



Annual Meeting Program

October 18 – 22, 2019

NAME

2019

Sheraton Kansas City Hotel at Crown Center

Kansas City, MO



THANK YOU

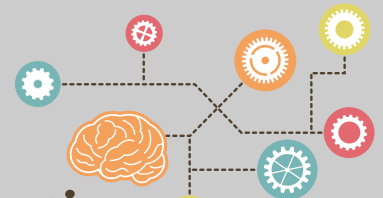
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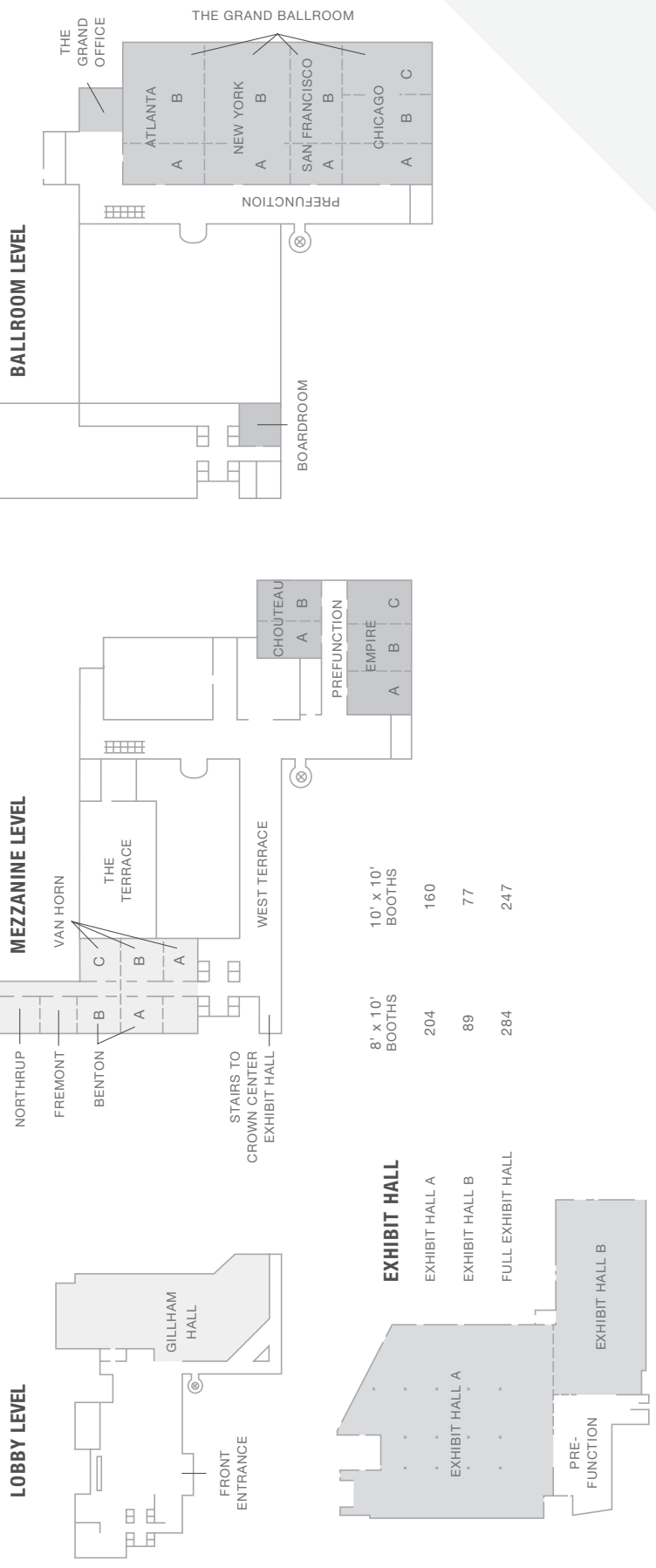


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SHERATON KANSAS CITY HOTEL AT CROWN CENTER

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Welcome to the NAME 2019 Meeting!

Dear Colleagues and Friends,

Welcome to the National Association of Medical Examiners 2019 Annual Meeting. The NAME Annual Meeting provides an international forum for discussion of a broad range of issues pertaining to forensic pathology and death investigation. This year we have much to discuss and a wonderful host city to enjoy.

Meeting Highlights

The 2019 Annual Meeting will be held from Friday, October 18 through Tuesday, October 22, 2019 at the Sheraton Kansas City Hotel at Crown Center.

Our meeting will feature presentations and posters that cover a wide variety of topics in forensic pathology.

The NAME Business Meeting will be held at the Sheraton on Monday morning (October 21) at 8:00am before the scientific sessions begin for the day. The business meeting will include discussion of matters of interest to all NAME members; we urge you to attend so that you may contribute your voice and vote to the decisions made by NAME.

The advance program and other information are available on NAME's website at <https://www.thename.org/2019-annual-mtg>.

Special Events

Friday evening (October 18) will begin the social activities. Please help us welcome all the international attendees during the international attendees' reception. Following this will be our annual Friday evening welcome reception and dinner at the Hilton.

On Saturday (October 19) early evening there will be a resident and fellow reception after the scientific sessions. Join us following the reception as we celebrate Denise McNally's 40th Anniversary with NAME!

The Rigor Run/Dead Man's Walk will take place early Sunday (October 20) morning. The Cadaver Open Golf Tournament will be held Sunday afternoon following the morning scientific sessions.

Monday (October 21) will begin with the Learn to Lead, Rise, and Shine from the Chiefs Breakfast. The Femme Fatale Luncheon will also take place on Monday.

The NAME Luncheon and Awards Ceremony will take place at the hotel on Tuesday (October 22). During the luncheon Dr. MGF Gilliland will be presented with the George E. Gantner, Jr., MD Annual Lecturer Award.

Take advantage of the 8th annual NAME Foundation Silent Auction located adjacent the registration booth. A wide variety of fabulous items available for bidding Saturday, October 19 – Monday, October 21.

Special Acknowledgements

We gratefully acknowledge all who have provided input and effort into the planning and implementation of the meeting, especially the Members and Chair of the Education, Program and Publications Subcommittee. Thank you to our speakers for their contributions to the program and to our colleagues who have been appointed to moderate sessions. We would not be here without the expertise of our Executive Director, Denise McNally. In particular, please thank Tara Snethen and Denise McNally when you see them.

Finally, the leadership and members of NAME acknowledge the gracious support of vendors and sponsors, without whom the meeting would be impossible.

We hope that the scientific program organized by the Program Committee will meet your highest expectations. The leadership of NAME asks all members to guarantee future successful meetings and the overall success of NAME by actively participating in the organization by joining one of our many committees and by completing the online meeting survey that will be sent to all participants at the end of the meeting. The program committee carefully considers this feedback, and vets all comments.

We welcome both our established and new colleagues and look forward to your active participation, which is essential to the success of this meeting. We hope that our new colleagues will consider joining NAME to take advantage of the year-round interactions that our current members enjoy.

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1390 Chain Bridge Rd, #105
McLean, VA 22101
703-749-0227
jlardenmd@ardenforensics.com

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SALLY S. AIKEN, M.D.
Chief Medical Examiner
Spokane Co Medical Examiner's Office
5901 N. Lidgerwood
Spokane, WA 99208
509-477-4366
saiken@spokanecounty.org

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309-888-5210
yincision@comcast.net

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1333 Martins Point Road
Wadmalaw Island, SC 29487
843-214-0378
843-557-1935
kimcollinsmd@gmail.com

PONNI ARUNKUMAR, M.D. (2021)
Cook County Medical Examiner Office
2121 West Harrison
Chicago, IL 60612
630-687-0628
ponniarunkumar@att.net

CHRISTOPHER BODEN, B.S. (2021)
Chief Operating Officer
Broward Co Medical Examiner's Office
5301 SW 31st Avenue
Fort Lauderdale, FL 33312
954-357-5255
chrisbodenfl@gmail.com

TRACEY S. COREY, M.D. (2020)
PO Box 770299
Ocala, FL 34477
Louisville, KY 40207
502-376-5109
traceyscorey@aol.com

***JOYCE L. DEJONG, D.O. (2019)**
Western Michigan University Homer
Stryker M.D. School of Medicine
1000 Oakland Drive
Kalamazoo, MI 49008
517-896-8787
Joyce.dejong@med.wmich.edu

DANIEL W. DYE, M.D. (2020)
Associate Coroner/Medical Examiner
Jefferson County Coroner/Medical
Examiner Office
1515 6th Ave South #220
Birmingham, AL 35233
205-930-3603
dwdye@uabmc.edu

LOUIS N. FINELLI, D.O. (2021)
Office of the Armed Forces Medical
Examiner
115 Purple Heart Drive
Dover AFB, DE 19902
302-346-8648
lfinelli13@verizon.net

KENT E. HARSHBARGER, M.D. (2019)
Montgomery County Coroner Office
361 West Third Street
Dayton, OH 45402
937-225-4156
harshbargerk@mcchio.org

TOM HENSLEY, F-ABMDI (2019)
Chief of Forensic Operations and
Investigations
Jackson Co Medical Examiner's Office
950 E 21st Street
Kansas City, MO 64108
816-881-6600
mo_reb@yahoo.com

MICHELLE A. JORDEN, M.D. (2021)
Santa Clara Co Medical Examiner-Coroner
850 Thornton Way
San Jose, CA 95128
408-793-1910
Michelle.jorden@mec.sccgov.org

***LAURA D. KNIGHT, M.D. (2020)**
Chief Medical Examiner & Coroner
Washoe County Regional Medical
Examiner's Office
990 E. 9th Street
Reno, NV 89512
775-785-6114
Lauraknight.md@gmail.com

DIANNE LITTLE, MBBS (2020)
Forensic Pathology QHFSS, Ground Floor
Block E, PED Building
Gold Coast University Hospital
Southport, Queensland 4215
Australia
+61756876537
dianne.little@sydney.edu.au

JUDY MELINEK, M.D. (2019)
PathologyExpert Inc.
3739 Balboa Street #102
San Francisco, CA 94121
415-850-7056
drjudymelinek@pathologyexpert.com

OWEN L. MIDDLETON, M.D. (2019)
Hennepin Co Medical Examiner Office
530 Chicago Avenue
Minneapolis, MN 55415-1518
612-215-6300
Owen.middleton@hennepin.us

WILLIAM R. OLIVER, M.D. (2019)
Regional Forensic Center
2761 Sullins Street
Knoxville, TN 37865
865-215-8000
name@billoblog.com

MANEESHA PANDEY, M.D. (2020)
Deputy Coroner, Forensic Pathologist
Lucas County Coroner's Office
2595 Arlington Avenue
Toledo, OH 43614
419-213-3900
ajaymaneesh@gmail.com

***KATHRYN PINNERI, M.D. (2020)**
205 Hilbig Road
Conroe, TX 77031
936-522-4502
Kpinneri@hotmail.com

JOSEPH PRAHLOW, M.D. (Ex-Officio)
Forensic Pathologist and Professor of
Pathology
Western Michigan University Homer
Stryker M.D. School of Medicine
Department of Pathology
300 Portage Street
Kalamazoo, MI 49008
269-337-6174
Joseph.prahlowlow@med.wmich.edu

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Sheraton Kansas City Hotel at Crown Center – Kansas City, Missouri

READE A. QUINTON, M.D. (2019)

Mayo Clinic
Hilton 11-62B
200 1st St SW
Rochester, MN 55902
972-394-0495
Quinton.reade@mayo.edu

MICHELE T STAUFFENBERG, M.D. (2020)

Oregon State Medical Examiner's Office
13309 SE 84th Ave, Ste 100
Clackamas, OR 97015-6922
971-673-8200
icdeadpeople@earthlink.net

ROBERT STOPPACHER, M.D. (2019)

SUNY Upstate Department of Pathology
750 E Adams Street
Syracuse, NY 13210
315-345-1849
upstateforensics@gmail.com

SUZANNE R. UTLEY, M.D. (2020)

Medical Examiner
District 12 Medical Examiner
2001 Siesta Drive Suite 302
Sarasota, FL 34239
941-330-5605
utleysuzanne@hotmail.com

VICTOR W. WEEDN, M.D., J.D. (2021)

George Washington University
3125 Arlington Blvd
Arlington, VA 22201
859-242-4567
vweedn@gwu.edu

BARBARA C. WOLF, M.D. (2019)

District 5 Medical Examiner Office
809 Pine Street
Leesburg, FL 34748
352-326-5961
barbaracwolf@aol.com

*Indicates Member of Executive Committee

MARY ANN SENS, M.D., Ph.D

NAME EXECUTIVE VICE PRESIDENT

Professor & Chair of Pathology
University of North Dakota
School of Medicine and Health Sciences
UNDSMHS Pathology Room W424
1301 N. Columbia Rd, Stop 9037
Grand Forks, ND 58202-9037
701-777-2561
evp@thename.org
mary.sens@und.edu

DENISE MCNALLY
NAME EXECUTIVE DIRECTOR

15444 Chinnereth Estates
Savannah, MO 64485
660-734-1891
name@thename.org

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240-498-2918
tsnethen@thename.org

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D. Kimberley Molina, MD
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Maneesha Pandey, MD
Ian Paul, MD
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Giancarlo Di Vella, MD
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Michelle Aurelius, MD
Nicholas Batalis, MD
Cassie Boggs, MD
Clare Bryce, MD
Steven Clark, PhD, *Advisor*
Lauren Edelman, MD
Amanda Fisher-Hubbard, MD
Jan Gorniak, DO
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Daniel Atherton, MD
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Nicholas Batalis, MD
John Fernandes, MD
Jan Gorniak, DO
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CME Accreditation Statement: This activity (“National Association of Medical Examiners 2019 Annual Meeting”) has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of MedChi, The Maryland State Medical Society and the National Association of Medical Examiners (NAME). MedChi is accredited by the ACCME to provide continuing medical education for physicians.

MedChi designates this “live” educational activity (“NAME 2019 Annual Meeting”) for a maximum of 29.25 *AMA PRA Category 1 Credit(s)*[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Educational Objective/Target Audience

The objective of the NAME 2019 Annual Meeting is to increase basic and applied pathology knowledge, focusing on autopsy and forensic pathology. The NAME 2019 Annual Meeting is designed to meet the participants’ education needs in the physician competency area of Medical Knowledge, as defined by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Medical Specialties (ABMS), and to support participants’ lifelong learning towards a goal of promoting patient safety and improving patient care and is specifically targeted to forensic pathologists, medical examiners, coroners, death investigators, forensic administrators, pathology assistants, laboratory personnel engaged in forensics, and forensic scientists.

At the completion of the NAME 2019 Annual Meeting, participants should be able to:

1. discuss medico-legal death investigation protocols;
2. describe regulations and competencies for medical examiners;
3. discuss the forensic investigation of accident- and trauma-related death;
4. discuss forensic science approaches to investigation of domestic violence and homicide; and
5. discuss forensic science approaches to sudden death in children and adult populations.

Disclosure of Financial Relationships and Resolution of Conflicts of Interest:

In order to ensure balance, independence, objectivity and scientific rigor in all its educational activities, and in accordance with ACCME Standards, MedChi requires that all individuals in a position to influence and/or control the content of MedChi CME activities disclose to MedChi and subsequently to learners whether they do or do not have any relevant financial relationships with proprietary entities producing health care goods or services that are discussed in CME activities. Faculty are asked to use generic names in any discussion of therapeutic options, to base patient care recommendations on scientific evidence and to base information regarding commercial products/services on scientific methods generally accepted by the medical community. All MedChi CME activities are evaluated by participants for the presence of any commercial bias and thus input is used to subsequent CME planning decisions. The primary purpose of this “live” CME activity is educational and the comments, opinions, and/or recommendations expressed by the faculty or authors are their own and not those of MedChi or NAME.

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ADDITIONAL INFORMATION

How to Apply for CME Credit:

CME application forms will be available online at <https://www.thename.org/2019-cme> by October 18, 2019 and must be submitted no later than December 31, 2019. Should you have questions about your CME application contact Tara Snethen, Meetings Manager/Assistant Executive Director (phone 240-498-2918; email: tsnethen@thename.org)

NOTES

NAME 2019 MEETING PROGRAM

THURSDAY, OCTOBER 17, 2019

COMMITTEE MEETING [NOT CME]:

8:00 AM – 5:00 PM Executive Committee Meeting (Invitation Only)
Boardroom, Ballroom Level

FRIDAY, OCTOBER 18, 2019

GENERAL INFORMATION [NOT CME]:

10:00 AM – 4:00 PM Pre-Registration (Exhibitors & Attendees)
Ballroom Pre-Function, Ballroom Level

1:00 PM – 4:00 PM Installation of Exhibits
San Francisco, New York & Atlanta, Ballroom Level

5:30 PM – 6:30 PM International Attendee Reception
Empire B, Mezzanine Level

5:30 PM – 9:00 PM Grand Opening of Exhibits; Welcome Reception and Dinner (Registrants and Ticket Holders Only)
San Francisco, New York & Atlanta, Ballroom Level

COMMITTEE MEETINGS [NOT CME]:

6:45 AM – 8:00 AM Foundation and Board of Directors Meeting & Continental Breakfast
Chouteau A, Mezzanine Level

7:00 AM – 8:00 AM Foundation Meeting
Chicago, Ballroom Level

8:00 AM – 12:00 PM Board of Directors Meeting
Chicago, Ballroom Level

12:00 PM – 1:00 PM Board of Directors Lunch
Chouteau A, Mezzanine Level

12:30 PM – 4:30 PM Strategic Planning Committee Meeting
Chouteau B, Mezzanine Level

3:00 PM – 5:00 PM Ad Hoc Meeting on Organ and Tissue Procurement
Empire A, Mezzanine Level

4:30 PM – 5:30 PM Ad Hoc Meeting on Protocols for Interagency Interactions in Mass Fatality Incidents
Boardroom, Ballroom Level

4:30 PM – 5:00 PM NAME Foundation Business Meeting
Chouteau A, Mezzanine Level

SATURDAY, OCTOBER 19, 2019

****Indicates the following:***

*John Smialek Best Resident Paper/Poster Competition
**Mary Fran Ernst Best Affiliate Paper/Poster Competition
***Susan P. Baker Public Health Impact Award
****Best Student Paper/Poster Competition

GENERAL INFORMATION:

6:45 AM – 8:00 AM Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME]
San Francisco, New York & Atlanta, Ballroom Level

8:00 AM – 4:00 PM Exhibits [NOT CME]
San Francisco, New York & Atlanta, Ballroom Level

7:00 AM – 5:00 PM Registration [NOT CME]
Ballroom Pre-Function, Ballroom Level

8:00 AM – 5:00 PM Posters
The Terrace, Mezzanine Level

5:20 PM – 6:20 PM Resident/Fellow Reception [NOT CME]
Empire A, Mezzanine Level

7:30 PM – 10:00 PM Denise McNally's 40th Anniversary Party
[NOT CME]
Chicago, Ballroom Level

NAME 2019 Annual Meeting
Sheraton Kansas City Hotel at Crown Center – Kansas City, Missouri

COMMITTEE MEETINGS [NOT CME]:

7:00 AM – 8:00 AM	International Relations Committee Meeting <i>Chouteau A, Mezzanine Level</i>
7:00 AM – 8:00 AM	Ethics Committee Meeting <i>Empire A, Mezzanine Level</i>
12:00 PM – 1:30 PM	Past President's Committee Meeting and Lunch <i>Chouteau B, Mezzanine Level</i>
12:00 PM – 1:30 PM	Journal Editorial Board Meeting <i>Chouteau A, Mezzanine Level</i>
6:00 PM – 8:00 PM	Forensic Pathology Training Subcommittee Meeting <i>Chouteau A, Mezzanine Level</i>

PROGRAM INFORMATION:

8:00 AM – 8:15 AM	Welcome and Introduction [NOT CME] <i>Chicago, Ballroom Level</i>
8:15 AM – 10:10 AM	SESSION 1: AWARD CONTENDERS I Moderators: John C. Walsh, MD, Cook County Medical Examiner, Chicago, IL, United States of America and Kathryn Pinneri, MD, Montgomery County Forensic Services Department, Conroe, TX, United States of America <i>Chicago, Ballroom Level</i>
8:15 AM – 8:30 AM	1.1 Beyond the Autopsy: Postmortem Familial Variant Testing *** <i>Kathryn Pinneri, MD, Montgomery County Forensic Services, Conroe, Texas, United States of America</i>
8:30 AM – 8:45 AM	1.2 An Assessment of Cardiomegaly and Opioid-Related Death **** <i>Richard Seeber, II, BS, BA, UAB School of Medicine, Birmingham, Alabama, United States of America</i>
8:45 AM – 9:00 AM	1.3 Placental Refractile Material Identified in Three Cases of Intrauterine Demise Due to Known, Reported, and Suspected Misoprostol Use * <i>Daniel C Butler, MD, Medical University of South Carolina, Charleston, South Carolina, United States of America</i>
9:00 AM – 9:20 AM	1.4 Forensic Aspects, Challenges and Legal Consequences of the Munchausen by Proxy Syndrome * <i>Iana Lesnikova, MD, PhD, Department of Pathology Rush University Medical Center, Chicago, Illinois, United States of America</i>
9:20 AM – 9:35 AM	1.5 Moved to P100
9:35 AM – 9:50 AM	1.6 Head And Brain Postmortem Computed Tomography (PMCT)-Autopsy Correlation In Hospital Deaths * <i>Serenella Serinelli, MD, SUNY Upstate Medical University, Syracuse, New York, United States of America</i>
9:50 AM – 10:05 AM	1.7 Update from Office of Justice Programs and Department of Health and Human Services Federal Interagency Working Group on Medicolegal Death Investigation ** <i>Margaret Warner, PhD, CDC National Center for Health Statistics, Hyattsville, Maryland, United States of America</i>
10:05 AM – 10:10 AM	Questions
10:10 AM – 10:40 AM	VISIT EXHIBITS [NOT CME]
10:10 AM – 10:40 AM	BREAK [NOT CME]
10:10 AM – 10:40 AM	VISIT POSTERS

- 10:40 AM – 12:00 PM** **SESSION 2: AWARD CONTENDERS II**
Moderators: Theodore T. Brow, MD, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, MI, United States of America and Jan M. Gorniak, DO, MHSA, Fulton County Medical Examiner's Office, Atlanta, GA, United States of America
Chicago, Ballroom Level
- 10:40 AM – 10:55 AM 2.1 Xylazine, a Veterinary Tranquilizer, in Opioid Intoxications: Six Fatalities
****Jacqueline Nunez, MD, Connecticut Office of the Chief Medical Examiner, Farmington, Connecticut, United States of America*
- 10:55 AM – 11:10 AM 2.2 Fatal Brodifacoum Poisoning with Synthetic Marijuana
****Jarred Michalski, MD, University of South Florida Morsani College of Medicine, Tampa, Florida, United States of America*
- 11:10 AM – 11:25 AM 2.3 A Poison Most Peculiar: Suicide by Sodium Azide
**Julia Denise Berry, MD, Baylor University Medical Center, Dallas, Texas, United States of America*
- 11:25 AM – 11:40 AM 2.4 Beta-Hydroxybutyric acid (BHB) Testing in Postmortem Blood to Differentiate Between Solvent Ingestion and DKA
***Laura M. Labay, PhD, NMS Labs, Horsham, Pennsylvania, United States of America*
- 11:40 AM – 11:55 AM 2.5 Use of BioFire® FilmArray® in a Medical Examiner's Office: A Case Series
Megan Lee, MD, University of Missouri, Columbia, Missouri, United States of America
- 11:55 AM – 12:00 PM Questions
- 12:00 PM – 1:30 PM LUNCH (ON YOUR OWN) [NOT CME]
- 12:00 PM – 1:30 PM POSTER SESSION P1 – P31 [AUTHORS AT POSTERS 12:00PM – 1:00PM]
- 1:30 PM – 3:00 PM** **SESSION 3 (Part 1): AWARD CONTENDERS III**
Moderators: Jamie E. Kallan, MD, Utah Office of the Medical Examiner, Taylorsville, UT, United States of America and Gregory A. Schmunk, MD, Polk County Medical Examiner, Des Moines, IA, United States of America
Chicago, Ballroom Level
- 1:30 PM – 2:00 PM 3.1 A New Way to Look at Data: Collaboration Between the Cook County Medical Examiner's Office and the Bureau of Technology
****Michael D Eckhardt, MD, Cook County Medical Examiner's Office, Chicago, Illinois, United States of America*
- 2:00 PM – 2:20 PM 3.2 Freddie Gray: How One Death Changed the City of Baltimore
*****Sarah Sweet, Dame of Maryland University, Ellicott City, Maryland, United States of America*
- 2:20 PM – 2:40 PM 3.3 Improving Infectious Disease Reporting in a Medical Examiner's Office
****Christopher Rogers, MD, MBA, Los Angeles County, Los Angeles, California, United States of America and Lakshmanan Sathyavagiswaran, MD, FRCPC, FACP, FCAP, Los Angeles County, Los Angeles, California, United States of America*
- 2:40 PM – 3:00 PM 3.4 Critical Diagnoses and Duty to Warn in Forensic Pathology: An Evaluation of Ethics and Proposed Reporting Recommendations
**Cori Ann Breslauer, MD, North Carolina Office of the Chief Medical Examiner, Raleigh, North Carolina, United States of America*
- 3:00 PM – 3:30 PM VISIT EXHIBITS [NOT CME]

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3:00 PM – 3:30 PM	BREAK [NOT CME]
3:00 PM – 3:30 PM	VISIT POSTERS
3:30 PM – 4:45 PM	SESSION 3 (Part 2): AWARD CONTENDERS III Moderators: Jamie E. Kallan, MD, Utah Office of the Medical Examiner, Taylorsville, UT, United States of America and Gregory A. Schmunk, MD, Polk County Medical Examiner, Des Moines, IA, United States of America <i>Chicago, Ballroom Level</i>
3:30 PM – 3:50 PM	3.5 Attitudes Towards Forensic Autopsy Standard B3.7 and the Use of Physician Extenders in Select Autopsy Cases <i>*Cassie B. MacRae, M.Sc., M.D., Beth Israel Deaconess Medical Center/Harvard Medical School, Boston, Massachusetts, United States of America</i>
3:50 PM – 4:20 PM	3.6 The Michigan Co-ed Murders 1967-69: Collective Memory 50 Years Later <i>Jeffrey M. Jentzen, MD, PhD, University of Michigan, Ann Arbor, Michigan, United States of America</i>
4:20 PM – 4:40 PM	3.7 Utilization of Pathologists' Assistants within the Medical Examiner Setting: Bridging the Gap Between Forensic Pathologist Shortage and Increasing Workloads <i>***Milad Webb, MD, PhD, University of Michigan/Wayne County Medical Examiner's Office, Detroit, Michigan, United States of America and Carl J. Schmidt, MD, University of Michigan / Wayne County Medical Examiner's Office, Detroit, Michigan, United States of America</i>
4:40 PM – 4:45 PM	Questions

SUNDAY, OCTOBER 20, 2019

GENERAL INFORMATION:

6:00 AM – 8:00 AM	Rigor Run/Walk (Optional) [NOT CME]
6:45 AM – 8:00 AM	Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME] <i>San Francisco, New York & Atlanta, Ballroom Level</i>
8:00 AM – 3:00 PM	Exhibits [NOT CME] <i>San Francisco, New York & Atlanta, Ballroom Level</i>
7:00 AM – 5:00 PM	Registration [NOT CME] <i>Ballroom Pre-Function, Ballroom Level</i>
8:00 AM – 5:00 PM	Posters <i>The Terrace, Mezzanine Level</i>
1:00 PM – 5:00 PM	25 th Annual Cadaver Open Golf Tournament (Optional) [NOT CME] <i>*Additional Payment Required*</i> <i>Sponsored by CryoLife, Inc.</i>
8:00 PM – 10:00 PM	NAME FOUNDATION OUTREACH FUNDRAISER: The 9-11 Attack on American Airlines Flight 77 and the Pentagon <i>Chicago, Ballroom Level</i>

COMMITTEE MEETING [NOT CME]:

5:30 PM – 6:30 PM	Inspection and Accreditation Committee Meeting <i>Chouteau B, Mezzanine Level</i>
6:30 PM – 10:30 PM	Inspection and Accreditation Training <i>Chouteau B, Mezzanine Level</i>

PROGRAM INFORMATION:

8:00 AM – 10:50 AM	SESSION 4: MISCELLANEOUS Moderators: Matthew J. Miller, MD, County of Los Angeles Department of Medical Examiner-Coroner, Los Angeles, CA, United States of America and Agnieszka Rogalska, MD, Dane County Medical Examiner's Office, McFarland, WI, United States of America <i>Chicago, Ballroom Level</i>
8:00 AM – 8:15 AM	4.1 The Great Smoky Mountain Wildfires <i>Katherine Cochrane, MD, University of Tennessee Medical Center Knoxville, Knoxville, Tennessee, United States of America</i>
8:15 AM – 8:35 AM	4.2 Why We Tend to Underestimate Postmortem Interval (PMI): Anomalies of Decomposition <i>William C Rodriguez III, Ph.D., US Department of Defense - Defense Health Agency, Dover AFB, Delaware, United States of America</i>
8:35 AM – 8:55 AM	4.3 Exhumation of a Future Catholic Saint: the Story of Mother Mary Lange <i>William C Rodriguez III, Ph.D., Maryland State Medical Examiner, Baltimore, Maryland, United States of America</i>
8:55 AM – 9:10 AM	4.4 Faith or Delusion: Death Investigation of a Bizarre Mass Hanging- A Case Report and Review of Literature <i>Monisha Pradhan, MD, Maulana Azad Medical College, New Delhi, Delhi, India</i>
9:10 AM – 9:25 AM	4.5 The Perforated Jejunum: A Case Series <i>Hannah Claire Jarvis, MBBS BSc(Hons) MRCS(Eng), Harris County Institute of Forensic Sciences, Houston, Texas, United States of America and Rafael A Garcia, MD, Harris County Institute of Forensic Sciences, Houston, Texas, United States of America</i>
9:25 AM – 9:40 AM	4.6 They Say, "Don't Mess With Texas": A Review of Police-Involved Fatalities from Regions of Texas <i>Jessica B Dwyer, MD, Southwestern Institute of Forensic Sciences, Dallas, Texas, United States of America</i>
9:40 AM – 10:10 AM	4.7 Multi-Institutional Multi-Disciplinary Injury Mortality Investigation in the Civilian Pre-Hospital Environment (MIMIC): Concept of Utilizing Medical Examiner Data to Determine Prehospital Injury Survivability <i>C Lizette Villarreal, MA, National Trauma Institute, San Antonio, Texas, United States of America and Brian J Eastridge, MD, University of Texas Health Science Center at San Antonio, San Antonio, Texas, United States of America</i>
10:10 AM – 10:30 AM	4.8 Challenges of Interpreting Death Certifications of Fatal Drug Overdoses involving Novel Psychoactive Substances in the State Unintentional Drug Overdose Reporting System (SUDORS) <i>Emily O Olsen, PhD, MSPH, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America and Thomas P. Gilson, MD, Cuyahoga County Medical Examiner, Cleveland, Ohio, United States of America</i>
10:30 AM – 10:45 AM	4.9 Around the World in One Hundred and Eighty Days: How Much Has Twitter "Disrupted" Hierarchies in Forensic Pathology? <i>Ken Obenson, MD, Saint John Regional Hospital, Saint John, New Brunswick, Canada</i>
10:45 AM – 10:50 AM	Questions
10:50 AM – 1:00 PM	LUNCH (ON YOUR OWN) [NOT CME]
10:50 AM – 1:00 PM	POSTER SESSION P32, P34 – P66, P100 [AUTHORS AT POSTERS 11:00AM – 12:00PM]

- 1:00 PM – 2:30 PM** **SESSION 5: WORKSHOP**
Moderators: Maneesha Pandey, MBBS, Franklin County Coroner’s Office, Columbus, OH, United States of America and James R. Gill, MD, Connecticut Office of the Chief Medical Examiner, Farmington, CT, United States of America
Chicago, Ballroom Level
- 1:00 PM – 2:30 PM 5.1 Unexplained Pediatric Deaths: Investigation, Certification and Family Needs
Elizabeth A Bundock, MD, PhD, Office of the Chief Medical Examiner, Burlington, Vermont, United States of America, Kathryn Pinneri, MD, Montgomery County Forensic Services, Conroe, Texas, United States of America, Laura D. Knight, MD, Washoe County Regional Medical Examiner’s Office, Reno, Nevada, United States of America, Laura Gould Crandall, MA, NYU School of Medicine, New York, New York, United States of America, Richard D. Goldstein, MD, Boston Children’s Hospital, Boston, Massachusetts, United States of America and Mary Ann Sens, MD, PhD, University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, United States of America
- 2:30 PM – 3:00 PM VISIT EXHIBITS [NOT CME]
- 2:30 PM – 3:00 PM BREAK [NOT CME]
- 2:30 PM – 3:00 PM VISIT POSTERS
- 3:00 PM – 5:30 PM** **SESSION 6: WORKSHOP**
Moderators: Christine James, DO, New Hampshire Office of the Chief Medical Examiner, Concord, NH, United States of America and Daniel Schultz, MD, Final Diagnosis, Inc, Tampa, FL, United States of America
Chicago, Ballroom Level
- 3:00 PM – 5:30 PM 6.1 Pharmacokinetics, Genetic Polymorphisms, and Drug-Drug Interactions
Laura M. Labay, PhD, NMS Labs, Willow Grove, Pennsylvania, United States of America, Jirair Gevorkyan, PhD, Office of the Chief Medical Examiner City and County of San Francisco, San Francisco, California, United States of America and Luigino Apollonio, PhD, Cuyahoga County Medical Examiner’s Office, Cleveland, Ohio, United States of America

MONDAY, OCTOBER 21, 2019

GENERAL INFORMATION:

- 6:45 AM – 8:00 AM Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME]
San Francisco, New York & Atlanta, Ballroom Level
- 8:00 AM – 4:00 PM Exhibits [NOT CME]
San Francisco, New York & Atlanta, Ballroom Level
- 7:00 AM – 5:00 PM Registration [NOT CME]
Ballroom Pre-Function, Ballroom Level
- 8:00 AM – 5:00 PM Posters
The Terrace, Mezzanine Level
- 12:30 PM – 1:30 PM Femme Fatale Luncheon (Optional) [NOT CME]
Additional Payment Required
Empire AB, Mezzanine Level
Sponsored by Autism BrainNet
- 6:30 PM – 8:30 PM Board of Directors Reception (Invitation Only) [NOT CME]
Empire AB, Mezzanine Level

PROGRAM INFORMATION:

- 7:00 AM – 8:00 AM** **OPTIONAL WORKSHOP 1: LEARN TO LEAD IN FORENSIC PATHOLOGY FROM CHIEF MEDICAL EXAMINERS**
Moderator: Michelle Aurelius, MD, NC Office of the Chief Medical Examiner, Raleigh, North Carolina, United States of America
Empire AB, Mezzanine Level
- 8:00 AM – 10:00 AM NAME Business Meeting [NOT CME]
Chicago, Ballroom Level

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10:00 AM – 10:15 AM	VISIT EXHIBITS [NOT CME]
10:00 AM – 10:15 AM	BREAK [NOT CME]
10:00 AM – 10:15 AM	VISIT POSTERS
10:15 AM – 12:00 PM	SESSION 7: TOXICOLOGY Moderators: Rebecca J. Asch-Kendrick, MD, Midwest Medical Examiner’s Office, Anoka County, MN, United States of America and Thomas Gilson, MD, Cuyahoga Medical Examiner, Cleveland, OH, United States of America <i>Chicago, Ballroom Level</i> <i>Supported by an unrestricted educational grant from MTF Biologics</i>
10:15 AM – 10:35 AM	7.1 The Issue of the Interpretation of Morphine in Postmortem Toxicology <i>Karl E Williams, MD, MPH, Office of the Medical Examiner of Allegheny County, Pittsburgh, Pennsylvania, United States of America</i>
10:35 AM – 10:55 AM	7.2 Identification and Quantification of Exogenous Insulin Analogs in Postmortem Specimens <i>Laura M. Labay, PhD, NMS Labs, Horsham, Pennsylvania, United States of America</i>
10:55 AM – 11:15 AM	7.3 Involvement of Synthetic Cannabinoids as Cause or Contributing Cause of Death <i>Barry K Logan, PhD, NMS Labs, Horsham, Pennsylvania, United States of America</i>
11:15 AM – 11:45 AM	7.4 Looking Ahead to Toxicology in 2020: A Presentation from the NAME Toxicology Committee <i>Laura M. Labay, PhD, NMS Labs, Horsham, Pennsylvania, United States of America</i>
11:45 AM – 11:50 AM	Questions
11:50 AM – 1:30 PM	LUNCH (ON YOUR OWN) [NOT CME]
11:50 AM – 1:30 PM	POSTER SESSION P33 and P67 – P99 [AUTHORS AT POSTERS 12:00PM – 1:00PM]
1:30 PM – 3:30 PM	SESSION 8: PEDIATRIC FORENSIC PATHOLOGY AND CARDIAC PATHOLOGY Moderators: Adam J. Covach, MD, Fond du Lac County Medical Examiner’s Office, Fond du Lac, WI, United States of America and Laura D. Knight, MD, Washoe County Regional Medical Examiner’s Office, Reno, NV, United States of America <i>Chicago, Ballroom Level</i>
1:30 PM – 1:50 PM	8.1 Hypoxic Ischemia, Brain and Spinal Cord Injury with Pulmonary Thromboemboli: A Mimic of Inflicted Trauma <i>Anna Greene McDonald, MD, Wake Forest Baptist Medical Center, Winston Salem, North Carolina, United States of America</i>
1:50 PM – 2:05 PM	8.2 Gross and Histologic Comparison of Acute and Chronic Skull Fractures to Typical and Accessory Sutures of the Infant Skull <i>Agnieszka Rogalska, MD, Dane County Medical Examiner’s Office, McFarland, Wisconsin, United States of America</i>
2:05 PM – 2:20 PM	8.3 Tackling the Challenges of Fetal Autopsies in the Setting of Maternal Trauma <i>Benjamin Daggett, MD, University of Alabama Hospitals, Birmingham, Alabama, United States of America and Daniel S Atherton, MD, Jefferson County Coroner/Medical Examiner’s Office, Birmingham, Alabama, United States of America</i>

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- 2:20 PM – 2:40PM 8.4 Sudden Unexplained Death in Childhood (SUDC): Blinded Neuropathology Review of Autopsy Standardized Cases
Dominique F Leitner, PhD, New York University, New York, New York, United States of America
- 2:40 PM – 2:55 PM 8.5 Mechanisms of Cerebral Edema in Abusive Head Trauma
Rudolph J Castellani, Jr, MD, West Virginia University, Morgantown, West Virginia, United States of America
- 2:55 PM – 3:10 PM 8.6 Histiocytoid Cardiomyopathy (HC): Is it Really Cardiomyopathy? Renaming the Condition and an Update of Newly Discovered Genes
Bahig M Shehata, MD, Children's Hospital of Michigan, Detroit, Detroit, Michigan, United States of America
- 3:10 PM – 3:25 PM 8.7 The Autopsy Pathologist and Extracorporeal Membrane Oxygenation (ECMO)
Abraham T. Philip, M.B.B.S., MD, Cobb County Medical Examiner's Office, Marietta, Georgia, United States of America
- 3:25 PM – 3:30 PM Questions
- 3:30 PM – 4:00 PM VISIT EXHIBITS [NOT CME]
- 3:30 PM – 4:00 PM BREAK [NOT CME]
- 3:30 PM – 4:00 PM VISIT POSTERS
- 4:00 PM – 5:00 PM** **SESSION 9: MOLECULAR DIAGNOSTICS**
Moderators: Sara Zydowicz, DO, District 9 Medical Examiner's Office, Orlando, FL, United States of America and Jeffrey Jentzen, MD, University of Michigan, Ann Arbor, MI, United States of America
Chicago, Ballroom Level
- 4:00 PM – 4:15 PM 9.1 The "Molecular Autopsy": Real Life Experience in a Medical Examiner's Office
Michael D. Bell, M.D., Palm Beach County Medical Examiner Office, West Palm Beach, Florida, United States of America
- 4:15 PM – 4:30 PM 9.2 Use of Molecular Autopsy in Cases of Suspected Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)
Kristen De Berg, MS, Sanford Health, Sioux Falls, South Dakota, United States of America and Kenneth Snell, MD, Sanford Health, Sioux Falls, South Dakota, United States of America
- 4:30 PM – 4:45 PM 9.3 Results of the Molecular Autopsy from a Sudden Unexplained Death in Childhood Cohort
Rachel Rabin, MS, NYU Langone Health, New York, New York, United States of America
- 4:45 PM – 5:00 PM Questions

TUESDAY, OCTOBER 22, 2019

GENERAL INFORMATION:

- 6:30 AM – 8:00 AM Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME]
Atlanta & New York, Ballroom Level
- 7:00 AM – 5:00 PM Registration [NOT CME]
Ballroom Pre-Function, Ballroom Level

PROGRAM INFORMATION:

8:00 AM – 10:10 AM	SESSION 10: ADMINISTRATIVE Moderators: Eli Goodman, MD, Dane County Medical Examiner's Office, McFarland, WI, United States of America and Judy Melinek, MD, Alameda County Sheriff-Coroner Office and PathologyExpert Inc, San Francisco, CA, United States of America <i>Chicago, Ballroom Level</i>
8:00 AM – 9:00 AM	10.1 ISO17020:2012 Accreditation and NAME Accreditation: Our Experience and Removing the Misconceptions <i>Amy C. Gruszecki, MSFS, DO, American Forensics, Mesquite, Texas, United States of America, Sally Aiken, MD, Spokane County Medical Examiner's office, Spokane, Washington, United States of America, Barbara C. Wolf, MD, Districts 5 & 24 Medical Examiner's Office, Leesburg, Florida, United States of America, Ponni Arunkumar, MD, Cook County Medical Examiner's Office, Chicago, Illinois, United States of America, and Roger Mitchell, MD, Office of the Chief Medical Examiner, Washington, District of Columbia, United States of America</i>
9:00 AM – 9:15 AM	10.2 2019 Salary Survey Results <i>William Oliver, MD, Regional Forensic Center, Knoxville, Tennessee, United States of America</i>
9:15 AM – 9:30 AM	10.3 Check Please: The Importance of The Pregnancy Check Box On Death Certificates in Identifying Pregnancy-Related Deaths <i>Jan M. Gorniak, DO, MHSA, Fulton County Medical Examiner's Office, Atlanta, Georgia, United States of America</i>
9:30 AM – 9:50 AM	10.4 Reclaiming the Autopsy as the Practice of Medicine: A Pathway to Remediation of the Forensic Pathology Workforce Shortages? <i>Victor W. Weedn, MD, JD, George Washington University, Washington, District of Columbia, United States of America and MJ Menendez, JD, Philadelphia, Pennsylvania, United States of America</i>
9:50 AM – 10:05 AM	10.5 The Oscar Pistorius Trial: Ethico-Legal Perspectives For Forensic Pathologists <i>Gert Saayman, MBChB, MMed(MedForens), Department of Forensic Medicine, University of Pretoria, Pretoria, Gauteng, South Africa</i>
10:05 AM – 10:10 AM	Questions
10:10 AM – 10:45 AM	BREAK [NOT CME]
10:45 AM – 12:00 PM	SESSION 11 Moderators: Nicole R. Jackson, MD, MPH, New Mexico Office of the Medical Examiner, Albuquerque, NM, United States of America and Edward L. Mazuchowski, MD PhD, Armed Forces Medical Examiner System, Joint Base San Antonio, TX, United States of America <i>Chicago, Ballroom Level</i>
10:45 AM – 11:45 AM	11.1 Butte County Camp Fire 2018: Methods used to Identify Victims of California's Deadliest Fire <i>Jason P Tovar, MD, Sacramento County Coroner Office, Sacramento, California, United States of America, Kim Gin, MS, Sacramento County Coroner, Sacramento, California, United States of America, Richard F Selden, MD, PhD, ANDE, Waltham, Massachusetts, United States of America and Kory L Honea, Butte County Sherriff-Coroner Office, Oroville, California, United States of America</i>
11:45 AM – 11:50 PM	Questions
12:00 PM – 2:00 PM	NAME Luncheon & Awards Presentations (Registrants and Ticket Holders Only) [NOT CME] <i>Atlanta & New York, Ballroom Level</i>

- 2:00 PM – 4:45 PM** **SESSION 12: ALPHABET SOUP**
Moderators: Brandi McCleskey, MD, Jefferson County Coroner/Medical Examiner's Office, Birmingham, AL, United States of America and Brian L. Peterson, MD, Milwaukee County Medical Examiner's Office, Milwaukee, WI, United States of America
Chicago, Ballroom Level
- 2:00 PM – 3:00 PM 12.1 How the Centers for Disease Control and Prevention (CDC) and Medical Examiners Collaborate to Help the Living
Carri Cottengim, MA, CDC, Atlanta, Georgia, United States of America, Paula A. Braun, MSA, CDC, Atlanta, Georgia, United States of America, Katherine Fowler, PhD, CDC, Atlanta, Georgia, United States of America, David Goodman, PhD, CDC, Atlanta, Georgia, United States of America, Christine Mattson, PhD, CDC, Atlanta, Georgia, United States of America, Rebecca Noe, MN, MPH, FMP-BC, CDC, Atlanta, Georgia, United States of America, Sarah Reagan-Steiner, MD, MPH, CDC, Atlanta, Georgia, United States of America, Kevin Chatham-Stephens, MD, MPH, CDC, Atlanta, Georgia, United States of America and Margaret Warner, PhD, CDC, Hyatsville, Maryland, United States of America
- 3:00 PM – 3:20 PM 12.2 The Centers for Disease Control and Prevention's Sudden Unexplained Infant Death Investigation Reporting Form Update
Alexa B Erck Lambert, MPH, Contractor at the Centers for Disease Control and Prevention, DB Consulting Group, New Orleans, Louisiana, United States of America
- 3:20 PM – 3:35 PM 12.3 Medical Examiner Data on Mass Homicide: Findings from the National Violent Death Reporting System, 32 US states, 2003-2016
Katherine A Fowler, PhD, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America
- 3:35 PM – 3:55 PM 12.4 ECHO: Medicolegal Death Investigation - A Novel Solution to Training and Certifying Forensic Medicolegal Death Investigators in a Geographically Distributed Medical Examiner System
Ian Daniel Paul, MD, Office of the Medical Investigator, University of New Mexico, Albuquerque, New Mexico, United States of America
- 3:55 PM – 4:15 PM 12.5 Automated Drug-Involved Death Data Collection Pilot
Steven Clark, PhD, Occupational Research and Assessment, Big Rapids, Michigan, United States of America
- 4:15 PM – 4:30 PM 12.6 Preventing Consumer Product-Related Deaths: The Vital Role of Medical Examiners
Yolanda Nash, BS, U.S. Consumer Product Safety Commission, Bethesda, Maryland, United States of America
- 4:30 PM – 4:45 PM Questions
- 4:45 PM Meeting Adjourns

POSTER PRESENTATIONS:

Please note posters P1-P31 must be on the assigned board by Saturday, October 19 at 8:00 AM and remain posted until 5:00 PM. Posters P32 and P34-P66, and P100 must be on the assigned board by Sunday, October 20 at 8:00 AM and remain posted until 5:00 PM. Posters P33 and P67-P99 must be on the assigned board by Monday, October 21 at 8:00 AM and remain posted until 5:00 PM. NAME is not responsible for posters left on the board after 5:00PM on the day of your presentation.

It is required that presenters are to stand by their posters during the presentation time for discussion of their posters with meeting attendees that will occur:

- P1 – P31: Saturday, October 19, 12:00 PM – 1:00 PM
P32, P34 – P66, P100: Sunday, October 20, 11:00 AM – 12:00 PM
P33, P67 – P99: Monday, October 21, 12:00 PM – 1:00 PM

P1 *Coccidioides immitis*: A Rare Form of the Disease Process Presenting in an Even Rarer Location

****Haley Amoth, BS, University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, United States of America

P2 Autopsy Findings Following Prolonged Cardiopulmonary Resuscitation and Thrombolytic Therapy for Suspected Pulmonary Thromboembolism: a Case Series

****Keenan McNamara, BS, University of Arizona College of Medicine - Phoenix, Phoenix, Arizona, United States of America

P3 Reducing Laboratory Rejection Rates of Postmortem Specimens at a County Medical Examiner's Office

****Kasey Kreutz, University of Texas Southwestern Medical Center, Dallas, Texas, United States of America

P4 Pseudo-CPM (Central Pontine Myelinolysis)

****Matthew Thomas Rumschlag, BS, Western Michigan School of Medicine, Kalamazoo, Michigan, United States of America

P5 Forensic Neuropathologic Phenotypes of Fungal Central Nervous System Infections: A Case Series

****Gary Wu, BS, Rush Medical College of Rush University, Chicago, Illinois, United States of America

P6 Ecchordosis Physaliphora: Case Reports and Review of Literature

****Yoad Porat, BS, Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, United States of America

P7 Volumetric Changes of the Insular Cortex in Adult Sudden Unexplained Death: A Pilot Project

****Allison K Maybank, MSc, Dalhousie University, Saint John, New Brunswick, Canada

P8 Relationship between Postmortem Interval and Gene Expression of Skeletal Muscle

****H. Wang, L. Chen, Department of Forensic Medicine, School of Basic Medical Sciences, Fudan University, Shanghai, China

P9 The Toxic Effects of Loperamide: A Case Study

****Lauren V Strzyzewski, BS, Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, United States of America

P10 A Relationship Between Asthma and Opioids

****Sabrina F Zohoury, BS, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan, United States of America

P11 Importance of Scene Investigation and Toxicology Interpretation in Non-Accidental Opioid-Related Deaths

****Paul Yousif, BS, Western Michigan University Homer Stryker M.D. School of Medicine, Oakland Township, Michigan, United States of America

P12 Exsanguination from Superficial Lower Extremity Trauma

****Samuel P Prahlow, MPH, Florida State University, Tallahassee, Florida, United States of America

P13 Homicide-Suicide: A Homicidal Asphyxia Misinterpreted as a Gunshot Wound at the Scene

****Elizabeth Hafner, BS, University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, United States of America

P14 Two Cases of Tandem Bullets: One Homicide and One Suicide

****Allyson Marie Khau, UC Davis, San Jose, California, United States of America

P15 High-Voltage Electrocution From Home-Made Fractal Burning Device

****Evan Rush, MD, Regional Hospital, Terre Haute, Indiana, United States of America

P16 Crossbow Homicides: More Common Than Reported?

****Lo Tamburro, BS, Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, United States of America

P17 Fatal Direct Current Electrocution in a Welder

****Anmol Hans, BS, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan, United States of America

P18 Black Esophagus: A Report of Three Cases and Review of the Literature

****Megan Pignato, BS, University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, United States of America

P19 Under Pressure: Two Acute Events with a Common Risk Factor

*Alexandra L Isaacson, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America

P20 How an Autopsy Can Help the Living: a Case of Vascular Ehlers-Danlos Syndrome

*Guoliang Wang, University of Missouri School of Medicine, Columbia, Missouri, United States of America

P21 The All American Bridge Suicide Prevention Barrier: Effects on Suicide Rates, Mechanisms, and Locations in Summit County, Ohio.

