherwise healthy individual.

Case: A 54-year-old black male was found in asystole after collapsing during a video call with a client. The client called 911 but did not know the decedent's address. EMS located him around 60 minutes later. CPR was performed throughout transport and continued for nine minutes upon arrival to the ED where the decedent was pronounced. According to the decedent’s spouse, he was an avid runner with no known medical conditions or previous hospitalizations. He had gone for a run earlier that day. A full autopsy was performed on the decedent including external and internal exams, toxicology, and histology.

Results: All organ systems were unremarkable aside from the cardiovascular system, including a negative toxicology screening. The decedent had an anomalous origin of both coronary arteries from a single aortic sinus. Both coronary arteries were dilated, and the left coronary ostium was narrowed to a pinpoint opening, suggesting probable collateral heart circulation. The left coronary artery ran between the pulmonic trunk and aorta. In addition, mild coronary atherosclerosis and atheromas along the length of the aorta were noted. His lateral left ventricle showed an area of white-tan fibrosis compatible with a remote myocardial infarction. Cardiomegaly was noted, suggesting hypertensive cardiovascular disease.

Discussion: SCD is associated with various etiologies in younger patients including arrhythmias, cardiomyopathies, and coronary artery anomalies. In particular, coronary artery anomalies are the second most common cause of SCD in athletes. In this case, the anomalous origin of the coronaries, particularly the narrowed left ostium and interarterial course of the left coronary artery, likely led to impaired perfusion of the myocardium which could be exacerbated by exercise. This case highlights the disease course of an undiagnosed coronary artery anomaly and stresses the importance of evaluation for symptoms like chest pain or palpitations, even in those perceived as healthy and active.

P11 Anesthesia-Related Deaths: A Case Series

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Anesthesia-related deaths are challenging for forensic pathologists. Not only is the cause of death (COD) potentially problematic in such cases, but so too is the manner of death (MOD) determination. We present a series of anesthesia-associated deaths, highlighting COD and MOD issues.

Cases included: 1) A 54-year-old male with underlying natural disease underwent dental surgery with general anesthesia, experienced post-anesthesia respiratory distress, and subsequently expired. 2) An 18-year-old asthmatic female presented for Cesarean section via general anesthesia, but experienced severe bronchospasm and died. 3) A 46-year-old male with multiple comorbidities presented for back surgery, experienced an idiosyncratic reaction during general anesthesia, and died. 4) A 33-year-old female underwent epidural anesthesia for Cesarian section and experienced multiple hypotensive episodes with cardiac dysrhythmia, cardiac arrest, hypoxic encephalopathy, and death. 5) A 48-year-old female presented for resection of metastatic breast adenocarcinoma to the brain. Postoperatively, she did not awaken from general anesthesia and subsequently expired. 6) A 53-year-old male presented for coronary artery bypass graft surgery. He underwent general anesthesia and received neuroleptic and MAO inhibitor medications, which led to drug-induced hyperthermia and death. 7) A 71-year-old female underwent surgery for a left thoracic schwannoma, after which she declined in the post-anesthesia recovery unit and died. 8) A 12-month-old female with a history of congenital heart disease presented for elective eye surgery under general anesthesia, during which she experienced cardiorespiratory distress and death. 9) A 47-year-old male with hypertensive and atherosclerotic cardiovascular disease (HASCVD) presented for a dental procedure. After receiving fentanyl and Versed, he experienced cardiac arrest and could not be resuscitated. 10) A 39-year-old female with HASCVD and Raynaud's syndrome presented for surgical amputation of a gangrenous fingertip. During general anesthesia, she experienced multiple complications and died. 11) An 80-year-old male with a perforated peptic ulcer underwent general anesthesia for surgical repair, but aspirated during anesthesia and died several days later. For each case, the certified COD and MOD are presented, highlighting the potential variability of opinion regarding such certification.

Anesthesia-related death investigations present unique challenges due to the multitude of potential contributing factors, some of which have no definite anatomic findings and are based on medical record review. Differences in medical examiner protocols can lead to inconsistent classifications in similar cases, especially regarding MOD rulings. By examining these cases, we hope to advocate for uniform standards for anesthesia-related death investigations to improve data collection and contribute to patient safety.

P12 A Rare Case of Osteogenesis Imperfecta in an Adult

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Osteogenesis imperfecta (OI) is a rare congenital connective tissue disorder primarily caused by mutations affecting type I collagen synthesis. Clinically, OI is characterized by increased bone fragility, leading to frequent fractures with minimal or no trauma. This presentation may mimic non-accidental injury, creating diagnostic challenges, particularly in forensic settings. Although OI is commonly diagnosed in childhood, its complications may persist into adulthood, where it may lead to progressive skeletal fragility, repeated fractures and healing, chronic pain, reduced mobility, hearing loss, and dental abnormalities. In forensic cases involving adults with confirmed or suspected OI, interpretation of skeletal injuries requires familiarity with the adult manifestations of the disease.

The present case involves a 56-year-old woman with a history of OI who witnessed a cardiac arrest with no reported trauma or evidence of foul play. Postmortem examination revealed faint blue-gray sclera and multiple deformities, including pronounced bowing and shortening of long bones, a narrow and asymmetric chest with pectus deformities, and marked scoliosis. The overlying skin was thin and atrophic, with joint laxity. Postmortem radiographs showed diffuse osteopenia, thinned cortices, sparse trabeculae, and

multiple stainless-steel intramedullary rods in the femora, tibiae, and spine. The findings were suggestive of type III OI.

The Sillence classification defines four OI subtypes based on severity: type I (mild, non-deforming), type II (perinatal lethal), type III (severe, progressively deforming), and type IV (intermediate). Type III results from dominant mutations in type I collagen genes, leading to structural instability despite early intervention. Adults with type III may exhibit skeletal deformities, short stature, blue sclerae, dentinogenesis imperfecta, joint hypermobility, and sensorineural hearing loss. Life-threatening complications include restrictive lung disease from chest wall deformities, aortic root dilation, basilar invagination potentially leading to compression of the brainstem, and immobility-related conditions such as pneumonia, thromboembolism, and pressure ulcers.

Fractures in unusual patterns or locations in adults with OI should prompt careful evaluation to distinguish disease-related changes from traumatic injury. Radiographic findings must be interpreted in the context of clinical history and disease progression. Accurate postmortem assessment of OI requires recognition of adult-specific features, comprehensive medical and family history, radiological review, and, when possible, genetic testing. Misdiagnosis can lead to unnecessary medico-legal scrutiny and emotional distress for families, highlighting the importance of awareness and familiarity with this rare condition among forensic pathologists.

P13 Death, Drug, and Detectives: A Case Study of a Pennsylvania Cohort of 3-Methylfentanyl Overdoses

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Drug overdose investigations are inherently complex, but when forensically rigorous, can positively impact public health and safety at a community level. Death investigators, toxicologists, coroners/medical examiners, along with federal, state and local law enforcement agencies, may work together in fatal overdose investigations, with the intention of connecting causal agents to the local drug supply. This study will detail how 3-methylfentanyl (3MF), a potent fentanyl analogue, was identified in a series of deaths from Montgomery County, Pennsylvania (PA), and how comprehensive toxicology, detailed death reporting, and investigative efforts resulted in the eradication of 3MF from PA.

The Montgomery County Coroner's Office performs complete autopsies on all drug-suspected fatalities, with comprehensive toxicology performed on collected specimens by a reference laboratory. Between March 2016 and March 2021, 3MF was reported in blood samples collected from 70 fatalities, accounting for 34% of the reporting laboratory's cumulative 3MF-related death cases. Toxicology testing relied on high-resolution mass spectrometry (HRMS) screening to detect low concentrations of 3MF in authentic casework. Confirmatory testing by liquid chromatography tandem mass spectrometry improved over time, with ultimate separation and quantitation of the enantiomers, (±)*cis* and (±)*trans*-3MF. In cases with enantiomeric separation (n=40), (±)*cis*-3MF blood concentrations ranged from 0.057-2.5 ng/mL and (±)*trans*-3MF ranged from <0.050 -0.85 ng/mL, underscoring the need for sensitive and specific toxicological instrumentation.
For the 70 3MF fatalities from Montgomery County, most cases were ruled accidental overdoses (n=62), with 3MF identified as the primary agent in only fifteen cases. Most cases reported additional toxicological findings, but drugs have varying degrees of contributory effects and require careful assessment during death reporting. For example, fentanyl and/or heroin were reported in 41% of 3MF cases, which would contribute to the respiratory depressant effects of 3MF.

The emergence and proliferation of 3MF during this time was geographically limited, which may have assisted investigative efforts. Drug delivery resulting in death is a first-degree felony in PA; 35 3MF cases were investigated and charges filed against five individuals related to three deaths. Law enforcement, armed with the harms posed by 3MF as evidenced by the toxicology reports and death certificates, were also able to disrupt the local supply chain by identifying the supplier of 3MF, who was manufacturing fentanyl and fentanyl analogues under the guise of a scientific company. Once the "laboratory" was shut down, 3MF essentially disappeared from the local drug supply, demonstrating the tangible benefits of shared death data.

P14 Increased Incidence of Invasive Group A Streptococcus Fatalities in Southern Wisconsin

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Introduction: In spring 2024 two otherwise healthy men were diagnosed with invasive Group A Streptococcus (i.e. iGAS; *Streptococcus pyogenes*) sepsis with meningitis at autopsies performed at 2 separate southern Wisconsin (WI) offices. As most GAS infections are mild, and iGAS is a rare cause of bacterial meningitis, this raised concern for an outbreak and/or more virulent circulating form of iGAS. In WI, iGAS cases are a Category II reportable disease, e.g. the disease must be reported to the local health officer within 72 hours.

Methods: The University of WI Hospital and Clinics (UWHC) has a combined medical/forensic autopsy service that has a catchment area of 29 WI counties. The Milwaukee County Medical Examiner's Office (MCMEO) investigates approximately 10,000 deaths per year. We searched the electronic databases of both offices for a 22-year span (i.e. 2002-2024) using terms 'Group A Streptococcus' and 'Streptococcus pyogenes.' In order to assess overall GAS activity at the state level, we collaborated with the WI State Laboratory of Hygiene (WSLH).

Results: There were 19 total iGAS deaths with roughly equal numbers of males vs. females (i.e. 10 vs. 9). Ages ranged from 5-58 (avg:33.1 yrs). In >1/2 of cases (10/19;52.6%), there were no known comorbidities. In the majority (12/19;63.2%) iGAS was diagnosed via postmortem testing. In 5/19 cases (26.3%) iGAS manifested as bronchopneumonia, in 3/19 (15.8%) as soft tissue infection of extremities, in 3/19 (15.8%) as epiglottic/retropharyngeal abscesses, and in 2/19 (10.5%) as meningitis. In the remainder of cases (i.e. 6/19;31.6%) the iGAS presented as sepsis without clear antecedent source. In 18/19 cases, the manner of death was natural; 1 death was accidental (due to infected laceration.)

The majority of iGAS deaths occurred during winter (i.e. December/January/February; 11/19= 57.9%). Spring (i.e. March/April/May) showed the second highest peak of deaths (4/19;21.1%). In assessing iGAS deaths per year, our offices noted a dramatic increase in 2023-2024; almost 1/3 of deaths (6/19;31.6%) occurring during those 2 years. During this same timeframe WSLH also reported an increase in the number of specimens testing PCR positive for GAS in WI overall.

Discussion: In 2023-2024 our offices saw a marked increase in iGAS deaths. This trend was reflected by increased statewide incidence of GAS diagnosis, as well as increasing iGAS incidence nationally. The reasons for this are not entirely clear but may include post-pandemic respiratory illness rebound, increasing iGAS virulence, and lack of a GAS vaccine.

P15 Optimizing Postmortem Microbiology: Enhancing Insights Through Strategic Sampling

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Postmortem microbiology plays a crucial role in hospital and forensic autopsies, providing valuable clinical insights in both ante- and postmortem settings. Blood cultures remain the gold standard of postmortem microbial identification. However, distinguishing contamination, colonization, transmigration, and true infection remains challenging. With declining hospital autopsy rates and potential underutilization of microbiologic studies, there is a need for optimized, reproducible approaches to maximize diagnostic yield. We prospectively analyzed microbial growth from blood cultures and directed tissue cultures and/or swabs of the lungs, liver (hilum and peripheral), and spleen in 70 hospital autopsy cases at a tertiary care academic medical center from August 2022 to April 2023. Organisms were identified via culture and compared to antemortem microbiologic data, clinical history, and autopsy findings to assess pathogenicity. SAS Version 9.4 was used to generate 2x2 tables and calculate McNemar and kappa statistics. Microsoft Excel was used for data collection.

Two of the 70 patients in this study were asplenic and therefore did not contribute samples for the spleen tissue and swab cultures. 68 cases had a complete set of cultures. The most common causes of death were cardiovascular (30%), infectious (26%), and malignancy (13%), with sepsis and pneumonia being the leading infectious causes. A total of 108 organisms were recovered, with 55 cases yielding positive blood cultures. Of these, 39 organisms were considered pathogenic, most commonly *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Enterococcus* species, *Escherichia coli*, and yeasts. The isolation of organisms consistent with flora of the gastrointestinal tract (including bacteria such as Klebsiella, *Enterobacter* species, or Lactobacilli) was additionally classified as contaminant due to transmigration and not indicative of true infection in the absence of antemortem data or histologic evidence of infectious etiology. Blood cultures had the highest yield for both growth and pathogenicity, followed by lung cultures, liver hilum cultures, peripheral liver cultures, and spleen cultures. No statistical difference was observed between organism recovery from swab versus tissue collection methods.

Directed sampling of the lungs, liver, and spleen aided in distinguishing true infection from contamination and, in 14 cases, identified novel pathogens with negative or contaminant blood cultures. Overall organism recovery was not statistically different between collection methods, but swabs identified a higher proportion of pathogenic organisms in the spleen and liver. These findings support the routine use of blood cultures alongside targeted tissue sampling in cases of suspected infectious death or when the clinical history is unclear.

P16 An Unusual Presentation of Nonpseudomonal Ecthyma Gangrenosum of the Oral Cavity from Oropharyngeal Bacterial Species in an Immunosuppressed Patient: A Case Report

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Ecthyma gangrenosum (EG) typically presents as a discrete necrotic ulcer with a black eschar, evolving from an erythematous or hemorrhagic lesion. Clinicians commonly associate EG with *Pseudomonas aeruginosa* infections in immunocompromised patients, although rare cases have implicated other microorganisms. We report an unusual case of EG in an immunosuppressed individual, arising from the oral cavity and accompanied by extensive ecchymoses, in which *Pseudomonas aeruginosa* was not the causative agent.

An elderly white male with myasthenia gravis, undergoing treatment with mycophenolate mofetil and prednisone, and with a history of opportunistic infections (including “green nail” syndrome), initially presented with swelling of the upper lip and nose. Weeks later, he was admitted with worsening facial edema, spreading dark purple cutaneous discoloration suggestive of ecchymoses or contusions over his chest and neck, and painful oral lesions. Despite negative blood cultures, his symptoms progressed, leading to bloody secretions and airway edema. At his death, the family requested an autopsy.

The autopsy revealed confluent ecchymoses of the neck, upper torso, and larynx, along with facial, torso, and oropharyngeal edema. His lips and gums showed hemorrhage and necrosis, sparing the buccal mucosa and tongue. Histologic examination of skin and soft tissue samples revealed gram-positive bacterial colonies and fungal elements amid soft tissue necrosis and acute inflammation, most pronounced at the upper lip. Focal necrosis appeared at the leading edges of the ecchymoses. Gram stain of postmortem lip tissue demonstrated gram-positive cocci in chains and bacilli. Aerobic cultures yielded moderate to heavy growth of *Candida albicans* and normal respiratory flora.

We will review the spectrum of pathogens associated with EG and emphasize the atypical features of this patient’s presentation, including its oral origin, polymicrobial findings, and absence of *Pseudomonas* infection.

P17 Heterotopic Pregnancy in the Forensic Setting

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This case involves a 36-year-old female with a past medical history significant for hypertension and drug abuse. The decedent initially presented to the emergency room (ER) in a tachycardic state complaining of right lower abdominal pain. A urine pregnancy test was positive, and the quantitative β-human chorionic gonadotropin (β-HCG) was 59,090 mIU/mL. A transvaginal ultrasound showed an intrauterine gestational sac measuring 2.78 cm in length, which corresponded to an 8-week intrauterine pregnancy. The bilateral ovaries and uterus were reported within normal limits. Laboratory testing demonstrated trichomonas on a vaginal swab via rapid polymerase chain reaction while a urine drug screen was positive for methamphetamine. Obtaining a computed tomography (CT) was discussed and the decedent elected not to undergo a CT scan to avoid radiation exposure to the intrauterine pregnancy. In the ER, she was given diphenhydramine, metoclopramide, and antibiotics and then discharged with metronidazole.

A few hours later, the decedent was found down and apneic in the shower. Emergency medical services were called and responded to the scene. Upon arrival at the hospital, an abdominal CT scan was performed and showed concern for a possible splenic injury. The decedent's condition continued to decline ultimately resulting in multiple rounds of unsuccessful cardiopulmonary resuscitation.

At forensic autopsy, a large hemoperitoneum (~2,000 mL) was found. Additionally, the right fallopian tube showed a dilated area with an irregular, ragged, red-purple, interior lining consistent with a tubal rupture. The uterus was opened to reveal an intact amniotic sac and fetus (2.0 x 2.0 cm) attached to a placenta adherent to the endometrial wall. Histological analysis of the right fallopian tube rupture site revealed immature chorionic villi with mixed inflammatory infiltrates and hemorrhage with clot formation.

Heterotopic pregnancies (HTs) are rare potentially fatal conditions that involve the simultaneous coexistence of both an intrauterine and extrauterine pregnancy. The estimated incidence of HTs occurring in the general population is 1/30,000 (0.003%). Known risk factors notable for the development of HTs, include: assisted reproductive techniques, infertility treatment, and pelvic inflammatory disease. HTs are rarely encountered in the forensic pathology setting. It's important for the forensic pathologist to consider these rare entities when examining and dissecting the abdominal cavity in deaths involving pregnant decedents. Additionally, from a public and women's health standpoint, it's imperative to convey these findings to those involved in the antemortem care of the deceased (especially in the setting of substance abuse).

P18 Methamphetamine Use in Asthma Exacerbations: A Multiple Case Study

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Introduction: Methamphetamine is an illicit drug with various methods of administration that has been linked to many acute and chronic health effects. However, research on methamphetamine exacerbating severe or fatal asthma attacks is an understudied topic in the literature and is relevant to the practice of Forensic Pathology. We present two cases of decedents having acute asthma attacks with evidence strongly suggesting methamphetamine as an exacerbating factor.
Cases: A 30-year-old white male with a history of fentanyl abuse and asthma was found struggling to breath by his roommate and was pronounced at the scene an hour later. Upon inspection of the residence, there were multiple plastic baggies contaminated with white powder and inhalers in the decedent's bathroom. Inside the decedent's pockets were a cut straw with white powder residue and a container with two white powder containing capsules.

A 39-year-old black male with a history of methamphetamine use was found unresponsive after the decedent's sister heard him call out for help due to an asthma attack and collapse. The decedent did not have any medication for his asthma other than an inhaler. No drug paraphernalia was observed at the scene.

In both cases, a full autopsy was performed including external and internal exams, toxicology, and histology.

Results: Both descendants were found to have gross and microscopic changes in the lungs reflective of acute asthma including mucus plugged airways and eosinophilic infiltration. In both cases, methamphetamine and amphetamine were found in the blood on toxicology.

Discussion: Typically, asthma exacerbations are the result of environmental triggers. These two cases present histories of asthma with an overly severe and accentuated attack compared to normal following methamphetamine use. No other factors suggesting an asthma trigger were found in either case. The literature has provided conflicting evidence as to whether methamphetamine is related to asthma exacerbations. Thus, seeing the life-threatening effects that methamphetamine may have in asthma exacerbations as suggested by these two cases, more detailed studies are warranted to explore methamphetamine as a possible exacerbating factor of bronchial asthma.

Methamphetamine use has various confirmed negative health effects, but its association as a potential trigger for severe and fatal asthma is understudied. These cases highlight the risk of asthma related deaths among those with illicit drug use and should raise suspicion for methamphetamine as an exacerbating factor for asthma attacks.

P19 The New Fentanyl: A Case Series of Nitazene Fatalities on the Texas Gulf Coast

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Opioid overdose fatalities remain an area of significant public health concern with an estimated 114,000 deaths in 2023 and 87,000 deaths in 2024. In 2023, approximately 80% of reported overdose deaths were attributed to synthetic opioids. A growing concern is the emergence of novel synthetic opioids (NSOs) which are characterized by a 2-benzylbenzimidazole core. Some formulations of NSOs are up to 1000-fold and 45 times more potent than morphine and fentanyl respectively. These compounds, known as nitazenes, have quickly become the largest class of non-fentanyl-related opioids. According to one report, between 2019 and 2023, there were about 2,000 deaths related solely to nitazenes. However, commercial testing from some reference toxicology labs did not have nitazene detection panels until 2023 which may have caused underreporting of the actual death count.

Recent literature identifies at least 19 different nitazene analogs, with each one differing at three chemical locations which alters the mu-opioid receptor activation profile and influences their potency. These novel chemical structures of emerging nitazenes, and exclusion from routine forensic testing, pose challenges for detection, monitoring, and timely clinical or law enforcement intervention.

Among the nitazenes, N-pyrrolidino protonitazene has emerged as the most commonly detected variant in recent casework. We present five cases from November 2024 to February 2025 in Galveston County and Brazoria County, with N-pyrrolidino protonitazene contributing to the cause of death. The decedents, with an average age of 26 years old, were found in five different cities, within two counties, spanning a geographic area of about 700 square miles. In three of the five cases, additional substances were detected alongside N-pyrrolidino protonitazene.
Accurate reporting of nitazene overdoses and deaths plays a critical role in informing public health responses and equipping healthcare providers and law enforcement with up-to-date information on circulating substances. It is also important for health care providers to recognize that patients overdosing from nitazenes may need a higher dose of Naloxone than usual. Future studies are required to evaluate the potency and toxic effects of NSOs and delineate postmortem concentration ranges to assist the forensic community with test interpretation.

P20 Train Video Cam in Elucidating Manner Of Death In the County of Santa Clara

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Train fatalities account for many deaths in the United States necessitating a medicolegal death investigation and involvement of the Medical Examiner/Coroner systems. Cause of death is seldom an issue as most deaths are due to fatal blunt force injuries, but manner of death can be challenging to determine, even with thorough death investigation. It is incumbent that train fatality is not automatically concluded as suicide without thorough investigation. The differential diagnosis should be broad and can include acute intoxication, or distractions such as cellphone or headphone usage. To further aid in manner determination, in 2017, the Medical Examiner Office of the County of Santa Clara incorporated systematic analysis of train videos into death investigation of these fatalities.

We performed a retrospective review of our case files, and 91 train fatalities occurred between 2006 to 2024 in the County of Santa Clara. Prior to 2017, there were 33 train related deaths and 58 deaths after 2017. Of these 91 cases, 41 were certified as accidents, 40 as suicide, and 10 as undetermined. Prior to 2017, only 7 videos were available for review when compared to 40 after 2017. The data was further segregated to compare manner of death determination. Our data shows that when we compare manner determination prior to and after reviewing the videos, 7.5% of deaths where video was present were classified as undetermined, compared to 27.8% of deaths without video, which was consistent with our hypothesis. Reviewing video can provide more context to the death circumstances, by allowing direct observation of the last moments of the individual.

Additionally, our analysis showed that among accidental manner of death, 46.3% of decedents had positive methamphetamine toxicology results, compared with 10% of suicide manners. Among the undetermined deaths (total10 cases), train videos were available in three cases, which revealed that decedents did not show clear intentions prior to death. Furthermore, we found that among decedents with positive psychotropic toxicology results (10 total), 60% were classified as suicide manner. The undetermined deaths, which comprised 20% of these cases, also had available train video, which showed unclear intentions of the decedents prior to death.

In conclusion, this study supports systemic incorporation of train videos in death investigation for manner determination. Obtaining train videos, in conjunction with other analyses such as toxicology results, suicide assessment form completion, and speaking to families about disabilities, can elucidate the manner of death in train fatalities.

P21 Beyond the Cysts: A Rare Case of Splenic Artery Aneurysm Rupture in Autosomal Recessive Polycystic Kidney Disease

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Autosomal recessive polycystic kidney disease (ARPKD) is a genotypically and phenotypically variable disease for which the underlying molecular and developmental pathophysiology are not well understood. It is associated with germ-line mutations in the polycystic kidney and hepatic disease 1 (*PKHD1*) gene which codes the fibrocystin/ polyductin protein. ARPKD has very high rate of infant mortality, due to the disruption of the Potter sequence with subsequent oligohydramnios and pulmonary hypoplasia. Those who survive these early morbidities often develop hypertension, renal insufficiency, portal hypertension, and splenomegaly. Often, adult ARPKD patients also show signs of congenital hepatic fibrosis and Caroli's syndrome.

We present a case of a 27-year-old female with multiple documented chronic conditions associated with known ARPKD which ultimately caused her death some 10 years status-post kidney transplant. The decedent was found in her home with no reported symptoms the day prior to death. At autopsy she was found to have two liters of hemoperitoneum and a proximal segment of splenic artery with aneurysmal dilation, rupture of the vessel wall, and surrounding hematoma. The right native kidney was atrophic,

markedly fibrotic, and contained numerous simple cysts lined by cuboidal epithelium. The liver was enlarged, cirrhotic, and histologically showed bile duct malformations consistent with congenital hepatic fibrosis. Additionally, the intrahepatic bile ducts were markedly dilated, consistent with an ultimate diagnosis of Caroli's syndrome. The spleen was enlarged and fibrotic with a markedly tortuous splenic artery. These findings support chronic kidney and liver disease, of which the latter significantly contributed to portal hypertension and splenomegaly. The resulting increased pressure in the splenic artery caused aneurysmal dilation and eventual rupture of the vessel wall, leading to hemoperitoneum and death.

It is important to both recognize and document the variable presentations and possible sequelae associated with ARPKD to help prevent these deaths. Well-documented autopsy reports, pre-mortem medical records, radiology, surgical pathology, and correlation with genetic analysis all help further our understanding of the molecular mechanisms underpinning the multi-organ variability in the presentation of germline *PKHD1* mutations. While molecular testing of postmortem samples is not always be available, in this case we were able to use next generation sequencing to examine the most common genes linked to ARPKD to support the postmortem findings. Ultimately, the increased understanding of the adult manifestations of ARPKD allows more accurate communication of information of cause of death and any possible germline-associated risks to surviving family members.

P22 A Fatal Cervical Injury during Bull Riding: A Case Report and Review of the Literature

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A young professional bull rider was participating in a bull riding competition when he was injured in the arena after being thrown from the bull at the start of his ride. He landed on the ground and was then stomped on the neck by the bull during its bucking motion. This bull rider was wearing a protective helmet and vest, but no neck guard. He was able to get up, walk out of the arena, and sought medical attention. During his initial assessment, he became went unresponsive. Emergency Medical Services on scene began resuscitative efforts but it was apparent he would have needed a higher level of care. He was transferred by LifeFlight to a hospital trauma center, but he was ultimately pronounced dead shortly after arrival.

At autopsy, the decedent had a large laceration of anterior neck with multiple cervical injuries including blunt trauma of the left external jugular vein, thyroid vasculature, neck strap muscles, epiglottis, and posterior oropharynx. There was a significant crush injury of laryngeal cartilages and transection of the proximal trachea. Transections of left external jugular vein and the vasculature supplying the thyroid gland were noted, but the carotid arteries and internal jugular veins were without injury. The cervical spine had no fracture. Bilateral hemoaspiration of the lungs was seen. The decedent's toxicology was negative for alcohol and illicit substances. The cause of death was certified as blunt force and crush injuries of neck. The manner of death was accidental.

Bull riding is a physically demanding rodeo sport where the athletes are at high risk of morbidity from cranial and torso injuries, which are well documented in the sports medicine and orthopedics literature. There is a paucity of rodeo related deaths in the forensic pathology literature. The case is presented to highlight the importance of full protective gear to minimize the likelihood of sustaining fatal injuries.

P23 Death by Triglycerides: A Multifaceted Case of Dyslipidemia, Obesity, and Polycystic Ovary Syndrome Resulting In Lethal Acute Pancreatitis

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A 22-year-old female was found unresponsive in her bed following a nighttime sleep period. The decedent had been sick for the past three weeks and presented to urgent care a day prior to her death with a complaint of nausea, vomiting, and abdominal cramping. At that time, she was diagnosed with a viral intestinal infection. Multiple forms of rehydration therapy and water were found at bedside. She had a

history of polycystic ovarian disorder (PCOS), chronic abdominal pain, obesity, depression, anxiety, and insomnia. Family history includes high cholesterol of unknown type. Acanthosis nigricans was present.

During autopsy slight atherosclerotic stenosis of the coronary arteries was seen with no recent thrombus and slight to moderate aortic atherosclerosis. Non-hemorrhagic acute pancreatitis and steatohepatitis were identified. The kidneys, thyroid, pituitary, and lungs were unremarkable. No identifiable fragments of pills, tablets, or solid food were found in the stomach. During the exam, areas of fat congealing within pooled blood were readily visible. This was more noticeable in the tubes of blood drawn, which were grossly lipemic.

Toxicological and laboratory testing showed a triglyceride level of 5440 mg/dL, 9 mg/dL HDL, 0.06% g/dL acetone in peripheral blood, and therapeutic levels of fluconazole, for which the decedent had an active prescription. The acetone levels were attributed to diabetic ketoacidosis.

PCOS is an endocrine disorder predominantly characterized by irregular menstrual cycles, hyperandrogenism, and enlarged polycystic ovaries. It is associated with metabolic syndrome, a higher prevalence of aortic calcification and atherosclerotic plaque formation. Insulin resistance is a key pathophysiology of PCOS. Obesity, high cholesterol, and PCOS are all disturbances known to perpetuate further metabolic issues, including severe hypertriglyceridemia (HTG). Mild to moderate HTG is frequently the result of many genetic factors, while severe HTG (>885mg/dL) often implies a single gene or monogenic cause. However, most causes are the result of multigenic or polygenic mutations and further exacerbated by exposure to non-genetic secondary factors.

Though we could not identify why the patient was prescribed fluconazole, both fluconazole and obesity are potential triggers for severe HTG. Complications of severe HTG include acute pancreatitis and atherosclerotic cardiovascular disease. The combination of the patient's familial dyslipidemia, PCOS, and obesity created a perfect storm of metabolic dysfunction leading to her sudden death. Overall, this case highlights the need for close follow-up in patients with these conditions and better education on the possible consequences of their interplay, which can prove lethal.

P24 An Unusual Suicide Involving an Air Rifle: Case Report and Review of the Forensic Literature

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Air or non-powder weapons utilize energy from pressurized gases or air to propel a projectile without igniting gunpowder. Common uses include sport, hunting, training, or as children's toys. These weapons are widely available and not subject to acquisition or unsupervised use regulations in many jurisdictions of the United States, despite achieving muzzle velocities up to 1400 feet per second. Many serious accidents are reported annually, mostly involving adolescent boys. The extent of injury depends on the characteristics of the air weapon and projectile, the anatomical site of injury, range, and presence of intermediate objects. Although rare, fatalities have been reported in the literature, with suicides representing less than 1% of cases. The head and eyes are the most reported locations of injury.

The present case is about a 15-year-old black male who was reportedly at home playing with a 0.177 inch caliber pellet air rifle and shot himself in the chest. Emergency medical services were called, and he was transported to the hospital. Despite resuscitative measures, he expired later that day. At autopsy, a penetrating wound to the left side of the chest measuring 3/16 inch in diameter with a concentric rim of abrasion was identified. A lead-pointed Diabolo pellet was recovered from the left lung, with a path of injury involving the left pulmonary artery and left-sided hemothorax. The cause of death was determined to be an air rifle pellet wound to the chest; the manner of death was certified as suicide.

