

**50<sup>th</sup> Anniversary Golden Jubilee**

**Celebrating Our Past,  
Inspiring Our Future**

**National Association of Medical Examiners**

# **MEETING PROGRAM**



**NAME 2016 Annual  
Meeting & Exhibits**  
*50th Anniversary Golden Jubilee*

**September 7-13, 2016  
Hyatt Regency Minneapolis  
Minneapolis, MN (USA)**

**[www.thename.org](http://www.thename.org)**



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Hyatt Regency Minneapolis – Minneapolis, Minnesota, USA

## **NOTES**

## Welcome to the NAME 2016 50th Anniversary Meeting!

Dear Colleagues and Friends,

Welcome to the National Association of Medical Examiners 2016 Annual Meeting. The NAME Annual Meeting provides an international forum for discussion of a broad range of issues pertaining to death investigation. This year we have much to discuss and a wonderful host city to enjoy.

### Meeting Highlights

The 2016 Annual Meeting will be held from Wednesday, September 7 through Tuesday, September 13, 2016 at the Hyatt Regency Minneapolis. It will be an opportunity to celebrate the 50th Anniversary of NAME.

Our meeting will feature presentations and posters that cover a broad range of topics.

Prior to the scientific sessions, there will be a 2 day workshop in Lead Assessor Training for ISO/IEC 17020.

On Sunday afternoon we will have our inaugural workshop which will explore the topic of Cardiovascular Pathology.

The NAME Business Meeting will be held at the Hyatt Regency on Monday morning 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 <http://www.name2016.org/>.

### Social Events

Friday evening 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 Hyatt Regency.

On Saturday evening early there will be a resident and fellow reception after the scientific sessions. This will precede a celebration of Dr Tom Noguchi's 90th birthday, followed by a NAME Foundation Fundraiser featuring Dr G.

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

Monday will begin with the Ask the Chiefs Breakfast. The Femme Fatale Luncheon will also take place on Monday.

The NAME Luncheon and Award Ceremony will take place at the hotel on Tuesday. During the luncheon there will be a special presentation by Dr. Anne Schuchat from the CDC.

### 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 the American Society for Investigative Pathology (ASIP), which serves as meeting manager, and of course our Executive Director, Denise McNally. In particular, please thank Tara Snethen of the ASIP team 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.

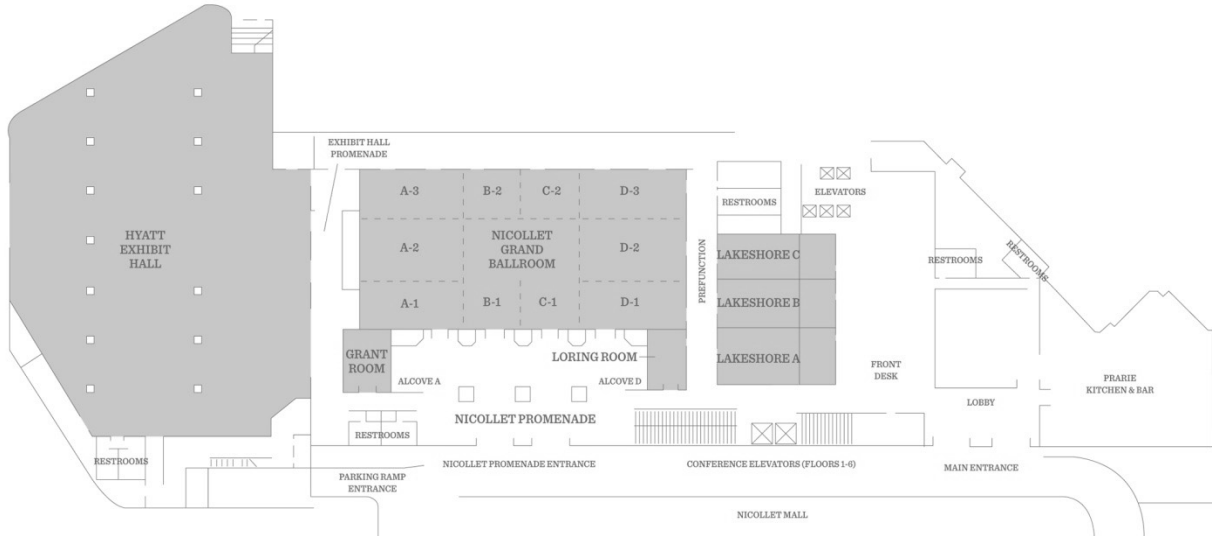
We welcome both our established and new colleagues and look forward to your active participation, which is essential to the success of this meeting. We hope that our new colleagues will consider joining NAME to take advantage of the year-round interactions that our current members enjoy.

***Dianne Little, MBBS, 2016 Program Chair***  
***David Fowler, M.D., 2016 President***

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# HOTEL MAP

## Hyatt Regency Minneapolis Main Level Meeting Rooms:



## Second Level Meeting Rooms



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Gregory Schmunk, MD, *Secretary*

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Gregory G. Davis, MD  
Randy Hanzlick, MD  
Laura Knight, MD, *Chair*  
Brian Peterson, MD

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James Frost, MD  
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Charles Stahl, MD  
William Sturner, MD  
Ross Zumwalt, MD

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Accreditation**

Bamidele Adeagbo, MD  
Lindsey Bayer  
Paul Chui, DMJ  
Steven Clark, PHD, *Consultant*  
Kim Collins, MD  
Tracey Corey, MD  
Joyce deJong, DO  
Edmund Donoghue, MD  
Mark Fajardo, MD  
David Fowler, MD  
Randall Frost, MD  
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Amy Gruszecki, DO  
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Deborah Kay, MD  
Karen Kelly, MD  
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Robert Ross Reichard, MD  
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Shaku Teas, MD  
Andrea Wiens, DO  
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Jonathan Arden, MD  
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Stacy Drake, PHD  
Norma Farley, MD  
Marcella Fierro, MD  
James Gill, MD  
Marie Herrmann, MD  
Karen Kelly, MD  
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Valerie Rao, MD  
Lakshmanan Sathyavagiswaran, MD  
Gregory Schmunk, MD  
Carl Stacy, MD

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Jonathan Arden, MD, *Chair*  
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Mark Super, MD  
Lindsey Thomas, MD, *Ex-Officio*  
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**American Medical Association CPT  
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Paul Raslavicus, MD, *Alternate  
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**American Medical Association**

J. Scott Denton, MD, *Alternate Delegate*  
Aldo Fusaro, DO, *Delegate*

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Mary Ann Sens, MD

**College of American Pathologists (CAP) Liaison**

Stephen Cina, MD

**Consortium of Forensic Sciences Organizations (CFSO) Liaison**

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**Intersociety Pathology Council Liaison**

Mary Ann Sens, MD

**NCRPCD**

Gregory Schmunk, MD

**Pathology Roundtable**

Stephen Cina, MD  
David Fowler, MD  
Mary Ann Sens, MD

**World Association for Medical Law (WAML)**

Thomas Noguchi, MD

**NAME 2016 MEETING PROGRAM**

**WEDNESDAY, SEPTEMBER 7, 2016**

**PROGRAM INFORMATION:**

<b>9:00 AM - 5:00 PM</b>	<b>OPTIONAL WORKSHOP: ISO/IEC 17020 and Audit Preparation for Forensic Agencies [CME]</b> <b>Instructors: David Grady, Erica Collins and Sarah Franchowiak, ANAB (ANSI-ASQ National Accreditation Board)</b> <i>Skyway Suite AB, Second Level</i>
9:00 AM – 9:30 AM	Introduction
9:30 AM – 10:30 AM	ISO/IEC
10:30 AM – 10:45 AM	BREAK [NOT CME]
10:45 AM – 11:30 AM	ILAC and Regional Cooperatives
11:30 AM – 12:30 PM	LUNCH [NOT CME]
1:30 PM – 2:30 PM	Exercises
2:30 PM – 2:45 PM	BREAK [NOT CME]
2:45 PM – 3:15 PM	Method Validation
3:15 PM – 5:00 PM	Jeopardy Exercise

**THURSDAY – SEPTEMBER 8, 2016**

**COMMITTEE MEETING [NOT CME]:**

8:00 AM – 5:00 PM	Executive Committee Meeting (Invitation Only) <i>St. Croix, Second Level</i>
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**PROGRAM INFORMATION:**

<b>9:00 AM - 5:00 PM</b>	<b>OPTIONAL WORKSHOP: ISO/IEC 17020 and Audit Preparation for Forensic Agencies [CME]</b> <b>Instructors: David Grady, Erica Collins and Sarah Franchowiak, ANAB (ANSI-ASQ National Accreditation Board)</b> <i>Skyway Suite AB, Second Level</i>
9:00 AM – 9:45 AM	Traceability, Uncertainty of Measurements
9:45 AM – 10:15 AM	Internal Audits, Principles of Auditing
10:15 AM – 10:45 AM	Quality Manual
10:45 AM – 11:00 AM	BREAK [NOT CME]
11:00 AM – 12:00 PM	Internal Audits
12:00 PM – 1:00 PM	LUNCH [NOT CME]
1:00 PM – 1:45 PM	Quality Manual
1:45 PM – 2:15 PM	Accreditation Process
2:15 PM – 2:45 PM	General Questions
2:45 PM – 3:00 PM	BREAK [NOT CME]
3:00 PM – 5:00 PM	Computer Training (EQM, Nimonik App and Computer Application)

**FRIDAY – SEPTEMBER 9, 2016**

**GENERAL INFORMATION [NOT CME]:**

10:00 AM – 4:00 PM	Pre-Registration (Exhibitors & Attendees) <i>Nicollet Promenade, Main Level</i>
10:00 PM – 4:00 PM	Installation of Exhibits <i>Exhibit Hall, Main Level</i>
4:30 PM – 6:30 PM	Grand Opening of Exhibits <i>Exhibit Hall, Main Level</i>
4:30 PM – 6:30 PM	Welcome Reception (Registrants and Ticket Holders Only) <i>Exhibit Hall, Main Level</i>
5:30 PM – 6:30 PM	International Attendee Reception <i>Lakeshore A, Main Level</i> <i>Sponsored by The Musculoskeletal Transplant Foundation</i>
6:30 PM – 9:00 PM	Welcome Dinner (Registrants and Ticket Holders Only) <i>Northstar Ballroom, Second Level</i>

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**COMMITTEE MEETINGS [NOT CME]:**

6:45 AM – 8:00 AM	Foundation and Board of Directors Meeting & Continental Breakfast <i>Skyway Suite AB, Second Level</i>
7:00 AM – 8:00 AM	Foundation Meeting <i>St. Croix, Second Level</i>
8:00 AM – 4:00 PM	Board of Directors Meeting <i>Lakeshore A, Main Level</i>
12:00 PM – 1:00 PM	Board of Directors Lunch <i>Lakeshore B, Main Level</i>
12:00 PM – 1:00 PM	Inspection and Accreditation Committee Meeting <i>Lakeshore C, Main Level</i>
4:00 PM – 5:00 PM	NAME Foundation Business Meeting <i>Minnehaha, Second Level</i>
4:00 PM – 5:00 PM	Ad Hoc Meeting on Protocols for Interagency Interactions in Mass Fatality Incidents <i>Skyway Suite AB, Second Level</i>
4:00 PM – 6:00 PM	Ad Hoc Meeting on Organ and Tissue Procurement <i>St. Croix, Second Level</i>

**PROGRAM INFORMATION:**

<b>1:00 PM - 5:00 PM</b>	<b>OPTIONAL WORKSHOP: ISO Standards [CME]</b> <b>Instructor: David Grady, ANAB (ANSI-ASQ National Accreditation Board)</b> <i>Lakeshore C, Main Level</i>
1:00 PM – 1:45 PM	Hierarchy of ISO Standards
1:45 PM – 2:15 PM	Benefits of Accreditation
2:15 PM – 2:45 PM	Role of an Accreditation Body
2:45 PM – 3:00 PM	BREAK [NOT CME]
3:00 PM – 3:45 PM	ILAC and Regional Cooperatives
3:45 PM – 4:30 PM	ISO/IEC 17020 Requirements for Forensic Agencies
4:30 PM – 5:00 PM	Conclusions and Questions & Answers

**SATURDAY, SEPTEMBER 10, 2016**

***\*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] <i>Greenway Ballroom, Second Level</i>
7:00 AM – 5:00 PM	Registration [NOT CME] <i>Nicollet Promenade, Main Level</i>
8:00 AM – 4:00 PM	Exhibits [NOT CME] <i>Exhibit Hall, Main Level</i>
8:00 AM – 5:20 PM	Posters <i>Lakeshore Ballroom, Main Level</i>
1:00 PM – 2:00 PM	NAME Foundation Yoga by Donation [NOT CME] <i>StayFit Spin Room, Sixth Level</i>
5:20 PM – 6:20 PM	Resident/Fellow Reception [NOT CME] <i>Skyway Suite AB, Second Level</i>
6:30 PM – 7:30 PM	Thomas Noguchi 90 <sup>th</sup> Birthday Celebration [NOT CME] <i>Greenway Ballroom, Second Level</i>
8:00 PM – 10:00 PM	NAME Foundation Outreach Fundraiser, Featuring Dr. G [NOT CME] <i>Nicollet A-C, Main Level</i>

**COMMITTEE MEETINGS [NOT CME]:**

7:00 AM – 8:00 AM	International Relations Committee Meeting <i>Minnehaha, Second Level</i>
12:30 PM – 2:00 PM	Past Presidents' Committee Meeting and Lunch <i>Nicollet D2, Main Level</i>
12:30 PM – 2:00 PM	Ethics Committee Meeting and Lunch <i>Nicollet D1, Main Level</i>

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12:30 PM – 2:00 PM Journal Editorial Board Meeting  
*Nicollet D3, Main Level*

**PROGRAM INFORMATION:**

**8:00 AM – 10:20 AM** **SESSION 1: OUR HISTORY [NOT CME]**  
**Moderators: Gregory A Schmunk, Polk County Medical Examiner, Des Moines, Iowa, United States of America and Thomas T. Noguchi, Former Chief Medical Examiner (1967-1982), Los Angeles County Medical Examiner-Coroner, Los Angeles, California, United States of America**  
*Nicollet A-C, Main Level*

8:00 AM – 10:00 AM **1.1 The 50-Year History of the National Association of Medical Examiners [NOT CME]**  
*Gregory A. Schmunk, MD, Polk County Medical Examiner, Des Moines, Iowa, United States of America*

Introduction to the History of the National Association of Medical Examiners (NAME)  
*Gregory A. Schmunk, MD, Chief Medical Examiner, Polk County Medical Examiner, Des Moines, Iowa, United States of America*  
*NAME President 2013*

The Formative Years in NAME – 1966 through 1985  
*Thomas T. Noguchi, MD, Former Chief Medical Examiner (1967-1982), Los Angeles County Medical Examiner-Coroner, Los Angeles, California, United States of America*  
*NAME President 1982-83*

NAME in its 3<sup>rd</sup> and 4<sup>th</sup> Decades: Leadership, Accomplishments, and Trends – 1986 through 2005  
*Randy Hanzlick, MD, Former Chief Medical Examiner (1998-2016), Fulton County Medical Examiner, Atlanta, Georgia, United States of America*  
*NAME President 2001*

NAME and the 21st Century – 2006 through the present  
*Gregory G. Davis, MD, Chief Coroner/Medical Examiner, Jefferson County Coroner/Medical Examiner Office, Birmingham, Alabama, United States of America*  
*NAME President 2014*

1.2 1970-79 and the Start of Connecticut's Medical Examiner System  
*Elliot M Gross, MD, Former Chief Medical Examiner – Connecticut and New York, New York, New York, United States of America*  
*NAME President 1984-85*

Inspection and Accreditation: Past, Present, Future and ISO  
*David Fowler, MD, Chief Medical Examiner, Maryland Office of the Chief Medical Examiner, Baltimore, Maryland, United States of America*  
*NAME President 2016*

*Jeffrey Jentzen, MD, Director of Autopsy and Forensic Services, University of Michigan Department of Pathology, Ann Arbor, Michigan, United States of America*  
*NAME President 2008*

Women in NAME and Forensic Pathology / Academic Homes, Models and Influence in Forensic Pathology  
*Mary Ann Sens, MD, University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota, United States of America*  
*NAME President 2011*

Maintaining Relevance: Our National Contribution  
*Steven Clark, PhD, Occupational Research and Development, Big Rapids, Michigan, United States of America*

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The Age of the Affiliate and the American Board of Medicolegal Death Investigation (ABMDI)  
*Mary Fran Ernst, F-ABMDI, Medicolegal Death Investigator, St. Louis County Medical Examiner's Office, St. Louis, Missouri, United States of America*  
*Former NAME Meeting Manager (1980-2011) and President of the Society of Medicolegal Death Investigators*

- 10:15 AM – 10:20 AM Questions
- 10:20 AM – 11:00 AM VISIT EXHIBITS [NOT CME]  
*Exhibit Hall, Main Level*
- 10:20 AM – 11:00 AM BREAK [NOT CME]  
*Exhibit Hall, Main Level*  
*Sponsored by The Musculoskeletal Transplant Foundation*
- 10:20 AM – 11:00 AM VISIT POSTERS  
*Lakeshore Ballroom, Main Level*
- 11:00 AM – 12:45 PM** **SESSION 2: TOXICOLOGY**  
**Moderators: Owen L. Middleton, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America and Marianne Beynon, Baylor College of Medicine, Houston, Texas, United States of America**  
*Nicollet A-C, Main Level*
- 11:00 AM – 11:15 AM 2.1 Trends in Drug Intoxication Deaths in the United States, 2000-2014  
*\*\*Margaret Warner, PhD, CDC National Center for Health Statistics, Hyattsville, Maryland, United States of America*
- 11:15 AM – 11:30 AM 2.2 Common Findings and Predictive Measures of Opioid Overdoses  
*\*\*\*Danielle Elizabeth Pelletier, BS, The Office of Chief Medical Examiners, Concord, New Hampshire, United States of America*
- 11:30 AM – 11:45 AM 2.3 Emerging Toxicity: The Impact of Fentanyl and Acetyl Fentanyl on Opioid Drug Deaths in Washington DC  
*\*\*\*Roger A Mitchell, MD, DC Office of the Chief Medical Examiner, Washington DC, District of Columbia, United States of America*
- 11:45 AM – 12:00 PM 2.4 A Unique Ppublic Access Database Created From Separate Coroner and Medical Examiner Jurisdictions on the Local Nature of the Toxicology and Demographic Features of the Current Overdose Crisis  
*\*\*\*Karl E Williams, MD, MPH, Allegheny County Office of the Medical Examiner, Pittsburgh, Pennsylvania, United States of America*
- 12:00 PM – 12:10 PM 2.5 A Model of Collaboration During the 2015 Opioid Epidemic: The Cook County Experience  
*\*\*\*Zachary Michalicek, DO, Cook County Office of the Medical Examiner, Chicago, Illinois, United States of America*
- 12:10 PM – 12:30 PM 2.6 Emerging Designer Opioids: Toxicological Implications for Death Investigation  
*Donna M Papsun, MS, D-ABFT-FT, NMS Labs, Willow Grove, Pennsylvania, United States of America*
- 12:30 PM – 12:40 PM 2.7 Off-label Use of a Urine Immunoassay Screening Kit for Common Drugs of Abuse in Vitreous and Cerebrospinal Fluid  
*S. Erin Presnell, MD, Medical University of South Carolina, Charleston, South Carolina, United States of America*
- 12:40 PM – 12:45 PM Questions
- 12:45 PM – 2:40 PM LUNCH (ON YOUR OWN) [NOT CME]