*Alexis Jelinek, MD, Summa Health System-Akron City Hospital, Akron, Ohio, United States of America

P22 Systemic Amyloidosis as a Sequela of Congenital Central Nervous System Malformations

*Meredith Parsons, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America

P23 Hairy Polyp: A Case Study at Autopsy

*Justin Lohmann, DO, University of Tennessee Medical Center Knoxville, Knoxville, Tennessee, United States of America

P24 Mechanical Asphyxia of an Eight-month-old Infant in an Overturned Inclined Sleeper

*Tatiana Bihun, MD, St. Louis University, St. Louis, Missouri, United States of America

P25 Variation in Degree of Decomposition of Two Bodies Buried in Close Proximity

*Mary E Green, MD, Wake Forest Baptist Health, Winston Salem, North Carolina, United States of America

P26 WITHDRAWN

P27 Analysis of Substance Use in Suicides in Cuyahoga County

*Alexander F Blank, MD, Cleveland Clinic Foundation, Cleveland, Ohio, United States of America

P28 Extreme Adrenal Atrophy in a Healthy Young Adult

****Meagan Chambers, MS, MSc, Dartmouth Medical School, Lebanon, New Hampshire, United States of America

P29 Fatal Fentanyl-Induced Status Asthmaticus

****Meagan Chambers, MS, MSc, Dartmouth Medical School, Lebanon, New Hampshire, United States of America

P30 A Case of Fatal Surgical Complications from Penile Implant Surgery

****Meagan Chambers, MS, MSc, Dartmouth Medical School, Lebanon, New Hampshire, United States of America

P31 False Positive Enzymatic Ethanol Result in a Patient with Elevated Lactate and LDH from Acetaminophen-Induced Liver Failure

*Brienne Flynn, MD, Vanderbilt University Medical Center, Nashville, Tennessee, United States of America

P32 Pulmonary Artery Dissection: Autopsy Case Report and Literature Review

Brienne Flynn, MD, Vanderbilt University Medical Center, Nashville, Tennessee, United States of America

P33 Death by Dog Bite: Case Report of Fulminant Sepsis from *Capnocytophaga canimorsus* Infection

Brienne Flynn, MD, Vanderbilt University Medical Center, Nashville, Tennessee, United States of America

P34 Two Cases of 5-fluoro-MDMB-PICA Overdose

*Adam C Gonzalez, MD, University of Texas Medical Branch at Galveston, Galveston, Texas, United States of America

P35 Suicide by an Unusual Compound: A Case of Barium Acetate Toxicity

**Elena Fenu, MD, Wake Forest Baptist Medical Center, Winston-Salem, North Carolina, United States of America*

P36 Critical Analysis of Laboratory Testing Methodologies When Interpreting Conflicting Results at Autopsy

**Kimberly M Johnson, MD, Medical College of Wisconsin, Milwaukee, Wisconsin, United States of America*

P37 Accidental Overdose Deaths in Women: Toxicological Trends in New Mexico from 2011-2015

**Elena Gandara, MD, University of Colorado School of Medicine, Aurora, Colorado, United States of America*

P38 Correlation of External Physical Examination Findings of Neck Trauma with Post Mortem Computed Tomography

**Timothy Jong, MD, Los Angeles County/University of Southern California Medical Center, Los Angeles, California, United States of America*

P39 Anatomical Distribution and Autopsy Features of Gunshot Injuries to Determine the Manner of Death. A 5-Year Retrospective Study From The Cook County Medical Examiner's Office

**Lorenzo Gitto, MD, State University of New York, Upstate Medical University, Syracuse, New York, United States of America*

P40 Multiple Projectiles Recovered from a Single Entrance and Wound path: A Rare Case of Tandem Bullets and Literature Review

**Stefanie J Grewe, MD, University of South Florida, Tampa, Florida, United States of America*

P41 Sudden Death Due to Osler-Weber-Rendu Syndrome Presenting as Suspected Traumatic Death

**Nicole E Stanley, MD, University of Utah Health, Salt Lake City, Utah, United States of America*

P42 Why So Blue? Suicide by Sodium Nitrite

**Megan Lawless, MD, University of Nebraska Medical Center, Omaha, Nebraska, United States of America*

P43 Different Mean, Same End: An Unexpected Death Prior to Suicide Attempt

**Anna Lane Tart, MD, University of Arkansas for Medical Sciences, Little Rock, Arkansas, United States of America*

P44 Fatal Ludwig's Angina in a Patient with Submandibular Abscess

**Allison Cooper, MD, Baylor University Medical Center, Dallas, Texas, United States of America*

P45 Transection of Skull Via Helicopter Blade: An Unusual Cause of Death

**Temma Kaufman, University of South Florida, Tampa, Florida, United States of America*

P46 Radically Invasive Projectiles and their Destruction

**Imran L Hitto, MD, The University of Texas Southwestern Medical Center, Dallas, Texas, United States of America*

P47 Huffington Postmortem

**Melinda Flores, MD, University of Texas Southwestern Medical Center, Dallas, Texas, United States of America*

P48 Fentanyl and Fentanyl-laced Heroin Overdose Deaths Have Become the Number One Cause of Accidental Drug Poisoning in Rural, Suburban, and Urban Michigan, Displacing Prescription Opioids; Fentanyl Deaths Are Underappreciated

****William R. Morrone, DO, MPH, MS, Office of the Medical Examiner, Forensic Toxicology, Bay County Health Department, Bay City, Michigan, United States of America*

P49 Unusual Presentation of Giant Cell Myocarditis: Cases of Sudden Cardiac Death

Altaf Hossain, MD, MPH, PhD, Forensic Medical of Kansas City, Kansas City, Kansas, United States of America

P50 Death due to Pulmonary Embolism and Pulmonary Hypertension in Klippel-Trenaunay Syndrome

Altaf Hossain, MD, MPH, PhD, Forensic Medical of Kansas City, Kansas City, Kansas, United States of America

P51 The Use of a Homemade Improvised Shotgun in a Suicide

Zoe-Anne Barcellos, BA, Office of the Chief Medical Examiner, Commonwealth of Virginia, Roanoke, Virginia, United States of America

P52 "VIAGRA"- the Killer! Fact or Fiction

Murari P Sarangi, Dr., MD, Cornwall Regional Hospital, Montegon Bay, St. James, Jamaica

P53 The Presence of Comorbid Neurodegenerative Disease in the Forensic Setting: The Rule Rather than the Exception?

**Christopher Alan Hauch, MD, UT Southwestern Medical Center - Southwestern Institute of Forensic Sciences, Dallas, Texas, United States of America*

P54 A Fatal Case of Occupational Hydrogen Sulfide Exposure and Sewage Aspiration: Sewage Happens

Christopher Alan Hauch, MD, UT Southwestern Medical Center - Southwestern Institute of Forensic Sciences, Dallas, Texas, United States of America

P55 Automating Organ and Tissue Reporting: The Michigan Medicine Experience

Jeffrey M. Jentzen, MD., PhD, University of Michigan, Ann Arbor, Michigan, United States of America

P56 Sudden, Unexpected Death after Remote Treatment with Doxorubicin and Radiation for Hodgkin Lymphoma

Denise Jacob, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America

P57 Overweight and Underreported: Listing Obesity on Death Certificates at the Miami-Dade County Medical Examiner Department

Jamie E. Kallan, MD, Miami-Dade County Medical Examiner Department, Miami, Florida, United States of America

P58 Homicides in Denver, 2008-2018

Meredith A. Frank, MD, Denver Office of the Medical Examiner, Denver, Colorado, United States of America

P59 Opioid Overdose Suicide to Accident Ratios: Comparison of Virginia to New York City Over More than 10 Years

Simmi Patel, BS, St. George's University School of Medicine, Voorhees, New Jersey, United States of America

P60 Diagnosis of Gastrointestinal Mucormycosis at Autopsy

Tracy Stein Halvorson, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America

P61 Paenibacillus Sepsis and Meningitis in a Premature Infant: A Case Report

Lakshmanan Sathyavagiswaran, MD, FRCPC, FACP, FACP, Los Angeles County, Los Angeles, California, United States of America

P62 The Autopsy as a Tool for Antibiotic Resistance Gene Surveillance

Carl J. Schmidt, MD, MPH, University of Michigan / Wayne County Medical Examiner, Detroit, Michigan, United States of America

P63 A Microbiology Mystery Seated in the Tricuspid Valve: An Autopsy Case Report

Emma Henrie, MD, University of Texas Medical Branch, Galveston, Texas, United States of America

P64 Sudden Death: Splenic Sequestration and Myocarditis in Sickle Cell Anemia

Joseph A. Mininni, MD, University of Maryland Medical Center, Baltimore, Maryland, United States of America

P65 Postmortem Serum Levels of Beta Tryptase and Total IgE in Non-Anaphylactic Deaths

Monisha Pradhan, MD, Maulana Azad Medical College, New Delhi, India

P66 By Their Own Hand: Examining Police Suicides in Cook County, Illinois

Stephanie M Powers, MD, Cook County Medical Examiner's Office, Chicago, Illinois, United States of America

P67 Molecular Diagnostics: A Chemical Pathology And Forensic Medicine Collaboration

Chantal Van Niekerk, Dr, PhD, National Health Laboratory Service (NHLS), Pretoria, Gauteng, South Africa

P68 In-Custody Deaths with Concomittant Drug and/or Alcohol Intoxication in New Mexico

Heather S Jarrell, MD, Office of the Medical Investigator, University of New Mexico, Albuquerque, New Mexico, United States of America

P69 Epidural Hematoma Following Cranioplasty: Forensic Issues and Legal Implications

Wan Zafirah Zamaliana Alias, MBBS, Sultanah Bahiyah Hospital, Alor Setar, Kedah, Malaysia

P70 ALCAPA: A Case Report of a Sudden Maternal Death from a Rare Cause

Mohd Suhani Mohd Noor, MBBS, MPath, Ministry of Health, Malaysia, Alor Setar, Kedah, Malaysia

P71 A Review of Neuropathologic Findings in Cases of Sudden Unexplained Death in Pediatrics

Nicole Harvilla, MD, University of Maryland Medical Center, Baltimore, Maryland, United States of America

P72 Venous Malformations of the Brain: Underappreciated Contributors to Cause of Death

Jelena Krcecinac Marks, MD, Office of Chief Medical Examiner, City of New York, New York, New York, United States of America

P73 Primary Endocardial Fibroelastosis: Natural Cardiac Disease Findings in an Infant Forensic Autopsy

Kristinza Woodard Giese, MD, Washington DC, Office of the Chief Medical Examiner, Washington, District of Columbia, United States of America

P74 The Added Value of Molecular-Based Diagnostics in the Forensic Medical Setting: A Case Report

Barbara Stroh van Deventer, MS, University of Pretoria, Pretoria, Gauteng, South Africa

P75 When Alice Drinks from the Wrong “Drink Me” Bottle: A Case Series of Nonfatal Drug Intoxication in Young Children

Giancarlo Di Vella, MD, PhD, Università degli Studi di Torino - Italy, Torino, Torino, Italy

P76 Differential Diagnosis Between Fatty Acid Beta-oxidation Disorders and Idiopathic Hemorrhage of the Cardiac Conduction System in an Infant Sudden Death

Giancarlo Di Vella, MD, PhD, Università degli Studi di Torino - Italy, Torino, Torino, Italy

P77 Methamphetamine in Fetal and Infant Deaths: Direct Toxicity or Confounding Factors?

Lisa M Barton, MD, PhD, Oklahoma Office of the Chief Medical Examiner, Oklahoma City, Oklahoma, United States of America

P78 Cardiac Pathology and Neuropathology Sampling and Photographs in SUDC

Laura Gould Crandall, MA, NYU School of Medicine, New York, New York, United States of America

P79 Estimation of the Time of Death from Temporal Changes of Dural Morphology and Biomechanical Parameters in Human Cadavers

Jiawen Wang, Guizhou Medical University, Guiyang, Guizhou, China

P80 Evaluation of a Rapid (Less Than 23 Minutes) Biochip Based System Applied to the Multidrug Screening from a Single Blood Sample

P. Sinha, Randox Toxicology Ltd., Crumlin, Northern Ireland, United Kingdom of Great Britain and Northern Ireland

P81 Elderly Opiate Related Fatalities During The Opioid Epidemic: A Retrospective Study

Maneesha Pandey, MBBS, Franklin County Coroner's Office, Columbus, Ohio, Columbus, Ohio, United States of America

P82 Asthma, Methamphetamine and a Coccinellidae (Ladybug) Allergy

Matrina J Schmidt, MD, William L. Jenkins Forensic Center, East Tennessee University, Johnson City, Tennessee, United States of America

P83 Is There Cross Reactivity of Fentanyl Analogs with a Fentanyl Urine Immunoassay Kit?

Lee Marie Tormos, MD, Palm Beach County Medical Examiner Office - District 15, West Palm Beach, Florida, United States of America

P84 False Positive 6-MAM Detection in Hospice Patient Treated with Morphine

Daniel E. Pitcher, BS, University of New Mexico School of Medicine, Albuquerque, New Mexico, United States of America

P85 Suicidal Sodium Nitrite Ingestion

Stephen M Wills, MBChB, Forensic Science SA, Adelaide, South Australia, Australia

P86 Complex (Multimodality) Suicides in New York City: 2008-2017

Mary Grace Centeno, MD, New York City Office of Chief Medical Examiner, New York, New York, United States of America and Katya Merkulova, MS4, New York City Office of Chief Medical Examiner, New York, New York, United States of America

P87 Sudden Death in a Teenager with Klippel-Feil Syndrome

Pamela Sophia Wong, MS, Eastern Virginia Medical School of Health Professions, Norfolk, Virginia, United States of America

P88 Accidental Death Associated with Urban Exploration in Detroit, Michigan

Milad Webb, MD, PhD, University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, United States of America

P89 Significant Increase in Suicide Deaths from 2009 to 2018: 10-year trends from Wayne County, Michigan

Milad Webb, MD, PhD, University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, United States of America

P90 Bloody Scenes: A Collaborative Approach to a Challenging Investigation

Milad Webb, MD, PhD, University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, United States of America

P91 Chasing Dragons and Fungi: Two Unusual Deaths Related to Opioid Abuse

Sara H Zydowicz, DO, District 9 Medical Examiner's Office, Orlando, Florida, United States of America

P92 When A Beer Belly Isn't From Beer: A Case of Massive Dedifferentiated Liposarcoma

Stephanie Diu, Kew Gardens Hills, New York, United States of America

P93 Raccoon Eyes Without the Typical Raccoon

Kathryn Pinneri, MD, Montgomery County Forensic Services, Conroe, Texas, United States of America

P94 DNA Variations Found in South African Cases of Sudden Unexplained Death: How relevant is postmortem genetic testing?

Tristan Alexander Wallace, MSc, University of Pretoria, Pretoria, Gauteng, South Africa

P95 Sudden Deaths due to Diabetic Ketoacidosis: a retrospective study of forensic autopsy cases in the State of Maryland

Jingjie Wu, PhD, Guizhou Police College, Guiyang, Guizhou, China

P96 WITHDRAWN

P97 Bilateral Congenital Ovarian Cysts with Intracystic Hemorrhage Causing Intrauterine Fetal Demise

Anthony J Emanuel, MD, Medical University of South Carolina, Charleston, South Carolina, United States of America

P98 Another Case of Probable Clozapine Toxicity

Ken Obenson, MD, Saint John Regional Hospital, Saint John, New Brunswick, Canada

P99 A Case of Probable Hypertrophic Cardiomyopathy Presenting as Sudden Death in Early Infancy

Ken Obenson, MD, Saint John Regional Hospital, Saint John, New Brunswick, Canada

P100 Reanalysis Of Genomic Data For Sudden-Death Cases Reveal New Diagnoses And Give Greater Context For Variant Of Unknown Pathogenicity

****Elias L Salfati, PhD, Scripps Research, La Jolla, California, United States of America*

Exhibit Schedule

Exhibit Installation

Friday, October 18 1:00PM – 5:00PM

**Companies requiring additional installation time should contact NAME Exhibits Management for assistance. Early move-in may be subject to additional fees.*

Exhibitor Registration

Friday, October 18 10:00AM – 5:00PM

Saturday, October 19 7:00AM – 5:00PM

Sunday, October 20 7:00AM – 5:00PM

Monday, October 21 7:00AM – 5:00PM

Overall Exhibit Hall Hours

Friday, October 18 5:30PM – 9:00PM

(Exhibits Open During Opening Reception and Welcome Dinner)

Saturday, October 19 8:00AM – 3:30PM

Exhibit Hall Open: OPTIONAL

6:45AM – 8:00AM

Breakfast will be served in the Exhibit Hall

Sunday, October 20 8:00AM – 3:00PM

Exhibit Hall Open: OPTIONAL

6:45AM – 8:00AM

Breakfast will be served in the Exhibit Hall

Monday, October 21 8:00AM – 4:00PM

Exhibit Hall Open: OPTIONAL

6:45AM – 8:00AM

Breakfast will be served in the Exhibit Hall

Published Visiting Hours

Friday, October 18 5:30PM – 9:00PM

Saturday, October 19 10:10AM – 10:40AM

3:00PM – 3:30PM

Sunday, October 20 2:30PM – 3:00PM

Monday, October 21 10:00AM – 10:15AM

3:30PM – 4:00PM

Exhibit Dismantling

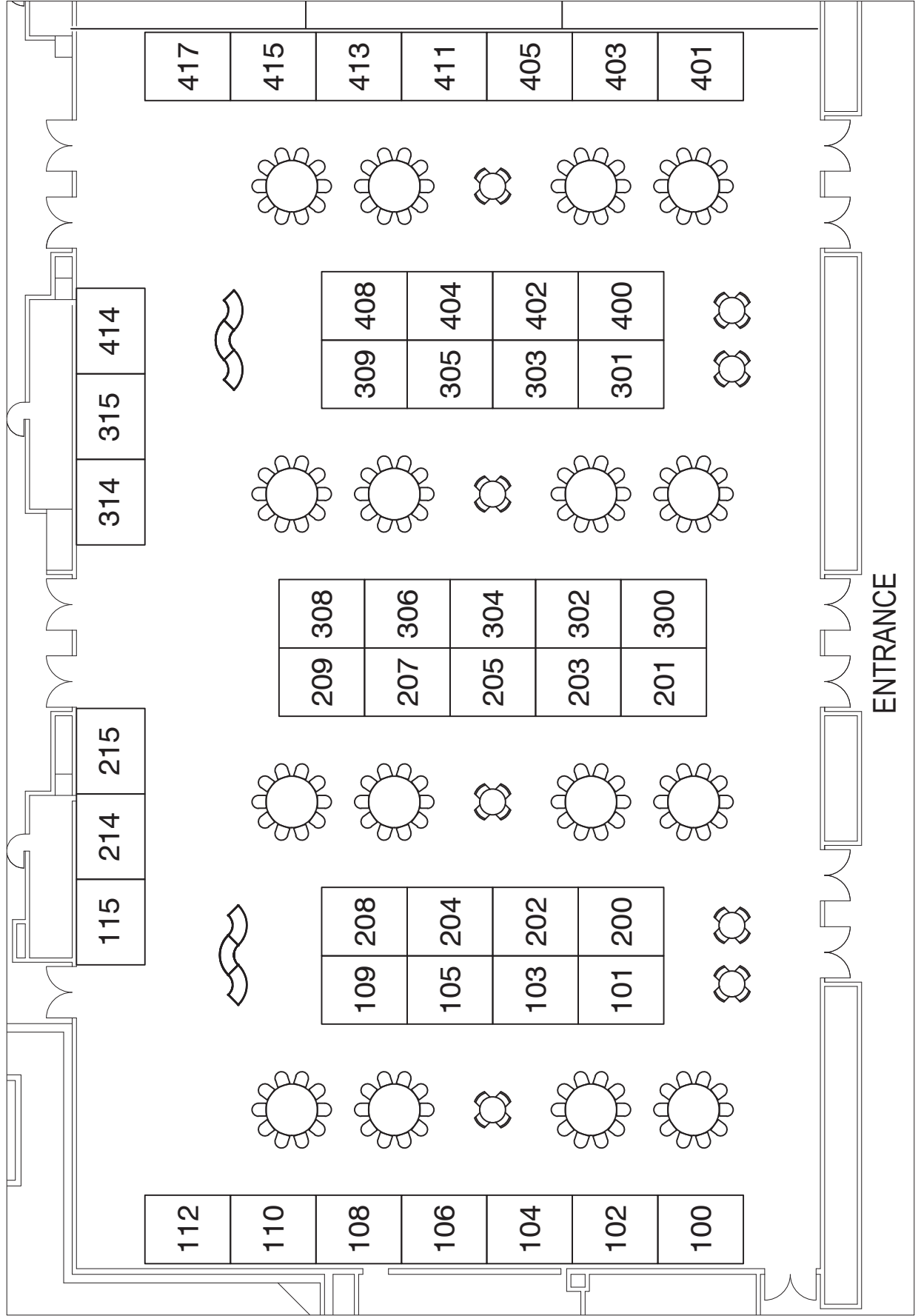
Monday, October 21 4:00PM – 9:00PM

**No packing or dismantling of exhibits will be permitted until 4:00PM, Monday, October 21. Early departure will result in the company or group being penalized a fee no less than \$500 and may result in being prohibited from participating in future NAME events.*

NAME 2019 Annual Meeting

October 18 - 22, 2019

Sheraton at Crown Center/San Francisco/New York/Atlanta Ballrooms/Kansas City, MO



EXHIBITOR DESCRIPTIONS

ADANI SYSTEMS, INC. (BOOTH #315)

ADANI Systems, a leading manufacturer of medical and checkpoint security X-ray imaging systems, introduces FOBOS. This system is fiscally prudent, reliable and a highly effective full body X-ray scanner for utilization in forensic pathology. FOBOS aims to bring essential cutting-edge technology to facilities most in need. For more information visit: <http://adanisystems.us/>

ADVANCED DETECTION SOLUTIONS, LLC (BOOTH # 102)

Comprehensive autopsy radiography solutions. 1) Virtual Autopsy / PMCT Services, that help: i) enhance traditional autopsies and ii) assist in case of shortage of forensic pathologists. Our Virtual Autopsy / PMCT services are modular and can be tailor-made to your own facility and/or shared regional needs. 2) FOBOS™ whole-body digital forensic scanner. AP / Lateral views. Bariatric and infant friendly. Low cost of ownership. For more information visit: www.detection-solutions.com

AMERICAN ASSOCIATION OF PATHOLOGISTS' ASSISTANTS (BOOTH # 306)

The American Association of Pathologists' Assistants is dedicated to furthering the PA profession by providing members with targeted CE, professional support, and advocacy. Over 1700 certified and exam eligible members have met the highest standards for education and training in surgical and autopsy pathology, ensuring your pathology laboratory is meeting the standards of accreditation, licensing, and expectations of medical staff. For more information visit: <https://www.pathassist.org>

ANDE CORPORATION (BOOTH # 413/415)

ANDE is the global leader in Rapid DNA. ANDE believes that moving DNA analysis from sophisticated laboratories to the police station, battlefield, borders, and disaster sites will dramatically transform public safety and strengthen national security. By reducing crime, exonerating the innocent, monitoring borders, and reuniting families by identifying remains, Rapid DNA represents a fundamental opportunity to protect the innocent. For more information visit: <https://www.andecom.com/>

ANSI NATIONAL ACCREDITATION BOARD (BOOTH # 103)

ANAB is an internationally recognized provider of accreditation services for a wide range services, including forensic testing services (Crime Laboratories) under ISO 17025 and inspection providers (typically Medical Examiners or police crime scene units) under ISO 17020. Focusing on forensic services for many years it is a natural evolution to the medicolegal death investigation field. For more information visit: <https://www.anab.org/>

ASSOCIATION OF ORGAN PROCUREMENT ORGANIZATIONS (BOOTH # 201)

The Association of Organ Procurement Organizations (AOPO) is a non-profit, national organization representing all federally-designated organ procurement organizations (OPOs). The association represents and serves OPOs through advocacy, support and the development of activities that will maximize the availability of organs and tissues and enhance the quality, effectiveness and integrity of the donation process. OPOs are federally-designated non-profit organizations that are responsible for coordinating organ and tissue donation across the United States, bridging the gap between the generous donation of organs and tissues and the thousands in need of these gifts. For more information visit: <http://www.aopo.org/>

AUTISM BRAINNET (BOOTH # 209)

Autism BrainNet is a collaborative network of University-based repositories for the acquisition and distribution of postmortem brain tissue to facilitate autism research. By providing this precious resource for research, Autism BrainNet aims to improve the understanding, diagnosis and treatment of autism and related neurodevelopmental disorders. Our mission, in partnership with the medical examiner community, is to communicate the need for donated brain and other tissue and develop a sensitive, transparent and effective strategy for acquiring and distributing the highest quality tissue for research worldwide. For more information visit: <https://www.autismbrainnet.org/>

AXIS FORENSIC TOXICOLOGY, INC. (BOOTH # 305)

Forensic Toxicology Testing Services
For more information visit: www.axisfortox.com

CANON MEDICAL SYSTEMS (BOOTH # 308)

About Canon Medical Systems USA, Inc. Canon Medical Systems USA, Inc., headquartered in Tustin, Calif., markets, sells, distributes and services radiology and cardiovascular systems, including CT, MR, ultrasound, X-ray and interventional X-ray equipment.

For more information visit: www.us.medical.canon

CENTERS FOR DISEASE CONTROL AND PREVENTION - NATIONAL CENTER FOR INJURY PREVENTION AND CONTROL (BOOTH # 208)

Medical Examiners are critical to the Center for Disease Control and Prevention's (CDC) mission to save lives and protect the public's health. The CDC booth will have representatives across the agency to discuss our work and to continue to develop and enhance our collaboration.

For more information visit: www.cdc.gov

COMMUNIO (BOOTH # 401)

New Zealand health management company with forensic and coronial post mortem services.

For more information visit: <https://communio.co.nz/>

CRC PRESS, TAYLOR AND FRANCIS GROUP (BOOTH # 403)

Taylor and Francis Group/CRC Press is a leading publisher of technical references and textbooks in forensic science, forensic pathology, physical evidence, and crime scene investigation. Review new and bestselling books and receive up to 25% off on conference specials. Talk to us about being a CRC Press Author!

For more information visit: www.crcpress.com

DODGE (BOOTH # 408)

Dodge carries a complete line of embalming chemicals, instruments, safety equipment, protective attire, disinfectants, cosmetics, urns, cremation supplies, InSight Books, Glass Remembrance & Capture Bead Keepsakes. Dodge also offers custom canvas portraits and no cost funeral home web sites. Please register for our web store.

For more information visit: www.dodgeco.com

ELITE ALUMINUM CORPORATION/FORTS USA (BOOTH # 101)

Elite Aluminum Corporation has been a premier design, engineering, and production manufacturer of aluminum panels, and aluminum extrusions for over 35 years. We have provided aluminum products for both commercial and government use, for a variety of permanent and temporary building projects. We also manufacture an exclusive line of portable fold-out rigid wall shelters, known as FORTS. Our 260K SF design, engineering and production facility, in Coconut Creek, FL is currently expanding to 410K SF to meet the demand for our FORTS' solutions.

Our FORTS division is providing energy efficient, rapidly deployable, and easily transportable, rigid walled shelter solutions, across the globe. All of our Forts Shelters are fully integrated with HVAC, plumbing, electric, lighting, windows, doors, and security, to meet your mission requirements. Our customers include: USAF, USA, USN, NGB, ANG, AFRC, DHS, State Dept., State and Local Fire, EMS, Police, Medical Examiners, Hospitals, and private sector.

For more information visit: www.fortsusa.com

FORENSIC ADVANTAGE (BOOTH # 200)

Providing LIMS / Case Management automated workflow solutions, for Medical Examiners, Crime Labs and associated public safety work flow solutions.

For more information visit: <https://www.thincit.com/>

INVITAE (BOOTH # 202)

Invitae's mission is to bring comprehensive genetic information into mainstream medical practice to improve the quality of healthcare for billions of people. Our goal is to aggregate most of the world's genetic tests into a single service with higher quality, faster turnaround time and lower prices.

For more information visit: <https://www.invitae.com/en/>

KUBTEC SCIENTIFIC (BOOTH # 314)

KUBTEC is your premier provider of digital X-ray imaging systems for Medical Examiner, Forensic and Pathology applications. Our XPERT® range of Cabinet X-ray Systems create the highest resolution images of pathological specimens of all sizes. For the field or morgue, the KUBTEC XTEND® Portable X-ray systems are rugged, compact, easy to carry and simple to use. The KUBTEC Parameter® 3D is the only Cabinet X-ray system to use Tomosynthesis to give you three dimensional images of pathology specimens. All KUBTEC products are made in the USA.

For more information visit: <https://www.kubtecscientific.com/>

LIFESIGN (BOOTH # 205)

LifeSign is a medical diagnostics company delivering rapid point of care testing products to caregivers in critical care, physicians' offices, criminal justice and more. Lifesign's line of products is used worldwide for the detection of Infectious Disease, Women's Health, Drugs of Abuse and Cardiac Markers. Our products are developed and manufactured in the USA under ISO, FDA, CGMP and CE Guidelines.

For more information visit: www.lifesignmed.com

LODOX SYSTEMS (BOOTH # 301/303)

Introducing eXero-dr- rapidly evident.

The first and only, full-body, high-speed digital radiology solution premeditated for forensic pathology. Lodox provides a time-saving, low-dose investigation of the entire body in less than 5 minutes. An imaging solution used around the world in multiple applications such as major Trauma, Mass Casualty, Pediatric, Bariatric, Bone Scans, and Forensic Medico-Legal Investigations.

For more information visit www.exero.lodox.com

MOPEC (BOOTH # 405/411)

Mopec provides American-made equipment and laboratory products to the autopsy, mortuary, pathology and histology industries. Mopec solutions are among the very best as demonstrated by the vast number of installations in America's top healthcare institutions and facilities. Our reputation is built on decades of superior customer service specializing in consultation and customization. Mopec is committed to designing and manufacturing ergonomic work stations to enhance your facility's safety, flexibility and productivity. Our technical process stems from true innovative design and high-touch service.

For more information visit: <https://www.mopec.com/>

MORTECH MANUFACTURING, INC. (BOOTH # 115)

Mortech Manufacturing has been providing quality postmortem equipment and instruments since 1985, serving the pathology, autopsy, necropsy, veterinary, morgue and mortuary industries. We are an ISO 9001:2015 certified company with NSF certification. We adhere to all Leed Green, UL, and CE standards. We are proud to be a part of the MADE IN THE USA tradition.

For more information visit: <https://mortechmfg.com/>

MWL ARCHITECTS (BOOTH # 300)

McClaren, Wilson & Lawrie, Inc. is a leader in architecture specializing in the forensic sciences and law enforcement. MWL offers master plans, needs assessments, site feasibility studies, budget development, design services and construction administration. With offices nationwide, MWL has completed over 300 public safety and 140 forensic facilities in 46 states.

For more information visit: www.mwlarchitects.com

THE NAME FOUNDATION (BOOTHS 104/106/108/110/112)

The NAME Foundation, a not-for-profit 501c3 corporation, has been created to foster the intellectual development and leadership of young forensic pathologists, advance the forensic sciences through financial support of research and to fund humanitarian projects which will bring our expertise as medical examiners and public health physicians to underserved communities. The NAME Foundation accepts donations from individual and corporate donors and to receive funds from grants in order to promote excellence in forensic science. The Foundation will focus on sustaining recruitment into the field, promoting education and leadership, and funding research in forensic pathology and death investigation. The Foundation will also support efforts designed to preserve the history and follow the progress of the forensic sciences and NAME. For more information visit: <https://namefoundation.wildapricot.org/>

NEUROLOGICA (BOOTH # 105/109)

NeuroLogica, a healthcare subsidiary of Samsung Electronics Co. Ltd., develops, manufactures, and markets advanced healthcare solutions. NeuroLogica, the global corporate headquarters and manufacturer of Samsung computed tomography, is also the USA headquarters for sales, marketing and distribution of all Samsung digital radiography and ultrasound systems. NeuroLogica's growing portfolio of advanced medical technologies are used worldwide in leading healthcare institutions helping providers enhance patient care, improve patient satisfaction, and increase workflow efficiency. For more information, please visit www.NeuroLogica.com.

For more information visit: www.neurologica.com

NIHILENT (BOOTH # 309)

Nihilent is a global consulting and services company. Our mission, 'Change for Performance' epitomized our commitment to enable customers to achieve new heights of business performance.

For more information visit: www.nihilent.com

NMS LABS (BOOTH # 100)

NMS Labs is an international forensic and clinical reference laboratory that is unsurpassed in its scope of toxicology tests, accuracy of results, scientific expertise, and innovation. The state-of-the-art headquarters includes clinical, forensic and research facilities, a dedicated and secure crime laboratory, and is staffed by more than 350 highly trained professionals. NMS Labs is passionate about promoting public health and safety.

For more information visit: www.nmslabs.com

QUINCY TECHNOLOGY SOLUTIONS, INC. (BOOTH # 414)

QuincyTech provides Case Management software for Medical Examiner and Coroner offices. Our software is Commercial Off-The-Shelf (COTS) that is configurable. QuincyTech can host (our cloud), or we can provide an enterprise installation (your server). For 25 plus years, we have been serving ME's from large States to small County Coroners. Contact us to discuss the latest in medico-legal office automation.

For more information visit: www.quincytech.com

RANDOX TOXICOLOGY (BOOTH # 204)

With the world's largest toxicology test menu detecting over 500 drugs and drug metabolites, you can trust Randox Toxicology to deliver a solution for whatever your laboratory testing requires. We're continually first to market with New Psychoactive Substances (NPS) drug tests including Synthetics Cannabinoids, Bath Salts, Kratom, and DOx Series.

For more information visit: www.randoxtoxicology.com

SCIMEDICO, LLC (BOOTH # 214)

Scimedico is a full service laboratory services and solutions firm, providing Planning and Design, Equipment and Installation, and Service and Preventive Maintenance solutions in the Healthcare, Education, and Government Sectors. Scimedico, LLC's preventive maintenance solutions set and related lab maintenance and support offerings are now offered on a national basis within the United States.

For more information visit: <https://www.scimedico.com/aapa>

SPIRE INTEGRATED SOLUTIONS/CSI JEWETT (BOOTH # 304)

CSI/Jewett is a leading manufacturer of standard and customized equipment for hospitals, laboratories, medical and veterinary schools, morgues and mortuaries. CSI/Jewett's metal forming expertise combines with state-of-the-art manufacturing equipment and fine hand-craftsmanship to produce stainless steel equipment to the exacting quality standards, structural integrity and cleanliness required to wear the Jewett name.

For more information visit: <http://csi-jewett.com/>

STONEWALL SOLUTIONS, INC. (BOOTH # 402)

Stonewall Solutions provides strategic software, technology and consulting solutions for organizations throughout the United States. Maintaining a keen focus on quality, our solutions are designed to adapt and provide years of benefit to our clients. Stonewall has core competencies within state & municipal government, criminal justice, victims services and higher education verticals. Expertise in SharePoint and web based technologies allows us to deliver a broad range of advanced solutions ranging from collaborative web portals and case management to financial management systems and mobile app solutions on iOS, Android and Blackberry platforms.

For more information visit: www.stonewallsolutions.com

THE SUDC FOUNDATION (BOOTH # 203)

The SUDC Foundation is the only organization worldwide whose purpose is to promote awareness, advocate for research, and support those investigating, or affected by, sudden unexpected or unexplained deaths in childhood. Sudden Unexplained Deaths in Childhood (SUCD) is the fifth leading category of death in children ages one to four, yet SUDC receives no public funding. The SUDC Foundation provides all services at no cost to families and professionals it serves.

For more information visit: <https://sudc.org>

TISSUE TECHNIQUES PATHOLOGY LABS LLC (BOOTH # 215)

Histology slides (H&E, special stains & immuno's) top quality, fast service at reasonable prices.

For more information visit: <http://tissuetechpathology.com/>

U.S. CONSUMER PRODUCT SAFETY COMMISSION (BOOTH # 207)

The U.S. Consumer Product Safety Commission protects the public from unreasonable risks of injury or death associated with the use of thousands of types of consumer products within the agency's jurisdiction. CPSC conducts epidemiological studies to estimate consumer product-related deaths and analyzes factors contributing to deaths through in-depth investigation of incidents. Results are used by CPSC to set priorities, support ban or recall of hazardous products, support development or evaluation of product standards and to educate the public. Medical examiners throughout the U.S. have a critical role to play in keeping the public safe and in contributing to CPSC's success.

For more information visit: www.cpsc.gov

VERTIQ SOFTWARE LLC (BOOTH # 302)

CME has been redeveloped many times in order to offer our clients the benefit of the latest state of the art technology. We constantly strive to improve our software, based on the needs and feedback of our customers. Through this method we have been able to broaden the scope of our software. With a customer base spanning North America, and over 35 years of experience, this has further enabled us to remain domain experts in this field. VertiQ's newest application, CME-V3, our 100% Mobile Internet version is by far our premier application. CME-V3 offers a flexible system of integrated modules that can be utilized by both large and small agencies. Much of its configuration can be performed directly within the application by a user with System Administrator permissions. It is installable on either an in-house or cloud server.

For more information visit: www.vertiq.com

GEORGE E. GANTNER, JR., M.D. ANNUAL LECTURER AWARD



THE NATIONAL ASSOCIATION OF MEDICAL EXAMINERS®

This lectureship acknowledges and pays tribute to the contributions made by George E. Gantner, Jr., M.D. to the National Association of Medical Examiners. In 1977, when 11-year old NAME needed to relocate from its second home in Wilmington, Delaware, Dr. George E. Gantner, Jr. was Director of the Division of Forensic and Environmental Pathology at St. Louis University School of Medicine and had just been elected as Secretary/Treasurer of the organization. Dr. Gantner generously offered to oversee NAME activities in St. Louis, Missouri and NAME moved there in 1977 and remained there until 2003.

Dr. Gantner served as NAME's Secretary/Treasurer until his death November 15, 1988, having served as the daily overseer of NAME for more than a decade. He availed himself to NAME and its needs and contributed greatly to this organization. It is in his memory and honor that the George E. Gantner, Jr., M.D. Annual Lecturer Award was established in 1994. Those selected by the Awards Committee to give the lecture and receive the award have made outstanding contributions to the advancement of forensic science and have attained professional recognition and respect as an orator in a professional field.

This year's Gantner Lecturer and Award Recipient, MGF Gilliland, M.D., is an excellent addition to the distinguished group of lecturers.

MGF GILLILAND, M.D.



Dr MGF Gilliland served as a professor at the Brody School of Medicine at East Carolina University from 1989 to 2019. Forensic pathologists at BSOM at ECU provided medical examiner and forensic pathology services to the Office of the Chief Medical Examiner of the State of North Carolina for the region of the coastal plain. BSOM also provided education to medical students at BSOM, residents of the regional hospital now Vidant Medical Center in Greenville, North Carolina, to ECU, and to anyone who asked. She participated in the development of the Eastern Regional Medical Examiner's Office serving 23 coastal counties and centered in Greenville at The Brody School of Medicine at East Carolina University. Dr Gilliland received her degree as Doctor of Medicine from Loyola University of Chicago. She served a four-year pathology residency at Case Western Reserve University in Cleveland. Dr Gilliland completed two one-year forensic fellowships -- at the Cuyahoga County Coroner's Office in Cleveland under Lester Adelson MD and at the Office of the Chief Medical Examiner in Richmond, VA under David Wiecking MD and Marcella F Fierro MD. Dr Gilliland joined the Southwestern Institute of Forensic Sciences (Dallas County Medical Examiner's Office) and worked as an Assistant Professor of Pathology at the University of Texas Southwestern Medical School at Dallas for eight years before coming to East Carolina University School of Medicine as an Associate Professor. She received tenure at the University and rose to the rank of Professor. She has been granted Emerita status by the University. Commendations, letters of thanks, and proclamations celebrated the growth and development of the Eastern Regional Medical Examiners Office and were directed to Dr Gilliland but were actually the combined contributions of many people over many years starting with L. Stanley Harris MD, adding R Page Hudson MD, briefly Marcella F Fierro MD, and many more. Those providing the commendations also provided the collaborations that made it possible. It is a constellation with many stars.

NOTES

OPTIONAL MEETINGS/ACTIVITIES

OPTIONAL SATURDAY 40TH ANNIVERSARY PARTY

[NOT CME]

Date: Saturday, October 19, 2019

Location: Chicago, Ballroom Level, Sheraton Kansas City at Crowne Center, 2345 McGee Street, Kansas City, MO

Time: 7:30 PM to 10:00 PM

Event Description: Denise (Dee) McNally began work for NAME as an Administrative Assistant in 1979 and rose to Executive Director in 1991. In addition to her work with NAME she has also served as a Medicolegal Death Investigator in various counties in Missouri. She is the proud mother and grandmother of two daughters, Sarah and Nicole, and her granddaughter Kylee. Dee loves the outdoors and when she isn't working for NAME you can find her taking care of her dog, two cats and pet pig.

At the Annual Meeting this year we will celebrate Dee's 40th anniversary with NAME on the evening of Saturday, October 19th. We will be hosting a party in her honor that will include light hors d'oeuvres, the Second House Band performing 80s music with our very own Donna Hensley as the front woman, a cash bar (with one free drink ticket for each of you) as well as photos of Dee's many years with NAME. Please come out and help us celebrate her!

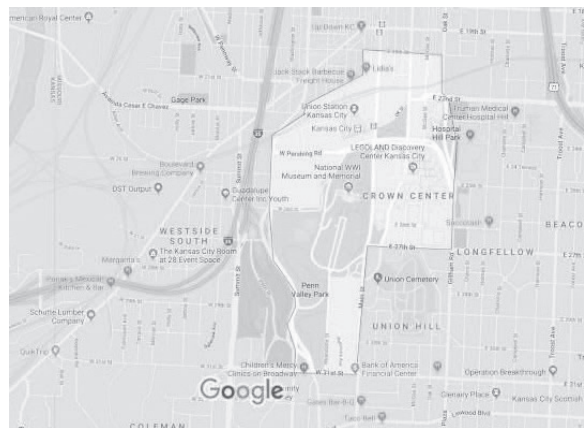
OPTIONAL SUNDAY 22ND RIGOR RUN/WALK

[NOT CME]

Date: Sunday, October 20, 2019

Time: 6:00 AM – 8:00 AM

Cost: \$25.00 per person



Event description: The NAME Rigor Run/Walk will be approximately 3 miles. The route will start and end at the meeting hotel. Registrants for the Rigor Run/Walk will receive a terrific t-shirt. Runners and walkers can go to the Sunday morning breakfast after returning to the hotel. Note: T-shirts will be available on a first come first serve basis. There will be shirts in sizes S, M, L and XL.

OPTIONAL SUNDAY 25TH ANNUAL CADAVER OPEN GOLF TOURNAMENT

[NOT CME]

Date: Sunday, October 20, 2019

Time: 1:00 PM

Cost: \$40.00 per player



The 2019 Cadaver Open will be held at the Swope Memorial Golf Course (<http://www.swopememorialgolfcourse.com/>). This course is about a 20 min drive from the meeting hotel. The cost is \$40 per golfer. Twenty sets of rental clubs are available at \$20/set. You must call the course to reserve the clubs. Team pairings will be announced a few weeks prior to the meeting. If you have a preference for who you would like on your team, please let me know as soon as you sign up. If you will have a car at the meeting, please contact David Winston at dcwinston@gmail.com to let him know how many passengers and golf bags you can transport.

Please bring \$10 cash for prize money to be divided up as prize money for closest to the pin winners and to the winning team.

OPTIONAL SUNDAY NAME FOUNDATION OUTREACH FUNDRAISER "The 9-11 Attack on American Airlines Flight 77 and the Pentagon" CME: 2.0

Date: Sunday, October 20, 2019

Location: Chicago, Ballroom Level, Sheraton Kansas City at Crowne Center, 2345 McGee Street, Kansas City, MO Time: 8:00 PM to 10:00 PM

Cost: Donation

Event description: Please join us Sunday, Saturday, October 20th from 8 to 10 PM at the Sheraton Kansas City Hotel at Crown Center, Kansas City, Missouri. On behalf of the NAME Foundation Board of Trustees, I would like to announce the fourth annual Sunday evening NAME Foundation fundraising event, to be presented in conjunction with the NAME Annual Meeting in Kansas City, MO this coming October.

This year's event will be a look back at 9-11 and will NOT be open to the public (see below). The presenter will be our very own Dr. Andrew Baker with his presentation entitled The 9-11 Attack on American Airlines Flight 77 and the Pentagon. Prior to joining the Hennepin County (Minneapolis) Medical

Examiner's Office in 2002, Dr. Baker was a forensic pathologist at the Office of the Armed Forces Medical Examiner in Washington DC, living and working in the Washington DC area. Following the 9-11 attacks, Dr. Baker was one of the core forensic pathologists and scientists responsible for the identification and autopsy of the victims and perpetrators of the attack on AA77 and the Pentagon. This very personal presentation will open with an overview of how the attack unfolded; take an in-depth view of the mass disaster morgue operation and identification process as they existed in 2001; and close with topics ranging from the results of the Pentagon operation to lessons learned to the long-term effects such an experience has produced.

The event will serve as an outreach fundraiser for the NAME FOUNDATION to help raise scholarship money for Forensic Pathology Fellows, Pathology Residents, and students to attend and make scientific presentations at the NAME Annual Meeting. As such, attendance at this event will be associated with a small donation and requires pre-registration. On-site registration is not guaranteed but if offered will be managed by THE CENTER FOR FORENSIC SCIENCES RESEARCH AND EDUCATION at The Fredric Rieders Family Foundation. Pre-registration will be only via the NAME Foundation Website: <https://namefoundation.wildapricot.org/event-3430353/Registration>. Ticket donations are \$10 for students, and \$20 for everyone else. NAME members may wish to opt for a special package deal: with a \$50 donation, NAME members will receive a 1-year NAME Foundation Membership and admission to the event.

Note: As indicated above, only persons who have registered for the 2019 NAME Annual Meeting will be allowed to attend this presentation. ALL attendees will be required to wear their meeting name badge and anyone without a badge will not be allowed to enter the presentation room. Absolutely NO photography, videography or audio recordings will be permitted as required by the United States Department of Defense. Anyone in violation will be immediately escorted out of the building and their recording device will be confiscated.

Any person purchasing a ticket for this event who does not register for the 2019 NAME Annual Meeting will not receive a refund of their donation.

OPTIONAL LEARN TO LEAD IN FORENSIC PATHOLOGY FROM CHIEF MEDICAL EXAMINERS – BREAKFAST WORKSHOP

Date: Monday, October 21, 2019

Time: 7:00 AM – 8:00 AM

Our greatest forensic leadership resources are our current and past leaders. Develop a deeper understanding of how our Chief Medical Examiners approach challenges and inspire others by attending this moderated interactive question and answer breakfast workshop. Previously titled the Chief's Breakfast, this session will highlight the experiences

of three successful Chief Medical Examiners. Topics that will be explored include administration, personnel issues, program innovations, budget management, leadership training, problem solving, and effective leadership styles. Former and current forensic pathology leaders are also invited to attend to share their experiences and interact with attendees who are interested in becoming future leaders.

According to Daniel Goleman's Leadership That Gets Results, a 2000 Harvard Business Review study, there are six leadership styles that effective leaders use. The Authoritative leadership style mobilizes people toward a vision and is considered to have the most positive impact on the organization. The Coercive leadership style demands immediate compliance and has the most negative impact on the organization.

Preregistration is required, but there is no separate fee for this breakfast. Breakfast will be available outside of the meeting room.

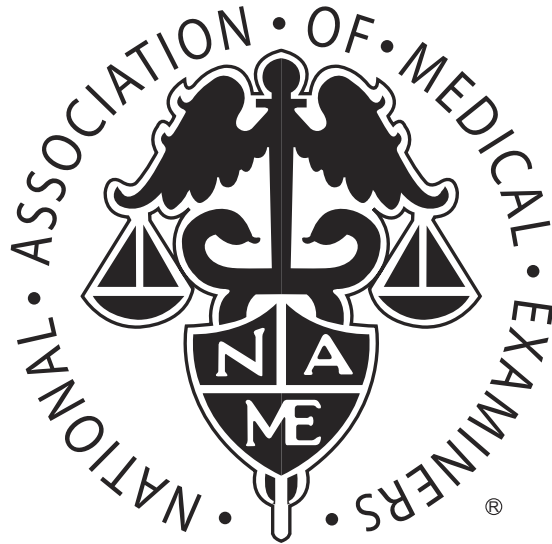
OPTIONAL FEMME FATALE LUNCHEON [NOT CME]

Date: Monday, October 21, 2019

Time: 12:00 PM – 1:30 PM

Cost: \$65.00 per person

Femme Fatales (Ladies) - Plan to join your forensic colleagues for lunch and get acquainted. This is a luncheon for all forensic femme fatales! Register early as space is limited!



National Association of Medical Examiners

Abstracts of the 2019 Annual Meeting

October 18 – 22, 2019

**Sheraton Kansas City Hotel at Crown Center
Kansas City, Missouri**

NOTES

National Association of Medical Examiners

Abstracts of the 2019 Annual Meeting

October 18-22 2019

Sheraton Kansas City Hotel at Crown Center, Kansas City, Missouri

ORAL PRESENTATIONS

1.1 Beyond the Autopsy: Postmortem Familial Variant Testing

K. Pinneri, S.N. Doyle

Montgomery County Forensic Services, Conroe, Texas, USA

Once only offered by research institutions, postmortem genetic testing has become more affordable and more widely available through commercial entities. The ability to diagnose genetic mutations in postmortem samples allows forensic pathologists to provide additional important information to surviving family members which may prevent another sudden death. Familial variant, or targeted testing is available to first degree relatives for free or at a reduced cost by most companies. Several cases submitted for testing, the results, and the familial variant testing results will be discussed, one of which is described here.

A 34 year old overweight black male was in town visiting family members when he became unresponsive after gasping for air. Resuscitative measures were unsuccessful and he was pronounced dead at the scene. His spouse reports a diagnosis of an unspecified cardiomyopathy a couple of weeks prior for which he was prescribed a beta blocker. The autopsy was notable for a 600 gm football-shaped heart with asymmetric left ventricular and septal hypertrophy, measuring up to 2.5 cm in thickness. Microscopic sections of the heart revealed myocyte disarray, hypertrophy, and fibrosis. With the consent of the family, blood in a purple top tube (the preferred sample) was sent for genetic testing for common cardiomyopathy mutations. A pathogenic variant in MYBPC3, known to be associated with hypertrophic cardiomyopathy, was identified. The results were discussed with the family and first degree relatives (mother, father, brothers and 2 children) were offered the familial variant testing for the MYBPC3 gene, all of whom agreed to the testing which is free and performed on saliva. Of those, a child and his father tested positive for the mutation. Upon speaking with the father, a more detailed family history was obtained, revealing sudden cardiac deaths of two of his brothers (our decedent's uncles) at young ages, only one of which had an autopsy performed. Each of the father's brothers had 2 children and he also had a living sister. Our office was able to locate the living relatives and offer the familial variant testing, one of which tested positive for the mutation. The family members who tested positive are under the care of cardiologists and receiving treatment and genetic counseling. Being able to provide this important information to these family members allows them to seek treatment and hopefully prevent further sudden deaths.