A literature review revealed a few case reports and small case series of fatalities associated with air weapons, only two of them describing suicides with a gunshot injury to the chest. Manner of death classification could be challenging in such cases, especially among adolescents who may not fully grasp the lethality of these weapons—partly due to their widespread marketing as safe alternatives to powder firearms. Air weapons are a wolf in sheep's clothing—seemingly harmless yet capable of deadly

consequences. As these weapons become more powerful and public concern increases, reassessing the current regulatory framework is recommended to enhance public safety and ensure they are handled with appropriate caution.

P25 Calcified Clues to Cause of Death: Forensic Imaging of Atherosclerotic Calcification in Decedents at the Tarrant County Medical Examiner's Office

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Introduction: Postmortem imaging is an integral tool in modern forensic pathology, typically used to detect skeletal trauma or foreign bodies. However, its use in evaluating soft tissue pathologies such as atherosclerotic cardiovascular disease (ASCVD) remains underexplored. While low-dose CT (LDCT) has demonstrated high sensitivity for detecting calcified arteriosclerosis, few studies have addressed the utility of Lodox ultra-low-dose X-ray imaging for this purpose.

Objective: To determine the correlation between postmortem Lodox X-ray findings and gross autopsy observations of calcified atherosclerotic lesions, with specific attention to the carotid arteries, abdominal aorta, iliac arteries, and femoral arteries. This study aims to evaluate whether Lodox imaging can serve as a reliable tool in identifying clinically significant atherosclerosis postmortem and assist forensic pathologists in triaging cases and assigning ASCVD as a cause of death in appropriate cases.
Methods: A retrospective review was conducted on over 2,500 cases examined at the Tarrant County Medical Examiner's Office. Both postmortem Lodox X-ray imaging and autopsy were completed in the included cases. Arterial segments—ranging from the aortic root to the femoral arteries—were analyzed for calcified lesions and compared to gross dissection findings to assess correlation and predictive value. The final study population was limited to decedents whose manner of death was classified as suicide and who underwent both autopsy and postmortem Lodox imaging, thereby ensuring the availability of complete data for correlation analysis.

Results: Cohort pilot data support prior literature identifying thoracic aortic and distal abdominal aortic calcifications as frequent postmortem findings associated with systemic atherosclerosis and ASCVD mortality. Early case analyses suggest that femoral artery calcification may serve as an exceptionally reliable marker of advanced atherosclerotic disease, with a high correlation observed between its presence and widespread vascular involvement at autopsy. The Lodox imaging system demonstrated variable sensitivity across anatomical regions. Still, it showed the most consistent calcification detection in the abdominal aorta and femoral arteries, indicating potential value in triaging cases.

Discussion: Lodox X-ray imaging demonstrated promise as a rapid, low-radiation modality for identifying atherosclerotic calcifications in forensic cases. While less sensitive than LDCT, it was a valuable screening tool for triaging autopsies and supporting external examination diagnoses of ASCVD.

P26 Sudden Cardiac Death in a Young Female with Bileaflet Mitral Valve Prolapse and Mitral Annular Disjunction: A Case Report Highlighting an Underrecognized Arrhythmogenic Substrate

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Introduction: Mitral valve prolapse (MVP) is a common valvular abnormality affecting up to 2–3% of the population, generally considered benign. However, a subset of individuals—particularly young females with bi-leaflet MVP—may harbor significant risk for malignant arrhythmias and sudden cardiac death (SCD). Recent attention has focused on mitral annular disjunction (MAD) as a structural abnormality associated with ventricular arrhythmias independent of MVP.

Case Presentation: We report the case of an early 30's, previously healthy female with a known history of MVP, mitral/aortic regurgitation, autoimmune thyroiditis, and palpitations. Following a mild COVID-19 illness, she experienced sudden cardiac arrest, with documented ventricular tachycardia requiring defibrillation and return of spontaneous circulation. Despite aggressive resuscitation, she suffered three

subsequent cardiac arrests, including episodes of polymorphic VT and VF. Coronary angiography revealed no obstructive disease, and echocardiography demonstrated a severely reduced ejection fraction (<10%). She was transferred for advanced management and placed on ECMO via left atrial ventricular assist (LAVA-ECMO). Empiric high-dose steroids were administered for suspected myocarditis, though biopsy was negative. Neurologic evaluation revealed profound anoxic brain injury with no recovery, and care was withdrawn.

Autopsy Findings: Gross and microscopic examination revealed bi-leaflet MVP with significant fibromyxoid degeneration and marked redundancy. MAD was observed with an abnormal displacement of the mural leaflet and systolic curling. Histologic findings included interstitial and perivascular fibrosis in the posterior left ventricular wall and evidence of recent subendocardial infarction. Additional findings included pulmonary edema, focal bronchopneumonia, and hepatic centrilobular necrosis, consistent with shock.

Discussion: This case underscores the arrhythmogenic potential of structural mitral valve abnormalities, particularly in patients with bi-leaflet MVP and MAD. The presence of myocardial fibrosis, disjunction exceeding 5 mm, and papillary muscle involvement aligns with high-risk profiles identified in recent literature. Importantly, MAD has been associated with arrhythmias even in the absence of MVP, suggesting it may serve as an independent risk marker.

This case illustrates the fatal potential of MVP and MAD in young patients with seemingly benign clinical profiles. Structural imaging and early electrophysiologic evaluation should be considered in symptomatic individuals, especially those with suggestive family history or arrhythmic symptoms.

P27 Challenges in Death Certification: Trends and Contributing Factors in Undetermined Manner of Death (2018–2024) from Two Large Medical Examiner Offices

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Medical examiner and coroner offices across the United States often encounter cases in which classifying the manner of death can be difficult. These challenges generally arise from inconclusive investigative findings, unclear intent of the victim, ambiguous circumstances, or non-specific autopsy results. Recently, cases have become even more complex due to factors including COVID-19, the fentanyl crisis, and rising caseloads nationwide.

This study examines data from two large urban independent medical examiner offices, the Santa Clara County Office of the Medical Examiner, located on the West Coast in California, which serves a population of approximately 2 million, and the Cook County Medical Examiner’s Office, based in the Midwest in Illinois, which serves a jurisdiction of roughly 5.2 million people. The purpose is to study cases in which the manner of death has been certified as undetermined to assess trends in undetermined manner of death certifications and explore contributing factors behind classification uncertainty.

A search was conducted for cases classified with an “Undetermined” manner of death between 2018 and 2024 from both medical examiner offices. Data from these cases were collected and coded based on gender, age, and race, as well as factors identified as contributing to the classification of an undetermined death. Common contributing factors were categorized as follows: drugs/alcohol/toxins/chemicals, chronic substance use disorder, use of a Schedule I substance or known illicit use of prescription medication, trauma/injury, remote trauma/injury, drowning/submersion, fire/inhalation/thermal injuries, chronic illness, involvement of a vehicle/train/bike, in-custody deaths, hanging/strangulation, recent altercation or fight, exposure to cold/hypothermia, acute illness/surgery, SIDS/unsafe sleep practices, and homelessness. The data were then analyzed using IBM SPSS Statistics v.30.

A total of 1,561 cases (464 from Santa Clara County and 1,097 from Cook County) were collected. Results showed that while the total number of cases classified with an Undetermined manner of death remained relatively stable during this time —ranging from 204 to 239 cases annually—several significant trends emerged across key categories. A more detailed examination of the data will include a deeper analysis of

case demographics, drowning, drug-related fatalities, pediatric deaths, fire-related deaths, suspicious deaths, and motor vehicle fatalities, in which the manner of death was certified as undetermined.

The data will help identify factors behind classification challenges and explore ways to improve consistency in death certification. A thorough discussion of the findings will be presented to attendees.

P28 Fatal Gas Gangrene from a Dog Bite: a Case study and Review of Animal Bite Workups in Postmortem Investigation

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Animal bites are a common occurrence, with the majority being manageable with first aid at home. Severe bites, however, may lead to infection which can prove fatal without medical intervention. Infections from bites are often polymicrobial, containing a mixture of bacteria originating from the animal's oral flora. Less commonly, bacteria may be introduced from the patient's skin or the surrounding environment. One particularly dangerous organism is *Clostridium perfringens*, a spore-forming bacterium found in soil and in the intestines of animals. C. perfringens can cause gas gangrene, a potentially fatal soft tissue infection that produces gas within tissues.

Here we present a case in which the decedent suffered multiple severe animal bite wounds, likely from one or more dogs, though circumstances are unclear. He did not initially seek medical treatment but presented to a hospital several days later, where he died. Examination revealed numerous puncture wounds, lacerations, and abrasions of the extremities and torso. The most striking finding was extensive crepitus and gas gangrene in the left lower extremity. Cultures confirmed the presence of *C. perfringens*. The cause of death was gas gangrene of the left lower extremity due to multiple animal bite wounds.

Animal scavenging is a common postmortem finding which can serve as a confounder during antemortem bite workup, especially when combined with decomposition. Scavenging often targets the lips, eyelids, and ears, while an attack is supported by "defensive" injuries to the limbs. Dog bites frequently present as multiple, complex wounds consisting of ecchymoses, contusions, lacerations, and extensive soft tissue damage with puncture wounds from the cuspids. Lacerations from tearing/shearing may resemble sharp force trauma. A forensic odontologist can aid with differentiation. In contrast, human bites are less puncture-like and produce a semicircular pattern of abrasions with underlying soft tissue hemorrhage.

Documentation and preservation of all bite wounds is essential. Workup includes collecting animal salivary DNA and brain for PCR or fluorescent antibody testing for rabies. At the scene, paw prints should be photographed and animal hair collected. Fatalities typically involve vulnerable populations, such as children or the elderly. Cause of death is most often "complications of multiple bite wounds" with "dog attack/mauling" in "how injury occurred". If the victim survives, infection, sepsis, and death may occur as a complication, as in this case. Though manner of death is usually accidental, in cases where an animal is intentionally used to cause harm homicide may be considered.

P29 A Rare Case of Suicide by Powder-Actuated Nail Gun

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Suicides involving powder-actuated nail guns are exceedingly rare. We report the unusual case of a 30-year-old male who sustained a self-inflicted cranial injury using a powder-actuated nail gun. Prompted by concerning text messages, authorities performed a search and discovered him hours later in a wooded area. He was unconscious with agonal breathing, foaming of the mouth, and bleeding on the right side of his head. A powder-actuated nail gun was observed at the scene by his feet and a spent .22 caliber load was later located inside the nail gun. He conveyed to the hospital, where despite intensive medical

intervention, including intubation, pressor support, and critical care management, brain death was declared approximately ten hours after admission.

Postmortem examination showed an atypical ¼ x ¼ inch ovoid entrance wound on the right temporal skull. There was a surrounding thin rim of marginal abrasion around the wound with no residue, including soot, on the scalp. There was a well-preserved wound track with the nail penetrating the right temporal bone, dura mater, right brain temporal lobe, crossing midline, and terminating in the left brain temporal lobe. The nail measured 1-1/2 inches in length and remained intact and undeformed. On the skull, internal beveling was appreciated at the entrance, emphasizing that high-powered nail guns can produce beveling patterns characteristic of traditional firearms. However, unlike some firearm wounds, there was no significant cavitation appreciated and minimal damage to the surrounding parenchyma. There was scalp hemorrhage around the entrance wound and subarachnoid hemorrhages over the right and left temporal lobes with pooling of blood in the ventricles. No additional skull fractures were identified. Given the circumstances, follow-up investigation, and autopsy, there were no signs of foul play. A cause of death of nail gun wound to the head was rendered and the manner was suicide.

There are few cases reported in the literature of suicide attempts by nail gun with even fewer reports showing nail gun wounds to the head with penetration of the skull. Most widely available nail guns are pneumatic-driven and have insufficient energy to penetrate bone compared to powder-actuated nail guns which can have projectile velocities comparable to firearms. This case highlights unconventional ballistic beveling patterns produced by non-firearm projectiles, particularly high-velocity nail guns, and includes high-quality photographic documentation of the wounds. Enhanced understanding of these unique forensic and clinical aspects contributes to the knowledge of atypical penetrating cranial injuries.

P30 Sarcina: A Case Report of a Sudden Demise, the Unexpected Intrathoracic Autopsy Findings, and the Gut-Busting Culprit

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Introduction: Sarcina is a rare, gram-positive bacteria that is associated with gastric ulceration and delayed gastric emptying. In severe cases, emphysematous gastritis, complete gastroparesis, and even gastric perforation can occur. While this bacterium is a known pathogen in livestock, the number of human illnesses and deaths attributed to *Sarcina* reported in scientific literature are limited. Here, we discuss an autopsy case of Sarcina bacterium found surrounding a large gastric perforation and within the intrathoracic gastric contents in an 83-year-old woman.

Methods: An 83-year-old female presented to the emergency department with sudden, severe abdominal distention, abdominal pain, complete uterine prolapse, and partial rectal prolapse. She was hypotensive upon arrival, decompensated rapidly, and expired prior to any labs or imaging being completed. Her family requested a full autopsy. Examination of her abdominal cavity revealed severe pneumatic dilation of her stomach, small bowel, and large bowel. Prosection into the thoracic cavity revealed a thick, grey grumous-like substance within both pleural cavities and within a phlegmon in the left lateral chest wall. Further exploration revealed a large 12.5 x 7.0 cm perforation in the gastric fundus adjacent to the gastroesophageal junction, which had protruded through a hiatal hernia in the left hemidiaphragm. From this perforation, spilled the thick, grey substance, which was consistent with partially digested gastric contents.
Results: A total of 1350 mL of gastric contents were retrieved from the decedent's thoracic cavity and left lateral chest wall, weighing 1418 g. A detailed examination of the stomach revealed dusky gastric mucosa with scattered ulcerations, hemorrhage, and petechiae within the cardia and fundus. Cuboidal, basophilic organisms in a tetrad formation were observed on microscopic evaluation. This organism, which was present within the perforated gastric wall, and intrathoracic and phlegmon gastric contents, was morphologically consistent with Sarcina spp.

Discussion: Although cases are rare, *Sarcina* can be deadly pathogen and should be considered in a patient presenting with sudden gastroparesis and emphysematous gastritis. Awareness of Sarcina alongside *H. pylori* during standard GI tissue biopsies is suggested to assess the prevalence of this potentially lethal organism within the general population. As it is easily identified in tissue, Sarcina should

also be considered in autopsies with severe pneumatic gastrointestinal dilation without other known causes.

P31 Fatal Falls from the US–Mexico Border Wall: A Retrospective Forensic and Biomechanical Analysis from El Paso, Texas

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Introduction: The elevation of the US–Mexico border wall to 30 feet in regions such as El Paso, Texas, has coincided with a rise in fatal fall-related injuries. This study investigates the demographic, seasonal, and biomechanical characteristics of fatal injuries resulting from such falls, highlighting the forensic implications of border infrastructure changes.

Methods: A retrospective review was conducted on 19 accidental deaths from border wall falls investigated by the El Paso County Office of the Medical Examiner between 2016 and 2024. Autopsy data included age, sex, BMI, and skeletal trauma across seven anatomical regions. Injury patterns were correlated with demographic factors, environmental conditions, and structural wall changes.

Results: Most decedents (73.6%) were under 50 years old; 57.8% were male. A majority were either obese (57.8%) or overweight (21%). A sharp rise in fatalities was observed after 2019, aligning with the implementation of 30-foot wall segments. The most commonly injured areas were the ribs/sternum (84%), cranium (63%), and pelvis (53%). Obese individuals more frequently sustained injuries to three or more regions, consistent with greater kinetic energy upon impact ($Ek = ½mv^2$). For instance, a 100 kg person falling from 30 feet generates nearly 9,000 joules—well above the fracture thresholds for major bones. While older age and female sex are typically associated with greater fracture risk, no significant differences in injury severity were observed across those subgroups in this cohort. Deaths clustered during the months of March, April, September, October, and December—times of milder weather that may encourage migration.

Discussion: Falls from the border wall result in consistent high-energy injury patterns, most commonly affecting the cranium, thorax, and pelvis. Higher BMI significantly correlates with increased skeletal trauma due to greater energy transfer during impact. These fatalities present an ongoing public health issue in border cities, particularly as migration patterns persist. This study demonstrates the value of biomechanical modeling in the forensic setting to interpret trauma severity and guide prevention strategies. Broader recognition of these injury trends may help support resource planning, regional forensic capacity, and public health preparedness in affected communities.

P32 Deciphering the Multiple Gunshot Wound Suicide: A Series of 21 Cases

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Multiple gunshot wound (GSW) suicides comprise a small minority of self-inflicted deaths. Given that an initial gunshot may cause debilitating injury, these cases provide a unique challenge to investigators, law enforcement, and forensic pathologists in determining manner of death. Anatomic structures affected by projectiles may determine if and how the deceased was able to deliver subsequent shots, though even with disruption of vital structures, immediate incapacitation may not occur. When death does not immediately occur, survival periods following gunshots to the head and chest can range from minutes to days. Once an individual has been shot, physical activity during the survival period (before the fatal shot) provides useful evidence in determining manner of death.

Decedents with previous psychiatric history account for most cases, and careful review of psychosocial factors may provide additional evidence to support a determination of suicide. The ballistic and structural characteristics of firearms used alongside wound patterns discovered at autopsy may help establish whether suicide is even physically possible.

This presentation explores a series of 21 multiple GSW suicides occurring in several jurisdictions over several decades in southern Michigan and northern Indiana. We will discuss trends in demographic profiles, collateral psychosocial factors, and firearm utilization specific to these cases. Additionally, we will explore patterns in toxicology results and antemortem stressors to provide a comprehensive understanding of the circumstances surrounding these deaths. When examined collectively, patterns begin to emerge in autopsy findings and scene characteristics analyzed in the series. For example, all decedents were white males, between the ages of 16 and 80. Two GSWs were identified at autopsy for all cases with the exception of one case which involved four GSWs. Most decedents experienced antemortem stressors, from grave illness to legal trouble.

One especially perplexing case will be discussed in greater detail. Following complete investigation, it was determined that a 19-year-old male first shot his dog in the head, between the eyes, and then shot himself between the eyes, using a two-shot derringer handgun. After realizing that the gunshot wound of his head had not caused death, he then walked from the second level of his family home down to the basement, where he retrieved and loaded a revolver before delivering the final shot to his chest. This case, along with others in the series, underscores the critical role of integrating autopsy findings with detailed scene investigation to differentiate suicide from homicide in cases involving multiple GSWs.

P33 The Impact of Scalp Hair on Gunshot Residue Deposition: A Forensic Approach to Range of Fire Determination

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In shooting investigations, estimating the distance between the firearm and the target, commonly referred to as range of fire, is a crucial element in reconstructing events. This determination often relies on the presence, distribution, and type of visible gunshot residue, such as soot and stippling around the entry wound. However, a key variable frequently overlooked in both investigative protocols and forensic literature is the presence of hair.

It is likely that scalp hair may significantly interfere with the deposition of GSR on the scalp, potentially leading to misinterpretations of shooting distance. While an earlier technical report has shown that hair-covered areas may display no visible GSR even at contact or close range, this topic remains underexplored in the forensic scientific literature. This gap becomes particularly relevant in forensic pathology, especially in cases involving a single gunshot wound to the head, where pathologists may be called upon during courtroom depositions to comment on the absence of GSR in relation to possible hair shielding.

This study is a collaboration between the Cook County Medical Examiner's Office and the Illinois State Police, Division of Forensic Services Forensic Science Center at Chicago. The present research involves a series of controlled firing tests using testing substrates to replicate the physical properties of human hair and scalp. A precision device (Ransom International Forensic Ballistic Machine) will be used for controlled firearm discharge testing to guarantee accuracy and reproducibility of the results. Five short barreled firearms of different calibers and multiple types of ammunition (representative of what is seen in typical casework) will be used. Shots will be fired at contact, near-contact, close, and intermediate ranges. For each distance, five shots will be fired with each weapon.

The goal is to observe whether different hair types, densities, and weapon systems result in varying levels of GSR deposition on or through the hair and to the underlying scalp surface.

This study aims to determine whether the absence of GSR in hair-covered areas should be interpreted as indicative of indeterminate-range fire, or if it may in fact reflect the shielding effect of hair at closer ranges.

The study is currently ongoing and the results will be presented to the attendees.

P34 Trends in Deaths Attributed to Mitragynine: The Georgia Bureau of Investigation Perspective

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Kratom (*Mitragyna speciosa*) is a psychoactive plant native to Southeast Asia that has been used traditionally for various health and well-being reasons. The primary active alkaloid, mitragynine, has gained increasing attention in Western societies due to its accessibility, lack of stringent regulation, and alleged benefits in managing pain, opioid withdrawal, and mood disorders. Concerns have emerged regarding the safety profile of mitragynine, particularly its potential for toxicity and involvement in drug-related fatalities.

The Georgia Bureau of Investigation Medical Examiner's Office provides forensic pathology services to 153 of Georgia's 159 counties, encompassing both rural and urban populations. A retrospective data review reveals that between 2016 and 2024, the presence of mitragynine in the cause of death, other significant conditions, or how injury occurred sections of the death certificate increased from 0.14% to 1.75% of total autopsy cases. During the same period, autopsies in which mitragynine was the only identified substance ranged from 0.03% to 0.17%.

This case series highlights four cases in which mitragynine toxicity was determined to be the sole cause of death, without lethal levels of other toxicologic substances or lethal anatomic abnormalities identified at autopsy. Postmortem mitragynine concentrations ranged from 1,000-7,600 nanogram/milliliter. Two of the four cases had natural diseases listed in the other significant conditions section, including atherosclerotic cardiovascular disease and hypertensive cardiovascular disease. In one case, toxicology also revealed therapeutic levels of diphenhydramine. Two decedents had a known history of drug abuse. The cause of death was certified as toxic effects of mitragynine in three cases and as acute drug toxicity including mitragynine in one case. The manner of death was classified as accident in all four cases.

These findings contribute to the expanding body of literature on fatalities attributed to mitragynine and highlight the potential lethality of mitragynine as a single-agent intoxicant. The upward trend of mitragynine involvement in Georgia death investigations raises concerns regarding the underrecognized risks associated with its use. These cases underscore the need for heightened forensic scrutiny and increased awareness among medical examiners of mitragynine's lethal potential.

P35 A Rare Report of Equine Peri- and Postmortem Scavenging of Human Remains

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Animal scavenging, particularly postmortem taphonomic scavenging, refers to the consumption or modification of remains by fauna, which can significantly alter decomposition patterns, bone dispersal, and forensic evidence. Characteristic scavenging patterns by species have been reported, with carnivores typically targeting soft tissue, while omnivores and even some herbivores may opportunistically gnaw on bones for nutrients. While scavenging by carnivores—including domesticated cats and dogs—and, to a lesser extent, ungulates such as deer, cattle, and sheep, have been documented, equine (*Equus ferus caballus*) scavenging of human remains has not been reported in the literature. This report documents the first suspected case of peri- and postmortem scavenging by domesticated horses, providing photographic documentation and a descriptive framework for future comparisons in similar cases.

A 69-year-old male with no documented medical history was found unresponsive on the ground outside of a barn stall, in the presence of two horses—one of which was reportedly accustomed to hand-feeding and exhibited 'nibbling/nipping' behavior. No other animals were reported to have access. Autopsy revealed hypertensive and atherosclerotic cardiovascular disease as the cause of death, evidenced by

significant cardiomegaly with myocyte hypertrophy and perivascular fibrosis, renal arteriolosclerosis, and moderate atherosclerosis of the aorta and coronary arteries. External examination revealed peri- and postmortem injuries, including multiple yellow abrasions measuring up to 6 inches, lacerations, and contusions on the head, torso, and extremities. Distinctive findings consistent with equine scavenging included partial loss of distal phalanges on digits 1–5 on the right hand and 2–4 on left hand with exposed bone, dried irregular margins, and no hemorrhage alongside a distinctly arch-shaped abrasion on the right forearm. Additional arch-shaped abrasions were identified on the lower extremities. There was no evidence of significant antemortem trauma and the death was certified as natural, with external injuries attributed to postmortem equine scavenging.

This case challenges assumptions in forensic investigations involving large herbivores and introduces equine involvement as a possible source of perimortem or postmortem alterations. The observed patterns, including partial phalangeal loss, arch shaped abrasions, and soft tissue damage without associated hemorrhage, provide a preliminary framework for identifying equine related trauma, particularly in agricultural settings where close human-animal interactions are common. In addition, the accompanying photographic documentation serves as a reference for forensic practitioners evaluating similar cases. Ultimately, the findings highlight the potential for postmortem artifact from domesticated horse behavior, particularly in cases with delayed discovery.

P36 Workforce Characteristics of Senior Physician Roles in United States Medical Examiner Offices

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Introduction: The US faces unprecedented shortages of physicians, including forensic pathologists (FPs), of which there are only about ~750 (projected need ~1500), serving ~45% of the US population through approximately 390 medical examiner offices (2018 data). This has led to enactment or active consideration of alternative pathways to allow qualified internationally trained specialty physicians to practice without characteristics of the FP leadership workforce to determine if this pathway had been utilized for the medical examiner workforce and to explore its potential for offsetting the workforce shortage.

Methods: Medical Examiner/Coroner (ME/C) offices employing FPs were identified through the CDC's Collaborating Office for Medical Examiners and Coroners. Leadership data (2023-2024) were collated from publicly available resources (office websites, published biographies), with particular attention to training status. Educational background was categorized as U.S.-PGT trained (including allopathic or osteopathic medical graduate (AMG), foreign-international medical graduate (F-IMG), U.S. citizen international medical graduate (US-IMG)), or Alternative pathway (Alt-IMG). A future survey of chief medical examiners is under consideration to gauge openness to alternative credentialing pathways.

Results: Of 384 ME/C offices employing FPs, leadership data were available for 188 (49%), including 58 Mid-West, 37 South, and 26 Northeast offices, serving 20.6%, 38.6% and 17.1% of the US population respectively. Forty-one ME/C offices, clustered in Mid-West regions, had no designated chief. Among 147 chiefs, 116 were AMGs (79%), 28 IMG's (16%; 24 F-IMGs, 4 US-IMGs), and 3 Unknown (0.02%). No Alt-IMG's chief or deputy chief MEs were identified. Of the 147 Chiefs, 51 AMGs (44% of AMG's) and 7 F-IMG's (29% of F-IMG) were women. Women chiefs clustered in the Midwest and South.

Discussion: This snapshot highlights the composition of senior FP leadership, including notable shortages in the South. There is a seeming underrepresentation of IMGs in ME/C leadership roles (34% of pathologists are IMGs) relative to general pathologists. This may reflect temporal lag, subspecialty selection choices of IMGs, or socio-demographic factors. That no Alt-IMG's were identified is expected, as this is a recent consideration in Medicine. However, there may be value to starting a discussion around alternative credentialing pathways and special visa programs, to prepare for imminent workforce shortages and to preserve standards as pressure to rely on non-physician pathology assistants increases.

Methodological limitations include reliance on publicly available data, which may omit recent appointments or misclassify educational or demographic information.

P37 Assessing the Impact of Religion and Culture on Autopsy Practice and Public Health

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The interplay of religion and culture shapes many health experiences, including death and the grieving process. These impacts fall on nearly every aspect of postmortem care, including decisions surrounding autopsy consent and the potential for research. Because of the great public health potential of collected autopsy data, it is vital that autopsy-based studies represent diverse populations. However, religious and cultural objections to autopsies may leave some populations underrepresented in autopsy-based studies. This paper aims to examine the effects that religion and culture have on autopsy consent and practice through three contextual lenses: the historical context, the contemporary context, and the personal context. By combining the emotional and spiritual experiences of the individual with the historical evolution of forensic pathology using a mixed-methods review, new avenues for improved cultural congruence can emerge to influence forensic pathology practice. Through a narrative literature review and interviews with field experts, this study is intended to examine diverse perspectives which reflect the complex relationship of religious and cultural beliefs with public health advancement. In the preliminary results reported in this manuscript, three primary conclusions are evident and point to future directions. First, there is a lack of standardized education for medical personnel about the religious and cultural implications for autopsy practice and consent, including a guide for suggesting appropriate alternative exam options to accommodate diverse needs. Additionally, continual study and acknowledgement of the history of forensic pathology and its ethical implications will lead to deeper cross-cultural understanding and illuminate avenues to bolster public trust and research relationships. Finally, both qualitative personal narratives and quantitative population-wide data bring unique and complimentary information that enhances the understanding of the complicated dynamics between religious and cultural groups and death practices

P38 Identifying Risk Factors in Child Abuse-Homicides: A Forensic Autopsy Case Study in the State of Maryland, 2016-2023

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The focus of this study is to identify risk factors related to child abuse homicides in the State of Maryland, using data from the Office of Chief Medical Examiners. By analyzing the trends and victim demographics such as sex, age, race, and social history, as well as examining evidence from autopsies, toxicology reports, and death scene investigations, this research seeks to uncover trends that may indicate increased risks to homicide in children. The intended findings are to inform agencies such as Child Protective Services (CPS) and other policymakers to reduce future deaths and provide evidence-based recommendations for improving child safety systems.

During 2016 to 2023, there was a total of 61 child abuse related homicides in Maryland ages from newborn to 5 years old. There was no significance between the sex of the victims. Of the 61 cases, 34% (N=14) had previous CPS involvement, 20% (N=12) were between the age of newborn and 4 months and 30% (N=18) were children of 2 years of age. African Americans made up most of the cases with 65% (N=40). More than 44% (N=27) of the incidents occurred in Baltimore city. There was a significance in the perpetrator (p=0.0043), with69% (N=42) being the parents (44% father and 25% the mother). The victim's home was the most common location of the incident (77%). Of the 61 cases, 61% (N=37) of the victims were the youngest child, a major relevance, whereas the only child was at 36% (N=22). This correlates to the significance in the number of siblings each victim had (p=0.02), 39% one sibling and 28% being only child. The most common cause of death was multiple injuries mainly due to blunt force trauma (41%) followed by intoxication (28%), asphyxia, sharp force injuries, thermal injuries, and complications of prematurity, gunshot wounds, and neglect. Of the 17 intoxication cases, 10 children (59%) died of fentanyl intoxication, 4 died of methadone intoxication, 1 from alcohol intoxication, 1 from citalopram intoxication and 1 from quetiapine intoxication.

Through this research, we hope more research can be done to reduce the risk factors pf child abuse related homicide in order to provide prevention measurements. More research is needed to determine all significant factors, including socioeconomic and educational status of the perpetrators in order to reduce the risk factors and to provide prevention measurement

P39 A 25-Year Retrospective Study on Bridge/Overpass-Related Deaths in St. Louis

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Since 2000, suicide has been in the top 4 leading causes of death of Americans under the age of 44, with it being the second highest cause of death from 2012 to 2023. A growing body of literature has shown that limiting access to means of committing suicide can be a successful prevention strategy. However, safeguarding publicly accessible heights like bridges and overpasses can be a challenge. Research has shown that having local landmark bridges present increases the number of suicides by jumping from a height.

In this case series, we present 19 cases of bridge/overpass related deaths seen at the St. Louis Medical Examiner's office from 2000 to 2025, 12 of which were ruled as suicides. Decedents ranged from 22 to 82 years of age, with an average being above the age of 40 (11/19) and male (16/19). Sixty eight percent of cases (13/19) had positive toxicology screenings, with ethanol being most common (7/13). Of those that jumped from bridges into bodies of water, the time to body recovery ranged from 0 to 29 days, with an average of 9 days. Forty two percent of cases (8/19) had previous psychiatric history.