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- 12:45 PM – 2:40 PM VISIT EXHIBITS [NOT CME]  
*Exhibit Hall, Main Level*
- 12:45 PM – 2:40 PM VISIT POSTERS  
*Lakeshore Ballroom, Main Level*
- 2:40 PM – 5:20 PM** **SESSION 3: NEUROPATHOLOGY, INFECTIONS AND TRAUMA**  
**Moderators: Rebecca M. Wilcoxon, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America and Kathryn Haden-Pinneri, Harris County Institute of Forensic Sciences, Houston, Texas, United States of America**  
*Nicollet A-C, Main Level*
- 2:40 PM – 2:55 PM 3.1 Death in Epilepsy: A Comprehensive 10-Year Review  
\*\*\*\**Tracy A Stein, BS, University of Minnesota, Saint Paul, Minnesota, United States of America*
- 2:55 PM – 3:05 PM 3.2 Symptomatic Acute on Chronic Subdural Hematoma: A Review of Clinical Findings, Neuroimaging Studies, and Pathological Findings in 47 Cases  
\**Gruschenka Mojica-Sanchez, MD, University of Maryland Medical Center, Baltimore, Maryland, United States of America*
- 3:05 PM – 3:35 PM 3.3 Autism BrainNet: A National Effort to Acquire Postmortem Brain Donations to Enhance Understanding of Autism Spectrum Disorder  
*Matthew Anderson, MD, PhD, Beth Israel Deaconess Medical Center, Boston, Massachusetts, United States of America*
- 3:35 PM – 3:50 PM 3.4 Blastomycosis in Wisconsin: Beyond the Outbreaks  
\*\*\**Katrina Thompson, MD, University of Wisconsin Hospital and Clinics, Madison, Wisconsin, United States of America*
- 3:50 PM – 4:05 PM 3.5 *Serratia marcescens*: Hospital Infection Outbreak Following Pain Medication Diversion  
\**Leah Schuppener, DO, University of Wisconsin Hospital and Clinics, Madison, Wisconsin, United States of America*
- 4:05 PM – 4:15 PM VISIT EXHIBITS [NOT CME]  
*Exhibit Hall, Main Level*
- 4:05 PM – 4:15 PM BREAK [NOT CME]  
*Exhibit Hall, Main Level*  
*Sponsored by The Musculoskeletal Transplant Foundation*
- 4:05 PM – 4:15 PM VISIT POSTERS  
*Lakeshore Ballroom, Main Level*
- 4:15 PM – 4:25 PM 3.6 The Relationship Between Systemic Infection and Intracranial Hemorrhage: A Study of 411 Consecutive Autopsy Cases  
*Rudy J Castellani, MD, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan, United States of America*
- 4:25 PM – 4:35 PM 3.7 Hemoglobin A1c and the Postmortem Diagnosis of Diabetes Mellitus  
*Luke R. Vogelsberg, BS, Sparrow Forensic Pathology, Lansing, Michigan, United States of America*
- 4:35 PM – 4:45 PM 3.8 Fatal Pulmonary Thromboembolism in Patients with Diabetic Ketoacidosis. A Seven-Case Series and Review of the Literature  
*Irini Scordi-Bello, MD, PhD, The Office of Chief Medical Examiner of New York City, New York, New York, United States of America*
- 4:45 PM – 5:00 PM 3.9 Extreme and Severe Crush Injuries: Case Comparisons from Tidewater, Virginia  
*Wendy M. Gunther, MD, Office of the Chief Medical Examiner, Norfolk, Virginia, United States of America*

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- 5:00 PM – 5:15 PM 3.10 Major Self-Mutilation: A Case Series  
*\*Beth E Frost, DO, University of Texas Southwestern & Southwestern Institute of Forensic Sciences, Dallas, Texas, United States of America*
- 5:15 PM – 5:20 PM Questions

**SUNDAY, SEPTEMBER 11, 2016**

**GENERAL INFORMATION:**

- 6:30 AM – 8:20 AM Rigor Run/Walk (Optional) [NOT CME]  
6:30AM – 8:20AM Affiliate Business Meeting [NOT CME]  
*Nicollet D1, Main Level*
- 6:45 AM – 8:20 AM Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME]  
*Greenway Ballroom, Second Level*
- 7:00 AM – 12:30 PM Registration [NOT CME]  
*Nicollet Promenade, Main Level*
- 8:00 AM – 1:15 PM Exhibits [NOT CME]  
*Exhibit Hall, Main Level*
- 8:00 AM – 6:30 PM Posters  
*Lakeshore Ballroom, Main Level*
- 12:30 PM – 1:30 PM NAME Foundation Yoga by Donation [NOT CME]  
*StayFit Spin Room, Sixth Level*
- 1:00 PM – 5:00 PM 21<sup>st</sup> Annual Cadaver Open Golf Tournament (Optional) [NOT CME]  
*\*Additional Payment Required\**  
*Sponsored by CryoLife, Inc.*

**COMMITTEE MEETING [NOT CME]:**

- 12:45 PM – 5:45 PM Strategic Planning Committee Meeting  
*Nicollet D1, Main Level*
- 6:30 PM – 8:30 PM Opioids/Opiates- Strategy Sharing Meeting  
*Location TBD*
- 7:00 PM – 9:00 PM Forensic Pathology Training Subcommittee Meeting  
*Nicollet D1, Main Level*

**PROGRAM INFORMATION:**

- 8:30 AM – 10:05 AM SESSION 4: DEATH INVESTIGATION**  
**Moderators: Lorren Jackson, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America and Megan E. Quinn, University of Colorado School of Medicine, Aurora, Colorado, United States of America**  
*Nicollet A-C, Main Level*
- 8:30 AM – 8:40 AM 4.1 Dissecting and Streamlining the Medical Record Acquisition Process in Death Investigation Systems  
*\*\*\*\*Nicole Alyse Croom, BS, MPH, University of California, San Francisco, San Francisco, California, United States of America*
- 8:40 AM – 8:55 AM 4.2 Educational Advancements in Medicolegal Death Investigation Training  
*\*\*Amanda Wallace, BS, Cuyahoga County Medical Examiner's Office, Cleveland, Ohio, United States of America*
- 8:55 AM – 9:10 AM 4.3 Using Case-Type Specific Data to Improve Medicolegal Death Investigation  
*\*\*Brian P. Ehret, F-ABMDI, Onondaga County Medical Examiner's Office, Syracuse, New York, United States of America*
- 9:10 AM – 9:25 AM 4.4 Deaths In Custody: Establishing a Public Health Surveillance Infrastructure in Washington DC  
*\*\*\*Roger A Mitchell, MD, Office of the Chief Medical Examiner - Washington DC, Washington DC, District of Columbia, United States of America*

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- 9:25 AM – 9:40 AM 4.5 Interdisciplinary Collaboration in the Evaluation of Sudden Unexpected Death of a Young Male  
*Dennis J Firchau, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America*
- 9:40 AM – 9:50 AM 4.6 A Procedural Template for Familial Evaluation After Sudden Unexplained Death  
*Gregory Webster, MD, MPH, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois, United States of America*
- 9:50 AM – 10:00 AM 4.7 Errors in Cause of Death Coding: Impact of New Electronic Death Registration System on Cause of Death in Vermont  
*\*Britni R.E. Bryant, MD, University of Vermont Medical Center, Burlington, Vermont, United States of America*
- 10:00 AM – 10:05 AM Questions
- 10:05 AM – 10:45 AM VISIT EXHIBITS [NOT CME]  
*Exhibit Hall, Main Level*
- 10:05 AM – 10:45 AM BREAK [NOT CME]  
*Exhibit Hall, Main Level*  
*Sponsored by our Platinum Level Corporate Partner, Lodox NA LLC*
- 10:05 AM – 10:45 AM VISIT POSTERS  
*Lakeshore Ballroom, Main Level*
- 10:45 AM – 12:25 PM** **SESSION 5: MORE TOXICOLOGY**  
**Moderators: R. Ross Reichard, Mayo Clinic, Rochester, Minnesota, United States of America and Amanda Spencer, Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania, United States of America**  
*Nicollet A-C, Main Level*
- 10:45 AM – 11:00 AM 5.1 Historical, Current and Forensic Perspectives of Heroin  
*Maneesha Pandey, MBBS, Lucas County Coroner's Office, Toledo, Ohio, United States of America*
- 11:00 AM – 11:15 AM 5.2 Acetyl Fentanyl: An Epidemic or the New Normal  
*Avneesh Gupta, MD, University of Michigan, Ann Arbor, Michigan, United States of America*
- 11:15 AM – 11:30 AM 5.3 Gabapentin in Mixed Drug Fatalities: Does this Frequent Analyte Deserve More Attention?  
*\*\*\*\*Grant Finlayson, BS, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan, United States of America*
- 11:30 AM – 11:45 AM 5.4 Certification of Deaths Associated with Co-ingestion of Fentanyl and/or Analogues and Heroin  
*Andrew L. Falzon, MD, DABP, New Jersey Office of the State Medical Examiner, Trenton, New Jersey, United States of America*
- 11:45 AM – 12:00 PM 5.5 The Determination of Insulin Overdose in Postmortem Investigations  
*Laura Marie Labay, PhD, F-ABFT, DABCC-TC, NMS Labs, Willow Grove, Pennsylvania, United States of America*
- 12:00 PM – 12:10 PM 5.6 Inadvertent Fluoride Ingestion Resulting in Death: A Case Report  
*Marisa Jacob, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America*
- 12:10 PM – 12:25 PM 5.7 Interpretive Considerations and Importance of Hair Toxicology Results in Pediatric Death Investigations  
*Laura Labay, PhD, NMS Labs, Willow Grove, Pennsylvania, United States of America*

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12:25 PM – 12:30 PM	Questions
12:30 PM – 2:00 PM	LUNCH (ON YOUR OWN) [NOT CME]
12:30 PM – 2:00 PM	VISIT POSTERS <i>Lakeshore Ballroom, Main Level</i>
12:30 PM – 2:00 PM	VISIT EXHIBITS [NOT CME] <i>Exhibit Hall, Main Level</i>
<b>2:00 PM – 5:00 PM</b>	<b>SESSION 6: WORKSHOP (<i>Limited Attendance</i>)</b> <b>Moderators: Julia Shields and Carmen Coles, Office of the Chief Medical Examiner, Baltimore, Maryland, United States of America</b> <i>Nicollet A-C, Main Level</i>
2:00 PM – 5:00 PM	6.1 Cardiovascular Pathology Workshop <i>Shannon M Mackey-Bojack, MD, Jesse E Edwards Registry of Cardiovascular Disease, St Paul, Minnesota, United States of America</i>  This workshop will provide a didactic overview of handling and processing cardiac specimens for postmortem diagnosis, followed by a hands-on experience with specimens to reinforce fundamental and advanced concepts. This workshop is geared for the practicing medical examiner/ coroner.
5:00 PM – 6:30 PM	Poster Presenters at Posters <i>Lakeshore Ballroom, Main Level</i>

**MONDAY, SEPTEMBER 12, 2016**

**GENERAL INFORMATION:**

6:00 AM – 7:00 AM	NAME Foundation Yoga by Donation [NOT CME] <i>StayFit Spin Room, Sixth Level</i>
6:45 AM – 8:20 AM	Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME] <i>Greenway Ballroom, Second Level</i>
7:00 AM – 5:00 PM	Registration [NOT CME] <i>Nicollet Promenade, Main Level</i>
7:00 AM – 8:00 AM	Ask the Chiefs Breakfast Workshop (Optional) [NOT CME] <i>Minnehaha, Second Level</i>
8:00 AM – 3:40 PM	Exhibits [NOT CME] <i>Exhibit Hall, Main Level</i>
8:00 AM – 3:40 PM	Posters <i>Lakeshore Ballroom, Main Level</i>
12:0 PM – 1:20 PM	Feme Fatale Luncheon (Optional) [NOT CME] <i>*Additional Payment Required*</i> <i>Minnehaha, Second Level</i> <i>Sponsored by our Platinum Level Corporate Partner, Lodox NA LLC</i>
6:30 PM – 8:30 PM	Board of Directors Reception (Invitation Only) [NOT CME] <i>Regency Room, Second Level</i>

**PROGRAM INFORMATION:**

8:00 AM – 9:50 AM	NAME Business Meeting [NOT CME] <i>Nicollet A-C, Main Level</i>
9:50 AM – 10:30 AM	VISIT EXHIBITS [NOT CME] <i>Exhibit Hall, Main Level</i>
9:50 AM – 10:30 AM	BREAK [NOT CME] <i>Exhibit Hall, Main Level</i> <i>Sponsored by our Gold Level Corporate Partner, NMS Labs</i>
9:50 AM – 10:30 AM	VISIT POSTERS

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10:30 AM – 12:00 PM	NAME Business Meeting [NOT CME] <i>Nicollet A-C, Main Level</i>
12:00 PM – 1:20 PM	LUNCH (ON YOUR OWN) [NOT CME]
12:00 PM – 1:20 PM	VISIT EXHIBITS [NOT CME] <i>Exhibit Hall, Main Level</i>
12:00 PM – 1:20 PM	VISIT POSTERS <i>Lakeshore Ballroom, Main Level</i>
<b>1:20PM – 3:00 PM</b>	<b>SESSION 7: POTPOURRI</b> <b>Moderators: Lindsey Thomas, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America and Ashley Lukefahr, University of Arizona College of Medicine, Tucson, Arizona, United States of America</b> <i>Nicollet A-C, Main Level</i>
1:20 PM – 1:35 PM	7.1 Forensic Pathology in Canada: Past, Present and Future <i>Christopher Milroy, MD, LLB, The University of Ottawa, Ottawa, Canada</i>
1:35 PM – 1:50 PM	7.2 Current Relevance of the Article on Classical Mistakes In Forensic Pathology by Dr. Alan R. Moritz <i>Maneesha Pandey, MBBS, Lucas County Coroner's Office, Toledo, Ohio, United States of America</i>
1:50 PM – 2:05 PM	7.3 The Medical Examiner as Defendant <i>Christopher B Rogers, MD, Los Angeles County, Los Angeles, California, United States of America</i>
2:05 PM – 2:15 PM	7.4 WITHDRAWN
2:15 PM – 2:25 PM	7.5 Death Certification at a Tertiary Care Center: A Retrospective Analysis of the Correlation in Clinical versus Postmortem Examination Diagnoses, Death Certification Errors, and the Efficacy of Electronic Death Certification. <i>Amanda Spencer, DO, Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania, United States of America</i>
2:25 PM – 2:40 PM	7.6 Effect of Minnesota's New Religious Objection Law on Medicolegal Autopsy Practice at the Hennepin County Medical Examiner's Office <i>Owen L. Middleton, MD, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America</i>
2:40 PM – 2:55 PM	7.7 The Physiologic Effects of a Conducted Electrical Weapon as a Function of Spread <i>Donald M Dawes, MD, Lompoc Valley Medical Center, Santa Barbara, California, United States of America</i>
2:55 PM – 3:00 PM	Questions
3:00 PM – 3:40 PM	VISIT EXHIBITS [NOT CME] <i>Exhibit Hall, Main Level</i>
3:00 PM – 3:40 PM	BREAK [NOT CME] <i>Exhibit Hall, Main Level</i> <i>Sponsored by our Platinum Level Corporate Partner, Lodox NA LLC</i>
3:00 PM – 3:40 PM	VISIT POSTERS <i>Lakeshore Ballroom, Main Level</i>

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- 3:40 PM – 5:55 PM**      **SESSION 8: TECHNIQUES**  
**Moderators: Louis Finelli, Armed Forces Medical Examiner, Dover AFB, Delaware, United States of America and Sarah Meyers, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America**  
*Nicollet A-C, Main Level*
- 3:40 PM – 4:25 PM      8.1 Best Practices for Forensic Photography in a Medical Examiner's Setting  
*Rand Stephen Swartz, B.A., District IV Medical Examiner, Jacksonville, Florida, United States of America*
- 4:25 PM – 5:10 PM      8.2 The Use and Promise of 3D Printing in Accidental, Penetrating and Blunt Force Trauma: A Disruptive Technology for Education, Criminal Justice Representation and Injury Reconstruction.  
*Jonathan M. Morris, MD, Mayo Clinic, Rochester, Minnesota, United States of America*
- 5:10 PM – 5:25 PM      8.3 Caveat Prosector: Avoiding Problems and Potholes on the Road to Dissection Perfection  
*Stephen D Cohle, MD, Kent County, Michigan Medical Examiner, Grand Rapids, Michigan, United States of America*
- 5:25 PM – 5:35 PM      8.4 The Utility of the Head-Only Autopsy: a 3-year Retrospective Review  
*Rebecca M. Wilcoxon, MD, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America*
- 5:35 PM – 5:50 PM      8.5 Genetic Counselors' Approach of the Postmortem Genetic Testing Process After Sudden Cardiac Death  
*Gina Liu, MS, Northwestern University, Fremont, California, United States of America*
- 5:50 PM – 5:55 PM      Questions

**TUESDAY, SEPTEMBER 13, 2016**

**GENERAL INFORMATION:**

- 6:30 AM – 8:00 AM      Buffet Breakfast (Registrants and Ticket Holders Only) [NOT CME]  
*Greenway Ballroom, Second Level*
- 7:00 AM – 5:00 PM      Registration [NOT CME]  
*Nicollet Promenade, Main Level*

**PROGRAM INFORMATION:**

- 8:00 AM – 10:00 AM**      **SESSION 9: TRAINING AND COLLABORATIONS**  
**Moderators: Laura Knight, Washoe County Medical Examiner, Reno, Nevada, United States of America and Britni Bryant, University of Vermont Medical Center, Burlington, Vermont, United States of America**  
*Nicollet A-C, Main Level*
- 8:00 AM – 8:30 AM      9.1 Assessing the Need for a Forensic Pathology Fellowship Match Program: Presentation and Panel Discussion  
*Reade A Quinton, MD, Southwestern Institute of Forensic Sciences, Dallas, Texas, United States of America*
- 8:30 AM – 9:00 AM      9.2 Cognitive Bias in Forensic Pathology: What It Is, What It Is Not, and Why You Need to Care  
*Andrew M Baker, MD, Hennepin County Medical Examiner, Minneapolis, Minnesota, United States of America*
- 9:00 AM – 9:15 AM      9.3 Collaboration with Outside Agencies for Proper Case Resolution: The Good, The Bad and The Ugly  
*Leah L. E. Bush, MS, MD, Virginia Commonwealth University, Richmond, Virginia, United States of America*

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9:15 AM – 9:50 AM	9.4 Medical Examiners, Occupational Health, and Collaborative Practice <i>Robert J Harrison, MD, MPH, University of California, San Francisco, San Francisco, California, United States of America</i>
9:50 AM – 10:00 AM	Questions
10:00 AM – 10:10 AM	BREAK [NOT CME] <i>Sponsored by our Platinum Level Corporate Partner, Lodox NA LLC</i>
<b>10:10 AM – 12:00 PM</b>	<b>SESSION 10: PEDIATRICS AND OTHER</b> <b>Moderators: Michael Madsen, Midwest Medical Examiner's Office, Ramsey, Minnesota, United States of America and Peter Mazari, Office of the Chief Medical Examiner, Baltimore, Maryland, United States of America</b> <i>Nicollet A-C, Main Level</i>
10:10 AM – 10:25 AM	10.1 Investigating Sudden Unexplained Death In Childhood at the SUDC Registry and Research Collaborative: A Novel and Comprehensive Approach <i>Laura A Crandall, MA, NYU Langone Medical Center, New York, New York, United States of America</i>
10:25 AM – 10:40 AM	10.2 Should Routine Metabolic Testing Continue to Be Standard Protocol in All Sudden Unexpected Infant Death Postmortem Examinations? <i>Allison Edgecombe, Hamilton Health Sciences, Hamilton, Canada</i>
10:40 AM – 10:55 AM	10.3 A Disease That Should Not Be of Our Time: A Diagnosis Only Fit for Where the Sun Rarely Shines <i>Alfredo Eugene Walker, MB.BS, FRCPath, DMJ (Path), Eastern Ontario Regional Forensic Pathology Unit, Ottawa, Canada</i>
10:55 AM – 11:10 AM	10.4 Fatal Gunshot Wounds in Young Children <i>Joseph A. Prahlow, MD, Western Michigan University Homer Stryker MD School of Medicine, Kalamazoo, Michigan</i>
11:10 AM – 11:25 AM	10.5 Shallow Water Blackout: The Deadly Combination of Hyperventilation and Prolonged Breath Holding <i>Paul S. Uribe, MD, Martin Army Community Hospital, Fort Benning GA, Fort Benning, Georgia, United States of America</i>
11:25 AM – 11:40 AM	10.6 Excited Delirium Deaths Not Involving Police Custody <i>Darinka Mileusnic, MD, PhD, Regional Forensic Center, Knoxville, Tennessee, United States of America</i>
11:40 AM – 11:55 AM	10.7 Aviation Mishaps: Role of the Medicolegal Death Investigation <i>Edward L Mazuchowski, MD, PhD, Armed Forces Medical Examiner System, Dover AFB, Delaware, United States of America</i>
11:55 AM – 12:00 PM	Questions
<b>12:00 PM – 2:00 PM</b>	<b>NAME Luncheon &amp; Award (Registrants and Ticket Holders Only)</b> <i>Greenway Ballroom, Second Level</i>
12:30 PM – 1:00 PM	NAME and CDC: Needs and Opportunities in Death Certification <i>Anne Schuchat, MD, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America</i>
<b>2:00 PM – 4:00 PM</b>	<b>SESSION 11: IDENTIFICATION AND PUBLIC HEALTH</b> <b>Moderators: Andrew Baker, Hennepin County Medical Examiner's Office, Minneapolis, Minnesota, United States of America</b> <i>Nicollet A-C, Main Level</i>

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- 2:00 PM – 2:30 PM 11.1 FBI Next-Generation Identification (NGI)  
*Gregory E. Scarbro, Federal Bureau of Investigation, Clarksburg, West Virginia, United States of America*
- 2:30 PM – 2:40 PM 11.2 Nuclear DNA Profiles from Decomposed Bone Samples  
*Kristine M. Cavicchi, MPA, MS, Office of the Chief Medical Examiner, Boston, Massachusetts, United States of America*
- 2:40 PM – 2:50 PM 11.3 Performance, Validation, and Field Exercise Results Supporting Use of Rapid DNA in Mass Fatality Response Human Identification Operations  
*Christopher Allen Miles, BS, Department of Homeland Security Science & Technology Directorate, Washington, District of Columbia, United States of America*
- 2:50 PM – 3:00 PM 11.4 Delayed Identification 20 Years after Death: What a Long, Strange Trip It's Been  
*Donna H. Price, , Virginia Office of the Chief Medical Examiner, Norfolk, Virginia, United States of America*
- 3:00 PM – 3:10 PM 11.5 Missing in Harris County Day: A Successful Initiative to Identify Unknown Decedents  
*Sharon M Derrick, PhD, Harris County Institute of Forensic Sciences, Houston, Texas, United States of America*
- 3:10 PM – 3:55 PM 11.6 Partnering with Public Health: How Forensic Pathology Provide Evidence and Advocacy to Save Lives  
*Joshua Sharfstein, MD, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, United States of America*
- 3:55 PM – 4:00 PM Questions
- 4:00 PM Program Adjourns