1.2 An Assessment of Cardiomegaly and Opioid-Related Death

R. Seeber¹, G. McGwin², B. McCleskey¹

¹UAB School of Medicine, Birmingham, Alabama, USA; ²UAB School of Medicine UAB School of Public Health, Birmingham, Alabama, USA

Deaths related to opioid use have been rising for well over a decade and perhaps have just recently begun to slow, establishing a "new normal." The central nervous system depressant effects of opioids are most often the proposed mechanism of death in opioid toxicity cases; however, some decedents do not present with the classic circumstances of a prolonged respiratory depressant death (i.e. loud snoring) and instead appear to be related to a sudden cardiac event (i.e. sudden collapse). Cardiac pathology

has been described in opioid toxicity deaths, and our goal was to assess the significance of cardiomegaly among opioid related deaths as compared to non-opioid deaths. The database of the Jefferson County Coroner/Medical Examiner's Office was searched for deaths due to opioid toxicity during 2016 – 2018; a comparison group was selected during this timeframe as well. Individuals with drugs detected at death were excluded, as were individuals whose death was caused by chronic substance use, regardless of whether drugs were detected at the time of death. Also excluded were individuals less than 20 years of age and with a body mass index (BMI) of less than 10 kg/m². Demographic information, heart weight, BMI, body length, and body weight were collected for each individual. T-tests were used to compare characteristics between the opioid (n=537) and non-opioid deaths (n=662). There was no significant difference between the BMI, body length, and body weight among the two groups. The comparison group was significantly older ($\mu = 46$ vs 39 years of age; $p < 0.0001$). Overall, the comparison group had hearts that weighed more than the opioid group though the difference was not significant ($\mu = 422$ vs 413 grams; $p > 0.18$). After adjusting for age, body weight, BMI, and body length, the difference between mean heart weight of the two groups was less than 1 gram ($p > 0.92$). The opioid group was significantly younger than the comparison group; therefore, cardiomegaly does appear to be accelerated among opioid users. Individuals dying of opioid toxicity within the 3rd decade of life had larger hearts, approximately 20 grams difference, than the comparison group ($p > 0.08$). Although evidence of opioid-mediated cardioprotection, similar to ischemic preconditioning, has been described, this protective effect is overcome with increased concentrations of opioids. Additionally, even though cardiac vulnerability may be present in opioid users, it does not appear to be significantly different than individuals dying of other causes, and both groups overall have enlarged hearts.

1.3 Placental Refractile Material Identified in Three Cases of Intrauterine Demise Due to Known, Reported, and Suspected Misoprostol Use

D.C. Butler, A. Phillips, S.E. Presnell

Medical University of South Carolina, Charleston, South Carolina, USA

Introduction:

Misoprostol is a prostaglandin analog commonly used to induce labor for medical abortions. While this drug is generally administered by a medical doctor, in some cases the drug may be procured without medical supervision in order to surreptitiously abort unwanted pregnancies. The latter is of particular importance in the forensic setting of perinatal fetal demise where clinical history and gross findings are often sparse. There is some evidence suggesting tablet preparations of misoprostol when inserted intravaginally may leave refractile deposits within the placental membranes, which could, in the appropriate context, support misoprostol use as a facilitator of premature labor.

In the following series, three cases of stillbirth with suspected, reported, and known misoprostol use are presented in which significant findings include refractile material seen on histologic examination of the placenta.

Case 1:

The first case is a third trimester fetus delivered precipitously at home without signs of life and no report of self-induction. Microscopic examination of the placenta showed refractile polarizable material associated with and focally embedded within the membranes, predominantly on the maternal

surface.

Case 2:

The second case is a male fetus delivered stillborn at an estimated 22 weeks gestation following maternal report of intravaginal use of misoprostol purchased online. Placental examination revealed a small placental disc; placental histology documented refractile and polarizable amorphous material and fibers consistent with cotton throughout the maternal surfaces of the placenta.

Case 3:

The third case involves a 28-year-old female presenting with intrauterine fetal demise for induction of labor with 800 mcg of misoprostol administered under medical supervision. The placental examination was performed in the surgical pathology lab where a small placental disc with extensive intraparenchymal infarcts was noted. Histology documented abundant polarizable material deposited throughout the maternal surfaces.

Conclusion:

In the cases presented, refractile and polarizable material was identified in cases of suspected, reported, and known misoprostol use. These cases highlight a suggestive histologic finding which may prove useful when investigating fetal deliveries meeting the criteria for forensic autopsy. A larger retrospective study comparing the histopathologic placental features in cases of no misoprostol use, low-dose, and high-dose misoprostol administration is currently underway to verify the sensitivity and specificity of these findings.

1.4 Forensic Aspects, Challenges, and Legal Consequences of the Münchausen By Proxy Syndrome

I. Lesnikova¹, L. Frost², M. Gilliland³, J. Banner⁴, A. Vesterby²
¹Department of Pathology Rush University Medical Center, Chicago, Illinois, USA; ²University of Aarhus; Denmark, Aarhus, Denmark; ³Brody School of Medicine, University of East Carolina, Greenville, North Carolina, USA; ⁴Department of Forensic Medicine, Faculty of Health Sciences, University of Copenhagen, Copenhagen, Denmark

Münchausen syndrome by proxy (MsBP) is a rare, underdiagnosed and poorly understood form of child abuse (other terms: factitious disorder imposed on other, medical child abuse). Child caregivers, often females, either induce or fabricate disease in a child, resulting in considerable medical attention, unnecessary treatment with risk of morbidity and mortality. Münchausen syndrome by proxy is primarily distinguished from other forms of abuse or neglect by the very different motives of the perpetrator, which are to draw attention, sympathy and reassurance to the perpetrator. The symptoms and signs used to induce the medical attention are extremely variable. The mortality is reported to be 8-12% and probably is higher. As the incidence of MsBP is unknown and almost every case is unique, we believe that our presentation of a series of cases will improve forensic recognition of MsBP.

We present eight cases of MsBP and suspected MsBP. In all these cases the perpetrator/suspected perpetrator was a female caregiver. The number of children in the families ranged from one to four. The clinical presentation included repeated perforation of tympanic membrane and otitis; "ingestion" of needles; repeated dyspnea in children associated with suspected exposure to gasoline, turpentine and "deodorant" with finding of pulmonary opacities and recurrent sepsis with culturing of intestinal microorganisms in blood; anemia after drawing blood from central venous catheter; and seizures, repeated cardiac arrest events, and death. To our knowledge, in four cases the perpetrators were declared guilty or were convicted after legal trial.

Postmortem diagnosis of MsBP is very difficult and probably impossible without investigational evidence and medical records. Even if suspected, the diagnosis of MsBP is difficult to prove. Symptoms and features often mimic other conditions and the evidence of abuse is often sparse and unreliable. Lack of clear investigational evidence makes social authorities and law enforcement reluctant to handle of this type of cases. Intra-professional cooperation is necessary to handle cases of such complexity as cases suspicious for MsBP. Forensic pathologists contribute knowledge of injury, experience of handling investigational evidence and experience of working with legal cases including high-profile type cases and cases with significant media attention. This cooperation benefits the forensic community by identifying this unusual form of child abuse and by building an interdisciplinary network improving handling of difficult and controversial MsBP cases.

1.5 MOVED TO P100

1.6 Head And Brain Postmortem Computed Tomography (PMCT)-Autopsy Correlation In Hospital Deaths.

S. Serinelli, T.E. Richardson, S. Destian, K. Mirchia, M. Williams, M. Medina Perez, L. Gitto
SUNY Upstate Medical University, Syracuse, New York, USA

The frequency of postmortem computed tomography (PMCT) imaging as support to autopsy has increased in the past decade. The purpose of this study was to compare the head and brain findings from PMCT with the autopsy results, to determine the diagnostic reliability of PMCT in deaths of hospitalized patients.

We examined postmortem CT images and autopsy data from 31 subjects who died at SUNY Upstate University Hospital between 2013-2018. Each subject underwent a full-body noncontrast PMCT and then a traditional autopsy. A neuroradiologist analyzed PMCT images for head and brain abnormalities. The autopsies were performed by pathologists who were aware of the radiology results. A data extraction sheet was developed to record age, sex, race, cause of death, PMCT and autopsy findings. Gross and histology findings from the autopsy were compared to the results from the PMCT.

The mean age of our population was 63 years (range: 5-85 years). Thirteen subjects were females and 18 males. Noncontrast PMCT was able to detect specific intracranial findings that were subsequently observed at the autopsy, such as brain atrophy, atherosclerosis, intracranial hemorrhages, edema, shifts, and herniations. On the other hand, small intracranial hemorrhages/tumors and skin findings could be established only at autopsy. Although not all of the pathologic findings were detected on imaging, the most important pathologies that can cause severe disability or death (such as hemorrhages, shifts, herniations), were correctly identified. In a few cases, the findings of the PMCT were essential to help to perform a more focused brain autopsy: for example, in case of subdural/epidural hemorrhage, the calvarium was removed more carefully, in order not to alter the position and volume of the hemorrhage. Also, in case of localized edema detected at the PMCT, a more focused histology sampling was performed.

In conclusion, although not all the pathologic findings were detected on the radiological images, the most important ones that can cause disability or death were correctly identified. Moreover, the PMCT findings helped to perform a more focused gross and histology brain autopsy.

1.7 Update from Office of Justice Programs and Department of Health and Human Services Federal Interagency Working Group on Medicolegal Death Investigation

M. Warner¹, J.G. McGrath², C.M. Jones³, H. Spivak²

¹CDC National Center for Health Statistics, Hyattsville, Maryland, USA;

²DOJ National Institute of Justice, Washington, District of Columbia, USA;

³CDC National Center for Injury Prevention and Control, Atlanta, Georgia, USA

In early 2018 the Department of Justice Office of Justice Programs (OJP) and Department of Health and Human Services (HHS) convened a Medicolegal Death Investigations (MDI) Federal Interagency working group (IWG) to coordinate Federal activities to strengthen the MDI system. The MDI-IWG was formed to provide a formal forum for discussion among federal agencies involved with or users of data from the MDI system and to identify both short- and long-term goals to develop and implement Federal programmatic activities that support the MDI system, that in turn, support federal, state, and local public safety and public health initiatives and strategies. Another function of the MDI-IWG is to coordinate work at Federal Agencies to maximize efficiencies, facilitate collaborations, and avoid redundancy. Although not specifically focused only on the drug overdose crisis, the MDI-IWG considers the needs related to drug overdoses and the opioid crisis as a top priority. This presentation will discuss the MDI-IWG current activities and future plans.

As of May 2019, the MDI-IWG has met on five occasions, and includes participants from approximately twenty Federal agencies. During the initial meetings, IWG members reviewed the proceedings and recommendations from previous panels, workgroups and workshops in the topic area and created a matrix of areas of interest as well as priority areas. From that review three main priority areas emerged, (1) workforce issues, including addressing the shortage of forensic pathologists, (2) data and technology systems, including strengthening and promoting interoperability among current electronic systems used within the MDI community such as electronic death registration systems, and considering data needs to facilitate timely data sharing and statistical reporting; and (3) strengthening communications between the Nation's medical examiner and coroner (ME/C) offices, HHS, DOJ, and other federal agencies and stakeholders with interest in MDI.

In order to inform the MDI community and others of the work of the MDI-IWG, the Office of Justice Programs has developed a website (See <https://ojp.gov/resources/ojp-hhs-mdi-wg.htm>). The website includes information from many of the federal programs which have contact with the MDI community.

2.1 Xylazine, a Veterinary Tranquilizer, in Opioid Intoxications: Six Fatalities

J. Nunez, J.R. Gill

Connecticut Office of the Chief Medical Examiner, Farmington, Connecticut, USA

Xylazine is a non-narcotic, veterinary sedative, analgesic, and anesthetic used in large animals. In 2006, it was reported in a group of seven fentanyl deaths in Philadelphia. We report six recent opioid intoxication deaths in 2019 in Connecticut in which xylazine also was detected. All six fatalities were due to multidrug intoxications. Fentanyl was detected in all six and five had acute or recent cocaine use. Two decedents also had heroin detected. The age ranged from 21 to 60 years and all were men. Four of the six occurred in a single county in Connecticut. The postmortem peripheral blood concentrations ranged from 6.0 ng/mL to 25 ng/mL. Liquid chromatography/tandem mass spectrometry was used for analysis.

Xylazine is a phenylaminothiazine derivative that is structurally related to clonidine and acts as a central α_2 -adrenergic agonist which decreases the release of norepinephrine and dopamine resulting in sedation, muscle relaxation, and decreased pain perception. Side effects include respiratory depression and transient hypertension followed by hypotension. The autonomic effects of blocking the release of norepinephrine causes bradycardia, reduced cardiac output, and hypotension. Xylazine's depression of the central nervous system, similar to opioids, leads to respiratory depression, bradycardia, hypotension, and hyperglycemia. Concomitant use of xylazine with opioids may potentiate or attenuate the effects of these drugs, which can lead to increased toxic effects. This combination may increase the fatality rate among drug users.

Xylazine is a common cutting agent/additive used for "bulking" in Puerto Rico and is known as "Anestesia de Caballo" (horse anesthesia). The detection of Xylazine in illicit drug intoxication deaths has important clinical and criminal-investigative implications. It is important for clinicians to be aware of the presence of xylazine in their community because opioid overdoses involving xylazine may not respond well to naloxone and may require prolonged treatment. Law enforcement may be able to use the detection of xylazine to track a particular dealer or distribution of a specific supply. Without an appropriate screening method, the prevalence of xylazine may be underestimated. Forensic pathologists should be aware of whether it is included in their toxicological testing.

2.2 Fatal Brodifacoum Poisoning with Synthetic Marijuana

J. Michalski¹, D. Schultz²

¹University of South Florida Morsani College of Medicine, Tampa, Florida, USA; ²Final Diagnosis, Inc., Tampa, Florida, USA

Synthetic cannabinoid abuse has been increasing across the United States. Examples K2 and spice are household names and for a short time could even be found at local convenience stores. Users often perceive a safe and legal alternative to marijuana that can evade modern drug tests. Synthetic cannabinoids are manufactured psychoactive chemicals that are sprayed onto plant material. Their heterogenous make up and rapidly evolving metabolites allows them to evade urine drug tests and the law. The chemicals in synthetic cannabinoids may not particularly be considered hazardous separately, but once mixed, they become potentially deadly. Recently, there are instances in which synthetic cannabinoids are laced with fatal compounds such as brodifacoum, the main constituent in commercial rat poison. It is known by pharmacologists as "Super Warfarin" due to it being 100 times more potent than the commonly prescribed vitamin K antagonist. This case report describes the gross anatomic findings, differential diagnoses raised and systematically eliminated. The reason for the additive brodifacoum is not clear. Findings included hemoptysis, massive retroperitoneal hemorrhage, subdural hemorrhage, diffuse deep and superficial neck hemorrhage and an unusual cobblestoned pattern of urinary bladder mucosal bleeding.

2.3 A Poison Most Peculiar: Suicide by Sodium Azide

J.D. Berry¹, E. Ventura²

¹Baylor University Medical Center, Dallas, Texas, USA; ²Southwestern Institute of Forensic Sciences at Dallas, Dallas, Texas, USA

Sodium azide is a white to colorless crystalline powder that is odorless, tasteless, and highly water-soluble. It is used as a chemical preservative in hospitals and laboratories, a pesticide in agriculture, and a component in the manufacture of rubber, latex, detonators, and other explosives. It is best known as the chemical found in automobile airbags. It is also rapidly acting and deadly.

We present the case of a 28-year-old male who had a history of suicidal ideation and attempts. One night, he sent a suicide-type text message to his wife who was out of town. He then called her and said the same thing. She could hear him breathing heavily and panting, and then she could not hear him anymore. Police were called to the scene where they found a note on the door to the master bedroom that partially stated "Do Not Enter NA Azide, toxic" and warned not to come in without a Hazmat suit. The decedent was found face down in the bedroom with a cloud of smoke still in the room. An empty cup was found near him, and a container of sodium azide was found in the bathroom. It appeared as though the decedent mixed the chemical with water and ingested the mixture.

At autopsy, external examination revealed a cyanotic nose, gingivae, and fingertips. The only evidence of injury was a small abrasion over the left eyebrow and on the lower right leg. Internal examination revealed petechiae on the posterior one-third of the tongue, larynx, and trachea along with laryngeal and esophageal cyanosis. The gastric mucosa, lungs, and liver were congested. Testing of various specimens by the Federal Bureau of Investigation identified an azide-containing compound in the decedent's gastric contents and lung tissue. The cause of death was determined to be the toxic effects of sodium azide. The manner of death was suicide.

While the exact mechanism underlying the toxicity of sodium azide remains unknown, its lethality is indisputable. However, it is rarely used in suicides. With this unusual case, we will describe the possible mechanisms of action of sodium azide, the clinical manifestations of exposure, the special testing and specimens required to establish its presence, and the importance of scene awareness and precautions when its presence is known or merely suspected as no specific treatment or antidote exist for this deadly agent.

2.4 Beta-hydroxybutyric acid Testing in Postmortem Blood to Differentiate Between Solvent Ingestion and Diabetic Ketoacidosis

L.M. Labay¹, K.E. Gallagher²

¹NMS Labs, Horsham, Pennsylvania, USA; ²State of Alaska Medical Examiners Office, Anchorage, Alaska, USA

Beta-hydroxybutyric acid (BHB), acetone, and acetoacetate are the three main ketone bodies produced at elevated concentrations in diabetic ketoacidosis (DKA). The inclusion of acetone in most routine toxicology testing panels allows death investigators to assess if an individual was experiencing an acute DKA metabolic condition at and around the time of death. While an elevated glucose concentration is indicative of diabetes, in postmortem evaluations glucose concentrations are unreliable in estimating antemortem blood glucose levels due to fluctuations, including significant decreases, after death. BHB testing is warranted when results (e.g., positive blood acetone, negative vitreous glucose) are insufficient for diagnosis. In blood, BHB concentrations below 50 mcg/mL are considered normal while concentrations greater than 250 mcg/mL are indicative of DKA. Furthermore, one major interpretive complication is that analytical testing for acetone does not differentiate between acetone formed due to DKA and acetone present from an acetone/isopropanol ingestion.

To underscore the forensic importance of BHB testing, the case of a 46-year old male with a history of ethanol abuse is presented. The subject was found incoherent by hotel staff at 12 PM, assisted back to his room and left in a seated position; police were called. At 12:52 PM, he was discovered unresponsive and death pronounced. Toxicology testing showed acetone and isopropanol in femoral blood at concentrations of 170 mg/dL and 43 mg/dL, respectively. In vitreous fluid, acetone was present at 220 mg/dL and isopropanol at 29 mg/dL. Medical history includes hypertension, but no medical diagnosis of diabetes. Glucose was not detected in vitreous fluid, but due to its instability, this in the absence of other information is not diagnostic of either DKA or solvent ingestion. Of note, multiple empty vodka bottles were found at the scene, but no containers of an acetone or

isopropanol containing product. To determine if death may be due to DKA complications, BHB analysis in blood was performed. BHB was not detected at a Reporting Limit of 20 mcg/mL. Autopsy findings included fatty infiltration of the liver, small blood clots in the right lung and unremarkable kidneys, heart and brain. Taking the totality of the findings into account, the cause of death was reported as acute acetone/isopropanol ingestion and the manner of death was accident.

Overall, BHB is not only a reliable biomarker of DKA, it can be employed to solidify the reason for an unexpected acetone/isopropanol finding in postmortem investigations.

2.5 Use of BioFire® FilmArray® in a Medical Examiner's Office: A Case Series

C. Cunningham, D. Duff, C.C. Stacy

University of Missouri, Columbia, Missouri, USA

Numerous clinically significant pathogens have been implicated as causes of death for many years. Quickly identifying these bacteria, viruses, fungi, and parasites can be challenging in the post-mortem examination. Historically, reliance on cultures, stains, and other diagnostic tests has, and continues to be, a mainstay in determining pathogen prevalence in communities and their role in mortality. These methods, while extremely useful, have significant limitations in the pre-analytic, analytic, and post-analytic stages of testing. As diagnostic technology continues to improve, its role in forensic pathology is also evolving. One such piece of technology that is changing the landscape of clinical and forensic medicine is BioFire® FilmArray®.

The BioFire® FilmArray® is a user-friendly multiplex PCR diagnostic tool that simplifies molecular testing through a completely automated protocol beginning with sample preparation and ending with automated result analysis. Each of the several panels screen for and report the presence of an array of common disease-causing pathogens and antibiotic resistance, all in about one hour per sample. This has allowed clinicians to provide directed treatment for patients in a much timelier manner than was previously available with conventional testing methods.

We report a series of forensic cases in which the BioFire® FilmArray® panels were used, some with positive results that were ultimately determined to be the cause of death and some with negative results, excluding many pathogens from the cause of death.

3.1 A New Way to Look at Data: Collaboration Between the Cook County Medical Examiner's Office and the Bureau of Technology

M.D. Eckhardt¹, P. Arunkumar¹, W. Ingente², A. Shah², D. Treering², D. Arfa²

¹Cook County Medical Examiner's Office, Chicago, Illinois, USA; ²Cook County Government, Bureau of Technology, Chicago, Illinois, USA

There are two critical issues facing Cook County that are taking a tremendous toll on the lives of our residents – the epidemics of opioid addiction and gun violence. In cases of fatalities, the victims of these epidemics fall under the jurisdiction of the Medical Examiner. Data surrounding these issues is currently not readily available. The goal of this project was to create a dashboard that will make the information easily accessible to residents, journalists, researchers, medical professionals and other stakeholders as part of our efforts to confront the issues Cook County is facing.

In 2017, more than 1,000 people died in Cook County due to an opioid or opiate overdose and there were 833 homicides, with 743 of those caused by gun violence. Last year, the Medical Examiner's Office received nearly

400 Freedom of Information Act (FOIA) requests more than any other county department.

To address this issue, the Cook County Medical Examiner's Office and Bureau of Technology teamed up to provide the public with crucial information about deaths -- including those caused by gun violence and the opioid epidemic. We created first-of-its-kind interactive dashboards, maps, and an open dataset providing the public with a geographic visualization of every Medical Examiner case since 2014. The maps and dashboard are populated our electronic case management system, updated nightly and are open to the public on the County's website. Information provided includes the cause and manner of death, demographic information about the deceased, and the location of the incident. This program was created to provide transparency and real-time data to researchers, law enforcement, journalists, and the public as our County grapples with gun violence and the opioid epidemic. The maps and data set were also made public to help reduce the number of FOIA requests received by the Medical Examiner's Office. By March 1, 2017, the office had received 51 statistical requests. Since the tool came online, the number of FOIA requests received has been reduced significantly with just 14 statistical requests submitted in 2018 by March 1.

This program was created to provide transparency and real-time data to researchers, law enforcement, journalists, and the public as our County grapples with gun violence and the opioid epidemic. We believe that making this data open and accessible to researchers, journalists and members of the public will produce research that can help drive informed policy changes that will have significant impact.

3.2 Freddie Gray: How One Death Changed the City of Baltimore

S. Sweet¹, D.R. Fowler², G.D. Alexander³, R.T. Alexander²

¹Notre Dame of Maryland University, Ellicott City, Maryland, USA; ²Office of the Chief Medical Examiner, State of Maryland, Baltimore, Maryland, USA;

³Folly Quarter Middle School, Ellicott City, Maryland, USA

Introduction: On 4/12/15, Freddie Gray was arrested within the Sandtown-Winchester neighborhood of Baltimore. He was placed into a police van with his hands cuffed behind his back, and leg restraints were subsequently applied; he was not secured as required by police policy. Within 30 minutes he found unresponsive in the van. He was transported to a hospital where he was determined to have a neck injury. He died on 4/19/15. Protests in Baltimore starting on 4/18/15 became violent on 4/25/15. Riots and looting starting on 4/27/15 resulted in the deployment of the Maryland National Guard. On 4/30/15, the cause of his death was determined to be "neck injury," and his manner of death was classified as homicide. The following day the Baltimore City State's Attorney filed charges against six officers involved in the arrest of Freddie Gray.

Methods: The records of the Office of the Chief Medical Examiner for the state of Maryland were searched for homicides and drug deaths occurring within Baltimore in the two years prior and after the death of Freddie Gray. ArcGIS was used to map the deaths.

Results: A total of 1147 homicides and 1719 drug related deaths were identified. The average number of homicides per month during the two years prior to Freddie Gray's death (18.1) showed a significant increase in the subsequent two years (28.8), with a sudden spike in homicides immediately following his death. An obvious increase in drug deaths occurred in May, 2016, but not immediately following Freddie Gray's death. Spatial density ("heat") maps of homicides showed that the neighborhoods most impacted by homicides varied in time and space. Notably, after Freddie Gray's death a prominent ring-shaped cluster of deaths in the Sandtown-Winchester and adjacent neighborhoods had a central "hole" of fewer homicides. While many of the same neighborhoods bore the brunt of

deaths from homicides and drugs, there were differences in their spatial and temporal distributions.

Discussion: The death of Freddie Gray resulted in an increase in the number of homicide deaths per month for at least the two years following his death. The neighborhoods impacted by these homicides did show temporal and spatial variability, but areas of West Baltimore near Freddie Gray's arrest site bore a large brunt of this increase. Discussions with law enforcement and the Drug Enforcement Agency will be presented to provide a more nuanced explanation of the trends delineated by mapping in this study.

3.3 Improving Infectious Disease Reporting in a Medical Examiner's Office

C. Rogers, L. Sathyavagiswaran

Los Angeles County, Los Angeles, California, USA

One important function of the medical examiner is to insure that dangerous contagious disease in medical examiner cases is reported promptly to Public Health. In Los Angeles in 2012, the Department of Coroner developed a quality assurance goal of making complete and timely reports of influenza deaths among Coroner's cases. We used several methods to reach this goal.

The agency that receives the contagious disease reports, Acute Communicable Disease Control (ACDC), gets immediate electronic transmission of information as it is reported to the Department of Coroner. Their software screens the Coroner's reported information for key words, such as "fever," "flu," "cough," etc. A staff member screens the output and asks the Coroner to obtain any necessary cultures or other studies. ACDC also uses the demographic and geographic information to identify clusters of cases as part of a bioterrorism preparedness and response agreement with the Centers for Disease Control.

A second method to improve contagious disease reporting is that all culture results go to a supervising pathologist, who immediately reports any reportable diseases and notifies the autopsy physician. This prevents delays in reporting while culture results are in transit. The laboratory has a separate reporting requirement for positive serologic results, such as human immunodeficiency virus and viral hepatitis. Positive serology reports go to a supervising criminalist, who reports them to Public Health immediately.

Finally, physician staff receives periodic in-service training about the need to report contagious disease. This reinforces the need to report disease discovered by microscopic examination, in addition to that discovered by culture. Public health physicians are available by telephone to discuss the diagnostic strategy for difficult cases.

Influenza deaths became reportable in our jurisdiction on October 15, 2010. Initially there was about one influenza death report per year from the Coroner's Office. However, after developing the quality assurance project in 2012, the number of annual influenza reports was between 7 and 22 each year.

During review of a case closed as undetermined cause, a reportable disease was diagnosed and the report and death certificate was amended. This case underscores the importance of a thorough scene investigation, medical record review, consultation to the Infectious Diseases branch of the CDC through the Los Angeles County Public Health Department. The process we followed is outlined at the Web site pathology@cdc.gov. At previous meetings we have discussed reporting of rabies, Chikungunya virus, and Norwalk virus infections facilitated through this process.

3.4 Critical Diagnoses and Duty to Warn in Forensic Pathology: an Evaluation of Ethics and Proposed Reporting Recommendations

C.A. Breslauer, C. Nelson

North Carolina Office of the Chief Medical Examiner, Raleigh, North Carolina, USA

Postmortem discovery of a spontaneous aortic dissection in a 9-year-old concerning for a heritable connective tissue disorder led to investigation of the ethics and legal requirements for reporting unexpected forensic pathology findings with potential impact on blood relatives of decedents. Although forensic autopsy results do not have immediate or direct clinical impact on decedents, forensic pathologists encounter entities which may have impact on surviving relatives. Multiple legal precedents in clinical medicine have established the concept of a duty to warn patients of potentially heritable conditions, and have even established that duty, in some cases, may include notification of family members in certain cases. However, no standard currently exists to guide forensic pathologists regarding critical autopsy results or their duty to warn. The concept of critical values in pathology was originally established as a quality control measure to improve communication between the lab and the treating physician and allow for immediate clinical management decisions to be made based on life-threatening results. In the anatomic pathology literature, applying this concept has not been so straightforward, and notably excludes autopsy from consideration. Herein, we propose guidelines to define results in forensic pathology that may warrant prompt notification and establish the timeline with which they should be relayed: The recommendations include an example set of unexpected conditions considered potentially actionable for screening or intervention (with categories including heritable disorders, infectious diseases, and life-threatening environmental hazards) that when discovered postmortem, should be communicated to next of kin, contact(s) of the decedent, or their physician. Timing of reporting should be driven by the nature of the condition and ability to diagnose, rather than when the autopsy report is ready for finalization. The person with whom the forensic pathologist communicates should be guided by the complexity of the discovered finding, the fund of knowledge of the family, and the availability of a treating physician to interpret findings for the family. Additionally, forensic pathologists should consider collection of ancillary specimens (e.g., blood in EDTA tube or fresh tissue) to allow for definitive postmortem diagnoses if private testing is requested, where such testing is beyond the scope of the office's capabilities.

3.5 Attitudes Towards Forensic Autopsy Standard B3.7 and the Use of Physician Extenders in Select Autopsy Cases

C.B. MacRae¹, C.B. MacRae¹, S.H. Weinberg², M.L. Weinberg³

¹Beth Israel Deaconess Medical Center/ Harvard Medical School, Boston, Massachusetts, USA; ²Virginia Commonwealth University, Richmond, Virginia, USA; ⁴University of Alberta, Edmonton, Canada

Studies have repeatedly demonstrated that autopsy is the gold standard in determining cause and manner of death. Indeed, the current National Association of Medical Examiners (NAME) mandated Forensic Autopsy Performance Standard B3.7 states that a forensic pathologist shall perform a forensic autopsy when the death is by apparent intoxication by alcohol, drugs, or poison. Unfortunately, the recent increase in opioid-related deaths has led to some question about the feasibility of maintaining compliance with the current NAME standard, especially for offices with lower staffing ratios and finite resources. We constructed a short survey to assess forensic pathologists' attitudes about the need for autopsies in all potential drug-related deaths, as well as, utilizing certified pathologist assistants (PAs) in performing autopsies in these cases.

The survey was distributed via the NAME-L electronic mailing list. Demographic data including gender, age, geographic distribution and years

of practical experience was collected. Additional questions were included to help classify respondent's individual workloads, office workloads, office resources, and prior experience working with PAs.

Our respondent pool (n=107) consisted primarily of actively practicing forensic pathologists with administrative responsibilities (42%) and actively practicing forensic pathologists without administrative responsibilities (41%). Sixty-three percent reported having greater than 10 years of experience. Preliminary analysis revealed that 65% of respondents agree with NAME standard B3.7. Tendency to agree was not associated with individual workload (p=0.75), number of overdose cases per office (p=0.62) or routine prosecution of drug dealers (p=0.92). In addition, 45% of respondents were amenable to the use of supervised PAs in non-suspicious forensic autopsies. Similarly, there was no statistical relationship between respondent's opinion on the use of PAs in select autopsy cases and individual case load (p=0.791), number of overdose cases per office (p=0.92) or routine prosecution of drug dealers in overdose deaths (p=0.89).

Our findings suggest that both the opinion on NAME standard B3.7 and the use of PAs in select forensic autopsy cases is not a function of individual workload, number of overdose cases processed per office or drug dealer prosecution. In certain offices and under certain conditions, the use of physician extenders may be one possible solution to ensuring that all potential overdose deaths receive an autopsy.

3.6 The Michigan Co-ed Murders 1967-69: Collective Memory 50 Years Later

J.M. Jentzen

University of Michigan, Ann Arbor, Michigan, USA

Under cover of the chaotic years in American culture from 1967 to 1969, a serial killer stalked two Michigan college campuses. John Norman Collins eventually brutally killed seven young women over a period of two years in a 15-mile triangle of killing. In a period before the advent of DNA and recognition of the unique characteristics of serial killers, police investigators and forensic pathologists relied on old school practices of investigation. This presentation will provide a first-hand discussion of the deaths and expand on the methods of police investigators and forensic pathologists in solving the crime. The necessity and methods of communal forgetting and remembrance will be addressed.

3.7 Utilization of Pathologists' Assistants within the Medical Examiner Setting: Bridging the Gap Between Forensic Pathologist Shortage and Increasing Workloads

M. Webb¹, L. Sung¹, L. Hlavaty¹, V. Mendes-Kramer², C.J. Schmidt¹

¹University of Michigan / Wayne County Medical Examiner's Office, Detroit, Michigan, USA; ²Wayne State University, Detroit, Michigan, USA

There is a significant shortage of forensic pathologists in the United States with significant consequences for the communities they serve. The gap between work and workforce is not trivial. It was estimated in 2013 that 1100-1200 forensic pathologists (FPs) are required nationally to conduct forensic autopsies, when in reality there are only approximately 500 Board Certified FPs practicing full time with an average of less than 40 per year being certified, and even fewer taking full-time positions. The increasing caseloads, fueled by the burden of a growing opioid epidemic, challenge the ability of an office to maintain standards and guidelines established by the National Association of Medical Examiners (NAME).

NAME currently requires all ex-situ dissections to be performed by a medical examiner, except for trainees and students operating under the supervision of the medical examiner; this does not extend to pathologists'

assistants (PA). This constraint impedes utilization of a trained, professional resource that can mitigate the substantial workload strain which most directly affects high-volume offices.

The physician assistant was developed in the 1960s as a workforce strategy to improve the delivery of medical services in underserved areas. The PA is its equivalent. Because of persistent staffing shortages, the Wayne County Medical Examiner's Office hired pathology assistants to help in selected cases.

The PA is capable of functioning under the direction and supervision of the FP, and is no different than the physician assistant in clinical practice. Aside from their role in the autopsy suite, the PA may assist in areas of quality assurance and quality improvement efforts, maintenance of professional certification and accreditation, the forensic education of students and residents, photography, personnel management, research projects, aid directly in death investigations, and more.

In our experience, the use of the PA in the medical examiner setting has become an asset to the daily workflow. This utilization has not jeopardized the quality or integrity of the postmortem examination or impacted the standing of the Office of the Medical Examiner. The PA has created an environment of improved communication and work satisfaction. They have allowed the FP to address other vital needs of the Office and, in the long-term, may extend the professional life of an aging workforce to bridge a growing divide. Based on our experience, utilization of the PA should be considered as one strategy to alleviate the gap between the shortage of FPs and increasing workloads.

4.1 The Great Smoky Mountain Wildfires

K. Cochrane¹, W. Oliver², D. Mileusnic²

¹University of Tennessee Medical Center Knoxville, Knoxville, Tennessee, USA; ²Knox County Regional Forensic Center, Knoxville, Tennessee, USA

The Great Smoky Mountains National Park is the most visited national park with more than 11.3 million annual visitors. The wildfires of 2016 were the deadliest in the Eastern United States since 1947 and one of the largest natural disasters in Tennessee's history. The fires burned more than 16,000 acres and forced the evacuation of 14,000 people from the towns of Pigeon Forge and Gatlinburg. The fire started on the Chimney Tops trail November 23rd during the Thanksgiving holiday. The weather had been particularly dry in the preceding months with the area classified as being in an 'exceptional drought', which contributed to the speed of the fire spread and made flash fires likely. Extreme weather conditions November 28th led to the exponential spread of fires with severe wind gusts causing the fire to spread rapidly and unpredictably. Wind gusts carried burning embers long distances igniting fires across the park and into Gatlinburg. High-winds also felled numerous trees, which brought down power lines and ignited additional fires that spread rapidly with the winds. Pumping stations burnt down, with others affected by power outages, resulting in the hydrants going dry. Communication of an urgent mandatory evacuation order was hindered by power loss with evacuation further complicated by the high number of visitors due to the holiday. Those unable to evacuate perished. Between November 28th and December 5th, there were 14 fatalities, 2 during evacuation and the remaining 12 as a direct result of the fire. A local mobile receiving station was set-up for remains found by rescue teams. The median age of those who died in the fire was 61 years, all with significant thermal burns. In cases of severely compromised remains, the precise cause of death is often difficult to determine. The level of carbon monoxide in several of these cases argued against smoke inhalation alone. Sudden cardiac death in heart disease is usually a combination of vulnerability and a triggering event. In these cases, exposure to smoke and fire represent the kind of stress that would trigger a sudden cardiac death. As many decedents were found outside, it is likely that several died because of the

cardiac stress associated with fleeing the fire and the respiratory effects of the intense smoke. The large number of visitors to the area added to the complexity of victim identification, however; using dental records, anthropologic analysis or DNA studies all victims were positively identified.

4.2 Why We Tend to Underestimate Postmortem Interval (PMI): Anomalies of Decomposition

W.C. Rodriguez

US Department of Defense - Defense Health Agency, Dover AFB, Delaware, USA

Estimation of time since death / postmortem interval (PMI) is certainly one of the most complex questions face by a medical examiner or coroner. Although there have been numerous scientific developments in the field over the past few years, we are in most cases left with a making our best estimate which falls somewhere in the realm of what we know about the decomposition process and what has been our personal case experience. When pressed for a more definitive PMI we might be able to rely on bio-environmental evidence such as the colonization of insects or intrusive plant growth. One common problem when pressed for a more definitive PMI the estimate tends to be quite conservative thus underestimating the PMI. The underestimating of the PMI is primarily the result not taking into account the multiple environmental aspects in relationship to the body. In terms of environmental conditions, one must examine the various barriers to the decomposition process they may or may not be present. Chemical barriers act to retard or alter decomposition, therefore evidence of insecticides, embalming agents and lime must be taken into account. Climatic conditions can also be a barrier to decomposition those include extremes of heat, cold, wind and rainfall. Physical barriers such as soil, water, containers, and caskets also effect the decompositional process. A body which comes in contact with dead vegetation in particular such as tree leaves, pine needles, and peat moss it is subject to preservation by natural tannins released by the vegetation. One of the most overlooked environmental condition is that of a body typically unclothed, which in contact with the ground/soil or partial water submersion in which the mean ambient air or water temperatures are relative cool the body acts much like a cold pack. This condition I refer to as simply the "cold pack effect" can greatly retard the decompositional process. A corpse which has been subjected to the "cold pack effect" can appear relatively fresh or in early stage of decomposition. These individuals will not show signs of carrion insect colonization which provides the mis-leading thought that the body has been deceased for less than 24 or 48 hours. As result of the "cold pack effect" the blow flies can be seen landing on the body and walking over the stab wounds without feeding or ovipositing, then quickly flying away. Other aspects leading to underestimation of the PMI will also be discussed.

4.3 Exhumation of a Future Catholic Saint: The Story of Mother Mary Lange

W.C. Rodriguez, D.R. Fowler

Maryland State Medical Examiner, Baltimore, Maryland, USA

Medical Examiner's offices from time to time will be called upon to conduct and exhumation of a body/remains in order to conduct either a first or secondary autopsy. In extremely rare cases such as the one to be presented they may be asked to exhume the remains of a famous historical figure or even that of an individual being considered for religious saint-hood. This case presentation details the procedures and religious ceremonial actions involved in the exhumation of a future Catholic Saint – that of Mother Mary Elizabeth Lange. Early in the spring of 2013, the Office of the Chief Medical Examiner, Baltimore, Maryland was approached by chief representatives of the Baltimore Catholic diocese as well as three representatives from the Vatican in Rome requesting the exhumation and examination of the remains of Mother Mary Lange. Mother Lange who was

born in 1784 was an African-American religious sister who was the first nun of African descent to be confirmed by the Catholic Church. Following her ordination, she found the first the Oblate Sisters of Providence, a religious congregation established to allow African-American women to enter religious life in the Catholic Church. In the early 1800's Mother Lange left Cuba and immigrated to the United States finally settling in Baltimore, Maryland in 1813. Recognizing the need for education of public education for African-American children she opened the first Catholic school for the children, even though the public education of African-American children was outlawed. On May 28, 2013 the Office of Chief Medical Examiner agreed to permit the exhumation under the guidance of their Forensic Anthropology consultant. The first major obstacle to overcome in the exhumation that Mother Lange was buried in the same Catholic cemetery grave that four other sisters of the order she founded. All had been buried in simple wooden coffins starting with Mother Lange in 1882, followed by the four other sisters in the years 1903, 1914, 1916 and 1972 respectively. Once Mother Lange's remains were identified they were later returned in one of the alter walls the mother house sanctuary. A grand religious ceremony which was televised took place in which the Forensic Anthropologist was asked to take part. The remains of Mother Lange now await official Beatification and sainthood to bestowed upon her by the Vatican, making her the first African-American Saint in America.

4.4 Faith or Delusion:Death Investigation of a Bizarre Mass Hanging--A Case Report and Review of Literature

M. Pradhan, D.D. Buchade

MAULANA AZAD MEDICAL COLLEGE, NEW DELHI, India

We report the most bizarre and mysterious deaths of eleven members of a joint family that shook the nation. The deaths were immediately shrouded in controversy due to the strange manner in which the bodies were found. The eleven bodies were found hanging together in a room of their residence with similar features of bound limbs, gagging, and blindfolding. This invariably led to the suspicion of mass homicide by the investigating authorities and the media. Autopsy revealed the cause of death as hanging with the use of peculiar bondage material along with other religious paraphernalia. Death investigation revealed strange scripted documents of step wise instructions for a religious/occult practice at the crime scene with revelation of a possible shared delusional disorder. Doubts regarding the manner of death deepened due to the presence of a coexisting psychiatric condition and unshakable faith. The autopsy findings, which were unique, exclusive, and defying imagination, have been deconstructed and explained in this report. We also delved into the realms of ritualistic hanging and reviewed the literature.

4.5 The Perforated Jejunum: A Case Series

H.C. Jarvis, R.A. Garcia

Harris County Institute of Forensic Sciences, Houston, Texas, USA

Perforation of the small intestine is an uncommon entity, with an estimated incidence of 1 in 300,000 to 350,000, which represents approximately one-quarter of all intestinal perforations. The jejunum is the least common site of small intestinal perforation, and is rarely identified preoperatively in the clinical environment. Globally, typhoid fever is the most common etiology of small intestinal perforation. However, in the developed world, more common etiologies include trauma, foreign bodies, iatrogenic, irradiation, bowel obstruction, inflammatory diseases, vascular abnormalities, drugs, tumors, congenital abnormalities, and graft versus host reaction. Isolated perforation of the jejunum due to blunt force trauma to the abdomen occurs in less than 1% of cases; the mortality rate is approximately 30%.

A review of the database of the Harris County Institute of Forensic Sciences identified 19 fatalities associated with perforation of the small intestine; of

which, seven cases were documented as being perforations of the jejunum, which occurred between 2006 and 2019. Of the seven cases, five were male and two were female. The ages ranged from 5 to 67 years old (mean: 38 years); five were black and two were white. The manner of death was natural in five cases, accident in one case, and homicide in one case. Within the cases certified as natural deaths, the underlying etiology was identified in three cases: perforation associated with an adynamic ileus; following recent surgical repair of a hernia; and perforation of an ulcer associated with Zollinger-Ellison syndrome. No specific underlying etiology was identified in the other two natural deaths. The case certified as an accident was associated with ingestion of a foreign body (plastic material with a needle). The homicide was a five-year-old female child who sustained blunt force trauma to the abdomen, resulting in jejunal perforation.

Four of the cases were associated with psychiatric illness or mental retardation, including schizophrenia, cerebral palsy and trisomy 9. Only one-third of cases certified as small intestinal perforation in our review identified the distinct region of intestine involved. When perforation of the small intestine is encountered at autopsy, an attempt should be made to identify the location as duodenum, jejunum or ileum, as this may suggest a possible underlying etiology. The jejunum has specific gross and microscopic features, including the presence of large, tall, closely packed plicae circularis and sparse numbers of Peyer's patches. This documentation may assist in a better understanding and awareness of this rare but important entity.

4.6 They Say "Don't Mess With Texas": A Review of Police-Involved Fatalities from Regions of Texas

J.B. Dwyer

Southwestern Institute of Forensic Sciences, Dallas, Texas, USA

Police-involved fatalities are a nationally relevant issue in the United States, but notoriously underreported and studied in the current scientific literature. By retrieving cases flagged as "police-involved deaths" from our laboratory information system database, a review of all deaths occurring in proximity to law enforcement during the processes of apprehension, arrest, and/or early incarceration is provided from a large metropolitan medical examiner's office in Texas. A total of 275 police-involved deaths were reported from April 2011 through 2018. The majority of deaths (155) occurred in Dallas County, while the remainder occurred in counties across north, east, and central Texas. The cohort consisted of 259 men and 16 women with an average age of 34.9 years (median 33 years). Racial demographics consisted of 128 white individuals, 87 black, 58 Hispanic, 1 Asian, and 1 Native American. Routine postmortem toxicology testing of all police-involved deaths detected substances in the blood of 237 cases, with the most commonly detected drugs being marijuana (85), ethanol (80), methamphetamine (62), and cocaine (44). Manners of death consisted of 160 homicides, 66 accidents, 41 suicides, 4 naturals, and 4 undetermined. The peak annual incidence of police-involved deaths occurred in 2015 (44), with 35 of those deaths being classified as homicides. Of the 160 homicides, 90 occurred within Dallas County and the racial demographics consisted of 74 white individuals, 49 black, 35 Hispanic, 1 Asian, and 1 Native American. The causes of death for all homicides were firearm injuries (148), the toxic effects of drugs in conjunction with physiologic stress/excited delirium (8), mechanical asphyxia (2), complications of blunt force injuries (1), and blast injuries (1).

This study provides a review of the annual incidences, demographic information, and death certification information for police-involved deaths within a specific region of the United States. There is a paucity of these types of reviews in current publications, namely due to case volume, funding limitations, and poor tracking or reporting of cases. Besides providing information that may be of interest to the general public and those involved in death investigation or prosecution, this review emphasizes the

importance of implementing procedures to uniformly track these cases in offices performing medicolegal autopsies in the hope to elucidate unbiased regional and national trends regarding police-involved fatalities.

4.7 Multi-Institutional Multi-Disciplinary Injury Mortality Investigation in the Civilian Pre-Hospital Environment (MIMIC): Concept of Utilizing Medical Examiner Data to Determine Prehospital Injury Survivability

C.L. Villarreal¹, N.W. Medrano¹, J.H. Brice², G. Davis³, E.A. Elster⁴, T.J. Esposito⁵, J.R. Ficke⁶, J.B. Holcomb⁷, J.L. Hunt⁸, D.H. Jenkins⁹, S.L. Lathrup⁸, R.L. Mabry¹⁰, E. MacKenzie⁶, M. Martin¹¹, R.T. Maxson¹², E.L. Mazuchowski¹³, L.E. Moores¹⁴, K.B. Nolte⁸, M.J. Phillips¹, M.A. Price¹, R.M. Stewart⁹, A.B. Valadka¹⁶, B.J. Eastridge⁹

¹National Trauma Institute, San Antonio, Texas, USA; ²University of North Carolina, Chapel Hill, North Carolina, USA; ³University of Alabama, Birmingham, Alabama, USA; ⁴Uniformed Services University of the Health Sciences, Bethesda, Maryland, USA; ⁵UnityPoint Health Methodist Proctor, Peoria, Illinois, USA; ⁶Johns Hopkins University, Baltimore, Maryland, USA; ⁷University of Texas Health Science Center at Houston, Houston, Texas, USA; ⁸University of New Mexico, Albuquerque, New Mexico, USA; ⁹University of Texas Health Science Center at San Antonio, San Antonio, Texas, USA; ¹⁰SOC Fort Bragg, Fort Bragg, North Carolina, USA; ¹¹Madigan Army Medical Center, Tacoma Washington, USA; ¹²Arkansas Children's Hospital, Little Rock, Arkansas, USA; ¹³Armed Forces Medical Examiner System, Dover Air Force Base, Delaware, USA; ¹⁴Pediatric Specialists of Virginia, Washington, District of Columbia, USA; ¹⁵Seton Brain and Spine Institute, Austin, Texas, USA

Introduction: In 2016, the National Academies of Science, Engineering, and Medicine published a comprehensive assessment of U.S. trauma care systems entitled "A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury". The report specifically noted, "a critical but often neglected source of data—particularly in civilian systems—is autopsy reports on trauma deaths, which could be used to determine the preventability of fatalities based on a common, accepted lexicon." One foundational deficiency noted was that data linkages are incomplete or missing between prehospital care and the medical examiner (ME). The Multi-Institutional Multi-Disciplinary Injury Mortality Investigation in the Civilian Pre-Hospital Environment (MIMIC) was conceptualized as a bridging strategy to develop a more comprehensive understanding of the epidemiology of civilian pre-hospital injury deaths and their potential for survivability.

Methods: The research proposes to analyze 3,000 civilian pre-hospital deaths and is being conducted at six ME offices across the United States: New Mexico, Oklahoma, Connecticut, Maryland, District of Columbia, and a region of Iowa. These sites were chosen because their centralized ME systems provide mortality investigation data that is uniform and readily accessible. A network of subject matter experts in the disciplines of forensic pathology, trauma surgery, neurosurgery, orthopedic surgery, emergency medicine, radiology, forensic nursing, trauma systems, and emergency medical services (EMS) collaborated to develop a consensus taxonomy relative to determination of potential for injury survivability. This framework and methodology were developed for evaluating the causes and pathophysiologic mechanisms of pre-hospital deaths, appropriateness of EMS response and care, and the potential for survivability under both optimal clinical circumstances and within the context of the scenario. The MIMIC Study Group consists of thirteen review panels, each including one medical examiner. Data available for survivability determinations include medical examiner autopsy data including imaging studies, field investigator reports, injury codes (Abbreviated Injury Scale / AIS), geospatial data (injury location, EMS location/time, trauma center level/location /time), and EMS data. Deaths are reviewed using an online electronic tool (Profiler) developed for this study.

Discussion: The goal of the research is to identify liabilities in trauma systems and develop mitigation strategies with translation potential for realistic and relevant improvements in trauma systems and medical examiner systems. The research intends to identify ways that the ME and trauma communities can improve linkages to foster in-depth reviews of traumamortality.

4.8 Challenges of Interpreting Death Certifications of Fatal Drug Overdoses involving Novel Psychoactive Substances in the State Unintentional Drug Overdose Reporting System (SUDORS)

E.O. Olsen¹, T.P. Gilson²

¹Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ²Cuyahoga County Medical Examiner, Cleveland, Ohio, USA

The United States is in an unprecedented drug overdose epidemic. The CDC's Enhanced State Opioid Overdose Surveillance (ESOOS) program funds states to collect and disseminate faster, more comprehensive data on fatal and nonfatal opioid overdoses. ESOOS includes the State Unintentional Drug Overdose Reporting System (SUDORS), the surveillance system designed to track fatal opioid-involved overdoses through the use of death certificates and also toxicology and death scene investigation data. These additional data sources can provide insight into circumstances (e.g., route of drug administration, bystander presence/absence) and additional substances driving overdose mortality, beyond what is available from death certificates alone. SUDORS data can aid in identifying emerging drug trends and novel psychoactive substances (NPS) among opioid overdose fatalities. One of the original 12 states participating in SUDORS is Ohio, which has provided data into the system for deaths occurring during July 2016-December 2018.

Ohio as a state has been particularly impacted by the opioid epidemic. In 2017 alone, more than 4,200 unintentional or undetermined opioid overdose deaths were recorded in Ohio. In addition to having one of the highest per capita overdose fatality rates in the nation, it has also been a bellwether for emerging drug trends and NPS. Ohio is a medical examiner/coroner hybrid death investigation system. Each of its 88 counties has a physician coroner or medical examiner, and death certification is not uniform. As such, it is a microcosm of the heterogeneity of death investigation in the United States, which represents a challenge for a surveillance system like SUDORS. Yet, the success of any system, like SUDORS, is dependent on its ability accurately capture (and exclude) appropriate overdose fatalities.