Most manners of death were classified as suicides (12/19). Of those suicides, 6 had previous psychiatric history and 3 had previous suicide attempts. Of the remaining 7 cases, 4 were classified as accidents and 3 were undetermined. Two of the accident cases involved fleeing from law enforcement. In the other 2 accident cases, the decedents had histories of mental health disorders, but were determined to be accidents by law enforcement based on witness' statements. Two of the undetermined cases lacked sufficient evidence to be categorized as accident or suicide. In the remaining undetermined case, the decedent's family was concerned that the death was not a suicide, as the decedent believed that his fiancée of 9 years had hired someone to kill him. Suicide could not be ruled-out, since witnesses stated that the decedent requested individuals to film him jumping off the bridge.

These cases highlight how difficult determining the manner of death can be in cases of unwitnessed falls or jumps from bridges or overpasses. These cases require a thorough investigation and coordination of various offices, including law enforcement, medical examiners, hospital systems, and mental health services organizations.

P40 Postmortem Genetic Testing: Do the Genes Fit…?

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Neurofibromatosis type 1 (NF1) is an autosomal dominant disorder affecting ~1:2600-3000 individuals, with approximately half being familial. Phenotypic expression is variable and includes neurocutaneous lesions, bone involvement, cognitive disabilities, and peripheral neuropathy. Seizures are twice as common in patients with NF1 and often associated with structural brain abnormalities, including cortical malformations, mesial temporal sclerosis, and low-grade gliomas. This case highlights the use of postmortem genetic testing (PGT) in clarifying NF1 diagnosis and demonstrates a novel application in the investigation of epilepsy.

The decedent was a 49-year-old man with a reported history of NF2, epilepsy, and early-onset dementia who was found deceased in bed after complaints of feeling unwell. The decedent's maternal grandmother, mother, and son were reportedly diagnosed with neurofibromatosis type 2 (NF2). External examination

revealed cafe-au-lait spots and neurofibroma excision scars. Neuropathological investigation demonstrated bilateral hippocampi with extensive Ammon's Horn and dentate gyrus gliosis with neuronal loss, gliosis of bilateral amygdalae, and focal subpial (Chaslin) gliosis. Other autopsy, histology, and toxicology findings—including cardiac pathology—were largely nonspecific.

The lack of CNS neurofibromas typically seen in NF2 and findings of neurocutaneous lesions with bilateral hippocampal sclerosis, both phenotypically associated with NF1, raised questions regarding the familial history of NF2. Whole genome sequencing was ordered and revealed *NF1* mutation in addition to *NAGLU* mutation significant for Charcot-Marie-Tooth 2v, which aided in the determination of epilepsy as cause of death with NF1 as a contributing condition. PGT plays a growing role in elucidating accurate clinical diagnoses and evaluating sudden unexpected death (SUD) with unrevealing traditional autopsies. For example, in a study investigating sudden arrhythmic death syndrome, PGT yielded a molecular diagnosis in ~30% of traditional autopsy-negative cases.

While PGT can aid diagnosis, ethical implications, logistics, and resource allocation must be considered. Given the potential to reveal pathogenic mutations, familial access to proper genetic guidance and surveillance is paramount. Moreover, while PGT largely falls under ME jurisdiction, familial consent should be considered as there may be a "duty to warn" relatives affected by heritable conditions. Cost remains a barrier as most insurances do not reimburse, shifting burden to families or institutions. Thus, implementing PGT requires clear protocols and appropriate access to resources for families. With the ability to facilitate diagnostic accuracy and family-centered care, PGT has the potential to become an integral component of SUD investigations, offering more precise diagnoses and also providing an avenue of clarity and closure for living relatives.

P41 Beyond the Blow: Exploring Post-Traumatic Hydrocephalus and Ventriculomegaly: A Case Report

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A 46-year-old male construction worker sustained a head injury when a section of framing fell onto his head, resulting in a brief loss of consciousness. He did not seek immediate medical evaluation. However, two weeks later, he presented to a local emergency department (ED) with complaints of headache and blurred vision and other visual changes. A computed tomography (CT) scan of the head demonstrated no skull fractures, subdural or subarachnoid hemorrhage, ventricular enlargement, or intraparenchymal lesions at that time. He was diagnosed with a concussion and discharged. Approximately seven weeks after the initial injury, he was brought to the ED in an obtunded state. Repeat CT imaging revealed significant ventriculomegaly consistent with hydrocephalus and evidence of brainstem herniation. He survived on life support for two days. An autopsy was performed, and the findings will be discussed.

Post-traumatic ventriculomegaly (PTV) is a recognized complication following head trauma. This entity, however, does not seem to be readily known in the forensic pathology community. It is most frequently associated with severe injuries, including intraventricular hemorrhage (IVH), subarachnoid hemorrhage (SAH), and traumatic brain injury (TBI), but may also occur after mild to moderate trauma. Ventriculomegaly can result from hydrocephalus—an imbalance between cerebrospinal fluid (CSF) production and absorption—or from cerebral atrophy; distinguishing between these etiologies can be challenging, particularly at autopsy. Post-traumatic hydrocephalus, on the other hand, is defined as a disorder of the production and absorption of cerebrospinal fluid (CSF) resulting in abnormal cerebrospinal fluid (CSF) accumulation to occur within the ventricles following traumatic brain injury that can manifest with increased intracranial pressure.

Clinical manifestations of hydrocephalus may include signs of increased intracranial pressure (ICP), gait disturbances, urinary incontinence, cognitive decline, or a plateau in neurological recovery; however, isolated headache may be the sole presenting symptom. The pathogenesis of hydrocephalus is believed to be multifactorial. Notably, limited forensic literature addresses the incidence of PTV or post-traumatic hydrocephalus (PTH) at autopsy, and histopathologic findings are not well characterized.
This presentation will review the definitions of post-traumatic hydrocephalus and post-traumatic ventriculomegaly, discuss the possible extended time interval between injury and death, and discuss

antemortem imaging and autopsy findings in this case. Additionally, this presentation will propose possible future studies.

P42 Demographics of Chronic Traumatic Encephalopathy Cases Received From Medical Examiner and Coroner Offices at the UNITE Brain Bank

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Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease associated with repetitive head impact (RHI) exposure that can only be diagnosed at autopsy by the presence of phospho-tau lesions at the depths of the cortical sulci. The Understanding Neurologic Injury and Traumatic Encephalopathy (UNITE) Brain Bank includes brain donors with a history of RHI, including contact/collision sports, military exposure, physical violence, and traumatic brain injury. We sought to compare demographics of CTE cases in UNITE that had been received from medical examiner or coroner offices (MECO) with cases from non-forensic sources. Of 509 CTE cases selected for analysis, we found 31 MECO cases and 478 non-MECO cases. Compared to non-MECO cases, MECO cases were significantly younger (MECO mean age (SD): 44.65 years (14.99), non-MECO mean age (SD): 53.64 years (18.521), $p<0.001$). MECO and non-MECO groups had RHI exposure primarily from American football participation (MECO=80%, non-MECO=94%) and had similar RHI exposure duration (MECO mean (SD): 17.85 years (7.962), non-MECO mean years (SD): 15.94 (7.079), $p=0.386$). Antemortem, MECO cases were more likely to have lower education levels ($p=0.034$), less likely to have dementia ($p<0.001$), less likely to show cognitive impairment assessed by multiple clinical scales ($p=0.026$), and more likely to have the behavioral subtype of traumatic encephalopathy syndrome (TES) ($p=0.007$) and have probable REM sleep behavior disorder ($p=0.036$) compared to non-MECO cases, but these differences were not significant when age was included in models (all p's>0.05). MECO cases were more likely to have died by suicide, while non-MECO cases were more likely to have a neurodegenerative cause of death ($p<0.001$). Pathologically, MECO cases were significantly less likely to have arteriolosclerosis ($p<0.001$), Alzheimer disease pathology ($p=0.031$), and lower CTE stage than non-MECO cases (MECO mean stage (SD): 2.03 (.836), non-MECO mean stage (SD): 2.74 (1.062), $p<0.001$), but these differences were not significant when including age in secondary analysis (all p's>0.05).. These results show that CTE cases received by the UNITE Brain Bank from forensic sources are more likely to be younger, to have died by suicide, and have less age-related neuropathological findings. Differences between MECO and non-MECO groups appear to be driven primarily by age at death, rather than the manner in how cases were acquired. These findings demonstrate demographic differences in forensically-sourced versus non-forensically sourced CTE cases and highlight that forensic pathologists should consider CTE in younger decedents with a history of head trauma.

P43 Not Trash: A Case Series of Solid Waste Truck/Facility Compactor Deaths in Vermont

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Introduction: Morbidity and mortality due to compaction in solid waste disposal facilities usually centers around deaths in the workplace, with workers who are trapped or injured while working on the machinery. In 2002, Staats et. al. addressed the novel incidence of deaths due to individuals in waste dumpsters, three occurring in a short period of time. In Vermont there has been an increase in non-work-related deaths due to solid waste disposal, four deaths in a five-year period, three in the same year (2023). Four similar deaths occurred in Vermont; decedents were found at multiple solid waste centers after initial crushing of materials. Most of the individuals were known to be unhoused or transient in the area and may have been using dumpsters for shelter, as reported in other cases. Distinguishing between fatal crushing injuries and postmortem trauma is difficult due to the extent of contact with debris and movement of the body through the phases of solid waste disposal. Identification and investigation are further complicated when multiple trash pick-up sites are co-mingled. In one case of this series, audio and video footage was

used to confirm that the individual was alive while in the solid waste dumpster and fatally crushed. Similar injuries and hemorrhage patterns were seen in the other three cases with less definitive evidence for time of death

Methods: Retrospective review of four deaths examined at the Vermont Office of the Chief Medical Examiner.

Results: Four decedents (3 male, 1 female), average age of 50.75, were discovered at four separate solid waste/recycling facilities. Three had full autopsies and one was a limited exam. Three were certified as crushing blunt force trauma, and one as mechanical asphyxiation. Three were certified as accident, and one as undetermined manner. Combinations of recreational drugs, ethanol, and prescribed medications were found on toxicology. Investigation revealed audio visual recording from a waste truck mounted camera of one decedent as they were emptied from the dumpster into the waste truck, showing the decedent was alive at the time of crushing. Similar injuries were seen among the cases, with exams revealing multiple blunt force injuries, with varying degrees of hemorrhage (fatal injuries), and some injuries without hemorrhage (likely) postmortem.

Discussion: Distinguishing between fatal crushing injuries and postmortem crushing injuries can be difficult, but review of waste truck/center surveillance recordings may provide critical information for determining the cause of death.

P44 r/ForensicPathology: Observations and Potential Implications from a Public Online Discussion Forum on Forensic Pathology Education and Recruitment

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Introduction: Over the last two decades, social media (SoMe) has exploded, winding its way into many aspects of medicine. Reddit, an internet forum with thousands of subforums dedicated to specific topics and interests, is a popular platform with over 90 million daily users. Users, who are often anonymized, visit “subreddits” - subforum pages dedicated to specific topics, such as r/Pathology – to communicate with others with similar interests. Though there are controversies on how SoMe may impact different medical fields, as improper moderation can lead to the spread of misinformation, SoMe is a popular, relatively accessible way to disseminate knowledge and improve non-traditional engagement between students, trainees, faculty physicians, and the general public. In today’s ever-increasing digital age, SoMe platforms such as Reddit can provide students, trainees, and the general public with increased access to forensic pathology, which is currently facing a critical workforce shortage. The subforum r/ForensicPathology, which has yet to be explored in academic literature, is moderated by a board-certified forensic pathologist and allows anonymous Reddit users to interact with and gain more exposure to the field.

Objectives: This study examines the analytical trends of r/ForensicPathology and users' engagement with this forum through an online survey.

Methods: The creator of r/ForensicPathology (EH) will provide the subforum’s analytics information. Additionally, a voluntary, anonymized survey with eight open-ended questions will be shared with r/ForensicPathology users in June 2025 and closed by August 2025. Answers, which will assess the observational impact of user engagement within this platform, will be analyzed and compiled upon survey closure.

Results: Initial analytics data from December 2023 to December 2024 show that r/ForensicPathology has been viewed over 550,000 times, with over 3,700 subscribers and 486 unique posts published. Within this timespan, the highest number of page views was in July 2024 (over 67,500 views). 17 total posts were removed (likely due to auto-moderation by Reddit). Since inception, only 3 users were manually banned by the creator (EH) from future posting. Survey results are pending.

Discussion: Presently, r/ForensicPathology seems to be an acceptable anonymous public discussion SoMe forum that may help improve online education and recruitment initiatives in forensic pathology. Information provided herein may help improve similar SoMe initiatives and create new innovative strategies to remedy the growing forensic pathologist workforce shortage.

P45 A Case of Mechanical Asphyxiation Related to Military Training

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Military service and training provide a unique environment that can lead to unusual causes of death. This is illustrated by a case of a DoD contractor who died while servicing the control arm of a tank target. The decedent was an experienced repair technician who was tasked with tightening several bolts that had come loose on the arm of the target. The target was normally activated to fall with impact, so the technician radioed to the control tower to place the target in an upright position and take it offline to terminate communication between the target and control tower. When the decedent was not responding to communications, it was discovered the arm of the target was down and he was found under the target in a prone position. The target was reported to be offline but not unplugged.

On autopsy, suffusion of the head, neck, and upper chest was identified. Additionally, there were florid petechial hemorrhages of the conjunctivae, periorbital skin, and on the upper chest and right upper extremity. Fractures were noted of the sternum and multiple ribs bilaterally, creating a flail segment. The decedent's medical history included diabetes mellitus, hypertension, hyperlipidemia, and post COVID syndrome which were not thought to be related to his cause of death. These findings were consistent with mechanical asphyxiation. The manner of death was ruled an accident.

While the circumstances of this death are unique, death related to military training (both of military members and DoD contractors) is not uncommon. The Congressional Research Service estimates that about 30% of active duty deaths are related to training accidents with approximately 6000 occurrences between 2006 and 2021. These numbers have been trending downward, but the risk still exists given the need for training and intrinsic danger in some of these environments. Properly understanding these risks and learning from accidents and the deaths resulting from them can hopefully aid in keeping service members safe and continuing to decrease these statistics.

P46 Shared and Withheld: Communication of Emotion in Death-Focused Medical Specialties

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Among physicans, forensic pathologists, autopsy pathologists, and anatomists are unusually placed on the receiving end of the dead. From a humanistic perspective, it is important to consider the emotional impact of autopsy and dissection on the medical professionals involved. The majority of the extant literature focuses on the *what* of emotion: how does engaging in this work make its practitioners and communities feel? Beyond only the negative emotional valences a casual observer might assume, there is also space in this work for fascination, gratitude, and even fun. Adjacent to this question, however, is the interpersonal *how*: in what ways do practitioners interact with each other in the context of their shared and unitary emotions?

The present study seeks to explore this topic through a biopsychosocial lens. Over summer 2025, approximately 20 semi-structured interviews will be held with forensic and autopsy pathologists, residents/fellows, anatomists, medical students, and allied professionals to elucidate their experiences of communication and withholding of emotion among colleagues in professional settings related to forensic autopsy, hospital autopsy, and anatomical dissection. Qualitative analysis will be rooted in humanistic and hermeneutic phenomenology methods, which account both for the research subject's explicit and implicit meaning in their speech, expression, and action, as well as the researcher's inextricable experience in interpreting the subject. Results will include a discussion of how participants perceive their own emotions, how they describe choosing to share or withhold that information with their colleagues, and how these

phenomena play out in observed professional settings. Discussion will also relate these findings to the development of professional identity and conformation to mores in professional pathology and anatomy/physiology circles, as well as other topics arising with participants. The outcomes of this project will carry implications for the design of training and professionalization of forensic pathologists, as well as other pathology and anatomic-based fields, with an eye toward wellness, sustainable professions, and organizational culture design.

P47 An Unusual Case of Suicide by Circular Saw

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Suicide via sharp force injury accounts for less than 2% of all suicides in the United States. A subset of this type, suicide via electric circular saw, is exceedingly rare and presents unique challenges in forensic investigation. We report here the case of a 45-year-old male with a history of illicit substance use who was found dead in his home with a bloodied circular saw nearby. On autopsy, a gaping incised wound extended from the ventral to dorsal right neck. There were no hesitation marks or defensive injuries. Blood was present at the nares, mouth, and ears, but no other trauma was noted. Postmortem toxicological analysis of femoral blood revealed the presence of methamphetamine and amphetamine. The characteristics of the wound, absence of other injuries, presence of the tool at the scene, and context of stimulant intoxication supported the determination of cause of death to be an incised wound to the neck caused by an electric Skil saw. The manner of death was suicide. This case emphasizes the importance of integrating postmortem findings, toxicology, and scene investigation to accurately determine the manner and circumstances of death in cases with unusual or violent presentations.

P48 A Rare Case of Death Due to Direct Penetrating Carotid Artery Trauma from Exploding Vaporizer Pen Resulting in Cerebral Infarction

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Multiple injuries caused by electronic cigarettes have been reported mostly to the thigh and hands due to explosion in the pocket, but they rarely directly result in death. This is a rare case of death due to the direct result of explosion of an electronic cigarette. We present a case of the decedent, a 24-year-old male who was admitted to the emergency room on 1/27/2019, alert with multiple shrapnel injuries to the neck and face including his left carotid artery. His condition declined and he was eventually pronounced dead following a cerebrovascular accident of the middle cerebral artery that led to cerebral infarction and herniation. Scene investigation and interview of the store where the e-cigarette was bought revealed the decedent was sold an older version of the device which uses a mechanical “mod” to deliver a direct, unregulated power output from the battery to the coil; This provides a more intense experience due to the high dose of active vapor delivered. These devices are no longer supposed to be sold due to the risk of overheating and explosion. Autopsy revealed lacerations of the tongue and posterior pharyngeal wall, florid deep soft tissue hemorrhage of the left neck surrounding the carotid sheath extending to the level of the base of skull, acute cerebral infarction of the left temporal and frontal lobes, and basal ganglia with secondary hypoxic brain injury, and bilateral uncal and cerebellar herniation due to widespread edema. Glass fragments were recovered from the wounds. This case shows the deadly potential of using unregulated and/or old vaporizer devices and highlights the importance of regulatory oversights. Raising awareness and educating the population about the dangers of purchasing these unsafe devices is essential in prevention of similar fatalities.

P49 Sudden Death of a Young Man with Seizures and Prior Brain Tumor Resection

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We report the sudden death of a young man with a history of seizures due to a brain tumor that was reported to have been previously resected. A 35-year-old man with a history of seizures, status-post neurosurgery due to a possible tumor resection, was found collapsed at home and was pronounced dead at the scene.

A full forensic autopsy revealed heavy, edematous lungs. There was evidence of a prior craniectomy. A patent and intact ventriculoperitoneal shunt was noted. Examination of the heart revealed cardiomegaly with left ventricular hypertrophy and coronary artery atherosclerosis, with a firm thrombus within the left anterior descending coronary artery. Microscopic examination demonstrated an acute-on-chronic myocardial infarct of the posterior left ventricle and interventricular septum. Neuropathologic examination revealed a gray-tan cystic mass, 3 x 3 x 2 centimeters, with gritty cut surfaces, superior to the optic chiasm, abutting the anterior commissure and left caudate nucleus, within the third ventricle, and extending into the left lateral ventricle. Microscopic examination of the mass showed a multicystic tumor composed of nests, lobules, and cords of squamous cells with peripheral palisading columnar epithelium, nests of keratin, associated pigment-laden macrophages, multifocal lymphocytic infiltrates, scattered giant cells, and multifocal calcifications, consistent with recurrent/residual adamantinomatous craniopharyngioma. Cause of death was ultimately certified as acute coronary artery thrombus with myocardial infarct due to atherosclerotic cardiovascular disease, with hypertensive cardiovascular disease and recurrent/residual adamantinomatous craniopharyngioma as contributory factors.

Craniopharyngiomas are rare, low-grade tumors that develop along the craniopharyngeal duct. There are two types: adamantinomatous craniopharyngioma (ACP) and papillary craniopharyngioma (PCP). ACPs are characterized by epithelial origin, β-catenin mutations, cystic structure, and calcification. Their histological appearance includes palisading epithelium, anucleated ghost cells, and stellate cells. While these tumors are benign, their location near crucial structures, including the pituitary gland, hypothalamus, Circle of Willis, and optic chiasm impact quality of life through endocrine changes, visual disturbances, and increased intracranial pressure. Proximity to these structures also means surgically removing the entire tumor is not always possible, so treatment also involves radiation or chemotherapy.

This case highlights the importance of a full autopsy in individuals with a history of seizures to rule-out concomitant pathology and to accurately certify deaths for the purposes of public health and vital statistics.

P50 Underlying Cause for Concern: State-Level Predictors of Poorly Defined Deaths During Periods of Elevated Mortality

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Mortality surveillance is a critical component of public-health decision making and the medicolegal community plays a pivotal role by providing accurate and detailed cause of death determination and certification. Systemic strain, in the form of other internal operational constraints or external increases in volume and complexity, however, may compromise the usefulness of cause of death certification for public health purposes. This study examined the impact of long-term medicolegal systemic stressors, specifically accidental poisonings due to drug toxicity and Covid-19, on the quality of cause of death certification. The utilization of the ICD-10 code R99 (Other ill-defined and unspecified causes of mortality) as the underlying cause of death, often referred to as a “garbage code”, represented insufficient death certification that served little to no public health purpose for mortality surveillance. Employing state level underlying cause of death data from CDC Wonder, a fixed effects panel regression over 6 years was performed in SPSS 29 (n=275 state year observations.) Covid-19 was found to have a not statistically significant, effect (p=0.107), while levels of accidental drug toxicity, namely narcotics, were significantly associated with increased rates of poorly coded R99 deaths and acted as a predictor (p=0.048.) Further, state-specific differences highlighted the importance of robust death certification infrastructure to support

mortality surveillance in periods of systemic stress. Enhancing state level capabilities is pivotal to ensure sufficient mortality surveillance in periods of increased medicolegal demand.

P51 Postmortem Eye Retention in a Regional Medical Examiner's Office

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At autopsy, forensic pathologists recover and retain the eyes of a decedent for a variety of reasons, with one of the most common being suspicion of trauma. To better understand the practice within the office, the authors evaluated the demographics, causes/manners of death, and globe/optic nerve pathology of decedents for which eyes were retained and examined.

The electronic database used for neuropathological specimens was queried for all cases in which forensic pathologists at Western Michigan University Homer Stryker M.D. School of Medicine retained eyes for formal neuropathology consultation, which includes cases from 2016 until present. The demographics, causes/manners of death, details of injury (if applicable), and gross/microscopic eye pathologic findings were documented. Examples of pertinent pathologic findings included hemorrhage of the optic nerve, sclera, conjunctiva, and retina; perimacular retinal folds; and amyloid precursor protein-positive axonal varicosities.

From 2016 to 2024, 32 cases were identified, two of which were excluded due to jurisdictional constraints. The ages of the decedents ranged from fetus to 6.9 years, and 76.7% (23) of these cases were certified as homicides. Undetermined deaths accounted for 10% (3) of cases, accidental deaths accounted for 6.7% (2) of cases, and natural deaths accounted for 3.3% (1) of cases. The one intrauterine fetal demise was not assigned a manner of death.

Of the homicides, 78.2% (18) had globe findings, 65.2% (15) had optic nerve findings, and 21.7% (5) had no ocular findings. Of the undetermined deaths, 66.7% (2) had globe findings, 33.3% (1) had optic nerve findings, and 33.3% (1) had no ocular findings. Of the accidental deaths, 100% (2) had globe findings and 50% (1) had optic nerve findings. Both the natural death and the intrauterine fetal demise showed neither significant globe nor optic nerve findings.

Of the 30 cases included in the query, 56.7% (17) had notable pathologies involving both the globe and the optic nerve, while 8 cases (26.7%) had neither globe nor optic nerve pathology. Though the majority of eyes were retained from cases that were certified as homicides, eye findings were not exclusive to homicides or accidental traumatic deaths. Therefore, as always, it is important to interpret these findings in the context of the entire case.

P52 From Intake to Lethal Outcomes: Postmortem Analyses of Carceral Healthcare in South Carolina

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The provision of adequate physical and mental healthcare services for incarcerated populations is a historically contentious topic. At least 777 detained individuals died in facilities across South Carolina between 2015-2021, none of which received death sentence penalties. This research aims to explore current healthcare challenges faced by those within the carceral system in the state of South Carolina and the resulting fatal outcomes.
South Carolina utilizes a coroner-system for death investigation. Each of the 46 counties has its own individual coroner's office. The Division of Medical and Forensic Autopsy at the Medical University of South Carolina (MUSC) currently provides forensic pathology services to 18 counties, spanning from rural to densely populated metropolitan areas. Across the state are 67 total detention centers, 46 county and 21 state facilities. Through manual review, seventeen cases of incarceration deaths at MUSC between 2021-2025 were selected and classified based on time of death while in detention: acute (less than 24 hours), subacute (24 hours to 1 week), and deferred (>1 week). Deficiencies in recognizing, managing,

and intervening for signs and symptoms of emergent and acute processes; delayed diagnoses of chronic conditions; lapses in care due to cited resources and staffing shortages; failures to expedite referrals for cases requiring higher levels of care; medication dosage or scheduling modifications; and delayed mental health interventions were identified as barriers leading up to death.

P53 Cough Dropped Dead: A Rare Antemortem Case Report of Lozenge-Induced Acquired Methemoglobinemia in the Presence of G6PD Deficiency and Twin Pregnancy

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A “perfect storm” of unique risk factors can turn a mild condition deadly. This case demonstrates an unusual presentation of a common condition that led to rapid deterioration under the right circumstances. In this case, the most salient risk factor was exposure to benzocaine contained in cough drops. This case helps bring attention to common risk factors that complicate G6PD deficiency while highlighting an abnormal presentation of the condition. This case covers the events and interventions that took place prior to the decedent’s passing.

The decedent was a previously healthy 34-year-old woman, pregnant in their third trimester with twins, who developed sudden respiratory collapse after a week of taking Cepacol cough drops for symptomatic relief of viral bronchitis. A week after taking the lozenges, they developed shortness of breath, cyanosis, and loss of consciousness. Paramedics arrived and administered ipratropium, breathing treatments, and supplemental oxygen. Their condition initially improved, but in the ambulance they suddenly entered asystole. Respiratory rates and blood pressure plummeted. CPR was started and the decedent was intubated, with no improvement. The decedent expired in the ED, and no fetal heartbeats were detected for either fetus. The initial clinical differential included cardiac arrest and pulmonary embolism, but a definitive diagnosis remained unclear. Postmortem investigation revealed G6PD deficiency, and the resulting methemoglobinemia likely led to their death. Genetic analysis confirmed heterozygosity for the A- complex G6PD variant, typically associated with mild enzymatic impairment. However, oxidative stress from infection, pregnancy, and benzocaine exposure created a fatal cascade.

Literature shows that benzocaine exposure can precipitate methemoglobinemia in individuals with G6PD deficiency, with the risk increasing upon repeated exposure. Furthermore, infection and pregnancy can both complicate G6PD deficiency. While each individual risk factor alone may not have been fatal, their combination created the “perfect storm” for rapid clinical deterioration. This case, by highlighting an unusual presentation of a common enzyme deficiency, emphasizes the need for early recognition, the importance of avoiding benzocaine-containing products in high-risk individuals, and recognizing how common conditions can interact with genetic vulnerabilities to produce rapid and fatal outcomes.

P54 Updates in Normal Organ Weights: Review of Tools for Adult and Pediatric Organ Weight References from the College of American Pathologists

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Introduction: Organ weights are an essential part of autopsy analysis. Deviations from normal organ weights provide important clues to disease processes. The quality of such inferences, however, depends in large part on the reliability and accuracy of the reference tables. There are multiple commonly used organ reference tables in circulation, yet these suffer from a range of methodological limitations including age of the data (some >100 years old), sample size, and screening criteria. Herein, we present updated standard organ weight tables from the College of American Pathologists’ Autopsy Committee.

Methods: Organ weights, body weight, and body length were collected from 8280 carefully screened autopsies performed between 2009 and 2023 on adults aged >18 years from 5 locations in the United States. Strict exclusion criteria were in place limiting postmortem interval, prior hospitalization, body

condition (e.g. decomposition), as well as organ specific exclusion criteria for diseases known to affect organ weight. The data was organized into reference tables and graphs. Ongoing efforts are underway to generate similar updated tables for pediatric organ weights in a US based population.

Results: 8280 decedents were included in the adult study. Multiple reference tables were generated using sex and body weight, height, BMI, or age. The study data show a strong positive association between organ weight and body weight for the heart, liver, and spleen. Brain weight shows a strong negative association with age. Even when controlling for body weight, men's organs are heavier, except for the weight of the liver, which is comparable in men and women. The current study suggests that, for some of the commonly weighed organs, there has been an increase in median organ weight when compared with existing references.

Discussion: The tables presented here provide an updated reference tool that is useful to forensic pathologists. Prior studies have suffered from issues with age of the data, poor screening criteria, and small sample size. This project reviews the prior literature, addresses these points, and provides a carefully screened collection of representative organ weights. The data is also available as a digital online tool at: organweights.theautopsybook.com. Updates on recruiting participation for revised pediatric organ weights tables will also be presented, offering an opportunity for ME Offices to get involved with ongoing work in this area.

P55 N_2O Other Explanation: Canisters, Clots, and Conundrums

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Inhalants are invisible, volatile substances that produce vapors people inhale to induce psychoactive effects. Associated deaths provide a challenge to investigators, forensic pathologists, and toxicologists. Inhalants are prone to rapid degradation especially with prolonged postmortem intervals, requiring additional evidence to determine cause and manner of death. We present autopsy and toxicologic findings of a decomposing decedent with known nitrous oxide (N_2O) abuse, negative postmortem toxicology, and unexpected autopsy findings requiring integration of scene findings and scientific literature to render the most appropriate cause and manner of death.

The decedent was a 26-year-old female with history of schizophrenia, bipolar disorder, syncope, and N_2O dependence. She was found in a moderate state of decomposition in her locked and secured residence during a welfare check twenty-two days after last being known alive, face-down on her kitchen floor. Over 20 N_2O canisters were present throughout the home. Naproxen, Fluoxetine and Lamotrigine bottles were also present and appeared to not be taken as prescribed.

Autopsy demonstrated moderate decomposition. All organs were unremarkable apart from the central nervous system (CNS). The edematous brain weighed 1300 grams. No subdural or subarachnoid hemorrhage was present. Large thrombi were present in cerebral meninges; dural sinus thrombi were not definitely identified. Acute intraparenchymal white matter hemorrhage was present at sulci depths dissecting into the cortex anteriorly, and parasagittal wedge-shaped hemorrhagic infarcts were present posteriorly. Microscopic examination demonstrated acute hypoxic-ischemic neuronal changes, acute parenchymal hemorrhage, and early organizing thrombi in large leptomeningeal blood vessels. Hydrocephalus ex-vacuo and mineralized arteriosclerosis was also seen. Postmortem toxicology on heart blood, including N_2O via Gas Chromatography/Mass Spectrometry, was negative. The cause of death was certified as "acute bilateral cerebral hemorrhage due to leptomeningeal thrombi associated with nitrous oxide abuse," and the manner of death as accident.

Mechanisms of inhalant deaths may include asphyxia or cardiac arrhythmia. Chronic N_2O abuse may result in coagulopathy including CNS thrombi. A suggested mechanism is due to its interference in cobalamin function, resulting in cobalamin deficiency and hyperhomocysteinemia. Other confounding factors, such as use of the oral contraceptive pill, should be considered. The acute findings, in the context

of the history and scene findings, allowed confident attribution to N_2O despite negative postmortem toxicology. Features of chronicity included hydrocephalus ex-vacuo and CNS arteriosclerosis. This case illustrates the importance of notable scene findings to present evidence of substance use, especially when it may not be possible to detect through toxicologic analysis.