**POSTER PRESENTATIONS:**

*Please note posters must be on the assigned board by Saturday, September 10, at 12:00PM and remain posted until Monday, September 12 at 3:40PM. It is required that presenters stand by their posters during the presentation time for discussion of their posters with meeting attendees, which will occur on Sunday, September 11, 5:00PM - 6:30PM. Lakeshore Ballroom, Main Level*

**P1 Fatal Catecholamine-Induced Cardiotoxicity Associated with Pheochromocytoma: Report of a Postpartum Case and Review of the Literature**

*\*Amber R. Wang, MD, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, United States of America*

**P2 Molecular Diagnoses of Cardiovascular Diseases Using a Multigene Panel On Sudden Cardiac Deaths**

*Sohyung Park, MD, National Forensic Service, Seoul, Korea, Republic of Korea*

**P3 Association of Waist-Hip Ratio to Sudden Cardiac Death and Severe Coronary Atherosclerosis in Medicolegal Autopsies**

*Linda Kocovski, MBBS, McMaster University, Hamilton, Canada*

**P4 Left-Dominant Arrhythmogenic Cardiomyopathy**

*\*Lorraine Lopez-Morell, MD, Brody School of Medicine at East Carolina University, Greenville, North Carolina, United States of America*

**P5 Analysis of Sudden Cardiac Deaths of Young Adults in Forensic Autopsy Cases**

*Tongxi Ren, MS, Institute of forensic science of Tianjin Public Security Bureau, Tianjin, China*

**P6 A Tale of Two Brothers: Two Cases of Adrenomyeloneuropathy**

*Cynthia S. Beisser, MD, Lucas County Coroner's Office, Toledo, Ohio, United States of America*

**P7 Pulmonary Tumor Microemboli Mimicking Acute Pulmonary Embolism as a Cause of Sudden Death**

*Megan E. Quinn, MD, University of Colorado School of Medicine, Aurora, Colorado, United States of America*



**P8 Acute Pancreatitis from Obstructive Cholelithiasis Presenting as Sudden, Unexpected Death: A Case Report and Review of the Literature**

*\*Lauren A. Havrilla, DO, Duke University Hospital, Durham, North Carolina, United States of America*

**P9 Undiagnosed Pheochromocytoma Simulating Malignant Hyperthermia.**

*\*Nisha S Ramani, MD, SUNY Upstate Medical University, Syracuse, New York, United States of America*

**P10 Simultaneous Sudden Death of Two Siblings During Sleep While in Police Custody: A Report of Two Cases**

*Guoqiang Qian, MD, Office of Chief Medical Examiner, Baltimore, Maryland, United States of America*

**P11 Unusual Brain “Abscesses” in an IV Drug Abuser**

*Sarah Maines, MD, University of Kentucky, Lexington, Kentucky, United States of America*

**P12 Zebras Make Hoofbeats, Too: A Fatal Case of Occult Budd-Chiari Syndrome**

*\*Stacey Reed, DO, Allegheny General Hospital, Pittsburgh, Pennsylvania, United States of America*

**P13 WITHDRAWN**

**P14 Causes of Sudden Death in Schizophrenia Patients: A Forensic Autopsy Population Study**

*Daming Sun, PhD, EastChina University of Political Science and Law, Shanghai, China*

**P15 Sudden Death Due to Pulmonary Thromboembolism While in Police Custody: A Report of Three Autopsy Cases**

*Ningguo Liu, Institute of Forensic Science, Ministry of Justice, P. R. China, Shanghai, China*

**P16 Genomic Analysis of Oxygen-glucose Deprivation in Primary Culture Cortical Neurons**

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

**P17 Intracerebral Glioneuronal Heterotopia: A Case Report of Sudden Death in a Young Adult Epileptic Patient**

*\*Carolina Dominguez, MD, University of South Florida, Brandon, Florida, United States of America*

**P18 A Case of Previously Unsuspected Huntington's Disease Diagnosed at Autopsy**

*\*Catherine R Miller, MD, The University of Texas Medical Branch, Galveston, Texas, United States of America*

**P19 Shaken but not Forgotten**

*Avneesh Gupta, MD, University of Michigan, Ann Arbor, Michigan, United States of America*

**P20 Primary Cardiac Tumors in Infancy: A Case Report**

*\*Carolina Dominguez, MD, University of South Florida/ Instituto Nacional de Medicina Legal y Ciencias Forenses, Brandon, Florida, United States of America*

**P21 Pericardial Tamponade in a 2-Month Old Infant**

*Carl C. Stacy, MD, University of Missouri, School of Medicine, Columbia, Missouri, United States of America*

**P22 A Complex Case of Loey's-Dietz Syndrome: An Autopsy Report and Review of the Literature**

*\*Tiffany Nicole Gaza, MD, PhD, SUNY Upstate Medical University, Syracuse, New York, United States of America*

**P23 Fatal Rotavirus Infection in a Four-Year Old with Unsuspected Autoimmune Adrenal Insufficiency**

*\*Alison Krywanczyk, MD, University of Vermont Medical Center, Burlington, Vermont, United States of America*

**P24 Secondary Pseudohypoaldosteronism Presenting as Sleep-Related Sudden Unexpected Infant Death**

*\*Megan E. Quinn, MD, University of Colorado School of Medicine, Aurora, Colorado, United States of America*

**P25 Rat Bite Fever with *Streptobacillus moniliformis* Meningitis and Myocarditis Resulting in the Death of a 7-Month Old Infant**

*\*Heidi Lynn Reinhard, MD, Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania, United States of America*

**P26 Cerebral Toxoplasmosis: A Case Report with Correlation of Radiographic Imaging, Surgical Pathology, and Autopsy Findings**

*William Thomas Harrison, MD, Duke University Medical Center, Durham, North Carolina, United States of America*

**P27 Rapidly Fatal *Bacillus cereus* Sepsis in a Neutropenic Pediatric Oncology Patient**

*Derek S. Bumgarner, MD, Loyola University Medical Center, Maywood, Illinois, United States of America*

**P28 “When Opportunity Knocks”: A Case Report of Numerous Opportunistic Pathogens as a Source of Sepsis in a Patient with Extensive Metastatic Cancer**

*\*Farshaad Bilimoria, MD, Allegheny Health Network, Pittsburgh, Pennsylvania, United States of America*

**P29 A Preliminary Study on Postmortem Interval Estimation by HILIC-MS Based Metabolomics Approach of postmortem myocardium**

*Tieshua Du, School of Basic Medical Sciences, Fudan University, Shanghai, China*

**P30 Correlation between Postmortem Interval and Degradation of 18S rRNA and Beta-Actin RNA in Liver after Death Under the Condition of Variant Temperature**

*Dong Zhao, MD, PhD, China University of Political Science and Law, Beijing, China*

**P31 Interpolation Analysis: A New Method in Estimating the Time of Death at Ambient Temperature**

*\*\*\*\*Jiang Zhuqing, MS, Key Laboratory of Evidence Science, China University of Political Science and Law, Beijing, China*

**P32 Postmortem Bacteriology and Postmortem Interval: Useful or Not?**

*Rebecca J Asch-Kendrick, MD, Johns Hopkins Hospital, Baltimore, Maryland, United States of America*

**P33 Rabbit Plasma-Based Postmortem Interval Determination with Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy in Combination with Chemometrics**

*Ji Zhang, MD, Xi'an Jiaotong University, Xi'an, China*

**P34 Gunshot Wound to the Head: Is It Suicide?**

*\*Adam Covach, MD, University of Wisconsin Hospital and Clinics, Madison, Wisconsin, United States of America*

**P35 Keyhole Lesions of the Skull: A Series of Three Cases and a Review of the Literature**

*Bryan J Platt, MD, Office of the Chief Medical Examiner, Commonwealth of Virginia, Norfolk, Virginia, United States of America*

**P36 Embolization of Fragmenting “Trocar” Ammunition**

*\*\*\*\*Christopher R Cunningham, BS, University of Missouri School of Medicine, Columbia, Missouri, United States of America*

**P38 Digital Forensic Evidence Cracking Ingenious Murder Cover Up**

*\*Mohit Chauhan, MD, Maulana Azad Medical College & Associated Hospital, New Delhi, India*

**P39 The Role of Computerized Tomography with 3D Reconstruction and Volume Rendering: A Prospective Study of all Lightning and Electrocution Deaths Presenting to the Medico-Legal Laboratory of Pretoria (2013 – 2016)**

*Ryan Blumenthal, PhD, University of Pretoria, Pretoria, South Africa*

**P40 Rupture of the Left Ventricle Due to Blunt Trauma Without Concomitant Injury: A Case Report**

*Hongmei Dong, MD, PhD, Tongji Medical College of Huazhong, University of Science and Technology, Wuhan, China*

**P41 Forensic Analysis of Sudden Death Due to Vagal Inhibition: A Case Report with Literature Review**

*Zhiyong Yang, MD, Institute of Forensic Science PSB Tianjin, China*

**P42 "Don't Try To Stop Me:" An Unusual Suicide By Circular Saw**

*\*Farshaad Bilimoria, MD, Allegheny General Hospital, Pittsburgh, Pennsylvania, United States of America*

**P43 Traumatic Dissection of the Portal Vein: An Unusual Cause of Delayed Death Due To Blunt Force Abdominal Injury**

*\*Anastasia Drobysheva, University of Texas Southwestern Medical Center, Dallas, Texas, United States of America*

**P44 Fatal Dragging Deaths with Soft Tissue and Bone Friction/Grinding/Dragging Injuries**

*\*\*\*\*Samuel P. Prahlow, BS, Valparaiso University, Tallahassee, Florida, United States of America*

**P45 WITHDRAWN**

**P46 Watt Happened? A Case Report of Electrocutation and Review of the Literature**

*\*\*\*\*Lauren R. Crowson, MS, Campbell University School of Osteopathic Medicine, Knightdale, North Carolina, United States of America*

**P47 An Unusual Suicide with a Firework Explosive in the Oral Cavity: a Case Report.**

*Marcos E B Melo, MD, Policia Civil do Distrito Federal - Departamento de Policia Tecnica, Brasilia, Brazil*

**P48 A Suicidal Hanging with Injuries of the Cervical Spine: A Case Report**

*\*Devin L Shrock, MD, University of Iowa Hospitals and Clinics, Iowa City, Iowa, United States of America*

**P49 Homicide-Suicide in Cuyahoga County, Ohio 1991-2012**

*Thomas Gilson, MD, Cuyahoga County Medical Examiner's Office, Cleveland, Ohio, United States of America*

**P50 Death Resulting from Pneumocephalus Complicating Endoscopic Food Bolus Retrieval in a Patient with Eosinophilic Esophagitis**

*\*\*\*\*Amy K. Fuhs, BS, BA, Indiana University School of Medicine, South Bend, Indiana, United States of America*

**P51 Butyrylfentanyl and Acetylfentanyl Levels in Driving Under the Influence and Overdose Cases**

*Katherine F. Maloney, MD, Erie County Medical Examiner's Office, Buffalo, New York, United States of America*

**P52 Unusual Suicide Case by Self-Injection of Adrenaline in a 35-Year-Old Female**

*Marie Barbesier, MD, Hôpital Edouard-Herriot, Hospices Civils de Lyon, Lyon, France*

**P53 A Case of Suicide Using Diphenhydramine**

*\*Andrea Ho, MD, Truman Medical Center, Kansas City, Missouri, United States of America*

**P54 Traditional Postmortem Toxicology Investigation Can Miss Drug Facilitated Sexual Assault Evidence**

*Laura Marie Labay, PhD, NMS Labs, Willow Grove, Pennsylvania, United States of America*

**P55 Volatile Abuse in Allegheny County – A 10-Year Retrospective Study of Autopsy and DUI Samples**

*W. Ashton Ennis, MD, Allegheny County Medical Examiner's Office, Pittsburgh, Pennsylvania, United States of America*

**P56 Human Biospecimen Collection Programs to Accelerate Biomedical Research**

*Honesto I. Nunez, National Disease Research Interchange, Philadelphia, Pennsylvania, United States of America*

**P57 Sudden Death Associated with Non-Toxic Megacolon**

*\*\*\*\*Shaily Patel, BS, IU School of Medicine, Terre Haute, Indiana, United States of America*

**NOTES**

## **Exhibit Schedule**

### **Exhibit Installation**

Friday, September 9 10:00AM - 4:00PM

### **Exhibitor Registration Open**

Friday, September 9 10:00AM – 4:00PM  
Saturday, September 10 7:00AM – 5:00PM  
Sunday, September 11 7:00AM – 12:30PM  
Monday, September 12 7:00AM – 5:00PM

### **Exhibit Dates and Overall Hours**

Friday, September 9 4:30PM - 6:30PM  
*(Exhibits Open during Opening Reception)*  
Saturday, September 10 8:00AM - 4:00PM  
Sunday, September 11 8:00AM - 12:30PM  
Monday, September 12 8:00AM - 4:00PM

*Please note: You are only required to be at your booth during designated break times as noted in the Meeting Program and below; however the hall will be open during the above hours.*

### **Published Visiting Hours**

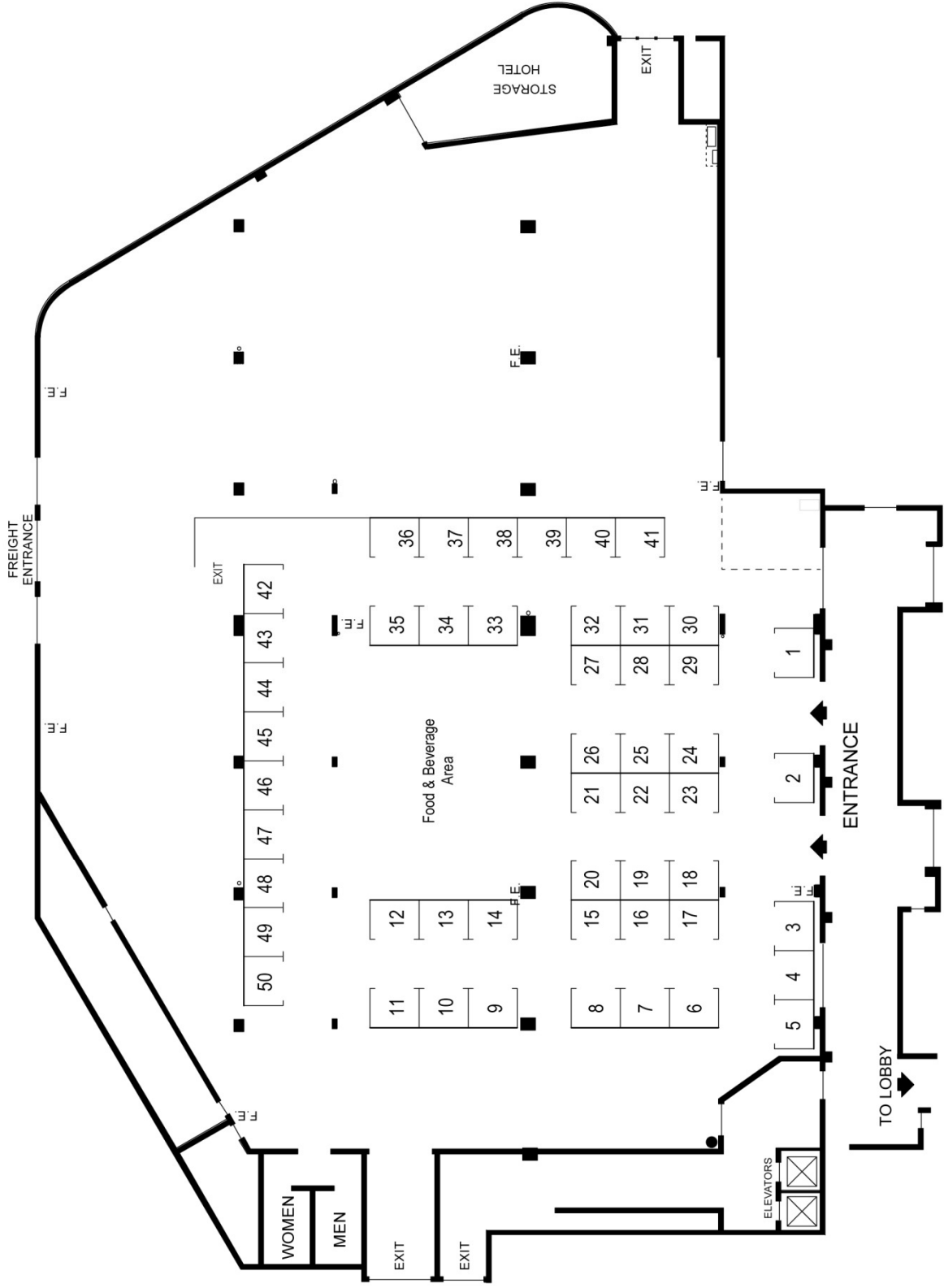
Friday, September 9 4:30PM – 6:30PM  
  
Saturday, September 10 10:20AM – 11:00AM  
12:45PM – 2:40PM  
4:05PM – 4:15PM  
  
Sunday, September 11 10:05AM – 10:45AM  
12:30PM – 2:00PM  
  
Monday, September 12 9:50AM – 10:30AM  
12:00PM – 1:20PM  
3:00PM – 3:40PM

### **Exhibit Dismantling**

Monday, September 12 3:40PM – 9:00PM

*\*No packing or dismantling of exhibits will be permitted until 3:40PM, Monday, September 12. 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.*

# Exhibit Hall



## EXHIBITOR DESCRIPTIONS

### **AEGIS SCIENCES CORPORATION (BOOTH# 16)**

Aegis CRIMES™, a specialty division of Aegis Sciences Corporation, provides toxicology and consulting services to medical examiners and police departments throughout the United States. Aegis CRIMES™ is accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board- *International* in compliance with ISO 17025 (ASCLD-LAB #377).

For more information visit: [www.aegislabs.com](http://www.aegislabs.com)

### **ALL MAKES DICTATION (BOOTH # 28)**

COMING SOON TO YOUR EXAM ROOMS!! THE BRAND NEW “EXAMINATOR”, The world’s greatest, easiest to use, Forensic and Pathology DICTATION DEVICE ever created! It will be the 1<sup>st</sup> wireless, anti-microbial surface, hands free, self-contained dictating system/speech processing device ever made! One piece unit sticks or fastens to your lab coat! Breakthrough, inductive charging design! Designed in the U.S. For more information visit: [www.allmakesdictation.com](http://www.allmakesdictation.com)

### **AMERICAN ASSOCIATION OF TISSUE BANKS (BOOTH # 14)**

The AATB is a professional, non-profit, scientific and educational organization. It is the only national tissue banking organization in the United States, and its membership totals 120+ accredited tissue banks and 1,800+ individual members. These banks recover tissue from 30,000+ donors and distribute in excess of two million allografts for more than one million tissue transplants performed annually in the U.S.

For more information visit: [www.aatb.org](http://www.aatb.org)

### **ANAB/ASCLD-LAB (BOOTH # 19)**

ANAB/ASCLD-LAB provides accreditation based on international standards for public and private sector crime laboratories. ANAB/ASCLD-LAB are grounded in conducting scientific and technical assessments and committed to assuring competent and credible test and inspection results. ANAB and the National Association of Medical Examiners (NAME) have formed a strategic alliance whereby ANAB will administer the NAME accreditation program on behalf of NAME.

For more information visit: [www.anab.org](http://www.anab.org)

### **ASSOCIATION OF ORGAN PROCUREMENT ORGANIZATIONS (AOPO)(BOOTH # 18)**

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 thousands in need of these gifts.

For more information visit: [www.aopo.org](http://www.aopo.org)

### **AUTISM BRAIN NET (BOOTH # 23)**

Autism BrainNet is a collaboration of 4 research institutions and the NIH NeuroBioBank created to increase the number of brains available for research. The mission is to create a partnership between the scientific, medical examiner, autism and organ donor communities to develop a sensitive, transparent, and effective strategy for acquiring and distributing the highest quality brain tissue for research worldwide.

For more information visit: [www.takesbrains.org](http://www.takesbrains.org)

### **AXIS FORENSIC TOXICOLOGY (FORMERLY AIT LABORATORIES) (BOOTH # 29)**

AIT Laboratories has been providing forensic toxicology testing and litigation services since 1990. AIT serves pathologists, medical examiners, coroners, hospitals, law enforcement, sexual assault centers, crime labs, courts of law and attorneys. We offer several drug panels including Synthetic Cannabinoids/K2 Spice, and non-routine analysis among others. AIT is ISO registered, and ABFT, CAP, and CLIA accredited. [www.aitlabs.com/800-875-3894](http://www.aitlabs.com/800-875-3894)

For more information visit: [www.aitlabs.com](http://www.aitlabs.com)

### **BODY SCOOP BY B. MOBIL (BOOTH # 42)**

The Body Scoop with a 1000 # lift motor on a room covering system, allows a person of any size and strength to make transfers without assistance. The Body Scoop slips under the body with minimal effort.