This presentation will review eight challenging NPS-involved cases identified in Ohio and address the potential difficulties in death certification and epidemiological case abstraction. The cases include deaths that cited natural causes as underlying cause of death but the ME/C report indicated an opioid overdose; cases for which a NPS was noted to be a cause of death when additional – likely more potent - substances detected on toxicology are not noted as causative, and cases for which NPS are indicated as COD along with other substances. Each case will be examined for the appropriateness of inclusion or exclusion of NPS in the cause of death and the difficulties these decisions created from an epidemiology perspective when reviewed for epidemiological analyses and public health planning.

4.9 Around the World in One Hundred and Eighty Days: How Much Has Twitter "Disrupted" Hierarchies in Forensic Pathology?

K. Obenson

Saint John Regional Hospital, Saint John, Canada

Introduction: Practitioners of forensic pathology are by training and experience, sensitive to the need to maintain decedent confidentiality and to avoid comment or "liking" or retweeting content that may place them in peril of being considered biased, unprofessional or incompetent by the public in general and defence attorneys in particular

Objective: To observe the online activity of forensic pathologists and those with an interest in forensic pathology to determine if there has been increased engagement on Twitter beyond a closed email group and to evaluate the general nature of those interactions..

Methods: Following the last meeting in October 2018, the number of NAME members who are part of the NAME list server were matched with those that have active Twitter accounts. These figures were compared those existing on April 18 2019, a six-month interval.

Results: In October 2018 while NAME listers members ran into several hundreds there were 15 pathologists, forensic fellows and pathology residents on the NAME list serve were known to have Twitter accounts. The numbers for April 2019 do not appear to have changed in the 6 months since. Almost all those on Twitter "follow" each other on Twitter, a term equivalent to Facebook "friends". Of the 15, seven appear to post content relating to forensic or autopsy pathology at least once a week. Many conversations start as a posted general comment or a question which appear in each others feeds or "in case you missed it" segments on your feed. Benefits of engagement include interesting discussions regarding techniques, wordings on cause of death and descriptions of particular findings, participation in discussions by medical students and trainees in pathology due to the open forum nature of Twitter, an awareness of trainee perceptions on exposure to pathology and suggestions to improve exposure; and several informal polls relating to practice style, cause of death determination, and court room demeanor. The flattened but supportive hierarchy also facilitates direct engagement by trainees interested in a career in forensic pathology.

Discussion: Most forensic pathologists remain hesitant to engage in direct and open communication with each other over open social media platforms such as Twitter. While there are justifiable reasons to approach social media with caution, we may be missing an golden opportunity to teach the public more about what we do and facilitate recruitment into a specialty in dire need of reinforcements.

5.1 Unexplained Pediatric Deaths: Investigation, Certification, and Family Needs

E.A. Bundock¹, T.S. Corey², K. Pinner³, L.D. Knight⁴, L.G. Crandall⁵, R.D. Goldstein⁶, M. Sens⁷

¹Office of the Chief Medical Examiner, Burlington, Vermont, USA;

²Kentucky Chief Medical Examiner, Retired, Ocala, Florida, USA;

³Montgomery County Forensic Services, Conroe, Texas, USA; ⁴Washoe County Regional Medical Examiner's Office, Reno, Nevada, USA;

⁵NYU School of Medicine, New York, New York, USA; ⁶Boston Children's Hospital, Boston, Massachusetts, USA;

⁷University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, USA

Causes of sudden deaths in infants and children are numerous and include diseases, accidental injuries and poisonings and inflicted trauma. However, many sudden pediatric deaths are not fully explained despite extensive investigation and thorough autopsy.

Sleep position and sleep environment have been recognized as important factors in infant deaths however, the downward trend in the rate of unexplained infant deaths, initiated by the Back to Sleep campaign, has seen a plateau. Rates of sudden unexplained death in childhood have remained stagnant for many decades. Infant death investigation and awareness of unsafe, potentially asphyxiating sleep environments has improved since the late 1990s, through training and educational efforts of the US Centers for Disease Control and Prevention and National Association of Medical Examiners (NAME). Training and education targeted to investigation of unexplained, non-infant pediatric deaths has been limited. There remains wide variation throughout the country in death investigation, autopsy practices, and certification of cause and manner of death for pediatric cases that remain partially or entirely unexplained and those associated with potentially asphyxiating sleep environments. Incomplete investigation and examination continue to contribute to inaccurate and undetermined causes of death. For deaths that do have comprehensive investigation and examination, lack of consensus on certification of unexplained pediatric deaths inhibits our ability to consistently and accurately monitor trends and characteristics of these deaths in different geographic regions, across the nation, and between countries. This directly affects the ability to effectively measure the impact of public health interventions and appropriately dedicate resources for research and program priorities. For families, grief and frustration may be compounded by death investigation system variations, non-standardized cause of death certification practices, and disparate support services.

A multidisciplinary panel of experts in pediatric sudden death, identified by NAME and the American Academy of Pediatrics, was convened to review evidence and literature in these areas of concern, identify system gaps and needs, and produce consensus practice guidelines that may ultimately improve the quality and consistency of sudden, unexplained pediatric death investigations, epidemiology and research. While the panel's final product will cover an extensive array of issues, this presentation will focus on key considerations and procedural guidance for investigation, autopsy (including autopsy procedures, subspecialty consultations and ancillary testing), autopsy reporting, cause of death certification and classification, and family support.

6.1 Pharmacokinetics, Genetic Polymorphisms, and Drug-Drug Interactions

L.M. Labay¹, J. Gevorkyan², L. Apollonio³, C. Catanese⁴

¹NMS Labs, Willow Grove, Pennsylvania, USA; ²Office of the Chief Medical Examiner City and County of San Francisco, San Francisco, California, USA;

³Cuyahoga County Medical Examiner's Office, Cleveland, Ohio, USA;

⁴Westchester County Healthcare, Valhalla, New York, USA

The purpose of this workshop is to review basic pharmacokinetic parameters and to foster an understanding about how an individual's genotype affects an individual's health status and influences their response to drugs.

It can be challenging to predict who will benefit from a medication, who will not respond, and who will experience an adverse drug event. In essence, genetic variability coupled with the use of different drug combinations and varying pre-existing medical conditions means that not all people within a population will react to the same drug(s) in the exact same manner. This concept can be applied to the prescribing process and can improve efficacy while minimizing adverse drug reactions and therapeutic failures. Alternate uses involve the identification of genetic abnormalities associated with a life-threatening or a lethal outcome.

This workshop will enable attendees to understand how metabolic and genetic influences affect the overall health of an individual, but specifically in regard to drug metabolism, drug-drug interactions and the disease

process. These considerations can be applied to interpretation of toxicology results in conjunction with provided case history. This becomes relevant to death investigations where the primary purpose is to determine an individual's cause and manner of death. Was a drug purposely consumed in an overdose amount or was the individual unable to properly metabolize the drug as a direct consequence of their genotype?

Speakers will address how genetic makeup influences drug metabolism, disease states and their progression, and describe how test results can have implications for cause and manner of death determinations. A set of increasingly complicated cases that draw in on the topics, the limitations to be considered, best interpretation practices, and the interpretations that can be made will be provided and discussed.

7.1 The Issue of the Interpretation of Morphine in Postmortem Toxicology

K.E. Williams

Office of the Medical Examiner of Allegheny County, Pittsburgh, Pennsylvania, USA

Overdose deaths in the United States demonstrate a striking variability from jurisdiction to jurisdiction. It is uncertain what proportion of the reported deaths are a result of demographic variations or from a lack of standardization of the interpretation of the results of toxicology testing. The lack of any widely accepted set of rules for analyzing the results of this testing further complicates the problem.

Focusing on the single analyte, morphine, highlights many of the essential features of this variability. Both heroin and its principal metabolite, 6-monoacetylmorphine, demonstrate short half-lives in both blood and urine. This results in a not uncommon situation where the "last man standing" metabolite, morphine, with a significantly longer half-life, is found only in urine. If the deceased individual is found in a typical surrounding of drug paraphernalia and evidence of recent drug ingestion; and, if the toxicology shows the presence of other opioids that are commonly found in mixed overdoses, it is logical to certify the causative agent as heroin. In striking contrast, the stated incidence of morphine overdoses in the medical literature varies from 2% to 50%. However, this conflicts with the reporting in the National Forensic Laboratory Information System, which reports an incidence of the presence of morphine in drug seizures of only 0.26% average nationally, with a great similarity between all reporting regions in the country. This discrepancy can only be explained as a marked variation in interpretive protocols.

This is perhaps the most obvious and problematic issue in the reporting of drugs causing overdose deaths where no universal standards exist for evaluating the complex factors of post-mortem toxicology.

7.2 Identification and Quantification of Exogenous Insulin Analogs in Postmortem Specimens

L.M. Labay¹, K. Legg², B. Logan², S.S. Aiken³

¹NMS Labs, Horsham, Pennsylvania, USA; ²Center for Forensic Science Research and Education, Willow Grove, Pennsylvania, USA; ³Spokane County Office of the Medical Examiner, Spokane, Washington, USA

The detection of exogenous insulin analogs in postmortem samples is of relevance in that insulin may be an agent used to purposefully cause illness or death. Analytical challenges include insulin instability and the forensic necessity to unequivocally identify the pharmaceutical analogs from each other and human insulin. A novel immunoaffinity extraction procedure was developed for the identification and quantification of human insulin, Glulisine, Lispro, Aspart, Glargine, and Detemir in vitreous fluid. LC-MS/MS

analysis of the β -chain allows for the identification and quantification of each insulin analogue.

This method was used in 2017-2018 to test 38 vitreous fluid specimens submitted by medical examiners and other death investigators. Evaluation of the data shows that 29% (n=11) of the samples tested positive (n=6 for Lispro; n=3 for Aspart; n=2 for Human Insulin). Detailed case history from one case demonstrates the utility and accuracy of the method. Briefly, a 38-year old female was found deceased in bed by her husband. Insulin was found at the scene. Comprehensive toxicology testing showed the presence of bupropion, fluoxetine, norfluoxetine, and phentermine in peripheral blood. Further analysis performed on vitreous fluid showed the presence of Lispro at a concentration of 2.0 ng/mL. Following the receipt of the laboratory findings, the husband was contacted and he verified that the insulin he used matched this result. The cause of death was documented as "Hypoglycemia due to intentional injection of insulin" and the manner of death was suicide.

Current scientific efforts involve sample process optimization so the method can be used for tissue samples that may contain injection marks. The main challenge, however, continues to be the lack of insulin stability in biological fluids. Experiments support the highly unstable nature of insulin at any "standard" condition where specimens would be collected, stored, and transported from collection site to laboratory. To mitigate concentration decreases, it is suggested that when insulin testing is required sample collection should occur as soon as possible, and the sample immediately stored and shipped frozen (-20°C). Overall, the development of this analytical procedure allows for the analysis of a matrix type that is routinely collected during autopsy.

7.3 Involvement of Synthetic Cannabinoids as Cause or Contributing Cause of Death

B.K. Logan

NMS Labs, Horsham, Pennsylvania, USA

Synthetic cannabinoid agonists were developed in the 1980s as part of pharmaceutical research to identify new drugs with therapeutic effects such as appetite stimulation, suppression of nausea and vomiting, seizure control and analgesia. There are an enormous number of potential synthetic cannabinoid agents that can be created by chemical manipulation of the basic synthetic cannabinoid core structure. According to the European Monitoring Center for Drugs and Drug Addiction (EMCDDA), by the end of 2017, there were at least 167 different synthetic cannabinoid agents that had been identified, and 14 distinct classes or families of these drugs. Receptor binding and functional activity assays have demonstrated a trend towards increasing receptor binding and potency with each successive generation. Since 2009, when the synthetic cannabinoids first appeared in the United States, there have been increasing numbers of reports in the literature of harms and adverse events.

A 2014 review of all available literature on the effects and adverse effects of synthetic cannabinoids reported that based on the 114 articles reviewed, it was clear that the synthetic cannabinoids had significant adverse cardiovascular effects (increased heart rate, increased blood pressure, other cardiac changes), neurological effects (hallucinations, delusions, anxiety, dizziness, sedation), and miscellaneous dermatological, gastrointestinal and hematological effects. This review included three published reports related to deaths attributed to synthetic cannabinoids, one of which was a cardiac death.

A 2016 publication documented a series of 25 death investigation cases in which synthetic cannabinoids had been detected, and reviewed them to determine the significance of the toxicological findings. In 20 cases in that report, various synthetic cannabinoids were determined by the expert

reviewers (toxicologists and pathologists) to be the sole cause or contributory cause of death, through mechanisms including cardiac and psychiatric effects. Many of these deaths in which synthetic cannabinoids were deemed to be contributory also had significant heart disease.

A 2017 review identified a further 10 published reports of case series of deaths attributed to use of various synthetic cannabinoids. The review concluded that as more testing became available for synthetic cannabinoids, their role in causation or contribution to deaths was increasing correspondingly.

Since 2017, there has been proliferation of new reports of toxicologically confirmed deaths associated with use of various emerging synthetic cannabinoid drugs, many associated with cardiac compromise. There is a large and growing body of literature indicating adverse effects including death attributed to multiple members of the synthetic cannabinoid class.

7.4 Looking Ahead to Toxicology in 2020: A Presentation from the NAME Toxicology Committee

L.M. Labay¹, C.A. Catanese²

¹NMS Labs, Horsham, Pennsylvania, USA; ²Westchester County Healthcare Corporation, Kingston, New York, USA

Analytical results obtained from the analysis of samples collected at autopsy contribute to the death investigation process. As such, it is important that toxicologists and forensic pathologists stay current with emerging drugs of abuse and newly approved medications. This process in the past several years has become increasingly complex with the increase of drug-related deaths and the rapid evolution of novel psychoactive substances such as synthetic cannabinoids and the fentanyl analogs. The required pace needed to develop and validate methods, perform autopsies in a timely manner, and complete toxicological testing has made it challenging to stay up to date with current toxicology developments and those expected in 2020. This presentation will consist of two main sections. One section will be used to review the new drug products that are in the late-phase pipeline and may appear or are expected to be available on the market in 2020. A special focus will be placed on the drugs that are of potential forensic significance including antipsychotics, sleep-aids, and antidepressants. The second section will allow for the presentation of any available pharmacokinetic data and reference range information for the newer drugs of forensic relevance including illicit drugs and pharmaceutical formulations.

8.1 Hypoxic Ischemia Brain and Spinal Cord Injury with Pulmonary Thromboemboli: A Mimic of Inflicted Trauma

A.G. McDonald, N.S. Shaller, P.E. Lantz

Wake Forest Baptist Medical Center, Winston Salem, North Carolina, USA

A thorough autopsy is essential in sudden, unexpected infant deaths. We report a unique case of fatal hypoxic-ischemic brain and spinal cord injury with subarachnoid and focal subdural hemorrhage, spinal nerve root/dorsal root ganglia hemorrhage, and retinal hemorrhages associated with acute and organizing pulmonary thromboemboli. This presentation highlights the need to perform postmortem ocular and spinal cord examinations and include dissection of spinal nerve roots/dorsal root ganglia dissection in cases of unexpected, unexplained infant death.

An 11-week-old female infant with no known significant medical history was transferred from a local hospital's emergency department after a resuscitated cardiopulmonary arrest with 42 minutes total downtime. Upon arrival, she had non-reactive pupils and a full anterior fontanelle. Admission laboratory data indicated evolving disseminated intravascular coagulation. A cranial computed tomography scan showed multifocal acute/subacute

subarachnoid hemorrhage along both hemispheres and a possible thin, subdural hemorrhage along the posterior falx cerebri and right cerebral convexity. Fundal examination revealed bilateral retinal hemorrhages. Skeletal survey disclosed no fractures. Death by neurologic criteria was pronounced two days after admission and limited organ procurement occurred two days later.

Autopsy findings were significant for acute and organizing pulmonary thromboemboli and subpleural pulmonary infarcts plus pulmonary hypertensive vascular changes. Postmortem ocular examination revealed bilateral, multilayered, retinal hemorrhages with intra-retinal vascular thrombi. The left eye contained retinoschisis with central retinal vein occlusion and vitreous hemorrhage. Optic nerve sheath hemorrhages were present bilaterally. Cranial findings included sutural diastasis without skull fractures; diffuse, thin subarachnoid hemorrhage; and a parafalcine subdural hemorrhage. Spinal cord examination showed intraparenchymal hemorrhage in the lumbar portion, dorsal root ganglia/nerve roots with hemorrhage and necrosis in all regions, and intravascular fibrin thrombin within the spinal nerve root vasculature. A limited hypercoagulability workup performed on antemortem and postmortem specimens failed to identify a cause of the hypercoagulability.

Sudden death due to pulmonary emboli in infancy is an extremely rare event. This infant suffered a hypoxic-ischemic injury of her brain and spinal cord secondary to the effects of pulmonary thromboemboli with subsequent resuscitation. The spinal nerve root/dorsal root ganglia hemorrhage is considered by some authors to be indicative of cervical flexion/extension; however, the diffuse presence of hemorrhage at all levels and associated microscopic necrosis and thrombi suggests that it is due to sequelae of ischemia-reperfusion and not inflicted injury. The case highlights the importance of maintaining an open mind to the findings of retinal, intracranial, and nerve root/dorsal root ganglia hemorrhages.

8.2 Gross and Histologic Comparison of Acute and Chronic Skull Fractures to Typical and Accessory Sutures of the Infant Skull

A. Rogalska, V. Tranchida

Dane County Medical Examiner's Office, McFarland, Wisconsin, USA

The bones of the skull form through fusion and ossification of multiple bone precursors. In addition to the readily identified sagittal, coronal, and lamboid sutures, numerous accessory sutures and fissures can be seen in infants, children, and sometimes adults. Incomplete fusion between bone precursors can result in accessory or atypical suture lines between any bones of the skull. The most commonly identified atypical sutures are the metopic, intraparietal and mendosal sutures. When encroaching into normal bone, these sutures can appear radiologically as acute fractures. Radiographically, acute fractures demonstrate sharp, lucent edges, which can help differentiate them from the scalloped, sclerotic edges of accessory sutures. However, these atypical sutures may be misdiagnosed as head trauma to the untrained eye. In these cases, histologic examination can help differentiate between acute fractures across an atypical suture, remote fractures of bone with fibrosis, and normal sutures. In this presentation, gross and histologic features of acute and remote parietal skull fractures in infants are compared to acute diastatic fractures of accessory parietal bone sutures, intact accessory parietal bone sutures, and normal control sutures of the skull.

8.3 Tackling the Challenges of Fetal Autopsies in the Setting of Maternal Trauma

B. Daggett¹, D.S. Atherton², D.W. Dye², B.C. McCleskey²

¹University of Alabama Hospitals, Birmingham, Alabama, USA; ²Jefferson County Coroner/Medical Examiner's Office, Birmingham, Alabama, USA

Fetal autopsies are challenging because of their relative infrequency and other social, historical, and technical factors that are associated with these sorts of cases. In this presentation, we will present a series of cases that will provide examples of some of these unique challenges. In one case, a 14-week gestational age fetus died due to complications of a maternal gunshot wound. Neither the fetus nor the uterus sustained direct injury from the projectile, but ultrasound at the treating hospital documented presence and then absence of fetal heart tones. This case will highlight the importance of correlation of findings with the maternal medical record. In another case, a 36-week gestational age fetus died after the mother reportedly abused heroin; morphine and codeine were detected in the meconium, but not the fetal blood or urine. This case highlights challenges in fetal toxicological interpretation. In another case, a 26-week gestational age fetus died due to acute hypoxia in the setting of a maternal assault in which the assailant reportedly "sat" on the victim's abdomen. In this case, gross and microscopic features helped establish the temporal relationship between the assault and intrauterine fetal demise. These cases will highlight the unique challenges of fetal deaths in a traumatic setting, as well as the importance of a correlation of findings with maternal history, medical documentation from the hospital, and toxicological analysis of fetal tissues.

8.4 Sudden Unexplained Death in Childhood (SUDC): Blinded Neuropathology Review of Autopsy Standardized Cases

D.F. Leitner¹, D. McGuone², C. William¹, A. Faustin¹, T. Shepherd¹, M. Snuderl¹, T. Wisniewski¹, L. Crandall¹, O. Devinsky¹

¹New York University, New York, New York, USA; ²Yale University, New Haven, Connecticut, USA

Introduction: Sudden unexplained death in childhood (SUDC) is the death of a child over one year of age that is unexplained despite review of clinical history, circumstances of death, and complete autopsy with ancillary testing. Sudden unexplained death in childhood is thought to result from multiple etiologies; thus, detailed investigation is required to identify the potential cause(s) of death. Two studies found hippocampal abnormalities to be the most common neuropathological findings, less often focal cortical dysplasia and dysgenesis of the brainstem and cerebellum. These neuropathologic investigations were retrospective and non-standardized in specimens available for review and some findings may be more subjective than others, and thus whole brain standardized studies are needed to define the neuropathology of SUDC.

Methods: We aimed to determine the concordance of neuropathologic findings in 20 cases from the SUDC Registry and Research Collaborative (SUDCRR). All cases were sudden and unexpected child deaths whose cause of death was undetermined after the gross autopsy alone. Average age was 39.4 months, 40% were male, 45% with simple and 15% complex febrile seizure history, 15% with genetic pathogenic variants, 85% died during apparent sleep, 80% prone, 45% in face down position and 30% to side. Post mortem 3-T MRI scanning of ex vivo whole brains was used as a part of this systematic protocol to investigate pathology. Two neuropathologists blinded to case history reviewed whole brain digital photographs and histology of 23 standardized brain regions.

Results: Hippocampal abnormalities were the most common findings on microscopic review and had the highest concordance between two blinded neuropathologists, with the most frequent findings including gliosis and irregular dentate gyrus (DG) configuration. Irregular DG configuration trended with increased lifetime seizure frequency. In three cases with

hippocampal abnormalities, pathogenic genetic cardiac variants were considered contributory to cause of death and transformed SUDC cases to explained deaths.

Discussion: In this small series, hippocampal abnormalities were the most common brain abnormality identified in both SUDC cases and cases of death associated with cardiac genetic variants. The significance of hippocampal abnormalities is uncertain due to evidence that hippocampal abnormalities may be the result of seizures as well as a contributor to seizure pathogenesis. Further research is needed to understand the implications of hippocampal microscopic findings of uncertain significance, and their relevance to mechanisms of death and underlying risks of SUDC.

8.5 Mechanisms of Cerebral Edema in Abusive Head Trauma

R.J. Castellani¹, A. Scholl¹, C.J. Schmidt²

¹West Virginia University, Morgantown, West Virginia, USA; ²Wayne County Medical Examiner's Office, Detroit, Michigan, USA

The pathophysiology of parenchymal brain injury in abusive head trauma is poorly understood. Whereas much of the focus has centered on biomechanical thresholds for subdural hematoma and traumatic axonal injury, neither are sufficient to explain the massive cerebral swelling and encephalopathy that often occurs in this setting. Moreover, imaging signal abnormalities and asymmetries (e.g., "big black brain" phenomenon) suggest that ischemia-reperfusion, although common in the aftermath of abusive head trauma, is also an insufficient explanation. As an initial step into the investigation of abusive encephalopathy, we first explored cases of abusive trauma versus asphyxia/unsafe sleep with immunoreactivity for IgG and albumin. Both proteins are normally restricted from entering the brain by an intact blood brain barrier. We also looked for up-regulation for sulfonylurea1 (Sur1), transient receptor potential melastatin-4 (TRMP4), and aquaporin-4. Emerging evidence suggests that Trpm4 interacts with Sur1 to form a novel ion channel, the Sur1-Trpm4 channel, which functions critically in various acute central nervous system injuries, contributing to cytotoxic and vasogenic edema. Aquaporin 4 is expressed in terminal astrocytic processes and facilitates water transport into and out of the central nervous system. Subjects included nine decedents with acute blunt force trauma (age range 2.5 months to 16 months) and seven subjects with asphyxial deaths due to unsafe sleep environments (age range 0.5 months to six months). Among the deaths from blunt force trauma, five were associated with subdural hemorrhage, while four of the trauma subjects lacked subdural hemorrhage. Survival in the trauma subjects ranged from 0 to 38 hours. Both groups showed variable IgG and albumin immunoreactivity around small blood vessels in gray and white matter. However, trauma subjects with subdural hematoma showed pronounced subpial immunoreactivity for IgG and albumin. SUR1 was upregulated in some trauma subjects, however Trmp4 appeared to be constitutively expressed. Aquaporin 4 showed no differences between groups, likely due to the short survival times. Overall, these data suggest a breach in the integrity of the superficial vasculature, possibly accompanied by SUR1-Trmp4 ion channel up regulation. Moreover, the association between the subpial IgG/albumin reactivity and subdural hemorrhage suggests mechanical injury to superficial veins and parenchymal venules. This initial study raises questions of pathophysiology and suggests a link between subdural hemorrhage and the devastating parenchymal brain injury that occurs in the aftermath of abusive head trauma. The study was approved by the WVU institutional review board.

8.6 Histiocytoid Cardiomyopathy (HC), is it Really Cardiomyopathy? Renaming the Condition and an Update of Newly Discovered Genes

B.M. Shehata, R. Taylor

Children's Hospital of Michigan, Detroit, Detroit, Michigan, USA

Introduction: Descriptions of histiocytoid cardiomyopathy (HC) have been published under various synonyms, including HC. Over the past several years, it has been demonstrated that the condition is neither histiocytic nor a cardiomyopathy. Therefore, we propose a new name for this condition to be more consistent with the lesion. Many hypotheses have been proposed in the etiopathogenesis of HC, including cytochrome b missense mutations in complex III of the electron transport chain, MERRF gene mutations in complex IV, and X-linked Xp22 mutations. The first breakthrough in the molecular characterization of HC was the identification of a de novo nonsense mutation in two cases, involving exon 2 of the *NDUFB11* gene, which encodes a structural component of complex I of the electron transport chain. This finding was confirmed three years later by Raheji, et al. We have since identified more genes from the *NDUF* families.

Methods: We performed whole exome sequencing of 10 members of one familial case and three family members in another sporadic case. More than 100 sections were stained for CD68 and CD163 to assess for the presence of histiocytic markers.

Results: The familial case was composed of two parents, six living siblings (four female and two male) and two deceased (six-month-old male and nine-month-old female). Our analysis showed no mutations in the parents and living siblings. Therefore, our identification of a de novo missense mutation in *NDUFB9* in male and female siblings, who died seven years apart, suggests a familial tendency of this condition. The other family had a sporadic case and consisted of two parents and one deceased child. In this case, we identified a nonsense mutation in *NDUFA1*, located on Xq24. For histiocytic markers, over 100 cases stained negative for both CD68 and CD 163.

Discussion: Our data implicate two additional members of the *NDUF* family (*NDUFB9* and *NDUFA1*) in the etiopathogenesis of this condition for its role in complex I of the electron transport chain. Our discovery of the same *NDUFB9* mutation in two deceased siblings also suggests a familial tendency in the condition. These findings support and expand upon our previous work on the role of the *NDUF* family. The cells of origin in these cases are not histiocytic; additionally, the disease has never been classified by consensus data as a cardiomyopathy. Therefore, we propose a more accurate name for the condition: Conduction System Hamartoma (CSH). We will adopt this name in further publications.

8.7 The Autopsy Pathologist and Extracorporeal Membrane Oxygenation (ECMO)

A.T. Philip, C. Boggs, C. Gulledege

Cobb County Medical Examiner's Office, Marietta, Georgia, USA

While ECMO needs no introduction, debate remains whether the more appropriate term should be Extracorporeal Life Support System (ELSS) as recommended by the Extracorporeal Support Organization (ELSO) and the ELSO Registry (ELSOR). Unfortunately, ELSS and its variants do not roll off the tongue as well as ECMO. ECMO gained widespread use initially in neonates and pediatric cases and later in adults with cardiac and/or pulmonary dysfunction that are refractory to conventional management. Beyond these well-known indications, ECMOs are now being used as a bridge to transplant and as support to maintain long term patients after lung resection. An Australian report in 2009 documented the great value of ECMO use during the H1N1 pandemic. Novel ECMO deployments being attempted include its use during aeromedical evacuations by the armed forces using a portable set up, as well as

maintaining regional perfusion of abdominal organs involving organ donations after pronouncement of cardiac death. A trade journal estimates the ECMO market is projected to reach \$346 million by 2024.

Considering these rapid changes in the practice of modern medicine, it is inevitable that any given pathologist could be called upon to do an autopsy evaluation of a decedent who was recently treated with ECMO. It should come as no surprise that ECMO units, comprised of a multi-disciplinary team of technicians, nurses, surgeons and physicians of diverse specialties, get over 100 hours of training, including practice drills, prior to certification before they are incorporated into the rapid deployment and prolonged maintenance teams. However, there is hardly any literature or protocol for the pathologist saddled with the task of autopsy evaluation.

The Cobb County Medical Examiner's Office performed a series of autopsies on ECMO patients from a local hospital between 11/2018 and 3/2019. This presentation briefly reviews the findings of five cases. We also discuss some of the aspects regarding the evolution of the involved technology, define some of the many confusing terms like veno-venous (VV) and veno-arterial (VA) ECMOs, as well as clarify acronyms like ALIRT, ROTEM and SET-LRP. Our ambition in embarking on this presentation is to develop a protocol that will be useful to forensic pathologists, hospital pathologists and pathology assistants when doing an autopsy on a case that was recently treated by ECMO.

9.1 The "Molecular Autopsy": Real Life Experience in a Medical Examiner's Office

M.D. Bell

Palm Beach County Medical Examiner Office, West Palm Beach, Florida, USA

The Palm Beach County Medical Examiner Office has used a commercial genetic testing laboratory (Invitae) for two years (2017-2019) to test for genetic mutations in decedents who died suddenly and unexpectedly. We used the criteria established by NAME to select decedents for postmortem genetic testing ("molecular autopsy"). There were 27 cases between 2017 and 2019 and five additional cases from previous years in which blood was retained and frozen at -85° F. The cases included individuals with autopsy diagnosed cardiomyopathies (hypertrophic and arrhythmogenic), sudden death with epilepsy, unexplained drowning, sudden death with a normal-appearing heart (including children and infants), thoracic aortic dissection, and miscellaneous disorders. Of the 32 cases tested, eight (25%) had recognized pathogenic variants, 17 (53%) had genetic variants of uncertain significance, and seven (22%) showed no genetic mutations. In 17 cases (53%), there was a correlation between the clinical and/or pathological findings found in the decedent and that expected based on the affected gene found during the molecular autopsy. We find postmortem genetic testing is affordable and helps to corroborate the clinical and pathological findings in individuals who die from heritable cardiovascular disease.

9.2 Use of Molecular Autopsy in Cases of Suspected Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)

K. De Berg, K. Snell

Sanford Health, Sioux Falls, South Dakota, USA

This case series presents two unrelated individuals who underwent molecular autopsy after sudden unexplained death. In the first case, a 25-year-old male, who competes on a high athletic level, passed away unexpectedly one day after competing in a triathlon. He received CPR from family until EMS were able to transport him to the local emergency department, where he died. Postmortem examination cardiac pathology showed fibrofatty replacement of the right ventricle indicating a diagnosis of arrhythmogenic right ventricular cardiomyopathy. Genetic counseling was offered to the surviving family where the option of molecular autopsy was

discussed. Family history was negative for cardiomyopathy or sudden unexplained death. Molecular testing revealed a heterozygous pathogenic variant in HFE, which was felt to be noncontributory. Testing also reported three variants of uncertain significance (*MYL2*, *RYR2* and *NEBL*). Familial variant testing has been initiated.

The second case was a 12-year-old boy who was found on the floor unresponsive by family at home. Post mortem examination reported fatty infiltration of the right ventricle. The family was referred to genetic counseling. Family history was largely negative with the exception of a living paternal grandfather with cardiomegaly. Molecular testing detected a pathogenic variant in *PKP2*. A detectable pathogenic variant has provided an opportunity of cascade testing.

These cases exemplify the benefit of incorporating the use of a genetic counselor when doing molecular autopsies of unexplained death. Molecular testing can help confirm a post-mortem diagnosis and aid in identifying other "at-risk" family members. Through genetic counseling, the families were able understand the benefits and limitations of molecular autopsy. In each case, first degree family members were offered cascade testing. Family members who are found to have the familial variant are referred to cardiology for screening and surveillance.

9.3 Results of the Molecular Autopsy from a Sudden Unexplained Death in Childhood Cohort

R. Rabin¹, M. Halvorsen², L. Crandall¹, O. Devinsky¹
¹NYU Langone Health, New York, New York, USA; ²University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

Sudden unexplained death in childhood (SUDC) is the sudden unexpected death of a child more than one year of age where the cause of death remains unknown after a complete investigation, including review of medical history, circumstances of death, and autopsy. When the cause of death remains unknown, underlying genetic factors may contribute. Molecular autopsies have identified contributory variants, but have traditionally targeted individuals suspected to have an inherited cardiomyopathy or arrhythmia. Neurologic mechanisms may also account for some SUDC cases, as approximately one-third of decedents have had febrile seizures. To better understand the genetic etiology of SUDC in seemingly healthy children, we performed trio based whole exome sequencing (WES) at Columbia University Institute for Genomic Medicine for the first 124 families enrolled in the NYU SUDC Registry and Research Collaborative. Consent for participation was obtained and the study protocol was approved by the NYU Institutional Review Board. Probands were eligible for enrollment if they died unexpectedly between the ages of 11 months to 18 years and complete investigation did not identify a cause of death. Through WES, 16 probands (about 13%) were identified to have a pathogenic or likely pathogenic variant that was thought to be contributory to the child's death. Ten of the variants were de novo and six of the variants were inherited from a parent. We identified variants in 10 unique genes: six of the genes are associated with cardiomyopathy and/or arrhythmia (*CACNA1C*, *RYR2*, *CALM1*, *TNNI3*, *PPA2*, and *SCN5A*), three of the genes are associated with a seizure disorder (*SCN1A*, *GNAO1*, and *DEPDC5*), and one gene is associated with an overgrowth syndrome (*DMNT3A*). Multiple probands were identified to have a pathogenic or likely pathogenic variant in *CACNA1C*, *RYR2*, and *SCN1A*. Our findings support the importance of cardiac genes in SUDC and we show that genes associated with neurologic disorders can also yield significant pathogenic findings. Identification of inherited variants may be medically actionable for additional family members and have reproductive recurrence risks for the family. Molecular autopsy using WES can identify the cause of death in some SUDC cases and helps define the phenotypic spectrum of genes, both known and unknown, that are associated with sudden death.

10.1 ISO17020:2012 Accreditation and NAME Accreditation: Our Experience and Removing the Misconceptions

A.C. Gruszecki¹, S. Aiken², B.C. Wolf³, P. Arunkumar⁴, R. Mitchell⁵
¹American Forensics, Mesquite, Texas, USA; ²Spokane County Medical Examiner's office, Spokane, Washington, USA; ³Districts 5 & 24 Medical Examiner's Office, Leesburg, Florida, USA; ⁴Cook County Medical Examiner's Office, Chicago, Illinois, USA; ⁵Office of the Chief Medical Examiner, Washington, District of Columbia, USA

Accreditation certifies that an entity has met and is maintaining the standards established by the accrediting agency. The National Association of Medical Examiners has been offering accreditation for Medical Examiner's office for decades. Beginning in 2013, NAME began offering accreditation for Autopsy Only facilities. NAME has been a leader in defining, quantifying and improving death investigation in the United States and internationally. Furthering this goal, in 2017, after several years of Dr. Barbara Wolf's and Dr. David Fowler's and Executive Director Dee McNally's efforts, NAME formed a partnership with ANAB for ISO 17020:2012 accreditation.

In this workshop, we will present aspects of the accreditation process and the reasons why ISO17020 was chosen to augment NAME core accreditation. This presentation will address misconceptions about ISO accreditation based on practical experience of offices that have been assessed to date.

Dr. Sally Aiken will provide an overview of ISO, and describe how ISO17020 was chosen for NAME from the thousands of ISO/IEC standards that exist. Dr. Aiken will also discuss the emphasis on quality assurance in ISO accreditation compared to the practice of medicine that is the center of NAME core accreditation.

Dr. Barbara Wolf will discuss the overall accreditation process for NAME and the status of accreditation for NAME in conjunction with ISO17020:2012.

Dr. Amy Gruszecki will present her experience as the first office to be ISO/IEC 17020 accredited. The experience will focus on the "small office" viewpoint, without the use of a consultant or a dedicated quality assurance manager. She will discuss tips and tricks from her experience on how accreditation was achieved.

Dr. Ponni Arunkumar will discuss her experience with ISO/IEC17020:2012 accreditation for a large medical examiner's office and her office being the first to apply for ISO/IEC17025 for their in house laboratory. She will discuss her use of a dedicated quality assurance manager for the process.

Dr. Roger Mitchell, Chief of the Washington DC office, will discuss preparing for ISO/IEC17020 accreditation using a consultant. He will discuss the pros and cons of using a consultant from his experience.

10.2 2019 Salary Survey Results

W. Oliver
Regional Forensic Center, Knoxville, Tennessee, USA

A follow-up survey of salaries and work demographics of medicolegal death investigation professionals has been developed. This survey builds on the responses garnered from a 2018 survey of a similar cohort. At the time of abstract submission, the survey period has not terminated, and results are not yet available. The results of this survey will be compared to those of last year, which will provide one of the first attempts at developing objective measures of trends in income, workload, and working conditions for those involved in medicolegal death investigation.

10.3 Check Please: The Importance of The Pregnancy Checkbox On Death Certificates in Identifying Pregnancy-Related Deaths

J.M. Gorniak

Fulton County Medical Examiner's Office, Atlanta, Georgia, USA

The main focus of medicolegal death investigation is on certifying cause and manner of death. However, medical examiner and coroner (ME/C) offices have an important public health role. ME/C offices contribute to public health by participating in surveillance systems, including pregnancy-related deaths. Georgia is one of nine States with a Maternal Mortality Review Committee (MMRC) in which the Fulton County Medical Examiner's Office (FCMEO) is a member.

Despite advances in medicine and medical technologies, the rate of pregnancy-related deaths in the United States has increased over the past 25 years. According to The Centers for Disease Control and Prevention (CDC), about 700 women die each year from complications of pregnancy or delivery. A pregnancy-related death can occur during pregnancy, at delivery, and even up to a year postpartum. In an effort to improve the reporting of maternal deaths, the US Standard Certificate of Death was revised in 2003 to include pregnancy status checkboxes. The question has checkboxes to determine whether female decedents were not pregnant within the past year, pregnant at the time of death, not pregnant but pregnant within 42 days of death, not pregnant but pregnant 43 days to 1 year before death, or unknown if pregnant within the past year.

During the time period 2014 – 2018, the FCMEO accepted jurisdiction of 7598 cases. Thirty-one percent (2359) were female, of which 886 (37.6%) were of reproductive age (10 years – 54 years) requiring the pregnancy status to be answered on the death certificate. Review of the 886 cases showed that the majority (42%) of the deaths were ruled natural, 303 (34%) as accident, 82 (9%) as homicide, 107 (12%) as suicide, and 22 (2%) as undetermined. Ninety-two percent of the cases had the "Unknown if pregnant within the past year" box checked on the death certificate. This supports the fact that accurate information that would allow the identification of women who were pregnant at the time of death or within the year preceding death is under-reported. Pregnancy status is not a routine question asked during the death investigation. To improve the identification and reporting of pregnancy-related deaths, the FCMEO will require the medicolegal death investigators to obtain pregnancy status of all female decedents, between the ages of 10 years and 54 years, in which jurisdiction is accepted.

10.4 Reclaiming the Autopsy as the Practice of Medicine: A Pathway to Remediation of the Forensic Pathology Workforce Shortages?

V.W. Weedn¹, M. Menendez²

¹George Washington University, Washington, District of Columbia, USA; ², Philadelphia, Pennsylvania, USA

The historically constricted Forensic Pathology workforce pipeline is facing an existential crisis. Pathology residents are exposed to Forensic Pathology through the Accreditation Council for Graduate Medical Education (ACMGE) autopsy requirement, but this requirement is not supported by many Pathology Department Chairs. In 1950, an autopsy was conducted on one-half of the patients dying in American hospitals and was often conducted in over 90% of the deaths in teaching hospitals. Autopsy rates declined precipitously after the 1971 decision by the Joint Commission on Accreditation of Healthcare Organizations (JCAH; now JCAHO) to eliminate the 20% autopsy requirement for hospital accreditation. The decline further accelerated after the Health Care Finance Administration (HCFA) (now Centers for Medicare and Medicaid Services; CMS) stopped paying for autopsies in 1986, ruling that autopsies were not part of patient diagnosis and treatment and thus were not the practice of medicine to be

funded by the federal government. The lack of autopsy funding is a major reason for the lack of support for autopsies in departments of pathology; therefore, a reclassification of the autopsy as a medical procedure may return funding by CMS and other sources, and would likely spawn financial support for the autopsy services of pathology training programs that supply the Forensic Pathology pipeline. The value and worth of autopsies as diagnostic tools and prophetic beacons in the practice of medicine is well-established and should be accorded proper status and respect as a vital medical procedure conducted in practice of medicine. Such recognition and reclassification carrying attendant CMS funding, professional recognition of value and worth, and pay parity for the practice of Forensic Pathology is essential for the survival of the autopsy and the rebuilding of the workforce performing the practice of medicine as Forensic Pathologists.

10.5 The Oscar Pistorius Trial: Ethicolegal Perspectives For Forensic Pathologists

G. Saayman

Department of Forensic Medicine, University of Pretoria, Pretoria, South Africa

In the course of his/her professional career every forensic pathologist is likely to encounter cases which will prove to be of a high profile or newsworthy nature. The "high profile" nature of the case may not always be apparent from the outset, manifesting itself only after the autopsy and initial investigations have been conducted. There is opportunity to learn from these high profile cases - and such cases may be very useful to teach or to highlight certain issues, whether it be to educate and inform the public or to sensitize politicians and administrators to resource limitations or legislative deficiencies, etc. More importantly, such cases offer opportunity for us as pathologists to learn and to improve on our standards and in service delivery to society.

The author was responsible for performing the autopsy on the deceased, Ms Reeva Steenkamp, and subsequently testified at the trial of Oscar Pistorius (OP). This trial, dubbed by some in South Africa to be the "trial of the century", generated huge media interest and public debate. A particular issue which arose in this case, was the contemporaneous direct TV transmission of proceedings, which brings substantial challenges for all parties involved. More than five years have now passed since the initial event, and much of the dust around the case has settled. Yet there are still issues which remain to be explored and which require critical review within the forensic science / medicine fraternity. This presentation aims to juxtapose some unusual perspectives which arose in relation to the Oscar Pistorius trial, with the fundamental principles of biomedical ethics (non-maleficence, beneficence, respect for autonomy and justice). Discreet use may be made of case material to illustrate and substantiate some of the ethico-legal concerns and dilemmas which arose in this matter.

South Africa has one of the highest nonnatural death rates in the world, with exceptionally high numbers of fatal outcomes due to interpersonal violence – with gender based violence being a particular problem. It is our duty to (responsibly) use cases of this nature to sensitise society to some important issues which arise in the context of death investigation and presentation of evidence in subsequent legal proceedings. Pathologists should responsibly debate these (universal) issues which go to the heart of morality, ethics and jurisprudence.

11.1 Butte County Camp Fire 2018: Methods used to Identify Victims of California's Deadliest Fire

J.P. Tovar¹, K. Gin², R.F. Selden³, K.L. Honea⁴

¹Sacramento County Coroner Office, Sacramento, California, USA;

²Sacramento County Coroner, Sacramento, California, USA; ³ANDE, Waltham, Massachusetts, USA; ⁴Butte County Sheriff-Coroner Office, Oroville, California, USA

Mass fatality incidents are fraught with difficulties from recovery to examination to identification. The larger the incident the larger the issues encountered. On the morning of November 8, 2018, a wild fire, quickly dubbed the Camp Fire, started in Butte County near the town of Paradise, California. The fire started within hours of the mass shooting in Ventura County and quickly became the biggest mass fatality incident in California's recorded history. Not surprisingly, the state's mutual aid system was rapidly overwhelmed and it became apparent that help would be needed from every region within the state. Butte County requested assistance through the California Office of Emergency Services for search and recovery efforts within the county. Agencies throughout the state responded to help with the efforts and various disciplines were utilized to help the recovery efforts. Butte County also requested assistance with the examination and identification of the unidentified victims. The majority of the examinations and the identifications were completed at the Sacramento County Coroner Office. The victims, 84 in total, were badly burned and in many cases the remains were nothing more than single bones and partial skeletons. Postmortem examinations consisted of separating the remains into bones and soft tissues, radiography, and autopsy in more complete bodies. Multiple samples for toxicology and DNA were taken. The identification process encompassed a variety of disciplines including odontology, anthropology, pathology, and DNA expertise using a variety of techniques including fingerprints, dental and anthropological exams, surgical hardware identification and DNA. Within three months, 87% of the victims were positively identified despite the extremely poor condition of the remains. One of the keys to the quick identification in this event was the use of rapid DNA. This was the first time in U.S. history that a rapid DNA process was used in a mass fatality incident. The coordination between Butte County, Sacramento County, California Department of Justice, the myriad of experts and a private company, ANDE, was the key to making the identifications quickly for most of the victims. The incident is presented, along with a discussion regarding the important aspects of the recovery, processing, examination and identification of these victims. A review of the lessons learned from the event is also provided.

12.1 How the Centers for Disease Control and Prevention (CDC) and Medical Examiners Collaborate to Help the Living

C. Cottengim¹, P.A. Braun¹, K. Fowler¹, D. Goodman¹, C. Mattson¹, R.

Noe¹, S. Reagan-Steiner¹, K. Chatham-Stephens¹, M. Warner¹

¹CDC, Atlanta, Georgia, USA; ²CDC, Hyatsville, Maryland, USA

Medical examiners are at the front line for many public health issues, and are critical to the Centers for Disease Control and Prevention's (CDC) mission to save lives and protect people from health threats. To accomplish this mission, CDC relies on collaborative efforts of the medical examiner community through sharing of data and resources. Because medical examiners have unique knowledge, perspective and data, they are key to successful mortality surveillance and public health prevention programs.

Multiple programs at the CDC collaborate with medical examiners nationwide. The goals of this workshop are to discuss CDC surveillance systems for which medical examiner input is critical, including effective use of the data for prevention strategies, and to share CDC's cross-center efforts to support medical examiners' needs and coordinate the data requests. Speakers representing several CDC centers will provide a brief

overview of their programs that involve medical examiners, including current activities and future opportunities.

This workshop will have nine presenters from seven different Centers at CDC: The Center for Preparedness and Response, The Center for Surveillance, Epidemiology, and Laboratory Services, The National Center on Birth Defects and Developmental Disabilities, The National Center for Chronic Disease Prevention and Health Promotion, The National Center for Health Statistics, The National Center for Infectious and Zoonotic Diseases and The National Center for Injury Prevention and Control. Important public health topics will include all-cause mortality surveillance, infant mortality, maternal mortality, infectious disease mortality, opioid overdose mortality, violence-related mortality, emergency preparedness and response efforts and deaths associated with emergencies and disasters. CDC provides technical expertise to support epidemiologic questions related to the topics and surveillance systems such as Epi Aids and preparedness for mass fatalities. CDC also provides expertise to emerging threats, particularly potential and known infectious agents. Presenters will also review ways CDC has supported medical examiners through shared resources for purchasing of equipment, purchasing genetic testing, supporting staff salaries, evaluating autopsy tissues, and supporting toxicology expenses.

As a result of data from medical examiners, CDC has been able to monitor trends in leading causes of death, identify common circumstances associated with suicide deaths, provide targeted safe sleep messages for infants, identify new or emerging pathogens, inform program, policy and priority setting, and document the impact of interventions. This workshop will highlight our continued efforts to share resources and support medical examiners in their efforts.

12.2 The Centers for Disease Control and Prevention's Sudden Unexplained Infant Death Investigation Reporting Form Update

A.B. Erck Lambert¹, C. Cottengim², E. Johnston²

¹Contractor at the Centers for Disease Control and Prevention, DB Consulting Group, New Orleans, Louisiana, USA; ²CDC, Atlanta, Georgia, USA

In 1991, the National Institute of Child Health and Human Development convened an expert panel that developed a definition for Sudden Infant Death Syndrome that included a thorough examination of the death scene. This prompted a 1992 congressional recommendation for a standard infant death scene investigation protocol and the first Sudden Unexplained Infant Death Investigation Reporting Form (SUIDIRF), was released in 1996. In 2006, the Centers for Disease Control and Prevention (CDC) and a group of experts in death investigation updated the SUIDIRF, and developed an accompanying scene investigation training curriculum.

In 2017, CDC began updating the SUIDIRF through Ideation Catalyst, an evidenced-based entrepreneurial training hosted by CDC's Office of Technology and Innovation and Georgia Tech's VentureLab. Stakeholders, identified through the National Association of Medical Examiners (NAME), American Board of Medicolegal Death Investigators and SUID Case Registry, included death scene investigators, law enforcement officers, pathologists, state health department staff and Child Death Review team members. Stakeholders were interviewed, and based on their comments we made edits to the 2006 SUIDIRF. For example, we learned it may be difficult for the family to answer questions after recounting the circumstances of the death. As a result, the 2019 SUIDIRF starts with pregnancy history, and moves to infant birth, medical and feeding history before asking about the death. New questions were added on the topics of substance use (e.g., Was the infant born with Neonatal Abstinence Syndrome?), infant development (e.g., Was the infant able to roll over on his/her own?), doll scene reenactment (e.g., Was a doll scene reenactment performed?), and sleep environment (e.g., Was the infant's airway

obstructed by a person or object when found?). Also, existing questions were streamlined, and definitions and instructions were added where there previously were none. For example, defining terms like “wedging”. During this session, CDC will review the changes described above, share the public health significance of new questions, and discuss how to access the form.

During the summer of 2019, CDC will complete the SUIDIRF update, and begin seeking endorsement and broad dissemination. CDC’s dissemination strategy relies on our partner organizations, like NAME, to assist in alerting their communities of the SUIDIRF update for use during death investigation, or to inform updates to jurisdictional equivalents and trainings. NAME’s support is critical in the continued dissemination of the updated SUIDIRF, which will ultimately result in a better understanding of the circumstances surrounding these tragic deaths.

12.3 Medical Examiner Data on Mass Homicide: Findings from the National Violent Death Reporting System, 32 US States, 2003-2016

K.A. Fowler

Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Introduction: Mass homicides present unique challenges to medical examiners, yet little comprehensive investigative data has described the characteristics of these incidents. This analysis presents findings from CDC’s National Violent Death Reporting System (NVDRS).

Methods: NVDRS is a public health surveillance system, aggregating information from medical examiner/coroner, law enforcement, and death certificate records into one database. NVDRS provides the most comprehensive information available about homicides, suicides, unintentional firearm deaths, deaths due to legal intervention (excluding executions), and deaths of undetermined intent. This includes characteristics of injury and manner of death, toxicology results, decedent demographics, limited information about suspected perpetrators, and precipitating circumstances. NVDRS also links related deaths that occur within the same 24 hours into one incident, a unique feature that makes it possible to analyze multi-victim incidents. Trained data abstractors abstract NVDRS variables from investigative records according to standardized CDC guidelines. Data came from all 32 states participating in NVDRS in all available data years (2003-2016). In keeping with federal definitions, mass homicides were defined as those with ≥ 4 homicide victims other than the perpetrator.