P56 Case Report: Congenital Cyst Causing Lethal Asphyxia in a One-month-old Infant

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The thyroglossal duct serves as a pathway for the developing thyroid gland during embryogenesis that normally disappears before the 10th week of fetal life. However, when the thyroglossal duct fails to close, it can result in fluid or mucus filled cysts extending from the foramen cecum at the base of the tongue to the thyroid gland at the 2nd and 3rd tracheal cartilages in the upper neck. Persistence of the thyroglossal duct is the most common congenital anomaly of the neck and is present in approximately 7% of the general population. Thyroglossal duct cysts are usually treated surgically in children less than 10 years of age and rarely recur. Less than 1% of all thyroglossal duct cysts develop a malignancy, the most common of which is papillary thyroid carcinoma which has an excellent prognosis. Although it is a benign lesion with a survival rate of greater than 99%, there have been many reported cases of fatal asphyxia due to airway obstruction from thyroglossal duct cysts even extending into adulthood. Here, we present a 1-month-old female infant who had a 2-week history of an enlarging neck mass with difficulty breathing. An ultrasound showed a smoothly marginated and complex cystic structure without internal flow, favoring a diagnosis of branchial cleft cyst. After leaving this radiology appointment, the decedent was found unresponsive in her car seat. At autopsy, the infant was found to have a 5 centimeter cystic lesion in the neck with associated tracheal deviation. Toxicology was negative for tested substances in blood. Histologically, this lesion showed an acutely inflamed cyst lined by respiratory epithelium with squamous metaplasia and thyroid tissue within the cyst wall, morphologically consistent with a thyroglossal duct cyst. This case highlights the challenges with histologic and radiographic correlations given the overlapping features of developmental cysts along with the potential for lethal asphyxia due to congenital neck masses, especially in vulnerable patient populations such as infants.

P57 Accidental Death Due To Self-Inflicted Negligent Discharge of a Gun in a Motor Vehicle Collision

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This is a case of an accidental death due to a self-inflicted gunshot wound triggered during a motor vehicle collision. The decedent is a 22-year-old black male who was the driver of a car which collided with another vehicle and guard rail on the interstate, after having been witnessed traveling at a high rate of speed. A full autopsy was performed which revealed a contact range gunshot wound to the head. A thorough investigation, which includes examination of blood spatter on the deployed airbags and ballistics examination, supported the determination of a self-inflicted gunshot wound due to negligent discharge of a firearm.

Motor vehicle collisions and gunshot injuries are two of the top three causes of injury-related death for persons younger than 65 years. Firearm injuries constitute a major US public health crisis, with widespread effects on both those directly affected by the injuries and deaths and on their families, friends, and communities. The manner of deaths due to firearm injuries is largely suicide followed by homicides, and less commonly accidents. Similarly, in the US motor vehicle collisions result in over 40,000 deaths each year. The manner of these deaths is most commonly accident, followed by rare instances of homicide and suicide.

Literature and case reports related to unintentional firearm injury during a motor vehicle collision are limited. The case we are presenting is unique in that not only is it a death due to unintentional firearm injury, but it is triggered by a motor vehicle collision.

P58 A Longitudinal Review of Homicide Gunshot Wound Fatalities in Cuyahoga County, Ohio: A Retrospective Analysis of Trends in Gunshot Wound Lethality

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In recent years, homicide rates in the United States have steadily increased, with firearms accounting for a growing proportion of these deaths. Notably, the average number of gunshot wounds (GSWs) per decedent also appears to be rising compared to data from the past two decades. Many of these additional wounds are classified as non-fatal, involving soft tissue or non-vital structures rather than major organs or vasculature. This study reviewed individual autopsy case files from firearm-related homicides in Cuyahoga County over the past 20 years to assess trends in the number and nature of gunshot wounds per victim. For each case, GSWs were categorized as either fatal or non-fatal based on bullet trajectory and the anatomical structures affected. Demographic variables including age, race, and sex were also recorded. Statistical analysis was conducted to determine annual trends in the average number of GSWs per decedent and the proportion classified as fatal. Linear regression revealed statistically significant increases in (1) the total number of firearm-related homicides ($p < 0.001$), (2) the average number of GSWs per decedent ($p = 0.009$), and (3) the number of non-fatal wounds per case ($p = 0.0021$). The number of fatal wounds per victim did not show a statistically significant change ($p = 0.1334$). These findings suggest a growing prevalence of multiple, non-fatal GSWs, potentially reflecting increased firearm availability or evolving patterns of violence. Understanding these shifts may inform both forensic investigation and public health approaches to urban gun violence through policy and prevention. All case files and statistical reports were provided by the Office of the Cuyahoga County Medical Examiner.

P60 Beyond the Bruises: Unraveling a Disguised Diagnosis of Fatal Infantile Appendicitis

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Acute appendicitis in infants is an infrequent yet potentially fatal condition, constituting approximately 0.38% of pediatric appendicitis cases. Its clinical presentation is often nonspecific, encompassing symptoms such as fever, irritability, poor feeding, and vague abdominal discomfort, which commonly lead to diagnostic delays and an elevated risk of severe complications, including perforation and peritonitis. The absence of classic appendicitis signs in infants complicates early diagnosis. Perforation rates in this cohort can reach as high as 86% in infants under 1 year of age. Even with timely diagnosis, up to 70% of cases in children under 3 years progress to perforation within 48 hours, resulting in significantly increased morbidity and mortality.

We report the case of a 3-month-old female who initially presented with persistent fever unresponsive to antipyretic therapy, followed by respiratory distress, altered mental status, and seizures. Clinical examination revealed dilated pupils and extensive bruising, raising initial concerns of traumatic brain injury and potential non-accidental trauma. Imaging studies demonstrated a moderate-volume acute subarachnoid hemorrhage, as well as free fluid in the liver and falciform ligament. Despite urgent transfer to a tertiary care center, the patient's clinical status deteriorated rapidly, with signs of brain herniation, and the infant ultimately succumbed shortly after arrival.

Postmortem examination revealed extensive hemorrhages across multiple organs, including the heart, lungs, and brain. Microbiological cultures from blood, lungs, spleen, and cerebrospinal fluid confirmed the presence of Pseudomonas aeruginosa bacteremia. Gross examination of the appendix revealed hyperemia and purulent, non-occluding material within the lumen, while histopathological analysis demonstrated necrosis, neutrophilic infiltration, and microabscess formation, consistent with acute appendicitis. Infiltration of neutrophils within the serosal layer confirmed the diagnosis of periappendicitis. The bacteremia developed secondary to acute appendicitis, leading to systemic sepsis and multi-organ failure. The rapid progression of the septic process highlights the aggressive and potentially lethal nature of appendicitis in this age group.

This case underscores the grave consequences of delayed diagnosis of infantile appendicitis and the potential for diagnostic confusion with non-accidental trauma. The physical findings in this infant initially

prompted wrongful suspicion of child abuse, resulting in unnecessary legal and social complications for the family. Timely diagnosis and intervention are paramount in preventing fatal outcomes, avoiding misdiagnosis, and mitigating associated legal and ethical issues. Enhanced clinical awareness, improved diagnostic techniques, and the application of advanced imaging modalities are critical to the successful management of this rare and life-threatening condition.

P62 Subgaleal Hematoma from Hair Pulling in Intimate Partner Violence: A Forensic Case Study

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Subgaleal hematoma (SGH) is a rare but life-threatening injury that has been associated with obstetric trauma in neonates and reported in non-accidental trauma in children and adolescents, when subjected to significant pulling and shearing forces, such as those seen in cases of injury associated with hair pulling or braiding. This case study describes a large subgaleal hematoma that was discovered during autopsy, with findings consistent with forceful hair pulling in the setting of intimate partner violence (IPV). To our knowledge, this is the first report of SGH in an adult related to IPV.

According to the National Violent Death Reporting System and the Uniform Crime Reporting – Supplementary Homicide Reports, IPV accounts for up to 50% of homicides of women in heterosexual relationships. This case underscores the importance of recognizing SGH in adults as a potentially fatal outcome of IPV, particularly when the mechanism of injury may not leave distinctive external trauma or may leave trauma that is difficult to identify through the hair. The decedent, a 45-year-old white female who resided with her boyfriend and had a documented history of IPV, was reported missing by family members. She was found deceased eight days later on land owned by her boyfriend. External examination revealed multiple blunt force injuries in various stages of healing, including contusions to the torso, extremities, neck, and head. External scalp examination showed 1 medium patch of traumatically absent hair over the frontal region just left of midline, and contusions, particularly over the frontoparietal and left temporal regions. Internal dissection revealed a large subgaleal hematoma extending from the frontal to the parietal scalp, greater on the left than the right, with an estimated volume of 150mL. No skull fractures or intracranial hemorrhages were identified. The characteristics and location of the hematoma, in the absence of high-velocity or impact-related scalp and cranial injury, was consistent with a pattern of forceful hair pulling as the primary mechanism. The death was ruled a homicide resulting from homicidal violence including multiple blunt force trauma. The subgaleal hematoma was considered one of the multiple blunt force injuries that contributed to her death.

Careful scalp dissection, correlation with investigative and scene findings, and documentation of hair pattern defects are critical in identifying hair-pulling injuries. This case highlights the lethal potential of non-traditional forms of physical abuse and calls for greater forensic awareness and multidisciplinary collaboration when investigating deaths with suspected domestic violence components.

P63 Clinicopathological Characteristics in Autopsy-Diagnosed Aortic Dissections and Ruptures: A Two-Center Retrospective Forensic Pathological Study

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Aortic dissection and rupture is one of the most common cause of sudden cardiac death (4-6% in forensic case series) with a high mortality. This retrospective study was conducted with data obtained from the Office of the Chief Medical Examiner (OCME) of Alberta, Canada, which is comprised of two separate office and investigates all sudden and unexpected deaths in the province. Total of 25 deceased from spontaneous dissection or rupture of the aorta were assessed using the published autopsy report and death certificates. Average decedent age was 59.4 years (n=25;range:29-90) with the average male age being 56.2 years (n=16;range:29-74) and the average female age being 65.2 years (n=9;range:44- 90). Decedents were either found unresponsive (n=13), with sudden collapse (n=6), or back, chest or abdominal pain (n=3). Common comorbidities noted were hypertension (n=17), atherosclerosis (n=14), obesity (n=8), COPD (n=5) and smoking (n=4). Toxicology results' for 4 decedents were positive for cocaine and/or methamphetamine. Type of autopsy was performed at discretion of the forensic

pathologist: full autopsy examination (n=9), targeted autopsy examination was performed in 12 cases, and extended external autopsy examination performed in remaining 4 cases. The average decedent weight was 83.7 kg (range: 50-151), average decedent height was 173.8 cm (range: 151 – 194). The average BMI was 27.9 kg/m2 (range:18.4 – 43.4). The average decedent heart weight was 518 g (range: 300 – 840). Cause of deaths were certified as hemopericardium (n=8), cardiac tamponade (n=6), hemoperitoneum (n=2), retroperitoneal hemorrhage (n=2), while left hemothorax, acute left anterior descending coronary artery dissection, and gastrointestinal hemorrhage were certified in 1 case each. Aortic rupture was noted in 11 cases. Volume of hemopericardium (n= 11) reported ranged from 400-600 mL while hemothorax (n=5) ranged from 1500 – 3000 mL. Stanford type A and B dissections comprised 13 and 6 decedents, respectively. Where recorded (n =7), aortic circumference ranged from 9.0 to 13.0 cm. Other cardiac findings were left ventricular hypertrophy (n=12), coronary artery disease (n=6), and chronic myocardial ischemia (n=7). Heritable thoracic aortic pathologies of Marfan syndrome and bicuspid aortic valve aortopathy were noted in 2 decedents. This present study reports the clinicopathological characteristics and autopsy findings of 25 decedent with aortic dissection and rupture in a Canadian forensic pathological context. Further analyses of histopathological findings in a forensic setting would add invaluable information in evaluation of central vascular pathologies.

P64 Fireworks and Fatal Blast-type Trauma: A Forensic Pathologist Perspective

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Fireworks are a common feature of celebratory events in the United States, particularly during national holidays. While typically viewed as sources of entertainment, their improper use or modification can result in severe injury and death. Blast-type injuries from fireworks present a unique challenge to forensic pathologists due to the severity and variability of trauma. A thorough medicolegal death investigation is essential to accurately reconstruct the circumstances of these deaths, document the injury patterns, and report cases to agencies such as the U.S. Consumer Product Safety Commission (CPSC). This case series presents four deaths resulting from the improper handling of fireworks, each demonstrating fatal blast-type trauma.

Case 1**:** A 34-year-old male died following the explosion of a mortar-type firework that he was holding during a New Year's Eve gathering. Autopsy revealed an injury to the left anterior chest wall with an internal avulsion pocket, depressed rib fractures, cardiac laceration, and hemopericardium.

Case 2: A 37-year-old male was found unresponsive in his yard with evidence of nearby explosive remnants. He had reportedly been constructing homemade explosives. Autopsy revealed multiple abrasions, liver lacerations, abdominal wall disruption with small bowel evisceration, soft tissue injuries to the right forearm and arm, and partial amputation of the right hand.

Case 3: A 42-year-old male sustained fatal injuries after a firework exploded in his hands at a Fourth of July event. Autopsy findings included soft tissue injury to the neck and chest, bilateral clavicle fractures, a sternal fracture, perforations of the aorta and heart, and bilateral thumb fractures.

Case 4: A 14-year-old male was holding a mortar-type firework shortly after July 4th when it exploded. He ran briefly before collapsing. Autopsy showed catastrophic thoracic trauma, including a sternal fracture, hemopericardium, cardiac and pulmonary lacerations, and bilateral lung hemorrhage.
These cases illustrate the potentially lethal consequences of both commercially available and improvised fireworks. Blast-type injuries most commonly affect the torso and upper extremities. Forensic pathologists play a critical role in accurately identifying and classifying such injuries, contributing to public health, safety surveillance, and prevention efforts. A multidisciplinary approach involving forensic pathologists, death investigators, law enforcement, public health and safety officials, and regulatory agencies is essential to reduce the incidence of firework-related fatalities.

P65 The Hidden Burden of Alzheimer's Dementia: ABC Scoring in Autopsy Cases Across a 10-Year Period at a Large Academic Institution

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Introduction: Alzheimer's disease (AD) is a progressive neurodegenerative disorder and a leading cause of death. Neuropathologic examination at autopsy provides definitive diagnosis. The National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment provides an "ABC" framework for scoring AD changes at autopsy. The "A" assesses amyloid deposition, "B" assesses neurofibrillary tangles, and "C" assesses neuritic plaques. They are scored from 0 to 3 and together, the total ABC score can be utilized to diagnose AD or explain cognitive impairment. Herein, we report our experience in using this grading system in a 10-year period at NYP/Weill Cornell Medical Center.

Methods: We performed a retrospective review of medical autopsy cases performed at our institution between 2013 and 2023. Cases with neuropathologic examination including immunohistochemical staining for beta-amyloid and Tau were included. Clinicopathologic variables and autopsy findings were recorded.

Results: We identified 104 cases, from decedents ranging in age from 56 to 98 years (median age 79.5 years), 52 of which were male. 10 (10%) decedents carried the diagnosis of AD and 35 (34%) decedents had some recorded history of cognitive decline or dementia. 29 (28%) decedents had a history of stroke or other cerebrovascular accident. 75 (72%) decedents had a history of hypertension and 37 (36%) decedents had a history of diabetes mellitus. At autopsy, median brain weight was 1250 g and 67 (64%) showed evidence of gross atrophy. Atherosclerosis was seen in 70 (67%) cases. Cerebral amyloid angiopathy was seen in 48 out of 64 (75%) cases with beta-amyloid staining.

Total ABC scores ranged from 1 to 9 for all cases identified (median score of 6). In patients with antemortem diagnosis of AD, ABC scores ranged from 5 to 9 (median score of 8). In patients with antemortem history of dementia or cognitive decline but no formal diagnosis of AD, ABC scores ranged from 1 to 9 (median score of 7). In patients with no documented antemortem history of cognitive impairment, the ABC scores ranged from 1 to 8 (median score of 6).

Discussion: These data highlights the importance of assessing postmortem neuropathology specimens for Alzheimer's type changes in both patients with antemortem AD or dementia diagnoses and those without. Interestingly, identification of AD-type changes can occur years prior to the onset of cognitive symptoms. Comprehensive neuropathological examination postmortem can also provide the decedent's family members with important information about any potential genetic predisposition to AD.

P66 Trends in Publication Outcomes of Platform Presentations at National Association of Medical Examiners (NAME) Annual Meetings from 2013-2022

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Introduction: The NAME annual meeting is the largest in-person gathering of medical examiners (MEs) and forensic pathologists (FPs) in the United States. The NAME meeting has been used to disseminate research and provide education from a wide variety of professionals. However, little is known about the rate of subsequent publication of NAME presentations. Publication of literature in peer-reviewed journals enhances the credibility of the research and increases the accessibility of the information. Therefore, this study aims to assess the publication outcomes of NAME presentations over a recent 10-year period.

Methods: Microsoft® Excel .xlsx files that listed titles, author information, and author affiliations of platform presentations given at NAME annual meetings from 2013-2022 were obtained. Two Python scripts were developed to identify matching publications in the PubMed database utilizing the Bio.Entrez module in Python's Biopython library. One script utilized only keywords in the presentation title, and the other script utilized both the keywords in the presentation title in addition to the first author's last name. Google Colab was used to execute the code, and the output scored 10 potential titles to each

presentation based on how closely they matched; these lists were analyzed to determine presentation/PubMed matches. A separate, manual search was also performed to assess the reliability of the code.

Results: Of 651 total presentations, 175 (27%) had corresponding publications in peer-reviewed literature. The most common journals were AFP with sixty-nine publications, AJFMP with fifty-five publications, and JFS with eight publications. According to our data, first authors affiliated with NMS, the CDC, and Ottawa-based institutions were among the most likely to publish presentation material. We will also report on first and last authors who were most likely to publish their presentation content. Our scripts identified 148/152 (97%) of the possible PubMed-indexed matches.

Discussion: About one quarter (27%) of platform presentations from 2013-2022 went on to be published in peer-reviewed literature, with most publications appearing in AJFMP or AFP. We found over 30 other journals to also contain publications from presentation content. This is not unexpected as NAME annual meeting platform presentations serve a variety of purposes, and not all or even most presentations should be expected to have corresponding publications. Analyzing trends related to publishing presentation content helps educational program organizers gauge the broader impact of research presented at annual meetings. Automated methods like the scripts we developed can also assist in monitoring outcomes of presentation content.

P67 Beyond Bullets: A Case Series of Diverse Suicide Methods in Belgium

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Suicide remains a leading cause of death in the United States, with data from the Centers for Disease Control and Prevention (CDC) indicating that firearms are involved in over 50% of suicide cases. In contrast, firearm access is more restricted in Belgium, and in the European Union in general, resulting in a broader range of suicide methods. This presentation provides a brief overview of key statistics such as age, gender and psychiatric history on all suicides in 2024 investigated by our department, the majority of which involve cases of hangings and intoxications. Additionally, we present a case series highlighting more unusual suicide methods, broadly categorized into toxicological and traumatic neck injuries. Accompanied by photographic documentation, this presentation illustrates the diversity of forensic challenges and aims to provide insight into variations in suicide mechanisms.

P69 Lessons Learned in Forensic Pathology: A Practitioner's Experience in the Commonwealth Caribbean

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This presentation provides an overview of forensic pathology practices in Saint Lucia, Anguilla, and the British Virgin Islands during the period of 2018–2022. It highlights the unique challenges encountered while conducting death investigations and performing autopsies in these Caribbean islands, as well as the strategies implemented to navigate these hurdles. Drawing from my experience as a U.S.-trained forensic pathologist returning to practice in the Commonwealth Caribbean, I will share firsthand insights into the complexities of working in these islands, where resource limitations, cultural differences, and logistical constraints often pose significant challenges.

Through case examples, I will demonstrate the practical solutions and adjustments made to address these obstacles, offering valuable lessons for forensic pathologists working in similar settings. Additionally, the presentation will explore the impact of COVID-19 and the resulting governmental travel restrictions in the Caribbean Region, which disrupted traditional forensic procedures. I will discuss how we adapted to these changes to minimize the effects on death investigations and autopsy.

In conclusion, I will reflect on the life lessons learnt throughout these experiences, illustrating how they have shaped my approach to forensic pathology and contributed to my personal and professional growth.

P70 A Comparative Overview of Medicolegal Death Investigation in Pakistan and the United States
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With increasing global collaboration in forensic medicine and the growing Pakistani diaspora in the United States, understanding differences in medicolegal death investigation (MLDI) systems is essential for both academic and practical exchange. This abstract presents a comparative overview of MLDI structures, practices, and challenges in Pakistan and the United States, two countries with distinct legal, administrative, and medical frameworks.

Pakistan follows a centralized, police-led inquest system under the Code of Criminal Procedure (CrPC), where medico-legal autopsies are performed primarily by forensic medicine specialists in public sector hospitals. In contrast, the U.S. system is decentralized, involving Medical Examiner or Coroner offices depending on jurisdiction, with board-certified forensic pathologists conducting autopsies under defined legal mandates. The educational pathways also diverge: Pakistan offers a dedicated postgraduate track in forensic medicine (MD/FCPS), while the U.S. views forensic pathology as a subspecialty following anatomic pathology residency.

Case referral patterns, autopsy rates, toxicology access, manner of death determinations, and final legal outcomes all vary between the two systems. Challenges in both countries include workforce shortages, training disparities, and infrastructural limitations, though these issues manifest differently. Pakistan's system struggles with resource constraints, outdated facilities, and low prioritization of forensic services. The U.S., despite technological advancement, faces a critical shortage of forensic pathologists, impacting case turnaround and public health surveillance.

This comparative analysis aims to foster cross-border dialogue, encourage mutual learning, and identify potential reform, training, and collaboration areas to strengthen medicolegal death investigation systems globally.

P72 Heat of the Moment: A 10-year Review of Investigative Insights into Environmental Hyperthermia Deaths in Harris County and Public Health Implications
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Climate change is an escalating global issue that poses risks to public health. In the United States, extreme heat is the leading weather-related cause of death, surpassing hurricanes, floods, and tornadoes. Harris County has a population of 4.9 million and is susceptible to extreme weather events. According to Harris County Public Health, the number of heat-related illnesses rose by 329% between 2019 and 2023. This study examines challenges, investigative findings, and timelines one should consider when evaluating these deaths.

The electronic databases of the Harris County Institute of Forensic Sciences were searched for all fatalities where the primary or contributing cause of death included environmental hyperthermia, between January 2013 to December 2023. Pediatric vehicular cases, artificial heating (i.e., radiant heaters in a closed setting), and climate-controlled environments were excluded.

There were 108 environmentally related hyperthermia deaths in Harris County. Of these, 84 were male, and 24 were female. The average age was 56 years (range: 18 to 90 years). The most cases by year was 2023 (56); and by month was August (47). Sixty-six deaths were hospital deaths, and forty-two deaths were on scene. Two scenes had two deaths each. The manner of death was Accident (106) or Undetermined (2). The cause of death was hyperthermia alone (25), natural diseases as the primary or contributing cause – such as cardiovascular disease (46), drug and/or alcohol toxicity – such as cocaine and methamphetamine (13), suffocation (1), and drowning (1). Ten cases listed hyperthermia as a contributory cause of death. The highest recorded body temperature on scene was 114°F; and for hospital deaths was 110°F. Seven deaths occurred while-at-work; and 18 were known to be homeless.

The diagnosis of environmental hyperthermia relies on a thorough scene investigation and reasonable exclusion of alternative causes. The postmortem diagnosis can be challenging as there are no major pathognomonic findings, and these deaths are likely underreported. Examination findings include accelerated postmortem changes and intrathoracic visceral petechial hemorrhage. Vulnerable populations – elderly, homeless, and drug users – are disproportionately affected. Power outages and lack of cooling resources were frequently reported in cases, highlighting infrastructure vulnerability. In 2023, the county experienced 17 consecutive days with a heat index over 103°F. Through this research, agencies can correlate clinical and autopsy findings with the circumstances of death and risk factors. Access to public education, targeted interventions, and emergency planning have significant roles in preventing these deaths.

P73 Sudden Death of Children with Septo-Optic Dysplasia Sequence: A Report of Three Cases

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Septo Optic dysplasia is a rare disorder characterized by optic nerve hypoplasia, hypoplasia of the hypothalamic-pituitary axis leading to hypopituitarism, and midline brain defects that can result in visual impairments, developmental delays and endocrine hormone deficiencies. The name, septo optic dysplasia refers to the absence of the septum pellucidum and hypoplasia of the optic nerves. The exact cause of the usually sporadically occurring disorder remains unknown, but evidence has been found linking the disorder to prenatal exposure to environmental toxins, younger mothers as well as mutations of the HESX1 (transcriptional repressor involved in pituitary development) and SOX2 (bilateral eye abnormalities) genes. Symptoms include visual impairment, growth deficiency, hypoglycemia, apnea, hypotonia, seizures and mental deficiency. The most serious complication is pituitary ACTH deficiency with subsequent adrenal cortisol deficiency exacerbated during stress such as a febrile illness and or with malnutrition or fasting. The resultant hypocortisolism can lead to sudden death by lethal hypoglycemia. Treatment involves hormone replacement therapy for hypopituitarism, neurodevelopmental support and prevention of obesity in some cases. Three cases of sudden death of a 3-year-old boy, a 12-year-old boy, and a 17-year-old girl which had a clinical history of septo-optic dysplasia sequence are discussed in this poster presentation. The children presented with panhypopituitarism and underdeveloped genitalia. All required hormonal replacement for adrenal insufficiency. Hypoglycemia was documented on clinic admission of the 12-year-old boy only as the others were discovered dead in their homes. Glucose levels could not be determined in the ones found dead due to prolonged postmortem interval. All three children demonstrated abnormalities of the septum pellucidum, optic nerves and adrenal glands. Foul play was ruled out. The cause of death in the children in the absence of anatomic findings was hypoglycemia, due to hypocortisolism related to septo-optic dysplasia with panhypopituitarism. Septo-optic dysplasia is a differential diagnosis in children succumbing to unexplained hypoglycemia in the presence of unusual midline neurological findings and a history of hypopituitarism.

P74 Suicide by Electrocution using a Homemade Device: A Unique Presentation of a Rare Entity

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Suicide is an intentional, self-inflicted act intended to cause harm or death to one's self. It is a global crisis, claiming approximately 700,000 lives annually. In the United States, suicide is the eleventh leading cause of death, and is disproportionately represented in males and younger individuals. Many suicide victims have a history of substance use disorder, mental illness, and/or concomitant life crisis. Studies show that 37% of individuals who survive a suicide attempt make a second attempt, and 6.7% of them ultimately die by suicide. Common methods of suicide in the United States include firearm injuries, suffocation, and poisonings. These methods account for over 90% of all suicide fatalities. Electrocution is an uncommon method of suicide, which involves intentional exposure to electrical energy in an effort to cause harm or death. While electrocution accounts for roughly 1,000 deaths per year in the United States, the vast majority are accidental. The most important factor in electrocution deaths is the current flow per unit time

(*amperes*). Other factors also play a role, such as the pathway of current flow through the body. Even exposure to relatively low voltage sources, such as residential outlets, can lead to lethal cardiac arrythmias. Herein, we present a unique case of suicide by electrocution using a homemade device with a residential outlet as the electrical source. The decedent was an elderly male with a history of prior suicide attempts and experience in electrical work. He was found deceased in his home, with electrical wires wrapped around his forearms. The wires were connected to a power strip, which was plugged into a standard household electrical outlet. At autopsy, electrothermal burns were noted on the forearms in the areas of wire contact. No additional contributory findings were noted. The cause of death was determined to be electrocution, and the manner suicide. This case represents a rare instance of suicide by electrocution, using a unique homemade implement. Such cases rarely present for forensic autopsy, and reports are only sparsely documented in the literature. As in all electrocution cases, scene investigation is of utmost importance to ensure accurate cause of death and manner classification. Further, documentation and reporting on these rare cases provides essential insights to enhance the understanding for medical professionals and may contribute to the development of more effective interventions.

P76 Silent Danger: The Fatal Consequences of Undiagnosed Brainstem Encephalitis

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Brainstem encephalitis (BSE), also known as “rhombencephalitis”, is a rare but serious inflammatory condition that can arise from infectious, autoimmune, or paraneoplastic causes. The most common bacterial pathogen is *Listeria monocytogenes*, while viral etiologies include HSV and enterovirus. BSE typically presents with rapidly progressing neurological symptoms, including cranial nerve dysfunction, ataxia, respiratory difficulties, and altered consciousness ranging from confusion to coma. If diagnosed early, prompt treatment can significantly improve outcomes. However, left untreated, the disease may progress to severe complications such as respiratory failure, widespread neurologic dysfunction, and ultimately death.

We report a case of a 27-year-old female with a history of anxiety and prior cholecystectomy, who was found unresponsive in her bed at home. Emergency services were called, but she was pronounced deceased upon arrival at the emergency department. No further testing was conducted. Additional investigation revealed that the decedent had recently been experiencing flu-like symptoms, along with pressure behind the orbits and a burning sensation on her lips. The last time she was seen alive was approximately ten hours before being found unresponsive.

Postmortem examination revealed chronic gastritis, liver steatosis, and lung congestion. There was no evidence of trauma or significant abnormalities seen. Toxicology was unrevealing and a viral swab was negative for influenza, SARS-CoV-2, and RSV. Neuropathological examination of the brain and dura mater revealed multifocal red/brown ill-defined discoloration in the brainstem, affecting the midbrain tegmentum, basal pons, and medullary tegmentum.

Microscopic neuropathological studies revealed multifocal suppurative acute inflammation, patchy perivascular lymphocytic infiltrates, and petechial hemorrhages throughout all levels of the brainstem. Gram staining demonstrated possible intracellular coccobacilli within areas of suppurative inflammation. Immunohistochemical studies for HSV-1, HSV-2, and CMV were negative. Postmortem culture studies were not performed due to fixation.

The final diagnosis was brainstem encephalitis. Given the inflammatory exudate and its localization within brainstem structures, Listeria monocytogenes was the favored etiology. However, definitive identification of the underlying infection cannot be made without confirmatory microbiological studies. This case highlights the potentially fatal outcomes of undiagnosed and untreated BSE. Bacterial BSE often presents with nonspecific symptoms that mimic less severe infections, leading to delays in diagnosis and treatment, which can increase mortality. This report serves as a crucial reminder of the need for heightened awareness of this rare but serious condition.

P77 Pink Skin and Purple Urine: The Effects of Hydroxocobalamin Administration in the Treatment of Cyanide Exposure

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House fires commonly lead to the combustion of commercial products made up of nitrogen containing materials such as plastic, vinyl, acrylic, neoprene, rubber, and insulation that can release hydrogen cyanide gas. Inhalation of hydrogen cyanide can be rapidly fatal but may be prevented by empiric high dose administration of the chelating agent hydroxocobalamin for patients suspected of having been exposed to cyanide. Hydroxocobalamin rapidly binds free cyanide to form cyanocobalamin, which is renally excreted. High dose hydroxocobalamin administration may result in a pink-red discoloration of tissues along with a deep purple to pink discoloration of bodily fluids such as blood serum, urine, vitreous humor, and cerebral spinal fluid. Although treatment with hydroxocobalamin is relatively safe, the resulting color changes may cause interference during colorimetric laboratory analyses. For example, laboratory instrument interference has been reported during the evaluation of liver enzymes, coagulation factors, blood gases, and urine dipstick analysis several days following administration with these irregularities persisting into the postmortem setting. Therefore, forensic pathologists must recognize these changes in tissue and fluid pigmentation during medicolegal death investigations of patients who received hydroxocobalamin treatment for cyanide toxicity due to their effects on the body and the ability to confound laboratory measurements.