For more information visit: [www.bodyscoop.net](http://www.bodyscoop.net)

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**CRC PRESS/TAYLOR & FRANCIS GROUP (BOOTH # 33)**

CRC PRESS, PART OF THE Taylor and Francis Group, is the premier publisher of textbooks, reference books, and e-books on Criminal Justice. Stop by our booth to view our latest titles on Criminal Justice and take advantage of our conference discount. Also be sure to ask about our special pricing for companies looking to purchase books for their employees. If you are interested in writing a book please stop by the booth to speak with our editors about your idea. For more information visit: [www.crcpress.com](http://www.crcpress.com)

**CSI/JEWETT (BOOTH # 25)**

For more than 150 years, CSI/Jewett has developed equipment an extensive line of Morgue, Autopsy and Laboratory Equipment. CSI/Jewett provides an integrated system of equipment to enhance work flow, improve space utilization and maximize the efficiency and ease of cadaver handling. From fast and efficient high-volume processing, to customized traditional installations, CSI/Jewett has the best equipment and technical support to meet your needs. For more information visit: [www.csi-jewett.com](http://www.csi-jewett.com)

**FORENSIC ADVANTAGE SYSTEMS (BOOTH # 13)**

Forensic Advantage® Systems provides innovative, easy-to-use solutions that optimize how medical examiners and coroner offices manage their daily work. Products include Forensic Advantage ® for case management and Incident Response 360 for field investigations and mass casualties. On premise and cloud based options provide flexibility and efficiency of customer implementations. For more information visit: [www.forensicadvntage.com](http://www.forensicadvntage.com)

**INVITAE (BOOTH # 17)**

Invitae, a genetic information company, is aggregating the world's genetic tests into a single service with better quality, faster turnaround time, and lower price than most single-gene tests today. Our mission is to bring genetic information into mainstream medical practice to improve the quality of healthcare for billions of people. For more information visit: [www.invitae.com](http://www.invitae.com)

**KUBTEC DIGITAL X-RAY (BOOTH # 11)**

Kubtec (Kuhb\*tech) manufactures advanced high-resolution 2D and 3D digital X-ray systems for medical examiners, including self-contained cabinet systems, portable units, and flat panel detectors. In the lab or the field, Kubtec systems are ideal for forensic pathology, and medical examination. Field tested and forensic approved, Kubtec's XTEND DR wireless designed for the field or the lab, goes wherever it is needed. For more information visit: [www.kubtec.com](http://www.kubtec.com)

**LIFENET HEALTH (BOOTH # 27)**

LifeNet health helps save lives, restore health, and give hope to thousands of patients each year. We are the world's most trusted provider of transplant solutions, from organ procurement to new innovations in bio-implant technologies and cellular therapies – a leader in the field of regenerative medicine, while always honoring the donors and healthcare professionals that allow the healing process. For more information visit: [www.lifenethealth.org](http://www.lifenethealth.org)

**LIFESIGN (BOOTH # 15)**

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](http://www.lifesignmed.com)

**LODOX SYSTEMS (BOOTH # 44/45)**

Full-body, high-speed digital radiology with low radiation emission and scatter. Lodox provides a time-saving, low-dose investigation of the entire body in less than 5 minutes. Institutions across the U.S. and around the World benefit in multiple applications such as major Trauma centers, ER's, Mass Casualty, Pediatric imaging, Bariatric imaging, Bone Scans, and Forensic Medical Investigations. For more information visit: [www.lodox.com](http://www.lodox.com)

**MORTUARY RESPONSE SOLUTIONS (BOOTH # 10)**

Mortuary Response Solutions®, an affiliate of Worldwide Disaster Response Group, is the leading manufacturer in mass fatality response equipment and offers on-site training and facility evaluation to ensure efficient response to a mass fatality incident. Product lines include the Mortuary Enhanced Remains Cooling System (MERCSystem®), portable morgue units, identification and processing equipment and complete mass fatality response solutions. For more information visit: [www.mortuaryresponse.com](http://www.mortuaryresponse.com)



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**MWL ARCHITECTS (BOOTH # 20)**

McClaren, Wilson & Lawrie, Inc. is a leader in architecture specializing in the forensic sciences and law enforcement with more projects worldwide, in its field of expertise, than any other firm. MWL has designed facilities as large as 665,000 SF to smaller facilities re-purposed from existing structures.

Planning Your Future- Right From the Start

For more information visit: [www.mwlarchitects.com](http://www.mwlarchitects.com)

**THE NAME FOUNDATION (BOOTH # 6/7)**

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 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: [www.thename.org](http://www.thename.org)

**NATIONAL CENTER FOR FATALITY REVIEW AND PREVENTION OF SUDDEN DEATH IN THE YOUNG CASE REGISTRY (BOOTH # 43)**

The National Center for Fatality Review and Prevention serves as a resource and data center for state and local Child Death Review (CDR). It promotes, supports and enhances child death review methodology and activities at the state, community and national levels. NCFRP serves as the Data Coordinating Center for the Sudden Death in the Young (SDY) Case Registry, a resource designed to increase understanding of the prevalence, causes and risk factors for sudden death in the young.

For more information visit: [www.childdeathreview.org](http://www.childdeathreview.org)

**NATIONAL CENTER FOR HEALTH STATISTICS (BOOTH # 49)**

CDC works 24/7 to protect America from health, safety and security threats. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same. Medical examiners play a critical role in identifying emerging threats as well as documenting causes of death.

For more information visit: <https://www.cdc.gov/nchs/>

**NATIONAL DISEASE RESEARCH INTERCHANGE (BOOTH # 26)**

The National Disease Research Interchange (NDRI) is a 501(c)(3) not-for-profit, NIH-funded organization that provides project-driven human biospecimen service to academic and corporate scientists. NDRI has 35 years of experience globally distributing human biospecimens for research. Our extensive recovery network has the expertise to provide anatomical structures, organs, and tissues with annotated data.

For more information visit: [www.ndriresource.org](http://www.ndriresource.org)

**NATIONAL INSTITUTE OF JUSTICE (BOOTH # 22)**

NIJ-the research, development and evaluation agency of the U.S. Department of Justice- is dedicated to improving knowledge and understanding of crime and justice issues through science. NIJ provides objective and independent knowledge and tools to reduce crime and promote justice, particularly at the state and local levels.

For more information visit: [www.nij.gov](http://www.nij.gov)

**NET BIO (BOOTH # 1)**

NetBio manufactures Rapid DNA analysis systems which are operated outside of the traditional DNA lab by non-technical users with less than 30 minutes of training. Up to 5 ante-mortem or 5 post-mortem results can be obtained in less than 105 minutes. Sample types include: tissue, bone, teeth, hair, etc.

For more information visit: [www.netbio.com](http://www.netbio.com)

**NMS LABS (BOOTH # 12)**

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 200 highly trained professionals. NMS Labs is passionate about promoting public health and safety. For more information on NMS Labs, please visit [www.nmslabs.com](http://www.nmslabs.com)

For more information visit: [www.nmslabs.com](http://www.nmslabs.com)

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**QUALTRAX, INC. (BOOTH # 35)**

Qualtrax Compliance Software helps ease the burden by providing a complete document and process automation software for compliance to industry, customer and internal standards.

For more information visit: [www.qualtrax.com](http://www.qualtrax.com)

**RTI DONOR SERVICES (BOOTH # 24)**

RTI Donor Services is a not-for-profit, American Association of Tissue Banks (AATB) accredited organization, working with organ and tissue agencies to provide responsible stewardship of the gift of donation.

For more information visit: [www.rtidonorservices.org](http://www.rtidonorservices.org)

**SADS FOUNDATION (BOOTH # 50)**

The SADS Foundation is dedicated to informing the general public, families, and medical professionals about the effects of undiagnosed/untreated cardiac arrhythmias and the methods by which death can be prevented.

For more information visit: [www.sads.org](http://www.sads.org)

**SALAM INTERNATIONAL, INC (BOOTH # 2)**

Salam International, Inc. has been in business since 1992. We supply Precision Medical Instruments, Equipment & Supplies to Medical Examiners, Medical Schools, Mortuary & Funeral Home in the field of Morgue and Postmortem. This includes Disaster Pouches and plastic sheets. Our customers are Funeral Homes, Cities, Counties, State, Federal Governments, Medical Examiners, and Medical Universities.

For more information visit: [www.salamint.com](http://www.salamint.com)

**SAMSUNG NEUROLOGICA (BOOTH # 48)**

Neurologica, a Subsidiary of Samsung Electronics Co. Ltd brings the power of innovative imaging to your patients. With an expertise in CT design and development, Neurologica transforms fixed CT technologies into portable platforms. Neurologica's imaging solutions are used in ICUs, operating rooms, emergency departments and stroke centers. For more, please visit [www.SamsungNeurologica.com](http://www.SamsungNeurologica.com)

For more information visit: [www.samsungneurologica.com](http://www.samsungneurologica.com)

**STEEL FUSION CLINICAL TOXICOLOGY LABORATORY, LLC (BOOTH # 34)**

SteelFusion Clinical Toxicology Laboratory, LLC began in 2014 with highly trained professionals with over 75 years combined experience in the clinical toxicology laboratory setting. SteelFusion has developed an innovative process to collect oral fluid in the post-mortem setting. Utilizing oral fluid enables SteelFusion to provide quantitative drug toxicology in 24 to 48 hours after receipt to our laboratory.

For more information visit: [www.steelfusionlabs.com](http://www.steelfusionlabs.com)

**THE SUDC FOUNDATION (BOOTH # 46)**

The SUDC Foundation's mission is to eliminate the tragedy of sudden and unexplained death in childhood. A centralized resource for sudden death in children, it is dedicated to supporting grieving families by developing support and advocacy programs specific to their needs. It works with family, professionals, and the general public to share accurate information, advance medical research, including the SUDCRRRC, and advocate for issues relative to SUDC.

For more information visit: [www.sudc.org](http://www.sudc.org)

**TISSUE TECHNIQUES PATHOLOGY LABS (BOOTH # 47)**

Tissue Techniques a small but efficient lab offering Histology Services at cost effective pricing. Services are H&E, Special Stains, Immuno's and our newest are nail fungus staining.

For more information visit: [www.tissuetechpathology.com](http://www.tissuetechpathology.com)

**VERTIQ SOFTWARE, LLC (BOOTH # 21)**

CME Case Management Software

CME is a 100% web-based case management solution with dynamic workflow configuration. Accessible from any mobile device with HTML5 Internet browser connectivity it is offered as both an in-house and hosted solution. CME-V3 records, tracks, reports demographic, pathological and statistical data of deceased persons and others associated with a case.

For more information visit: [www.vertiq.com](http://www.vertiq.com)

## OPTIONAL MEETINGS/ACTIVITIES

### **OPTIONAL WORKSHOP: ISO/IEC 17020 and Audit Preparation for Forensic Agencies [CME]**

Date: Wednesday, September 7 and Thursday, September 8, 2016

Time: 8:00 AM – 5:00 PM for two days.

The two-day inspector training will cover principles of auditing for ISO/IEC 17020 assessments narrowing the focus to forensic specific requirements. Attendees will learn effective auditing techniques and increase their understanding of audit principles. The purpose is to effectively audit to ISO/IEC 17020 and cover concepts such as traceability, method validation, and uncertainty of measurements. The course will include a thorough discussion of the quality manual and the quality manager. Attendees will learn how to evaluate the significance of audit findings as well as methods for improving communication skills during the audit. Additional concepts covered will include reporting findings and the corrective action process. This course is for current and prospective NAME inspectors seeking to assess under the joint NAME accreditation program and the ANAB ISO/IEC 17020 program. Those taking the course will fulfill one of the requirements for becoming an ANAB ISO/IEC 17020 lead assessor." Preregistration is required; however, there is NO charge for this Training Session.

### **OPTIONAL WORKSHOP: ISO Standards [CME]**

Date: Friday, September 9, 2016

Time: 1:00 PM – 5:00 PM

The half day workshop will focus on International Organization for Standardization (ISO), ISO standards, the hierarchy in the world of ISO accreditation, and the hierarchy in standards. This will include origin of the standard, the benefits of accreditation, and the role of an accreditation body. Course content will include an overview of ILAC and Regional Cooperatives as well as a general understanding the ISO/IEC 17020 requirements as they relate to forensic agencies Preregistration is required; however, there is NO charge for this Training Session.

### **OPTIONAL SATURDAY THOMAS NOGUCHI 90<sup>TH</sup> BIRTHDAY CELEBRATION [NOT CME]**

Date: Saturday, September 10, 2016

Time: 6:30 PM – 7:30 PM

All meeting attendees are invited to help celebrate Dr. Noguchi's 90th birthday. Tom is funding the celebratory event as a way of saying "thank you" to all of his friends and colleagues in the National Association of Medical Examiners for the many years of support he has experienced within our organization. Please plan to attend the festivities and wish Dr. Noguchi a very happy birthday.

### **OPTIONAL SATURDAY NAME FOUNDATION OUTREACH FUNDRAISER, FEATURING DR. G [NOT CME]**

Date: Saturday, September 10, 2016

Time: 8:00 PM to 10:00 PM

Cost: Donation

This event is intended to be an entertaining, educational and public outreach forum featuring NAME Foundation Advocate Dr. Jan Garavaglia, who starred in the reality TV series Dr. G: Medical Examiner, with an audience welcome and introduction by Minneapolis ME Dr. Andy Baker. Jan will share her personal story about her path to becoming a Forensic Pathologist; the challenges, humor and joys of the profession; her adventures as the star of a reality based TV series; and some stories about interesting cases; followed by a Q&A session. The broad target audience includes the NAME membership and their guests; however, we plan to extend invitations to Dr. G's fans (and admirers) as well as local physicians, pathologists, residents, students and other professionals.

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 require pre-registration. On-line ticketing and registration will be managed by THE CENTER FOR FORENSIC SCIENCES RESEARCH AND EDUCATION at The Fredric Rieders Family Foundation. 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, a 50th Anniversary commemorative challenge coin, and admission to the event. Pre-registration at <https://www.eventbrite.com/e/50th-anniversary-name-foundation-fundraiser-featuring-dr-jan-g-garavaglia-tickets-26157012328> - Space is limited

### **OPTIONAL SUNDAY 19<sup>TH</sup> RIGOR RUN/WALK [NOT CME]**

Date: Sunday, September 11, 2016

Time: 6:30 AM

Cost: \$20.00 per person

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, a route map, and a bottle of water. Runners and walkers can go to the Sunday morning continental 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.

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**OPTIONAL SUNDAY 22<sup>nd</sup> ANNUAL CADAVER  
OPEN GOLF TOURNAMENT [NOT CME]**

Date: Sunday, September 11, 2016  
Time: 1:00 PM  
Cost: \$68.00 per player



The tournament will take place at Braemer Golf Course in Edina, Minnesota. Fees include: Green fees and carts, score cards and cart assignments, staff to manage and score event and a four ball sleeve for each participant.

Club rental is available: Premium set is \$25 and basic set is \$10. Call 952-903-5755

**OPTIONAL ASK THE CHIEFS BREAKFAST  
WORKSHOP**

Date: Monday, September 12, 2016  
Time: 7:30 AM – 8:30 AM  
“Ask the Chiefs Breakfast” open to all NAME members who have a burning question for these respected chiefs: Randy Hanzlick, Mary Ann Sens, and Thomas Andrew. The breakfast is designed to discuss common administrative issues from the perspective of experienced and successful chiefs, based on direct audience questions. Preregistration is required, but there is no separate fee for this breakfast. Those attending will need to retrieve breakfast from the main breakfast buffet area and transport it to the meeting room.

**OPTIONAL FEMME FATALE LUNCHEON [NOT  
CME]**

Date: Monday, September 12, 2016  
Time: 12:00 PM – 1:20 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!

**OPTIONAL YOGA BY DONATION [NOT CME]**

Date and Times: Saturday, September 10, 2016 - 1 PM to 2 PM; Sunday, September 11, 2016 - 12:30 PM to 1:30 PM and Monday, September 12, 2016 – 6:00 AM – 7:00 AM.

Cost: Donation (suggested \$10.00) All proceeds go to the NAME Foundation

Dr. Amy Martin will be offering Yoga by donation in the StayFit Spin Room, located on the 6th floor of the Hyatt Regency Minneapolis. Saturday, September 10 there will be all levels of hatha flow. On Sunday, September 11 there will be a class of gentle yoga and Monday, September 12 there will be a class of all levels hatha flow. Bring your own mat if possible.



## **National Association of Medical Examiners**

### **Abstracts of the 2016 Annual Meeting**

**September 7 – 13, 2016**

**Hyatt Regency Minneapolis,**

**Minneapolis, Minnesota**

## NOTES

National Association of Medical Examiners

Abstracts of the 2016 Annual Meeting

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ORAL PRESENTATIONS

**1.1 The 50-Year History of the National Association of Medical Examiners**

G.A. Schmunk<sup>1</sup>, T.T. Noguchi<sup>2</sup>, R.L. Hanzlick<sup>3</sup>, G.G. Davis<sup>4</sup>, D.R. Fowler<sup>5</sup>, J.M. Jentzen<sup>6</sup>, M. Sens<sup>7</sup>, S.C. Clark<sup>8</sup>, M. Ernst<sup>9</sup>

<sup>1</sup>Polk County Medical Examiner, Des Moines, Iowa; <sup>2</sup>Los Angeles County Medical Examiner-Coroner (Emeritus), Los Angeles, California; <sup>3</sup>Fulton County Medical Examiner, Atlanta, Georgia; <sup>4</sup>Jefferson County Coroner/Medical Examiner Office, Birmingham, Alabama; <sup>5</sup>Maryland Office of the Chief Medical Examiner, Baltimore, Maryland; <sup>6</sup>University of Michigan, Dept of Pathology, Ann Arbor, Michigan; <sup>7</sup>Univ. of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota; <sup>8</sup>Occupational Research & Development, Big Rapids, Michigan; <sup>9</sup>St. Louis County Medical Examiner's Office, St. Louis, Missouri

The National Association of Medical Examiners was the brainchild of Milton Helpern, MD and Richard Childs, President of the Municipal League. Mr. Childs felt that Coroners were "really ineffective" and "all wrong". Helpern recognized that there were "a lot of medical examiners" who were "misguided" and that there were "some Coroners" who ran "good offices". Childs encouraged Dr. Helpern, as the head of the largest ME office in the country (NYC) to organize the profession. An Interim Steering Committee was formed consisting of 25 of the top Medical Examiners in the country and NAME was begun in 1966 as a "professional organization" to improve standards of death investigation in the US. The first meeting was held in 1968 in Chicago. Dr. Helpern was the first President and envisioned meetings of Medical Examiners (and Forensic Pathologists) where members would be able to "consult each other, talk to each other". The first several meetings were held in conjunction with the AAFS and only in 1976 was the first NAME meeting held separately from the Academy (in Orlando, FL).

In this workshop several Past Presidents and other distinguished members of NAME will discuss the history of the organization from its founding to the present day. The individual talks will include:

- Gregory A. Schmunk, MD – "Introduction to the History of NAME"
- Thomas T. Noguchi, MD – "The Formative Years in NAME - 1966 through 1985"
- Randy Hanzlick, MD – "NAME in its 3<sup>rd</sup> and 4<sup>th</sup> Decades: Leadership, Accomplishments, and Trends – 1986 through 2005"
- Gregory G. Davis, MD – "NAME and the 21st Century – 2006 through the present"
- David Fowler, MD and Jeffrey Jentzen, MD – "Inspection and Accreditation: Past, Present, Future and ISO"
- Mary Ann Sens, MD – "Women in NAME and Forensic Pathology" and "Academic Homes, Models and Influence in Forensic Pathology"
- Steven Clark, PhD – "Maintaining Relevance: Our National Contribution"
- Mary Fran Ernst, F-ABMDI – "The Age of the Affiliate and the ABMDI"

**1.2 1970-79 and the Start of Connecticut's Medical Examiner System**

E.M. Gross  
New York, New York

The creation of the National Association of Medical Examiners coincided with a period in which forensic pathology was recognized as a discipline, governmental offices were created, facilities built and academic affiliations established. In 1969 Connecticut passed legislation leading to a state-wide medical examiner system. The trials undergone by a change-over from an 1888 county attorney-coroner system to a forensic pathologist-led medical examiner's office were illustrative of those many NAME members faced over the latter quarter of the 20th century. The challenges met will be described through a review of the enabling legislation, the effects of public and private interactions, and outcomes of exemplary cases which over the ensuing decade led to abolition of the coroners, centralized laboratories and a firm footing for Connecticut's system. In an era of governmental budgetary restraints the author provides a historical perspective on NAME's founding goals and values.