Results: Six-hundred-forty-one people died in 122 mass homicide incidents captured by NVDRS between 2003-2016, with a range of 4-32 victims/incident. Autopsies were conducted for 98% of victims. Firearms inflicted fatal injuries in 77% of cases (most commonly semi-automatic handguns; 21%); the next most common weapons were sharp instruments (8%). Mass homicide decedents sustained a median of 5 penetrating wounds (range 0-75+), and for those that sustained gunshot wounds, a median of 3 bullet wounds (range 0-24). The most common wound locations inflicted by the weapon causing fatal injury were the head (52%), thorax (32%), upper extremities (25%), face (15%), and/or neck (15%). Over one-quarter of incidents (27%) resolved with the perpetrator’s suicide, and 3% with the perpetrator killed by law enforcement. In those incidents, toxicology information was available for 76% of perpetrators. The substances most frequently detected in the toxicology results of deceased perpetrators were alcohol (14%) and opioids (14%). The most common precipitating circumstances of mass homicides reported by medical examiner/coroners were occurrence in the context of another crime (e.g., robbery, drug trafficking; 36%); intimate partner violence (20%); and/or arguments (17%).

Discussion: Medical examiners play an important role in characterizing mass homicides. Their findings document the devastating physical consequences of fatal violence, an important piece of its impact on human health and allow violence researchers to identify patterns that may prevent future mass homicides.

12.4 ECHO: Medicolegal Death Investigation—A Novel Solution to Training and Certifying Forensic Medicolegal Death Investigators in a Geographically Distributed Medical Examiner System

I.D. Paul¹, A. Wyman¹, L. Decker¹, L. Edelman²

¹Office of the Medical Investigator, University of New Mexico, Albuquerque, New Mexico, USA; ²Travis County Medical Examiner, Austin, Texas, USA

Learning objectives: Attendees will understand how to utilize the virtual ECHO educational platform for ongoing training and ABMDI certification of medicolegal death investigators in a geographically distributed medical examiner system.

The New Mexico Office of the Medical Investigator is a centralized statewide medical examiner system based at the University of New Mexico School of Medicine in Albuquerque, NM. The office investigates approximately 7000 deaths each year and performs approximately 2000 autopsies annually. New Mexico is geographically the fifth largest state and has a widely distributed population. We rely on field medicolegal death investigators (MDI), located in every county across the state, as the primary source of investigative information and documentation at the scene of death.

Medical examiner and coroner’s offices nationwide are entirely dependent on the quality and accuracy of medicolegal death investigation to appropriately certify deaths. Training strategies for gaining experience in medicolegal death investigation vary widely nationwide and span the spectrum from minimal training, office specific training, university based programs, and online courses. There is no consistent approach to training MDI’s and this limitation has resulted in a national shortage of adequately trained and ABMDI certified MDI’s.

Project ECHO: Medicolegal Death Investigation (ECHO:MDI) was formally launched in July, 2015 to provide a training program for geographically dispersed MDI’s with the intent of increasing ABMDI certification rates, improving medicolegal death investigation education, and improving public health and safety. ECHO:MDI pairs an expert panel (forensic pathologist, MDI, grief counselor, and a rotating expert) together with field MDI’s in a weekly interactive videoconference to provide in depth and essential knowledge concerning medicolegal death investigation. ECHO:MDI also provides a forum for investigators to bring their difficult cases and questions to an expert panel. We currently have up to 80 New Mexico MDI investigators, and two medical examiner offices in Oklahoma participating in our weekly one-hour virtual conference.

The ECHO:MDI curriculum mirrors the certification recommendations from the American Board of Medicolegal Death Investigators. The majority of the educational content of each section is presented using ECHO:MDI as the primary modality. ECHO:MDI uses didactic lectures, role playing, creative games, and interactive case-based discussions to illustrate topics.

Project ECHO: Medicolegal Death Investigation is a novel, effective, relatively inexpensive and sustainable approach to training medicolegal death investigators in a distributed medical examiner system. Most medical examiner/coroner offices across the country would have access to the resources required to initiate and operate this cost effective approach

12.5 Automated Drug-Involved Death Data Collection Pilot

S. Clark¹, J. deJong², J. Jentzen³, L. Knight⁴, M. McGee⁵, G. Civanovich⁶, M. Sens⁷

¹Occupational Research and Assessment, Big Rapids, Michigan, USA; ²Western Michigan University, Kalamazoo, Michigan, USA; ³University of Michigan, Ann Arbor, Michigan, USA; ⁴Washoe County, Reno, Nevada, USA; ⁵Ramsey County, St Paul, Minnesota, USA; ⁶Jefferson Parish, Harvey, Louisiana, USA; ⁷University of North Dakota, Grand Forks, North Dakota, USA

The purpose of this presentation is to provide an overview of the need and development of the application programming interface (API) for interfacing two popular ME/C case management systems to the NAME Drug Death Registry pilot system.

Introduction: Opioid overdoses were reported to have caused over 42,000 deaths in 2016, resulting in the US Department of Health and Human Services (HHS) declaring a public health emergency in 2017 (HHS.gov), and an official epidemic in 2018 (HRSA.gov). Today (2019), nearly every Federal health and safety agency (e.g., NIH, HHS, CDC, NIJ, etc.) has new, or increased program funding for State-level offices (i.e., health, justice, law, etc.) to collect and organize mortality data surrounding cases involving drugs (e.g., NVDRS, HEAL Initiative, NIDA, etc.).

Scope of Work – Objectives: Between September 1, 2017 to August 31, 2018 ORA coordinated with the NAME, the IAC&ME, the technology providers (VertiQ and ORA), and the CDC to develop application programming interface (API) documentation and test automatic data extraction from the two selected case management systems; one software represented a traditional agency hosted database model (VertiQ), and one represented the web-based Software as a Service (SAAS) single database model (MDILog). Each software would ultimately place suspected drug death data into an independent “container” (i.e., NAME Drug Death Registry, or iDrug) automatically. This proof of concept would facilitate the standardized export and sharing of drug death data with State and Federal agencies, without exploiting local ME/C resources.

Six (6) NAME or IAC&ME member-offices, using MDILog or VertiQ case management systems were selected as national pilot sites for the API. If successful, this pilot project would create data transfer specifications (i.e., the API documentation) making the NAME Drug Death Registry available to a range of individuals and organizations, including public health officials (CDC), medical experts, law enforcement, forensic experts, and researchers. This initiative could create the largest forensic drug death database in the U.S. Such a database would facilitate research and big data analysis and help formulate policies and plans to address this devastating public health problem. Most importantly, the data would be timely and efficiently gathered from local ME/C offices.

Results: During the pilot study period; the six-pilot site’s case management systems automatically transferred drug involved death data to the “iDrug” container for 1,048 cases. The data transfers were automatically run each night, providing nearly “real time” drug death data the following day.

12.6 Preventing Consumer Product-Related Deaths: The Vital Role of Medical Examiners

Y. Nash, L. Chen, J. Ross

U.S. Consumer Product Safety Commission, Bethesda, Maryland, USA

There are approximately 46,000 consumer product-related deaths and consumer product-related deaths, injuries and property damage cost the U.S. more than \$1 trillion annually. The purpose of this presentation is to describe the Medical Examiners and Coroners Alert Project (MECAP) and

how medical examiners contribute to product safety through collaborative efforts with a federal agency, the Consumer Product Safety Commission (CPSC).

CPSC protects the public from unreasonable risks of injury or death associated with the use of products within the agency’s jurisdiction. CPSC conducts epidemiological studies to estimate consumer product-related deaths and analyzes factors contributing to deaths through in-depth investigation of incidents. Results are used by CPSC to set priorities, support ban or recall of hazardous products, support development or evaluation of product standards and to educate the public. CPSC received approximately 5,050 MECAP reports annually from more than 100 medical examiner and coroner offices during 2014-2018. About 7.9% are associated with in-depth investigations.

The MECAP is designed to collect detailed and timely fatality information. Detailed accounts of deaths enable specific product identification and allow CPSC staff to understand the interaction between product and person. Timely data submission enables CPSC staff to investigate deaths while products involved are available for examination and details of the incident are remembered by witnesses, experts and next of kin. The faster an incident is reported, the quicker CPSC may implement preventive strategies for mitigation of risk, such as product recalls.

Medical examiner reports have contributed to vital agency work to prevent children’s pool or spa related injuries and deaths. Between 2013 and 2015, approximately 350 deaths associated with pool or spa submersions of children younger than 15 years of age were reported to CPSC annually. Among those deaths, about 54 percent occurred in in-ground pools. CPSC launched its *Pool Safely* Campaign in early 2010 to raise awareness about pool and spa safety, as mandated by the Virginia Graeme Baker Pool and Spa Safety Act. *Pool Safely* is a national public education campaign that works with partners around the country to reduce child drownings and entrapments in swimming pools and spas.

CPSC’s work to ensure the safety of consumer products - such as toys, cribs, power tools, cigarette lighters, and household chemicals - contributed to a decline in the rate of deaths and injuries associated with consumer products over the past 45 years. Medical examiners have a critical role to play in CPSC’s success.

POSTER PRESENTATIONS

P1 *Coccidioides immitis*: A Rare Form of the Disease Process Presenting in an Even Rarer Location

H. Amoth, M. Sens, W. Kemp

University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, USA

Coccidioides immitis is a dimorphic fungus, growing as a fungus in the soil and as a yeast in the human body, that is geographically limited in the United States, being most commonly associated with the San Joaquin Valley and found in California and Arizona. In most individuals, infection with *Coccidioides immitis* causes an asymptomatic, self-limited pulmonary infection; however, in a small percentage of individuals, the infection is disseminated and can involve any organ. We present the case of a 52-year-old male who was found unresponsive in his home in Montana. Autopsy revealed a 2163 gram spleen and a 2994 gram liver. The initial differential diagnosis for the hepatosplenomegaly that was considered at the time of autopsy was an infection or a neoplastic process, such as leukemia. Because of the geographic location where the body was found, *Coccidioides immitis* was not considered. Microscopic examination confirmed the presence of *Coccidioides immitis* spherules, some filled with

endospores, which were found in the spleen, the lungs, the liver, and the bone marrow. Granulomatous inflammation, often with spherules identified associated with it, was also present in a kidney, the pancreas, the thyroid gland, a parathyroid gland, and the heart. HIV testing was not able to be performed on the blood available. Additional investigation following the autopsy revealed that the decedent had spent time in the past in California, which would have allowed for exposure to *Coccidioides immitis*. The decedent had a rare form of a disease process not normally associated with the geographic location in which he was found, which highlights the need for continued diligence in death investigation so as to not allow a first impression to impair the correct final determination.

P2 Autopsy Findings Following Prolonged Cardiopulmonary Resuscitation and Thrombolytic Therapy for Suspected Pulmonary Thromboembolism: a Case Series

K. McNamara¹, O. Middleton², M. Madsen³

¹University of Arizona College of Medicine - Phoenix, Phoenix, Arizona, USA; ²Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, USA; ³Cococino County Public Health District Medical Examiner's Office, Flagstaff, Arizona, USA

Sudden death due to pulmonary thromboembolism (PE) usually results from occlusion of the main pulmonary artery or its major branches, leading to cardiovascular collapse. We present three cases where PE was determined to be contributory to death, in the absence of a typical, large occlusive pulmonary thromboembolus at autopsy.

Case 1: A 54-year-old male with a history of multiple fractures due to a motorcycle crash. He underwent surgical repair of the long bone fractures and was recovering in the hospital. On hospital day 10, he experienced sudden onset of dyspnea prior to becoming unresponsive. Despite cardiopulmonary resuscitation and tissue plasminogen activator (tPA) administration, he did not regain spontaneous cardiac circulation. During postmortem examination no clots were identified in the pulmonary vasculature or veins of the extremities. However, rare small antemortem clots in the peripheral pulmonary vasculature were noted on microscopic examination of the lungs.

Case 2: A 69-year-old male who died in the hospital 12 days after presenting with left foot weakness. Imaging studies documented an expanding chronic subdural hematoma from a prior fall, and surgical evacuation was performed. He subsequently developed seizures and chest pain. A transthoracic echocardiogram showed pronounced enlargement of the right ventricle with septal bowing. During the exam, he experienced a seizure and became unresponsive. Despite prolonged resuscitation efforts and tPA administration, he did not regain spontaneous cardiac circulation. Autopsy revealed fragmented clots in the proximal branches of the pulmonary arteries, rare clots in the peripheral pulmonary vasculature, and clots in the posterior tibial veins.

Case 3: A 37-year-old female who developed sudden onset of dyspnea two weeks after fracturing her distal right fibula. Paramedics transported her to emergency department, and a prehospital electrocardiogram showed findings associated with PE. Upon arrival to the ER, she became unresponsive, and despite prolonged resuscitation efforts and tPA administration, she was pronounced dead. No PE was found at autopsy, but the right lower extremity did have a deep venous thrombosis.

In each of the cases, there was substantial clinical suspicion for the presence of PE. Although autopsy did not confirm the presence of a large, occlusive pulmonary thromboembolus, each case had supportive autopsy findings. In addition, each decedent received prolonged mechanical chest compression and thrombolytic therapy. We concluded that PE contributed to death, but classic findings were absent following mechanical

compression and thrombolytic therapy that caused in vivo lysis of the pulmonary thromboembolism.

P3 Reducing Laboratory Rejection Rates of Postmortem Specimens at a County Medical Examiner's Office

K. Kreutz¹, C. Schoppe², R. Quinton³

¹University of Texas Southwestern Medical Center, Dallas, Texas, USA;

²Southwestern Institute of Forensic Sciences, Dallas, Texas, USA; ³Mayo Clinic, Rochester, Minnesota, USA

Introduction: Laboratory testing of postmortem specimens is naturally prone to pre-collection sample degradation resulting in high specimen error rates at forensic autopsy facilities. Despite these inherent quality problems, there is room for improvement in the specimen collection process. Between April 2016 and March 2018, biochemistry and microbiology specimens sent to LabCorp from the Southwestern Institute of Forensic Sciences (SWIFS) in Dallas, TX had a mean pre-analytical error rate of 8.4%. These errors included outright specimen rejections as well as incomplete or ambiguous results. While the majority of these errors could be attributed to unavoidable pre-collection specimen degradation, 41.8% of all errors were determined to be avoidable. Avoidable points of failure included incorrect choice of collection devices for infrequently-used microbiology tests, as well as inconsistencies in storage and transportation conditions required by the off-site testing facility. These modifiable elements presented an opportunity for quality improvement. The aim of this effort was to decrease the specimen error rate by 25% within twelve months.

Methods: Lean Six Sigma methodology was used to characterize the major causes of specimen rejections over a 24-month pre-intervention period and develop targeted interventions. Interventions included the creation of a specimen collection guide for site-specific common laboratory tests with instructions modified and tailored for postmortem use, the provision of collection devices which had previously not been available at this facility, and education on packaging and storage instructions for the most problematic tests. Invoices from the off-site testing facility were compiled and categorized by test and outcome before and after intervention implementation.

Results: During the 12-month post-intervention period, the specimen error rate was found to be 5.7%, representing a 31.8% reduction from the previous error rate of 8.4%. Of note, the avoidable error rate was reduced by half, decreasing from 3.5% of all specimen errors during the pre-intervention period to 1.7% post-intervention. Error rates for respiratory virus profiles, the second most commonly rejected test, decreased from 18.7% to 3.0%.

Discussion: By characterizing pre-analytical specimen errors at a forensic autopsy facility, we were able to develop targeted and effective interventions to significantly reduce the number of avoidable errors encountered at this site.

P4 Pseudo-CPM (Central Pontine Myelinolysis)

M.T. Rumschlag, A. Fisher-Hubbard, R. Castellani, J.A. Prahlow
Western Michigan School of Medicine, Kalamazoo, Michigan, USA

Introduction: Central pontine myelinolysis (CPM) is associated with rapid correction of serum sodium concentration following chronic hyponatremia. In CPM cases, this is characterized pathologically by lesions of the central pons, appearing as a dark central abnormality. In the forensic pathology setting, CPM may be found at autopsy and can be considered a potential cause/mechanism of death; such cases typically occur in the setting of chronic alcoholics. In this case report, we present two autopsy cases where gross examination of the pons revealed lesions

suggestive of CPM; however, subsequent microscopic analysis indicated otherwise.

Methods: The cases were selected from the files of one of the authors (JP).

Results:

Case 1: A 30-year-old African American female with a history of drug abuse was admitted to the Emergency Department. She was subsequently found with altered mental status and an empty bottle of pills. She responded to Narcan but aspirated, developed Acute Respiratory Distress Syndrome and died 20 days after initial presentation. At autopsy, exam revealed a 0.8 cm area of dark tan discoloration involving the central pons, which appeared similar to CPM; however, microscopic examination revealed that the lesion was characterized by an aggregate of neurons, with no evidence of necrosis, consistent with a diagnosis of neuronal heterotopia.

Case 2: A 47-year-old white male with a history of chronic alcoholism was found deceased outdoors. Examination revealed a pink-red discoloration of the central pons, suggesting the possibility of CPM; however, microscopically, the pons lesion was consistent with capillary telangiectasia.

In both cases, the pontine lesions were considered incidental findings, unrelated to the cause of death. At autopsy, CPM can present with a dark central lesion of the pons. Histologically, there is destruction of myelin sheaths, with unaffected vasculature and normal neuronal cell bodies, and there is a notable lack of inflammation. In older lesions, degenerative changes may be seen.

Discussion: Initial impression at autopsy for these cases suggested CPM as a possible cause/mechanism of death. Although the decedent in Case 1 was not a chronic alcoholic, she was a chronic drug user and she had been hospitalized, creating a possible at-risk scenario for sodium disturbances. Her pons showed a pseudo-CPM lesion at autopsy. The decedent presented in Case 2 was a chronic alcoholic, so on initial exam, it seemed plausible that he could have died from CPM as well. These cases reiterate the importance of the histologic exam at autopsy.

P5 Forensic Neuropathologic Phenotypes of Fungal Central Nervous System Infections: A Case Series

G. Wu¹, E. Bulakhtina², J.L. Hammers³, Y. Liu⁴, E.M. Linde⁵, B.I. Omalu⁶
¹Rush Medical College of Rush University, Chicago, Illinois, USA; ²Hamilton Regional Forensic Pathology Unit, Hamilton, Canada; ³Cyril H. Wecht & Pathology Associates, Pittsburgh, Pennsylvania, USA; ⁴University of California, Davis, Sacramento, California, USA; ⁵PhysLab, Omaha, Nebraska, USA; ⁶Bennet Omalu Pathology, Stockton, California, USA

Fungal infections of the central nervous system (FI-CNS) are life threatening infections that most commonly affect immunocompromised individuals, but immunocompetent individuals may also be infected by high fungal burden or increased fungal virulence. While FI-CNS are relatively rare, the prevalence of FI-CNS is on the rise due to the increasing number of transplant recipients, HIV-infected individuals, and use of immunosuppressive therapies. Most cases of FI-CNS originate from outside the central nervous system (CNS) and develop via hematogenous seeding or direct inoculation, such as invasive procedures. The etiologic fungi can be classified into three fungal groups: molds, dimorphic fungi, and yeasts. The clinical presentation of FI-CNS is highly variable and may be difficult to diagnose pre-mortem. We present a case series of three patients, each infected by one representative species from each of the three fungal groups (*Aspergillus* spp., *Blastomyces*, *Candida* spp.) to illustrate different neuropathologic phenotypes of FI-CNS. All three patients had no history of immunodeficiency and were not suspected of FI-CNS until they were

diagnosed at autopsy. FI-CNS are often fatal due to delayed diagnostic testing and limited therapeutic options. Awareness of such poly-phenotypic manifestations of FI-CNS will be helpful in reducing delayed diagnosis. It is important for clinicians to include FI-CNS on the differential diagnosis when radiographic findings are non-specific for bacterial etiology.

P6 Echordosis Physaliphora: Case Reports and Review of Literature

Y. Porat, J. Prahlow, R. Castellani, A. isher-Hubbard
Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, USA

Introduction: Echordosis physaliphora (EP) is a benign tumor/hamartoma derived from notochord remnants. It can develop anywhere from the skull base to the sacrum. Although not well represented in the literature, EP is considered a somewhat common finding. EP is reportedly discovered in 2% of autopsies, although in the authors' experience, they are far less common. For the most part, EP lesions are asymptomatic but symptomatic cases of EP have been reported in the literature. In this report, we present several cases of asymptomatic echordosis physaliphora discovered incidentally at autopsy. Both gross and microscopic findings are presented to shed light on this interesting process.

Methods: Cases were selected from the files of the authors.

Case reports: Several cases are presented. Examples include a 51-year-old white female with a history of chronic pain who died from the toxic effects of methadone. At autopsy, a 1.5 cm multi-lobed translucent, mucoid mass was discovered adherent to the basilar artery overlying the pons. The rest of the autopsy was unremarkable. Histopathologic examination showed loosely packed eosinophilic cells with large vacuoles, with small nuclei. No mitotic activity was noted. Another example case involves a 50-year-old white male who died from the combined toxic effects of multiple drugs. During autopsy, a 1cm cystic-like, white-tan mass was found immediately anterior to the pons, in the midline. Histologic exam was consistent with EP. The remainder of the cases presented had similar findings at autopsy.

Discussion: The notochord forms after the third gestational week in development. During embryogenesis, the notochord regresses and eventually disappears and is replaced by the nucleus pulposus. Rarely, notochordal cells remain after embryogenesis along the vertebral column and can give rise to benign notochordal cell tumor, echordosis physaliphora, or aggressive tumors such as chordomas. Each of these manifestations is considered rare; however, EP represents a curious entity that may occasionally be discovered at autopsy. Echordosis physaliphora are biologically benign, and are usually of small size and slow growth rate; however, rare cases of symptomatic echordosis physaliphora have been reported, related to mass effect. As such, EP might rarely be contributory to death. The cases presented provide an overview of EP, highlighting their gross appearance, typical location, and histologic characteristics. Forensic pathologists should be aware of this unusual but classic incidental finding at autopsy, and be cognizant of the fact that EP may occasionally be symptomatic and therefore potentially contributory to death, depending on circumstances.

P7 Volumetric Changes of the Insular Cortex in Adult Sudden Unexplained Death: A Pilot Project

A.K. Maybank¹, K. Obenson², V. Northrup², J. Kavanaugh²

¹Dalhousie University, Saint John, Canada; ²Saint John Regional Hospital, Saint John, Canada

Introduction: The insular cortex of the brain has been associated with the control of heart rate and rhythm. Changes in cortical structure and/or volume are thought to cause cardiovascular derangements which have been linked to sudden unexplained deaths (SUD) in adults, in particular sudden unexplained death in epilepsy (SUDEP). However, since there are no known cardiac pathological changes, correlating the mechanism and cause of death is impossible absent a neuropathologic examination that includes detailed evaluation of the insular cortex. Part of this evaluation includes radiologic assessment of the insular cortex for which baseline measurements as well as comparisons to overall brain size are required. Therefore, the purpose of this pilot project is to determine baseline measurements of the insular cortex in live controls.

Methods: Live controls are males and females, aged 19-50, with normal brain computed tomography (CT) scans over the previous 5 years. Direct measurements include: a) left and right insular widths (used as proxies for insular volume), b) brain length, width and height, and c) insula-to-insula width. Calculated measurements include a) brain volume, b) insular width to insula-insula width ratio, c) insular width to brain volume ratio. Analysis consisted of descriptive statistics of the controls and their measurements, as well as comparisons of mean values between males and females. Variables were selected for comparison due to their reproducibility, with easily discernible landmarks and easily translatable between researchers.

Results: Overall, 56 brain CTs were examined, 31 females and 25 males. Average total age was 30.5 years; 33 for females and 27.2 for males. Average insular widths, right and left were the same, 0.53 cm. Average insula-insula width was 6.99 cm, with the average insular width to insula-insula ratio, right and left, being 0.077 and 0.076, respectively. Average estimated brain volume was 2593.73 cm³, with the average insular width to brain volume ratio being 0.00021 (right and left). All measurements and values were larger in males than females except for the insular width to brain volume ratio, which were similar.

Discussion: Based on these live control results, the average insular size and its relationship to other brain measurements is known. The use of CT to obtain these measurements is acceptable and the results are reliable and reproducible from the methodologies selected. The project may now proceed to its next stage in which insular cortical measurements by CT and histologic findings in SUD, including SUDEP, will be examined for correlation

P8 Relationship between Postmortem Interval and Gene Expression of Skeletal Muscle

H. Wang, L. Chen

Department of Forensic Medicine, School of Basic Medical Sciences, Fudan University, Shanghai, China

Introduction: After human dies, some of the cells remain functional while bodies are out of action as a whole. Genes differentially expressed after death were speculated to construct a mathematical model for early postmortem interval estimation (EPMI).

Methods: Rats were sacrificed and placed at four different temperatures. Skeletal Muscle were collected at different time points and total RNA was extracted. Reference genes were selected and evaluated using geNorm. Changes in gene transcript levels after death were detected using

microarray expression profiling. Preliminary screening of differentially expressed genes was performed using Cluster and Pathway. Experiments with an expanded sample size were performed using real-time quantitative PCR. Genes with high coefficients of determination were chosen for construction of mathematical models. Optimal ternary cubic equations were built using R software. The equations were then converted into a three-dimensional visual statistical model using MATLAB. Human samples were collected and used to validate the mathematical models.

Results: According to a comprehensive assessment, the 5srRNA showed best stability at four temperatures. The genes *Col12a1*, *Ucma*, *Grin3a*, *Cpz* and *Fam180a* showed high coefficients of determination. Human verification showed large errors.

Discussion: The 5srRNA was an appropriate reference gene and the genes *Col12a1*, *Ucma*, *Grin3a*, *Cpz* and *Fam180a* are potential markers for estimation of EPMI. Equations of human samples need larger sample capacity to reconstruct.

P9 The Toxic Effects of Loperamide: A Case Study

L.V. Strzyzewski, P. Key, P. Jones, J.A. Prahlow

Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, USA

Loperamide is an opioid available over-the-counter and in prescription form that functions as a μ -agonist within the enteric nervous system to slow intestinal motility. Loperamide's anti-diarrheal properties and primarily peripheral activity make it an important tool in the management of gastrointestinal symptoms associated with inflammatory bowel disease. We present a patient whose large consumption of loperamide, intended to alleviate the severe symptoms of his advanced Crohn's Disease, resulted in death.

A 42-year-old male was found in cardiac arrest, and Emergency Medical personnel restored normal sinus rhythm. Family reported that the patient complained of intense abdominal pain earlier that day and that he 'went through a lot' of loperamide. In the Emergency Department, he was unresponsive with symptoms mirroring an acute opioid overdose, including miosis and respiratory depression. His mental status improved after administration of naloxone, an opioid receptor antagonist. An electrocardiogram revealed a prolonged QTc interval that progressed into a lethal episode of ventricular tachycardia three days after admission, and he succumbed from sustained hypotension and hypoxic brain injury. At autopsy, there were findings consistent with Crohn's disease, as well as acute and chronic pancreatitis. The concentrations of loperamide and a loperamide metabolite desmethylloperamide, as measured in original hospital blood samples, were elevated beyond normal therapeutic peak concentrations. The cause of death was ruled the toxic effects of loperamide with contributing acute and chronic pancreatitis. The manner of death was accident.

Due to the lack of central nervous system activity and associated euphoria at therapeutic doses, loperamide abuse is rarely reported. This case demonstrates that an overdose of loperamide can occur in patients seeking gastrointestinal symptom alleviation, and that it may initially mimic the presentation of traditional opioid overdose. This case may be especially valuable as an illustration of the emerging clinical picture of the accompanying sequelae associated with loperamide abuse, which includes cardiac arrhythmias and pancreatitis. Forensic pathologists and toxicologists should consider the possibility of a loperamide overdose in decedents who present with signs of opioid overdose, but where routine tests fail to reveal one of the more common legal or illegal opioid drugs.

P10 A Relationship Between Asthma and Opioids

S.F. Zohoury, J. Prahlow, P. Jones
Western Michigan University Homer Stryker MD School of Medicine,
Kalamazoo, Michigan, USA;

The United States (US) has been experiencing increasing rates of drug overdose deaths involving opioids, with a majority of opioid-related deaths currently involving fentanyl and other synthetic opioids. It is well known that opioid toxicity leads to respiratory depression; however, the potential interplay between opioid toxicity and pre-existing lung disease, such as asthma, is less understood. We present the case of a young woman found dead with autopsy evidence of acute and chronic asthmatic bronchitis and fatal fentanyl intoxication.

A 24-year-old female was found unresponsive on the sofa by her boyfriend. At autopsy, external exam was unremarkable, while internal exam was remarkable for diffuse cerebral edema as well as lung findings. The right and left lungs weighed 350g and 310g respectively. Microscopically, the respiratory system demonstrated prominent acute and chronic asthmatic bronchitis with associated interstitial inflammation and air trapping. Toxicology testing of femoral blood revealed 8.4 ng/mL fentanyl, 0.56 ng/mL norfentanyl, and 400 ng/mL pseudoephedrine. The cause of death was fentanyl toxicity with a contributing cause of acute and chronic asthmatic bronchitis. The manner of death was accident.

While opioid-related intoxication deaths occur very commonly without associated contributing natural disease processes, the present case serves to highlight the fact that pre-existing lung disease may, in fact, predispose or contribute to deaths related to opioid-induced respiratory depression. The medical and forensic literature contains little with regard to opioid intoxication and asthma; however, a few studies have been published, including some which contend that opioid use may actually exacerbate asthma, and some which suggest that opioid use may play an etiologic role in some cases of asthma. Possible mechanisms involved in opioid-related exacerbation of asthma include opioid-induced histamine release, which could activate the parasympathetic nervous system and lead to bronchoconstriction; opioid-induced relaxation precipitating a parasympathetic nervous system response with bronchoconstriction; and opioid-induced central nervous system (CNS) depression with diminished ability for CNS-mediated compensation for asthma-related respiratory deterioration.

With the increasing use of opioids in the US, it is prudent for clinicians and forensic pathologists to consider underlying respiratory disease, such as asthma, as playing a potentially contributory role in the respiratory compromise produced by opioid intoxication. Currently, it is widely accepted within the medical and forensic communities that pre-existing cardiovascular disease may potentiate the ill-effects of stimulant drugs, such as cocaine. Coexisting respiratory disease likely plays a similar role in certain opioid-related intoxications. The present case serves to highlight this potential relationship.

P11 Importance of Scene Investigation and Toxicology Interpretation in Non-Accidental Opioid-Related Deaths

P. Yousif, P. Jones, A. Grande, T. Brown
Western Michigan University Homer Stryker M.D. School of Medicine,
Oakland Township, Michigan, USA

Opioid-related deaths in the United States continue to increase, due to both illicit and prescription drug abuse. The majority of drug-related deaths are accidental overdoses; however, not all opioid-related deaths are accidental. Determining which deaths may not be accidental can be challenging for medical examiners due to limited information regarding the decedent's history and circumstances of death. To better understand possible key

features in opioid-related deaths where the medical examiner opined suicide or undetermined manner of death, a review of the medical examiner database of deaths occurring in Michigan and northern Indiana from September 1, 2017 through August 31, 2018 was performed. Of 261 opioid-related deaths, 11 deaths (4.2%) were deemed suicide or undetermined in manner. The remaining deaths were accidental. For the 11 deaths of suicide or undetermined manners, the scene investigation report, autopsy report, and toxicology report were reviewed. Additionally, the toxicology report was compared to the Swift Toxicology of Opioid-Related Mortalities (STORM) results, which tests for a comprehensive panel of opioids at the same or lower level of detection in comparison to the toxicology report. Of the 11 opioid-related deaths reviewed, nine had a recent life or health stressor, seven had prior suicidal ideations, six had reported depression, five carried a reported psychiatric diagnosis, seven were found dead in their bed, and four left a departure note. Furthermore, on review of the STORM results, several cases demonstrated additional parent drugs or metabolites that may have helped the medical examiner better contextualize the drugs detected in the decedent's blood. This review highlights several key points for medical examiners to consider before opining the manner of death in opioid-related deaths: (1) the investigative report that includes detailed information of the decedent's history and circumstances of death, especially recent life or health stressors and psychiatric history; (2) location of death; and (3) understand possible limitations of toxicology results. Specifically, confidence in the presence or absence of a substance is critical in assuring an accurate certification of death. Medical examiners should be aware that there is no industry-specified or consensus agreement on what drug testing cutoffs should be used in the postmortem testing. Rather, laboratories administratively set drug testing cutoffs based on the performance characteristics of their analytical methods and quality assurance standards accepted by the laboratory. Consulting with laboratories about assay limitations may provide an interpretative benefit.

P12 Exsanguination from Superficial Lower Extremity Trauma

S.P. Prahlow¹, A. Abadi², J.A. Prahlow³
¹Florida State University, Tallahassee, Florida, USA; ²Huntington Memorial Hospital, University of Southern California, Pasadena, California, USA; ³Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan, USA

Deaths related to exsanguination are not rare; however, most are related to large-caliber blood vessel or organ disruption. This presentation highlights two deaths from external hemorrhage arising from superficial lower extremity trauma in persons with peripheral vascular disease and anticoagulant therapy.

An elderly woman was found unconscious at home, with a bloody plastic bag tied around her left foot. Despite resuscitation attempts, she was pronounced dead. Other blood-soaked items were evident at the scene. Her past medical history included coronary artery disease (CAD), chronic obstructive pulmonary disease, peripheral vascular disease (PVD), hypertension, and atrial fibrillation, for which she was prescribed Warfarin and Clopidogrel. External examination revealed stasis dermatitis of the lower legs, and partial avulsion of the left great toenail, with associated hemorrhage. The scene exam did not disclose an obvious cause of injury. A complete autopsy was not performed as per family wishes. The cause of death was hypertensive and atherosclerotic cardiovascular disease, with contributing factors of chronic atrial fibrillation with anticoagulation therapy and blunt-force injuries of the left great toe with associated hemorrhage. The manner of death was accident.

A middle-aged man in a group-home was involved in an altercation with a staff member and sustained a kick to his right shin, with resultant hemorrhage. Emergency responders found him sitting in a chair unconscious, with a pool of blood beneath him. All resuscitative efforts

failed. The patient had a history of schizophrenia, epilepsy, CAD, PVD, and deep vein thrombosis for which he was taking Warfarin. At autopsy, there was severe, thickened stasis dermatitis of the lower extremities, as well as a 10.5 cm long, linear full-skin-thickness laceration of the anterior right shin, with associated laceration of an underlying superficial vein. The cause of death was right leg trauma with vascular injury and hemorrhage, with contributing factors of anticoagulant therapy for thromboembolic disease, hypertension, atherosclerotic cardiovascular disease, and peripheral vascular disease. The manner of death was homicide.

Lethal superficial hemorrhage may occur in individuals with varicose veins. Cases typically occur in socially isolated elderly persons with accompanying medical issues, such as dementia. The cases are characterized by profound hemorrhage, sometimes associated with minor trauma or pre-existing ulceration. Cases may have other associated features, including anticoagulant use. The two presented cases are unusual in that the first case involved hemorrhage from an avulsed toenail, while the second had circumstances that led to the certification of death as a homicide.

P13 Homicide-Suicide: A Homicidal Asphyxia Misinterpreted as a Gunshot Wound at the Scene

E. Hafner, M. Sens, W. Kemp

University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, USA

Strangulation is commonly associated with certain findings at autopsy, including petechial hemorrhages in the conjunctiva and oral mucosa, contusions or abrasions of the neck, hemorrhage within the anterior and posterior neck musculature, and fractures of the hyoid bone or thyroid cartilage. We present the case of a 68-year-old female who was found dead in her bedroom, with her husband being found dead in the garage. Her husband had shot himself, and the woman, who was lying partially on her side, had blood coming from her ear that was facing upward, and was, at the scene, also believed to have been shot. Autopsy revealed no gunshot wound, but instead florid petechial hemorrhages of the face and conjunctivae, a few contusions of the left and right sides of the neck, a laceration of the lower lip, oral mucosal petechiae, focal hemorrhage in the soft tissue around the hyoid bone, and focal hemorrhages in the left and right sternohyoid muscle. There was also multiple contusions of the tongue. Her cause of death was certified as homicidal asphyxiation, including probable strangulation. Extensive contusions of the tongue are not routine with strangulations, but occur in about 25%, especially the elderly, and hemorrhage from the ear, is not a commonly reported finding. This case illustrates uncommon and rare autopsy findings for strangulation, which under the right circumstances, deceived investigators into thinking that a gunshot wound had occurred.

P14 Two Cases of Tandem Bullets: One Homicide and One Suicide

A.M. Khau¹, J. Melinek²

¹UC Davis, San Jose, California, USA; ²PathologyExpert Inc., San Francisco, California, USA

We report two unusual cases of tandem bullets. Case 1 is a homicide involving a piggyback screw. Case 2 is a suicide involving multiple tandem bullets as a result of improper ammunition size. Tandem bullet injuries can have a wide variety of presentations. Therefore, it is essential that forensic pathologists understand the mechanisms of tandem bullet wounds and familiarize themselves with the autopsy and radiological findings seen in tandem bullet injuries. This report supports that use of incorrect caliber ammunition and the lodgment of foreign objects in the barrel of a gun are possible causes of tandem bullet injuries.

P15 High-Voltage Electrocution From Home-Made Fractal Burning Device

E. Rush¹, R. Kohr¹, K. Hoover², B. Adeagbo¹

¹Regional Hospital, TERRE HAUTE, Indiana, USA; ²Rose-Hulman Institute of Technology, Terre Haute, Indiana, USA

Fractal burning is a new and controversial hobby that involves applying a high voltage across a wooden board soaked in an electrolyte solution to burn a Lichtenberg pattern (tree-branch pattern) into the board. As of January 2019, ten deaths have occurred from electrocutions involving this process, and the American Association of Woodturners (AAW) has banned this practice at all events and discourages its practice.

This case involves a 52-year-old male who was reportedly found dead in his garage with injuries sustained from a makeshift electrical device. Further history revealed the deceased was a woodworking hobbyist who had researched fractal burning and how to construct a home-made wood burning device. Examination of the body revealed 4th-degree electrothermal injuries to the right and left palms and to the upper left arm, with a transthoracic current path. The deceased was found to have mild cerebral edema and severe pulmonary congestion and edema.

The homemade device was examined by the Power Lab of Rose-Hulman Institute of Technology and was found to consist of a 120V AC power switch wired in series across the primary winding of a microwave oven transformer. The secondary winding of the transformer was connected to two large alligator clips that were taken from a 12V car battery charger. Further investigation revealed that the device could indeed transform 120V, 60 Hz AC to 2200V AC and was capable of sourcing up to 0.636 amperes (A) of current. When tested on dry skin, 430 K Ω and 0.0051A would be delivered. This is below the 0.016A let-go threshold where one could let go when being electrocuted. However, if the hands were damp from perspiration, the resistance would drop to as low as 25 K Ω and current of 0.086A. This exceeds the let-go threshold but wouldn't not arrest. However, a large amount of heat (93.7 Watts/hand) is released that would burn through the skin in contact with the alligator clips. Once through, the internal resistance of the body is only 300 Ω , and the necessary level of current to induce ventricular fibrillation would be delivered.

To our knowledge, no documented case of high voltage electrocution from fractal burning has been presented in the literature by a forensic pathologist. With the recent increase in popularity among hobbyists and the recent deaths related to fractal burning accidents, medical examiners and first responders should be made aware of this practice for forensic and safety purposes, respectively.

P16 Crossbow Homicides: More Common Than Reported?

L. Tamburro, T. Brown, L. Bauler

Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, Michigan, USA

Crossbow fatalities are a rare occurrence. The manner of death is overwhelmingly determined to be suicide or accident rather than homicide. Reported here is a crossbow homicide occurring in the United States, which, based on a review of the literature, has not been documented since 1994. A 20-year-old male was found dead in his driveway with a crossbow-bolt protruding from the upper left quadrant of his abdomen. On examination, the bolt had a mechanical two-blade broadhead that transected the descending aorta and lodged in the second lumbar vertebra. Due to the injury of the descending aorta, 2100 milliliters of liquid and clotted blood were present within the peritoneal cavity. For the forensic pathologist, entry wound reconstruction and radiology can be critical to determine if the weapon used to inflict a wound was a crossbow, firearm, or sharp object. This can be particularly challenging when the weapon is not found with the

body and is complicated by the variety of tips that can be used for a crossbow bolt. Though uncommon, the number of crossbow homicides may be underreported in the medical literature. An internet search resulted in the discovery of fourteen crossbow homicide cases in the last five years in countries where English is the primary written language compared to the eighteen total cases described in the medical literature. Underreporting may also be compounded by inconsistent manner of death determinations (homicide versus accident) in crossbow hunting-related deaths. Finally, the presented case, while highlighting the possible damage caused by a rarely used weapon, sheds light on the problems inherent with the crossbow being straightforward to use, fairly silent, easily accessible, and potentially deadly.

P17 Fatal Direct Current Electrocutation in a Welder

A. Hans, P. Key, J.A. Prahlow
Western Michigan University Homer Stryker MD School of Medicine,
Kalamazoo, Michigan, USA

Electricity involves the movement of electrons through a circuit. There are two types of "manmade": alternating current (AC) and direct current (DC). Alternating current involves the cycling of the direction of electron flow within the circuit at regular intervals. Most modern household and commercial electrical sources, fixtures, and appliances utilize AC. In contrast, direct current electricity involves unidirectional flow of electrons within the electrical circuit. Batteries and various specialized electronic equipment, including light-rail power sources, cardiac defibrillators, and some welding machines, utilize DC. DC electricity is generally considered much safer than AC electricity. This report presents a case of lethal DC electrocution occurring in a welder.

A 44-year-old, 350-pound, male welder was working at a farm to repair the metal plate floor of a silo. He was lying on the metal floor as he performed the repair. During several initial attempts at welding, he complained to his coworker that he was feeling electrical shocks up and down his arm. They both attempted to re-adjust the grounding connection before proceeding, but the man began to shout and yell upon continuing with the welding. His co-worker unplugged/disconnected all electrical hook-ups before rendering aid with the help of others at the farm. Despite attempts at resuscitation, including by Emergency Medical Services, the man was pronounced dead at the scene. A medicolegal autopsy revealed an electrical injury on his left forearm, as well as hypertensive and atherosclerotic cardiovascular disease, with a heart weight of 620 grams.

Evaluation of the older-model welding machine showed it was set at 140 volts DC. The welder had worked without problem for many years. Although the scene had been disrupted when the co-worker disconnected everything prior to rendering aid, the presumption was that the set-up had been inappropriately grounded. The cause of death was ruled as direct current electrocution, with contributing underlying factors of cardiomegaly due to hypertensive and atherosclerotic cardiovascular disease and morbid obesity. The manner of death was accident.

Lethal direct current (DC) electrocution is quite rare, especially in the context of workplace accidents and exposure, where electrical fatality is almost exclusively associated with AC. In addition to providing a detailed account of this rare case of direct current electrocution, this presentation will provide an overview of lethal direct current electrocutions.

P18 Black Esophagus: A Report of Three Cases and Review of the Literature

M. Pignato, M. Sens, W. Kemp
University of North Dakota School of Medicine and Health Sciences,
Grand Forks, North Dakota, USA

Acute esophageal necrosis (i.e., black esophagus) is a relatively rare condition that apparently derives its common name from the fact that the necrosis induced by the disease process leaves the esophageal mucosa appearing black. Acute esophageal necrosis occurs secondary to a combination of hypoperfusion, damage from refluxed gastric contents, and diminished function of protective mechanisms and is associated with diabetic ketoacidosis, alcohol intoxication, malignancy, sepsis, multi-organ failure and other conditions. The disease process is more common in men than women and older individuals have a higher risk, with the average age at presentation being 67 years. Acute esophageal necrosis can cause gastrointestinal bleeding, stenosis, and perforation, and has a high mortality rate, around 32%, and thus, could be encountered by a forensic pathologist. Acute esophageal necrosis causes a black appearance of the esophageal mucosa, which ends abruptly at the gastroesophageal junction. Microscopic examination reveals absence of epithelium, necrotic debris, and an inflammatory infiltrate. Necrosis of the wall of the esophagus predominantly involves the mucosa, but can extend full thickness through the wall. We present three cases of death due to acute esophageal necrosis (or, black esophagus). The ages of the three men were 31, 49, and 100 years; no females were represented. Toxicology testing was performed in two of the three men. Two men were in diabetic ketoacidosis, with acetone in the blood of 20 and 42 mg/dL, and a vitreous glucose of 442 mg/dL and 611 mg/dL. One of the men with diabetic ketoacidosis also had diffuse fatty liver. One man had 1400 mL of digested blood in the stomach and the other two had minimal digested blood. Given that the average age for acute esophageal necrosis is older, occurring in individuals who may just receive an external examination instead of a full autopsy, and given that the gastrointestinal bleeding is not always prominent at the time of death, although acute esophageal necrosis has a high mortality rate, some individuals who die from the disease process are not likely to be identified by forensic pathologists.

P19 Under Pressure: Two Acute Events with a Common Risk Factor

A.L. Isaacson, D. Firchau, J. Blau
University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA

Intraparenchymal brainstem hemorrhage and aortic dissection are well-documented complications of hypertension with high morbidity and mortality. We present a case of a 72-year-old man with a history of hypertension and hyperlipidemia who presented to his chiropractor with new-onset sharp pain in his upper back. Prior to chiropractic manipulation, he became severely hypertensive and diaphoretic in the waiting room and developed progressive loss of consciousness during transfer to the hospital. A computed tomography scan of the head demonstrated an acute pontine hemorrhage with extension into the fourth ventricle. The patient never regained consciousness and died five days later. Autopsy examination revealed a previously undiagnosed acute aortic dissection of the thoracic and proximal abdominal aorta without an identifiable intimal tear, in addition to the brainstem hemorrhage noted on imaging. Other findings included severe left ventricular hypertrophy and severe atherosclerosis of the coronary arteries and aorta. Histologic examination of the aorta confirmed an intramural hematoma with organizing peripheral thrombus. The cause of death was attributed to acute pontine hemorrhage due to hypertension, with descending aortic dissection/intramural hematoma and atherosclerosis as significant contributing conditions. This case illustrates classic gross and microscopic findings for both acute intraparenchymal brainstem hemorrhage and aortic dissection with intramural hematoma. Additionally, there are no reported cases of these

events presenting concurrently in an acute presentation, despite sharing a common underlying cause.

P20 How an Autopsy Can Help the Living: a Case of Vascular Ehlers-Danlos Syndrome

G. Wang, K. Binz, C.C. Stacy, D.J. Duff
University of Missouri School of Medicine, Columbia, Missouri, USA

Vascular Ehlers-Danlos syndrome (vEDS) is a connective tissue disorder with a high risk of spontaneous arterial and organ rupture. Abnormal type III collagen synthesis caused by mutations in the *COL3A1* gene is the underlying mechanism of vEDS.

We describe the pathological changes of the aorta in a previously healthy 32 year old male with sudden death due to pericardial tamponade secondary to a ruptured ascending aorta by application of the recent consensus statement on pathology of the aorta (Cardiovascular Pathology 25 (2016)247-257)). There was severe medial degeneration including multifocal mild intralamellar and translamellar mucoid extracellular matrix accumulation, patchy loss of smooth muscle cell nuclei, and focal elastic fiber loss. Additionally, we ordered a genetic panel containing 20 genes known to be associated with aortic diseases from John Welsh Cardiovascular Diagnostic Laboratory, Houston, TX. This revealed a known pathological heterozygous *COL3A1* missense mutation (*COL3A1*, NM_00090, c. 782G>A (p.Gly261Asp)) in the deceased.

The findings were discussed with the decedent's wife. She had their children tested, and all three of them were positive for the *COL3A1* mutation, thus they were also diagnosed with vEDS. They established care with a pediatric geneticist for counseling, anticipatory guidance and preventative measures including taking an antihypertensive.

P21 The All American Bridge Suicide Prevention Barrier: Effects on Suicide Rates, Mechanisms, and Locations in Summit County, Ohio

A. Jelinek¹, A. Deeken¹, L. Kohler²
¹Summa Health System-Akron City Hospital, Akron, Ohio, USA; ²Summit County Medical Examiner Office, Akron, Ohio, USA

Introduction: The "All American Bridge," was erected in 1981 and is a site that has developed so much local notoriety that it is commonly referred to as the "Suicide Bridge." Installation of safety fencing/suicide prevention barrier on the bridge began in 2009 and was completed in 2011.

The aim of this study is to examine data provided by the Summit County Medical Examiner's Office from all suicide cases in their jurisdiction from 2000-2018 to evaluate the effectiveness of the protective barrier and identify any emerging trends in suicide mechanisms since its installation.

Methods: A retrospective study was conducted using publicly available, de-identified case data (mechanism of suicide, year of death, and location of death) with suicide listed as the manner of death provided. Data analysis was performed using standard statistical methods.

Results: The total suicide deaths during the study period were 1,403. Comparing the total number of suicides by all methods per year from before and after the fence completion reveals a statistically significant increase (p value = 0.005). Jumping deaths from all sites comprised approximately 5% of all cases (n=67). Of the suicides resulting from jumping, 27% were completed at the All American Bridge location (n=18). Only one suicide occurred following the completion of the protective barrier at the bridge which resulted in a statistically significant decrease in the number of successful suicides at that location (p value = 0.018). The number of suicidal jumping deaths from other sites remained constant before and after the protective barrier installation and showed no statistically significant difference (p value = 0.40). Data analysis for other

methods of suicide for the same time period revealed a statistically significant increase in the incidence of hangings (p-value 0.003) and gunshots (p-value 0.021) after the installation of the barrier. All other methods remained relatively constant or decreased.

Discussion: There was a significant decrease in suicidal jumps from the All American Bridge following installation of the barrier with no evidence to support diversion of suicidal jumps to another geographic site in Summit County. Data analysis revealed an unexpected increase in total number of suicides per year following construction of the barrier. There was a significant increase in suicidal hangings and gunshots following installation of the protective barrier which may suggest a shift in trend of suicide method after the installation of the fence.

P22 Systemic Amyloidosis as a Sequela of Congenital Central Nervous System Malformations

M. Parsons, J. Blau, M.M. Hefti
University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA

Amyloidosis is a group of diseases characterized by extracellular deposition of insoluble protein fibrils. In AA (secondary) amyloidosis, chronic inflammation leads to systemic deposition of serum amyloid A protein, an acute phase reactant. As a result, AA amyloidosis is a potential complication of chronic diseases processes in which there is ongoing or recurring inflammation.

We report the case of a 25-year-old male with a history of congenital central nervous system (CNS) malformations including a myelomeningocele and a presumed Chiari II malformation. He was nonverbal, unable to move his lower extremities, ventilator-dependent, had a neurogenic bladder, and had neuromuscular scoliosis. He was admitted to our institution for coagulopathy of unknown etiology manifesting in gastrointestinal bleeding and bleeding around his feeding tube. His prolonged admission was complicated by acute on chronic kidney injury; malnutrition; delayed wound healing; and a *Pseudomonas aeruginosa* urinary tract infection, surgical hardware-associated abscess, and pneumonia. Over six months of inpatient admission his clinical status deteriorated and ultimately he died. Autopsy examination revealed total cerebellar agenesis with globally abnormal gyration including midline gyral interdigitation. Additionally, massive splenomegaly (2420 grams, expected: 143 grams) was identified. Microscopic examination showed obliteration of the splenic architecture by Congo red-positive material consistent with amyloid. Amyloid deposition was also identified in the adrenal glands, kidneys, thyroid, and vasculature. Clinical manifestations of amyloidosis vary based upon the extent of amyloid deposition and the organ systems affected. Renal amyloid deposition most commonly manifests as renal insufficiency and nephrotic proteinuria. Gastrointestinal amyloid deposition can cause malabsorption and chronic malnutrition. Bleeding also occurs in approximately one third of cases due to amyloid-associated coagulopathy and impaired vasoconstriction. Therefore, in this case the patient's chronic kidney disease, malnutrition, and coagulopathy were ultimately attributable to amyloidosis.