P78 Fatal Abdominal Pain: A Rare Case of Group A Streptococcal Phlegmonous Gastritis

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Introduction: Phlegmonous gastritis is a rare infection of the gastric wall, characterized by severe bacterial invasion and necrosis. The disease develops rapidly and carries a high mortality rate, even with antibiotic therapy (up to 48%). *Streptococcus* species are the most common causative agent. Predisposing factors include immunosuppression, pre-existing mucosal injury including ulcers and gastritis, malnutrition, malignancy, and chronic alcohol consumption; however, approximately one-half of cases reportedly have no risk factor. Infection is postulated to spread to the stomach by one of three routes; directly from injured mucosa, hematogenous spread, or via lymphatics. We present a fatal case of this rare disorder, with correlation of postmortem computed tomography findings.

Case Presentation: A 27-year-old man had a 24-hour history of nausea and vomiting, and was witnessed by a family member to become unresponsive. Emergency services were called, but attempts at resuscitation were ultimately unsuccessful. His medical history was significant for e-cigarette and marijuana use, and may have used other substances in the past.

Due to the sudden nature of his death without a confirmed diagnosis in the hospital, the case was reported to the medical examiner. Postmortem computed tomography (PMCT) findings included blurring of the gastric wall borders, with irregular thickening and focal gas accumulation. Autopsy confirmed diffuse, abnormal thickening of the gastric wall, at 0.8 cm thickness. The gastric mucosa was erythematous, with effacement of the rugae. Microscopic examination revealed active gastritis within the mucosa, but prominent, extensive infiltration of neutrophilic inflammation, necrosis, and numerous cocci-shaped bacterial colonies expanding the submucosa. Minimal infiltration of the muscularis was present. Bacterial blood and lung cultures all grew *Streptococcus pyogenes*, along with contaminant organisms. Evaluation of the heart muscle demonstrated contraction band necrosis. Intravascular neutrophils were detected in multiple organs. Toxicology analysis of the postmortem revealed evidence of cocaine use.

Discussion: This case illustrates a rare, but highly lethal entity that medical examiners should be aware of as a differential diagnosis in acute abdominal pain. The case also highlights the utility of PMCT to guide autopsy in identifying abnormalities and allowing for appropriate triage of ancillary testing upfront. PMCT may be helpful in identifying potential infection sources that may otherwise be missed at autopsy.

P80 Investigating Small Airplane Crashes: A Medicolegal Death Investigator's Approach

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Airplane crash investigations require a methodical and collaborative approach, especially when fatalities are involved. As Medicolegal Death Investigators, our primary responsibilities include body recovery, victim identification, and coordination with investigative agencies such as the National Transportation Safety Board (NTSB) and the Federal Aviation Administration (FAA).

The first step in an aircraft crash investigation is securing the scene. These incidents often span large areas with debris scattered, requiring coordination with law enforcement, fire departments, and search-and-rescue teams. Safety is always paramount due to hazards such as fuel fires, unstable wreckage, and biohazards. Once secured, a systematic search and recovery of remains begin. Working in conjunction with the FAA or NTSB, you will be able to obtain the flight manifest. It includes details such as passengers' names, seat numbers, and sometimes additional identifying information. This document is crucial for flight operations, security, and in the event of an accident or emergency, as it helps investigators and authorities account for everyone on board.

Victim identification is complex due to the severity of trauma and environmental conditions. Investigators rely on multiple forensic techniques, including fingerprinting, dental comparisons, and DNA analysis. Personal effects, medical records, and passenger manifests assist in the process.

Collaboration with the NTSB is essential. While the NTSB determines the cause of the crash, the Medical Examiner's Office establishes the cause and manner of death. Documenting injuries can provide insights into crash dynamics, seatbelt usage, and possible in-flight emergencies. Toxicology testing assesses whether substances like drugs, alcohol, or carbon monoxide were factors.

Investigators must also be mindful of the emotional impact on families. Clear communication, sensitivity, and providing timely updates are crucial. Families seek closure, and accurate identifications help bring them peace.

This presentation will outline how airplane crash investigations are challenging but essential in preventing future tragedies. By combining forensic science, investigative skills, and interagency cooperation, Medical Examiner Investigators play a vital role in understanding and mitigating aviation disasters.

P81 Silica Desiccants at Autopsy: An Uncommon Confounding Factor

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Silica desiccant packets typically contain silicon dioxide in the form of small, granular beads. They are found in products such as shoes, food, electronics, and medications, and are designed to absorb moisture. In some cases, silica gel is coated with cobalt chloride or methyl violet, which serves as a moisture indicator and may present low toxicity. While generally considered non-toxic by the National Capital Poison Center, these packets carry a choking risk, can cause skin and eye irritation, and can result in gastrointestinal burns.

Certain populations consume dietary silicon as a nutritional supplement, based on the belief that it can improve health, provide minerals, or aid in digestion. However, silicon dioxide is sometimes considered the same as dietary silicon, but the general population may be unaware that silica desiccants can contain additional chemicals and are not considered safe for ingestion. When encountered at autopsy, pathologists may be unfamiliar with these materials, and it can affect the determination of the cause and manner of death.

This study presents two cases from the Cook County Medical Examiner's Office in which desiccant materials were found in the upper gastrointestinal tracts of decedents.

In the first case, a 39-year-old female was found unresponsive at work. Her medical history included migraines, self-diagnosed hypertension, and a reported history of using edible silicates. At autopsy, a sandy, sediment-like material, polarizable under light microscopy, was found in her stomach. Toxicology screening revealed a low concentration of morphine, below the reporting limit.

In the second case, a 63-year-old male was found unresponsive in his work van during a wellness check. His vehicle contained various chemicals and appliances, as well as a bucket of medications, including Polopiryna C, Scorbolamid, Aconitum nap 6x, and an expired bottle of amoxicillin. At autopsy, an intact silica desiccant packet was found lodged in the esophagus and a plastic desiccant canister was found in his stomach. Dark hemorrhagic lesions were present in the gastric mucosa, along with approximately 130 grams of small yellow-white particulates. Toxicology analysis revealed a combined drug toxicity involving acetaminophen, salicylate, diphenhydramine, and doxylamine.

These cases illustrate the potential for silica desiccant materials to be misidentified during autopsy, as pathologists may not be aware of these substances. Moreover, the clinical implications of large amounts of silica ingestion remain unclear. Further research is needed to clarify the risks of significant ingestion of silica desiccants.

P82 Acute Disseminated Encephalomyelitis from Swine Flu

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Post-infectious acute disseminated encephalomyelitis (ADEM) is a rapidly progressing autoimmune demyelinating disease of the central nervous system that often occurs following a viral infection. While ADEM is more often associated with the pediatric population, cases have been found in adults. Here we present a case of a forty-one-year-old male with no significant past medial history who expired from acute disseminated encephalomyelitis following infection with novel H1N1 virus, also known as “swine flu.” Severe neurological complications of influenza are rare, but the occurrence of ADEM in the setting of influenza infection has been more commonly linked to the H1N1 variant of influenza virus. In our case, the decedent developed multiple acute hemorrhagic brain lesions, constituting acute hemorrhagic leukoencephalitis, a rare and severe form of this already rare disease. In this report we explore the internal exam findings at autopsy, histology, and brain findings associated with the decedent’s ADEM diagnosis.

P83 Validation of the ARK Fentanyl II Assay: A More Specific and Reliable Alternative to the Immunalysis SERFIA for Clinical Fentanyl Screening

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Introduction: Accurate detection of fentanyl in urine is crucial for managing the ongoing opioid crisis, as synthetic opioids were responsible for over 70,000 overdose deaths in the U.S. in 2022. The Immunalysis SERFIA Fentanyl assay with a cutoff of 1.0 ng/mL shows a significant rate of false positives, with nearly 33% of positive results not confirmed by HPLC-MS/MS testing, often due to cross-reactivity with unrelated compounds like loperamide and trazodone. The ARK Fentanyl II assay with the same cutoff of 1.0 ng/mL is being evaluated as a more specific and reliable alternative.

Methods: Validation studies were conducted on Alinity c analyzers. Within-run and between-run precision were evaluated using Bio-Rad QC materials. Linearity was assessed through admixture testing, and clinical accuracy was determined by comparing assay results with HPLC-MS/MS-confirmed fentanyl status on 252 patient urine samples. The cutoff of HPLC-MS/MS assay is 0.5 ng/mL.

Results: The ARK Fentanyl II assay exhibited superior analytical precision compared to the Immunalysis assay, with between-run coefficients of variation ranging from 3.7% to 11.7%, lower than the previously reported range of 10.6% to 13.5% for the Immunalysis assay. Regarding accuracy, the ARK assay achieved a higher negative percent agreement (NPA) of 97.3% (180/185) and an overall agreement of 97.6% (246/252) with HPLC-MS/MS confirmatory results. In contrast, the Immunalysis assay recorded an NPA of 89.7% (166/185) and an overall agreement of 90.5% (228/252). The observed improvement in

NPA and overall agreement was statistically significant (both P-values < 0.01). When compared with HPLC-MS/MS assay, ARK assay showed a positive percent agreement (PPA) of 98.5% (66/67), higher than the PPA of 92.5% (62/67) for Immunalysis assay, although this trend did not achieve statistical significance (P = 0.21).

Discussion: The ARK Fentanyl II assay enhances urine drug screening for fentanyl with improved specificity, better agreement with HPLC-MS/MS confirmatory methods, and longer calibration stability. It addresses current limitations in toxicology testing by reducing false positives, minimizing unnecessary confirmatory tests, and improving workflow efficiency. This assay supports accurate patient care and better use of healthcare resources, making it a validated replacement for the Immunalysis SERFIA assay in urine fentanyl screening.

P84 Suicide by Chainsaw to the Leg

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A 60-year-old white female, with a history of major depression and bipolar disorder, was found decomposing on her kitchen floor by her daughter, who had been unable to reach her for approximately two days. The decedent was found with a wound to her left thigh and a gas-powered chainsaw to her left, with fabric tangled in the chain matching the denim from her jeans.

Her history included 2 previous suicide attempts, one by gunshot wound to the chest 21 years earlier, the other by intentional overdose 6 years earlier. Recent stressors included episodes of physical abuse by her husband, with divorce proceedings ongoing. She was currently living alone. Law enforcement and the medical examiner investigated the scene. Scene photographs documented a linear pattern of blood across the kitchen floor, compatible with the use of the chainsaw. No suicide note was found at the scene, but a journal was found with disorganized writing in it.

At autopsy, no hesitation marks/wounds were observed. The large gaping defect of the left thigh showed division of the adductor magnus, vastus lateralis, sartorius, and rectus femoris muscles, with complete transection of the femoral artery and vein, and partial transection of the femur. Lines observed in the cortex of the femoral bone, around the site of transection, were consistent with chainsaw injuries. In addition, multiple parallel linear abrasions inferior to the gaping defect were consistent with the teeth of the chainsaw scraping across the skin. The mechanism of death was exsanguination.

Chainsaw deaths are usually work-related accidents with wounds to the upper and lower extremities. Injuries are generally fatal, with damage to deep tissues. The medical focus for survivors is to treat life-threatening hemorrhages and then reconstruct the damaged areas.

Few chainsaw suicides are reported in the literature. Suicide committed with a gasoline saw is an uncommonly reported incident, and the use of a chainsaw to commit suicide has been extremely rare; the few cases documented have wounds to the neck, most of them with sub-decapitation. We report a very unusual suicide by chainsaw with injury to the left lower extremity, with unique scene and autopsy findings.

P85 Aviation-Related Fatalities in Oklahoma (2015–2024): A Forensic Review of Crash Patterns, Demographics, and Contributing Factors

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Introduction: Recent high-profile aviation disasters have drawn national attention, but many general aviation fatalities occur without widespread media coverage. This review examines aviation fatalities investigated by the Oklahoma Office of the Chief Medical Examiner (OCME) between 2015 and 2024, in conjunction with data from the National Transportation Safety Board (NTSB), to evaluate crash patterns, injuries, contributing factors, and how the forensic perspective informs broader aviation trends.

Methods: The OCME database was queried for aviation-related fatalities during the study period. Autopsy, scene, and toxicology findings were reviewed. Analyses included aircraft type, crash phase, cause/manner of death, contributory factors, and demographics. Public NTSB records were reviewed for all aviation incidents in Oklahoma, including fatal and non-fatal cases, over the same study period.

Results: The OCME investigated 63 fatalities across 38 crashes, mostly (27) involving small propeller aircraft; others included helicopters (3), ultralights (4), experimental craft (3), and one jet. All deaths were certified as accidental. Decedents were predominantly male (92%) with a mean age of 47.2 years. Blunt force trauma was the leading cause of death (71%), with thermal or inhalation injuries in 11 cases. The deadliest crash involved five fatalities. Significant contributory toxicology was rare (3.2%); one pilot tested positive for methamphetamine, and another for ethanol and benzodiazepines. Crash analysis showed 15 with a single cause and 23 with multiple contributing factors. Pilot error was cited in 20 crashes, mechanical failure in 8, weather in 8, and wildlife (geese) in 1. Five remained undetermined despite NTSB input. Weather-related events most often involved night flying, poor visibility (fog/clouds), and icing, particularly during landing. Several ultralight and experimental crashes followed maiden flights or recent modifications. Flight phases were nearly evenly split among takeoff, midflight, and landing.

The NTSB recorded 187 aviation events in Oklahoma during the same period. Only 18% were fatal, and over half involved no injuries, highlighting OCME's role in assessing the most severe cases. Most incidents occurred near Tulsa or Oklahoma City, though the highest fatality counts were seen in smaller towns such as Yukon, Hydro, and Ponca City.

Discussion: Most aviation deaths in Oklahoma involved small aircraft and resulted from blunt force injuries. NTSB records helped clarify crash dynamics beyond preliminary forensic data. Most fatal events involved multifactorial causes—especially pilot error, mechanical issues, and weather. These findings highlight the need for improved collaboration between medicolegal and aviation safety agencies to better understand and prevent aviation-related deaths.

P86 A Fungus Among Us: Cryptococcal Meningoencephalitis in an Apparently Immunocompetent Individual

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Introduction: Pathogenic cryptococci (*C. neoformans and C. gattii*) are basidiomycetous, encapsulated yeasts that cause infection in humans via inhalation from the environment. In addition to pulmonary infection, these fungi can disseminate hematogenously and infect the central nervous system (cryptococcal meningoencephalitis). In the United States, cryptococcal meningoencephalitis is often associated with immunocompromised populations, though cases in apparently immunocompetent individuals have been reported. Here we present one such case.

Case Report: The decedent was a 31-year-old male with a history of substance use disorder and paraplegia of unclear duration or etiology, who was in police custody undergoing detoxification. After one week, he had a severe decline in mental status and worsening extremity weakness. He was taken to the emergency department for evaluation, where workup revealed severe left lower lobe pneumonia and leukocytosis; notably, initial head CT was unremarkable and blood cultures and HIV testing were negative. Despite treatment with broad spectrum antibiotics, he continued to deteriorate and was pronounced dead six days after admission. Autopsy revealed a grossly edematous brain with bilateral multicystic cavitation of the striatum and globus pallidus with scattered cystic defects in the frontoparietal lobe. Microscopic examination showed numerous yeast forms consistent with Cryptococcus, present in all examined brain and spinal cord sections. The cause of death was determined to be complications of cryptococcal meningoencephalitis and the manner natural.

Discussion: Two potential causes of cryptococcal infection in a person without overt immunosuppression are considered. First, conditions associated with mild immunosuppression, such as the decedent's history of substance use disorder, may have increased his risk of opportunistic infections. Second, the underlying pathogen may have played a role; while the two pathogenic cryptococci (*C. neoformans and C. gattii*)

present similarly, they differ in geographic distribution and host factors. C. neoformans has a worldwide distribution and higher prevalence in immunocompromised populations, while *C. gattii* is endemic to Australia and Papua New Guinea and often causes disease in immunocompetent hosts. Outbreaks and sporadic cases of *C. gattii* have been reported worldwide, including in the United States, however many microbiology labs outside of endemic regions do not distinguish between C. neoformans and C. gattii so the true incidence may be higher. Cryptococcal meningoencephalitis can be challenging to diagnose due to its nonspecific and subacute presentation. As highlighted in this case, presumed immunocompetence can further delay diagnosis due to the association of this infection with immunocompromised states.

P88 Histiocytoid Cardiomyopathy and Congenital Valvular Stenosis: A Case Report of Infant Death

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Introduction: Histiocytoid cardiomyopathy (HC) is a rare, often fatal disorder that predominantly affects girls in the first two years of life. Patients present with incessant arrhythmia thought to result from disruption of the conduction system by pathologic histiocytoid cardiomyocytes, leading to cardiac arrest. While HC has been reported in conjunction with cardiac malformations, the disorder has seldom been described in patients with cardiac valvular abnormalities. This report describes a unique case of histiocytoid cardiomyopathy diagnosed at autopsy in an infant with congenital valvular stenosis.

Case Report: A 3-month-old female with asymptomatic congenital aortic stenosis and regurgitation became limp and apneic during “tummy time” at home. Resuscitation efforts, including extracorporeal membrane oxygenation, were unsuccessful and the patient was pronounced dead approximately 72 hours after arrest. At autopsy, external examination showed an infant with mild dysmorphic facies. Heart dissection revealed thrombi in all chambers, a single coronary artery, and a dysmorphic, acommissural aortic valve. Microscopically, the valve was myxoid and surrounded by nodular fibroelastosis. The myocardium showed subtotal coagulative necrosis, consistent with ischemic injury 24-72 hours in duration. At the septum and left ventricular free wall, there were patchy subendocardial accumulations of large histiocytoid cells with clear cytoplasm, caterpillar nuclei, and peripheral myofibrils. These cells contained round, eosinophilic granules of different sizes, consistent with megamitochondria. The cells were highlighted by trichrome and Movat stains, with immunohistochemistry positive for desmin and negative for CD68, a histiocytic marker. The diagnosis of histiocytoid cardiomyopathy was rendered. Additionally, microscopy revealed a small focus of pneumonitis at the right lung and endocrine anomalies, including pancreatic islet cell hyperplasia and adrenocortical fatty change with dystrophic calcifications. Postmortem blood and tissue cultures were negative. Genetic testing of tissue collected at autopsy is pending.

Discussion: Histiocytoid cardiomyopathy is a devastating arrhythmogenic disorder that can lead to sudden death in infants, including those with a known history of valvular disease. It may co-occur with nonspecific syndromic elements such as endocrine anomalies and dysmorphic features. While the pathogenesis of HC is not always clear, genetic variants that disrupt the mitochondrial respiratory chain have been implicated in some cases, including loss of function mutations of the mitochondrial complex 1 subunit NDUFB11, located on the X chromosome. This emphasizes the importance of genetic testing in cases of infant cardiac arrest.

Discussion:

- HC should be considered in a differential diagnosis of sudden infant death.
- HC may co-occur with other cardiac anomalies and syndromic elements.

P89 Nitro Boost: The Importance of Timing and Collection in Nitrous Oxide Medicolegal Death Investigations

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Nitrous oxide (N_2O) is commonly known as “nitrous” or “laughing gas” due to its euphoric effects. It has been widely used in the medical and dental fields, in industrial whipped cream dispensers, and as a performance enhancement in automobiles. Recreational N_2O use continues to grow in popularity because it is readily available at low cost and produces effects rapidly. Between January 2022 and February 2025, NMS Labs received approximately 944 requests for N_2O testing on postmortem blood samples and 25 requests on tissue samples. Blood test requests increased annually from 186 in 2022 to 433 in 2024, or 133%. Increases were also observed in tissue test requests, but in fewer numbers.

Positive N_2O identifications were made in 263 postmortem specimens: 254 blood, 4 lung, 3 liver, and 2 brain. N_2O testing is ordered separately from other test panels and is largely based on scene investigation, case history, and autopsy findings. Given this fact, a 28% positivity rate is unusually low. There are several reasons specimens may be reported as none detected for N_2O presence despite evidence of use found during the investigation. N_2O concentrations decrease rapidly after use, and no metabolites are formed to extend detection times. Additionally, N_2O loss occurs during collection, testing, and storage due to its extremely volatile nature. Following a few sample collection and testing recommendations, it is possible to minimize N_2O loss by performing testing on an airtight container with limited empty space and by designating a separate tube specifically for N_2O testing.

Death investigations where scene information and substance use history are available will be presented, highlighting relevant findings, sample collection recommendations, and appropriate testing protocols. In one such investigation, a decedent was found with a plastic bag over the head and a mask fastened to a nitrous oxide tank. Two tubes of cardiac blood were submitted for testing: one for general toxicology and one for N_2O. Providing a designated sample for N_2O testing reduces tube ingresses and samplings for additional testing, minimizing analyte loss. For example, the initial N_2O result of 25 mcg/mL could not be reported due to analytical issues; upon retesting, the concentration had dropped to 14 mcg/mL despite the tube only being opened twice. Care should be taken when collecting and packaging samples for N_2O testing to prevent analyte loss throughout the testing process.

P90 Sudden Pediatric Death Due to Undiagnosed Massive Gastric Dilation

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The etiology of acute gastric dilation remains unclear. However, associated conditions include accumulation of gas, gastric secretions, or food oftentimes secondary to eating disorders, herniation, and gastric or intestinal obstruction. Reported symptoms include vomiting, acute abdominal pain and distention, and post-prandial fullness. Complications include ischemia, which may result in gastric perforation, gastritis, or compartment syndrome. Reported cases include adolescents to geriatric patients, oftentimes in the setting of postoperative care and aerophagia. Studies demonstrate the importance of early diagnosis and intervention to decrease the high mortality rate.

We present a case of a thin, 15-year-old male with no significant medical history. He was reportedly sick for three days, which included weakness, anorexia, nausea, vomiting mucoid material, and possible fever. The morning of his death, his weakness peaked and his family prepared to take him to the doctor when he vomited and subsequently went unresponsive. Emergency Medical Services arrived and he was transported to the hospital. He was pronounced dead shortly after arrival to the hospital.

Autopsy revealed an underweight teenager with dilated stomach, membranous omentum, collapsed bowel, and evidence of dehydration. The stomach consumed the entire abdominal cavity and extended into the pelvis. In addition, he had bilateral pleural effusions (left: 350 mL; right:150 mL). Histologically, gastric contents were in the lungs and there was gastric mucosal necrosis with bacterial colonization and acute inflammation extending into the muscular wall. An expanded viral study was negative. Vitreous fluid studies were consistent with hyponatremic dehydration and acute renal failure. Toxicology showed high therapeutic levels of promethazine and therapeutic levels of diphenhydramine and hydrocodone. Together, he had acute gastric dilation with necrosis, acute renal failure, and dehydration. In our opinion, the mechanism of death was fulminant septic shock.

Acute gastric dilation is a rare and largely fatal diagnosis with mortality rates exponentially increasing with necrosis and perforation. Most cases occur secondary to various conditions, including eating disorders, gastrointestinal obstruction, or cancer. Our case is unusual as it highlights a young patient with no such medical history, no identifiable underlying cause for his demise. Furthermore, our case demonstrates the importance of seeking medical care in the setting of acute abdominal symptoms, especially in the setting of massive gastric dilation. This case will be presented to the Arkansas Infant and Child Death Review Program whose role is to improve the response to child fatalities and reduce the number of preventable infant and child deaths.

P91 Suicidal Ingestion of Potassium Thiocyanate Presenting Clinically as Falsely Elevated Chloride: A Case Report

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Potassium thiocyanate is a long-discontinued weak antihypertensive and uncommonly encountered toxic agent. Despite its discontinued clinical use, it is a useful industrial chemical, and laboratory-grade potassium thiocyanate is readily accessible online. We report a 52-year-old man who, two hours after he was convicted of a crime and taken directly into custody, developed sudden onset of altered mental status, vomiting, and seizures. At the onset of these symptoms, he verbally declared his intention to die. In the emergency department, he was nonverbal, responsive to only painful stimuli, and sometimes yelled incoherently. He had elevated blood pressure, diaphoresis, and abdominal tenderness. He had to be sedated and intubated for airway protection because of seizures. Clinical laboratory tests showed a falsely elevated serum chloride (>200 mmol/L) with other normal electrolytes resulting in a significant negative anion gap. Tests for salicylate, bromide, and iodide levels at the hospital were negative. He was suspected to have a toxic ingestion, and an endoscopy showed gastric mucosa edema and hyperemia. Repeated electroencephalograms showed moderate to severe encephalopathy, and MRI of the brain performed two days later revealed a new acute right thalamic infarct. He remained symptomatic until his death 9 days later. Autopsy showed a grossly normal stomach with increased microscopic lymphocytic infiltration and hypoxic-ischemic changes in the brain. Toxicological analysis was performed on antemortem blood collected 93-95 hours after apparent ingestion and detected a thiocyanate concentration of 260 µg/mL and a cyanide concentration of 0.21 µg/mL. Toxicology on postmortem specimens revealed thiocyanate concentrations of 78 µg/mL in cardiac blood, 75 µg/mL in peripheral blood, 16 µg/g in brain, 49 µg/g in kidney, 37 µg/g in liver and 21 µg/g in skeletal muscle. An investigation found that the hospital's serum electrolyte analysis used a chemistry analyzer with ion-selective electrodes. Although this modern laboratory technology is efficient, the pseudohalide thiocyanate and other halides such as bromide and iodide, as well as salicylate poisoning and sodium nitroprusside, can interfere and present as falsely elevated chloride. Further investigation found that the decedent ordered potassium thiocyanate from an internet source four days before ingestion. The cause of death is acute thiocyanate poisoning, and the manner of death is suicide. This case report raises the awareness of thiocyanate as a potential re-emerging toxin and pseudohalide that can interfere with clinical laboratory testing and present as falsely elevated serum chloride.

P92 Starvation Bone Marrow and the Complications of Severe Malnutrition

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Malnutrition seen at postmortem examination demonstrates unique pathology for the forensic pathologist. We report a case of a male in his fifties with a history of eating disorder, depression, and pernicious anemia. He was found deceased in bed, having not been seen for approximately one month. He had a weight of 43.4 kg (95.7 lbs.) and a body mass index (BMI) of 12.8 kg/m^2. The postmortem computerized tomography (CT) scan showed poor organ contrast due to minimal visceral adipose tissue. The external examination demonstrated a scaphoid abdomen and diffuse petechial hemorrhages on the skin (that may be associated with vitamins C and K deficiency). The internal examination demonstrated a tortuous path of the coronary arteries in the setting of a heart weight of 290 grams, a feature thought secondary to reduction in myocardial mass. The microscopic examination demonstrated gelatinous transformation / degeneration of the bone marrow ('starvation bone marrow'). No significant injuries were identified, and postmortem biochemistry and toxicology were non-contributory. The cause of death was recommended to be recorded as complications of malnutrition. Gelatinous transformation of the bone marrow (GTBM) is an infrequent postmortem finding that can be seen as a complication of malnutrition. Features of GTBM include fat cell atrophy, loss of hematopoietic cells, and deposition of extracellular gelatinous substances. The differential diagnosis of a hypocellular bone marrow in addition to GTBM, includes bone marrow edema, bone marrow necrosis, aplastic anemia, and amyloidosis. Special stains can be used to confirm GTBM including Alcian blue and Periodic Acid Schiff (PAS). GTBM may be seen in multiple settings of protein-caloric malnutrition, including anorexia nervosa, malabsorption, alcoholism, congestive heart failure, renal failure, acquired immunodeficiency syndrome (AIDS), neoplasia, metabolic disorders, severe infection, and other acute febrile states. This case is noteworthy as the main causes of GTBM in the 40-60 year age group have been reported as neoplasia and congestive heart failure, which were not identified. Sudden death in severe malnutrition is commonly due to cardiovascular complications as a result of the multifactorial effects of malnutrition on the body. The pathways affected in malnutrition include dysfunction of neuroendocrine pathways, autonomic nervous system dysfunction, inflammatory cytokines, and, electrolyte disturbance that can cause fatal cardiac arrhythmias. An established cause of fatal cardiac arrhythmia, QT prolongation, is a known complication of starvation and malnutrition. This case report highlights the importance of bone marrow sampling and its interpretation in postmortem malnutrition cases.

P94 An 8-Year-Old With… Wait…What? Acute Aortic Dissection, Available Resources, and Review of the Literature

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Aortic dissection typically occurs in middle-aged to older persons with systemic hypertension or young persons with a genetic aortopathy. Acute aortic dissection can also occur due to a traumatic deceleration injury.

We present a case of an 8-year-old, without past medical history, complaining of difficulty breathing and head and leg pain, who presented to a local Emergency Department after collapse. The clinical differential diagnosis was active myocarditis with congestive heart failure. He could not be resuscitated.
Autopsy external examination showed an 8-year-old boy without trauma and no characteristics of typically associated syndromic genetic diseases. Internal examination and microscopic findings will be demonstrated in our presentation.

Review of the literature shows few cases of aortic dissection in a child without a history of significant trauma. This case demonstrates an acute aortic dissection in a child without a history of significant trauma, characteristic features of the usual associated genetic entities, or congenital heart disease. We will discuss the important inherited aortopathies that may be overlooked during a forensic autopsy.

Due to the high mortality of aortic dissection, this diagnosis is frequently the entry point into evaluation for genetic aortopathy, particularly in the case of underrecognized and undertreated nonsyndromic genetic aortic disease. However, early diagnosis and appropriate medical management can prevent most dissections. Thus, forensic autopsy can play an important role in determining the cause of death, and in preventing death and disability in at-risk families. Barriers to postmortem genetic counseling and testing persist, primarily in cost, awareness, and access.

The John Ritter Foundation for Aortic Health (JRF) provides no cost patient navigation services for families affected by aortic dissection. Services include connecting families with local experts in genetic aortopathies, reinforcing the importance of aortic imaging in at-risk relatives, one-on-one peer support with others who have lost loved ones to aortic dissection, and virtual patient education.
The presentation of two autopsy-diagnosed cases of aortic dissection, including that of John Ritter, will illustrate the important role the forensic pathologist plays in triggering cascade screening and preventive care for at-risk relatives. Heightened awareness of genetic contribution to aortic dissection, even in the absence of syndromic features, can save the lives of remaining family members. These cases also demonstrate how collaboration with the JRF can streamline this process and provide valuable support, including in cases where resources for genetic testing or counseling are limited.

P95 This is What Happens When You Fight: A Case Review Regarding Manner Determination in a Firearm-Related Death

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This case study is a review of the medicolegal death investigation of a suspicious firearm death in Central Virginia. This death was initially reported as an accidental shooting; however, the removal of the firearm from the scene, lack of bullet recovered on scene, and concerning autopsy findings initiated a possible homicide investigation by law enforcement that resulted in the arrest of two individuals present at the scene. The postmortem examination revealed a contact gunshot wound to the left thigh with injury of the femoral artery and vein. However, after further investigation by law enforcement, the forensic pathologist was unable to definitively rule the manner death as a homicide.

This podium presentation is a synopsis of this medicolegal death investigator's thorough review of available findings, including OCME scene photos, law enforcement scene photos, and transcripts of law enforcement interviews, which indicated the manner was likely accidental. This medicolegal reconstruction indicated that the decedent had traveled approximately twenty yards after the shooting had occurred, resulting in the unusual scene findings. This in-depth analysis led to the forensic pathologist ruling the manner of death to be accidental. Law enforcement was able to stop pursuing murder charges on the individuals present at the scene.

P96 Fatal Traumatic Brain Injury with Traumatic Axonal Injury from a Non-Penetrating Rubber Bullet: A Forensic Case Report

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Although significant morbidity and occasional fatalities related to the use of non-penetrating kinetic impact projectiles, such as rubber bullets, have been well-documented, cases of fatal traumatic brain injury resulting from these projectiles remain rare. A 38-year-old incarcerated male sustained a rubber bullet impact to the frontotemporal region of the head during an altercation. The impact resulted in significant traumatic brain injury, including traumatic axonal injury, leading to death.