**2.1 Trends in Drug Intoxication Deaths in the United States, 2000 - 2014**

M. Warner, H.B. Hedegaard  
CDC National Center for Health Statistics, Hyattsville, Maryland

Drug intoxication is a leading cause of injury deaths, resulting in over 47,000 deaths in 2014. This presentation will provide an overview of drug intoxication deaths using death certificate data from the National Vital Statistics System, a widely cited source. The strengths and limitations of these data will also be discussed, with the intent of improving national mortality data by providing feedback on these issues to medical examiners.

Over the past 15 years the drug intoxication death rate has more than doubled from 6.2 per 100,000 in 2000 to 14.7 per 100,000 in 2014. Rates have increased significantly for both sexes, most age groups, and all race/ethnicity groups. In a single year (from 2013 to 2014), rates increased by 7%. Between 2013 and 2014, statistically significant increases in drug intoxication death rates were seen for males and females, persons aged 25-34, 35-44 and 55-64, white non-Hispanics, black non-Hispanics, and residents in the Northeast, Midwest and South Census Regions. In 2014, over half of all drug intoxication deaths involved more than one drug.

Opioids are frequently mentioned in intoxication deaths. In 2014, 61% of drug intoxication deaths involved some type of opioid. Since 2000, the rate of intoxication deaths involving opioids increased 200%. Natural and semi-synthetic opioids account for much of the increase; rates increased from 1.0 per 100,000 in 2000 to 3.8 in 2014. From 2010 to 2014, the rate of drug intoxication deaths involving heroin more than tripled from 1.0 to 3.4 per 100,000. From 2013 to 2014, the rate of drug intoxication deaths involving synthetic opioids other than methadone (e.g., fentanyl, tramadol) increased 80% from 1.0 to 1.8 per 100,000.

While death certificate data provide a national picture of drug intoxication mortality, there are some limitations to this data source, including those related to the classification of drugs into broad categories (e.g., synthetic opioids) using the International Classification of Diseases, the standard coding system used to code the underlying and multiple causes of death.

Death certification practice also influences the utility of the data, as some certificates do not identify the specific drugs involved. Also needed is greater consistency in how metabolites are mentioned on the certificate; for example, heroin deaths may be misclassified as due to natural and semi-synthetic opioids if the heroin metabolite morphine is listed on the certificate. Possible ways to improve the completeness and consistency of drug information on death certificates will be discussed.

## 2.2 Common Findings and Predictive Measures of Opioid Overdoses

*D.E. Pelletier, T.A. Andrew*

*The Office of Chief Medical Examiners, Concord, New Hampshire*

**Purpose:** The increase in opioid deaths has become a nationwide problem. This research compares previously published radiological imaging of fatal intoxications to autopsy findings from fatal opioid intoxications in New Hampshire for cerebral edema (CE), pulmonary edema (PE), and urinary bladder distension (BD).

**Methods:** The dramatic increase in opioid related deaths and recent publication on the utility of postmortem computed tomography (PMCT) in such cases initiated research into post-mortem findings highlighted in the imaging studies. Autopsy reports of 150 decedents, between 20 and 40 years old, were reviewed. Subjects were divided into three groups as follows: 50 whose cause of death was opioid intoxication excluding fentanyl, 50 who died from solely fentanyl, and 50 controls, none of whom were intoxicated, none had a prolonged dying period, and none had injuries to their brain, lungs, and bladder. Autopsy reports were reviewed for PE, CD and BD determined by recorded findings and organ weights.

**Results:** Previous studies found a high correlation between urinary bladder volume and intoxication as well as a high specificity for drug-associated cases of death with the triad of PE, CE and BD. Our research found 96% of those who died of fentanyl intoxication had PE as well as 94% of those who died of opioid intoxication excluding fentanyl. CE was present in 54% who died of intoxication excluding fentanyl and 8% in those who died of fentanyl intoxication. 34% of the fatal intoxications excluding fentanyl had BD while this finding was present in only 16% who died of fentanyl intoxication. The control group had PE 14% of the time and CE was found in 6% and BD 6% of the time. All three occurred simultaneously in 8% of intoxications and never in the control group.

**Conclusion:** Review of the data validated a correlation between opioid intoxication and PE. Intoxication showed a relationship with CE and BD that appears to be opioid dependent arising less frequently in fentanyl intoxication alone. Fentanyl causes death more rapidly than other opioids possibly leading to the results found. There appears to be a relationship between opioid intoxication and the presence of these findings. However, given the variations, particularly where fentanyl and its analogues, currently the most common agents isolated in fatal intoxications in our jurisdiction are causative or contributory intoxicants. We do not recommend reliance on postmortem computed tomography in lieu of autopsy to fully evaluate potential fatal drug intoxications.

## 2.3 Emerging Toxicity: The Impact of Fentanyl and Acetyl Fentanyl on Opioid Drug Deaths in Washington DC

*R.A. Mitchell*

*DC Office of the Chief Medical Examiner, Washington, District of Columbia*

The DC Office of the Chief Medical Examiner (OCME) investigated a total of 197 (83 CY 2014, 114 CY 2015) deaths involving Opioids from January 1, 2014 through December 31, 2015. These deaths included both prescription and illicit drugs. When examining the monthly trends, the most fatalities occurred in July 2014 and September 2015. Overall there was a 37% increase in fatal overdoses involving prescription and illicit opioids from 2014 to 2015.

Further analysis revealed a focal steep increase of deaths from September 2015 to December 2015 (timeframe); a trend that showed divergence from the 2014 trend line. A deeper dive into the total fifty (50) cases examined during that time period revealed eleven (11) cases that involved Fentanyl, Acetyl fentanyl, or both: 3 cases involved Fentanyl only; 6 cases involved Fentanyl, Acetyl fentanyl, and Heroin; 2 case involved Acetyl fentanyl and Heroin.

There was an increase in cases involving Fentanyl from 2014 (11) to 2015 (17). 53% (9/17) of the 2015 cases involving Fentanyl occurred in the above timeframe. 88% (8/9) of the 2015 cases involving Acetyl fentanyl occurred during the above timeframe. However, the median age, race and gender (52, Black, Male) for the cases within this timeframe did not differ significantly from the rest of the year.

Both Fentanyl and Acetyl fentanyl have recently been identified as agents, either alone or in combination, capable of causing deaths among the heroin using population. In October 2015 the Centers for Disease Control (CDC) issued a Health Advisory over the Health Alert Network (HAN) entitled "Increases in Fentanyl Drug Confiscations and Fentanyl-related Overdose Fatalities". As early as March 2015 the Drug Enforcement Agency (DEA) issued a nationwide alert identifying fentanyl as a threat to public health and safety.

The DC OCME began included fentanyl into its routine post-mortem testing in February 2014 and was positioned to identify any increase in deaths due to this substance. However, Acetyl fentanyl, a potent synthetic opioid, was most recently added to the testing schedule until January 2015.

The purpose of this presentation is to inform participants as to the experience of the DC OCME during the 2015 outbreak of Acetyl fentanyl and fentanyl associated deaths, review of the associated cases, and to illustrate the importance of testing for these drugs as part of the post-mortem examination for suspected overdose deaths.

## 2.4 A Unique Public Access Database Created from Separate Coroner and Medical Examiner Jurisdictions on the Local Nature of the Toxicology and Demographic Features of the Current Overdose Crisis.

*K.E. Williams*

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

The annual deaths due to drug overdoses in the United States has long since exceeded deaths due to motor vehicle accidents, and is now on a par with the total number of American deaths during the Vietnam War. Focusing on this startling statistic, however, obscures the reality that these deaths occur at a local level and are investigated without uniform standards by the heterogeneous Death Scene Investigation and Law Enforcement systems, as described in the 2009 NAS report. Long term solutions to this Public Health crisis inevitably will need to be aimed at the specific local nature of the problem – opioids in Southwest Pennsylvania, for example, versus methamphetamine in South Carolina.

Proposed solutions to this epidemic vary from complete public release of drug related autopsy and Crime Laboratory information aimed at the broad Public Health based rehabilitation/prevention community, to releasing only selective data to Law Enforcement entities employing methods based on the "War on Drugs" model. There is nothing but anecdotal evidence to support either approach. What is lacking is a database to which an evidence based, epidemiologic methodology might be applied.

The Allegheny County Office of the Medical Examiner (ACOME), in conjunction with the School of Pharmacy of the University of Pittsburgh, maintains a public website that provides complete demographic and



toxicology data since 2007 from several contiguous jurisdictions in Southwestern Pennsylvania, as well as a broad-based source of additional resources (<http://www.overdosefreepa.pitt.edu/>). That data can be mined to demonstrate significantly different patterns of drug abuse within adjacent and nearby jurisdictions. Efforts at dealing with the crisis may then be applied to the specific needs of each community. In Pennsylvania specifically mandated Single County Authorities are charged with this responsibility.

This presentation will demonstrate the unusual nature and capabilities of this public access database for both treatment/rehabilitation and Law Enforcement communities by providing the exact nature of what potentially lethal drugs are available to the drug using community at any one location and time. Specific trends in drug usage over that past decade can be viewed. Ultimately, a database including specific levels of the individual drugs will be available.

## 2.5 A Model of Collaboration During the 2015 Opioid Epidemic: The Cook County Experience

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While the number of homicides investigated by the Cook County Medical Examiner's Office (CCME) garners a great deal of media attention, the rise in opioid related deaths is equally concerning. Of the 5667 cases accepted by the CCME in 2015, 588 cases (10.4%) were attributed, at least in part, to opioids. 424 cases were due to heroin toxicity or heroin in combination with ethanol or other drugs (most often cocaine). 102 cases were related to fentanyl abuse, alone or in combination. 117 of these 526 cases had co-use of fentanyl and heroin, a trend that began in late September 2015. There were also 179 cases of other opioid overdoses (hydrocodone=33, oxycodone=15, methadone=47, opioids in hospital urine screen with no quantification=84), with prescription medication overdoses occurring disproportionately in the suburbs surrounding Chicago. A concurrent spike in clinical overdoses believed to be opioid-related was seen by Chicago emergency medical services, with 2724 overdose cases reported in 2015 (7.4/day) versus 2014 overdose cases occurring in 2014 (5.5/day), representing a 32% increase. Most striking was a sudden spike in opioid overdoses from September through October 2015 compared with the same time period in 2014. There were 665 overdoses in 2015 versus 398 overdoses in 2014, a 67% increase. October 1st to 2nd 2015 showed 66 overdoses alone. Emergency physicians at Cook County Hospital (CCH) also saw an increase in opioid overdose-like presentations, although frequently cases had negative initial urine drug screens. Regular communication between the CCME, Emergency Medical Services (EMS) and CCH staff confirmed that there was a congruent increase in opioid-related overdoses and deaths. It was believed that patients presenting with symptoms of opioid overdose with negative urine drug screens may have unwittingly taken large doses or taken drugs which had been laced with fentanyl and had gone into respiratory depression/arrest. Because fentanyl and synthetic opioids are not part of the standard EMIT toxicology screen in the hospital, clinicians had to act based on the opioid toxidrome and the results of urine drugs screens. Emergency Department and EMS treatment protocols were changed in real-time in response to the data shared by the CCME. Patients presenting with opioid overdoses were treated empirically, often requiring multiple doses of naloxone even with negative urine screens. This collaboration during an epidemic exemplifies the role of the medical examiner as an agent of public health and demonstrates the forensic pathologist's role in live patient care.

## 2.6 Emerging Designer Opioids: Toxicological Implications for Death Investigation

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Opiate drugs are commonly abused in the United States and are common toxicological findings in death investigation cases. The substances involved have included natural products (e.g. morphine, codeine), semi-synthetic opioids (e.g. hydrocodone, oxycodone, hydromorphone), and synthetic opioids (e.g. fentanyl, sufentanil). Laboratories performing death investigation toxicology typically screen autopsy samples by immunoassay, with confirmation by chromatography and mass spectrometry. Within the last two years there has been a sharp increase in novel illicit opioids. These include about a dozen fentanyl analogs (e.g. acetyl fentanyl, furanyl fentanyl) and other substances include MT-45, AH-7921 and U-47700. These substances are increasingly encountered on their own or in combination with other opioids in what appear to be routine intravenous drug deaths. Traditional laboratory approaches to drug screening however may fail to detect them as most do not cross react on traditional immunoassay tests (some designer fentanyls may be an exception), and frequently are not part of laboratory's routine mass spectral libraries.

Fentanyl analogs are a major part of the new designer opioid group. Between June 2013 and December 2015, NMS Labs has reported 582 cases of acetyl fentanyl use, with blood concentrations ranging from 0.11 to 3900 ng/mL, with average and median concentrations of 133 and 12 ng/mL, respectively. Acetyl fentanyl is reported to be 10-15 times more potent than heroin, and 80 times more potent than morphine. Since June 2015, butyryl fentanyl, an analog with about a quarter the potency of fentanyl, has been detected in approximately 20 cases in a 10 month period, with concentrations ranging from 0.33-270 ng/mL. Furanyl fentanyl, another analog, has subsequently been detected in over thirty cases, and while its potency is not reported in man, it has an ED-50 in mice of 0.02 mg/Kg which is comparable to fentanyl (0.016 mg/Kg). Sometimes fentanyl is accompanied by the novel compound U-47700, an experimental opioid patented in the 1970s with potency of 7.5 times that of morphine in animal models. We have recently tested over forty death investigation cases with U-47700 concentrations ranging from 59-487 ng/mL (mean 256 ng/mL). In addition,  $\beta$ -hydroxythiofentanyl and MT-45 have each been identified in two cases. Novel compounds continue to appear on a monthly basis, including the alleged appearance in the US of W-18 and W-15, compounds with 10,000 times the potency of morphine.

Deaths with histories consistent with opioid overdose but negative toxicology should be subjected to further testing for these novel compounds.

## 2.7 Off-label Use of a Urine Immunoassay Screening Kit for Common Drugs of Abuse in Vitreous and Cerebrospinal Fluid

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Standard immunoassay testing kits are fast and relatively inexpensive screens for drugs of abuse. Status DS<sup>®</sup> is a one-step assay that provides results in as little as five minutes. The manufacturer's validation testing shows a 97-99% correlation to gas chromatography-mass spectrometry (GC/MS). The test menu includes:

- Tricyclic Antidepressants (TCA)
- Opiates (OPI)
- Methadone (MTD)
- Phencyclidine (PCP)
- Amphetamine (AMP)
- Barbiturates (BAR)

- Methamphetamine (MET)
- Benzodiazepines (BZO)
- Marijuana (THC)
- Cocaine (COC)

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. However, not all decedents have urine at the time of postmortem examination.

**Study:** A prospective study was designed to screen body fluids in 10 autopsy cases where the cause of death was suspected to be associated with drug use. To qualify for the study, urine, vitreous fluid and cerebrospinal fluid (CSF) had to be available for collection and the drug screens performed at the time of autopsy. The results were then compared to the blood drug concentrations detected by routine comprehensive toxicologic testing at reference laboratories.

**Results:** In this study, the following drugs were detected in urine, vitreous and/or CSF via screening at the time of autopsy: OPI, AMP, BAR, MET, BZO, THC, and COC. In comparison, OPI, BAR, MET, BZO, THC, and COC were confirmed via traditional toxicological analysis of blood. Urine results correlated well with the presence of drugs in blood, whereas both vitreous and CSF failed to identify THC (in five cases) and AMP (in one case). Vitreous fluid and CSF showed comparable results, although barbiturates were identified in CSF, but not in vitreous, in one case. Notably, acquisition of CSF is more challenging than vitreous, and blood-contaminated CSF sample hindered result interpretation while the viscosity of vitreous also complicated assay resulting.

**Conclusion:** Urine immunoassay tests are presently used for rapid drug screening, both in living people and in postmortem settings. When urine is not available for testing, vitreous fluid may provide the next best alternative fluid for testing. CSF shows no significant benefit over vitreous testing, and is also more technically difficult to obtain than vitreous fluid. Further studies documenting the negative predictive value and any selective benefit of one matrix over the other are ongoing.

### 3.1 Death in Epilepsy: A Comprehensive 10-Year Review

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One in 26 individuals in the United States will develop epilepsy or recurrent seizures during their lifetime, and those with epilepsy have a 20-fold risk of sudden death compared to the general population. However, information regarding at-risk patient populations is limited, and the physiologic mechanisms underlying sudden death in epilepsy have not been fully elucidated. In order to gain further insight, a systematic review of medical examiner records was performed. Cases of sudden unexpected death in epilepsy (SUDEP), seizure-related death (SRD), and people dying with epilepsy (PWE) were identified and characterized.

**Methods:** A retrospective analysis of medical examiner cases in Dakota, Hennepin, and Scott counties in Minnesota from 2004-2014 was performed. Of the 18,621 cases where jurisdiction was assumed, a natural language search identified 430 cases with death certificates containing the words "epilepsy" or "seizure". 67 cases were excluded. All available information pertaining to the remaining 363 cases was reviewed. Cases were categorized as:

1. SUDEP
2. SRD (positional asphyxia, drowning, trauma)
3. PWE (dying of other causes)
4. Undetermined seizure contribution to death

**Results:** 12% of cases were identified as SUDEP (45/363), and of those, one case had SUDEP listed as cause of death. SRD represented 19% of cases (70/363), with positional asphyxia being the most common etiology (64%) vs. drowning (17%) vs. trauma (11%, with 75% involving blunt force craniocerebral injury). 4% of cases were classified as undetermined (13/363).

Individuals dying from SUDEP and SRD were approximately 10 years younger than those dying of other causes. Continued, recently increased, poorly controlled, and breakthrough seizure activity were associated with SUDEP and SRD. Anti-seizure medication non-compliance was more common in SUDEP and SRD. SUDEP cases had more anti-seizure medications prescribed (average 2.03) and frequent clinical histories of sub-therapeutic levels.

Retrospective analysis was complicated by limited seizure history in 67% of cases, the majority of which were categorized as PWE. Alcohol and drug use were also frequent complicating factors.

**Conclusions:** This retrospective analysis identified numerous risk factors for death in epilepsy that can be utilized to identify at-risk patients and formulate prevention strategies. Additionally, many similarities were identified between SUDEP and SRD, and there was a lack of significant difference in biological characteristics between these groups at autopsy. Therefore, consideration should be given to expanding the definition of SUDEP to include positional asphyxia. Lastly, current strengths and shortcomings in seizure-related death investigation were revealed, and potential recommendations will be addressed.

### 3.2 Symptomatic Acute on Chronic Subdural Hematoma: a Review of Clinical Findings, Neuroimaging Studies, and Pathological Findings in 47 Cases

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The process of organization of subdural collections is incompletely understood. Nevertheless, such collections are often assessed in the forensic setting with implications regarding manner of death. In order to better understand the pathology and pathophysiology of clinically significant acute on chronic subdural hemorrhages, we studied clinical history, neuroimaging findings, and pathological findings of 47 acute on chronic subdural hematomas presenting to the University of Maryland Shock Trauma Center. The mean age at presentation was 70 years. There was a male preponderance with 38 men and 9 women. 40 out of the 47 subdural collections were unilateral. The 7 bilateral collections were asymmetric, favoring either the right or the left side with midline shift. Where detailed medical records were available, 56% were either anti-coagulated (aspirin, plavix, Coumadin) or had an intrinsic coagulopathy (disseminated cancer, cirrhosis). 90% of cases had demonstrable trauma in the clinical history, of which 90% were due to falls. All patients underwent craniotomy with evacuation of subdural blood and neomembrane. Pathological examination showed neomembranes readily identifiable by macroscopic examination in all cases. The thickness of the neomembranes was measured in the least thick region of the histologic slide in a representative cross section (blood clot was not included in the measurement). By this method, the neomembranes average 0.99 mm in thickness, with a standard deviation of 0.45 mm and a range of 0.28 mm to 2.05 mm. Inflammatory cells and extent of hyalinization/vascularity were variable and unrelated to the thickness of the neomembranes. Hemosiderin deposits were detectable in all pathological specimens on H&E, precluding the need for an iron stain. In conclusion, i) clinically significant acute on chronic subdural hematoma is a lateralized process. The majority of cases in this series showed unilateral hemorrhage contained by the neomembrane. Moreover, the minority of cases that

were bilateral on imaging were also asymmetrical. This contrasts with bilaterally symmetric and often thin acute subdural hemorrhage often seen with inflicted trauma, irrespective of the presence of a neomembrane. ii) Clinically significant acute on chronic subdural hematomas are plainly visible by macroscopic examination. Thus, the microscopic detection of a small collection of hemosiderin, even with some organization, is insufficient evidence for a predisposition to acute on chronic subdural hemorrhage. iii) acute on chronic subdural hematoma is largely related to falls in middle-aged and elderly adults, most of whom have a demonstrable coagulopathy.