The development of amyloidosis was an unrecognized consequence of recurrent infections and chronic inflammation secondary to the patient's underlying congenital CNS malformations: colonization with *Pseudomonas aeruginosa* and recurrent bouts of pneumonia were a direct result of his reliance on a ventilator, repeated urinary tract infections were in part caused by his neurogenic bladder, and abscess formation was associated with spinal fusion hardware from his surgeries for neuromuscular scoliosis. This case provides an interesting example of systemic amyloidosis as an unanticipated consequence of complex congenital CNS malformations, elucidated at the time of autopsy.

P23 Hairy Polyp: A Case Study at Autopsy

J. Lohmann¹, C. Lockmuller²

¹University of Tennessee Medical Center Knoxville, Knoxville, Tennessee, USA; ²Regional Forensic Center, Knoxville, Knoxville, Tennessee, USA

Hairy polyps are rare benign tumors of the naso-oro-pharynx consisting of skin overlying a mesenchymal core. This tumor has a female predominance and generally presents with respiratory and/or swallowing issues. Delayed clinical diagnosis and treatment can lead to asphyxia from upper airway obstruction. The presence of bigeminal histology provides a definitive diagnosis. Since hairy polyps are rare and should be treated antemortem due to symptomatology, some forensic pathologists may be unaware of this potentially life-threatening entity. In addition, due to their naso-oro-pharyngeal location and the small size of the mouth of infants, these polyps could be missed at autopsy. Presented is a case of a 7-week-old healthy child who had recently been having some feeding difficulties that went unresponsive in her car seat. Despite forty minutes of attempted resuscitation, the child was officially pronounced dead in the emergency department without any clear indication as to why she had died. A complete autopsy was negative except for a pedunculated polyp attached to the soft palate that was obstructing the oropharynx. It was only after the tongue had been removed and direct visualization of the oropharynx was performed that this unexpected polyp was discovered. Microscopic examination revealed the obstructing mass to be a hairy polyp. Without discovery of this hairy polyp, the cause of death would have been signed out as undetermined.

P24 Mechanical Asphyxia of an 8-month old Infant in an Overturned Inclined Sleeper

T. Bihun¹, J. Ribe², E. Ely¹

¹St. Louis University, St. Louis, Missouri, USA; ²Los Angeles County Department of Medical Examiner-Coroner, Los Angeles, California, USA

On April 12, 2019, the United States Consumer Product Safety Commission recalled all models of Fisher-Price Rock n' Play sleepers. Over 30 infant fatalities have been reported since the product's introduction on the market in 2009. Fatalities were reported to be from positional asphyxia after the infants rolled over unrestrained or under other circumstances. Rock n' Play sleepers were advertised as inclined sleepers where infants can safely sleep. This is in direct contradiction of the recommendations set forth by the American Academy of Pediatrics that state infants should be placed on their back, in a bare crib or bassinet with a tight-fitting sheet and no bumpers, blankets, pillows or soft toys. Most of the reported fatalities are from infants 3 months or older, but deaths from younger infants have been reported. We present a case of mechanical asphyxia of an 8-month-old infant found prone beneath an overturned inclined sleeper. The sleeper was placed in the center of the bed and the infant was left unsupervised for an extended period of time. Autopsy showed no evidence of trauma and there were no significant findings. Scene investigation was monumental in the determination of cause and manner of death in this case.

P25 Variation in Degree of Decomposition of Two Bodies Buried in Close Proximity

M.E. Green¹, J. McLemore², A.H. Ross³

¹Wake Forest Baptist Health, Winston Salem, North Carolina, USA; ²Wake Forest School of Medicine, Winston Salem, North Carolina, USA; ³North Carolina State University, Raleigh, North Carolina, USA

The remains of two men who had been shot and buried in clandestine graves were excavated from the back yard of a residential house 6 years after death. The victims were murdered approximately 2-3 months apart. The bodies were buried only three-foot-eight inches apart. The burial site of one body was buried close to the house in clay-like soil adjacent to a

main water line and in a shaded area. The remains of this body had extensive adipocere with remarkable preservation of internal organs. The burial site of the other victim was in a make-shift fire pit underneath approximately 12 inches of sandy soil in the middle of the yard and was exposed to direct sunlight. The remains of this body were completely skeletonized. The remains were excavated with the aid of a forensic anthropologist who documented the immediate surrounding environmental conditions of both bodies. This case highlights the importance of documentation of the immediate environment on rate and type of decomposition, and the value of input from a qualified forensic anthropologist. This case also emphasizes the difficulty and the potential for error when trying to estimate a time interval of death without knowing the conditions surrounding a body.

P26 WITHDRAWN

P27 Analysis of Substance Use in Suicides in Cuyahoga County

A.F. Blank¹, J.A. Felo²

¹Cleveland Clinic Foundation, Cleveland, Ohio, USA; ²Cuyahoga County Medical Examiner's Office, Cleveland, Ohio, USA

Introduction: Suicides make up a noteworthy portion of deaths investigated in a forensic setting. At the Cuyahoga County Medical Examiner's Office comprehensive toxicological testing is performed in the majority of cases classified as suicide. This allowed us to identify correlations between suicide methods, the specific substances used and characteristics of victims.

Methods: 1019 cases classified as suicide, occurring from 2013-2018, were reviewed. In 95.1% of cases postmortem toxicology studies were performed. The cases were categorized by mode and cause of death, sex, age, race/ethnicity, and substances found in toxicology and correlations were identified. Statistical significance was assessed by calculating p-values using the Chi-squared test.

Results: Suicide in Cuyahoga County is most prevalent among males and white (not Hispanic or Latino) individuals. 19.5% of cases had ethanol levels ≥ 0.08 g/dl. Individuals 30-39 years were more likely to have ethanol levels above 0.08 g/dl, while this was less likely in individuals 10-19 years and above 70 years. Benzodiazepines were found in 14.5% of cases. Females were more likely positive. African Americans were less likely positive. Cannabinoids were found in 14.4% of cases. They were more likely found in African Americans. Individuals 20-39 years were more likely positive, while individuals above 60 years were less likely positive. Suicides by cutting and stabbing were more likely to be correlated with cannabinoids. 9.3% of cases were positive for prescription opioids (hydrocodone, oxycodone, propoxyphene, tramadol, and methadone). Females were more likely positive with those over 70 years most likely affected. African Americans were less likely positive. 7.9% of cases were positive for amphetamine. Individuals 40-49 years were more likely positive. African Americans were less likely positive. 7.6% of cases were positive for cocaine. Individuals 40-49 years, as well as individuals of Hispanic ethnicity were more likely tested positive for cocaine, while nobody above 70 years tested positive. Suicides by shooting were less likely positive for cocaine, while suicides by asphyxia were more likely so. Fentanyl was positive in 3% of cases. No African Americans were positive. 6-Acetylmorphine (heroin) was found in 2.5% of suicides. Females were more likely positive. Women 30-39 years were especially at risk.

Discussion: Deaths by suicide in Cuyahoga County had significant differences related to age, sex, race/ethnicity and substances found in postmortem toxicology. Understanding factors contributing to suicide and

how they interact with suicide victims' personal characteristics can be crucial in the development of preventive strategies.

P28 Extreme Adrenal Atrophy in a Healthy Young Adult

M. Chambers¹, T. Gilson², B. Boh³, J. Duval⁴

¹Dartmouth Medical School, Lebanon, New Hampshire, USA; ²Cuyahoga County Medical Examiner's Office, Cleveland, Ohio, USA; ³Dartmouth Hitchcock Medical Center, Lebanon, New Hampshire, USA; ⁴Office of the Chief Medical Examiner, Concord, New Hampshire, USA

We report a case of absent adrenal glands on autopsy in a 20-year-old African American male with no significant past medical history. Fatal respiratory infection was suggested as his potential cause of death, with a clinical course of several days of antecedent respiratory symptoms. Autopsy revealed pulmonary consolidation, absent adrenal glands and no trauma. Pulmonary histology was consistent with florid bacterial pneumonia superimposed on an underlying viral infection. Illness in combination with adrenal atrophy classically suggests Addison's Disease (AD) with underlying adrenal crisis. But while adrenal atrophy is a common finding in idiopathic AD, replacement of adrenal tissue with fibrosis, inflammatory infiltrate, and the necessity of some functional tissue for maintenance of life, usually leaves sufficient tissue for identification at autopsy. Ectopic locations for tissue were considered, including the broader retroperitoneum as well as spermatic cords, but no grossly appreciable tissue was found. There is one prior published case of adrenal insufficiency with no identifiable adrenal tissue on autopsy in which the authors were able to histologically section the supra-renal fat and identify microscopic deposits of tissue. We consider this to also be the most likely explanation in our case. The patient's thin BMI (16.3), recent history of vomiting, and electrolyte imbalances (hyperkalemia and hyponatremia) are consistent with adrenal insufficiency and Addison's Crisis, although these are hardly diagnostic. The most common test for postmortem evaluation of adrenal function is serum cortisol although there is controversy about its utility in the postmortem setting. The pituitary was not enlarged and there were no other gross findings of other possible underlying causes of primary adrenal insufficiency such as chronic infection and polyglandular syndrome. Cases of such profound adrenal atrophy are exceedingly rare, and this case study allows for a broad consideration of the typical presentation of acute adrenal insufficiency, common etiologies, and options for postmortem diagnosis.

P29 Fatal Fentanyl-Induced Status Asthmaticus

M. Chambers¹, C. James², D. Jennie²

¹Dartmouth Medical School, Hanover, New Hampshire, USA; ²Office of the Chief Medical Examiner, Concord, New Hampshire, USA

We report three cases of recreational fentanyl triggering fatal asthma attacks. Two of the three cases had known histories of asthma, and the third decedent was suspected of having asthma but did not seek a formal medical diagnosis. The fatal asthma attacks each occurred immediately following drug use. The decedents include a 30 year old male who insufflated fentanyl, a 23 year old female IV drug user, and a 20 year old female who injected a cotton rinse (using water to extract residual drug product from a used cotton ball filter). While opiates such as codeine, morphine, and meperidine are known to trigger histamine release from mast cells, other opiates such as fentanyl do not release histamine and are even recommended therapies for pulmonary disease requiring opiates. Despite this, fentanyl has been known to trigger cough, anaphylaxis, and bronchospasm, and pharmacologic use of transdermal fentanyl is contraindicated in asthma patients. A review of the literature reveals one case report of transdermal fentanyl triggering a persistent asthma exacerbation. In this case, the patient survived, and symptoms resolved after discontinuation of the fentanyl patch. In contrast, our cases were all fatal, with patients becoming unresponsive minutes after injection or insufflation, despite the use of inhalers or nebulizers. On histology, these

decedents each had changes consistent with an acute asthma attack including thickened basement membranes, bronchial smooth muscle hypertrophy, abundant eosinophils, and mucus plugging. Goblet cell metaplasia suggested chronic disease in each individual. Postmortem toxicology was positive for fentanyl in all three cases (femoral blood levels 1.1, 12, and 32 ng/mL). All three cases were polysubstance users and had additional drugs in serum samples including amphetamines and/or marijuana. Investigation of recreational drug overdoses and asthma has suggested that as many as 60% of fatal asthma attacks have positive toxicology results for recreational drugs and known drug users may have higher rates of respiratory disease, including asthma, compared to the broader population. However, research into the connection between asthma and recreational drug use – particularly fentanyl – is otherwise limited. These three cases highlight the need for greater exploration of the risks of recreational drug use in persons with known asthma histories.

P30 A Case of Fatal Surgical Complications from Penile Implant Surgery

M. Chambers¹, C. James², J. Duval²

¹Dartmouth Medical School, Hanover, New Hampshire, USA; ²Office of the Chief Medical Examiner, Concord, New Hampshire, USA

Inflatable penile prostheses (IPP) are an established elective surgical treatment for erectile dysfunction refractory to medical therapy. Recent reports have suggested that all-cause complication rates are less than 5%. A review of the literature reveals no published reports of death due to hypovolemic shock after IPP surgery. Herein we describe a case of post-surgical fatal exsanguination in a 72-year-old man who underwent IPP placement. The decedent had a past medical history of diabetes, obesity, hypertension, hyperlipidemia and valvular and atherosclerotic cardiovascular disease, status post aortic valve replacement and cardiac stents, and was on chronic anticoagulation therapy. He opted to undergo surgical management with placement of an IPP after failing multiple conservative management therapies for his severe vasculogenic erectile dysfunction. The procedure was completed without complication, and he was discharged home the next day. However, on post-op day #2, he complained of fatigue and weakness and fell twice in his home. He was later found unconscious on the floor by his wife and was pronounced dead at the scene. At autopsy, the decedent was found to have pelvic and right abdominal wall hematomas with 350 cc of free, clotted blood in the pelvis, a bladder serosal hematoma, gross hematuria, and pale organs. Enoxaparin injection sites were identified on the abdomen. Dissection of the pelvic vasculature showed no obvious disruption, and the prosthesis appeared intact. Extensive hypertensive, valvular, and atherosclerotic cardiovascular disease was also noted. Cause of death was opined as exsanguination due to surgical complications. Anticoagulation therapy and hypertensive, valvular, and atherosclerotic cardiovascular disease were recognized as contributory factors. This case highlights many of the key gross findings of exsanguination as well as represents a rare complication of an elective surgery in a patient who represents a growing demographic receiving this procedure.

P31 False Positive Enzymatic Ethanol Result in a Patient with Elevated Lactate and LDH from Acetaminophen-Induced Liver Failure

B. Flynn, J. Hughey, R. Bruccoleri, J. Colby

Vanderbilt University Medical Center, Nashville, Tennessee, USA

Blood ethanol testing is important in both clinical and forensic settings, and false-positives can have serious implications. Here we present the case of a patient with acetaminophen-induced liver failure who had a serum ethanol of 45 mg/dL, measured using an enzymatic assay. The patient denied using ethanol and confirmatory testing using gas chromatography was negative

for ethanol. There are a number of reports of false-positive enzymatic ethanol results occurring due to the presence of elevated lactate and lactate dehydrogenase (LDH). The metabolism of lactate by LDH produces a signal that is indistinguishable from the metabolism of ethanol by alcohol dehydrogenase, leading to a false-positive ethanol result in enzymatic assays. In this case, LDH elevations were consistent with previous reports of false-positive ethanol results (LDH > 26,339 IU/L, Nine et al., 1995). Lactate measurements were suppressed by the patient's treatment with N-acetylcysteine, thus the highest measured lactate (6.5 mmol/L) was less than the value shown to produce interference (26 mmol/L, Nine et al., 1995)

Many previous reports of lactate-LDH mediated interference in enzymatic ethanol testing have occurred in samples collected peri- or post-mortem (Badcock & O'Reilly, 1992; Thompson et al., 1994; Nine et al., 1995). Our patient was critically ill at the time the false-positive occurred, but the sample was collected antemortem. The frequency of lactate and LDH values capable of producing a false-positive ethanol result in a population of hospitalized patients is not known. To answer this question, we used the Synthetic Derivative (SD), a database of de-identified clinical information from 2.8 million VUMC patients. As part of the de-identification process used to create the SD, dates are shifted backwards. The shift is constant within an individual's record but varies between individuals. We queried the SD for individuals with clinically ordered lactate and LDH tests and identified fewer than 30 cases with elevations consistent with false positive ethanol results (lactate >5 mmol/L, LDH >26,000 IU/L). From these records we then extracted the date of lactate and LDH measurement and date of death (if applicable). To determine if the elevations in lactate and LDH necessary to produce false-positive ethanol results are only rarely observed antemortem, we calculated the time elapsed between the elevated measurements and death. We determined that these elevations are frequently, but not always, observed within three days of death.

P32 Pulmonary Artery Dissection: Autopsy Case Report and Literature Review

B. Flynn¹, M. Laboy²

¹Vanderbilt University Medical Center, Nashville, Tennessee, USA;

²Forensic Medical, Nashville, Tennessee, USA

Pulmonary artery dissection is an exceedingly rare cause of death, especially in patients with no history of pulmonary arterial hypertension or congenital cardiac abnormalities. Here we report a case of an unexpected idiopathic pulmonary artery dissection discovered during the autopsy of a relatively healthy 40-year-old man with a history of hypertension and recent back pain. The decedent had no history of pulmonary arterial hypertension, congenital cardiac abnormalities, nor recent cardiac interventions. Other significant findings at autopsy were cardiomegaly (640 grams) and left ventricular hypertrophy. Toxicology was negative. Gross and microscopic findings are discussed, and literature on pulmonary artery dissection is reviewed.

P33 Death by Dog Bite: Case Report of Fulminant Sepsis from *Capnocytophaga canimorsus* Infection

B. Flynn, M. Kapp

Vanderbilt University Medical Center, Nashville, Tennessee, USA

Capnocytophaga canimorsus is a bacterium found commensally in the oral cavity of dogs and cats and is a known pathogen capable of causing opportunistic infections in humans. This bacterium is a rare yet emerging cause of fulminant sepsis and death particularly in patients with asplenia, cirrhosis and alcohol abuse most commonly acquired via dog bites or by dogs licking an open wound. Herein we report a case of a middle-aged man with a history of alcohol abuse who demonstrated a rapid clinical decline with subsequent death due to *Capnocytophaga canimorsus* sepsis in the

setting of recent dog bites. The autopsy findings are discussed, and recent literature is reviewed.

P34 Two Cases of 5-fluoro-MDMB-PICA Overdose

A.C. Gonzalez, J.E. Nickels, D.H. Walker

University of Texas Medical Branch at Galveston, Galveston, Texas, USA

Synthetic cannabinoid-like designer drugs commonly referred to as "spice" include a large family of chemically unrelated structures with potent psychoactive properties resembling delta-9-THC (the active chemical of marijuana). These properties are more varied and intense with often unpredictable effects. The structure of these chemicals are often augmented to avoid chemical detection and maintain "legal" status. Synthetic cannabinoids are a threat to one's health because there is no reliable information or regulation regarding their composition and pharmacological effects. Generally, the synthetic cannabinoids act via agonism at the CB1 receptor, like THC, though some may also act at the CB2 receptor (peripherally). It is notable that the agonism may be several times more potent than THC and may induce other deleterious physiologic effects such as pronounced hypertension, tachycardia, and seizure. Individuals have often been found unresponsive following smoking of these substances.

The decedent was a 43-year-old male inmate with a past medical history of asthma, HCV, and hypertension found unresponsive in his cell. Resuscitative efforts were initiated and thirty-four minutes later, death was pronounced. Coincidentally, a fellow inmate had been found unresponsive and died despite resuscitative efforts in his cell with a similar presentation earlier that morning: a 65 year-old male inmate with past medical history of HCV and hypertension. Investigators at the scene requested toxicology testing in addition to autopsy for both cases.

At autopsy, findings in both decedents were remarkable for cardiomegaly and pulmonary edema bilaterally. Additional shared findings included atherosclerosis and thyromegaly. Toxicology was positive for 5-fluoro-MDMB-PICA in both decedents.

5-fluoro-MDMB-PICA is one of many synthetic cannabinoid drugs. It has been reported to cause psychoactive effects 380 times that of delta-9THC, and has caused adverse effects, including deaths. Structurally-similar synthetic cannabinoids such as 5F-ADB are Schedule I substances in the United States and have been associated with numerous intoxications and death cases worldwide. It has been identified in nine deaths since January 2018 as of August 2018. In August 2018, 47 cases of overdoses were reported in New Haven, CT in which 5F-MDMB-PICA was detected. Additionally, 244 overdoses involving 5F-MDMB-PICA were reported in Washington, DC from September 10-16, 2018. As of January 28, 2019, the US Drug Enforcement Administration issued the temporary placement of 5F-MDMB-PICA in Schedule I in order to avoid an imminent hazard to public safety. It is our opinion that the deaths of these individuals were due to the effects of 5-fluoro-MDMB-PICA.

P35 Suicide by an Unusual Compound: A Case of Barium Acetate Toxicity

E. Fenu, T. O'Neill

Wake Forest Baptist Medical Center, Winston-Salem, North Carolina, USA

Barium compounds have numerous industrial uses including in mining and in the manufacture of paint, glass, bricks and insect and rat poisons. In the literature there are rare case reports of deaths attributed to barium, either from unintentional exposure or intentional ingestion.

The authors report a case of a 33-year-old woman who was transported to a hospital after a suicide attempt following ingestion of "a couple scoops" of barium acetate mixed with water. During transport to the hospital she had episodes of narrow and wide complex tachyarrhythmias. A chemistry panel performed in the emergency department showed an extremely low potassium level and she was started on potassium and magnesium replacement. While in the emergency department, she had tachyarrhythmias which progressed to wide complex tachycardia and eventual asystolic arrest. Major autopsy findings included an obese female with cardiomegaly and mild hepatic steatosis. Postmortem toxicology performed on peripheral blood was positive for a barium level of 13 mg/L. Scene investigation and toxicology findings allowed the authors to attribute the death to ingestion of barium acetate.

Routine postmortem toxicology may not have barium as a commonly detected substance. With this case report, the authors would like to share knowledge with the forensic community about the clinical presentation from barium poisoning which may assist in ordering the correct toxicology panel to determine the cause of death.

P36 Critical Analysis of Laboratory Testing Methodologies When Interpreting Conflicting Results at Autopsy

K.M. Johnson¹, W. Tlomak², I. Gunsolus¹

¹Medical College of Wisconsin, Milwaukee, Wisconsin, USA; ²Milwaukee County Medical Examiner's Office, Milwaukee, Wisconsin, USA

A 51-year-old male presented with shortness of breath and coffee ground emesis. Medical history included chronic alcohol abuse, alcoholic hepatitis and alcoholic pancreatitis. He and his family members reported that his last drink was two days prior to admission. He was tachypneic, tachycardic, and hypoxic and required intubation. He was found to have an upper gastrointestinal bleed as well as severe metabolic acidosis with an anion gap of 31. His initial blood alcohol level was reported as 0.960 g/dL and repeated four hours later, after fluid resuscitation, and was reported as 0.500 g/dL. At autopsy, an antemortem blood sample collected from the hospital, postmortem blood and vitreous samples were analyzed using head-space gas chromatography (HSGC) and all three samples were found negative for volatiles. The antemortem blood was also analyzed in the toxicology lab using an immunoassay and the result was negative for ethanol. Given these confounding chemistry results, a review of the chart revealed an interpretive comment that accompanied the second hospital result stating the sample was significantly lipemic, the result was initially reported as 0.00 g/dL and was deemed not to be accurate because of the lipemia. The result reported was a best estimate based on six repeated runs through the enzymatic assay. In chemical analysis using enzymatic assays, there are three thoroughly established causes of interference; hemolysis, ictericia and lipemia. Modern chemistry analyzers automate measurement of these sources of interference, enabling rapid triage of compromised specimens. Given the negative results at autopsy were from HSGC, a methodology that would not be impacted by lipemia, hemolysis, or ictericia, it is suggested that despite the history of chronic alcohol abuse and physical findings of complications related to chronic alcoholism, the decedent did not have an elevated alcohol level at time of death. The laboratory results reported could be spuriously elevated due to light scattering in the lipemic sample. This case raises questions about the use of laboratory interpretive comments and the clinical utility of test results when a known interference is identified. In this case, the cause of death was determined to be complications of chronic alcoholism, but the laboratory findings do not support an acute intoxication related event or the presence of alcohol despite initial laboratory findings. The methodologies used in the laboratory, including their limitations and causes of interference, must be communicated appropriately and considered when interpreting antemortem and postmortem discrepant results.

P37 Accidental Overdose Deaths in Women: Toxicological Trends in New Mexico from 2011-2015

E. Gandara¹, E. Glassheim², J. Harris², H. Schainost², J. Suddock², S. Lathrop²

¹University of Colorado School of Medicine, Aurora, Colorado, USA;

²University of New Mexico School of Medicine, Albuquerque, New Mexico, USA

Introduction: Opioid-related deaths in women rose fivefold from 1999-2010, and women continue to be more likely to die of drug overdose than they are of both homicide and motor vehicle accidents.

Methods: The New Mexico Office of the Medical Investigator (OMI) database was queried for all female deaths from 2011-2015 with cause of death identified as acute drug intoxication and manner classified as "accidental" or "undetermined." Demographic data for these deaths was reviewed. Post-mortem toxicology reports were reviewed for the presence of common drugs of abuse ("primary substances") as well as other prescription/non-prescription medications. Finalized autopsy reports were assessed for primary substances contributing to cause of death A, B, or both.

Results: 634 female deaths met inclusion criteria. White non-Hispanic females were significantly older than White Hispanic female decedents at time of death (p<0.0005). Opiates and benzodiazepines were mostly frequently present on toxicology and most frequently contributed to cause of death A. Benzodiazepines and opiates co-occurred in a large number of cases. Anti-depressants were present in almost half of all deaths and contributed to cause of death A just as often as heroin. A high degree of polypharmacy was observed with 1 to 9 primary substances contributing to COD A and 1 to 4 primary substances contributing to COD B. A range of 1 to 10 "other" drugs were also present on toxicology, most commonly nicotine, caffeine, theobromine, NSAIDs, and marijuana. Alcohol was present in 23% of cases, most commonly at or below 0.08 g/dL BAC. Mean number of drugs listed in COD statements increased over time, following 2013 NAME recommendations regarding reporting of deaths attributed to opioid toxicity. Finally, naloxone was present in only a small number of cases and appeared in less than 5% of opiate-related deaths.

Discussion: Women remain at high risk of overdosing on opiates. Benzodiazepines and anti-depressants also represent significant risk to women. This study highlights the need for women in at-risk demographic groups (particularly young Hispanic women and middle- to older-aged non-Hispanic white women) to maintain regular visits with their primary care providers for monitoring of and titration of medications for chronic conditions like pain, depression, and anxiety. The risk of overdose death among women is high and frequent medication reconciliation of all illicit, prescription, and non-prescription medications female patients may be taking is critical in reducing the amount of future accidental overdoses in women in the state of NM.

P38 Correlation of External Physical Examination Findings of Neck Trauma with Postmortem Computed Tomography

T. Jong¹, C. Yim², M. Thomas², O. Ukpo³

¹Los Angeles County/University of Southern California Medical Center, Los Angeles, California, USA; ²Olive View-UCLA Medical Center, Sylmar, California, USA; ³Los Angeles County Department of Medical Examiner-Coroner, Los Angeles, California, USA

The concordance of external examination findings by either medical examiners or investigators with post mortem computed tomography findings is largely unknown. Computed tomography scanners in some offices provide a more sensitive method in the detection of neck trauma. We hypothesized that the cervical spine physical examination findings by

the forensic pathologists and investigators do not correlate well with postmortem computed tomography findings.

A retrospective review of 490 external exam only cases from 2016-2017 in Los Angeles County found 53 cases containing terms suggestive of neck fracture and/or dislocation within the external examination documentation of both the investigator or medical examiner or either alone. All cases received a postmortem CT scan upon arrival into the office and the images were reviewed after the physical examination. After identifying the cases containing language suggestive of neck trauma, 3 board certified radiologists reviewed the CT scans of the identified cases. The investigators' and medical examiners' external examination neck trauma findings were then compared with the CT scan findings.

Our study found poor concordance between external exam and CT findings for neck fractures in both investigators (25% accuracy) and medical examiners (27% accuracy). Among cervical dislocations there was a 25% accuracy for medical examiners in correctly identifying neck dislocations. The kappa statistic for physical examination findings to CT findings for fractures and dislocations was 0. This suggests that the determination of fractures and/or dislocations by physical examination findings was due to chance alone. Determination of neck trauma by external examination without CT imaging should be avoided. Research and training to develop more accurate means of determining neck trauma at the scene and at the examination table is indicated.

P39 Anatomical Distribution and Autopsy Features of Gunshot Injuries to Determine the Manner of Death. A 5-year Retrospective Study from the Cook County Medical Examiner's Office

L. Gitto¹, P. Arunkumar², A. Segovia², S. Serinelli¹

¹State University of New York, Upstate Medical University, Syracuse, New York, USA; ²Cook County Medical Examiner's Office, Chicago, Illinois, USA

Gunshot wounds are associated with significant morbidity and mortality worldwide. In such cases, determining the manner of death is mandatory. The analysis of the pattern and location of the gunshot wounds can help in understanding the circumstances of death. This study will provide data to support an association between gunshot wound features and the manner of death.

The files of the Cook County Medical Examiner's Office were searched for deaths due to gunshot wounds between August 2014 and April 2019. Complications due to remote gunshot wounds were not included in the study. The investigative, autopsy and toxicological reports were reviewed in each case. The following parameters were recorded: manner of death, gender, race and age, firearms, and bullets type (if available), number and sites of entrance and exit wounds, shooting distance, internal bullet pathway, blood drugs and/or alcohol concentration, and investigative narratives. The obtained data were then subcategorized as to the manner of death (suicide, homicide, accident, or undetermined). The information detected on the autopsy report were used to create a graphic reconstruction of the anatomical distribution of the gunshot wounds on the body surface. A total of 3492 deaths due to gunshot wounds were identified, that have been subcategorized based on the manner of death, showing: 2842 homicides (81%), 627 suicides (18%), 4 accidents (<1%), and 19 undetermined (<1%). The ages of the subjects ranged from 0 to 96 years, with an average of 32. Males accounted for 92% while females for 8%, and in 1 case the gender was undetermined (unknown bones). Regarding race, there were 2437 African Americans, 1006 Caucasians, 14 Asians, 1 Native American, 2 undetermined, and 32 "Others".

The presented research is one of the most extensive case studies about gunshot wound fatalities and presents distinct differences that should be considered while investigating gunshot-wounds related deaths. A thorough

discussion of the results, including graphical models showing the most common location of the injuries will be presented.

P40 Multiple Projectiles Recovered from a Single Entrance and Wound path: A Rare Case of Tandem Bullets and Literature Review

S.J. Grewe¹, C. McEnnan¹, S. Strauch Rivers²

¹University of South Florida, Tampa, Florida, USA; ²Hillsborough County Medical Examiners Office, Tampa, Florida, USA

Gunshot injuries can manifest in a variety of unusual presentations that can raise difficulty in interpretation for forensic pathologists when reconstructing the events at the time of death. One such unique presentation is the finding of tandem bullets recovered from a single firearm discharge and entry wound site. In this phenomenon, more than one bullet travels together in a single trajectory pathway, creating an unusual finding at the time of autopsy. Tandem bullet cases previously reported in the literature describe the finding as a result of a bullet remaining in the firearm chamber despite the trigger being pulled, due to insufficient ignition. This occurrence leads to an inconsistency that can cause confusion without knowledge of this exceedingly rare entity. Given the unusual appearance of this finding, we present a case in which a discrepancy was presented when multiple bullets were recovered from a single wound pathway. In our case, a 34-year-old male was found covered in blood with a visible firearm injury after neighbors reported hearing gunshots in their yard. Upon external examination, a single gunshot wound in the left subcostal region revealed an oval 0.6 x 0.9cm entrance site with associated gunpowder stippling. Internal examination revealed two medium-caliber jacket tandem bullets recovered from the left subscapular region. Examination of the bullets revealed two bullets in tandem. The first projectile had an intact base where the second projectile's nose impacted to cause deformity of the bullet. The piggybacking bullets were recovered and photographed in a linear arrangement in the wound tract. Sequential firearm discharges were excluded from our case after a thorough examination of the bullet deformities and characteristics, as well as taking into account the findings at the time of autopsy which included a careful trajectory analysis. Given the single wound path and multiple bullets recovered, a difficulty is presented when one attempts to correspond the bullets entry sites, and individual pathways. When inequalities exist with the number of rounds fired, wounds examined, and information obtained from the scene, radiographic analysis in combination with autopsy findings can further help to elucidate the events that transpired. It is important for forensic pathologists to be aware of this finding to avoid making inaccurate conclusions regarding bullet trajectories, evidence recovered at the crime scene, and corresponding wound injuries seen during external examination, as tandem bullets can be misinterpreted if one is not aware of this rare phenomenon.

P41 Sudden Death Due to Osler-Weber-Rendu Syndrome Presenting as Suspected Traumatic Death

N.E. Stanley¹, Z.D. Michalick²

¹University of Utah Health, Salt Lake City, Utah, USA; ²Utah Department of Health, Taylorsville, Utah, USA

Occasionally, investigation of an apparent traumatic death reveals an unknown genetic abnormality that not only provides a cause of death but also has implications for surviving family members. Herein we report a case of previously undiagnosed hereditary hemorrhagic telangiectasia (HHT), or Osler-Weber-Rendu Syndrome. A previously healthy 20-year-old female had been breaking in a horse when she was found down in a pasture behind her home. She was not wearing a helmet, and traumatic death was suspected. Gross examination revealed focal subdural and subarachnoid hemorrhages over the left cerebral convexity but was otherwise unremarkable. Neuropathologic examination following fixation revealed

numerous vascular malformations with associated hemorrhage throughout the left cerebral hemisphere and brainstem. Subsequent interviews with family members revealed that the deceased had had near-daily bouts of epistaxis. Thus, genetic testing was requested, and the ACVRL1 mutation, one of the most common mutations associated with HHT and the most common in the state of Utah, was identified. This case highlights the importance of accurate diagnosis at autopsy, an endeavour that may require full external and internal examinations to include histology, neuropathology, and molecular studies, as well as careful review of personal and family history and employment of medical genetics expertise, so that genetic investigation of surviving family members may then be undertaken.

P42 Why So Blue? Suicide by Sodium Nitrite

M. Lawless¹, M. Elieff²

¹University of Nebraska Medical Center, Omaha, Nebraska, USA;

²Physicians Laboratory, Omaha, Nebraska, USA

Sodium nitrite is a white crystalline powder that is most commonly used as an additive in meat. It imparts a reddish-pink hue to meat, gives cured meat a distinctive flavor, prolongs the storage life of meats, and inhibits growth of *Clostridium botulinum* and some other microorganisms. Sodium nitrite is available readily and cheaply online or in grocery stores. It is often sold as a pink salt in a mixture with table salt.

We report a case of a 19-year-old male who ingested at least 10 grams of sodium nitrite powder mixed with water after internet-researching the use of the substance in suicides. After ingestion, he called family members who contacted paramedics. En route to the hospital, he became unresponsive and suffered circulatory collapse. Despite aggressive resuscitation and administration of methylene blue, he died. Post-mortem examination showed a well-developed, well-nourished young man with green-blue-gray discoloration of the skin and a brownish discoloration of the organs and tissues, including the blood. Toxicology showed a post-resuscitation methemoglobin level of 25% saturation in the blood. Reports of suicidal ingestion of sodium nitrite are rare, and resuscitation is often possible with rapid administration of methylene blue. Although survival has been documented with much higher levels of methemoglobinemia, the onset of circulatory collapse is unpredictable and resuscitation may be difficult or impossible.

P43 Different Mean, Same End: An Unexpected Death Prior to Suicide Attempt

A.L. Tart¹, S. Erickson²

¹University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA;

²Arkansas State Crime Lab, Little Rock, Arkansas, USA

Determining the manner of death is one of the most important aspects of a performing a post-mortem examination and signing out a death certificate. The manner of death is crucial in order to provide statistical evidence to health departments, as well as track epidemiology of diseases and potential public health risks. At times, the manner of death is easily identified, while other scenes and circumstances may prove confounding. Upon arriving at a death scene, when a note of intention, pills, and a decedent are found, suicide is generally the presumed manner of death. However, here we present a case in which a 48-year-old female intended to commit suicide via pill ingestion, but died before ingesting any pills. A note of intention was discovered, outlining the number and type of pills she planned to ingest. Upon post-mortem examination, a previously unknown malignancy was found in the anterior mediastinum in addition to multiple organs, including kidneys, uterus, and lungs. Toxicological studies returned as negative for illicit substances, as well as prescription medications. Sections were taken from the mediastinal mass in addition to the uterus, kidneys, heart, lungs,

liver and adrenal glands. Histologic examination with additional immunohistochemical staining revealed the malignancy to be a mature T-cell lymphoma. All pills described in her note of intention were accounted for, and no other explanation for death was found at the time of autopsy. Ultimately, the manner of death was ruled as natural, and signed out as such. Cases such as this serve as examples of the importance of post-mortem examinations, even in cases that appear otherwise simple.

P44 Fatal Ludwig's Angina in a Patient with Submandibular Abscess

A. Cooper¹, J. Barnard²

¹Baylor University Medical Center, Dallas, Texas, USA; ²Southwestern Institute of Forensic Sciences (University of Texas Southwestern), Dallas, Texas, USA

Ludwig's angina is a gangrenous cellulitis of the floor of the mouth and neck that presents with bilateral, tense submandibular swelling. The development of Ludwig's angina and spread of infection is a consequence of the anatomy of the head and neck and the potential spaces created by its fascia. The submandibular space is subdivided by the mylohyoid muscle into an inferior submaxillary and superior sublingual space. In the majority of cases of Ludwig's angina, cellulitis arises from odontogenic infection, particularly of the second and third lower molars which have roots that directly access the submaxillary space. Contiguous spread to the sublingual space, which is roofed by the floor of the mouth, follows. Fatal asphyxiation may subsequently occur as expanding infection displaces the tongue, obstructing the airway. Additional complications, including mediastinitis and pericarditis, may arise from contiguous spread of infection along fascial planes to the adjacent parapharyngeal and retropharyngeal spaces.

We report a case of Ludwig's angina in a 61 year-old woman with a clinical history of diabetes who presented to the emergency department with complaints of dyspnea. She had been hospitalized the previous month for a suspected esophageal perforation and placed on a liquid diet. A week prior to presentation to the emergency department, she had complained of right molar pain. Before dental extraction could be performed, she developed facial swelling and dyspnea. Shortly after her arrival in the emergency department, she coded and was unable to be resuscitated. At autopsy, the jaws were partially edentulous and facial and neck edema without crepitus were present. On internal examination, the soft tissues of the neck were edematous and a right submandibular abscess was present. There was no evidence of esophageal perforation. Microscopic examination demonstrated chronic inflammation of bilateral submandibular glands with abscess formation with necrosis of the soft tissue and muscle surrounding the right gland. Acute inflammation additionally involved the soft tissue and muscle of the right posterior pharynx. Focal bronchopneumonia was seen. Culture of the right submandibular abscess demonstrated *Klebsiella pneumoniae*.

With the advent of antibiotics, the mortality rate of Ludwig's angina has decreased from 50% to between 5% and 10%, leading to potential under-recognition of lethal cases. The possibility of Ludwig's angina should be considered in decedents with submandibular swelling, particularly those with poor dentition and causes of immune dysfunction such as diabetes, so that an infectious source may be identified.

P45 Transection of Skull via Helicopter Blade: an Unusual Cause of Death

T. Kaufman¹, S. Grewe¹, S. Strauch Rivers², L. Chrostowski²
¹University of South Florida, Tampa, Florida, USA; ²Hillsborough County Medical Examiners Office, Tampa, Florida, USA

Unexpected events that result in death require a thorough scene investigation and postmortem examination in order to elucidate the cause and manner of death. In cases of death due to tragic events, collaboration with government agencies, such as the National Transportation Safety Board, may be necessary for reconstructing the events that lead to death. Here we present an unusual cause of death, where fatal injuries resulted from a helicopter emergently landing on a busy roadway. The decedent was a 72-year-old man traveling home from the grocery store, who was seated in the passenger seat of a northbound vehicle. At this time, a Robinson R44 helicopter experienced mechanical difficulties that resulted in complete loss of engine power. The pilot made a forced, hard landing in the southbound portion of the roadway. The momentum of the landing caused the helicopter to skid forward and collide with a wooden utility pole located near a busy intersection. The force of impact resulted in the distal tips of the helicopter's main rotor blade becoming fragmented, thus creating an airborne projectile. The two-and-a-half-foot main rotor blade tip impacted the front windshield of the decedent's pickup truck, penetrating the vehicle and subsequently impacting the decedent's head. The decedent was pronounced dead at the scene. Upon arrival at the scene, the investigators noted apparent trauma to the decedent's head, exposing brain and skull tissue admixed with synthetic material. A full autopsy with radiographic analysis was performed, which revealed transection of the skull, cervical vertebrae, and brainstem due to blunt impact trauma from the propeller blade tips. Additional information concerning the nature of the incident was obtained from the National Transportation Safety Board's aviation accident report, which detailed the helicopter's engine failure and mechanical issues. After reviewing this report in conjunction with the information obtained from the scene investigation and autopsy findings, the manner of death was ruled an accident. This extremely rare case resulted from a sequence of uncommon fatal events, beginning with a catastrophic helicopter engine failure, and ending with an airborne projectile penetrating the windshield of a distant motor vehicle. Given the infrequency of this cause and manner of death, we present this case to emphasize the importance of a thorough scene investigation and postmortem examination in understanding the unfortunate chain of events leading up to death.

P46 Radically Invasive Projectiles and Their Destruction

I.L. Hitto¹, J. Dwyer²
¹The University of Texas Southwestern Medical Center, Dallas, Texas, USA; ²Southwestern Institute of Forensic Sciences, Dallas, Texas, USA

Introduction: Expanding bullets and ammunition were first developed in the mid 19th century. Radically invasive projectile (RIP) ammunition is a type of expanding bullet which was developed in 2014. The bullet is designed with 8 prongs or trocars which release either on impact or prior to impact creating multiple deep penetrating wound tracks. Interestingly, The Hague convention prohibits the use of RIP ammunition in war.

Case Report: A 40-year-old black male is found dead at his girlfriend's residence with multiple gunshot wounds noted at the scene. There is a reported history of mental illness in the decedent's girlfriend. There is a total of 12 gunshot wounds on various parts of the body including the face, right upper extremity, right shoulder, bilateral chest, bilateral lower extremities, and left buttock.

Results and Discussion: The bullet/bullet component injuries resulted in a distinct wheel spoke-like pattern on the skin which reflects the "blooming" effect of the attached metal prongs after firing the round. Multiple injuries

were noted to vital organs surrounding hemorrhage. It was concluded that the decedent died as the result of multiple gunshot wounds, and the manner was deemed a homicide.

P47 Huffington Postmortem

M. Flores¹, E. Ogden²
¹University of Texas Southwestern Medical Center, Dallas, Texas, USA; ²Southwestern Institute of Forensic Sciences, Dallas, Texas, USA

Introduction: Huffing, or inhalant abuse, is the intentional inhalation of fumes or chemical vapors to attain euphoric effects. Household aerosol products contain 1,1 difluoroethane (DFE), also known as HFC-152a, and are abused due to their wide availability. DFE is a halogenated hydrocarbon used in refrigeration, dusting spray for electronics, and airbrush paint. Common side effects associated with huffing include respiratory distress, cough, hypoxia, nausea, vomiting, central nervous system depression, and sudden death. The cardiac effects of DFE are still not well understood, but palpitations, arrhythmia, coronary vasospasm, and direct cellular toxicity have been reported.

Methods: A case report of the death of a 30 year old unidentified man with unknown history at the time of autopsy is presented. Autopsy findings, including toxicology and histology, and a review of the literature are discussed.

Results: The decedent was found unresponsive on the grassy embankment of a drainage ditch. Autopsy with gross and microscopic examinations was performed. External examination revealed only poor dentition, early decomposition changes, and postmortem insect activity. Upon internal examination, the heart was grossly unremarkable. However, histology revealed neutrophilic and mononuclear inflammation with associated myocyte destruction. Difluoroethane was detected on routine postmortem toxicology.

Discussion: 1,1-difluoroethane is a commonly abused aerosol with a wide range of recognized side effects. The cardiotoxic effects of DFE are an emerging area of study. We present a case of death due to DFE-induced toxic myocarditis. The decedent was identified after autopsy, and a history of huffing was revealed. This case provides the opportunity to discuss the current literature available on death due to DFE and the importance of forensic toxicology.

P48 Fentanyl and Fentanyl-laced Heroin Overdose Deaths Have Become the Number One Cause of Accidental Drug Poisoning in Rural, Suburban, and Urban Michigan, Displacing Prescription Opioids; Fentanyl Deaths Are Underappreciated

W.R. Morrone
Office of the Medical Examiner, Forensic Toxicology, Bay County Health Department, Bay City, Michigan, USA

Introduction: This report identifies the specific drugs involved most frequently in drug overdose deaths in the Michigan from 2014 through 2019.

Methods: Data from the 2014–2019 Michigan Department of Health and Human Service–Mortality files were linked to death certificates containing literal text information from death certificates. Drug overdose deaths were identified using the International Classification of Diseases, Tenth Revision. Drug mentions were identified by searching the literal text in three fields of the death certificate: the causes of death from Part I, significant conditions contributing to death from Part II, and a description of how the injury occurred. Contextual information was used to determine drug involvement in the death. Descriptive statistics were calculated for drug overdose deaths

involving the 7 most frequently mentioned drugs. Deaths involving more than one drug (e.g., a death involving both heroin and fentanyl) were counted in all relevant drug categories (e.g., the same death was included in counts of heroin deaths and in counts of fentanyl deaths).

Results: Among drug overdose deaths that mentioned at least one specific drug, the 7 most frequently mentioned drugs during 2014–2019 included fentanyl, heroin, hydrocodone, methadone, morphine, cocaine, and methamphetamine. Hydrocodone ranked first in 2014, heroin during 2015, and fentanyl in 2016-2019. During the study period, cocaine consistently ranked fourth. From 2014 through 2019, the age-adjusted rate of drug overdose deaths involving fentanyl and fentanyl analogues more than tripled, as did the rate of drug overdose deaths involving methamphetamine. The rate of drug overdose deaths involving heroin doubled from 2014 through 2016. The rate of overdose deaths involving methadone decreased from 2014-2019. The 7 most frequently mentioned drugs often were found in combination with each other. The drugs most frequently mentioned varied by the intent of the drug overdose death. In 2017-2019, the drugs most frequently mentioned in unintentional drug overdose deaths were fentanyl, heroin, and cocaine.

Discussion: This report identifies patterns in the specific drugs most frequently involved in drug overdose deaths from 2014 through 2019 and highlights the importance of complete and accurate reporting in the literal text on death certificates.

P49 Unusual Presentation of Giant Cell Myocarditis: Cases of Sudden Cardiac Death

*A. Hossain, R.A. Ellis, A.P. Martinez, K.O. Pitsenbarger, P. Rogers
Forensic Medical of Kansas City, Kansas City, Kansas, USA*

Idiopathic giant cell myocarditis (IGCM) is an extremely rare but well-known fatal entity, afflicting relatively young, predominately healthy adults. The patients usually succumb to the disease secondary to heart failure unless cardiac transplantation is pursued. Giant cell myocarditis is regarded as an autoimmune inflammatory response within the myocardium that is not secondary to ischemic events or rejection in the setting of cardiac transplantation. In forensic pathology a great number of cardiovascular deaths are regarded as sudden. We present several cases of giant cell myocarditis with atypical features. Microscopic findings in all three cases included widespread and striking necrosis of the cardiac myocytes, zones of strap like and round multinucleated giant cells, dense inflammatory infiltrates comprised of segmented neutrophils, eosinophils and lymphocytes. Granulomas are absent. The lack of granulomas is probably the most useful clue to exclude sarcoidosis. Giant cell myocarditis often eludes diagnosis until autopsy and has defied proper treatment trials due to its rarity and deadly behavior.

Case 1: A 28-year-old female who recently underwent a cholecystectomy, developing bradycardia terminating in cardiac arrest. Gross findings at autopsy included: dilated and flaccid ventricular walls, diffuse irregular linear and serpinginous pale grey-yellow-white within myocardium.

Case 2: A 41-year-old female hospitalized for shortness of breath and a sensation of heaviness in the chest. Gross findings at autopsy included: A grey-yellow-white area of the interventricular septum, with extension into the free walls of the right and left ventricle. The cardiac muscle appeared to be replaced by fibrous tissue and adipose tissue within the septum and the entirety of the right ventricular wall. Scattered gray-white patches were seen throughout the left ventricular wall.

Case 3: A 46-year-old female obtunded from ethanol intoxication resulting in death. Gross findings at autopsy included: gray white elevated patches

on the epicardium, ventricular septum and papillary muscles. The muscle again appeared to be replaced by fibrous tissue within the septum.

The gross findings in GCM are vague and very difficult to make provisional diagnosis macroscopically. Cardiac sarcoidosis may also have gray-white patches. Although rare, sarcoidosis may cause sudden death. In all three cases gross morphology are very similar. We believe these gross findings may aid forensic pathologists in including giant cell myocarditis on the differential. In cases of sudden death in young individuals, a careful search for histological evidence of idiopathic giant cell myocarditis is essential after ruling out myocardial infarction and sarcoidosis

P50 Death due to Pulmonary Embolism and Pulmonary Hypertension in Klippel Trenaunay Syndrome

*A. Hossain, E. Altaf, K. Pilsenbarger, K. Gajewski, P. Rogers
Forensic Medical of Kansas City, Kansas City, Kansas, USA*

Klippel Trenaunay Syndrome (KTS) is a congenital disorder characterized by bony and soft tissue hypertrophy, capillary malformation, and varicosities. This syndrome has several complications such as, sepsis, hypercoagulability, rectal and bladder bleeding, venous thrombosis, and pulmonary embolism. This rare entity is not familiar by many clinicians, pathologists, and forensic pathologists. Forensic pathologists can narrow down the complications and carefully look for the potential causes of death in KTS. Massive hemorrhage due to rupture of malformed leg vessels has been reported as a cause of death. Those with large arteriovenous malformations are at risk of formation of blood clots in the vascular lesion and if there is a large-volume blood flow occurs, high-output cardiac failure may develop. We present a case of KTS where an adult Caucasian male who lived alone and died suddenly at home. Clinically, the decedent had chronic pain and warmth in both legs, with the left being worse than the right. Additionally, they had port wine stain, longer and hypertrophied left leg, vascular malformation, big toes, and swollen soft tissues. Although left leg is most commonly hypertrophied, multiple affected limbs have been reported, such as arms, trunk, and rarely head and neck. Confirmatory toxicological analyses indicate no evidence of prescription or non-prescription drug intoxication. Autopsy revealed no traumatic injury. The usual treatment of KTS include compression garment, support stocking, compression pump, laser treatment, surgical intervention and preventive anticoagulation. The decedent refused to routinely wear support stockings. Reportedly, he received anticoagulation therapy infrequently. Although the decedent had large venous malformations, organomegaly, and chronic lymphedema, there was no evidence of hemorrhage from vascular malformations. There is no evidence of cardiomegaly, or intrusive coronary artery disease. A rosy, granular, organized, and formed anti-mortem blood clot is observed in the pulmonary trunk, its branches, and in the lungs. Arterial obstruction by an organized clot produced pulmonary hypertension with medial hypertrophy. There are also intimal fibrosis that narrows the blood vessels and tuft of capillaries spanning the lumen of arteries. Wedge-shaped pulmonary infarction is absent. The pulmonary hypertension generally results following chronic pulmonary thrombo-embolism of one or multiple episodes. The forensic pathologists should aware that when there are suspected cases of KTS that are partially or improperly treated and the person suddenly dies, pulmonary thrombo-embolism should be at the top of the list in differential diagnosis as a cause of death.

P51 The Use of a Homemade Improvised Shotgun in a Suicide

*Z. Barcellos
Office of the Chief Medical Examiner, Commonwealth of Virginia, Roanoke, Virginia, USA*

A decedent was found, in the early stages of decomposition, at a National Park overlook in his unlocked vehicle. He had a gunshot wound to the head.

What appeared to be a shotgun barrel was between his legs, pointing at the roof. There were shotgun shells and a receipt for a home improvement store on the passenger seat. When weapon was removed it was found to be a homemade 'slam fire' gun. The decedent had purchased common items from the store and fashioned a functional shotgun.