At autopsy, pertinent findings included subdural and subarachnoid hemorrhage, coup and contre-coup cortical contusions, and cerebral edema. Midline brainstem (Duret) hemorrhages were present secondary

to increased intracranial pressure with axial displacement. Additionally, traumatic and ischemic axonal injury was identified on histology. Significantly, no skull fractures were present.

This case highlights the forensic significance of kinetic impact projectiles as a mechanism for severe neurotrauma and underscores the importance of comprehensive forensic neuropathological evaluation in these deaths. Given the increasing use of rubber bullets in correctional and crowd-control settings, this report contributes to the growing body of forensic literature documenting their potential lethality. A deeper understanding of the biomechanical forces at play in head injuries resulting from so-called non-lethal (or less lethal) projectiles is essential for both forensic investigation and policy considerations regarding the regulation and use of kinetic impact munitions.

P97 Hidden Risks in the Pantry: Quantifying the Morphine Content in Washed and Unwashed Poppy Seeds

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Introduction: Recently, poppy seed tea has emerged as an easily accessible method for achieving an opioid-like high as unwashed seeds can retain high concentrations of alkaloids such as morphine, codeine, and thebaine. In 2016, 25-year-old Stephen Hacala of Fayetteville, Arkansas, died from morphine toxicity linked to poppy seed ingestion. This prompted the drafting of the Stephen Hacala Poppy Seed Safety Act, a bill that has garnered support from attorneys general in 12 states, including Texas. In 2024, a 21-year-old White male with a history of severe anxiety, depression, and opioid use disorder died from mixed drug toxicity involving morphine and codeine after reportedly ingesting large quantities of poppy seed tea. Postmortem toxicology revealed a blood morphine concentration of 287 ng/mL.

Objective: The aim of this study is to determine the amount of morphine that can be obtained from making poppy seed tea. Through poppy seed tea preparations, we can quantify the morphine in the resulting extraction and evaluate if ingestion would cause toxicity. Additionally, we seek to investigate whether the risk varies depending on the type of seeds used—specifically comparing unwashed to washed seeds.

Methods: To evaluate the morphine content of poppy seeds, we prepared poppy seed tea using two unwashed and one washed brand. Seeds were steeped in 1000 mL of room-temperature water, with quantities ranging from 100g to 550g in 50g increments, to assess the amount required to reach potentially lethal morphine concentrations. Morphine levels in each extract were quantified using a validated analytical method with liquid chromatography–tandem mass spectrometry (LC-MS/MS).

Results: Preliminary results revealed morphine concentrations in both washed and unwashed poppy seed preparations that exceeded the upper limit of our calibration curve, even after dilution. Elevated morphine levels in the unwashed seeds were expected but were surprisingly higher in the washed brand. This unexpected result raises the possibility that the seeds were not effectively processed as advertised, or that there may be issues with instrumentation or the analytical method.

Discussion: Unwashed poppy seeds can yield morphine concentrations high enough to pose a serious risk of opioid toxicity and death. Unlike prescription medications, unwashed poppy seeds are not regulated for opioid content, and they are readily available online for purchase in bulk. The preliminary findings in this project highlight the public health risks associated with unregulated poppy seed products as consumers are unaware of the potential lethality of unwashed poppy seed tea.

P98 Results of Molecular Genetic Autopsy Screening

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Variant analysis on postmortem DNA is a molecular autopsy and identifies pathogenic mutations. Half of all sudden unexplained deaths have a normal autopsy and toxicology screen. Not all cardiovascular abnormalities are identified at autopsy including the channelopathies, catecholaminergic polymorphic ventricular tachycardia, and Brugada syndrome. Molecular genetic results from medical examiners nationally will be presented. Dried blood spot specimens were used to simplify collection and lower costs. Targeted Whole Exome Sequencing was used to identify variants in genomic DNA. Samples were enriched for coding regions, splice site junctions, and a custom bait-capture system utilizing paired end sequencing on an Ilumina platform. Reads were assembled, aligned to reference sequences based on RefSeq transcripts and human genomic GRcH37/UCSC with data filtering. They were analyzed with variant calling by the OrionSeek bioinformatic program. Re-analysis for other variants was performed if initial results were negative. Data interpretation is a challenge due to high incidence of variants of unknown significance. Blood specimens were screened from 307 autopsies. Analysis showed 266/307 (87%) had pathological, likely pathological mutations, or variants of unknown significance. Some conditions identified include: the channelopathies (20 long QT and 4 short QT syndromes); 6 Brugada syndrome; 49 dilated and 30 hypertrophic cardiomyopathies; 13 primary immunodeficiencies; 11 seizure disorders; 12 metabolic disorders; and many syndromes including Loeys-Dietz, Liddle, Vici, cardiac-urogenital, Noonan, Rubenstein-Taybi, Schwartz-Jampel, Ehlers-Danlos, Frasier, Fontaine-Progeroid, Coffin-Siris, CHOPS, Smith-Kingsmore, Neurooculorenal, Cornelia de Lange, Marfan, Snidjers Blok-Campeau, and Radio-Tartaglia syndromes. While variants in the genes for these conditions are clearly present, pathogenicity, expressivity, and penetrance are not known. This information does, however, provides a key piece of information for the medical examiner to correlate the molecular genetic results with the physical autopsy results, and the individual's clinical history. Molecular autopsy screening has demonstrated a high yield of diagnostic information. A total of 87% of cases submitted were found to have a variant directly associated with the unexplained death. The molecular autopsy should be a part of every clinical autopsy protocol especially when there is no clear cause of death. Most conditions are autosomal dominant, so family studies are also important.

P99 A Case of Fatal Measles Pneumonia in an Adult

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Introduction: Measles (rubeola) is a highly contagious, vaccine preventable viral infection that can be fatal, mostly commonly due to pneumonia or encephalitis. Death may occur in up to 3 out of 1,000 people infected. Symptoms occur 1-2 weeks after infection beginning with high fever, cough, coryza (runny nose), and conjunctivitis. Small white spots (Koplik spots) may appear on the oral mucosa 2-3 days following the first symptoms. A rash, consisting of flat red spots starting at the hairline and extending downwards, occurs 3-5 days later. Common complications include ear infection, diarrhea, and premature birth in pregnant patients. Rarely, subacute sclerosing panencephalitis, a fatal brain disorder, can develop years following measles infection. Diagnosis of measles pneumonia at autopsy can be done by nasopharyngeal swab, serology for Rubeola IgG and IgM, and by histologic identification of characteristic multinucleated cells with eosinophilic nuclear inclusions (Warthin-Finkeldey cells). We present a case of fatal measles pneumonia in an unvaccinated adult.

Case Presentation: A 59-year-old man was exposed to individuals presumed to have measles 3 weeks prior to his death. He was reportedly not vaccinated against the virus. Prior to his death, he experienced fever, rash, loss of balance, and an earache. He did not seek medical care. He had no known significant medical history and did not have a primary care physician.

Autopsy examination showed erythema of the conjunctiva and mouth with a macular rash involving the head, neck, upper chest and back. The lungs and brain were edematous, and there was hilar lymphadenopathy. Microscopic examination of the lungs showed interstitial lymphocytic inflammation, alveolar fibrin deposition and rare fibroblasts, focal hyaline membranes, pulmonary edema admixed with neutrophils, patchy alveolar and interstitial neutrophilic inflammation, peribronchiolar mononuclear

inflammation, and scattered multinucleated cells within the alveolar spaces and rarely of the perivascular tissue (without obvious nuclear margination or eosinophilic inclusions). Scattered multinucleated cells were also present in the skin, brain, and a lymph node near the lungs, without definitive Warthin Finkeldey cells. Real-time PCR testing of the lungs was positive for rubeola (measles) RNA.

Discussion: This case marks one of the first deaths due to measles in the United States in over 10 years. With measles cases on the rise, it is important for forensic pathologists to know the common findings in deaths due to measles.

P100 Medical Examiner Evaluation of Prehospital Needle Thoracostomy Accuracy and Success

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Needle thoracostomy (NT) is a potentially life-saving prehospital intervention for suspected tension pneumothorax (T-PTX). The success of the procedure is dependent on multiple variables, including external landmark identification, equipment, patient habitus, and procedural skills. This study describes the accuracy of NT anatomic placement, entrance to the pleural space, and complications as identified by a Medical Examiner for both anterior and lateral NTs.

To investigate this further, a large fire-based metropolitan Emergency Medical Service (EMS) system and a County Medical Examiner (ME) collaborated in an IRB-approved study to explore post-procedural evaluation of patients who received trauma resuscitation in the prehospital setting but did not survive to hospital arrival. All NT procedures were identified via a daily electronic patient care record report; the ME completed a postmortem procedure evaluation when possible.

A total of 151 NTs including 130 lateral chest wall NTs (LCWNTs) and 21 anterior chest wall NTs (ACWNTs) placements from 80 decedents over a 29-month period were reviewed by medical examiners. Among LCWNTs, 72.7% (93/128) were placed in the correct anterior-posterior external landmark, and 82.3% (107/130) were placed in the correct superior-inferior location. Seven NTs were placed below the 7th intercostal space. Overall, 57.7% (75/130) of the LCWNTs were placed in the correct anatomic location; 64.6% (84/130) accessed the pleural space and 13.5% (18/130) demonstrated obvious complications, with the most common being lung parenchymal injury. For ACWNTs, 90.5% (19/21) were placed in the correct external landmark position, but only 19.1% (4/21) accessed the pleural space. Only one lung parenchymal injury was noted as an obvious complication.

Lateral chest wall needle thoracostomies were placed in the correct anatomic external location less than 60% of the time, while ACWNTs were placed in the anatomic correct external location more than 90% of the time. They were more likely than ACWNTs to access the pleural space, but still only successfully did this less than three-fourths of the time. Complications were rare overall. Even when NTs were placed in the correct external anatomic location, as compared to those placed in the incorrect external anatomic location, there were no changes in complication rates or access to the pleural space. This suggests that even with correct external placement, there are other factors that dictate procedural success and complication rates. By using autopsy data, this study helps to reinforce the importance of medical examiner evaluations and highlight areas for procedural improvement.

P101 Decoding Congenital Hepatorenal Fibrocystic Syndromes Postmortem: An Exomic Study of Autosomal Recessive Polycystic Kidney Disease and Caroli's Syndrome

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As postmortem genetic testing is an increasingly utilized tool in death investigations, providing information to cause of death and allowing notification of at-risk relatives, a longstanding challenge remains in sample collection, storage and processing. Obstacles to using formalin fixed paraffin embedded (FFPE) tissue for genetic analysis include base modifications, cross-linking and fragmentation of DNA – challenges recently being overcome with extraction protocols minimizing cross-linking and DNA degradation.

This is a case presentation of a 27-year-old-female with congenital hepatorenal syndrome, identified at autopsy as likely Caroli syndrome, who ultimately died from complications of the disease process. Using postmortem exomic analysis to identify and characterize expected germline mutations in the polycystic kidney and hepatic disease 1 (PKHD1) gene, coding for the fibrocystin / polyductin protein, we aim to confirm clinical and postmortem findings supporting Caroli's syndrome, while excluding other possible etiologies.

Adolescent loss of kidney function with progressive hepatic complications supports a germline null mutation in combination with any one of the at least 55 documented PKHD1 missense mutations identified as survivable past the peri-natal period. Alternately, two separate such missense mutations, one in each of the patient's chromosome 6p12.3-p12.2 loci, could account for early polycystic kidney disease and progressive hepatic fibrosis. Previous studies of age-of-onset of portal hypertension with maintenance of hepatic function with adolescent loss of kidney function support a missense mutation in either the AA1-708 or AA709-1837 regions of the extracellular, N -terminal domain of fibrocystin. Full exome sequencing, allowing inclusion of other, non-PKHD1 gene mutations, will confirm or disprove this. While we focus on PKHD, we also review other genes associated with different clinical presentations of congenital hepatorenal fibrocystic syndromes, including PKD1, PKD2, HNF1b, ARPKD, DZIP1L.

This study will provide the evidence supporting the feasibility of using formalin-fixed-paraffin-embedded (FFPE) tissue samples to identify germline mutations in larger proteins using next generation sequencing. We are comparing antemortem liver biopsy tissue from 2017 to postmortem liver sample from 2023. We expect similar or better diagnostic utility using the postmortem sample. More tissue was harvested postmortem, compared to the antemortem fine-needle liver biopsy sample, allowing more DNA to be extracted in hopes of reaching a minimum 30-read-depth for variant analysis. Concerns using the postmortem samples include postmortem tissue autolysis, DNA hydrolysis, and DNA depurination. As such, we will compare DNA quality and sequence data from antemortem and postmortem samples to assess utility of postmortem FFPE tissue for sequencing and genetic analysis.

P102 Forensic Pathology Education: Do We Need an Alternative Pathway?

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The Accreditation Council for Graduate Medical Education (ACGME) is the body which oversees accreditation for graduate medical education (GME) programs for physicians in the United States. ACGME maintains affiliations with member organizations including the American Board of Medical Specialties, the parent organization of the American Board of Pathology (ABP). The ABP is the specialty board for certification of pathology postgraduate trainees, including forensic pathology (FP). ABP requires completion of a fellowship accredited by ACGME for board eligibility to take the certifying examination for FP. ACGME accreditation is also a requirement for access to most federal funding available for GME, although FP is not eligible for federal funding regardless of accreditation.

The initial model for FP fellowship training involved medical examiner/coroner (ME/C) offices developing programs within their offices. Most FP legacy training programs maintain this model; however, more

recently created programs were required by ACGME to establish a relationship with an academic institution. A benefit of this relationship is contact with the accreditation infrastructure of an academic institution to facilitate ACGME requirements for postgraduate education. These requirements are extensive and are often quite burdensome to a legacy FP training program, particularly at the institutional level, where public sector funding is limited to government budgets and not supplemented, as noted above, by federal support for GME.

Recently a number of ME/C offices supporting legacy FP training programs have experienced difficulty with ACGME accreditation. Since the legacy training programs produce a substantial number of forensic pathologists, the timing for this situation is decidedly unfortunate given the worsening workforce numbers in FP. As these institutions receive no federal support for maintenance of ACGME, perhaps FP could be better served by an alternative to the onerous requirements of ACGME accreditation. Ultimately, the acceptance of any alternative would be contingent on the recognition of ABP as to adequacy for board examination eligibility.

The ACGME program requirements are fundamentally sound and could be adopted largely intact. The institutional requirements could be modified to align better with the reality of the legacy programs in terms of oversight and evaluation of education. At a minimum, the clinical learning environment would be addressed in a more focused way by implementation of office accreditation by the National Association of Medical Examiners. Other options merit further discussion prior to approaching ABP.

P103 Pediatric Natural Deaths in a Small, Mixed Suburban and Rural Medical Examiner Jurisdiction

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Pediatric natural deaths (PND) pose distinct objectives and challenges to forensic pathologists (FPs). These cases require consideration of a broad range of causes, including uncommon and often subtle pathology rarely seen in adult populations, and exclusion of non-natural causes. However, jurisdictional requirements and practices vary greatly, influenced by state law, resource availability, geographic factors, and academic affiliation. We sought to describe the spectrum of PND case types and evaluation in our rural to suburban Midwest jurisdiction, aiming to highlight some of these variables and potentially inform practice recommendations pertaining to the larger medicolegal community.

We retrospectively reviewed pediatric deaths (<18 years) reported to the Johnson County Medical Examiner's Department (JCME) from 2014 to 2024. We evaluated the following variables: jurisdiction, decedent demographics, pediatric pathology case consultation, sub-specialty evaluation, and pathology resident involvement. Non-natural deaths and partial autopsies were excluded.

During the study period, 288 pediatric deaths were reported to JCME, of which 48% were certified as natural. Complete autopsy was performed in 52, including 31 medical examiner-ordered and 21 family-consented after jurisdiction was declined. Pediatric pathologists were involved in 19 of 52 cases (36.5%), serving as the primary pathologist in 8 (15.4%) and consultant in 11 (21.2%). Among medical examiner accepted cases, most decedents were white and non-Hispanic (54.8%) and male (58.0%). Decedents were most often in the 12–17 years age group (32.2%), followed by the <1 and 1–2 years age groups (both 22.6%). Causes of death were further categorized as infectious, congenital, prematurity-related, seizure-related, or other. Infectious causes were most common (32.3%), followed by congenital (29.0%). Pediatric pathology consultation was more common in cases involving prematurity or seizure disorders. Other subspecialty consultation occurred in all but one case, with neuropathology involvement in all cases utilizing consultation. Residents were the primary prosector in 11 (35.5%) cases.

This study describes PDNs under medical examiner jurisdiction in a predominantly rural area, supported by an academic pathology department. Patterns of case acceptance and subspecialty consultation illustrate the influence of local population factors, legal statutes, and academic resources on pediatric death investigations. These data contribute to a broader understanding of regional variability in pediatric

medicolegal practice and point to the value of academic affiliation, even when used sparingly in resource-limited settings.

P105 Case Report: A Heart Too Big for My Size

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Cardiac fibromas are the second most common type of primary cardiac tumors seen in infants and children, after rhabdomyomas. Although cardiac fibromas are technically benign, they may be associated with cardiac arrhythmias and sudden death. These tumors may be identified prenatally, but they are typically first discovered in early childhood and patients are commonly asymptomatic.

Our case is that of a 22-month-old, African American female, with a past medical history of recurrent ear infections and ongoing cough following a respiratory syncytial viral (RSV) infection six months prior. She was born full term via normal vaginal delivery, weighing 8 pounds, 4 ounces. On the date of death, the decedent's mother called 911 upon witnessing the decedent begin gasping for air. Emergency services personnel attempted resuscitation for 42 minutes, noting primarily asystole with one brief period of a shockable rhythm. Death was pronounced on scene.

At autopsy, there were no signs of trauma. She was a normally developed, well-nourished phenotypic female child with evidence of resuscitation-related medical therapy. The internal examination was significant for a 277-gram heart, which was situated predominately within the left pleural cavity, displacing the left lung. The cut surface of the myocardium revealed a 10.0 x 4.5 x 3.1 cm tan-white well-circumscribed, firm mass present in the interventricular septum extending from apex to base. The left lung weighed one-third that of the right lung likely due to the compression by the heart. The aorta followed the normal distribution, and the origins of the major vessels were normally positioned and developed for a typical 22-month-old, meaning the heart size did not correlate proportionally to the aorta and major vessel caliber. On histologic examination, the interventricular septal mass showed a moderately cellular spindle cell lesion with abundant collagenous stroma and scattered calcifications, confirming the diagnosis of a cardiac fibroma. The cause of death was cardiac fibroma, and the manner of death was natural.

The most common location for cardiac fibromas is within the ventricular septum followed by the right ventricle. Prognosis is generally good since these tumors are not malignant, but that depends on the size of the tumor, its location relative to the conduction system, and mass effect by obstructing blood flow. Our decedent had developed symptoms that were vague and indeterminate with an ongoing cough. At time of death, her heart was greater than four times the size/weight of the heart of an average child her age.

P106 Extrapulmonary Tuberculosis Manifesting as Postmenopausal Pyometra in a Chronically Ill Elderly Female

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Tuberculosis (TB) remains a leading infectious cause of death worldwide, yet extrapulmonary presentations can complicate diagnosis, particularly among immunosuppressed or chronically ill individuals. We report the case of an 82-year-old obese female with chronic obstructive pulmonary disease (COPD), hypertension, dementia, and chronic hypoxic-hypercarbic respiratory failure (oxygen-dependent), who was found unresponsive at home and subsequently transported to the hospital. Jurisdiction was assumed by the medical examiner's office due to concerns for potential neglect related to a sacral pressure ulcer discovered on presentation, prompting a forensic autopsy. Her previous hospitalization two months prior to her death revealed that the decedent had a fluid-filled endometrial cavity and lesions in her liver and spleen on CT scan that were concerning for metastatic disease.

Autopsy revealed features of her severe chronic disease including anasarca (diffuse generalized swelling) and a sacral pressure ulcer with fungal colonization. The internal examination demonstrated pyometra (pus within the uterine cavity) with chronic endometritis. Microscopic examination of the uterus, liver,

spleen, and right kidney revealed granulomatous inflammation with focal necrosis. While these tissue slides were negative by AFB immunohistochemistry, AFB-DNA molecular microbiology sequencing performed on tissue confirmed infection with Mycobacterium tuberculosis complex.

Additional autopsy findings included COPD with superimposed acute and organizing pneumonia, cardiomegaly (538 g) with moderate coronary artery atherosclerosis (60% stenosis in the mid-to-distal left anterior descending artery), and cerebrovascular atherosclerosis. No primary or miliary involvement of the lungs by tuberculosis was observed. The spleen also demonstrated an incidental hemangioma.
The cause of her death was certified as chronic hypoxic-hypercarbic respiratory failure due to acute and organizing pneumonia complicated by chronic obstructive pulmonary disease. Contributory conditions included extrapulmonary tuberculosis (pyometra with disseminated granulomatous infection), dementia, hypertensive and atherosclerotic cardiovascular disease, and aspiration pneumonia. Manner of death was certified as natural.

This case highlights the diagnostic challenges of extrapulmonary TB in elderly, chronically ill populations. Diagnosis often requires a high index of suspicion and confirmatory molecular testing, as traditional clinical, imaging, and even immunohistochemical findings may be subtle, nonspecific, or misinterpreted. Ultimately, it further emphasizes the value of forensic autopsy in uncovering clinically elusive infectious manifestations.

P107 *Mortui Vivos Docent*: Forensic and Clinical Significance of Research on Diastatic Cranial Fractures in the Adult Neurocranium

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The interpretation of cranial trauma in dry skulls is challenging, especially in cases of blunt force trauma and/or extensive fragmentation. Previous cadaveric research on cranial trauma conducted by forensic anthropologists has shown that identifying the point or points of impact as well as the type of instrument used is not straightforward. For example, bone fracture can occur peripheral to the point of impact. Also receiving limited attention has been how subtle age changes in the adult skull can alter fracture biomechanics and propagation in cases of severe head injury. Diastatic cranial fractures, which generally occur as a widening along a suture, are well documented in pediatric patients, given the unfused nature of their cranial bones. The goal of this presentation is to discuss findings obtained from a literature review of research and case studies on diastatic fractures in adult skulls in preparation for a project using a large database of decedent CT images to examine if diastatic fractures decrease with increasing age due to joint synostosis. As expected, results are limited. The authors and a radiologist found seven peer-reviewed journal articles using PubMed, Google Scholar, and various web browsers with the search terms “diastatic cranial fractures” and “adult.” Further review of cited references found a few additional relevant case studies. Textbooks in forensic anthropology and clinical skeletal trauma were also reviewed. In summary, diastatic cranial fractures are observed in adult patients, but only one forensic study linked fracture data trend to age. In neurosurgical studies, diastatic fractures in adult patients are mentioned relating to survivability. Forced sutural separation was beneficial in certain cases of epidural hematomas, hypothesized to allow dispersion of the hematoma with a subsequent decrease in intracranial pressure, allowing for healing and survival without surgical intervention. Another study found that diastasis along the lambdoidal suture was linked to poor outcomes due to tears of the venous sinuses. In addition to providing a better understanding of how the adult skull fractures in fatal cases, this research aims to consider other ways to aid the survival and recovery of injured living patients. This project, which is part of a larger study on progressive yet insidious bony changes in the aging adult neurocranium, also aims to shed light on subtle aspects of cranial vault fractures that may be missed in standard imaging.

P108 Assessing Viral Risks in Autopsy Practice: A Case of Donor-Derived Rabies

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The risk of infectious disease transmission during autopsy is generally considered low, but not negligible. Viral transmission during autopsy remains an underexplored risk, especially for viruses with high environmental persistence. Risk factors include aerosol-generating procedures, contaminated personal protective equipment (PPE), and the postmortem interval. As vaccine hesitancy rises, pathogens like measles—highly contagious via aerosol—present new challenges in autopsy safety, even when not suspected clinically. Importantly, gross findings may be absent, especially during viral incubation periods. This presentation explores a rare and compelling case of rabies transmission through organ transplantation, highlighting potential for gaps in diagnosis, communication, and autopsy safety protocols. A 76-year-old male, five weeks post-cadaveric renal transplant, was admitted with progressive neurological symptoms including tremors, myoclonus, excessive somnolence, loss of consciousness, and eventually death. Rabies was only considered late in the clinical course, and confirmation of infection via tissue sent to the CDC was received two days after autopsy. Cerebrospinal fluid was negative for rabies virus, and no gross brain abnormalities were found. Microscopic examination revealed Negri bodies in the brainstem and cerebellum. The infection was ultimately traced to the transplanted kidney, though details of the donor's exposure were unclear, involving conflicting reports from two different regions and animal sources. A literature review identified 21 confirmed rabies deaths in the U.S. since 1940, including cases from organ and corneal transplants, animal bites, and laboratory accidents. There are no documented cases of autopsy-transmitted rabies, but this case underscores potential transmission risk to autopsy personnel. Enhanced vigilance, improved diagnostic turnaround, and standardized protocols for handling potential viral cases are essential for protecting autopsy workers.

P109 Barriers to Autopsy Acceptance in Muslim-Majority Populations: A Systematic Review of Cultural, Religious, and Educational Influences

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Introduction: Autopsy plays a vital role in medical education, clinical audits, and establishing the cause of death. However, its acceptance varies widely across cultures and religious groups. In Muslim-majority populations, attitudes toward autopsy are often shaped by religious beliefs, cultural values, and limited awareness of its medical and legal significance. Islam places strong emphasis on the sanctity of the human body after death, leading to sensitivities around postmortem procedures. This study explores the perceptions, knowledge, and factors influencing attitudes toward autopsy in Muslim-majority populations, with the aim of identifying barriers and opportunities for improving acceptance in medical and legal settings.

Methods: A comprehensive literature search was conducted across three databases (PubMed, Scopus, and Google Scholar) using a combination of Medical Subject Headings (MeSH) and relevant keywords. The search initially yielded 584 articles. Following title and abstract screening by 2 reviewers, 31 articles were selected for full-text review. Of these, 12 studies met the predefined eligibility criteria and were included in the final analysis. The screening and selection process followed the PRISMA guidelines. The methodological quality of the included studies was assessed using the 10-item Critical Appraisal Skills Program (CASP) checklist. Data from the included studies were thematically synthesized using Quirkos v1.6 qualitative analysis software.

Results: Twelve studies met the inclusion criteria, representing diverse Arab and Muslim-majority populations. Methodologies included cross-sectional surveys and qualitative interviews, with sample sizes ranging from 60 to over 11,000 participants. Attitudes toward autopsy were heterogeneous, with acceptance rates ranging from 46% to 78%. Non-invasive autopsy methods were more generally viewed more favorably, especially when perceived as beneficial for determining the cause of death, supporting legal investigations, or advancing public health. Common barriers to acceptance included religious objections, concerns about body disfigurement and delayed burial, and mistrust in medical institutions.

More positive attitudes were associated with higher levels of education and employment in healthcare-related fields. However, awareness of legal and ethical frameworks remained limited across most studies.

Discussion: Attitudes toward autopsy among Arab and Muslim communities are shaped by a complex interplay of religious, cultural, and educational factors. While there is recognition of its potential medical and legal value, religious and ethical concerns remain significant barriers. Promoting non-invasive alternatives, enhancing public awareness, and engaging with religious authorities are critical steps toward improving acceptance in these communities.

P110 Deaths Due to Drowning in the State of Maryland: A Retrospective Forensic Autopsy Study (2021-2023)

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Introduction: In the State of Maryland, sudden deaths due to drowning continue to be a public safety issue, affecting every county and reaching every demographic. Drowning was reported as the fifth leading cause of death in Maryland between 2010 and 2019 and is the third leading cause of injury-related death worldwide. This research paper analyzes drowning related deaths and investigate common trends and patterns, and highlighting potential risk factors such as drug and alcohol use, and past medical history.
Objective: Our study was to document the epidemiologic characteristics of victims of drowning and to identify potential risk factors of drowning victims

Methods: This was a retrospective study of drowning victims in the State of Maryland by conducting an in-depth examination of scene investigations, autopsy and toxicology reports at the Office of the Chief Medical Examiner from 2021 to 2023.

Results: In Maryland, from 2021 to 2023, a total of 171 people died from drowning investigated by the Office of the Chief Medical Examiner (OCME). Of the 171 victims, 121 (70%) were male and 50 (30%) were female. The ages of the victims ranged from 9 months to 87 years old. The drowning media greatly varied, with the most common being swimming pool, bathtub, and river. The least common locations were marsh, flooding, and Sump pump. Based on the data, 56% of the victims were White, 26% African Americans, 15% Hispanic and 4% Asian and Other. Case total per year ranged from most to least; 2021 (N= 62), 2022 (N=56), and 2023 (N=53). The peak number of cases occurred from June to September. Among the victims, 33% tested positive for drugs, 18% positive for alcohol, and 0.1% tested positive for both. There has been a significant increase of positive drugs, most commonly diphenhydramine (N=13), cocaine (N=11), fentanyl (N=10), doxylamine (N=8), and amphetamine (N=7). Other known risk factors include cardiovascular disease, neurological diseases, and mental disabilities.

Discussion: Drowning related fatalities continue to be a public health and safety issue. There are many contributing factors to drowning related deaths. Certain circumstances impair people's ability to swim, such as drug and alcohol use, and medical issues. Further research is needed to mitigate the drowning related fatalities.

P111 Sutural Bones Masquerading as Inflicted Traumatic Skull Fracture in an Infant

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Sutural (or Wormian) bones are small accessory bones that can be found within sutures of the cranium and are thought to develop from separate ossification centers. They are reported in association with certain developmental and genetic conditions such as osteogenesis imperfecta but can be found in varying percentages of healthy populations as natural variants of skull anatomy. Unfused sutural bones in infants can be misinterpreted as skull fractures radiographically with the potential to be labeled nonaccidental in nature, possibly leading to unnecessary medical or surgical intervention, legal investigation with unwarranted involvement of child protective services, and, in some cases, delay of appropriate medical treatment. We report a case of a 1-week-old male infant who was brought to the hospital after his parents

reported he was not waking up. Examination documented lethargy, hypothermia and respiratory distress, and head CT showed a possible occipital skull fracture, right frontal intraparenchymal hemorrhage and subarachnoid hemorrhages. The decedent was coagulopathic and died the following evening despite supportive care including blood products. Child protective services removed the decedent's two siblings from their home due to suspected fatal child abuse. Autopsy five days later documented a triangular-shaped lambdoid sutural bone at the posterior skull, with no associated intracranial or extracranial head trauma. Skeletal survey x-rays were negative for trauma. Histologically, microabscesses were identified in the brain, liver and kidney, and adrenal medullary hemorrhages were present. Hospital blood and cerebrospinal cultures grew *Streptococcus pyogenes*. The cause of death was certified as Group A Streptococcal neonatal sepsis. Child protective services and law enforcement personnel were educated regarding the nontraumatic findings at autopsy, and they initiated the process of reuniting the children to the family home. The authors aim to raise awareness about the existence of sutural bones to prevent their misinterpretation as skull fractures and potential misreporting as child abuse.