### 3.3 Autism BrainNet: A National Effort to Acquire Postmortem Brain Donations to Enhance Understanding of Autism Spectrum Disorder

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Autism spectrum disorder (or autism) affects 1:68 children in the United States. All available evidence indicates that it has a variety of etiologies that involve both genetic and environmental factors that act to disrupt brain function. While the biological analysis of autism has advanced rapidly in the last two decades, one area of research that has not progressed as quickly is identifying the underlying neuropathology. This is due largely to the lack of availability of postmortem brain specimens and appropriate comparison brains. Autism BrainNet is a national effort funded by the Simons Foundation and Autism Speaks that is supported by brain collection efforts at four universities around the country. The first part of this presentation by neuropathologist, Dr. Matthew Anderson, will describe the organization of Autism BrainNet and the potential for collaboration with medical examiners throughout the United States. Dr. Anderson will discuss data indicating that mortality is greater in individuals with autism spectrum disorder and that the causes of death, such as drowning and sudden death due to seizure, are within the common experiences of medical examiners. He will also highlight some of the known pathological features of autism determined by brain tissue collected so far. And he will discuss new scientific methods to understand the genetic and neural underpinnings of autism that are being hampered by lack of appropriate postmortem tissue for research, including nonaffected controls. The second part of the presentation, by Dr. Alycia Halladay, will highlight the ways in which Autism BrainNet is communicating the importance of brain tissue to the community as a whole and how medical examiners can participate in this research. Autism BrainNet is enthusiastic to recognize the contributions of medical examiners on scientific papers, through the web site and published materials, as well as media opportunities. Finally, Dr. Reade Quinton, a forensic pathologist, will relate his experiences working with Autism BrainNet. He will describe the relationship of the ME office to the research program and review protocols for identification, consent, removal, shipment and coordination with Autism BrainNet tissue banks. It is our hope that this presentation may begin a dialogue between Autism BrainNet personnel and the medical examiner community. Medical examiners have, and will be, an important contributor to understanding the causes of autism with the ultimate goal of decreasing disability and improving the quality of lives of individuals and families affected by autism spectrum disorder.

### 3.4 Blastomycosis in Wisconsin: Beyond the Outbreaks

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**Background:** In the summer of 2015, individuals visiting Little Wolf River in Waupaca County were exposed to one of the largest outbreaks of the pathogenic fungi *Blastomyces* in recent state history. Though most cases of blastomycosis are not associated with common source outbreaks, cases such as this highlight the need for vigilance regarding this preventable cause of death. The purpose of this study is to familiarize

pathologists with the epidemiologic and histologic characteristics of this disease.

**Methods:** We retrospectively searched our electronic pathology database PowerPath (Sunquest Informational Systems) as well as our forensic autopsy database for blastomycosis cases between 2003-2015. We also utilized Wisconsin Division of Health (WDH) epidemiologic data, as blastomycosis is a reportable disease in Wisconsin.

**Results:** A total of 51 confirmed and 39 probable blastomycosis cases were reported in the 2015 Little Wolf River outbreak. Between the years 2003-2014, there was an average of 117 blastomycosis cases per year in Wisconsin, and 3 separate outbreaks. Between 2008-2014, 44% of blastomycosis patients required hospitalization and 5.6% (range 3.2% - 11.2%) died annually. As reporting of blastomycosis deaths in Wisconsin is voluntary, this case fatality rate likely represents an underestimate.

Two autopsies of blastomycosis fatalities were performed at the University of Wisconsin. The first, an immunocompetent 21 year old man without significant medical history who had participated in a Little Wolf River rafting trip in July 2015. He was diagnosed in August, declined antifungal treatment and expired in November. At autopsy, the lungs were markedly heavy with diffuse alveolar damage, organizing pneumonia, and copious yeasts consistent with blastomycosis.

The second was an immunocompromised 68 year old man with a history of renal transplantation secondary to diabetic nephropathy. A month prior to death, he underwent above-the-knee amputation, developed complications, and expired. At autopsy, the lungs were heavy with multiple tan parenchymal nodules ( $\leq 0.5$  cm) containing necrosis, hemorrhage, and numerous yeasts consistent with blastomycosis. His skin revealed several ring-like gray lesions (0.5 - 1.0 cm).

Thirty-three additional patients were diagnosed with blastomycosis at our institution between 2003-2015 via surgical samples (i.e. 14 skin biopsies, 13 lung specimens, 6 mixed specimens), of which two expired of blastomycosis-related complications without subsequent autopsies.

**Discussion:** Although *Blastomyces* is endemic east of the Mississippi River, cases of blastomycosis are not limited to these areas. This disease may not always be clinically suspected antemortem, and thus postmortem diagnosis can be instrumental in identifying possible outbreaks and mitigating further morbidity/mortality.

### 3.5 *Serratia marcescens*: Hospital Infection Outbreak Following Pain Medication Diversion

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**Background:** *Serratia marcescens* is a gram-negative rod that causes opportunistic infections with a predilection for hospitalized patients. At our tertiary care institution, *Serratia marcescens* bacteremia has occurred an average of once every two months over the last five years. Between March and April of 2014, however, there was a cluster of 6 cases including one fatality.

**Methods:** Six blood culture isolates from six patients were obtained for pulsed field gel electrophoresis analysis (PFGE). The gels were stained, photographed, and analyzed to calculate genetic similarities. A hierarchical dendrogram was created and the genetic similarity between isolates was calculated. Autopsy was performed on the patient expiring with *S. marcescens* bacteremia.

**Results:** Five of six blood culture isolates were identical *S. marcescens* strains; one culture isolate smeared when electrophoresed and could not

be further interpreted. The 5 patients with identical strains ranged in age from 51-80 years (median: 57) and were predominantly men (80%). Major comorbidities included burns, malignancy, multiple sclerosis, and cardiac valvular disease. Procedures and medical devices received by patients during their hospitalization were reviewed; no common factor was found. The fatality was a 53 year old man with esophageal squamous cell carcinoma status post chemoradiation. Following repair of a perforated gastric ulcer during an aborted esophagectomy, he developed fever, hypotension, and shock. Antemortem blood cultures subsequently grew *S. marcescens*. At autopsy, no source of the *S. marcescens* was identified, suggesting a primary bacteremia of unknown etiology. The death was attributed to *S. marcescens* sepsis arising in the setting of esophageal carcinoma.

Subsequent epidemiologic investigation revealed that four of the five patients with genetically identical strains had received pain medication from units where a former hospital nurse was discovered to have been diverting narcotics. She confessed to removing morphine/hydromorphone from patient syringes and refilling with saline and/or water. A connection between the nurse and fifth patient was later identified, prompting our hospital to contact law enforcement and the district attorney. No further cases of blood stream infection with the outbreak strain of *Serratia* have occurred since termination of the employee.

**Discussion:** A cluster of *Serratia* infections in a hospital setting should trigger investigation into a potential common source of the outbreak. PFGE is a common method used to compare strains of microbes in outbreaks to identify a common source. The possibility of contaminated infusate via drug diversion or other means should be evaluated in the investigation of *Serratia* outbreaks.

### 3.6 The Relationship Between Systemic Infection and Intracranial Hemorrhage: A Study of 411 Consecutive Autopsy Cases

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In decedents who present at autopsy with simultaneous presence of infection and intracranial hemorrhage, the question of whether the infection predisposed to the hemorrhage may arise. The issue may come up, for example, when unwitnessed deaths show changes otherwise ascribed to trauma (e.g. subdural hemorrhage) but also have evidence of infection (e.g. acute bronchopneumonia). Putative mechanisms include infection-associated coagulopathies (e.g. sepsis with disseminated intravascular coagulopathy) and treatment for infection (e.g. non-steroidal anti-inflammatory agents). To address this question, 411 consecutive and unselected patients who were autopsied at the University of Maryland Medical Center over a 3-year period were studied. Specifically sought were unrestricted autopsies that included examination of the brain and dura. Of the 411 autopsies, 142 had evidence of infection by pathological examination. The patients ranged in age from birth to age 86. Of these, pneumonia was the most common. 57 cases had clinical evidence of sepsis or bacteremia. 29 cases had clinically diagnosed severe coagulopathies with or without sepsis, including disseminated intravascular coagulopathy, thrombocytopenia, drug induced coagulopathy, and inherited coagulopathy. Of the 142 patients with infection, there were four organizing subdural neomembranes. Of these four, one had an additional history of head trauma from a fall. One had a congenital coagulopathy (methylene tetrahydrofolate reductase deficiency and Down's syndrome), one was cirrhotic and anti-coagulated, and one had recurrent sepsis. The neomembranes were incidental with no mass effect in each of these cases. The only clinically significant intracranial hemorrhage accompanied by infection in this time frame was a brainstem hemorrhage in a 62-year old man with end-stage cirrhosis. Other hemorrhagic lesions included petechial hemorrhages in a case of thrombotic thrombocytopenia purpura, small foci of incidental

subarachnoid blood in two cases, hemorrhagic infarcts in a case of invasive aspergillosis, and subependymal hemorrhage in prematurity. In conclusion, this consecutive series of autopsy patients of a 3 year period show no discernible association between clinically significant intracranial (including subdural) hemorrhage and the presence of infection, with or without severe coagulopathy. Therefore, the presence of infection may not mitigate head trauma if the patient presentation otherwise indicates that trauma occurred.

### 3.7 Hemoglobin A1c and the Postmortem Diagnosis of Diabetes Mellitus

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This presentation will discuss the utility of hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) in the postmortem diagnosis of diabetes mellitus, which affects millions of persons in the United States and is commonly cited on death certificates either as the cause of death or as a significant contributing condition. Although DM's role in a death typically relates to its chronic sequelae, some deaths are due to acute exacerbation of the disease, such as diabetic ketoacidosis. Occasionally, deaths due to acute hyperglycemic diabetic crises occur in persons without a previous diagnosis of DM, so the diagnosis of DM must be made at autopsy, usually when the vitreous glucose concentration is determined to be significantly elevated. However, DM is not the only cause of significant elevations of vitreous glucose concentrations, and depending on the circumstances of the death, a postmortem diagnosis of DM in a person not previously known to have DM should be made with caution. In such cases, postmortem testing of blood for HbA<sub>1c</sub>—an irreversible, non-enzymatically glycosylated form of hemoglobin that reflects blood glucose concentrations over a period of weeks to months—can be used to aid in the interpretation of elevated vitreous glucose concentrations in persons not known to have DM. HbA<sub>1c</sub> levels exceeding 6.5% are considered clinically to be consistent with DM. Previous studies indicate that HbA<sub>1c</sub> is relatively stable postmortem and *in vitro*.

We report four cases in which postmortem HbA<sub>1c</sub> testing of blood was used as an aid in the interpretation of elevated vitreous glucose concentrations in persons who died without a known diagnosis of DM. For each case, consideration was given to the possibility that the elevated vitreous glucose concentration was the result of physiologic stress and/or medical therapy rather than an acute exacerbation of previously undiagnosed DM. For three of these cases, HbA<sub>1c</sub> in blood collected at autopsy exceeded 13%, and each of these individuals was diagnosed with DM postmortem. In the fourth case, the HbA<sub>1c</sub> was 6.1%, and the elevated vitreous glucose concentration was determined to be due to causes unrelated to DM. In cases such as these, postmortem HbA<sub>1c</sub> is a valuable adjunct to vitreous glucose concentration for the autopsy pathologist seeking to identify true and previously unknown DM.

### 3.8 Fatal Pulmonary Thromboembolism in Patients with Diabetic Ketoacidosis. A Seven-case Series and Review of the Literature

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Diabetes mellitus (DM) is an accepted risk factor for arterial thrombosis, however its connection to venous thromboembolism (VTE) is not as well elucidated. We report here seven cases of fatal pulmonary thromboembolism in adults with diabetic ketoacidosis as the underlying cause. To our knowledge, this is the largest case series of DKA and PE to date. Four of the seven cases had no prior diagnosis of DM and patients were either diagnosed during hospital admission when they were found to be in diabetic ketoacidosis (DKA) or at the time of autopsy by the vitreous glucose concentration. None of the patients had other significant risk factors for VTE, such as family history, recent surgery, recent trauma, long

distance travel or substance abuse. Only two patients had a body mass index (BMI) greater than 35 kg/m<sup>2</sup> and the same patients had hospital stays that ranged from three to five days. It is our opinion that DKA is a frequently unrecognized and sometimes overlooked risk factor for VTE. We encourage forensic pathologists, medical examiners, and other practitioners involved in death investigation to consider the possibility of diabetic ketoacidosis as a risk factor, and if appropriate, the underlying etiology for pulmonary thromboembolism. We further recommend vitreous glucose analysis in cases of "idiopathic" pulmonary thromboembolism that lack other significant traditional risk factors. Most cases of pulmonary thromboembolism due to DKA should be certified as natural deaths, unless the DKA has been precipitated by medication in which case they would be certified as a therapeutic complication in New York City or accidental in other jurisdictions.

### 3.9 Extreme and Severe Crush Injuries: Case Comparisons from Tidewater, Virginia

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This case series compares eight individuals who died from extreme crush injuries with eleven who died from severe crush injuries, over a fourteen-year period in Tidewater, Virginia. Extreme crush injuries are here defined as blunt/sharp force trauma causing immediate death, characterized by extensive or complete skeletal and visceral fragmentation or disruption. Severe crush injuries caused rapid or delayed death, with one or more areas of significant skeletal and visceral disruption. All the cases were work-associated, most were witnessed, and all were assigned an accidental manner of death. Heavy vehicles (such as tractors, tow trucks, and mobile cranes) caused five of the extreme cases, and eight of the severe cases; no case was caused by a car or light truck. Of the vehicle-involved cases, ten were due to rollover of the victims; only three were due to impact; two of those were drivers. Two severe cases were from heavy objects (concrete beam, crane) falling onto vehicles; one was due to pinning under a dredge. Two of the extreme cases were due to wood chipper and conveyor belt chopper injuries; one was a parachuting death. Autopsy was performed in six of the eight extreme cases, and in nine of the eleven severe cases. Six severe cases showed signs of mechanical asphyxia; no extreme case did. In both case types, if the body was not disaggregated, external signs correlated poorly with severity and location of internal injury. Toxicology was performed in all the cases. It showed artifact in two of the extreme cases, and heroin in a third; there were prescription drugs in two of the severe cases, and tetrahydrocannabinol compounds in a third. In eleven of the cases, no inciting factors were detected at autopsy or investigation; in one extreme case, and five severe cases, there was significant natural disease, or advanced age; in one case, there was suspected cell phone use. The parachuting death was associated with accidental head injury during the initial portion of the jump. This report compares the histories, scene investigations, and injury patterns in extreme and severe crush injury cases in the Tidewater experience with comparison to the literature, reviews obstacles for the forensic pathologist inherent in the severity of the injuries, and considers some of the implications for the workplace.

### 3.10 Major Self-Mutilation: A Case Series

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Major self-mutilation (MSM) is a rare complication of severe mental illness. MSM is defined as deliberate destruction of body tissue to a degree that is not socially or culturally accepted and without suicidal intent. It most commonly takes the form of amputation of limbs/digits, direct injury to genitals and/or eye enucleation. In contrast to the more common minor self-mutilation which tends to be repetitive and usually does not cause significant disability, MSM is sporadic, non-repetitive and

involves a history or suspected history of psychotic disorder. Many episodes of MSM occur as the initial presentation of organic or substance-induced psychosis. When profound self-injury results in death, a manner of death (MOD) of suicide must be considered. Variability of opinion among forensic pathologists in MOD determination presents a challenge in identifying these rare cases. Careful scene investigation and professional collaboration are important in arriving at an appropriate MOD. We present a series of cases in which MSM resulted in death. The demographics, methods and extent of injury and overriding themes of each will be highlighted. In the context of these cases we will discuss MSM as it related to psychosis, scene investigation and MOD.

### 4.1 Dissecting and Streamlining the Medical Record Acquisition Process in Death Investigation Systems

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Though medicolegal death investigation (MDI) systems are generally associated with criminal justice, they serve an integral role in the realm of public health and safety since death certificate and autopsy data is used in public health disease and injury mortality research. MDI offices collect information from a variety of outside sources, including medical records from hospitals and doctors' offices both within and outside of their jurisdiction. For data to travel efficiently, transmission should be fully integrated between the MDI office and external organizations giving information to and receiving information from the office. However, this is often not the case. Delays in the transmission of medical records in particular lead to subsequent delays in autopsy report completion and death certification or to excessive resource waste in cases where a timely medical record would have let the pathologist know an autopsy was not required. Almost no peer-reviewed literature currently exists regarding the particular problem of record acquisition by MDI systems. Most literature focuses on the transmission of data either to the MDI office from laboratory services or from the MDI office to public health instruments, such as surveillance databases. To develop a better understanding of how electronic medical records have impacted MDI systems, we conducted an online mixed methods survey through the National Association of Medical Examiners (NAME) listserv. In the survey we inquired about the medical records acquisition processes at MDI systems around the nation to gauge forensic pathologists' opinions about the use of electronic health data and the integration of MDI data in public health. Concurrently, we piloted a quality improvement project at the Alameda County Sheriff-Coroner's Office (ACSCO) in Oakland, California. The Alameda Coroner has had many problems with their current system, in which they acquire a decedent's medical record through fax or by assigning personnel to physically pick up the printed paper record at the hospital. As several of the hospitals within the ACSCO's jurisdiction have electronic health record (EHR) systems, this laborious and resource-intensive method of record acquisition is outdated. We worked with various hospitals within Alameda County to get ACSCO employees, including pathologists and deputy coroners, direct access to decedents' EHR. With this pilot project, we were able to document the barriers encountered when attempting to reform medical record acquisition, and to suggest potential systemic changes to reduce delays and resource waste while investigating death.

### 4.2 Educational Advancements in Medicolegal Death Investigation Training

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Multiple jurisdictions host medicolegal death investigation (MDI) courses. The National Academy of Sciences (NAS) noted in its 2009 review of forensic practice that competent MDI requires a foundation of well-trained death investigators attending death scenes. The NAS report has become a road map for several areas of forensic science in the pursuit of practice

improvement and has served as a catalyst in current initiatives to establish practice guidelines and standards.

Among the areas the NAS report cited as being in need of standardization is forensic education. Too often forensic science relies upon apprentice-like training or academic courses without associated practical experience. MDI is no exception to these pitfalls and has been the focus of proposed standards from the National Institute of Justice and the American Board of Medicolegal Death Investigation. Current MDI courses offer a variety of approaches including online formats and didactic lectures in either a university setting or an intensive short course.

Building on the recommendations of the NAS report, the reconfiguration of courses is essential for the evolution of MDI training that promotes consistent and fundamental standards. This presentation will evaluate the capacity of multiple programs and their ability to effectively teach the application of investigative principles. This will be accomplished by comparing and contrasting different nationally recognized MDI training courses. This will include examining their curricula, format, length, accreditations, faculty credentials, course materials, and facilities. We will focus on the benefits of various teaching methods including didactic, internet based, and hands-on training.

While it is likely that no single approach to forensic MDI education will be optimal for all students, this presentation will examine certain principles which may be helpful as a foundation in more standard development. As with any scientific discipline, forensic education will need to provide a student first hand training that both incorporates current knowledge and lays a foundation for life-long learning. While forensic "apprenticeships" cannot completely replace didactic instruction they are never the less critical in the generation of competent investigators. As death investigation continues to evolve, forensic trainers must focus on the most effective ways to educate their students. A firm scientific base coupled with a process for professional development should be at the core of this education.

#### 4.3 Using Case-Type Specific Data to Improve Medicolegal Death Investigation

*B.P. Ehret, C. Unger, R. Stoppacher*

*Onondaga County Medical Examiner's Office, Syracuse, New York*

In conjunction with the creation of an electronic database for use in a regional medical examiner's office, we have established specific investigative information that was deemed to be of significance in a variety of different types of death investigations. The case-type specific data includes numerous pieces of scene and investigative information that are important not only for cause and manner of death determination, but for statistical analysis and in training forensic science practitioners just entering the field. Examples of some of the "case-types" that were created include, hanging/asphyxial deaths, suicides, firearm deaths, drowning in different bodies of water, and drug/medication overdoses.

We will present an overview of the different case-types that we use in practice, specifically addressing the value of using these as scene checklists for novice investigators. We will also provide examples of statistical analyses that can be obtained through collection of searchable case-type specific data. Lastly, we will highlight the differences in data collection between experienced medicolegal death investigators with American Board of Medicolegal Death Investigator (ABMDI) credentials, local coroners in a regional system, and in jurisdictions where law enforcement conduct a majority of the scene investigations. In doing so, we will demonstrate how collecting case-type specific data increases efficiency and accuracy in cause and manner of death determination. The presentation will also address some of the preceived barriers to the use of case-types, in an effort to encourage their use throughout the medicolegal death investigation community.

#### 4.4 Deaths In Custody: Establishing a Public Health Surveillance Infrastructure in Washington DC

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The *Death in Custody Reporting Act of 2013* (H.R. 1447) requires all states to report 'deaths of individuals in the custody of law enforcement'. As a result, the Office of the Chief Medical Examiner in Washington DC (DC OCME) was motivated to develop a public health surveillance infrastructure to better understand Deaths in Custody. Initial legal research revealed the definition of Legal Custody in the District of Columbia included only "- imprisonment, jail, or detention". This definition proved to be limiting and would not afford the DC OCME the ability to include deaths occurring outside of these circumstances as deaths in custody. The first order of business was to build consensus surrounding the definition of "Legal Custody". The OCME reached out to the Metropolitan Police Department, Department of Corrections, Department of Youth and Rehabilitation Services, the Office of the Attorney General and the Mayor's Office of Legal Counsel to develop a more comprehensive definition. The definition agreed upon was adopted from the federal legislation and voted on by the city council. The new definition reads as follows:

"Legal custody" –

- (1) Under the physical control or restraint of a law enforcement officer, a correctional officer (including a private correctional officer), or an authorized employee or agent of a District juvenile secure facility, or youth residential facility, including being:
  - (A) Under arrest;
  - (B) In the process of being arrested;
  - (C) Detained; or
  - (D) In the process of being detained;
- (2) Incarcerated in, committed to, or on work release from a District jail or correctional facility (including contract facility) or a District psychiatric hospital; or
- (3) Committed to a District juvenile secure facility or youth residential facility."