I would have a diagram of how the weapon was created and how it worked. A review of the different terms used for improvised shotguns will be supplied. The history of how homemade improvised shotguns have been developed and used will be presented. I will discuss the ease of getting the supplies and instructions on how to manufacture this sort of weapon. I will present the percentage of the use of homemade weapons in the gun deaths investigated by our office.

P52 "VIAGRA"- the Killer! Fact or Fiction

M.P. SARANGI

Cornwall Regional Hospital, Montego Bay, Jamaica

Instances of sudden deaths following abuse of 'aphrodisiacs' in seemingly hale and hearty males with unknown morbidity are not infrequent.

The present case is about an international visitor in his early fifties of obese built, who died with terminal sudden unresponsiveness accompanied by foaming from his mouth, immediately after sexual intercourse, reportedly having had consumed a low dose of "Viagra" (25mg) tablet- a known 'aphrodisiac' drug the day before.

Autopsy revealed an overtly large thrombus with an aneurysm of 4x2 cm size in the right middle cerebral artery on the base of brain, in the region of 'Circle of Willies', with recent sign of rupture and diffuse 'subarachnoid' haemorrhage, more pronounced on the base of brain.

Gross examination of Heart indicated moderate cardiomegaly and concentric hypertrophic cardiomyopathy in the left ventricle, weighed- 520g. Brain parenchyma was moderately oedematous and with recent intraparenchymal haemorrhage, weighed 1520g. Lungs parenchyma was grossly congested and markedly oedematous, weighed- 1240g (right), 820g (left); with no signs of thrombo-embolism and/or any other pathological lesions. Abdominal organs showed generalized congestion. Stomach contained pasty food materials without any perceptible odour.

Histology was carried out on the segment of aneurysmal blood vessel with the suspected 'thrombus' in addition to tissues from other salient organs including Brain, Heart and Lungs, which confirmed the thrombus of recent duration with lines 'Zahn' and haemorrhages (Subarachnoid and intraparenchymal) from the ruptured aneurysmal dilatation of the blood vessel. Toxicology of stomach contents and important body fluids did not reveal presence of either 'Sildenafil' (Viagra) or any other noxious substance/drug(s).

Given as above, the cause of death in the instant case was attributed to sudden rupture in the cerebral blood vessel (Right middle cerebral artery) aneurysm with an embedded recent thrombus, in association with Hypertensive Heart Disease.

The role of "Viagra" in the causation of the death was ruled out though could have presumably triggered significant hypotension at the time, following rupture of the pre-existing cerebral blood vessel aneurysm, despite absence of the drug (Sildenafil) from Toxicology, which possibly got completely metabolized after long interval between its consumption and death. As such, that "Viagra" was the killer in the case was proved as a fiction, not a fact. However, it remained as a 'myth' in the minds of a few lay investigators and public. Details are discussed in the "paper".

P53 The Presence of Comorbid Neurodegenerative Disease in the Forensic Setting: The rule Rather than the Exception?

C.A. Hauch¹, J.J. Barnard², T. Danielsen³, P. Yell³, R. Chkheidze³, B. Evers³, D.K. Burn³, J. Raisanen³, C.L. White³

¹UT Southwestern Medical Center - Southwestern Institute of Forensic Sciences, Dallas, Texas, USA; ²Southwestern Institute of Forensic Sciences, Dallas, Texas, USA; ³UT Southwestern Medical Center, Dallas, Texas, USA

Neurodegenerative disease is an all-encompassing term for a wide range of disorders that result in neuronal dysfunction and loss. The specific clinical manifestations of neurodegenerative disease depend on the underlying condition, but the majority are associated with a progressive decline in memory and cognition – otherwise known as dementia. While Alzheimer disease (AD) and Lewy body disease (LBD) remain the two most commonly diagnosed neurodegenerative diseases, there are many other entities that must be considered in the setting of dementia. In many cases of dementia, the autopsy and neuropathologic workup identifies comorbid neurodegenerative processes. Given the reported high rate of coexisting (comorbid) neuropathologic disease in tertiary care and research settings, we hypothesized that individuals with an antemortem diagnosis of dementia who are autopsied in the forensic setting would demonstrate similar phenomena.

We reviewed 105 brains from autopsies on patients with histories suggestive of dementia or a specific neurodegenerative disorder conducted at a medical examiner's office between 2012-2019. The evaluations included review of H&E preparations, neurofibrillary tangle and neuritic plaque assessment using fluorescent thioflavine-S staining, Braak & Braak staging and assessment of additional tau deposition using phospho-tau (AT8) immunostaining, and the assessment of alpha-synuclein, TDP-43, and polyglutamine pathology by immunohistochemistry.

Of the 105 cases, the primary neuropathologic diagnoses were: 32 AD neuropathologic change (ADNC), 25 primary age-related tauopathy (PART), 24 LBD, 5 Huntington disease (HD), 3 chronic traumatic encephalopathy (CTE), 3 vascular brain injury (VBI), 2 amyotrophic lateral sclerosis (ALS), 2 frontotemporal lobar degeneration TDP-43 type (FTLD-TDP), 2 spongiform encephalopathy, 2 progressive supranuclear palsy (PSP), 1 corticobasal degeneration (CBD), 1 multiple system atrophy (MSA), 1 argyrophilic grain disease (AGD), 1 cerebral amyloid angiopathy (CAA), and 1 Pick disease. Importantly, 44% (46/105) of cases demonstrated comorbid neurodegenerative pathologies, with 36% (38/105) having two distinct pathologic processes and 8% (8/105) of cases having three. The most frequent combination of comorbid conditions included PART and VBI (10/105), followed by LBD and PART (9/105), and finally LBD and AD (8/105). These results highlight the importance of understanding and appreciating the often complex etiology of dementia, as well the value of a thorough neuropathologic evaluation in such cases encountered in the forensic setting.

P54 A Fatal Case of Occupational Hydrogen Sulfide Exposure and Sewage Aspiration: Sewage Happens

C.A. Hauch, E. Ogden

Southwestern Institute of Forensic Sciences, Dallas, Texas, USA

Accidental death secondary to poison gas exposure is not uncommon in the forensic setting. While the vast majority of such cases are due to carbon monoxide poisoning, it is important for the forensic pathologist to be aware of less common toxic gases such as hydrogen sulfide (H₂S), one of the leading causes of workplace death due to gas inhalation.

H₂S is a colorless, highly flammable, and toxic gas with a distinctively pungent odor akin to the stench of rotten eggs. H₂S is produced through

many industrial processes, but also occurs naturally as a byproduct of the bacterial breakdown of organic compounds. H₂S exposure commonly affects waste management personnel working in sewers or landfills, and those involved in oil and natural gas drilling and refining.

While cases of lethal hydrogen sulfide exposure have been well documented, we present a unique case that combines the toxic effects of hydrogen sulfide and sewage aspiration. A 31-year-old male construction worker was repairing a sewer line at the bottom of a trench. A foul-smelling liquid spewed from the pipe, and he suddenly collapsed in the prone position at the bottom of the trench. A second construction worker attempted to render aid, but fell unconscious as he approached the trench. Observing from a distance, a third construction worker attempted to assist, but left the area upon feeling dizzy. The decedent remained prone at the bottom of the trench for approximately twenty minutes prior to EMS arrival. He was transported to the hospital, and died despite resuscitation efforts.

Significant autopsy findings included brown granular material within the trachea that extended into the terminal bronchi. Brown semisolid material was also found within the sphenoid sinus. Microscopic examination of the lungs revealed abundant acellular granular material admixed with refractile elements and bacterial overgrowth within the air spaces. Post-mortem blood thiosulfate level was 4.4 mcg/mL (normal < 0.3 mcg/mL). Based on the case history and autopsy findings, it was our opinion that this individual died as a result of toxic effects of hydrogen sulfide and aspiration of sewage.

P55 Automating Organ and Tissue Reporting: The Michigan Medicine Experience

J.M. Jentzen¹, S.C. Clark², S. Sommers³

¹University of Michigan, Ann Arbor, Michigan, USA; ²Occupation Research and Assessment, Big Rapids, Michigan, USA; ³Gift of Life Michigan, Ann Arbor, Michigan, USA

There is an urgent and continuous need for organ and tissue transplantation across the United States. Deaths under the jurisdiction of medical examiners and coroners provide 70 per cent of all donated tissues. In Michigan, there is mandatory reporting of all deaths to the designated Organ Procurement Organization (OPO) by the Kyle Horning Law MCL 52.209. Due to poor cooperation and communication, states have hastily enacted legislation unilaterally and without input or consultation of frontline death investigators. The limited ME/C input has resulted in unreliable reporting practices and impractical expectations by the organ procurement organizations (OPO). Lines of communication between ME/C offices and the OPO are often aggravated or nonexistent. From 2008 to 2018 Washtenaw County, Michigan using an automated reporting system made 1142 non-hospital referrals resulting in 126 tissue donors and 141 eye donations. Automated reporting improves communication and reporting thus increases organ and tissue recovery.

P56 Sudden, Unexpected Death after Remote Treatment with Doxorubicin and Radiation for Hodgkin Lymphoma

D. Jacob, M. Nashelsky

University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA

Doxorubicin, an anthracycline, is cardiotoxic and may cause dose-dependent heart failure. Radiation therapy to the chest may cause pericarditis, valvular disease, myocardial fibrosis, and accelerated coronary artery atherosclerosis. These possible therapeutic complications are well known but, in cases of a long interval between therapy and morbidity/mortality, may be overlooked as important components of a patient's or a decedent's medical history.

We report the case of a 36 year old female who presented with a large anterior mediastinal mass (up to 8.1 cm in greatest dimension) that was centered on the thymus and mediastinum. Thymectomy revealed classical Hodgkin lymphoma, nodular sclerosing type. Disease was not identified elsewhere. She received post-operative chemotherapy, including doxorubicin, and radiation therapy to the chest. She was thought to be cured of Hodgkin lymphoma. The recent medical history consisted of tobacco use, a panic disorder, and agoraphobia. More than nine years following tumor diagnosis and therapies, the patient was found deceased in bed by her husband. Death investigation did not reveal suspicious circumstances.

Autopsy examination revealed dilated cardiomyopathy and focal severe coronary artery atherosclerosis. There were also mitral valvular fibrosis, pericardial and pleural fibrosis, and thyroid gland fibrosis. Toxicology examination of blood was not contributory. Death was attributed to remote cardiac complications of treatment of Hodgkin lymphoma.

This report discusses a case of remote cardiac complications of chemotherapy and radiation therapy. Death investigators should be aware of remote diagnoses, therapies, and possible complications that may not manifest until a long period of time has passed.

P57 Overweight and Underreported: Listing Obesity on Death Certificates at the Miami-Dade County Medical Examiner Department

J.E. Kallan, M.J. Shuman, B. Mathis

Miami-Dade County Medical Examiner Department, Miami, Florida, USA

Introduction: Obesity is a growing public health crisis and a well-known risk factor in the development of many chronic medical conditions. However, obesity is inconsistently included on death certificates. Therefore, vital statistics data may not accurately capture the number of obesity-related deaths. We looked retrospectively at how frequently obesity is listed on death certificates, when appropriate.

Methods: Data including cause and manner of death, height, weight, body mass index (BMI), and age were compiled for 1,184 autopsies completed over a 6 month period. A non-natural manner of death (783), children < 18 years of age (10), decompositional changes (10), BMI < 30 kg/m² (255), and a cause of death that was not due to an obesity-related medical condition (16) were excluded. Death certificates for the remaining 110 cases were analyzed for whether or not obesity was mentioned.

Results: Obesity-related medical conditions listed as the cause of death included hypertensive and/or atherosclerotic heart disease (95), thromboembolism (6), asthma/chronic obstructive pulmonary disease (4), diabetes mellitus (3), pancreatitis (1), and obesity (1). Cases were classified based on BMI as obese (76), morbidly obese (27), and super obese (7). Obesity was cited on 26% of death certificates when the BMI was 30 to < 35 kg/m², 50% when the BMI was 35 to < 40 kg/m², 90% when the BMI was 40 to < 45 kg/m², 100% when the BMI was 45 to < 50 kg/m², 75% when the BMI was 50 to < 60 kg/m², and 100% when the BMI was 60 kg/m² or greater.

Discussion: Our data show that there are inconsistencies among medical examiners in listing obesity on death certificates. There was, however, a general trend that as BMI increased, the likelihood in which obesity was listed on the death certificate also increased. This inconsistency may be due, in part, to an element of subjectivity when interpreting BMI, since this calculation does not take into account race, sex, muscle mass, bone density, and body composition. In addition, obesity can be a stigmatizing medical condition that can upset decedents' family members, and may be intentionally excluded from the death certificate in order to avoid conflict.

Conclusion: Obesity is a risk factor in many chronic medical conditions, yet it is underreported on death certificates. Medical examiners should make an effort, when appropriate, to cite obesity on death certificates in order to accurately capture the extent of this growing public health epidemic.

P58 Homicides in Denver, 2008-2018

M.A. Frank

Denver Office of the Medical Examiner, Denver, Colorado, USA

The Denver Office of the Medical Examiner serves the City and County of Denver and takes jurisdiction of approximately 1200 cases per year. Deaths ruled as homicidal in manner from 2008 through 2018 are reviewed. There are a total of 578 homicides during this time period. Firearm injuries comprise 68.2% of all homicides (394 cases), sharp force injuries 15.1% (87 cases), blunt force injuries 12.6% (73 cases), asphyxia 3.3% (19 cases), thermal injuries 0.7% (4 cases), other 0.7% (4 cases), undetermined 0.5% (3 cases), and elderly neglect 0.3% (2). Fifty-six homicides are associated with a significant survival interval after injury. Of these delayed deaths, blunt force injuries involve 48.2% (27), firearm injuries 33.9% (19), sharp force injuries 7.1% (4 cases - one is also with blunt force injuries), asphyxia 3.6% (2), elderly neglect 3.6% (2), and thermal injuries 1.8% (1 case - which is also with blunt force injuries). One pediatric homicide of undetermined means and unknown survival interval is noted. There are a total of 5 law enforcement-related homicides; 3 are due to firearm injuries, 1 due to asphyxia with chronic disease and cocaine intoxication, and 1 as delayed complications of positional asphyxia with chronic disease. Decedents are more often male than female and show ages ranges similar to state and national data. Additional discussion at the presentation will include the ages of decedents according to type of death by year, a map of known locations of incidents, and other trends regarding homicides in Denver during this time period.

P59 Opioid Overdose Suicide to Accident Ratios: Comparison of Virginia to New York City Over More than 10 Years

S. Patel¹, W. Gunther²

¹St. George's University School of Medicine, Voorhees, New Jersey, USA;

²Office of Chief Medical Examiner, Commonwealth of Virginia, Norfolk, Virginia, USA

Introduction: In the United States, deaths due to suicide and unintentional overdose are a major public health concern. Between 2000 and 2017, the number of deaths from suicide and unintentional overdose in the United States increased from 41,364 to 110,749 [1]. During this period, nationally synthetic opioids other than methadone led with the most deaths, with over 20,000 deaths, while fentanyl deaths increased by 520% nationally. Prescription opioid deaths also increased by 18% overall during a similar time period. The link between prescription or illicit opioid use and unintentional overdose has been demonstrated [2]; however, the link between opioids and suicidal overdose is less well known. According to national data, in 2017, more than 40% of suicidal and accidental deaths were due to opioid involvement [3].

Methods: Data were obtained from the Virginia Office of the Chief Medical Examiner (OCME) annual reports from 2007 to 2017, comparing suicide and accidental overdose rates due to opioid use. This data was cross-compared to New York City (NYC) data from the National Institute on Drug Abuse from 2006 to 2016.

Results: Parallel to national data, deaths from accidental overdose skyrocketed over the 10-year span from the baseline year data to the most recently available data. However, the ratio of suicidal opioid deaths to accidental opioid overdoses fell in Virginia, while it increased in NYC. In 2007 in Virginia, 15% of total deaths were due to suicide, and 16.5% were

due to opioid use; in 2017, 16.1% of total deaths were due to suicide, but only 10.8% were due to opioid use. Over the 10-year span in NYC, opioid related suicides increased from 5.2% to 15.1%.

Discussion: The increase in death rates from the opioid crisis does not indicate a uniform increase in suicidal and accidental overdose deaths in the United States; opioid-related suicide to accident ratio is actually decreasing in Virginia while it has tripled in New York City, for unknown causes.

Ref. 1 Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS), 2018.

Ref. 2 Bohnert KM, Ilgen MA, Louzon S, McCarthy JF, Katz IR. Substance use disorders and the risk of suicide mortality among men and women in the U.S. Veterans Health Administration. *Addiction* 112: 1193-201, 2017.

Ref. 3 Bohnert AS and Ilgen MA. Understanding Links among Opioid Use, Overdose and Suicide. *New England Journal of Medicine*. 308:71-79, 2019.

P60 Diagnosis of Gastrointestinal Mucormycosis at Autopsy

T.S. Halvorson, B. Ford, D. Firchau

University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA

Mucormycosis is a rare life-threatening infection caused by fungi in the order Mucorales such as *Mucor* and *Rhizopus* spp.. These fungi are ubiquitous and invade tissue in an angioinvasive fashion. Infection typically occurs in immunocompromised hosts, often with a history of hematologic or solid organ transplantation, hematologic malignancy, neutropenia, or poorly controlled diabetes.

We report the case of a 32 year old male with acute myeloid leukemia (AML) status-post hematopoietic stem cell transplantation who was admitted to our institution for recurrent AML and re-induction chemotherapy. Upon admission non-specific symptoms including fever and vomiting were noted with subsequent development of abdominal pain and diarrhea. Computed tomography on hospital day 5 showed a small bowel obstruction and neutropenic enterocolitis. On hospital day, 12 the patient developed acute right upper quadrant pain and transaminitis. Mass-like liver lesions concerning for leukemic infiltration were identified on magnetic resonance imaging. On hospital day 14 a rapid response was called when he suddenly became unresponsive. He was found to be in shock with worsening liver function. He was transferred to the intensive care unit where he died shortly after. His family consented to an abdomen-only autopsy to determine the cause of his acute liver failure.

Autopsy examination revealed jaundice and 2300 mL of ascites. There was significant dilation of the small intestine. The wall of the cecum was markedly thickened and hemorrhagic. There were patchy petechial hemorrhages and areas of purple-red discoloration of the peritoneum and small intestinal serosa. There were numerous raised, purple-brown, circular mucosal lesions throughout the colon. The liver was soft and mottled. Microscopic examination identified innumerable large, non-pigmented, ribbon-like, pauci-septate hyphae, consistent with a *mucormycete*. The fungi were identified in the liver, gallbladder, right kidney, ileum, cecum, colon, and intra-abdominal soft tissues, with associated hemorrhagic necrosis.

Up to 7% of mucormycosis cases present as gastrointestinal disease, which has a mortality rate of 85% and can be challenging to diagnose clinically due to its non-specific symptoms. As a result, gastrointestinal mucormycosis is predominantly diagnosed at autopsy through histologic examination or tissue culture. In this case the cause of death was disseminated mucormycosis complicating recurrent acute myeloid leukemia. Given the limited nature of this autopsy the complete extent of disease was not known.

This case provides an interesting example of the gross appearance of gastrointestinal mucormycosis and underscores the importance of autopsy examination in the diagnosis.

P61 Paenibacillus Sepsis and Meningitis in a Premature Infant: A Case Report

L. Sathyavagiswaran¹, A. Panchal¹, R. Martin-Blais², K. Adachi², C. Rogers¹

¹Los Angeles County, Los Angeles, California, USA; ²University of California, Los Angeles, Los Angeles, California, USA

The polymorphous *Paenibacilli* are aerobic or facultatively anaerobic Gram-positive or Gram-variable endospore-forming environmental bacteria. They are commonly thought of as contaminants and have been described as the causative agents of disease in only a few cases. However, new techniques for pathogen identification may allow us to identify these organisms. We would like to report a case of a 25-day-old female infant who died from presumed *Paenibacillus* sepsis and meningitis. The infant presented to the emergency department after cardiopulmonary arrest; she had been found unresponsive by caregivers and transported by EMS following several rounds of CPR. Her birth history was significant for preterm delivery at 35 weeks gestational age, lack of prenatal care, and maternal substance abuse (methamphetamine, marijuana and tobacco).

On arrival to the hospital, the infant was noted to have pulseless electrical activity with a Glasgow coma score of 3 requiring further CPR and intubation prior to transfer to the intensive care unit. Her exam was also notable for a bulging fontanelle. Diffuse bilateral pulmonary opacities were noted on chest CT imaging. The infant had initially been started on ceftriaxone and ampicillin for empiric coverage of neonatal sepsis and transitioned to acyclovir, gentamicin, and ampicillin. Given the severity of her illness and CSF studies consistent with purulent meningitis, cefepime was added for additional coverage. Blood culture drawn on admission returned positive. Matrix-assisted laser desorption/ionization-time of flight testing preliminarily identified the organism as *Paenibacillus thiaminolyticus*. The infant continued on ampicillin, cefepime, and gentamicin for treatment of meningitis and sepsis. Further infectious workup was unrevealing. There was no evidence of non-accidental trauma based on hospital workup.

Postmortem neuropathology showed hypoxic-ischemic encephalopathy, fibrin thrombi, and subacute sulcal infarction. Autopsy showed no trauma or any other anomaly that could explain her clinical deterioration. Post-mortem respiratory PCR panel for viruses was completely negative. Law enforcement investigation revealed no foul play. The case was finalized with discussion with clinicians who treated her as a natural death presumably from meningitis related to probable *Paenibacillus* species. Most prior reported cases of *Paenibacillus* bacteremia were among patients who had prosthetic medical devices, were immunocompromised, or were injection drug users. Yet, to our knowledge, this is the first reported case of infant death from presumed *Paenibacillus*. This case suggests the potential for severe human infection by a bacterium previously considered an environmental organism of little consequence.

P62 The Autopsy as a Tool for Antibiotic Resistance Gene Surveillance

C.J. Schmidt¹, M.E. Benbow², H.R. Jordan³, J.L. Pechal²

¹University of Michigan / Wayne County Medical Examiner, Detroit, Michigan, USA; ²Michigan State University, East Lansing, Michigan, Afghanistan; ³Mississippi State University, Mississippi State, Mississippi, USA

The emergence of antibiotic resistant (AR) genes, proliferation of multiple drug resistant bacterial species and newly emerging pathogens is a clinical

and financial burden, and an existential threat. It could change medical practice by making even simple infections untreatable and routine surgery hazardous due to the threat of infection. Surveillance comes from limited samples, mainly case reports through the Centers for Disease Control and Prevention (CDC), and from the Food and Drug Administration (FDA) and the US Department of Agriculture (USDA; i.e., the livestock industry).

The human microbiome is an accessible, high density bacterial reservoir with untapped surveillance potential. In the living, it has been studied mainly in the gut due to accessibility. The routine autopsy provides an unmatched opportunity to sample and study the microbiome in anatomic sites not available under clinical circumstances. We have shown that the postmortem human microbiome is stable for the first 48 hours after death, and that it has potential to correlate with antemortem health conditions. It also has great potential to study the prevalence of AR genes in a random selected, diverse population.

Samples from 22 cases taken from swabs of eyes, nose, mouth, umbilicus and rectum were pooled and analyzed with commercially available AR arrays. Swabs were taken in 20 cases from the cerebral interhemispheric fissure and the cut surface of the autopsy craniotomy and analyzed using shotgun sequencing. Results showed diverse AR genes present in all cases, but their diversity varied. The highest percentage of positive AR genes were identified for the macrolide Lincosamide and Streptogramin B, followed by class A β -lactamases, Staphylococcus MecA β -lactamases, and tetracycline efflux pumps. Genes for Class D β -lactamases, vancomycin and aminoglycoside resistance, multi-drug efflux pumps, and fluoroquinolone resistance were also identified, but to a lesser extent. There was one case positive for both MecA and VanB genes, markers for both methicillin and vancomycin resistance, respectively. AR genes associated with the "ESKAPE" pathogens, the leading cause of nosocomial infections, were found (*Enterococcus*, *Staphylococcus*, *Klebsiella*, *Acinetobacter*, *Pseudomonas*, and *Enterobacter* species).

Using functional metagenomics, many AR transformants were found encoding resistance to multiple antibiotics. Different kinds of proteins such as transposable elements, endonucleases, and others capable of lateral gene transfer between bacteria and people as well as the inactivation of antibiotics were identified. A major challenge is to analyze the large amounts of data generated by these techniques.

Multiple AR genes were found in a diverse, non-selected population. The routine medical examiner autopsy has potential for public health surveillance of AR genes.

P63 A Microbiology Mystery Seated in the Tricuspid Valve: An Autopsy Case Report

E. Henrie, J. Nickels, R. Seymour

University of Texas Medical Branch, Galveston, Texas, USA

A 55-year-old Hispanic male with a history of an unspecified congenital heart defect and "growth in his heart" (diagnosed 3 months previously) was found with hematemesis and pronounced deceased shortly thereafter. Autopsy revealed massive semi-translucent orange-yellow pericardial effusion (775 mL), marked cardiomegaly (810 g), multiple ventricular septal defects (1.7 x 1.1 cm, 0.3 cm, and 0.2 cm), tricuspid valve vegetations, and multifocal areas of hemorrhage in the lungs with pink-red solid material within multiple bronchi which did not correlate with stomach contents. The vegetations on the tricuspid valve were gritty and tan-yellow 2.0 x 1.5 cm, located on the chordae tendoneae and papillary muscles. Gram stain of these vegetations showed few Gram positive cocci, and *Actinomyces odontolyticus* as well as *Penicillium chrysogenum* were isolated in culture. Lung tissue cultures for bacteria and fungus were negative for growth. Microscopic evaluation of the tricuspid valve revealed numerous fungal

elements and filamentous bacteria consistent with the above organisms. The lungs showed acute pneumonia with areas of calcification and organizing pulmonary emboli. Evaluation of the liver, pancreas and spleen showed areas with numerous plasma cells, lymphocytes and neutrophils. In addition, mediastinal lymph nodes had several nests of plasma cells.

P64 Sudden Death: Splenic Sequestration and Myocarditis in Sickle Cell Anemia

J.A. Mininni, A.P. Burke

University of Maryland Medical Center, Baltimore, Maryland, USA

Introduction: The decedent is a six-year-old African-American male, with a history of sickle cell anemia, who woke up complaining of abdominal pain and nausea. Shortly thereafter, he lost consciousness and collapsed suddenly. Upon arrival to the emergency department, patient was in cardiac arrest. Physical examination was notable for splenomegaly. Laboratory studies showed hemoglobin of 0.9 g/dL and hematocrit of 3%. Despite resuscitative efforts, patient expired and an autopsy was performed.

Methods: The patient was autopsied using standard autopsy procedures. Formalin-fixed paraffin embedded tissue sections were stained with H&E and applicable immunohistochemical markers.

Results: Gross examination of the organ block revealed a markedly enlarged spleen, weighing 700 grams. The remaining organs were grossly unremarkable. Histologic sections of the spleen showed severe sinusoidal congestion and trapping of sickled red blood cells. The bone marrow was notable for erythroid hyperplasia. Sections of the heart showed diffuse capillary sickling with intra- and perivascular inflammation. Macrophages and lymphocytes were identified by CD68 and CD3 stains, respectively. Sections of the lung showed occlusive microthrombi and increased interstitial megakaryocytes.

Discussion: The patient's enlarged spleen indicates that he was likely suffering from a splenic sequestration crisis, a known complication of sickle cell anemia. Additionally, the patient's hemoglobin of 0.9 g/dL (normal range 11.5-15.5 g/dL) and hematocrit of 3% (normal range, 35-45%) is further proof that the spleen was sequestering vast amounts of red blood cells. Splenic sequestration has been reported as a likely cause of death in 6.6% of sickle cell anemia patients and is more common in children because they have intact spleens. The occlusive microthrombi formation in the heart and lungs is the result of red blood cell sickling. The microthrombi insult likely led to a ventricular arrhythmia, resulting in the patient's sudden death. The findings of myocarditis and its relationship to sickle cell crises are unknown, but also likely contributed to the development of ventricular arrhythmia.

P65 Postmortem Serum Levels of Beta-Tryptase and Total IgE in Non-Anaphylactic Deaths

M. Pradhan, D. KONER, D. Khanna

Maulana Azad Medical College, New Delhi, India

Introduction: The role of beta-tryptase and IgE in the diagnosis of anaphylactic deaths is well established. However, contradicting studies challenge the veracity of these biomarkers as they are found to be raised even in non-anaphylactic deaths.

Objective: To study the postmortem serum beta-tryptase and IgE levels in various causes of deaths other than anaphylaxis.

Methods: Seventy-six cases of different causes of death other than anaphylaxis were selected who were autopsied in the Department of Forensic Medicine, Maulana Azad Medical College, New Delhi,

India. Serum Beta tryptase and serum Total IgE levels were determined using the Sincere Biotech Immunoassay. The postmortem interval was less than 48 hours.

Results: The mean beta tryptase level of all the cases was 0.85 ng/ml. The mean serum beta tryptase levels, in different causes of death, in descending order was: fall (1.33 ng/ml), disease (1.02 ng/ml), penetrating trauma (0.90 ng/ml), cardiac death (0.85 ng/ml), burns (0.72 ng/ml), RTA (0.70 ng/ml), poisoning (0.70 ng/ml), asphyxia (0.58 ng/ml). The mean serum total IgE level of all the cases was 584 IU/ml. The serum total IgE levels, in different causes of death, in descending order was: fall (1273.5 IU/ml), asphyxia (1003.24 IU/ml), road traffic accident (659.57 IU/ml), burns (628.83 IU/ml), disease (603.77 IU/ml), cardiac deaths (595.23 IU/ml), poisoning (336.15 IU/ml), penetrating trauma (265.35 IU/ml). No correlation was seen between time since death and beta tryptase levels and IgE levels.

Discussion: The negligible levels of serum beta tryptase in the non-anaphylactic deaths indicate that serum tryptase is specific for anaphylactic deaths. Serum total IgE level was raised in all the cases and was much higher than the reference value. This indicates that total IgE levels may not be useful in diagnosis of anaphylactic deaths. Instead, allergen specific IgE should be estimated to confirm death due to anaphylaxis.

P66 By Their Own Hand: Examining Police Suicides in Cook County, Illinois

S.M. Powers

Cook County Medical Examiner's Office, Chicago, Illinois, USA

Police suicides have come to the forefront of the media in recent years. Since at least 2016, more police officers have committed suicide than have died in the line of duty. A retrospective look at police suicides in Cook County, Illinois, from 2015 through April 2019 was performed to offer insight into these tragic events. There were 6 police suicides each in 2015 and 2016, 4 in 2017, and 9 in 2018; in the first four months of 2019, there have been 5 police suicides. Of these 30 suicides, 26 of them are due to gunshot wounds (87%). This is in stark contrast to the overall rate of gunshot-related suicides from January 2015 through April 2019 (average 35% per year). 16 of the decedents were currently employed by a police department. Of those, 13 committed suicide while off-duty; the 3 on-duty suicides occurred in 2018. The overall average age of these decedents was 52.6 years; for those still working as officers, it was 42.9 years, and for those no longer with the force, it was 63.7 years. 17 of all suicides occurred somewhere in the decedent's home; 4 occurred in a police vehicle. In 13 cases, relationship issues appeared to be a factor behind the suicide; medical issues appeared to be a factor in 9. When looking at the frequency of police suicides, the average number of suicides per month for January 2015 through December 2017 is 0.44; for January 2018 through April 2019, that number doubles to 0.88, with 11 (37%) of the total number of suicides occurring between July 2018 and April 2019. Because of the increase in police suicides over the last year in the Chicago area, more attention has been given to providing mental health benefits to officers; there has not been a clear impact on the suicide rate since implementation of these newer opportunities for a variety of reasons, including the ease of taking advantage of these services and the social stigma associated with mental health issues in general. By examining the suicides that have already occurred, we can possibly identify patterns to better guide policy development to help prevent suicides in the future.

P67 Molecular Diagnostics: A Chemical Pathology And Forensic Medicine Collaboration

C. Van Niekerk¹, T. Wallace², R. Vernal², L. Du Toit-Prinsloo², B. Van Deventer²

¹National Health Laboratory Service (NHLS), Pretoria, South Africa;
²University of Pretoria, Pretoria, South Africa

A cause of death is not always possible after autopsy, particularly in cases such as sudden unexpected death (SUD) or where unidentified remains are concerned. Molecular techniques have improved findings in such cases, leading to the term molecular autopsy. As a collaboration between the departments of Chemical Pathology and Forensic Medicine, we have used various molecular techniques to assist in identifying cause of death in SUD cases, as well as determining age and sex in unidentified remains.

Retrospective studies were conducted on sudden infant death cases (SIDS), SUD cases and unidentified remains admitted to the Pretoria Medico-Legal Laboratory. DNA was extracted from formalin-fixed, paraffin-embedded (FFPE) tissue samples as well as blood samples. Real-time polymerase chain reaction (PCR) amplification and sequencing was used to determine genetic propensity for channelopathies in SIDS and SUD cases. DNA samples were extracted from teeth and bone after which DNA demethylation and real-time PCR was utilised to determine sex and age in unidentified remains.

Of the SIDS cases, analysis revealed 33 different single nucleotide variants of which seven had been previously reported as variants of known pathogenic significance, 14 variants of benign clinical significance and 12 novel variants. Of these novel variants, two were predicted as "probably damaging" with a high level of certainty, one was predicted to be "possibly damaging" and nine variants were predicted to be of benign significance. SUD case analysis has shown six variations so far, of which one seems to be novel. Unidentified remains have been successfully used to extract DNA and amplify five genes linked to sex and aging. An "age calculator" is being developed according to the methylation patterns seen on three of the genes. All the studies are still ongoing. These studies show the significant added value in identifying unknown remains as well as determining the cause of death in South Africa using genetic testing.

P68 In-Custody Deaths with Concomitant Drug and/or Alcohol Intoxication in New Mexico

H.S. Jarrell¹, D. Horton², G. Bodor¹

¹Office of the Medical Investigator, University of New Mexico, Albuquerque, New Mexico, USA; ²University of New Mexico, Albuquerque, New Mexico, USA

According to sources, the state of New Mexico has placed either first or second in the United States for its number of lethal shootings by law enforcement since 2015. In 2018, 20 people were shot by law enforcement officers in NM; more than any other state, at a rate of 9.59 per 1 million. Recognizing that many other factors are involved in the decision to use deadly force, there is no recent literature on the number of people who died while in law enforcement custody in New Mexico, with concomitant drug and/or alcohol intoxication. According to some sources, alcohol is the substance that is most frequently affiliated in homicides in general, with other illicit substances and violence are related to distribution interactions. Although alcohol use has been shown to be predictive of association with violent behavior, methamphetamine use has not, according to some sources, although literature is conflicting. A retrospective review of in-custody deaths was performed from 2007 through 2018, in the state of New Mexico, where death was caused by law enforcement action. Cases involving death from motor vehicle collision while in police pursuit and deaths occurring during incarceration were excluded. Postmortem blood

toxicology results were obtained for each case and were analyzed. Throughout the 11 year period, 90.5% of deaths were due to gunshot wound(s), 7.1% were associated with restraint use, 1.2% were associated with an electronic conductive device, and 1.2% were due to another cause. One-third of all deaths took place within the city of Albuquerque and Bernalillo County, which contain approximately one-half the total population of New Mexico. Toxicology analysis demonstrated 89.3% positivity for illicit substance and 50.7% were positive for alcohol (concentration above the legal limit for driving of 0.08%). Sixteen percent demonstrated blood alcohol concentration at least 0.16, while 8% demonstrated blood alcohol concentration of at least 0.24. Sixty percent demonstrated positive postmortem blood toxicology for methamphetamine and 5% were positive for cocaine. The majority of decedents who tested positive for illicit stimulant use demonstrated irrational and/or violent behavior, prompting either lethal force or physical force. While some medical examiner jurisdictions do not evaluate blood toxicology in homicidal cases, toxicology results may be helpful in the evaluation of the use of deadly force or physical force by law enforcement.

P69 Epidural Hematoma Following Cranioplasty: Forensic Issues and Legal Implications

W. Alias, M. Mohd Noor

Sultanah Bahiyah Hospital, Alor Setar, Malaysia

Introduction: The perception that cranioplasty is a simple surgical procedure has led to its complications being underemphasized. It is in fact associated with a high overall complication rate of 15%-36.5%. One recognized complication is postcranioplasty hemorrhage comprising epidural, subdural and intracerebral hematomas requiring reoperation. Most of the reported deaths from postcranioplasty hemorrhage involved patients who were being monitored postoperatively in hospitals. To date, we have not yet identified a case report that specifically discusses the forensic importance of death due to postcranioplasty hemorrhage occurring outside of the hospital. We present a case report of a postcranioplasty death of an adolescent male who died at home two days after he was discharged from the hospital

Case Report: A 17-year-old epileptic male was involved in a vehicular crash and subsequently underwent a right decompressive craniectomy for traumatic head injury. He recovered well from the surgery and regained his consciousness, albeit ADL (Activities of Daily Living) dependent due to left hemiparesis. Approximately five months after the decompressive craniectomy, he underwent a cranioplasty and was discharged from the hospital 5 days after making a good postoperative recovery. Unfortunately, he died at home two days later following a seizure. A subsequent forensic autopsy revealed a large epidural hematoma at the cranioplasty site. The relevant forensic issues pertaining to this case will be discussed.

Discussion: This case illustrates the medicolegal importance of determining the cause of death in deaths associated with surgical procedures which may have far-reaching legal implications for criminal investigation and civil compensation.

P70 ALCAPA: A Case Report of a Sudden Maternal Death from a Rare Cause

M. Mohd Noor, W. Alias, N. Ahmad

Ministry of Health, Malaysia, Alor Setar, Malaysia

Introduction: Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA or Bland-White-Garland syndrome) is a rare congenital cardiac lesion affecting 1 in 300000 live births, and constitutes 0.25% to 0.5% of congenital heart disease. It is usually an isolated cardiac anomaly, and if untreated surgically up to 90% would die in infancy from

cardiac failure. Survival into adulthood depends on the development of adequate collaterals from the right coronary artery (RCA), and is likely to be complicated by myocardial ischemia and mitral regurgitation. Sudden cardiac death may also be the first clinical presentation in later life. Whilst women with untreated ALCAPA having uncomplicated pregnancies have been reported, it is most unusual for sudden maternal death to be the first clinical manifestation of the anomaly. We report a case of ALCAPA that was undetected during life presenting as sudden maternal death.

Case report: An apparently healthy 23 year old primigravida at 5 weeks of gestation was found unresponsive at home without any prior symptoms, and was dead on arrival to the hospital. There was no suspicion of foul play. Aside from a history of stable asthma she also had a vague childhood history of suspected valvular heart disease, but had not had cardiac symptoms nor was she on any cardiac follow-up. At autopsy, her left coronary artery was found to originate from the pulmonary trunk instead of the aorta. The right coronary artery, which was of normal aortic origin, and its branches were markedly dilated and tortuous. The left ventricle of the heart showed endocardial and myocardial fibrosis, and the chordae tendineae of the mitral valve were shortened and thickened. The in utero gestational sac was intact.

Discussion: The deceased had the adult type of ALCAPA with complicating chronic ischemic myocardial damage and mitral valve structural abnormality. The changes in cardiovascular physiology that occur during pregnancy had likely precipitated her sudden cardiac death. This case highlights the fact that in spite of their rarity, forensic pathologists need to be aware of coronary anomalies such as ectopic origins when investigating a case of sudden death.

P71 A Review of Neuropathologic Findings in Cases of Sudden Unexplained Death in Pediatrics

N. Harvilla, C. Ho

University of Maryland Medical Center, Baltimore, Maryland, USA

Background: Sudden unexplained death in pediatrics (SUDP) encompasses sudden unexplained infant death (SUID) and sudden unexplained death in childhood. It is a diagnosis of exclusion after complete and thorough death investigation. As a leading cause of death in children, SUDP accounts for more deaths than cardiac disease and cancer. SUDP, particularly SUID, tends to occur in a critical developmental period. A proposed cause of SUDP is believed to be an underlying disease state accompanied by an environmental stressor. The "underlying disease state", however, is currently unknown and not well studied.

Methods: Postmortem examination of the brain was performed on 22 cases of SUDP (Male:Female = 5:2; age at death: 0 days-4.5 years [median= 4 months]), of which 45.4% (10/22) showed histologic findings. Those without histologic findings were designated as the control group.

Results: The brains examined were grossly unremarkable, with the exception of one individual with Down syndrome who exhibited microcephaly (4.5%; 1/22). The histologic findings included: perivascular microbleeds of small cerebral vessels and associated microcalcifications (13.6%; 3/22), periventricular encephalomalacia (9.1%; 2/22), acute hypoxic/ischemic changes in basal ganglia (4.5%; 1/22), reactive gliosis in parietal lobe (4.5%; 1/22), focal dentate granule cell bilamination (9.1%; 2/22), and hippocampal sclerosis (4.5%; 1/22).

Discussion: In addition to the hippocampal abnormalities previously noted by Kinney et al. (Acta Neuropathol, 2015), we found microbleeds, microcalcifications and hypoxic-ischemic changes in a significant portion of the SUDP cases in our cohort. The significance of this pattern of histologic findings is unclear, but suggests that recurrent hypoxic/ischemic insults

may be a disease process that predisposes young children to sudden death. The histologic findings, particularly microbleeds and microcalcifications, raise the possibility of using imaging modalities in detecting SUDP-related brain pathology and predicting the pediatric population that is vulnerable to sudden death.

P72 Venous Malformations of the Brain: Underappreciated Contributors to Cause of Death

J. Krcecinac Marks, J.M. Taylor, C.C. Borck, R.D. Folkerth

Office of Chief Medical Examiner, City of New York, New York, New York, USA

Introduction: Cerebral vascular malformations include venous malformations (VMs), cavernous hemangiomas, arteriovenous malformations, and capillary telangiectasia, of which VMs are the most common with an incidence of up to 3% at autopsy. VMs, also termed developmental venous anomalies or venous angiomas, are generally considered "benign" lesions, with little effect on the cerebral circulation.

Objectives: Our goal was to review VMs and their relationship to symptomatology and cause of death.

Methods: We screened our database at the Office of Chief Medical Examiner, City of New York, from July 2016 to March 2019 and found 9 cases of brain VMs (2 women and 7 men). The clinical manifestations (collected from the family members) and relationship of VMs to the cause of death were analyzed.

Results: Supratentorial (frontal lobe) VMs were present in 4 of 9 cases. Two had known seizure disorder, 1 had autism/schizophrenia/intellectual disability and 1 case had no neurological history available. Two supratentorial cases had multifocal, lobar involvement of the frontal lobe and ipsilateral basal ganglia. Three had associated focal cortical dysplasia (FCD IIIc), related to a prominent capillary component of the VM. Hippocampal sclerosis was noted in 1 seizure case, and tongue laceration in the other. Five of 7 cases had infratentorial VMs (4 cerebellum and 1 brainstem, the latter with hemorrhage 1 year prior to death). Cause of death was attributed to complications of seizure disorder (2 supratentorial cases), or to VM rupture and hemorrhage (2 infratentorial cases). Death was unrelated to the presence of VMs in 5 cases.

Discussion: Although considered "benign" and incidental, a subset of VMs are associated with death due to seizure disorder in supratentorial locations, and with fatal hemorrhage in infratentorial sites. Moreover, accompanying capillary malformative components to VMs in the cortex should prompt evaluation for FCD (type IIIc). Finally, broad lobar involvement, including deep gray matter structures, may occur, raising the prospect of a radial telencephalic developmental defect involving embryonic vascular and neuronal organization.

P73 Primary Endocardial Fibroelastosis: Natural Cardiac Disease Findings in an Infant Forensic Autopsy

K.W. Giese

Washington DC, Office of the Chief Medical Examiner, Washington, District of Columbia, USA

The infant forensic autopsy often involves injury such as blunt force trauma or cases of asphyxia, most notably related to unsafe sleep environments and/or bed-sharing. In many cases a definitive Cause of Death is Undetermined. This case presentation involves a 4 month old infant who reportedly had a jerk-like movement prior to becoming unresponsive and died within 20 minutes of arriving at the hospital. The infant was born vaginally at 39 weeks gestation. Prior to birth, the mother exhibited labile

blood pressure readings and intermittent palpitations in the third trimester. The mother was referred to Cardiology in her 36th week of pregnancy. Additional prenatal testing demonstrated 2 copies of the *SMN1* gene (indicating reduced risk for Spinal Muscular Atrophy). Ultrasound results indicated possible intrauterine growth restriction; no definitive structural abnormalities were mentioned. There was prolonged rupture of membranes at birth. The infant's APGAR ("Appearance, Pulse, Grimace, Activity, and Respiration") scores were 9 and 9 at 1 and 5 minutes, respectively. The decedent received the Hepatitis B vaccine, vitamin K, and ophthalmic erythromycin ointment, with no documented adverse reactions. Additional screenings were within normal limits. At autopsy, no external trauma was noted; however, there was a faint green nevus on the right side of the face. Internal examination demonstrated an 88-gram, globular shaped heart (predicted weight: 27 grams), which underwent Cardiac Pathology review. Additionally, there were bilateral pleural effusions (right chest 15 milliliters; left chest 11 milliliters), ascites (50 milliliters), and a pericardial effusion (22 milliliters). The lungs were edematous, weighing 55 grams on the right and 40 grams on the left (predicted weights: right lung 37 grams; left lung 33 grams). Ancillary tests, including microbiology, metabolic screen, and Neuropathology consultation, were non-definitive for additional significant findings. Toxicology was negative and the vitreous chemistry was within normal limits. The Cardiac Pathologist diagnosed Primary Endocardial Fibroelastosis as no structural valvular lesion or congenital attributing cardiac disease was noted.

Primary Endocardial Fibroelastosis leads to dilated cardiomyopathy and subsequent congestive heart failure, as demonstrated through the autopsy findings. The etiology of the disease process is uncertain and was thought at one point to be attributed to viral infection (viral cultures were negative). Cases can be sporadic or familial (approximately 10%). This case underscores the continued and necessary process of a full infant autopsy, including bacterial and viral cultures, histology, toxicology, and the use of consultation when necessary.

P74 The Added Value of Molecular-Based Diagnostics in the Forensic Medical Setting: A Case Report

*B.S. van Deventer, M.A. Makhoba, L. du Toit-Prinsloo, C. van Niekerk
University of Pretoria, Pretoria, South Africa*

Introduction: This study discusses a case of a 2-month-old infant boy who was found unresponsive in his crib by his mother. This occurred during a routine sleeping period of the child. Due to the nature and circumstances surrounding the sudden unexpected death, the body was admitted to the Pretoria Medico-Legal Laboratory for further medico-legal investigation in terms of the Inquests Act 58 of 1959. No clinical history/records were available, only a personal history of a recent cold prior to death was reported by the mother. At autopsy, no external injuries to the body were noted. A complete autopsy revealed no morphological or structural abnormalities; as a result no macroscopic cause of death could be identified. The additional toxicological and laboratory tests were all normal. Histological examination of the lungs provided an underlying microscopic cause of death consistent with viral pneumonia.

Methods: Recent advances in molecular-based diagnostics allowed researchers to identify numerous underlying inherited cardiomyopathies that have been misdiagnosed in many sudden unexpected infant deaths. Based on the insufficient clinical history and minimal post mortem findings, the case was subjected to retrospective post mortem molecular analysis in order to identify any possible pathogenic variations associated with an inherited cardiac disease, which may have predisposed this infant to a sudden death. DNA extracted from an archived formalin-fixed, paraffin-embedded (FFPE) myocardial tissue sample, obtained from the original autopsy for histology purposes, was used to test for pathogenic variations

in the *SCN5A* gene by using high resolution melt (HRM) real-time PCR and sequencing.

Results: Genetic analysis revealed two distinct single nucleotide variants, of which one of them was not found to be reported in any database or published literature. This novel variation was predicted to be "probably damaging" with a high level of certainty. The second variant has previously been reported as "disease-causing" and associated with dilated cardiomyopathy (DCM).

Discussion: Considering the identification of two pathogenic/probably pathogenic variants and the reported direct link between a respiratory infection and an increased risk of acute onset in DCM infants, it was determined that a genetic cardiomyopathy could be a possible underlying cause of death in our case study. The results of this study prove the invaluable role of additional molecular diagnostics in identifying an inherited cardiomyopathy in those sudden unexpected infant deaths generally presenting with minimal findings including microscopic evidence of a viral infection.

P75 When Alice Drinks from the Wrong "Drink Me" bottle: a Case Series of Nonfatal Drug Intoxication in Young Children

G. Di Vella¹, C. Bosco¹, G. Cena¹, L. Bonaccorso¹, C. Petetta¹, E. Coppo², L. Tattoli³

¹Università degli Studi di Torino - Italy, Torino, Italy; ²Ospedale Infantile Regina Margherita, Torino, Italy; ³AOU Città della Salute e della Scienza di Torino, Torino, Italy

Child abuse (CA) includes not only sexual abuse and physical maltreatment, but also neglect (CN). CN can be described as "persistent failure to provide health care and to protect the child from exposure to any type of danger". Accidental drug intoxication is an indicator of neglect as a failure of appropriate supervision by parents which can cause severe and long-term damage to the child or even death. The authors report 13 suspected cases of life-threatening CN due to acute drug intoxication which were evaluated from January 2016 to February 2019 by the multidisciplinary unit ("Bambi") of the Pediatric Hospital "Regina Margherita" in Turin (Italy), which is dedicated to the assessment of CA. Among them, 7 children were male and 6 female, with a mean age of 5.9 years (4 months -14.5 years). One case (the oldest child) was a voluntary alcohol intoxication. The remaining cases were all accidental poisonings. In 8 children the intoxication was due to the ingestion of drugs: marijuana candy-like edible (n=5), cocaine (n=1), and psychiatric drugs (n=2). Two children unintentionally inhaled opioids, and the last 2 cases overdosed on acetaminophen, administered rectally. Most of the events occurred at home; the poisoning took place at the park in 4 cases. Parents were responsible for the accidental intoxication of 7 children, while in 5 cases extra-familial people was suspected. Eight cases were reported to the Judicial Authority as highly suggestive of CN. Social workers intervened in all cases, and the child was entrusted to a foster family in 2 cases because the parents were unable to properly care for them. All the children were brought to the Paediatric Emergency Department showing severe symptoms such as hyporeactivity, hypotonia, difficulty of speech, and ataxia. Toxicological analyses of urine and blood confirmed the drug exposure. The most serious case involved a 2-year-old girl who was admitted to the Intensive Care Unit in a comatose state, showing respiratory insufficiency, pin-point pupils, and lethargy. As an acute opioid intoxication was suspected, the drug screening tests were performed, revealing near fatal levels of heroin and methadone. The unexpected survival of the child was explained by opioids tolerance following repeated exposure. Hair analysis confirmed a chronic consumption of opioids. In suspected cases of poisoning in children, it is crucial an appropriate evaluation based on clinical findings and toxicology, in order to discriminate between accident and neglect.