P113 A Lethal Instance of Spontaneous Coronary Artery Dissection Caused by Fibromuscular Dysplasia

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Spontaneous coronary artery dissection (SCAD) is a leading cause of acute coronary syndrome in young women, particularly during the peripartum period, who lack significant cardiovascular risk factors. Although the exact cause remains unclear, SCAD primarily affects young women, especially those shortly after childbirth. Contributing factors that have been linked to SCAD include fibromuscular dysplasia (FMD), exposure to female sex hormones (like estrogen and progesterone), physical and emotional stress, and the use of stimulants or cocaine. We present a case of sudden cardiac death in a 30-year-old woman with no prior medical history, who was eight days postpartum following an uncomplicated vaginal delivery. An autopsy revealed a 370-gram globular heart, with scattered petechiae and ecchymosis around the epicardial arteries. Further examination showed spontaneous coronary artery dissections in the left main artery, proximal and mid left anterior descending artery, as well as the right acute marginal artery. This was accompanied by medial disorganization and increased proteoglycan deposition consistent with coronary artery fibromuscular dysplasia. The findings also included focal myocardial necrosis and hemorrhage bordered by fibroblast proliferation in the posterior right ventricle, along with biventricular dilatation. This case highlights the rare and potentially fatal outcome of spontaneous coronary artery dissection in a young woman during the peripartum period, who exhibited no cardiovascular risk factors. It emphasizes the importance of maintaining a high index of suspicion for rare causes of sudden cardiac death during postmortem examinations.

P114 Drowning and Elopement: A Retrospective Examination of Drowning Incidents in Children with Autism Spectrum Disorder

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Autism spectrum disorder (ASD) is a complex developmental condition involving persistent challenges with social communication, restricted interests, and repetitive behavior. Elopement (wandering) is a common behavior observed in children with autism spectrum disorder where they leave a safe area or their caregiver without permission. The prevalence of children with a diagnosis of ASD has steadily increased, as has the risk of injury mortality associated with unintentional drowning incidents from elopement behavior commonly associated with children with ASD. The purpose of this study was to perform a retrospective review and epidemiological examination of fatal unintentional drowning incidents in children with and without a clinical diagnosis of ASD in the State of Maryland.

A search of the electronic database (CME) of the Maryland Office of the Chief Medical Examiner for January 1, 2009, through December 31, 2024, revealed 62 cases of pediatric accidental drowning deaths involving 42 boys and 20 girls, ages 2 – 10 years old. Of the 62 cases, 14 cases (22.6%) occurred in

children with ASD, of which 9 (64 %) were males and 5 (36%) were females. Data showed that the age range for drowning in non-ASD children clustered between 2 and 6 years, with 25% (12 cases) occurring at age 2. Most drownings in children with ASD occurred in children between the ages of 3 and 6 years, with most (29%) occurring at 3 years of age. Concerning race, drownings occurred more frequently in the Caucasian (45%) and African American populations (39%) and accounted for 79% of drowning deaths in children with ASD in Maryland.

Ponds were the most common bodies of water where children with Autism Spectrum Disorder (ASD) drowned, while swimming pools were the most common locations for drownings among non-ASD children. When excluding swimming pools from both groups, 78.5% of children with ASD drowned in non-pool settings, compared to 37.5% of non-ASD children. The data revealed that 89% of drownings in both groups occurred between April and September, with July showing the highest incidence of drownings at 31%.
Fatal accidental drownings involving children with ASD who exhibit elopement behavior are on the rise in the state of Maryland and are a significant public health problem. Awareness and alertness of this phenomenon in the community are vital for the health and safety of children with ASD and provide an opportunity for engagement and education for families of children with ASD for the prevention of future tragedies.

P115 Fatal Necrotizing Enteritis Due to Clostridium Perfringens in an Immunocompetent Child
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Clostridium perfringens is a Gram-positive, bacillus, anaerobic bacteria commonly found in the intestines of humans and animals. It is known to cause food borne illnesses; approximately 1 million cases annually in the United States. It’s ability to undergo spore formation and produce several toxins allows for its survival and pathogenicity. Initial symptomatology of Clostridium perfringens gastroenteritis includes abdominal cramps, diarrhea, nausea, and vomiting, arising 6–24 hours after consuming contaminated food and typically self-resolving within 24–48 hours. Although rare, an intestinal disease caused by the toxin Type A and/or Type C, generally called necrotizing enteritis, can be fatal.

We present a case of a 13-year-old immunocompetent female who presented to the hospital with diffuse abdominal pain, nausea, and vomiting approximately one hour after consuming dinner (steak, mashed potatoes, and broccoli). Before then, after school, she reported consuming lunch at a restaurant (chicken and hamburger). At presentation she was afebrile and denied cough or respiratory issues. Physical examination showed abdominal tenderness. The complete blood count with differential (CBC) showed normal white blood cell count with slightly elevated red blood cell count. She was given fluids, dicyclomine, and ondansetron. Upon improvement she was discharged with supportive care. The following day, she returned to the emergency department after a witnessed episode of loss of consciousness following a bloody bowel movement. Physical examination noted a distended abdomen. An ultrasound showed fluid within the abdomen. CBC had increased white blood cells, increased neutrophils, and low hemoglobin. Despite resuscitative efforts, she was pronounced dead. Postmortem external examination revealed a severely taut, distended abdomen. Upon internal examination the small intestine was thin-walled and hemorrhagic. Histologic examination of the bowel demonstrated transmural hemorrhage with associated acute inflammatory infiltrate. Clusters of Gram-positive bacilli were noted in the epithelium. Similar organisms, admixed with edema and hemorrhage, were identified within the alveolar spaces of both lungs. Postmortem blood cultures were positive for *Clostridium perfringens*. Other autopsy findings included bilateral pleural effusion, ascites, and brain edema.

Necrotizing enteritis due to *Clostridium perfringens* is a well-known syndrome seen mostly in the immunodeficient, such as premature infants and protein deficient populations. This case highlights the fatal potential of *C. perfringens* infection in otherwise healthy individuals. It underscores the importance of proper food handling and storage practices, as well as the need for heightened clinical awareness and rapid intervention in suspected cases to prevent catastrophic outcomes.

P116 Polymicrogyria and *DDX3X* Variants: Neuropathologic Findings in Two Forensic Autopsy Cases

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Polymicrogyria (PMG) is a malformation of cortical development characterized by excessive small gyri and abnormal cortical lamination. Though most commonly associated with neurodevelopmental delay and epilepsy, the condition is genetically and phenotypically heterogeneous. DDX3X, an X-linked RNA helicase gene, has recently emerged as a contributor to neurodevelopmental disorders. Heterozygous, usually de-novo, variants in females have been associated with PMG and epilepsy. However, the histopathologic correlation in autopsy cases remains limited in the forensic literature.

We present two autopsy cases in which PMG was identified and confirmed to harbor a DDX3X variant. The first case involves a 17-year-old female with no medical history and no prior neurologic workup, who was witnessed to have a generalized tonic-clonic seizure prior to death. Neuropathologic examination revealed cerebral edema and localized left frontoparietal polymicrogyria. Genetic analysis performed on a postmortem blood sample revealed a variant of undetermined significance in DDX3X. The second case is a 36-week gestation female fetus with extensive bifrontal convexity polymicrogyria, with a known pathogenic mutation in DDX3X as well as dilated temporal horns and mild inferior olivary nuclear dysplasia.

The forensic relevance of these findings lies in the recognition of structural brain anomalies that may underlie sudden or unexplained death in infants, children, or young adults, even in the absence of a prior epilepsy diagnosis. Additionally, the findings underscore the value of integrating molecular genetics into forensic neuropathology and illustrate the importance of whole brain examination in decedents with seizure-like activity or suspected developmental abnormalities.

P117 Identification of Ectopic Variceal Bleed at Autopsy

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Identification of the source of bleeding leading to large volume hemoperitoneum at autopsy can be challenging. In fact, DiMaio DiMaio in their landmark text book “Forensic Pathology” describe cases of cirrhotic decedents with “massive non-traumatic intra-abdominal hemorrhage” where “in which no source for the bleeding was found”. However, an uncommon, yet well described entity, ectopic varices, likely accounted for these cases originally described by DiMaio DiMaio. Ectopic varices are dilated submucosal venous plexus, primarily due to portal hypertension, located at sties outside the usual gastroesophageal region. The sites can vary and include both luminal (gastric, duodenum, colon, rectum, etc.) and extraluminal (intraperitoneal, retroperitoneal, ovary, perisplenic, etc.). Although rare, accounting for approximately 5% of variceal bleeds, mortality rates from such bleeds is estimated between 40-50%. Several factors contribute to the high mortality rate including the ability of clinicians to diagnose these. Thus, recognition, description, and reporting of this entity through autopsy is crucial in broadening our clinical understanding of ectopic varices. The following describes a case report where an ectopic varix was identified in a decedent with a classic presentation that should prompt the forensic pathologist to consider this entity. A 47-year-old male collapsed in his home after complaining of “stomach pain”. His history was significant for ethanol use disorder, cirrhosis, and a diagnosis of portal hypertension with previously banded esophageal varices. Postmortem examination beginning with full body computed tomography scan (CT) revealed large volume hemoperitoneum and no evidence of trauma. Autopsy confirmed hemoperitoneum with 2000 mL of liquid and clotting blood recovered. The liver was grossly cirrhotic and careful examination of the gastrointestinal tract revealed no obvious source of bleed. However, examination of the mesentery demonstrated a large, engorged varix that produced a large stream of blood on manipulation. The cause of death was determined to be hemoperitoneum due to mesenteric varices due to hepatic cirrhosis due to chronic ethanol toxicity.

Ectopic varies are a sequala of portal hypertension like their esophageal varix counterparts, and are usually in the context of a cirrhotic liver. As ectopic varices tend to have a high risk of rupture, their identification is paramount to clinicians being able to administer proper treatment. Especially important, is identification and accurate reporting of non-luminal ectopic varices when encountered as these present a particularly difficult clinical diagnostic challenge considered they are not identified by traditional diagnostic modalities such as esophageal esophagogastroduodenoscopy or colonoscopy.

P119 Central Pontine Myelinolysis as a Marker of Chronic Alcohol Use

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Introduction: Medical examiners are often required to establish “chronic alcohol use” by decedents. In some instances, the clinical and social history is enough to satisfy that burden of proof; however, medical examiners are often required to rely predominantly on autopsy findings. Common findings used to establish chronic alcohol use include those of the liver, pancreas, and brain. A less commonly relied upon finding is central pontine myelinolysis (CPM), an osmotic demyelination syndrome most commonly associated with rapid correction of hyponatremia. Recognition of the features of CPM may provide medical examiners with evidence needed to more confidently establish alcohol use in the deceased. This study aims to examine deaths where CPM was identified at autopsy in order to determine the validity of this finding as a marker of chronic alcohol use.

Methods: Cases of CPM were identified via a natural language database search of autopsy reports and death certificates from a mixed suburban and rural Medical Examiner’s office in the Midwest. Histopathologic sections were reviewed, including tissue of the brain, heart, liver, pancreas, and kidney. When available, retrospective review of medical records and investigative reports were performed to assess the clinical course and symptom review.

Results: Overall, 9053 autopsies were performed within the study period (2015 to 2024). Of these, there were 1376 alcohol-related deaths with an average decedent age of 52.4 years (range, 0 to 94 years). Forty-four percent of cases (n=610) noted “chronic alcohol use” in the autopsy report. A separate search identified 10 cases carrying an autopsy diagnosis of CPM, with all of these occurring in the setting of chronic alcohol use. Retrospective medical record review demonstrated antemortem episodes of hyponatremia in these decedents with half experiencing motor symptoms. Two individuals were noted to have pontine lesions on antemortem imaging.

Discussion: Despite being a rare diagnosis, the specificity of CPM as a marker for chronic alcohol use in our data set was 100%. While other clinical conditions can lead to CPM, alcohol use is far more common among decedents presenting for forensic autopsy. Literature review proposes that the habitual alcohol user experiences repeated periods of hyponatremia. This mechanism was corroborated by our study with most decedents having had documented episodes of hyponatremia. Consequently, the finding of CPM could help bolster a diagnosis of chronic alcohol use. Thus, evaluation of the pons should be considered when chronic alcohol use is suspected despite the lack of a definitive social history.

P120 Older Synthetic Cannabinoids Still Lurk: The Detection of MDMB-4en-PINACA via its Butanoic Acid Metabolite in Postmortem Toxicology Casework During 2024-2025

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Synthetic cannabinoids are synthetically derived substances designed to simulate the effects of delta-9-THC, the primary psychoactive component of cannabis. Unlike natural phytocannabinoids, synthetic cannabinoids are often created in clandestine laboratories and sold as “incense”, powders, or vape liquids. MDMB-4en-PINACA is an older synthetic cannabinoid of the indazole-3-carboxamide family that was first detected in the Slovenia in 2018 and in the United States in 2019. It is a potent cannabinoid receptor 1 and 2 full agonist and is thought to produce effects more intense than cannabis. These effects are often

unpredictable and may include anxiety, agitation, tachycardia, hypertension, paranoia, hallucinations, and seizure.

Specimens were collected in gray top tubes containing sodium fluoride as an additive and sent to the laboratory. Samples received comprehensive testing to include volatiles analysis by headspace gas chromatography with flame ionization detection (GC-FID) and a screen for greater than 350 drugs of abuse, prescription drugs, and other agents by liquid chromatography with quadrupole time of flight mass spectrometry (LC-QToF-MS). Confirmation analysis included liquid chromatography with triple quadrupole mass spectrometry (LC-MS/MS) and LC-QToF-MS. MDMB-4en-PINACA as its 3,3-dimethylbutanoic acid metabolite was confirmed via LC-MS/MS with a 2 ng/mL reporting limit. The analytical method was validated to be quantitative, but results are reported as qualitative.

The toxicology laboratory has been testing directly for MDMB-4en-PINACA as the metabolite since 2022, and it was added to the laboratory's comprehensive panel screen in January 2024. From January 1, 2024 to March 31, 2025, the lab detected MDMB-4en-PINACA metabolite in 126 postmortem toxicology cases. The metabolite has been detected in the states of Indiana (64), Florida (16), Kentucky (13), Kansas (11), Michigan (7), Missouri (7), Illinois (3), Nebraska (2), Ohio (2), and Louisiana (1). Other drugs or drug metabolites detected in these cases include cotinine (64), caffeine (54), naloxone (39), fentanyl/norfentanyl (32), methamphetamine/amphetamine (32), 4-ANPP (30), cocaine/benzoylecgonine (15), ethanol (14), and amiodarone (13). MDMB-4en-PINACA metabolite was detected as the only substance in 7 cases, and when excluding caffeine, cotinine, naloxone, and amiodarone, the metabolite was detected as the sole substance in 29 cases.

It is prudent to remember that while most novel psychoactive substances emerge and then disappear rapidly from the illicit market, some persist for months and years. MDMB-4en-PINACA still maintains a presence on the synthetic cannabinoid drug market despite its emergence several years ago and it being federally scheduled in the United States in 2023.

P121 Ketamine: It is not Just a Club Drug Anymore

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Ketamine is a widely-used dissociative anesthetic with euphoric, stimulant, and hallucinogenic properties. These qualities have made ketamine prone to abuse in an illicit setting, with names such as "special K" and "vitamin K." Currently, there is a burgeoning off-label medical use of ketamine for chronic pain management and treatment of severe depression and posttraumatic stress disorder (PTSD). Given the potential to encounter ketamine in illicit and a variety of legitimate medical settings, we reviewed all ketamine positive deaths (61) examined at the Connecticut Office of the Chief Medical Examiner over a five-year period (2020-2025).

There were 25 intoxication deaths involving ketamine, 25 in which ketamine had been administered in the hospital, and 9 deaths due to injury or disease where the ketamine did not pathophysiologically cause or contribute to the cause of death. There were two trauma deaths in which illicit vs. hospital administration could not be discerned due to inconclusive medical documentation. There was one intoxication death involving both illicit fentanyl and hospital administered ketamine in the critical care setting, and one natural death in a person with PTSD receiving ketamine therapy. In only one instance was the fatal intoxication caused exclusively by ketamine. For intoxication deaths, the ketamine concentrations ranged from 25 ng/mL to 3200 ng/mL, with an average of 690 ng/mL. The majority were men (20/25) between the ages of 18-62 years, 22/25 were White (6 of which identified as Hispanic) and 3/25 were African American.
For injury deaths, the ketamine concentrations ranged from 250 ng/mL to 500 ng/mL, with an average of 377 ng/mL. For disease deaths, the ketamine concentrations ranged from 96 ng/mL to 1200 ng/mL, with an average of 507 ng/mL. For all deaths with non-hospital administered ketamine, the most common co-intoxicants included fentanyl (20/34), followed by marijuana (13/34), cocaine (13/34), and ethanol (10/34). Other detected drugs included benzodiazepines (6), xylazine (4), MDMA/MDA (3), and mitragynine 2).

Review of these deaths shows that ketamine is often part of a multidrug intoxication when implicated in the cause of death. Ketamine is also widely used in the medical setting; familiarity with its uses in anesthetic and psychiatric protocols with a review of operative and intubation procedure notes is necessary to interpret toxicology reports.

P122 α -Pyrrolidinoisohexanophenone (α-PiHP)-Associated Deaths in Broward County from 2022-2023

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α-Pyrrolidinoisohexanophenone (α-PiHP) belongs to a large, diverse group of recreational drugs known as novel psychoactive substances (NPS). Synthetic drugs mimicking the effects of popular illicit psychoactive drugs began to be classified as NPS in 2007 with the sale of “Spice” and other synthetic cannabinoids marketed as “Legal Highs”. Others categorized as stimulants, hallucinogens, or depressants soon followed. Since 2023, a total of 1184 NPS have been reported with ß-keto substituted stimulants such as α-PVP, methylone, and α-PiHP second only to fentanyl analogues in overall number. Initially labeled “Bath Salts”, these stimulants are classified as synthetic cathinones due to their structural similarity to the psychoactive components of the KHAT plant. While pharmacologically similar to amphetamines, their carbonyl group enhances CNS penetration, increasing potency and reinforcing effects. The absence of clinical trial data requires medical practitioners to rely on anecdotal evidence from clinical and postmortem cases to recognize and treat cathinone toxicity; a process complicated by the polypharmacy status of most overdose victims. Clinical symptoms include tachycardia, hyperthermia, agitation, paranoia, hallucinations, seizures, and sometimes sudden death. Currently few drug screen tests or field test kits can detect synthetic cathinones; therefore, hospitals, workplace drug testing, and other screening labs are unable to establish cathinone use.

In Broward County, Florida (District 17), α-PiHP has rapidly emerged as a drug of concern, with forensic toxicology records showing a significant increase in related deaths. In 2022, there were 75 cases where α-PiHP was detected, followed by 93 cases in 2023—compared to just 2 total cases in a neighboring county. These fatalities span various ages, genders, and races. In many instances, α-PiHP was frequently found in combination with other stimulants or opioids and rarely detected on its own. The concentrations of α-PiHP also varied depending on the individual’s cause of death, gender, and race. Notably, α-PiHP has been linked to a growing number of fatalities across all causes and manners of death, including traffic accidents, homicides, and drug overdoses.

This surge highlights the increasing presence of α-PiHP in the local drug market and its contribution to polysubstance use and violence-related deaths. The drug’s unpredictable pharmacologic profile and ease of availability contribute to its appeal and risk. The rise of α-PiHP associated mortality necessitates greater awareness among forensic pathologists, toxicologists, public health officials, and law enforcement. To address this emerging threat, it is critical to improve detection methods, enhance real-time data sharing, and increase public education efforts.

P123 A Review of Cases Involving Nitazene Detections

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Nitazenes first emerged in 2019 and have remained present in the drug supply since that time. Isotonitazene was the first to emerge of this class of opioids and there have been many more compounds that have emerged. The most recent to emerge are the N-pyrrolidino derivatives of metonitazene and protonitazene. Currently, the nitazenes most often detected have a similar or greater potency than fentanyl. Testing for these drugs can be tricky. Immunoassay techniques will not pick them up due to their structural distinction from other opioids. This means that a case may present as a likely opioid overdose but toxicology screening could be negative if nitazenes are not included in the scope of testing.
Postmortem blood specimens are collected in tubes containing preservative. Specimens are screened on arrival for 350+ drugs including 14 different nitazenes. These are prepared using a protein precipitation

extraction with cold acetonitrile. Extracts are analyzed by liquid chromatography paired with a quadrupole time of flight mass spectrometry (LC-QToF-MS) instrument. Ethyleneoxynitazene, N-desethyl isotonitazene, N-pyrrolidino metonitazene, and N-pyrrolidino protonitazene are reported qualitatively with a cutoff of 1 ng/mL using LC-QToF-MS. Butonitazene, etodesnitazene, etonitazene, flunitazene, isotodesnitazene, isotonitazene, metodesnitazene, metonitazene, N-pyrrolidino etonitazene, and protonitazene are reported quantitatively with a lower limit of quantitation of 1 ng/mL. Quantitation is performed using liquid chromatography paired with triple quadrupole mass spectrometry (LC-MS/MS) instrumentation.

From 2020-2024, the lab had 341 detections of nitazenes in casework which is about 0.3%. Indiana (178, 60.7%), Ohio (40, 13.6%), and Florida (40, 13.6%) have had the highest number of detections by state. Metonitazene accounts for 202 of 293 detections and has been the top nitazene by detections from 2020-2024. In 2025, N-pyrrolidino metonitazene and N-pyrrolidino protonitazene are on pace to equal or exceed metonitazene detections. Nitazenes are most often detected with fentanyl (70.9%) but 49 cases (14.4%) had no other drugs of interest detected. The lab reached out to investigators for information regarding cases with nitazene detections. Based on available information, the lab selected cases that illustrate the importance of including nitazene testing for the purposes of cause of death determination and public health tracking.

P124 Characteristics of Hunting-Related Fatalities in Western Michigan (2015-2024)

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Despite advances in agricultural practices, hunting remains an integral part of many people's cultural, personal, and socioeconomic identity. It is a popular activity in the United States and in Michigan. We sought to characterize hunting-related fatalities in our jurisdiction to facilitate public health interventions for safe hunting practices.

The electronic death investigation database was queried for all cases reported to the Medical Examiner's Office between 2015 and 2024 that included the following: "hunt," "tree stand," "hunting stand," "hunting blind," and "deer blind".

The authors identified 430 cases within the search parameters. Of those, 36 cases matched inclusion criteria. Four deaths were excluded as they occurred in physical proximity to hunting-related materials (e.g., tree stands), but did not occur during active hunting activities. Thirty decedents were male (93.75%), two were female (6.25%) and the decedents ranged in age from 13 to 79 years. Of the 32 confirmed cases, 15 were certified as natural (46.9%), 12 as accidents (37.5%), 3 as suicide (9.4%), 1 as homicide (3.1%), and 1 as indeterminate (3.1%).

Of the 15 natural deaths, only 6 (40%) had cause of death (COD) information available. Of those available, 6 (100%) listed cardiovascular disease as COD. Of the 12 accidents, 6 (50%) were the result of blunt force injuries, including 5 (41.7%) falls from height, typically from a tree stand. Two (16.7%) cases listed COD as gunshot wound(s) (GSW) to the head or chest. Two cases (16.7%) were due to drowning. Two (16.7%) cases listed natural disease as contributing to COD, two (16.7%) cases listed mechanical or positional asphyxia as contributing to COD and one case (8.3%) listed hypothermia as contributing to COD. Two (16.7%) cases involved a fall from height which the individuals survived, but did not return to baseline before dying. Four (33%) individuals tested positive for opioids, methamphetamine, ethanol, or a combination at time of death. All decedents appeared to be hunting within regular Michigan game seasons.

Hunting is a popular recreational activity with inherent risks related to firearms, environmental exposure, and falls from height. Our review identified the influence of illicit substances, natural disease, and homicidal violence as key components of hunting-related fatalities, supporting the need for comprehensive forensic autopsies in these fatalities for the purposes of accurate and complete death investigation and certification.

P126 Is it a "Guy Thing?" Death, Diabetes, and Diabetic Ketoacidosis in the State of Georgia

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Introduction: The Georgia Bureau of Investigation (GBI) serves 155 of 159 counties in Georgia and works with elected coroners, who may report natural deaths for consult or examination. In the setting of a global diabetes mellitus epidemic, we examined the characteristics of patients with fatal diabetic ketoacidosis (DKA) as the presenting symptom of undiagnosed diabetes mellitus in our patient population.

Methods: We performed a retrospective review of all in-office examinations from March 2024 to March 2025 with keywords "diabetes" and "diabetic ketoacidosis" in the immediate cause of death. Variables examined were age, sex, race, and BMI. Statistical significance was evaluated with ANOVA and T-tests.

Results: Forty-six cases were identified. Overall, the average decedent age was 47 years (range: 19 to 83 years) with an average body mass index (BMI) of 25.2. Sixteen (35%) were female and 30 were male (65%). Reported race was as follows: 47.8% Black, 47.8% White, 4.4% other race.
Decedents were classified by cause of death: Group 1: Diabetic complications other than DKA, (n=14, 30%), Group 2: DKA with reported diabetic history (n=24, 52%), and Group 3: DKA with no known diabetic history (n=8, 17%).

Group 1 had an average age of 58 years and BMI of 27.64. 57.2% were male. 42.8% were Black and 57.2% were White.

Group 2 had an average age of 42 years and BMI of 22.81. 58% were male. 46% were Black, 50% were White, and 4% were of another race.

Group 3 had an average age of 41 years and BMI of 25.56. 100% were male. 63% were Black, 25% were white, and 12% were of another race.

Our data showed a statistical significance (ANOVA) in the variances in sex in group 3 compared to group 1(p=0.0299) and group 2(p=0.0278). Additionally, there was a statistical difference (T-test) in the age of the DKA decedents (groups 2 and 3) compared to non DKA decedents (group 1) (p=0.0008, p=0.014). BMI was statistically significant (T-test) only between groups 1 and 2 (p=0.02). There were no significant differences in race.

Discussion: Twenty-five percent (8 of 32) of fatal DKA cases occurred in individuals with no known history of diabetes. Strikingly, all these decedents were male. Limitations to our study include incomplete reported medical history and selection bias of cases reported to the medical examiner's office. Continued investigation into deaths attributed to diabetes is needed to reduce preventable deaths in the future.

P127 Propoxyphene was Taken off the Market Fifteen Years Ago, and Yet the Lab is Still Confirming it in Toxicology Casework

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Dextro-propoxyphene was introduced for clinical use in 1963 as an opioid pain reliever for mild to moderate pain. It was sold under various names as a single-ingredient product (Darvon or Wygesic), or as part of a combination product which could contain acetaminophen, aspirin, phenacetin, and/or caffeine (Darvocet, Darvon Compound-65). Dextro-Propoxyphene was abused and had street names such as footballs, pink footballs, pinks, yellow footballs, and 65s. The most common side effects of dextro-propoxyphene included lightheadedness, dizziness, sedation, nausea, and vomiting. However, as the drug continued to be used it was discovered that, even during proper therapeutic use, it was cardio-toxic. In November of 2010 the FDA released a drug safety communication that recommended against the continued use of dextro-propoxyphene. Levo-propoxyphene (FDA approved in 1962) was available as an antitussive (Novrad) with no opioid like effects, however it was removed from the market in the 1970s.

Specimens were collected at autopsy in gray top tubes containing sodium fluoride and potassium oxalate and sent to the laboratory for analysis. Samples received comprehensive testing to include volatiles analysis by headspace gas chromatography with flame ionization detection (GC-FID) and a screen for greater than 350 drugs of abuse, prescription drugs, and other agents by liquid chromatography with quadrupole time of flight mass spectrometry (LC-QToF-MS). Confirmation analysis included liquid chromatography with triple quadrupole mass spectrometry (LC-MS/MS), and gas chromatography with mass spectrometry (GC-MS), and LC-QToF-MS. Propoxyphene and its metabolite norpropoxyphene were confirmed via LC-MS/MS with a reporting limit of 20 ng/mL.

Eight cases confirmed positive for propoxyphene and/or norpropoxyphene in cases received by the lab from January 2020 to April of 2025. The eight cases were from the following States; Arizona (2), Florida (2), Kentucky (1), Michigan (1), and Ohio (2). Other drugs or drug metabolites detected in these cases included; 7- amino clonazepam (1), alprazolam (1), acetaminophen (4), amitriptyline/nortriptyline (1), bupropion (1), caffeine (3), carisoprodol/meprobamate (1), cyclobenzaprine (2), cotinine (1), ethanol (3), fentanyl/norfentanyl (1), acetylfentanyl (1), gabapentin (2), hydrocodone/dihydrocodeine (2), hydroxyzine (1), methamphetamine/amphetamine (2), oxycodone (1), salicylic acid (1), tramadol (1), trazodone (2), and venlafaxine/O-desmethylvenlafaxine (1). The cases were classified as; three suicide cases, four accidental death cases, and one natural case. This data shows that old drugs should never be counted out. Somehow, they have a way of making an appearance just when you thought you would probably never see them again.

P128 Blood Gone Bitter: A Fatal Case of Methemoglobinemia Disguised as Carbon Monoxide Poisoning

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When cardiorespiratory arrest is reported in a pregnant individual, methemoglobinemia is not usually in the differential. Maternal deaths are typically attributed to cardiovascular conditions, hemorrhage, embolism, eclampsia, and mental health conditions. However, this postmortem case review examines an unusual cause of death. This individual was a previously healthy, active, 34-year-old female, pregnant with twins, with recent viral bronchitis and acute otitis externa, who expired shortly after being brought to the ER for difficulty breathing. Autopsy examination showed no evidence of trauma, pneumothorax, or other gross findings. Full histology was mostly unremarkable with only mild focal villitis, and special stains ruled out amniotic fluid embolism. Comprehensive toxicology revealed subtherapeutic cold medications and normal postmortem I-Stat results. Carbon monoxide (CO) testing revealed elevated CO and methemoglobin. The decedent's home showed no CO leak, and the CO-oximeter manufacturer confirmed the elevated methemoglobin caused a false CO reading. Vitreous nitrite testing was negative, ruling out sodium nitrite ingestion. Further interview with the decedent's spouse revealed that the decedent had been using benzocaine cough drops to control her bronchitis symptoms. With limited blood sample remaining, and consultation with hematopathology and genetics, exome sequencing seemed the most advantageous option; this revealed two mutations on the G6PD (glucose-6-phosphate dehydrogenase) allele. The decedent's undiagnosed G6PD deficiency, in combination with benzocaine exposure and the physiologic stressors of pregnancy and illness, resulted in fatal methemoglobinemia. This postmortem case review is important because maternal deaths are not typically attributed to enzyme deficiencies and CO/methemoglobin instrument interference is not well-known.

P129 Unintentional Injury Following Internal Bullet Strike on Weapon Components

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Firearm injuries are a core staple of forensic pathology practice, with the most recent data from the Centers for Disease Control and Prevention (CDC) showing nearly 47,000 deaths due to firearm-related injury in the United States in 2023. Although most firearm cases involve predictable wound patterns related to bullet trajectories and associated blunt or penetrating trauma, unique and atypical findings can emerge,

especially in dynamic environments involving interposed targets and malfunctioning of firearms components. This poster presents a case involving a 20-year-old male who sustained direct and secondary projectile injuries during a shootout.

At autopsy, the decedent was found to have gunshot wounds involving the torso and extremities, with injuries of the aortic arch, right lung, and liver. An unusual additional wound was noted near the left axilla, where a metal coil had become intertwined within the subcutaneous tissues of the decedent's skin and clothing in a helical fashion. No other projectiles or foreign objects were recovered from this region. The metal coil was submitted to evidence, along with the firearm recovered from the scene.

Firearm examination revealed a pistol with a circular defect on the magazine portion of the gun, and numerous missing firearm components including the recoil spring, baseplate, floorplate, and follower. Examination further determined that the coiled pieces submitted with the firearm were consistent with the missing recoil spring. Review of police investigation, firearm examination, together with autopsy findings, suggest that while exchanging gunfire, the extended magazine of the decedent's semi-automatic handgun was struck by a projectile. The impact caused the magazine to rupture and eject its internal components with significant force, which then became a secondary projectile and struck the decedent.

This case underscores the potential for non-bullet components of a firearm to cause penetrating trauma under specific circumstances, a mechanism rarely encountered or reported in forensic literature. The morphology of the wound, the presence of metallic fragments consistent with the spring, the matching deformation pattern of the extended magazine, and supplementary ballistic report support the conclusion that this was an injury caused by internal component failure following ballistic impact.