Once the definition was established, the DC OCME worked with the DC Department of Health to add a check box to the local electronic death certificate to indicate whether or not the death is in custody. This box is very simple with the heading, "Death in Custody?" and the associated boxes indicating "Yes", "No", and "Unknown". The Death in Custody section of the death certificate is only visible to the physicians of the OCME and is required to be executed on all cases.

This presentation will inform participants as to specific steps taken to by the the DC OCME to develop a adequate and reliable public health surveillance infrastructure to collect, analyze and interpret deaths in custody.

#### 4.5 Interdisciplinary Collaboration in the Evaluation of Sudden Unexpected Death of a Young Male

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Interdisciplinary collaboration and consultation are important facets in the practice of medicine. In most situations the utility of consultative services and the available resources are quite obvious. There are unique situations where the utility of consultative services and available resources may not be apparent. Knowing what resources are available for collaboration and consultation and having a sense of what situations may warrant utilizing available resources are important aspects of practice in any medical discipline. This report is an example of an unusual case where

interdisciplinary collaboration, crossing wide chasms in pathology and death investigation, played a crucial role in the evaluation of the high-profile sudden unexpected death of a young male.

Here we present a sudden death of a 23-year-old male who belonged to a unique population. He resided in a public facility and was a notable public figure. He was found unresponsive after eating breakfast and was pronounced dead despite resuscitative efforts. He had regular medical care and had no known medical conditions. He had no history of drug or alcohol use and ate a vegetarian diet. As this was a sudden, unexpected death in a previously healthy public figure, a postmortem examination was performed. The postmortem examination revealed a well-developed male with no significant injuries. The heart weighed 739 grams; however, the cause of death remained unclear. The pathologists who performed the postmortem examination sought consultative assistance from the medical examiner. Consultative review of the case, and a second examination of the heart, revealed multiple areas of severe atherosclerotic stenosis of the coronary arteries with no acute plaque changes. Histologic examination of the heart revealed myocyte hypertrophy and interstitial fibrosis. Toxicological testing revealed no abnormalities for tested substances. Atherosclerotic and hypertensive heart disease was opined as the cause of death.

Interdisciplinary collaborative efforts can be very important in the evaluation and interpretation of certain case types. Particularly in a case such as this - a sudden and unexpected death in an otherwise healthy individual who was a public figure and belonged to a unique population - the potential public interest should prompt one to consider collaboration with others in evaluation and interpretation of postmortem examinations, when appropriate. This case demonstrates the potential utility of these collaborative efforts in a scenario foreign to most forensic pathologists, in circumstances not normally reported for medicolegal death investigation.

#### 4.6 A Procedural Template for Familial Evaluation after Sudden Unexplained Death

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**Introduction:** Risk for sudden unexplained death (SUD) may arise from genetic mutations and may be heritable. Cost and expertise are barriers to genetic testing of decedents and first degree relatives after SUD. Furthermore, genetic variants are challenging to interpret without cooperation between medical examiners (ME) and a clinical center. Establishing these partnerships can be idiosyncratic and time-consuming. We describe a cooperative method of clinical screening that does not depend on geographic proximity, thus simplifying ME referrals for clinical and genetic testing.

**Methods:** The Cook County Medical Examiner's office (population base 5.25M) identified cases of SUD or sudden cardiac death (SCD) during a 12 month period. A rapid-response checklist was developed, which dictated a simple and reproducible referral procedure at the time of autopsy. First-degree relatives were contacted prior to final histology and toxicology results. After reviewing subsequent histology and toxicology data, a panel of clinical experts (the ME, two clinicians, and a genetic counselor) identified decedents whose families were recommended for further clinical/genetic screening according to published guidelines. Clinical gene panels or whole genome sequencing (WGS) was performed on SUD/SCD decedent DNA.

**Results:** The ME office referred 43 decedents at the time of autopsy. The panel identified 30 decedents that warranted further clinical/genetic screening (70%). Twenty three families assented to direct contact (77%

inclusion; averaging 3 first-degree relatives per family). Genetic analysis from the first 14 decedents revealed 5 genetic variants in 4 families (28%); however, some genetic results are still pending and the final yield may be higher. Penetrance of clinical disease was 20% in the evaluation of living first degree relatives in the initial 10 families.

**Discussion:** We describe an effective, streamlined process for MEs to refer first degree relatives after SUD/SCD. This procedural template allows ME offices to refer at the time of autopsy. Panel review does not require geographic proximity. This process results in a high frequency of clinical screening of first degree relatives and may improve clinical interpretation of genetic variants. By reporting SUD/SCD with a standardized system immediately following autopsy, rather than awaiting histology, ME offices may minimize expense and effort and provide a key post-mortem service to the community, even without geographic proximity to a clinical center.

#### 4.7 Errors in Cause of Death Coding: Impact of New Electronic Death Registration System on Cause of Death in Vermont

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The death certificate is the final entry in an individual's medical record; therefore the value of accurate certification cannot be understated. Accurate recording of the cause of death statement is essential for ensuring quality vital statistics for epidemiological purposes. After the death certificate is registered, the cause of death is assigned an International Classification of Disease, 10th revision (ICD-10) code which is compiled by the National Center for Health Statistics (NCHS). This coding step is also subject to error which can affect accuracy.

In July 2008, the state of Vermont transitioned to an electronic death registration system (EDRS). Although several commercial systems are available, Vermont created its own. During development, the cause of death portion (Part I) was modified to include two additional lines, allowing for a total of six diagnoses. Unfortunately, the systems used to transmit death certificate information and the algorithms used by NCHS for coding only support the entry and transmission of four lines. Therefore, when the cause of death statement contained more than four lines, the last lines were unknowingly omitted. This led to undetected errors when the proximate cause was entered as line 5 or 6.

The problem was identified when the unique death certification habits of a single Vermont physician led to an apparent regional increase in deaths from "disorders of electrolyte and fluid balance, not elsewhere classified" (ICD-10 E87.8). Investigation into this anomaly identified the two line addition to the cause of death statement as the source, simultaneously exposing a pattern that proved to be a much broader issue. A total of 768 death certificates were affected, and therefore coded incorrectly, from 2012 to 2014. This represents nearly 5% of all deaths in Vermont within that time period. An effort is currently underway to re-code the affected death certificates from 2012-2015 and those figures are still being compiled. In the interim, an update to the Vermont EDRS has removed the additional two lines to prevent future coding issues of this type.

While these circumstances are specific to the Vermont EDRS, this issue serves as a notice of caution to others seeking to make changes to their own death certification processes. Additionally, as there is continued emphasis in the literature on the importance of accurate death certification, perhaps care needs to be taken to ensure accuracy in coding as well. This could be an area for future investigation.

### 5.1 Historical, Current, and Forensic Perspectives of Heroin

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Heroin is a synthetic opioid drug (chemical nomenclature of 3,6-diacetylmorphine) which was first synthesized from morphine in 1874 by C.R.Wright in London. It was first marketed commercially with the trademark of "Heroin" in 1898 as a cough suppressant and cure for morphine addiction by Bayer, German Pharmaceutical company. In mid 1920's it was determined to be a dangerous drug associated with increase in crime and addiction in United States. It is manufactured from morphine derived from opium poppy plants primarily sourced from four geographical areas of South America, Southeast Asia, Southwest Asia and Mexico.

Currently the Heroin Epidemic is increasing rapidly and has been responsible for drastic increase in case loads for medical examiners and coroners across USA. Heroin fatality occurs due to morphine toxicity and presence of multiple other drugs in the system of the deceased. Recently adulteration of the drug primarily with Fentanyl is resulting in exponential increase in deaths. Per National Institute of drug abuse (NIDA) there was a 6 fold increase in the total number of deaths from Heroin between 2001 to 2014. In North West Ohio region covering 19 Ohio counties and 2 south east Michigan Counties the deaths have increased dramatically every year since 2010. In 2014 there were 80 deaths related to Heroin/ Fentanyl and in 2015 there were 145 deaths. In 2016 the deaths continue to increase and are likely to surpass those of the previous years especially with increase in purity, adulteration with other drugs and significantly cheaper price.

Some of the routes of abusing Heroin are by intranasal (snorting or sniffing), smoking, and the most common route via intravenous administration. Heroin is more fat soluble than other opioids and crosses the blood brain barrier to cause both analgesic and euphoric effects. It is rapidly deacetylated to 6 monoacetylmorphine (6MAM) and then to morphine within minutes. Presence of 6 MAM in urine along with morphine in body fluids usually supports that the death occurred as a result of morphine toxicity or intoxication with morphine derived from Heroin.

Forensic Pathologist responsibility in any drug related death including that due to Heroin involves determining cause and manner of death after reviewing law enforcement and death investigation, full autopsy, toxicology testing on peripheral blood, postmortem fluids, and drug paraphernalia.

Some of these deaths are being investigated and processed as homicides in certain jurisdictions.

### 5.2 Acetyl Fentanyl: An Epidemic or the New Normal

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Acetyl fentanyl (N-[1-phenethylpiperidin-4-yl]-N-phenylacetamide), a derivative of fentanyl, is a non-prescription synthetic opioid. Acetyl fentanyl is reported to be fifteen times more potent than morphine, five times more potent than heroin, but only one third as potent as fentanyl. Acetyl fentanyl is used in the adulteration of fentanyl, heroin, and now cocaine. The first outbreak of acetyl fentanyl related deaths was reported in Rhode Island from March-May 2013 followed by Pennsylvania, North Carolina, and followed by several southern states with occasional case reports in the English medical literature. We report 75 deaths between February 2015 and March 2016 at the Wayne County Medical Examiner's Office in Detroit, MI, where acetyl fentanyl was detected in the decedent's blood. This represents the largest number of reported cases and represents an epidemic in Michigan State. Acetyl fentanyl related deaths represented 9.2% of all drug related deaths during that time period. 67% (50) occurred in males, 33% (25) occurred in females, 65% (49) occurred

in whites, 29% (22) occurred in blacks, 4% (3) occurred in Hispanics, and 1% (1) occurred in Arabs. The mean age was 38.6 years and the mean concentration in the peripheral blood was 9.25 ng/mL (range 0.28 ng/mL to 37 ng/mL). Among acetyl fentanyl related deaths, 99% (74) of the decedents tested positive for fentanyl, 67% (50) for heroin, 21% (16) for other opiates, 44% (33) for cocaine, 31% (23) for both heroin and cocaine, 43% (32) for benzodiazepines, and 20% (15) for ethanol. In all 75 cases, the deaths were the results of multiple drug toxicity that included acetyl fentanyl. Only one case was identified where fentanyl was not detected in the blood. Lozier et al similarly reported one case out of 13 cases series of acetyl fentanyl drug toxicity to be positive alone for acetyl fentanyl. Poklis et al had four cases of fatal acetyl fentanyl cases where fentanyl was not detected. The average blood concentration of acetyl fentanyl in these four cases was 0.457mg/l as compared to 0.008mg/l in cases of combined acetyl fentanyl and fentanyl toxicity. The observed findings are evident of toxicity of acetyl fentanyl. Specific testing for acetyl fentanyl or other designer fentanyls such as furanyl fentanyl or butyryl fentanyl should be considered if the screening test for fentanyl is positive, but negative on confirmatory testing due to their structural similarities.

### 5.3 Gabapentin in Mixed Drug Fatalities: Does this Frequent Analyte Deserve More Attention?

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**Background:** From 2000 to 2014, drug overdose deaths increased 137% in the United States, and 61% of these deaths included some form of opiate (CDC, 2016). The vast majority of opiate-related drug fatalities include multiple drugs, although there is scant data quantitatively describing the exact drugs that contribute to deaths due to multiple drugs. In the present study, we sought to quantitatively identify the drugs that occur with opiates in accidental multi-drug related fatalities.

**Methods:** We retrospectively explored fatal drug trends in four Michigan counties, with a focus on profiling drugs present concurrently with opiates. Blood and urine toxicology reports for mixed drug fatalities (n=180) were analyzed using cluster and candidate-based approaches to identify significant analyte trends in opiate related fatalities.

**Results:** Within our cohort, the most prevalent serum analytes included caffeine (n=147), morphine (n=90), alprazolam (n=69), gabapentin (n=46), and tetrahydrocannabinol (n=44). In 100% of cases where gabapentin was present, an opiate was also present in the serum or urine. The average gabapentin serum concentration was 13.56 µg/mL (SEM =0.33 µg/mL), with a range of 0.5-88.7 µg/mL.

**Conclusions:** Gabapentin was found at very high frequency in accidental mixed drug fatalities. Gabapentin concentrations were generally within the normal therapeutic range (2-20 µg/mL). It is unknown whether a synergistic effect with gabapentin may contribute to central respiratory depression. Further research is warranted to determine any contributory role of gabapentin in these deaths. Potential synergistic drug interactions between gabapentin and opiates will be presented. Confirmed interactions following additional research could have broad implications for future reporting by forensic pathologists as well as prescribing practices by clinicians.

### 5.4 Certification of Deaths Associated with Co-ingestion of Fentanyl and/or Analogues and Heroin

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The surge in opiate/opioid related deaths witnessed in recent years across the country has generated significant interest from the media, legislators and other interested parties. Numerous scientific articles, including



position papers have been published, proposing guidelines for completion of the cause of death in drug-related fatalities. Concomitant with the surge of Heroin related deaths, we have also seen a dramatic increase in the abuse of Fentanyl, including analogs such as Acetyl Fentanyl, and more recently Fentanyl. A common phenomenon observed in the Toxicology reports of these cases was the presence of Fentanyl (with or without analogs or metabolites) in blood, accompanied by the presence of morphine in urine (with or without the presence of 6-monoacetyl morphine/codeine suggesting recent use of Heroin). Given that the half-life of Fentanyl is 3 - 12 hours, while that for morphine is 1.3 - 6.7 hours, the issue was raised as to whether these cases represented co-ingestion of Fentanyl and Heroin, or the ingestion of Fentanyl in chronic opiate users.

In this study, the OSME reviewed all drug related deaths reported to the office in 2015. All cases where Fentanyl or its analogues were listed in the cause of death were identified, and a review of the investigative, autopsy, and toxicology reports was conducted. Eleven cases of Acetyl Fentanyl only were identified. Review of the toxicology reports showed that in 9 cases urine was submitted for testing, and that 3 of those cases tested positive for morphine. The scene examination report indicated the presence of drug paraphernalia in 1 case. A total of 41 cases were positive for Fentanyl only. Review of the toxicology reports showed that in 31 cases urine was submitted for testing, and that 11 of those cases tested positive for morphine. The scene examination report confirmed the presence of drug paraphernalia in 7 cases.

It is recommended that when a case is positive for Fentanyl or its analogues in blood, and the urine tests positive for morphine, a careful review of the scene examination is made to determine whether drug paraphernalia was present at the scene. In the event that drug paraphernalia was documented, the cause of death should be attributed to the toxic effects of Fentanyl and Heroin, as the findings would suggest co-ingestion of the drugs. If law enforcement personnel have conducted testing of the drugs and paraphernalia recovered from the scene, those findings could be utilized to confirm this conclusion.

### 5.5 The Determination of Insulin Overdose in Postmortem Investigations

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The analysis of biological specimens for the presence of exogenous insulin is of special interest in select postmortem investigations. Insulin analogues are primarily used for the regulation of blood glucose levels and, like other drugs and chemical agents, may be implicated in cause of death investigations. Toxicological analysis, however, is challenging due to the limited stability of insulin in whole blood and various complexities associated with sample preparation and instrumentation. As a consequence, the determination of insulin in postmortem cases is not routinely performed or offered by forensic laboratories. Forensic death investigation is further complicated by interpretative difficulties including the frequent absence of anatomical findings at autopsy, presence of baseline exogenous insulin among insulin-dependent diabetics, and the impact of postmortem redistribution. Forensic science, however, fundamentally requires validated detection methods capable of withstanding scientific and legal scrutiny. In this regard, methods allowing for the detection of exogenous insulin in postmortem samples have been published in a handful of cases. The purpose of this presentation is to review the primary functions of insulin, the primary disease states associated with the therapeutic use of exogenous insulin, the current state of laboratory testing, and to provide a brief review of the literature

summarizing the timeline of advancements in postmortem insulin detection that underscore the importance of this work.

### 5.6 Inadvertent Fluoride Ingestion Resulting in Death: A Case Report

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Ingestion of caustic substances is an uncommon event in the adult population. Typically these ingestions are either associated with attempted suicides or consumption of caustic agents transferred to food containers and bottles that are stored in inappropriate areas such as kitchen cupboards. We report a case of a witnessed, unintentional, fatal caustic ingestion. The decedent was with his girlfriend who was working on a glass etching project. During the project she left the glass etching solution unattended and witnessed the decedent to drink a few ounces of it. She immediately stopped him and called 911. On hospital admission he had evidence of shock with hypotension and renal failure. He was also hypocalcemic and acidotic. He continued to decline and died shortly after admission. Investigative reports revealed that the decedent may have mistaken the glass etching solution container for one of his dietary supplement shakes. He also had a known medical history of frontotemporal dementia. Postmortem examination revealed extensive erythema and mucosal necrosis of the esophagus and stomach with hemorrhagic gastric contents. Detailed examination of the brain revealed findings that were more consistent with early onset frontal variant Alzheimer disease than frontotemporal dementia. The glass etching solution involved in this case was an odorless, tan liquid that contained sodium bifluoride, sulfuric acid, barium sulfate and ammonium bifluoride. Toxicological testing of available antemortem blood included targeted testing for fluoride that revealed, a fluoride concentration of 23 mg/L (normal range <0.3mg/L), compatible with the type of solution thought to be ingested. Injuries from this type of ingestion are mainly related to metabolic disorders caused by acute fluoride poisoning of which the most significant symptom is rapid hypocalcemia, and contaminated tissue burns due to its corrosive nature. Fluoride ingestion is extremely rare. Many of the cases reported occurred in children through dental products exposure, most commonly dentifrices, which have a high concentration of fluoride and a pleasant flavor. Mortality from fluoride containing compounds may result within 5 minutes, with average death occurring in 8 hours. Currently no minimal lethal dose is known, however 4 mg has been reported to be lethal in an adult. This is an unusual case of an unintentional ingestion involving an adult male with a history of dementia, the source of ingested fluoride being glass etching solution, which highlights the effects of acute fluoride toxicity/poisoning that healthcare workers, including pathologists, should be aware of.

### 5.7 Interpretive Considerations and Importance of Hair Toxicology Results in Pediatric Death Investigations

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In postmortem investigations, children are the subject of special focus. It is well documented that hair testing can be used to demonstrate past and/or a pattern of exposure to many different drugs, and this is especially pertinent in those populations where limited medical history exists and/or care providers are not forthcoming with information. If a drug, identified through toxicological testing, has been determined to be relevant to the cause of death, investigators often need to know if the drug exposure was from a single event or occurring on a chronic and repetitive basis. Since the concept is that head hair grows at a fairly constant rate, head hair analysis enables the determination of a retrospective timeline of drug exposure. For example, if the tested hair is 8 cm in length and a positive drug result is obtained, the most straightforward interpretation is that during the 8 month period covered by the hair growth, the individual used or was exposed to the drug. Taking into account the growth rate of head

hair over time, time periods of interest may be selected based upon case history and the hair segmented accordingly. Incorporation of drug and drug metabolites into hair may occur through several mechanisms including via the capillary blood supply to the hair follicle, introduction through sebum and/or sweat and external contamination. A review of several pediatric cases submitted for analysis shows that detected drugs include over-the-counter (e.g., diphenhydramine) and prescribed medications (e.g., methadone) and illicit substances (e.g., cocaine). Determining the timeframe of exposure(s), however, in a pediatric case is a practice that should be undertaken with care. Some considerations include hair growth rate variability, axial diffusion of drug, external contamination and the possibility of *in utero* exposure. The purpose of this presentation is to highlight the criticality of hair testing in a pediatric postmortem investigation and to use several case specific examples to demonstrate how these considerations may be applied in practice.

### 6.1 Cardiovascular Pathology Workshop

S.M. Mackey-Bojack<sup>1</sup>, E.R. Duncanson<sup>1</sup>, P.T. Lin<sup>2</sup>, J.J. Maleszewski<sup>2</sup>  
<sup>1</sup>Jesse E Edwards Registry of Cardiovascular Disease, St Paul, Minnesota; <sup>2</sup>Mayo Clinic, Rochester, Minnesota

**Overview:** This 3-hour session will focus on cardiovascular pathology. It will include a 2-hour didactic, followed by a 1-hour hands on session. Participation should be limited to 100, requiring separate registration on a first come-first serve basis.