P76 Differential Diagnosis Between Fatty Acid Beta-oxidation Disorders and Idiopathic Hemorrhage of the Cardiac Conduction System in an Infant Sudden Death

G. Di Vella, F. Lupariello, N. Melloni, A. Gabriele, F. Innocenzi
Universtà degli Studi di Torino, Torino, Italy

The authors describe an expected infant death in which a careful differential diagnosis between fatty acid beta-oxidation disorders (FAO disorders) and idiopathic hemorrhage of the cardiac conduction system was necessary as follows. At 39 weeks of gestational age, a 33 year-old woman (para 1, gravida 1) had a vaginal delivery; the baby was male and the Apgar score was 9 at 1' and 5' minutes; the hemogasanalysis (umbilical arterial blood) was unremarkable. The mother and the baby were sent to the maternity ward without specific therapy. During the night and the following day the baby showed poor breast feeding that was resolved thanks to obstetrics' counseling. The pediatric evaluation in the first hours of the second day of life was unremarkable (heart frequency: 34/minutes, hemoglobin oxygen saturation: 99%, cardiac frequency: 150/minutes). Few hours later the mother found the baby cyanotic in his crib. Neonatologist and anesthesiologist immediately arrived and they started standard cardiopulmonary resuscitation. Despite prolonged cardiac external massage, respiratory support, and drugs administration, the baby was pronounced as death in the second day of life. The case was referred to pathologists in order to define the cause of the sudden death. At autopsy the infant appeared well grown and nourished; external and internal examinations and organs' gross evaluation were unremarkable. At histology liver slides (stained with eosin/hematoxylin, Sudan III, and Black Sudan) consented to diagnose a FAO disorder. However, sino-atrial node slides (eosin/hematoxylin stain) also consented to identify a recent hemorrhage. After a careful study of the case and an in-depth analysis of the scientific literature, pathologists signed a FAO disorder as cause of death and natural as manner. Indeed, pathologists pointed out that the recent sino-atrial node hemorrhage had no role in the sudden death and it had been caused by the multiple cardiac massages. The literature states that FAO disorders may be causes of sudden and unexpected death because the accumulation of toxic metabolites in the heart may determine the alteration of myocardial membrane polarization. On the contrary, even if idiopathic sino-atrial node hemorrhages are reported as possible causes of sudden death, the literature also states that these findings are common in case of multiple chest compressions. In the light of the above, it can be stated that in these cases only a careful evaluation of histologic findings and literature data can define the cause of death.

P77 Methamphetamine in Fetal and Infant Deaths: Direct Toxicity or Confounding Factors?

L.M. Barton, R. Miller, E. Stroberg, J. Kemp, E. Pfeifer
Oklahoma Office of the Chief Medical Examiner, Oklahoma City, Oklahoma, USA

Methamphetamine is a widely abused illicit drug that can have devastating consequences. Prenatal exposure to methamphetamine has been shown to cause increased probabilities of intrauterine fetal demise and neonatal mortality. The drug has powerful effects on the central nervous system through increased release of catecholamines and dopamine. In addition to causing vasoconstriction, increased heart rate, and increasing blood pressure, these are thought to play a role in amniotic sac environment homeostasis. Currently, it is difficult to directly attribute fetal and infant deaths to methamphetamine use when it is detected by post-mortem toxicology due to confounding factors.

Ten years of fetal and infant deaths (less than one year old) were retrospectively reviewed for this study. All cases were examined at the State of Oklahoma's Office of the Chief Medical Examiner between January 1, 2008 to December 31, 2017. There were 1,088 infant deaths during this

time period. Of these cases, 57 had positive post-mortem toxicology results for methamphetamine. Of the 57 cases, 52 of the mothers had either positive methamphetamine hospital urine drug screens, admitted to using methamphetamine, or were known drug users. Thirty-seven had limited maternal prenatal care or no prenatal care. The majority of the deaths reviewed were intrauterine fetal demise. Of the cases born alive, most died almost immediately or after brief resuscitation attempts. The longest life span of the study was two days, which included ventilator support. The average gestational age was 27 weeks; the gestational age ranged between 12-39 weeks. Fifty placentas were examined and 46 of them (92%) were abnormal in some way. Thirty placentas (65%) had abruptions or severe hemorrhage. Sixteen placentas (35%) had evidence of infection (chorioamnionitis and/or funisitis). Five placentas (11%) had both infection and abruption. Five placentas (11%) had infarctions or other signs of severe ischemia.

The results of this review show that confounding factors do indeed make it difficult to directly attribute fetal and infant deaths to the toxic effects of methamphetamine. While it has been shown that stopping methamphetamine use at any time during pregnancy improves the pregnancy outcome, it is not uncommon for maternal methamphetamine users to not seek prenatal care due to complex socioeconomic factors. Regardless of drug use, this lack of adequate prenatal care can cause a cascade of detrimental problems to the fetus. It appears warranted to identify mothers who are using methamphetamine and to provide appropriate support for them throughout the pregnancy.

P78 Cardiac Pathology and Neuropathology Sampling and Photographs in Sudden Unexplained Death in Childhood

L.G. Crandall¹, J.H. Lee¹, J.J. Maleszewski², R.R. Reichard², O. Devinsky¹
¹NYU School of Medicine, New York, New York, USA; ²Mayo Clinic, Rochester, Minnesota, USA

Sudden Unexplained Death in Childhood (SUDC) is the sudden and unexpected death of a child 12 months or older that remains unexplained after a thorough case investigation. In 2017, SUDC led to more than 26,900 potential years-of-life. Comprehensive autopsies, performed using the National Association of Medical Examiners (NAME 2016) standards, failed to identify a clear cause of death. Understanding potential cardiac and neurological factors are crucial to accurately determine causes of death. The SUDC Registry and Research Collaborative (SUDCRRC) aims to comprehensively study the characteristics, circumstances, medical histories and pathologies of children 11 months through 18 years who have died suddenly and unexpectedly, and in many instances, without explanation. We analyzed the cardiac pathology and neuropathology investigations of 100 sleep-related cases enrolled in the SUDCRRC in the United States. To assess the comprehensiveness of the cardiac pathology and neuropathology exams, we studied the number of gross cardiac photos, cardiac histology slides, gross neuropathology photos, and neuropathology histology slides released for our review. There was a mean (IQR) number of 0.26 (0-0) gross cardiac photos, 3.25 (2-4) cardiac histology slides, 2.34 (0-4.25) gross neuropathology photos, and 6.36 (5-9) neuropathology histology slides. We analyzed these factors across office type, qualifications of the pathologist, and the population of the jurisdiction. 66% of cases were from Medical Examiner (ME) jurisdictions, 26% from Coroner jurisdictions, and 8% from Sheriff-Coroner jurisdictions. ME offices generated significantly more cardiac histology slides than coroner offices (p=0.02). 62% of cases were performed by a board-certified forensic pathologist (FP) and 38% by a pathologist not board-certified in FP. Non-FP pathologists generated more cardiac histology slides than board-certified forensic pathologists (p=0.03). While most cases had at least one cardiac and neuropathology histological section available for review, most cases analyzed had no gross cardiac photos (89/100) or neuropathology photos (66/100) for review. Minimal sampling of gross photos and

histological sections highlight some challenges in reviewing SUDC cases that warrant the creation of specific national guidelines to better facilitate sudden pediatric death investigations.

P79 Estimation of the Time of Death from Temporal Changes of Dural Morphology and Biomechanical Parameters in Human Cadavers

J. Wang

Guizhou Medical University, Guiyang, China

Objective: To investigate the sequential changes of morphological and biomechanical properties of dura mater in human cadavers and the feasibility of using them to infer the postmortem interval (PMI). **Methods:** The color of dura mater was observed by morphological methods, the thickness of dura mater and the total area of fiber space were measured by histology staining, and the biomechanical parameters such as maximum force(MF) and elastic modulus(EM) were measured by universal material tester. The correlation between parameters and PMI was analyzed, and the regression equations between different parameters and PMI were established.

Results: Within 0 to 28 days, the parameters of dural RGB value, thickness(T), total gap area(TGA) of fiber space, maximum force(MF), tensile strength(TS) and elastic modulus(EM) decreased, which were negatively correlated with PMI, but there was no significant correlation between maximum force deformation(MFD) parameters and PMI.

Discussion: In the range of 0 to 28 days, the morphological and biomechanical parameters of human cadaver dura mater can be used as a new index to infer PMI, which has important forensic significance.

P80 Evaluation of a Rapid (less than 23 minutes) Biochip Based System Applied to the Multidrug Screening from a Single Blood Sample

P. Sinha¹, V. Anderson¹, I. Larabi², J. Alvarez², J. Darragh¹, M. Rodriguez¹, R. McConnell¹, S. FitzGerald¹

¹Randox Toxicology Ltd., Crumlin, United Kingdom of Great Britain and Northern Ireland; ²R. Poincare Hospital, Garches, France

Introduction: The use of biochip array technology provides multi-drug detection from one single sample, this multi-analytical approach increases the screening capacity and provides more information from a sample during the drug testing process. By using the fully automated benchtop analyser Evidence MultiSTAT, rapid screening results (< 23 minutes) are obtained for twenty drug classes (including new psychoactive substances) from a single sample. The comparative evaluation reported in this study aimed to show the applicability of this biochip based system to the multi-drug screening of blood samples from forensic and clinical cases.

Methods: For the screening, simultaneous chemiluminescent immunoassays defining discrete test sites on the biochip surface, were applied to the Evidence MultiSTAT analyser. This system processes a self-contained cartridge which contains all components required for the immunoreactions. Each sample is tested against cut-off values, the results are qualitative. Blood samples from forensic and clinical cases, were screened following simple centrifugation and dilution (1:4). The screening results were compared to LC-MS/MS results and the percentage agreement was calculated.

Results: The biochip based system allowed multi-drug screening from a single blood sample. The simultaneous immunoassays, the number of samples assessed and the assay cut-off were as follows: α-PVP (n=68, cut-off: 5ng/mL), AB-PINACA (n=73, cut-off: 2ng/mL), amphetamine (n=68, cut-off: 50ng/mL), barbiturates (n=55, cut-off: 50ng/mL), benzodiazepines

(n=58, cut-off: 20ng/mL), benzoylcegonine (n=68, cut-off: 25ng/mL), buprenorphine (n=58, cut-off: 2ng/mL), cannabinoids (n=69, cut-off: 10ng/mL), fentanyl (n=51, cut-off: 1ng/mL), methadone (n=59, cut-off: 5ng/mL), methamphetamine (n=67, cut-off: 50ng/mL), opiate (n=67, cut-off: 80ng/mL), oxycodone (n=68, cut-off: 10ng/mL), pregabalin (n=58, cut-off: 1000ng/mL), tramadol (n=58, cut-off: 5ng/mL), tricyclic antidepressants (n=58, cut-off: 60ng/mL), 6-MAM (n=68, cut-off: 10ng/mL). The percentage agreement with LC-MS/MS was: 100% α-PVP, AB-PINACA, buprenorphine, fentanyl, methadone and 6-MAM, 98.5% benzoylcegonine, 98.3% tramadol, 98.2% barbiturates, 97% methamphetamine, 96.6% benzodiazepines and pregabalin, 95.7% cannabinoids, 92.6% oxycodone, 87.9% tricyclic antidepressants, 86.6% opiate, 73.5% amphetamine.

Discussion: The results indicate that biochip array technology allows the rapid (< 23 minutes) multi-drug screening (twenty drug classes) from a single blood sample when applied to the fully automated benchtop analyser Evidence MultiSTAT. An overall favourable agreement with LC-MS/MS was achieved. The presence of putrefactive amines -formed in post-mortem samples-, interfering with the amphetamine assay could explain the occurrence of false positive results. This biochip based application represents a useful analytical tool for drug testing in forensic toxicology.

P81 Elderly Opiate Related Fatalities During The Opioid Epidemic: A Retrospective Study

M. Pandey

Franklin County Coroner's Office, Columbus, Ohio, Columbus, Ohio, USA

According to the United States Census Bureau, aging population (>65 years old) is increasing rapidly and it is projected to outnumber children by 2035. As forensic pathologists we are likely to see more elderly deaths going forward because of this rapid increase in this population set. The cause of death is likely to be varied to include drug toxicities and not just limited to chronic diseases or falls. This would in turn necessitate increase in autopsies on older adults where they would have been viewed only in the past due to old age.

In 1931 Dr. Albert Schweitzer, a French physician proclaimed that, "Pain is a more terrible lord of mankind than even death itself." Little did he know that by 2017 pain would actually become quite the monster. Recent literature has shown that pain overtakes diabetes, heart disease and cancer combined as the most common reason for Americans to access health care. In fact per British Medical Journal "Chronic pain is one of the most common conditions encountered by healthcare professionals, particularly among older (≥65 years) patients." We are in the midst of opioid epidemic, which is essentially affecting all walks of life.

Elderly are a vulnerable group. A retrospective study was done at Lucas County Coroner's Office, Toledo Ohio over a three period covering 2015 to 2017 to document opioid related fatalities in the elderly. The study was to determine whether elderly drug related fatalities were primarily as a result of prescription drugs or drugs of abuse such as Heroin, and or Fentanyl over the three year period. Per Center for Disease Control (CDC) the older adult is defined as greater than 60 years or older under the category of elder abuse. For the purpose of the study the elderly were defined as between 60-80 years. The database was searched over the defined three years. The search parameters used to assess opioid related death were overdose, drugs, and substance abuse. The study compared the annual numbers for total number of cases done, total number of drug related deaths, total number of elderly deaths, and total number of elderly deaths due to drugs. A marked increase in the number of drug related elderly fatalities with Fentanyl, and Heroin was seen in 2017 cases compared to the cases in 2015 where there were fewer such cases and the deaths were primarily due to prescription drugs.

P82 Asthma, Methamphetamine and a Coccinellidae (Ladybug)

Allergy

M.J. Schmidt, L.B. Parsons

William L. Jenkins Forensic Center, East Tennessee University, Johnson City, Tennessee, USA

This is a case study review of allergic reactions to methamphetamine and ladybugs. A 38-year-old male was reportedly witnessed to inject methamphetamine in the presence of his family. Post-injection he reported he could not see and had difficulty breathing. He experienced cardiopulmonary arrest and a 911 call was placed. Emergency medical services (EMS) responded to the residence and initiated advanced cardiac life support (ACLS) and administered Narcan. EMS performed a tracheostomy secondary to laryngeal swelling and a difficult intubation. Resuscitative efforts were not successful and the decedent was pronounced deceased. The family reported to EMS and a local law enforcement agency that prior to injection of the drug by the decedent, a ladybug landed on his methamphetamine. The family reported he was allergic to ladybugs. The decedent had a history of childhood asthma, intravenous drug abuse with osteomyelitis and chronic hepatitis C infection.

External examination revealed multiple non-therapeutic needle punctures. Internal examination did not reveal laryngeal edema. Cerebral edema, cardiomegaly, atrial septal defect (1.2 centimeters) and severe pulmonary congestion and pulmonary edema were identified. Histology was performed on the lungs and larynx. Peripheral blood was submitted for a blood drug screen and serum was submitted for a tryptase level.

Toxicological examination was positive for methamphetamine and the metabolite amphetamine. The tryptase was significantly elevated, 182.0 ug/L (reference range < or = to 10.9 ug/L). Histology revealed chronic inflammation around bronchioles and bronchi with increased eosinophils, mucus plugging, smooth muscle hyperplasia and rare perivascular granulomas with minimal polarizable material. Blood vessels with rare polarizable material were also identified. The larynx had minimal mucosal edema and chronic inflammation with increased eosinophils.

An allergy to ladybugs was not documented in the decedent's medical records. The changes in the lungs were consistent with asthma. Methamphetamine has bronchodilating effects and would improve asthma symptoms. But methamphetamine can also cause allergic reactions and edema of the airways.

Ladybugs belong to the beetle family Coccinellidae. An allergic reaction to Asian ladybugs, *Harmonia axyridis*, can manifest as asthma. This study will review allergic reactions to methamphetamine and ladybugs.

P83 Is There Cross Reactivity of Fentanyl Analogs with a Fentanyl Urine Immunoassay Kit?

L.M. Tormos

Palm Beach County Medical Examiner Office - District 15, West Palm Beach, Florida, USA

Standard drugs of abuse urine immunoassay testing kits are fast and relatively inexpensive screening tools. Urine immunoassay kits are a one-step test that provide results in as little as five minutes. Positive results may help guide the death investigation, and negative screens may allow completion of cause of death statements in cases where there is sufficient anatomical disease.

Pre-marketing fentanyl urine immunoassay test kits were provided without cost from a private vendor; during the study the provided fentanyl kits were engineered by the manufacturer to two different sensitivity levels. Our prospective study involved all suspected acute drug overdose autopsy cases. Individuals that had available blood and urine were tested with the provided urine immunoassay. As per office standard practice, blood and

urine were also tested by a third party accredited toxicology laboratory. The result of urine immunoassay was then compared to the blood drug concentrations and the qualitative presence of the drug in the urine, as detected by routine comprehensive toxicologic testing at the reference laboratory. In particular, we were looking for evidence of potential cross reaction of fentanyl analogs in urine.

Urine immunoassay tests are presently used for rapid drug screening, both in living people and in postmortem settings. In our jurisdiction, deaths by fentanyl and fentanyl analogs are far surpassing deaths by heroin and oxycodone. Quantification of fentanyl analogs in blood may be difficult due to the small concentrations causing respiratory depression, therefore any indicator of the presence of a fentanyl analog is important. In general, urine immunoassay testing is excellent at identifying fentanyl in urine, with sensitivity approaching 100%. Despite increased sensitivity engineered by the manufacturer, we were not able to reliably identify cross reactivity of fentanyl analogs to the fentanyl urine immunoassay.

P84 False Positive 6-MAM Detection in Hospice Patient Treated with Morphine

D.E. Pitcher¹, S. Kacinko², L.A. Decker³

¹University of New Mexico School of Medicine, Albuquerque, New Mexico, USA; ²NMS Labs, Horsham, Pennsylvania, USA; ³University of New Mexico School of Medicine Department of Pathology, Albuquerque, New Mexico, USA

The presence of 6-monoacetylmorphine (6-MAM) in a toxicologic specimen is generally considered a definitive indication of recent usage of heroin. However, recent reports have described the presence of 6-MAM in urine specimens in individuals without heroin usage. In fact, in vitro production of 6-MAM within drug-free urine spiked with morphine has been previously documented.

This is a case of a 78 year-old woman with end-stage lung disease on home hospice care. She was given increasing doses of morphine for her progressive pain. Due to allegations of over-medication, the case fell under the jurisdiction of the Medical Examiner. Autopsy revealed a well-cared for elderly woman with severe pulmonary fibrosis and acute bronchopneumonia. Blood and urine samples were screened for opioids by enzyme immunoassay. Confirmation and quantification was achieved employing liquid-chromatography tandem mass-spectrometry. Peripheral blood contained a free morphine concentration of 3400 ng/mL and hydromorphone of 6.9 ng/mL and urine contained 6-MAM at a concentration of 26 ng/mL. Additional testing of the vitreous humor was negative for the presence of 6-MAM. Thorough record review elucidated a medical error resulting in the administration of a dose of liquid morphine at least 40 times higher than the previous dosage. Cause of death was certified as toxic effects of morphine and manner of death was certified as accidental.

It is hypothesized that the presence of an unknown acetylating agent in the urine, combined with a markedly elevated concentration of morphine, reversed enzyme kinetics resulting in the production of 6-MAM. Heroin use can be ruled out by identifying the following pattern in the toxicology results: abnormally high morphine, absence of codeine or other contaminants of heroin, elevated ratio of morphine to 6-MAM, absence of 6-MAM in blood or vitreous humor. It is imperative to recognize this potential false positive result as heroin use in this population may have significant legal ramifications.

P85 Suicidal Sodium Nitrite Ingestion

S.M. Wills, K. Thai, K. Mason

Forensic Science SA, Adelaide, Australia

Sodium nitrite is used as a preservative in food. It can be toxic to humans and its ingestion results in methemoglobinemia. This results from oxidation of iron within hemoglobin from Fe²⁺ to Fe³⁺ causing left-shift in the haemoglobin-oxygen saturation curve and cellular hypoxia. The outcome will depend upon the amount of methemoglobin (MetHb) within the blood, with levels around 70% considered generally lethal with underlying cardiorespiratory disease exacerbating the toxicity.

Ingestion of a solution of sodium nitrite has been recommended as a method of euthanasia by an Australian advocacy group as an alternative to the barbiturate pentobarbital (Nembutal) due to uncertainty of its supply and the ready availability of legal supplies of sodium nitrite. It is unclear when the recommendation first occurred however, the National Coronial Information System (NCIS) in Australia recorded no deaths from sodium nitrite poisoning between 2000 and 2016, with deaths first being recorded in 2017.

Investigation of death due to sodium nitrite toxicity at autopsy in the first instance requires recognition of methemoglobinemia and consideration of sodium nitrite toxicity within the differential diagnosis. At autopsy the deceased may exhibit a blue/red to grey hue, particularly in areas of hypostasis and a chocolate brown coloration of the blood. These findings are non-specific and may be obscured with increasing post-mortem interval. Interpretation of methemoglobin concentrations in post-mortem samples is furthermore complicated by the potential for increase in MetHb to occur during sample storage. Analysis for nitrite within body fluids may also not be encompassed by standard screening methodologies and may not be reliable in autopsy specimens. This places greater emphasis upon the scene investigation to uncover evidence of the ingestion of sodium nitrite and the pathologist to consider methemoglobinemia in their differential diagnosis.

We present a series of cases to highlight features which should alert the autopsy Pathologist to this condition and the difficulties encountered in the laboratory analysis of these cases. The NCIS data indicates that these cases are more likely to be encountered now than in the past.

Sodium nitrite may be packaged as food-grade material and not arouse suspicion amongst family members or scene investigators as potentially toxic. Although the amount required to be ingested to result in death is variable, ingestion of as little as 1g has previously been reported in a fatality. This may have implications for Public Health and labeling.

P86 Complex (Multimodality) Suicides in New York City: 2008-2017

J. Stahl-Herz

New York City Office of Chief Medical Examiner, New York, New York, USA

Complex (also called Multi-Modality) suicides are defined as the use of two or more self-inflicted injurious modalities to cause death. The incidence has been estimated at 1.5-5% of suicides based on case reports and small case series. A ten-year retrospective review was performed on suicides in New York City from 2008 through 2017 (the last year complete data was available) of the cases in the database of the New York City Office of Chief Medical Examiner. The inclusion criteria were suicide as manner of death and two or more injurious modalities contributing to cause of death. Over the study period, 93 cases met these criteria representing an average of 9.3 complex suicides per year (median 8.5; mode 8). Complex suicides represented 1.79% of total suicides over the study period ranging from 1.05% to 2.75% of total suicides per year. The age range of decedents was 17 to 87 years (average 46.8; median 46.5; mode 39) with a strong male predominance (72 cases; 77.4%). Most decedents were Caucasian (62

cases; 66.7%) followed by Asian (14 cases; 15.5%), African American (11 cases; 11.8%) and Hispanic/Latinx (6 cases; 6.5%). The most common injurious mechanism across all cases was asphyxia (78 cases; 83.9%). When broken down by type of asphyxia, drowning was the most common asphyxial mechanism. Blunt trauma (45 cases; 48.4%), drug intoxication (40 cases; 43.0%) and sharp force trauma (17 cases; 18.3%) were the next most common injurious mechanisms. Four additional injury mechanisms were recorded in the study. The most common combinations of injurious modalities were drowning and blunt trauma (42 cases; 45.2%), obstruction of the nose and mouth by a plastic bag and drug intoxication (19 cases; 20.4%), sharp force trauma and drug intoxication (10 cases; 10.8%) and drowning and drug intoxication (6 cases; 6.5%). These four combinations represented 82.8% of cases included in the study. Eleven additional combinations of injury modalities made up the remaining 17.2% of cases accounting for either one or two total cases in the study. No case in the study had more than two injury modalities. Hypertensive and atherosclerotic cardiovascular disease was included as a contributory factor in two cases (2.2%) and was the sole natural modality reported as a contributory factor in the series. The data and several interesting cases will be presented and discussed.

P87 Sudden Death in a Teenager with Klippel-Feil Syndrome

P.S. Wong¹, K.M. Nelsen¹, W.M. Gunther²

¹Eastern Virginia Medical School of Health Professions, Norfolk, Virginia, USA; ²Office of the Chief Medical Examiner, Tidewater District, Commonwealth of Virginia, Norfolk, Virginia, USA

A 16-year-old boy carrying a diagnosis of Klippel-Feil syndrome presented at an emergency room in Norfolk, VA with sudden cardiac arrest. When trying to rouse the young man for breakfast, the patient's stepfather found the patient unresponsive and reportedly "blue." The patient's mother began chest compressions; on arrival, emergency medical technicians noted asystole; after return of spontaneous circulation, he remained comatose overnight until death ensued.

Hospital records showed physical exam and radiology consistent with anoxic brain injury following cardiac arrest. Dilated, fluid-filled small bowel loops on CT scan were suggestive of enteritis and/or early ischemia. The patient's recent history included 2 days of abdominal pain and bouts of diarrhea, easily alleviated with over-the-counter medications. He was a bright student without developmental delays, home schooled with honors; however, he was inactive from his limited range of motion. There was no history of trauma, or upper respiratory illness; there was no family history of bleeding disorders, or sudden cardiac arrest before 40 years of age. Forensic autopsy was undertaken to rule out accidental or inflicted causes of cardiac arrest.

Autopsy identified multiple anomalies consistent with Klippel-Feil syndrome (1), including plagiocephaly, webbing of the neck, apparent low hairline, kyphoscoliosis, Sprengel deformity, and an absent left kidney. Gross findings as well as toxicology results gave no indication of inflicted injury. Deformation of the right cerebellar lobe was identified, indicating Chiari malformation, with evidence of acute and chronic herniation. Histology demonstrated complex findings related to cardiac arrest, including atypical bronchopneumonia, neuronal ischemia, and no explanation for the enteritis. Cultures were noncontributory. Death was attributed to the Chiari malformation.

Klippel-Feil syndrome is associated with a variable life expectancy dependent on the number and severity of related anomalies (1). Sudden death in teenagers with Klippel-Feil syndrome and minimal life-threatening anomalies, such as in this case, to our knowledge has not been reported. However, Chiari malformation, sometimes associated with Klippel-Feil syndrome, has been reported in association with sudden death in sleep

(1,2). Both, as reported here, may present for forensic autopsy. The manner of this death was deemed natural.

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Ref. 2 Roohi F, Gropen T, Kula RW. Sudden unexpected nocturnal death in Chiari type 1 malformation and potential role of opioid analgesics. *Surg Neurol Int.* 2014; 5: 17. Published online 2014 Feb 12. doi: 10.4103/2152-7806.126931.

P88 Accidental Death Associated with Urban Exploration in Detroit, Michigan

M. Webb¹, K. Dill², A. Jaworski², A. Gupta²

¹University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, USA; ²Wayne County Medical Examiner's Office, Detroit, Michigan, USA

Urban exploration is the exploration of man-made structures. These structures are usually abandoned ruins or parts of the man-made environment that are typically unseen (e.g. sewers). This is increasingly popular on social media with many posting videos and photographs of their conquests. The activity often involves trespassing onto private property and inherently features a myriad of risks, including both physical and legal. With thousands of abandoned buildings, Detroit, Michigan is a thriving destination for urban explorers, despite known dangers of unstable structures, unsafe floors, the presence of unknown chemicals and harmful substances (notably asbestos), stray voltage, and entrapment hazards. Not only are many of these buildings condemned, they are also sites of many violent crimes. We present a case of a 21-year-old white male who fell nearly 100 feet in a vacant industrial building in Detroit, Michigan, while urban exploring. The decedent and friends were reportedly playing "flash tag," a common variation of "hide-and-seek" played in the dark of night. As the group was leaving, they noticed that the decedent was missing. After hours of searching, he was found in the rubble of an elevator shaft. In the interest of public safety, it is important to acknowledge this growing trend and increase awareness of urban exploration and the risks associated with these vacant, dilapidated structures. Education should be paired with heightened security measures at these locations. Efforts aimed at education alone will not prevent accidental deaths, as many are attracted to the risk itself.

P89 Significant Increase in Suicide Deaths from 2009 to 2018: 10-year trends from Wayne County, Michigan

M. Webb¹, L. Sung²

¹University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, USA; ²Wayne County Medical Examiner's Office, Detroit, Michigan, USA

The United States is seeing an alarming increasing in suicide deaths over the previous decade. Suicide is currently the tenth leading cause of death and only one of three leading causes that is increasing. Wayne County Medical Examiner's Office, which service Detroit, Michigan and the Detroit metro area, has seen 2244 suicide deaths over the period of 2009 to 2018. There has been a 30% increase (10.9 per 100,000 to 14.2 per 100,000) in suicides in Southeast Michigan over that period; including a 12% increase over 2017 figures. This reflects increased suicide rates among most age groups, both sexes, and all racial groups examined, with most significant increases seen among individuals under the age of 18 and over the age of 70. Among individuals under the age of 18, there was a 64% increase over 2017 (11 to 18), and 39% increase over the high previously reported in 2013 (13). Among elderly decedents (over the age of 70), there was a 158% increase over 2017 (12 to 31), and 24% increase over the previously reported high of 25 (2015). Racial demographics indicate that Wayne

County is 52% white; however, suicides over the period examined were 76% white and 77% male. Use of firearms was the primary cause of death (49%, 33% increase from 2017), with hanging (28%, 7% increase from 2017) and drug toxicity (11%) accounting for most suicide deaths. Among female decedents, deaths were divided among firearm (30%), hanging (27%), and drug toxicity (29%); where male suicides were largely dominated by firearms and hangings, 54% and 28%, respectively. Decedents under the age of 18 favored hangings (62%) and firearms (25%). Preliminary findings suggest a significant portion of decedents were not known to have mental health conditions. Suicide is a growing public health concern. The circumstances contributing to the act of suicide are diverse and require a multidisciplinary approach. Although effective strategies exist, the most current trends suggest greater and more comprehensive approaches are necessary among the young and the elderly.

P90 Bloody Scenes: A Collaborative Approach to a Challenging Investigation

M. Webb¹, A. Jaworski², K. Dill², P. Cecile³, L. Sung⁴

¹University of Michigan, Ann Arbor / Wayne County Medical Examiner's Office, Detroit, Michigan, USA; ²Wayne County Medical Examiner's Office, Detroit, Michigan, USA; ³Detroit Police Department, Detroit, Michigan, USA; ⁴University of Michigan / Wayne County Medical Examiner's Office, Detroit, Michigan, USA

Investigation of a bloody scene without a body, a suspect, or known circumstances is a challenging dilemma for investigators. Bloodstain pattern analysis is a forensic specialty involving the examination and interpretation of bloodstains at a crime scene. However, even with these sophisticated techniques, some scenes and circumstances remain elusive. Here we present a case of a bloody scene which took place in the apartment of a 33-year-old black male residing in an assisted facility. Upon routine entry, facility staff discovered a significant volume of blood covering the floors and furniture in multiple rooms. Police were notified immediately and quickly realized the resident had not been seen in approximately one month and his whereabouts were unknown. In the course of the investigation it was discovered that the resident had presented to a nearby hospital with a laceration to the upper extremity one month prior, alleging he was cut while moving furniture, then subsequently never returned home. As this did not alleviate the suspicion of possible foul play, the Wayne County Medical Examiner's Office was consulted to view the scene. In a collaborative effort with police investigators, review of medical records, and with reasonable medical certainty, it was determined that it was possible that the blood, although significant, could have come as a result of accidental injury or self-harm. This case highlights the benefits of collaborative approaches to challenging bloody scenes where police expertise in bloodstain pattern analysis and forensic pathologist's medical expertise in blood loss and exsanguination can work synergistically to guide an investigation.

P91 Chasing Dragons and Fungi: Two Unusual Deaths Related to Opioid Abuse

S.H. Zydowicz¹, A. Wagner²

¹District 9 Medical Examiner's Office, Orlando, Florida, USA; ²Orlando Regional Medical Center, Orlando, Florida, USA

Forensic pathologists are all too familiar with opioid related deaths whether from the acute toxic effects or long term complications of drug use. Two cases are presented as examples of rare sequelae of opioid drug abuse.

Case 1: An 18-year-old man was found unresponsive in bed by his paramour. The previous evening they both used vaporized heroin (chasing the dragon). He was admitted to the hospital where imaging studies revealed extensive abnormalities suspicious for leukoencephalopathy. His course was complicated by pneumonia with acute kidney injury. Both

conditions resolved, however, his neurologic status continued to decline and he ultimately died one month after initial presentation. A complete autopsy was performed, including neuropathological examination of the formalin fixed brain. The white matter revealed extensive degeneration with varying degrees of cystic degeneration. Microscopic examination of the brain revealed spongiform degeneration with vacuolization of the oligodendroglia and edema of the myelin sheaths. Spongiform leukoencephalopathy can result from exposure to various leukotoxins including solvent, chemotherapeutic agents, carbon monoxide and drugs of abuse including heroin. The exact mechanism of neurotoxicity is yet unknown although heroin leukoencephalopathy has not been seen in those who snort or inject heroin. Less than 1000 cases have been reported thus far.

Case 2: A 31-year-old man presented to the local ED with fever and headaches for one week prior to seeking treatment. He had no significant medical history and was a known intravenous drug abuser with a recent incarceration for drug related charges. Upon admission he was conscious though lethargic and confused. His clinical status deteriorated rapidly and diagnostic testing was suggestive of encephalitis although an etiologic agent could not be identified. Vasculitis and rapidly progressive lymphoma were also considered. He had a precipitous clinical course and died 5 days after admission. A complete autopsy was performed including neuropathologic examination of the formalin fixed brain. It revealed bilateral hemorrhage and necrosis of the basal ganglia with extension to the brain stem. Histologic examination revealed extensive inflammation, necrosis with numerous non-septate hyphae, morphologically consistent with mucormycosis. Isolated cerebral mucormycosis in immunocompetent individuals is rare; only 31 cases have been reported in the literature and the majority of cases occurred in intravenous drug users.

P92 When A Beer Belly Isn't From Beer: A Case of Massive Dedifferentiated Liposarcoma

S. Diu¹, J. Hammers², G. Wu³

¹N/A, *Kew Gardens Hills, New York, USA*; ²Cyril H. Wecht and Pathology Associates, *Pittsburgh, Pennsylvania, USA*; ³Rush Medical College, *Chicago, Illinois, USA*

Liposarcoma is a malignancy of the fat cells and represents the most common form of soft tissue sarcoma. Dedifferentiated liposarcoma is a high-grade subtype of liposarcoma. Dedifferentiated liposarcoma presents most often in middle aged and older adults with equal sex and racial distribution. It can technically occur wherever fat is present but is found mostly in the retroperitoneal space. It has also been known to occur in the inguinoscrotal region and thigh and rarely in the trunk, head and neck. Because there are usually no symptoms in the retroperitoneal space, liposarcomas can grow to a large size by the time of diagnosis, often compressing nearby organs. It presents as large, usually painless masses and are often detected incidentally. Complete surgical resection is the ideal and potentially curative treatment, although most surgeries are complicated by the large size of the liposarcoma and tendency to infiltrate adjacent organs and critical structures.

We present a case of a 75-year-old man who was found upon autopsy to have a massive, untreated dedifferentiated liposarcoma. The decedent presented with abdominal pain and distension. He received a CT scan, which revealed a growing abdominal mass that was most likely malignant but he did not undergo biopsy to obtain a specific pathologic diagnosis. The decedent chose to forgo treatment and received comfort care until death. An autopsy was performed at the request of the coroner because the decedent died while incarcerated. Additionally, though the decedent was placed in hospice care before death, an antemortem diagnosis had not been made. The abdomen was markedly protuberant and firm with palpable masses within the abdominal cavity. The loops of bowel were not dilated or

obstructed, although they were markedly displaced due to a very large mass that originated from the retroperitoneum and measured 30 x 20 x 15 cm. The small and large intestines were pushed mostly to the right side of the mass and the descending colon traveled over the anterior aspect of the mass where it was flattened. Sectioned surfaces of the mass were solid and cystic. Histopathologic sections of the mass showed fatty and fibrotic tissue with many lipoblasts and more dedifferentiated areas comprised of sheets of spindle cells. The findings were most consistent with a liposarcoma with high grade dedifferentiation. The cause of death was determined to be dedifferentiated liposarcoma of the abdomen. The manner of death was Natural.

P93 Raccoon Eyes Without the Typical Raccoon

K. Pinneri

Montgomery County Forensic Services, Conroe, Texas, USA

A 76-year-old male with a medical history of asthma complained of difficulty breathing at his residence. A breathing treatment did not resolve his symptoms, so family members attempted to transport him to a local Emergency Department; however, he became unresponsive en route. They stopped at a fire department along the way and resuscitative measures were started. He was transported by ambulance to the hospital where he was pronounced dead 13 minutes after arrival. External findings were notable for large areas of ecchymosis encompassing the anterior neck, the perioral skin and lips and the periorbital skin as well as subcutaneous emphysema of the upper chest and neck. During the course of the autopsy, the areas of purpura were noted to be expanding/evolving with larger areas involved and a deepening purple color. The family reported no history of falls. Internal examination revealed trauma secondary to cardiopulmonary resuscitation and numerous petechiae and hemorrhages throughout the internal body surfaces and organs. The heart weighed 416 gm and the coronary arteries had no significant atherosclerosis. The lungs were atelectatic and without mucous plugs. The skull was intact and without basilar fractures. Microscopic examination revealed amorphous eosinophilic material in multiple organs, including the heart. A Congo red stain revealed bright red staining under regular light and apple green birefringence under polarized light, consistent with amyloid deposition.

Amyloid is an abnormal protein that builds up in tissues and organs resulting in dysfunction. Amyloidosis can be systemic or localized, acquired or familial and amyloid proteins have been identified in numerous central nervous system diseases, such as Alzheimer's dementia and prion diseases. AL or primary amyloidosis is caused by overproduction of clonal light chains and may be associated with a monoclonal plasma cell or B cell proliferative disorder. The deposition of amyloid in the walls of capillaries causes them to become fragile and may burst spontaneously or with minor trauma, such as rubbing the skin or even sneezing or coughing. Amyloid deposits in the heart result in a restrictive cardiomyopathy which can lead to arrhythmias and heart failure. The kidneys, liver, GI tract (including the tongue), airways, lungs, thyroid gland and cerebral blood vessels are other common sites of involvement. Treatment depends on the type of amyloidosis and typically is supportive rather than curative.

P94 DNA Variations Found in South African Cases of Sudden Unexplained Death: How Relevant is Postmortem Genetic Testing?

T.A. Wallace, B.B. Van Deventer, C.C. Van Niekerk

University of Pretoria, Pretosia, South Africa

Introduction: Sudden death of an individual in South Africa is classified as an unnatural death according to the Regulations Regarding the Rendering of Forensic Pathology Service R636 and is thus mandated by the Inquest Act 58 of 1959 to undergo a full medico-legal investigation into the cause of death. If no cause of death is found it is better known as Sudden

Unexplained Death. DNA variations of several genes including the *RyR2*, *CALM1*, *KCNH2*, *KCNQ1*, *SCN5A* and others can cause cardioarrhythmic disorders that may cause death in healthy young individuals. This study aimed to optimized 22 exons of the *RyR2* gene and to investigate and amplify and analyse those exons in a South African sample size as well as a South African reference group.

Methods: The Pretoria Medico-Legal Laboratory (PMLL) performed medicolegal investigations and those that fitted the set-out criteria were included in this study. Post mortem blood samples were drawn, and DNA was extracted from these samples. Twenty-two primer pairs were designed for the *RyR2* gene and systematically the qPCR reactions were optimised. Thereafter, the optimised protocols were used to amplify the selected exons in 33 case samples. The samples were analysed using High Resolution Melting (HRM) to type the samples. After DNA typing, selected amplicons were sent to Inqaba Biotech for sequencing. All sequencing results were analysed using CLC Main Workbench.

Results and Discussion: Seven DNA variations were found in this population group in 10 of the exons. Sequencing will be continued for the remaining 12 exons. The typing method used correlated well with the results obtained from sequencing. Five of the DNA variations are known variations whereas two variations were novel. One of the DNA variations were found were classified as "probably damaging" with a PolyPhen score of 0.923.

Conclusion: Post mortem DNA testing is a very relevant and useful way of diagnosing fatal cardiac arrhythmias. The clinical conditions associated with DNA variations of the aforementioned genes are highly treatable conditions. Therefore, detection of possibly harmful DNA variations in the deceased is highly relevant, because the family members will be informed and offered genetic testing for the same genetic variations.

P95 Sudden Deaths due to Diabetic Ketoacidosis: a Retrospective Study of Forensic Autopsy Cases in the State of Maryland

J. Wu¹, P. Lei², B. Li³, Y. Fang⁴, X. Zhang⁵, D.R. Fowler⁵, L. Li⁵
¹Guizhou Police College, Guiyang, China; ²School of Basic Medical Sciences, Kunming Medical University, Kunming, China; ³School of Basic Medical Sciences, Fudan University, Shanghai, China; ⁴Fudan University, Shanghai, China; ⁵Office of the Chief Medical Examiner, Baltimore, Maryland, USA

Diabetic ketoacidosis (DKA) is a severe acute metabolic complication of diabetes mellitus (DM) due to absolute insulin insufficiency, which may be the initial manifestation of DM or may result from increased insulin requirement in DM patients. A retrospective study was conducted to discover features of sudden deaths due to diabetic ketoacidosis (DKA) in the State of Maryland. The Office of the Chief Medical Examiner (OCME) is responsible for the medicolegal death investigation of all sudden and unexpected deaths in the entire state. Cases were accepted for this study based on the postmortem diagnosis of DKA as cause of death. Our study revealed that a total of 156 sudden deaths were due to DKA in an 8-year period from 2005 to 2012. Of the 156 cases, 117 (75%) patients were reportedly with history of DM (study group I) and 39 patients (25%) had no history of DM (clinically undiagnosed patients-study group II). In both study groups, more males died of DKA than females (male to female ratio =2.3:1) and more blacks died of DKA than whites (black to white ratio = 1.7:1) based on the death rate. The majority (67.3%) of patients died at ages between 30 to 50 years. We focused on the study group II. Of the 37 clinically undiagnosed individuals, they all died suddenly and unexpectedly. More than 66% of the individuals were either overweight or obese with Body Mass Index ranged from >25 (N=6) or >30 (N=20). Approximately 30% of the individuals had complaint of nausea or vomiting, 28% of patients had abdominal pain, and 25% had flue like symptom prior to death, but did not seek medical treatment. Eight individuals had psychological disorders or

mental retarded. The postmortem vitreous humor glucose and acetone concentration in two groups were similar. More than 96% (N=151) individuals' vitreous humor glucose concentration was greater than 200 mg/dL and 92 individuals' vitreous humor glucose concentration was greater than 500. The acetone concentration ranged from 0.012 to >0.1 in the vitreous humor and urine. The risk factors of sudden death due to DKA from clinical undiagnosed DM are discussed.

P96 WITHDRAWN

P97 Bilateral Congenital Ovarian Cysts with Intracystic Hemorrhage Causing Intrauterine Fetal Demise

A.J. Emanuel, S.E. Presnell
Medical University of South Carolina, Charleston, South Carolina, USA

Congenital ovarian cysts are benign, usually asymptomatic lesions arising from the ovaries of neonatal females. Although rare overall, cysts in this location represent the most commonly encountered intra-abdominal cysts of the fetus and newborn. Improved technique and use of ultrasonographic imaging have increased the detection of these cysts, including many smaller, simple cysts that spontaneously regress before or shortly after birth. In fact, some studies indicate that as many as 30-40% of fetuses have detectable cysts. These cysts are thought to be a functional enlargement of otherwise unremarkable follicles, perhaps in response to increasing levels of maternal hormones. Much like cystic structures in other parts of the body, congenital ovarian cysts can be divided into simple or complex categories, with the majority falling into the simple, uncomplicated group. When present, symptoms tend to be nonspecific, and may include mass effect, torsion (of the cyst or ovary), hemorrhage, and rupture. In most cases, the newborn can be monitored for spontaneous resolution of the cyst, with surgical cystectomy or fluid aspiration representing the primary treatment modality for large, complex, or otherwise symptomatic cysts.

Here, we present an unusual case of bilateral ovarian cysts in an otherwise unremarkable and normally developing female fetus. Ultrasound performed after the mother noted a decrease in fetal movement revealed a deceased fetus and what was thought to be an enlarged bladder. Labor was induced, and the decedent was delivered vaginally. Autopsy documented a 6 cm unilocular left ovarian follicular cyst with serous fluid and a 6 cm right ovarian follicular cyst engorged with blood. There was compression of adjacent organs by the cysts. Amniotic fluid was sent for cytogenetic analysis; culture failure precluded karyotyping, but microarray revealed a normal female fetus with no observed abnormalities. Based on the large amount of hemorrhage into the right ovarian cyst, along with otherwise normal autopsy findings, the cause of death was documented as bilateral congenital ovarian follicular cysts complicated by intracystic hemorrhage. This case illustrates the fact that these cysts can produce clinically relevant and potentially fatal symptoms and reinforces the utility of autopsy in intrauterine fetal demise.

P98 Another Case of Probable Clozapine Toxicity

K. Obenson, I. Umar
Saint John Regional Hospital, Saint John, Canada

Introduction: Deaths due to clozapine toxicity have been associated with a variety of mechanisms involving effects on the heart, bone marrow, lungs and bowel. In some cases the decedent took the drug as prescribed. The case presented is of a 50+ year old male.

Case Report: The decedent was found dead at home after complaints of feeling unwell. Medical history was significant for diabetes mellitus, schizophrenia and alcohol abuse disorder of several years duration. He

had been prescribed a monthly supply of clozapine for several years at 550 mg/ day which was dispensed with other medications on a 28 day cycle. The other drugs were clonazepam, sertraline, haloperidol, amitriptyline, atorvastatin, bntropine, atenolol, metformin and glycazide. There is no history of intravenous or inhalational drug use. Pill counts were as expected and none had been crushed. No illicit drugs or drug paraphernalia were observed. Clinical laboratory analysis performed at regular intervals ante-mortem revealed normal hemoglobin and white blood cell counts. At post-mortem examination, there were bilaterally heavy lungs, weighing 1100 g combined. Coronary arteries showed moderate atherosclerosis. Microscopic examination of the lung showed changes characteristic of diffuse alveolar damage. Rare intraalveolar refractile foreign bodies were identified. There were no organisms or viral cytopathic changes. Only clozapine was within the clinically toxic range on blood analysis. No ethanol was detected. Vitreous biochemical analyses were remarkable for beta hydroxybutyrate ketoacidosis.

Discussion: Toxic clozapine levels may result from abnormal drug absorption, distribution, metabolism or elimination. The prescription history of several years and the deceased's general drug compliance suggest that there were no changes in self-administration that would explain the toxic level. However the fact that clozapine shares hepatic metabolic machinery with ethanol raises the possibility of impaired clozapine metabolism in this decedent with alcohol use disorder. This may increase the bioavailability of clozapine to toxic levels. Clozapine use is also associated with interstitial lung disease including pneumonitis, vasculitis and diffuse alveolar damage an effect which may or may not be dose dependent. Ketosis could have been due to malnutrition or diabetes or both and clozapine has been known to cause insulin dependent ketoacidosis in patients without a history of diabetes.

Conclusion: Based on a review of the circumstances scene findings and comorbidities, clozapine toxicity is a significant factor in causing this death. Given the various ways by which clozapine toxicity manifests, the mechanism of death is probably multifactorial.

P99 A Case of Probable Hypertrophic Cardiomyopathy Presenting as Sudden Death in Early Infancy

*K. Obenson, A. Naseemuddin
Saint John Regional Hospital, Saint John, Canada*

Introduction: Hypertrophic cardiomyopathy (HCM) has been described as a cause of sudden unexpected death in infants and children. It is defined by left ventricular hypertrophy in the absence of an increased external load. The present case of probable HCM is in a young infant with no family history of sudden death.

Case Report: The decedent, a 5 week old female who was the second child of non-consanguineous parents, was delivered at 39 weeks following an uneventful antenatal course. There was no history of gestational diabetes. She was found unresponsive by her mother who reported that she had been suffering a cold. No cardiac murmurs reported on previous physical examinations. Scene examination was unremarkable. Complete post-mortem examination was performed including whole body CT, conventional radiography, bacterial and viral culture of selected tissues, metabolic assay and a comprehensive histologic examination. Besides resuscitation injuries (pericardial and pleural petechiae), the significant finding was an enlarged heart which weighed 50 g (> 95th percentile). The right upper and middle lung lobes were edematous but overall lung weights were below the mean for age. The rest of the internal examination was unremarkable. Cardiac wall thicknesses and valve dimensions were within usual limits for body length. There were no valve anomalies or aortic coarctation. Histologic examination of the heart showed patchy myocardial fiber hypertrophy with slight disarray. There was no infarction, fibrosis or myocarditis or vasculitis.

Toxicologic analysis and vitreous biochemical analyses were unremarkable.

Discussion: HCM is often inherited as an autosomal dominant trait in genes that encode protein constituents of the sarcomere and may present as syncopal episodes or as sudden unexpected death especially in the presence of severe cardiac hypertrophy, family history of the disease or abnormal cardiac rhythm. Presentation in infancy or childhood is extremely rare (0.47/100,000). Most newborns with HCM are asymptomatic although up to 20% may present with low output cardiac failure. Prototypic features such as fibrosis and myocardial fiber disarray may be lacking on histologic examination despite diligent sampling. However in the neonate, it is important to exclude other genetic and acquired systemic diseases including inborn errors of metabolism, neuromuscular disorders and syndromic illnesses before attributing etiology of cardiac pathology to HCM. Given the relatively normal cardiac wall and ventricular cavity dimensions and the absence of other disease stigmata, the likely mechanism of death was probably a fatal cardiac arrhythmia occurring in the context of an enlarged, electrically unstable heart.

P100 Reanalysis Of Genomic Data For Sudden-Death Cases Reveal New Diagnoses And Give Greater Context For Variant Of Unknown Pathogenicity.

*E.L. Salfati¹, E.G. Spencer¹, S.E. Topol¹, E.D. Muse¹, J.R. Lucas², G.N. Wagner³, S. Campman³, E.J. Topol¹, A. Torkamani¹
¹Scripps Research, La Jolla, California, USA; ²Los Angeles County Department of Medical Examiner-Coroner, Los Angeles, California, USA; ³San Diego County Medical Examiner's Office, San Diego, California, USA*

Around 10% of natural death cases remain unexplained each year and are subsequently classified as sudden unexpected deaths (SUD). The use of exome sequencing-based (WES) molecular autopsy protocol has recently proven its potential to improve this yield. As genomic sequencing expands and knowledge of gene-disease and variant-disease associations increase, reanalysis of initial WES data may facilitate new discovery and maximize the accuracy of clinical sequencing.

We tested this hypothesis in the Scripps Molecular Autopsy study, where in 2017 we reported a diagnostic yield of 16% through WES of 50 sudden-death cases. We re-assessed these post-mortem genetic data ~2 years later using an improved variant classification methodology and updated variant annotation pipeline.

Reanalysis yielded one pathogenic variant [MQU1] that was not initially reported in one individual, comprising an 18% increase in P/LP yield. We also reclassified variants of uncertain significance (VUS) to benign due to updated population frequency data. Explanatory variants have been discovered in 9 of 50 previously SUD cases. Our re-annotation efforts also classified another 30 (60%) cases with uncertain clinical significance finding [MQU2] (VUS), an almost 10% increase from our original study. These new genetic diagnoses are mainly due to improved variant prioritization, newly available clinical information since our original publication and highly accurate annotation database.

Iterative reanalysis of negative WES data may prove useful, as knowledge of genetic etiologies grows. In addition, these findings underline the importance for systematic molecular autopsy to cases with an undetermined manner of death, with implications for screening of relatives.

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NAME 2020

Interim Meeting

February 18, 2020

Anaheim Hilton

Anaheim, California

Program Chair: Suzanne Utley, MD

Topic: Mass Fatality

<https://www.thename.org/interim-meetings>





NAME 2020

Annual Meeting & Exhibits

October 9 - 13, 2020

**Hyatt Regency Denver at Colorado
Convention Center**

Denver, Colorado