The implications of this case extend to both forensic, clinical, and investigative settings. Awareness of such injury patterns and proper evidence collection in both forensics and clinical settings is important for proper identification of weapon-related trauma that may not conform to standard ballistic expectations and may later become vital in reconstructing events during crime scene investigation.

P130 Lethal Bowel Ischemia in a Teenager with Undiagnosed Median Arcuate Ligament Syndrome and Familial Hypercholesterolemia

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A 17-year-old female presented to the emergency department with recent onset abdominal pain, worsening over time and with activity. She was subsequently found unresponsive in the bathroom in pulseless electrical activity (PEA) cardiac arrest. She was admitted for multiple days prior to her death. Following resuscitation, she exhibited metabolic acidosis with elevated lactate and hyperphosphatemia. While lactic acidosis is a non-specific marker of tissue ischemia, anion gap metabolic acidosis with hyperphosphatemia is a more specific biomarker for bowel ischemia in patients without renal dysfunction. Hyperphosphatemia alone can precipitate cardiac arrhythmias and PEA arrest, and this effect is potentiated in metabolic acidosis. On hospital day 2, she was noted to have dark, melanic stools, and endoscopy revealed diffuse erythema in the stomach and small bowel without a discrete source of bleeding. Imaging during admission indicated severe stenosis of the celiac artery with a "J-shaped or hooked appearance", as well as fluid accumulation, wall thickening, and dilation in the small bowel, colon, and gallbladder. Furthermore, at autopsy following organ donation, pronounced atheromatous change was noted in all three major coronary arteries, advanced for the decedent's age, as well as variably dusky small bowel segments with mild edema and histologic evidence of serositis and early coagulative necrosis, suggestive of subacute ischemic injury.

Worsening abdominal pain during activity with food avoidance in the setting of celiac artery stenosis with a "fish-hook" takeoff are consistent with median arcuate ligament syndrome (MALS). In MALS, fibrous tissue surrounding the celiac artery and nerve plexus leads to transient compression that results in intermittent abdominal pain and hypoxic ischemia in the foregut, particularly during activity or after meals. Additional risk factors for MALS include female sex and hyperlipidemia; transient vascular injury caused by compression is thought to predispose to atheromatous change in the celiac trunk, particularly with hyperlipidemia or hypercholesterolemia[2]. During the decedent's hospital course, genetic testing revealed

a heterozygous autosomal dominant pathogenic mutation in the LDLR gene (LDLR c.862 C>A), which is linked to familial hypercholesterolemia. Previously, her total cholesterol and LDLC were elevated in 2023, and in light of noted coronary artery atheromatous change, it is likely that the celiac artery stenosis is at least partially attributable to familial hypercholesterolemia. This atheromatous narrowing of the celiac artery exacerbated the arterial compression that is inherent in MALS, representing the unfortunate co-occurrence of two uncommon conditions that compounded the risk for fatal bowel ischemia.

P131 A Case of Cerebellopontine Angle Lipoma in a Sudden Death from Trauma: Etiology or Incidental Finding?

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Lipomas are benign tumors composed of adipose tissue and represent the most common form of soft tissue neoplasm in adults. However, their occurrence within the central nervous system is exceedingly rare with an intracranial incidence of 0.08% in autopsy series. Approximately 45% of intracranial lipomas exist in the interhemispheric fissure. Cerebellopontine angle (CPA) and internal auditory canal (IAC) lipomas are extremely rare, accounting for only 0.1% of cases, in contrast with vestibular schwannomas that constitute 75–90% of tumors in these locations. Intracranial lipomas are considered congenital malformations caused by abnormal differentiation and persistence of the primitive meninx with transformation to adipose tissue during subarachnoid space development. These lesions in the CNS are thought to result from misplaced meningeal or mesenchymal progenitors failing to differentiate into the leptomeninges (pia and arachnoid) during a critical window of CNS and meningeal development, and form lipomatous lesions instead.

CPAs are often asymptomatic because of their relatively indolent growth but can present with mild, nonspecific symptoms to more severe presentations such as trigeminal neuralgia, facial weakness, sensorineural hearing loss, vertigo, and tinnitus due to their proximity to the trigeminal, facial, and vestibulocochlear nerves. Although CPA lipomas are generally considered incidental findings, their potential neurological impact remains an area of interest. Reports in the medical literature have documented cases where they were associated with sudden death that likely due to their effect on vital neurological functions and their potential role in precipitating catastrophic events.

The case of a 39-year-old male flight instructor who suffered fatal blunt force injuries in a light aircraft crash and was found to have an CPA lipoma at autopsy with no identifiable mechanical or environmental cause for the crash, is presented for consideration. The air transportation safety investigation reported no major catastrophic engine failure, mechanical issues, fuel leaks, fuel contamination, or any signs of foul play in the aircraft's operation.

While the etiological role of the CPA lipoma in precipitating the crash remains uncertain, this case sets the stage to discuss developmental etiology of intracranial lipomas and their role in causing sudden natural and unnatural death.

This case presentation will add to the literature on the association between intracranial lipomas and sudden death. To the best of our knowledge, this is the first case that shows an association between a CPA lipoma and sudden traumatic death.

P132 Autopsy Conclusions from the World's First Two Genetically Modified Porcine-to-Human Cardiac Xenotransplants

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Background:
Xenotransplantation, the transplantation of tissues or organs across species, has emerged as a potential solution to the global shortage of donor organs. Advances in genetic engineering have allowed for gene edits in the porcine hearts to mitigate rejection, graft overgrowth, and zoonotic risk. In 2022 and 2023, the

world witnessed the first two cases of genetically modified porcine cardiac xenotransplantation into live human recipients with end-stage heart failure ineligible for standard allotransplantation.

Case Summaries and Challenges:

The first recipient, a 57-year-old man with nonischemic cardiomyopathy and an ejection fraction (EF) of 10%, survived 60 days post-transplant. His postoperative course was complicated by intravenous immune globulin administration and the replication of latent porcine cytomegalovirus in the xenograft.

The second recipient, a 58-year-old man with ischemic cardiomyopathy and an EF of 15%, had fewer comorbidities and a greater functional status than the first recipient. He survived 40 days post-transplant. His postoperative course was complicated by ambiguous antibody-mediated rejection (AMR) status, leading to a delay in treatment escalation.
Despite extensive immunosuppression and close post-transplant surveillance, both patients ultimately experienced xenograft failure. Autopsies revealed widespread microvascular injury and loss with secondary myocyte ischemia, similar to antibody-mediated rejection seen in other solid organ transplants. However, diagnostic AMR findings of capillary complement deposition and intravascular macrophages were absent. Focal myocardial infarcts were also identified in both cases.

A unique challenge during both cases was the highly scrutinized environment created by the xenotransplant research team. This environment required multiple strategies to minimize procedural disruption and miscommunication, including using workflow checklists, having a designated liaison to the research team, and ensuring a focused approach to real-time verbal preliminary findings.

Discussion: These landmark xenotransplant autopsies emphasize the critical role of the autopsy in translational medicine. The autopsy findings not only informed cause-of-death determinations but also highlighted the limitations of current AMR diagnostic frameworks when applied to xenografts. Additionally, the cases underscored the importance of clear communication, defined procedures, and adaptability when working as a multidisciplinary team. As xenotransplantation advances, pathologists must navigate the scientific and operational complexities that arise at the intersection of innovation, death investigation, and interdisciplinary collaboration.

P133 Project My Heart Your Heart: Pacemaker Recycling Program

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Globally, over one million people die each year due to lack of access to pacemakers and defibrillators. Utilization of salvageable postmortem pacemakers, characterized by adequate battery life, offers a viable approach to address this challenge safely and ethically. Refurbished devices can deliver necessary treatment for individuals enduring symptomatic bradycardia without access to new pacemakers.
Founded in 2009 at Michigan Medicine (MM), Project My Heart Your Heart (MHYH) serves as a central repository for postmortem pacemakers. Following a rigorous FDA-approved testing and reconditioning process, pacemakers are distributed to patients in low-and-middle-income countries (LMICs) around the world. MM collaborates with Northeast Scientific (NES), Implant Recycling (IR), and World Medical Relief (WMR) to facilitate the notification of hospitals, funeral homes, medical examiners and others about the philanthropic mission of MHYH.

Prospective device donors access the project website via an online device donation process and receive a pre-paid kit for donation shipments adhering to Homeland Security guidelines. Once the fulfillment kits arrive at WMR, eligible postmortem pacemakers undergo rigorous initial evaluation focusing on battery life and physical integrity, ensuring compliance with inclusion and exclusion criteria. Devices meeting established criteria continue to be processed, including privacy-compliant erasure of identifying data and removal of specific components before sterilization and packaging. Devices with a battery life estimation of a minimum of 75%, or estimated four-year longevity, continue through the next steps of the process. Eligible devices are turned off with parameters set to the lowest settings to preserve battery life while in

storage. The set screw and screw cap are removed from the header per FDA recommendation. Devices with external damage, insufficient battery life, or inadequate testing performance are forwarded to Implant Recycling for recycling and proper disposal.

Eligible devices are shipped to NES where they undergo cleaning and decontamination. Upon their return back to WMR, the devices continue through additional electrical testing, battery management, and parts replacement via a silicon dipping procedure all following validated protocols. Devices are sent back to NES for final sterilization, adhering to specialized pacemaker safety protocols. Appropriate shipping protocols are followed to ensure the devices safely reach participating centers.

Preliminary results presented at the 2024 AHA Scientific Sessions, provides convincing evidence that reconditioned pacemakers are a safe and effective alternative to new devices for patients in LMICs. The MHYH Team has established a comprehensive framework for the ethical recycling of pacemakers, fostering improved access to essential cardiovascular care in LMICs countries.

P134 Airbag Components Causing Fatal Injury in Motor Vehicle Crashes

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The purpose of this presentation is to discuss two cases of fatal injury resulting from faulty airbag deployment components in motor vehicle crashes (MVCs) in Maricopa County, Arizona. Deaths related to faulty vehicle mechanisms and components fall squarely in the purview of the forensic pathologist, not only because they are accidental, unexpected, and generally due to traumatic injury, but also because of the major role of the medical examiner in public health. These types of deaths are important to identify and subsequently report to the National Highway Traffic Safety Administration (NHTSA) for the safety of the public.

The majority of airbag related injuries and deaths in the United States are attributed to blunt impact injuries from the airbag itself, often in combination with improper restraint of the occupant and/or the occupant being a child. These are rare incidents with correctly functioning airbags and are more common in older vehicle models. However, faulty airbags have been shown to cause death by blunt force injuries related to excessive force or improper timing of deployment and, more rarely, by sharp force and penetrating injuries from faulty components. Of these injuries, the most notable examples involve the Takata airbag that has been under recall since 2015 after several deaths occurred when the airbag inflator component exploded with excessive force, creating sharp projectiles that injured vehicle occupants. The inflator in these cases is suspected to have been degraded by high heat and humidity causing destructive explosion of the component on deployment of the airbag.

Presented here are two cases in which faulty airbag components became shrapnel resulting in penetrating injuries of the neck, ultimately causing death of the vehicle operators. Notably, these were the only significant injuries sustained by the decedent in both cases. Only one of the vehicles had a current recall on the driver's front airbag. Due to the need to report cases of fatal injury caused by these components to the NHTSA, it is imperative that forensic pathologists can recognize airbag components and the related injury patterns during postmortem examination.

P135 Cyanide Toxicity from Ingestion of Silverware Polish: A Case Study and Review of Suicide Trends in the Hmong Population of Marathon County, Wisconsin

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As of 2021, there was an estimated 368,609 persons who identified as having Hmong ethnicity living in the United States. Approximately 62,331 (16.9%) lived in Wisconsin at that time with the highest proportion (5.1%) residing in Marathon County. We examined all deaths investigated by the Marathon County Medical Examiner's Office over a 10-year period (2015-2024). The percentage of deaths certified as suicide within Marathon County during this time span was 1.8% overall. However, suicides within the

Hmong community were over 6 times higher and accounted for 11.0% of deaths (which was second only to natural deaths at 76.3% and was greater than the 9.3% of deaths attributed to accidental means). One possible explanation for this increase in suicide deaths within the Hmong population may be the emphasis placed on traditional Hmong ways along with difficulty assimilating into Western culture, which has reportedly been linked to increased rates of depression and attempts at suicide. We present a case in which a 35-year-old Hmong man ingested silverware polish that contained cyanide with his intentions of self-harm documented via video and a written end of life note present at the scene. Postmortem toxicological analysis detected a lethal level of cyanide (12 mcg/mL) within femoral blood and the cause of death was certified as acute cyanide toxicity. Investigative information suggested that the decedent may have been pressured to end his life in order to preserve honor to his family since he was actively being investigated by law enforcement for alleged sexual assault and other criminal charges. This adds to the growing number of cases involving fatal poisoning by the intentional ingestion of jewelry cleaner. Our hope is to raise awareness of the increased rates of suicide within the Hmong community, for our clinical colleagues to more easily recognize and consider the possibility of cyanide toxicity in patients of Hmong descent who present emergently to local healthcare facilities so that potentially lifesaving treatment can be administered without delay, and for forensic pathologists to be cognizant of the ingestion of cyanide containing products in order to guide postmortem toxicology testing for substances outside the scope of standard toxicology panels.

P136 A Year of Aortic Dissections: Demographics and Diagnostic Challenges from Autopsy Records in Georgia

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Nontraumatic acute aortic dissection (AAD) is a rare but highly lethal condition when left untreated. Mortality rates are reported as approximately 1% per hour after onset if treated expeditiously and greater than 50% by the third day if untreated, with a higher recorded incidence of this condition in the United States than in many developed countries. Published misdiagnosis rates for AAD range widely, from 14% to 45%.

Reports made to the Georgia Bureau of Investigation Medical Examiner’s Office by elected coroners from March 2024 to April 2025 were queried. This agency covers 155 of Georgia’s 159 counties, serving a population of approximately 7.5 million. Of these reported cases, 21 deaths were attributed to nontraumatic aortic dissection. Further review of these cases revealed 7 individuals who sought medical care for their symptoms, and of those, 4 were subsequently discharged from a healthcare facility without a diagnosis of AAD and died later at home. Risk factors of these individuals who sought medical attention were similar to those who did not, and were also similar to national trends when accounting for age, race, and presence of hypertension. Among our sample, 50% of undiagnosed cases were identified as female, despite females representing 24% of the sample group and approximately 33% of all cases of AAD nationally.

While representing a small sample size, these cases may correlate with other studies which have demonstrated underdiagnosis of emergent pathologies in women. Clear data with demographics regarding diagnostic rate disparities in AAD may be difficult to accurately assess without the inclusion of forensic autopsy data. This study highlights potential considerations that may contribute to diagnostic criteria of this challenging condition in the clinical setting, and emphasizes the importance of autopsy data in accurately assessing AAD mortality and influencing variables. Limitations of this study include sample size and bias in cases reported to the state medical examiner.

P137 A Complication of Rigid Plate Fixation for Sternal Closure

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Metal plates and screws are frequently used as rigid sternal fixation devices in open heart surgeries to fix the sternum following sternotomy. Rigid plate fixation is designed to increase sternal stability, thus promoting healing, and decreasing potential complications such as sternal dehiscence and infection. Rigid plate fixation is generally safe; however, potentially lethal complications may occur if product instructions are not followed carefully. Here, we report a case where the selection of screws that were too long resulted in full thickness aortic injury during postoperative cardiopulmonary resuscitation.

The patient was a 72-year-old female with a history significant for multivessel coronary artery disease, recent myocardial infarction, hypertension, and type 2 diabetes who presented for elective coronary bypass surgery. The patient tolerated the procedure well. While recovering in the ICU, she developed refractory ventricular fibrillation and ventricular tachycardia. During chest compressions, she developed significant sanguinous output from her chest tubes. Despite resuscitation efforts and emergent bedside sternotomy with repair of the aortic defect, the patient passed away. An autopsy was performed to evaluate the underlying condition.

The autopsy confirmed the hemothorax and repair of the ascending aortic defect. Seven of the 20 sternal fixation screws perforated the sternum into the chest cavity. The two screws on the right superior fixation plate had the deepest perforation with the screws protruding 3mm from the inner sternum at the same level of the aortic defect. The recent 3-vessel grafts, pacing wires, cardiopulmonary bypass cannulation sites were intact. The patient only started to have significant liquid sanguinous output from her chest tubes during chest compressions, which suggested that the inappropriately long screws perforated the aorta and led to acute exsanguination. It is uncertain whether the patient would have survived the refractory postoperative arrhythmias if she had not sustained the aortic injury; however, significant acute blood loss from the aorta likely hastened her death.

With the development of medical technology, new surgical devices that are meant to improve patient outcomes and to be easier to use are introduced every year; however, careful selection of the appropriate devices and strict adherence to product instruction are crucial to patient safety. Furthermore, even in decedents with known potentially lethal medical conditions, unusual findings in the medical record or investigations warrant autopsy examinations which may yield unexpected findings that potentially benefit future patients.

P138 A Lethal Unexpected Toxic Megacolon with Rare Bacteremia

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We present an autopsy case of an unexpected toxic megacolon and rare bacteremia in a 15 year old male. He had a past medical history of autism, sensory disorder, and alternating constipation and diarrhea. The decedent was found dead in his bedroom with feces on the floor, his lower extremities, and buttocks. Immediately after opening the torso the distal colon was noted to be markedly distended and taking up a large portion of the peritoneal cavity. The distal colon was 27 centimeters in circumference with loss of haustral folds.

Another notable autopsy finding was a fecalith in the urinary bladder. The bladder contained 10 mL of dark brown liquid with no overt fistula. There were no significant findings in the lungs, heart, liver, or kidneys. Microscopic examination of the distal bowel revealed necrosis with extensive submucosal inflammation (acute and chronic), with some extension into the muscularis and fibroadipose tissues.

Postmortem blood cultures were collected and grew a rare gram negative bacteria, *Pantoea agglomerans.* This bacteria has been associated with infections in multiple sites, often following penetrative trauma by vegetation. *Pantoea agglomerans* has been associated with immunocompromised hosts and rare reports of spontaneously occurring bacteremia by this organism can occur. No additional cases have been

reported to our knowledge with toxic megacolon as the most likely source of this bacteremia. Our case highlights an unsuspected and rare presentation of a lethal toxic megacolon.

P139 Beyond the Sternum: A Rare Case of Posterior Mediastinal Injury from Manual Cardiopulmonary Resuscitation

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Introduction: Cardiopulmonary resuscitation (CPR) is a critical life-saving intervention, but it is not without complications. CPR-associated injuries are well documented, typically involving the anterior thorax and upper abdominal organs. These include sternal and rib fractures, hemopericardium, pulmonary contusions, cardiac lacerations, hepatic and splenic injuries, and gastric perforation. However, posterior mediastinal injuries such as trauma to the thoracic esophagus, descending thoracic aorta, azygos vein, and paravertebral soft tissues are exceedingly rare, underrecognized, and may be overlooked during autopsy.
Case Report: The decedent was a 77-year-old female with unknown medical history who was found on her bathroom floor with altered metal status. She was transported to the hospital, found to be hypothermic, and decompensated in the emergency department. Resuscitative efforts, including manual chest compressions and cycles of defibrillation, were performed for approximately 40 minutes until death was pronounced. Autopsy revealed Wischnewski lesions, cardiomegaly, glomerulonephrosclerosis, multivessel coronary artery disease, and obesity. There was extensive soft tissue hemorrhage in the anterior mediastinal fat, a lacerated epicardium, and adventitial hemorrhage near the right atrium at the inferior vena cava entrance. While the esophagus and aorta were intact, their thoracic portions were completely avulsed from one another. A column of clotted blood occupied the posterior mediastinum at the expected location of the azygos vein. The cause of death was hypothermia due to environmental cold exposure. Contributing conditions included atherosclerotic and hypertensive cardiovascular disease and WHO Class III obesity. The manner of death was accident. Posterior mediastinal injuries were attributed to manual CPR based on scene, clinical, and autopsy findings.

Discussion: The forensic literature describes common CPR-related injuries; however, documentation of posterior mediastinal damage is scarce. The decedent in this case was found to have extensive shearing injuries to the posterior mediastinal structures following manual CPR. No automated chest compression device was used. Scene investigation revealed challenging extrication conditions, including significant body habitus and a confined, hoarder-type environment. Antemortem trauma related to body positioning was also considered. This case emphasizes the importance of considering atypical injury patterns in the context of resuscitation efforts, particularly when automated devices are not used. Recognition of such findings may have implications for manner-of-death determinations and medicolegal interpretations.

Posterior mediastinal injuries resulting from manual CPR may be underreported and diagnostically challenging. Increased awareness of these injury patterns is essential in forensic autopsy practice to avoid misinterpretation and to ensure accurate cause-of-death assessments.

P140 The Cost of Excess: Binge Drinking and Chronic Alcohol Use as Drivers of Youth Deaths

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Introduction: Ethanol consumption, such as binge-drinking and chronic consumption, are responsible for significant morbidity and mortality in the general population. In particular, binge drinking leads primarily to acute mortality from alcohol poisoning and trauma, whether intentional or unintentional , with high blood alcohol levels impairing judgment and coordination. Conversely, chronic alcohol use results in progressive liver damage and other organ pathologies, leading to enhanced morbidity and mortality.
Increasing mortality rates among younger populations in the United States, particularly individuals aged 19 to 45, have recently been linked to alcohol consumption patterns. Since 2020, there has been a 14% rise in alcohol consumption, contributing to a 24.8% increase in alcohol use disorder-related mortality in

2020 and an additional 22% rise in 2021. Furthermore, the pandemic led to escalated hospital admissions for alcohol-associated hepatitis and a notable increase in alcoholic cirrhosis among younger individuals.

This study aims to investigate alcohol-related mortality patterns among adults aged 19 to 45 by conducting a comparative analysis of death rates from between the pre-pandemic period (2010-2019) and post-pandemic period (2020 onwards). Our research seeks to determine whether there has been a statistically significant increase in alcohol-related deaths within this demographic since the pandemic. Additionally, we will examine shifts in alcohol consumption patterns, distinguishing between acute and chronic use, to assess how these changes may correlate with the observed increase in alcohol-related mortality.

Results: In King County, between 2010-2024, there were a total of 1,258 alcohol related deaths, of which 363 were in the age group of 19 to 45 years. Age of death trends were analyzed pre and post pandemic and show a large increase in alcohol-related deaths in this cohort. Trends in alcohol-related causes of death were analyzed, with an emphasis on acute vs chronic complications. Pre-pandemic, within the 19-45 age range, a total of 80 deaths were attributed to acute alcohol complications and 53 deaths to chronic complications. Noticeably, post-pandemic data shows that 179 cases of alcohol related deaths were from acute complications and 52 cases died from chronic complications.

Discussion: The changing demographics of death from chronic alcohol use in an older population to acute complications in younger individuals underscores the urgent need for a shift in strategy. Acute alcohol use primarily leads to immediate fatal outcomes, while chronic consumption results in long-term liver damage and serious life-threatening complications, suggesting early intervention may have an outsized impact on mortality.

P141 Anatomical Variations of the Human Skull at Autopsy: A Forensic Pathology–Anthropology Correlation

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The complexity of human anatomy presents the opportunity for morphological anomalies. In forensic investigations, the knowledge and identification of variations in bone is vital for differentiation between normal variation, trauma and/or pathology. The misinterpretation of such findings can have consequences in the determination of cause of death. Therefore, the correlation between forensic pathology and anthropology can be crucial in these cases. We present two separate cases of normal variations in the calvarium that required consultation with forensic anthropology colleagues to understand their significance.

Separate autopsy-produced findings reveal two osteological variants associated with the symmetry and size of the parietal foramina and thickness of the parietal bones. Case A was a 61-year-old male with natural disease and concern for drug overdose. Upon reflection of the scalp, there were symmetric, semi-circular areas of darkening and thinning (left: 5.2 x 3.9 cm; right: 5.8 x 3.8 cm) of the bilateral parietal bones. Case B was a 34-year-old male with hypertensive atherosclerotic cardiovascular disease. The calvarium was remarkable for bilateral circular foramina (left diameter: 3.2 cm; right diameter: 3.9 cm) in the parietal bone, near the sagittal suture, with direct communication to the underlying cerebral cortex and dura mater. The foramina were nearly equidistant (left: 0.3 cm; right: 0.9 cm) from the sagittal suture and equidistant from the frontal suture.

Case A represents biparietal osteodystrophy, which is a rare finding characterized by bilateral and symmetrical thinning of the parietal bones of the skull. The etiology is unknown but it is speculated to be an age-related defect that progresses as the outer table and diploe of the calvarium thins, with postmenopausal females being disproportionately affected.

Case B represents giant parietal foramina, which are congenital defects characterized by symmetrical, semicircular openings in the parietal bones of the skull. These defects result from incomplete ossification during fetal development, typically due to autosomal mutations or hereditary syndromes resulting in deficient ossification. While many individuals with this condition remain asymptomatic, common

symptoms include pain, vomiting, headaches, or seizures due to the unprotected cerebral cortex beneath the foramina.

These autopsy findings highlight the importance of recognizing morphologic abnormalities during examination to accurately certify the cause of death. Careful observation and support from forensic anthropological experts, can be useful for accurate interpretation. While these findings may be pathologically inconsequential, knowledge of anomalies is useful in determining forensic significance.

P142 Fatal Complex Self-Harming in the Setting of Psilocybin Intoxication: Suicide or Not?

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Psilocybin is a hallucinogen found in more than 200 species of basidiomycetes worldwide and has been subject to legal restrictions due to recreational misuse. It mediates significant changes in perception, mood and cognition from agonism with the 5-HT2A receptor and has gained increased attention for its potential application in the treatment of psychiatric disorders inclusive of treatment-resistant depression, anxiety, substance use disorder and obsessive-compulsive disorder. However, a systematic review revealed that the association between suicidality and psychedelic use in both clinical and recreational settings is mixed. Suicide as a manner of death requires demonstrated intent to fatally self-harm and a burden of proof that exceeds other competing possibilities. However, fatal self-harming that occurs in the context of drug intoxication without any prior demonstrated intent to take one's life raises the question as to the underlying true reason for the fatal self-harming. A previous case report of an individual without a psychiatric history who presented with self-harming behavior in the context of psilocybin ingestion was unable to provide the intent of his self-harming attempt on recovery.

Despite a volitional act of self-harm, it is difficult to determine the intent of the act, and the terminology “self-harm” is favored over suicide in such cases. In some jurisdictions, the manner of death in these cases is classified as undetermined, given the competing possibility that it is purely the intoxicant effect of the drug(s) on board that precipitated the acts of fatal self-harm. Another related question is whether the volitional act of consuming psilocybin includes accepting the risk of harm as the intent of the act. This scenario is similar to Russian roulette, where the act of placing a loaded firearm to the head is inclusive of accepting a definite risk of death. When death does result, such cases are classified as suicide.

We report a case of a 32-year-old man with a history of obsessive-compulsive disorder, trichotillomania, misuse of cannabis and magic mushrooms, but no history of suicidal ideation or attempts, who died after complex fatal self-harming through a combination of hanging, plastic bag asphyxia and sharp force injuries whilst intoxicated with psilocybin. This case is presented to highlight the difficulty in certifying the manner of death in these cases when no history of suicidal ideation or attempts exists in the setting of psilocybin intoxication.

P143 A Missed Zebra: A Case Report of the Postmortem Diagnosis of Vascular Ehlers-Danlos Syndrome (vEDS)

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A young black man of Hispanic heritage with a recent medical history of a recent inflamed throat, right shoulder pain with documented right shoulder dislocation, and a fall with minor abrasions of the face and arm on the day of death, was found unresponsive at home. He was taken to the emergency room by EMS, despite resuscitation was pronounced dead. On the day prior to death, he went to another hospital for treatment of shortness of breath and worsening throat inflammation with loss of his voice. He was imaged by x-ray and found to have a large abdominal soft tissue mass and right particular region measuring up to 5 cm in greatest dimensions. However, the x-ray was not reviewed by the clinician, and he was discharged home with treatment of esophageal reflux with antihistamines, acetaminophen for musculoskeletal chest pain, and lozenges for laryngitis. He had a remote embolization of the right

cavernous internal carotid artery, for presumed arteriovenous fistula in 2020. There was no emergency follow-up for the x-ray finding, although there was recommendation for follow-up CT scan.

At autopsy, a ruptured aneurysm of the right brachiocephalic artery was identified. The aneurysm rupture site abutted the right pleural dome, perforated the upper lobe of the right lung, and subsequent subsequently produced a two liter right hemothorax. No other additional arterial aneurysms were seen. Microscopy confirmed the ruptured arterial aneurysm with adherent acute thrombus, acute and chronic inflammation, and hemorrhage in the tunica media of the arterial wall. There are no tumor cells in the artery or right lung. Postmortem genetic testing was performed for aortopathy analysis, which was positive for a COL3A1 heterozygous pathogenic gene variant. This pathogenic variant is known to cause autosomal dominant vascular Ehlers-Danlos syndrome (vEDS). After genetic counseling was initiated, a family history of symptomatology consistent with vascular Ehlers-Danlos syndrome was discovered in one full sibling, her children and the decedent's child. Follow up care and genetic testing is currently underway.

This case highlights a missed diagnosis of vascular Ehlers-Danlos syndrome in a young man who had a very subtle signs of the disease, that were missed previously including prominent eyes, an arteriovenous fistula, and joint dislocation. The postmortem testing was critical in arriving at the right diagnosis, not only for decedent, but also for the decedent's immediate family who were having symptoms of Ehlers-Danlos syndrome for some time.

P144 Curriculum Improvement Through Autopsy Didactics with Standardized Materials

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Introduction: Resident training in autopsy is essential for developing foundational skills in forensic and anatomic pathology. However, the broad scope of autopsy practice presents challenges in designing structured curricula and measurable assessments. Here, we introduce modules on common autopsy topics and evaluate their effectiveness in improving resident knowledge and confidence. The modules are a freely available resource from TheAutopsyBook.com, an educational website continuously developed by nationally-recognized autopsy practitioners. This study is an attempt to validate its effectiveness as a learning tool.

Methods: Pathology Residents at a large academic residency program were given standardized modules to review three critical autopsy topics: pulmonary emboli, cirrhosis, and sepsis. They then completed post-module quizzes to evaluate their learning for each of these topics. Additionally, residents were asked to rate their confidence in locating answers to autopsy-related questions and their confidence in addressing the topics before and after completing each module.

Results: Six residents completed all three modules (18 survey responses). Prior to viewing the modules, surveyed residents generally felt unsure where to find answers on these topics (2.5/5.0 on a Likert scale). For all post-modules assessments, the average score was 89% correct, demonstrating good understanding of core concepts in the areas of pulmonary embolism, cirrhosis, and sepsis. Residents felt that the modules were a good reference for understanding these core concepts (4.5/5.0 on a Likert scale for pulmonary embolism, 4.8/5.0 for cirrhosis, and 4.8/5.0 for sepsis), and that the modules were effective at preparing them to more confidently approach an autopsy on patients with those findings (4.5/5.0 for pulmonary embolism, 4.8/5.0 for cirrhosis, and 4.7/5.0 for sepsis). P-values comparing pre-module confidence compared to post-module confidence confirm that resident felt significantly more prepared after reviewing the modules (pulmonary embolism: $p = 0.012$, cirrhosis: $p = 0.0062$, and sepsis: $p = 0.0042$).

Discussion: Data collection is ongoing, and additional respondents will be included in the final presentation. However, these early findings highlight the value of a standardized autopsy curriculum in improving resident education and preparing them for a career in forensics. Future steps include expanding the project to include control groups who take the quizzes without exposure to the website to assess for how much understanding of these topics is associated with exposure to modules on TheAutopsyBook.com.

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