**Space Requirements:** Tables will be arranged into separate stations, which participants will rotate through.

**Target audience:** Medical examiners, coroners and autopsy pathologists (including those responsible for completing death certificates)

**Course Description:** Didactic Session (4 presentations, 20 minutes each, with a 20 minute break)

1) *Standardized Practices* – will focus on discussing uniform approach to dissection and description. Topics to be addressed include: separation of the heart from the lungs; heart weight; wall thickness measurement; valve measurement and description; and examination of coronary arteries. Preparation/packaging of specimen for consultation will also be addressed.

2) *Histology* – will address normal myocardium; age-related changes; various disease states (e.g. hydrophilic polymer embolization; lymphocytic myocarditis; chronic ischemia; storage diseases; myocyte disarray).

3) *Conduction system* - when to evaluate the conduction system will be the primary focus in this session. Focus will be placed also on anatomic concepts and dissection technique.

4) *Molecular Genetics* - will focus on when to consider molecular testing, what specimens to collect, and what to do with the result (including basics of how to interpret the report).

Hands-on Session (4 stations, 15 minutes/station).

1) *Cardiomyopathies* – hypertrophic, dilated, arrhythmogenic, restrictive

2) *Devices/Interventions* – leads, artificial valves, ablation sites, ventricular assist devices

3) *Congenital* – septal defects, tetralogy of fallot, transposition, hypoplastic left heart

4) *Valvular Disease* – fibrocalcific, myxomatous, rheumatic, congenitally bicuspid aortic valve

### 7.1 Forensic Pathology in Canada: Past, Present and Future

C. Milroy

*The University of Ottawa, Ottawa, Canada*

Canada is a country with 10 Provinces and 3 Territories and has 13 medico-legal systems. These consist of Forensic Pathology led Medical Examiner systems in 4 Provinces and 9 coroner systems. The coroner systems are a mixture of lay coroners, medical coroners and legal coroners. The coroner system was inherited directing from the English Coroners system when Canada was colonized by the British. The Coroners system was introduced to Quebec after the defeat of France in the French and Indian war. Although there are multiple medico-leaf systems Canada has one criminal code which applies across all provinces and territories and is based upon English common law.

Postgraduate education in Canada is the responsibility of the Royal College of Physicians and Surgeons of Canada. Unlike the UK and Australasia, which have specialty Royal Colleges such as the Royal College of Pathologists, Canada has one overarching body. The Royal College of Physicians of Canada did not recognize Forensic Pathology as a speciality until 2005 and the first training programme was not started until 2008 at the University of Toronto. Training requires initial training in either Anatomical or General Pathology, which are 5 year programmes and are followed by one year of Forensic Pathology training. An exit exam run by the Royal College of Physicians must be passed to gain Royal College certification.

The problems of a lack of training among practitioners was illustrated with the Charles Smith Inquiry. Smith was a paediatric pathologist who was in charge of paediatric homicide autopsies in Ontario. He had no training in forensic pathology. His lack of training and competence led to a judge led public inquiry in Ontario in 2008. The subsequent report, The Goudge Report, was a seminal moment for Forensic Pathology in Canada as it led to significant changes in the practice of forensic pathology. This resulted in the development of the Ontario Forensic Pathology Service and strengthening of the central and regional forensic pathology units. The service has a service, teaching and research role and innovative work includes the development of robust peer review and molecular diagnostic services for autopsy work. Ontario has a medical coroners system and recent developments have included forensic pathologists becoming coroners.

Latest Royal College developments include the changing training to competency by design. The Royal College also administers continuing professional development. The future of Forensic Pathology appears significantly brighter than it did a decade ago.

### 7.2 Current Relevance of the Article on Classical Mistakes in Forensic Pathology by Dr. Alan R. Moritz

M. Pandey

*Lucas County Coroner's Office, Toledo, Ohio*

The first time I read this article I was a Forensic Pathology Fellow. Today ten years later this article continues to be a good learning and teaching tool. This article on Classical Mistakes in Forensic Pathology was written by Dr. Alan R. Moritz, who was a pathologist from Institute of pathology, Western Reserve University, Cleveland, Ohio. He first presented it at Ward Burdick Award Address, at the thirty-fifth annual meeting of the American Society of Clinical Pathologists, Chicago, Illinois, October 11, 1956. The mistakes as discussed in the article were " a) not being aware of the objective of the medico legal autopsy, b) performing an incomplete autopsy, c) permitting the body to be embalmed before performing a medico legal autopsy, d) non recognition or misinterpretation of postmortem changes, e) failing to make an adequate examination and description of external abnormalities, f) confusing the objective with the subjective sections of the protocol, g) not examining the body at the scene of the crime, h) substituting intuition for scientifically defensible

interpretation, i) not making adequate photographs of the evidence, j) not exercising good judgment in the taking or handling of specimens for toxicologic examination, k) permitting the value of the protocol to be jeopardized by minor error, l) talking too soon, too much, or to the wrong people and other miscellaneous mistakes".

While reviewing this article on 50th anniversary of the National Association of Medical Examiners meeting, September 2016, it is important to compare examples of the listed mistakes with examples of those in recent times. The mistakes listed by Dr. Alan Moritz have not become obsolete and they continue to be just as relevant today as they were in 1956.

### 7.3 The Medical Examiner as Defendant

*C.B. Rogers*

*Los Angeles County, Los Angeles, California*

Little information is available about litigation against medical examiners. This study examines closed cases filed against Los Angeles County Medical Examiner from 2001 to present. It excludes litigation not related to the medical examiner function, such as worker's compensation, vehicle litigation and general litigation (such as injury on the premises, contract litigation, etc.). There were 24 cases filed. The most common allegation was that the autopsy conclusions were incorrect (9 cases), followed by the allegation that the body was allowed to decompose in the medical examiner's custody (8 cases). Damages awarded ranged from zero to \$45,000. Attorney fees ranged from zero to \$355,690.

Although it may not be possible to avoid all litigation, it is helpful to keep careful documentation. It is especially useful for the pathologist to document how he or she reached the conclusions, and for the medical examiner to document the storage conditions and the initial appearance of the body. Quality assurance systems can help to avoid situations that create a risk of litigation.

### 7.4 WITHDRAWN

### 7.5 Death Certification at a Tertiary Care Center: A Retrospective Analysis of the Correlation in Clinical versus Postmortem Examination Diagnoses, Death Certification Errors, and the Efficacy of Electronic Death Certification.

*A. Spencer, H. Reinhard, A. Lewis, J. Baccon*

*Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania*

The death certificate is a legal document containing a wealth of crucial information for the decedent, the decedent's family, and the general public. It serves as a declaration of the terminal events in the individual's life, answers lingering questions, and may act as an epidemiologic tool for public health. It is for these reasons, and many others, that it is critical the death certificate be filled out completely and accurately.

Our aim was to perform a retrospective analysis of the death certificates associated with the postmortem examinations at Penn State Milton S. Hershey Medical Center. Hershey Medical Center is a tertiary care and level one trauma center. The main facility has a capacity of 551 beds, while the Children's hospital consists of 151 beds. In addition to the hospital inpatients, the Department of Pathology also performs private and contract autopsies for nearby affiliated hospitals.

From January 2015 through March 2016, 109 autopsies were performed and reviewed. 39% of the cases showed discordant diagnoses between the clinical diagnoses on the death certificates and the final autopsy diagnoses. Errors were found in 26% of the certificates, of which 87% were adult cases and 13% were pediatric. The errors identified were cases certified by attending physicians (20%), residents (17%), physician extenders (7%), and fellows (3%). The level of training was unknown in 53% of cases. Inaccurate diagnoses were found in 47% of the certificates.

Some examples of these inaccurate causes of death include "cardiopulmonary arrest", "asystole", and "unknown". Incomplete reports were also frequently identified including a missing time or date of death (13%), lack of the certifier's signature (10%), missing pregnancy or tobacco-associated demographics (30%), and no listed manner of death (3%). Multiple errors were found in 20% of the death certificates.

In March 2016, Hershey Medical Center instituted an electronic death registration system, called "DAVE", in accordance with the CDC and NIH to expedite processing and increase accuracy of death certification. The DAVE system ensures the certificates are complete and contain appropriate, supportive diagnoses before it can be finalized. Since it was instituted, the error rate went from 26% down to 0%. We are optimistic that with continued review the error rate will remain at or nearly 0%.

The future of forensic and autopsy pathology, much like everything else, will be shaped and changed by progressing technology. These programs have the capacity to improve our efficiency and ability to accurately report deaths.

### 7.6 Effect of Minnesota's New Religious Objection Law on Medicolegal Autopsy Practice at the Hennepin County Medical Examiner's Office

*O.L. Middleton, L.W. Jackson*

*Hennepin County Medical Examiner's Office, Minneapolis, Minnesota*

**Introduction:** Efforts to complete autopsies in a timely a manner are often hindered by objections voiced by representatives of the decedent. Most objections stem from unfamiliarity with autopsy procedures and perceived impacts on funeral arrangements and settling of estates. Objections due to sincerely held religious beliefs are also encountered. Few states have a legal requirement for Medical Examiner's to either abandon an autopsy or seek legal directive for one when religious objection presents. On July 1, 2015, Minnesota State Statutes were amended to allow for religious objections to autopsy, except under limited circumstances as defined in the Statutes. We examine how introduction of this law has effected the efficiency of autopsy practice at the Hennepin County Medical Examiner's Office. **Materials and Methods:** Data for all autopsies (full and head only examinations) performed in 2015 were extracted from the Hennepin County Medical Examiner's Office electronic records database. Referral cases and those delayed by organ/tissue donation were excluded. Summary statistics were compiled and an "autopsy interval" (interval between time the death was reported to the Medical Examiner's Office, and time the autopsy started) was calculated for every case. Comparison of average autopsy intervals in cases performed before and after the policy change was evaluated using widely available statistical tests.

**Results:** Of the 1181 autopsies performed in 2015, 1042 met inclusion criteria. Of these, 504 (48%) occurred in the first half of the year, prior to enactment of the law; and 538 (52%) occurred subsequently. The average autopsy interval for the 504 cases was 18 hours and 32 minutes (SD 11 hours, 14 minutes); the average autopsy interval for the 538 cases was 20 hours and 31 minutes (SD 12 hours, 27 minutes). A statistically significant difference in average autopsy intervals between the two groups was identified and confirmed via T-test ( $p = 0.007$ ).

**Discussion:** Comparative analysis of a large number of autopsies performed before and after introduction of a religious objection law in Minnesota, suggests a statistically significant difference in autopsy efficiency between those performed before and after the law was enacted. These findings suggest that despite only minimal procedural change, the possibility of objection has contributed to an increased autopsy interval. The practice of acknowledging a family's objection to autopsy followed by compassionate discussion and education remains a critical aspect of investigation.

## 7.7 The Physiologic Effects of a Conducted Electrical Weapon as a Function of Spread

D.M. Dawes<sup>1</sup>, J.D. Ho<sup>2</sup>, J. Sweeney<sup>3</sup>

<sup>1</sup>Lompoc Valley Medical Center, Santa Barbara, California; <sup>2</sup>Hennepin County Medical Center, Minneapolis, Minnesota; <sup>3</sup>Oregon State, Corvallis, Oregon

Medical Examiners (ME) may be presented with an arrest-related death (ARD) case that involves many confounding variables including suspect and law enforcement related variables. Legal proceedings may rely on the opinion of the ME on the relative contributions of the variables on the death. At the last meeting, we discussed the basic physiology of CEWs. In this presentation, we will briefly review this material and expand on it with a recently performed pilot study examining the physiologic effects of a TASER X26 as a function of probe spread.

Previously published work has shown that the two most important variables in the effectiveness of the CEW are the region of the probes (muscle groups are stimulated) and the spread between the probes (number of motor nerves stimulated). Most of the published physiologic research has utilized large spread exposures. However, in field use, exposures range from "drive stuns" through a range of spreads. A NYPD study found an average deployment of 5.5 feet resulting in a spread of about 9 inches. In encounters in which multiple CEW deployments occur, it is not uncommon for these to be lower spread, less effective exposures. Until now, while a basic understanding of the physiology of CEWs could guide the ME in determining the relative contribution of the CEW exposures on the subject's physiology, there was no research looking specifically at the physiologic effects as a function of spread.

In our small pilot study, we examined the effect of a 5-second TASER X26 CEW on pH, lactate, and vital signs using back exposures with variable spreads: 1) a "drive stun", 2) 1.5 inches, 3) 6 inches, and 4) 20 inches. We found no significant changes in pH or vital signs with any of the exposures. With lactate, there was no change with the "drive stun" but small statistically significant changes with the other spreads with the change increasing with increasing spread. Four subjects performed a 30 second exercise regimen. The pH and lactate for these subjects was significantly different from the 5-second exposures (median pH 7.28 v 7.34; median lactate 5.09 v 1.86). While the study is limited, there appears to be a greater effect on physiology as the spread increases and the effects of a 30-second exertion regimen are significantly greater than the 5-second TASER CEW exposure. This data is important for the ME to understand when evaluating an ARD case involving multiple variables.

## 8.1 Best Practices for Forensic Photography in a Medical Examiner's Setting

R.S. Swartz

District IV Medical Examiner, Jacksonville, Florida

After attending this presentation, attendees will gain an understanding of the photographic principles, proper technique, and equipment necessary to produce consistently high quality photographs of autopsies and related materials that are worthy of being presented to and scrutinized by medical and legal professionals. This presentation will impact the forensic science community by providing concrete methodology, technique, and a framework for forensic photography where none currently exist. Many local and even national agencies such as N.A.M.E. have only general guidelines and practices in place to govern forensic photography, but this presentation will be more specific and detailed to standardize forensic photography procedures and help others working in this field to produce higher quality photographs.

The presentation will begin with general guidelines for autopsy photography including composition, case number placement, backgrounds, orientation and close-up photos, and the use of measurement scales. Following that, the framework for what should be photographed during autopsies will be discussed. Certain photos should

be taken of every decedent, regardless of the nature of the case. These include "As Is" photographs, anterior and posterior overalls, a head shot, ID photographs, and identifying marks such as scars and tattoos. Beyond those, it is at the discretion of the Medical Examiner performing the autopsy what needs to be documented on the decedent. A policy or framework should be in place to describe how that photo is taken. The type of photos covered will be wounds, internal injuries, projectiles and pathways, organs and gross specimens, clothing and personal effects, and evidence.

Equipment considerations and proper camera settings will be discussed as well. A photographer needs the proper tools to acquire the proper results and these include the right camera, lenses, and flash. Camera settings and techniques are equally important and will be discussed in detail. These include but are not limited to: shooting mode, ISO or sensitivity to light, shutter speed, aperture, white balance, exposure compensation, proper focus settings and technique, flash placement, and flash angle.

Image processing and management issues, covered in the final section, include SWGIT guidelines (Scientific Working Group on Imaging Technologies), the importance of maintaining original images, image processing and retouching, image security, image nomenclature, image storage and archival, and related software processes. This process will be summarized by walking through a step-by-step example of a daily image workflow from start to finish.

## 8.2 The Use and Promise of 3D Printing in Accidental, Penetrating, and Blunt Force Trauma: A Disruptive Technology for Education, Criminal Justice Representation, and Injury Reconstruction.

J.M. Morris, K.P. McGee, R.R. Reichard, J.M. Matsumoto  
Mayo Clinic, Rochester, Minnesota

Within the past several years, advances in additive (i.e., 3D) printing technologies in combination with high resolution 3D diagnostic medical imaging data have initiated revolutionary changes in the practice of medicine. 3D printing is now routinely used to create customized surgical guides, presurgical planning models as well as a range of patient-specific treatment immobilization systems and devices. Recently our group has investigated the use of 3D printing as a tool for illustrating and understanding penetrating and blunt force traumatic injury. High resolution computed tomography (CT) or magnetic resonance (MR) imaging data sets are first obtained of the traumatic injury, typically obtained at the time of presentation of the subject within the emergency room or prior to autopsy, and are then used to create accurate high resolution 3D models of the injury. Models can be printed with either bone and soft tissue or bone only to demonstrate the extent and location of the injury. Representation of the injury in this manner provides a novel method of communicating often complex traumatic injury. Accurate 3D printed models solve many of the difficulties with using current renditions of traumatic injuries (e.g. graphic images, inaccuracies of scale). We predict that 3D printed models will play a significant role in research, education, medicolegal death investigation and as a demonstrative aide within the criminal justice system. To this end, this presentation will focus on the history and development of 3D printing technologies, the translation and disruptive influence of 3D printing in clinical medicine, its application as a presurgical planning tool within our own practice, and its use in penetrating and blunt force traumatic injuries.

To date our group has printed a range of 3D models including non-accidental and accidental pediatric and adult traumatic injuries, penetrating (i.e. gunshot wound) and blunt force injuries. Examples of each will be presented and their potential use within the above context will be discussed.

### 8.3 Caveat Prosector: Avoiding Problems and Potholes on the Road to Dissection Perfection

S.D. Cohle

*Kent County, Michigan Medical Examiner, Grand Rapids, Michigan*

Proper dissection technique yields a heart with preserved anatomy that is suitable for review by the prosector, consultants, or clinicians. This presentation will illustrate methods for opening the atria and ventricles so that key anatomical landmarks, such as the coronary sinus, ostia of the venae cavae, crista terminalis, and pectinate muscles are not destroyed. This is accomplished by incising the atrial walls from the septum to the atrial appendages, leaving the venae cavae ostia intact. A method for opening the left ventricular outflow track, with cutting through the commissure between the right and noncoronary cusps will be shown, which preserves the aortic valve cusps and coronary ostia. Proper opening of the heart allows others to review the specimen with key landmarks intact and enhances the ability of the prosector to teach others as well as facilitating examination of the heart by a consultant. The speaker will demonstrate how to identify a "buried" left circumflex coronary artery and infarcts at the base of the left ventricle – an easily overlooked lesion.

Since thorough examination of the coronary arteries is important in cases of sudden cardiac death it is crucial for the prosector to identify those vessels such as the left circumflex coronary artery, which may course beneath the coronary sinus and thus be missed by superficial sectioning. Some myocardial infarcts may only occur at the base of the left ventricle, thus if the death appears to be of cardiac origin the ventricles must be sectioned from apex to base if no infarct is identified with routine sectioning.

This presentation will also describe excision of the cardiac conducting tissue. Lesions such as atrioventricular node tumors and fibromuscular dysplasia of the AV node artery can be an adequate explanation for death when other anatomic and toxicologic studies fail to disclose a cause. These suggestions for optimal examination of the heart originate from the author's years of examining hearts at autopsy and in consultation. Acknowledgement of and comments upon previous cardiac examination presentations will be made.

### 8.4 The Utility of the Head-Only Autopsy: A 3-year Retrospective Review

R.M. Wilcoxon, E. Boeding

*Hennepin County Medical Examiner's Office, Minneapolis, Minnesota*

Falls in the elderly are common and can have significant morbidity and mortality. In order for the Medical Examiner to fulfill their statutory duty of correctly certifying cause and manner of death, falls around the time of death in older adults may necessitate an examination when one might not otherwise have been performed due to the decedent's age and significant documented natural disease. We looked at the utility of performing head-only autopsies in this population in order to answer the question "Did a fall prior to death cause lethal craniocerebral injury?" We performed an electronic retrospective review of all head-only autopsies performed by our office during 2012 - 2014 (74 cases). Nine head-only autopsies that were performed for other reasons (including religious objections to full autopsy) were excluded. Of the remaining 65 cases, 9 deaths were ruled accidental (13.8%), with 7 being due to blunt force craniocerebral injury (10.8%). Death was due to cervical vertebral fracture and hip fracture in the other 2 accidental cases. Cases receiving a head-only autopsy consisted of 31 females and 34 males with an average age of 79 years (range 49 - 99 years). We examined features of each case such as time interval between injury and death, signs of external head injury, documented change in neurologic status, presence of anticoagulation, whether the fall was witnessed, and whether there was a documented head impact and/or internal non-head injury. While the numbers are too small for statistical analysis, it was observed that the head-only autopsies

that had significant blunt force craniocerebral trauma were more likely to have an injury-to-death interval of less than 24 hours (85.7% in the injury group, with one unknown interval, versus 51.7% in the non-injury group), a documented change in neurologic status (85.7%, with one unknown, versus 48.3%), and to be anticoagulated (57% versus 22.4%). They also more frequently had a witnessed fall with a documented head impact. Interestingly, signs of external head injury, while prominent in both groups, was actually less common in the injury group (71.4%) than the non-injury group (89.7%); however, the 2 individuals in the craniocerebral injury group that had no evidence of external injury were both noted to be anticoagulated. We conclude that head-only autopsies are of utility in correctly certifying the manner of death in cases of pre-terminal falls, and that evaluation of injury-to-death interval, change in neurologic status, and anticoagulation may assist in autopsy decision-making for these cases.

### 8.5 Genetic Counselors' Approach of the Postmortem Genetic Testing Process After Sudden Cardiac Death

G. Liu<sup>1</sup>, H. MacLeod<sup>2</sup>, R.G. Webster<sup>3</sup>, S. O'Neill<sup>1</sup>, E. McNally<sup>1</sup>, L. Dellefave-Castillo<sup>1</sup>

<sup>1</sup>Northwestern University, Fremont, California; <sup>2</sup>Sudden Death in the Young Registry, Chicago, Illinois; <sup>3</sup>Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois

**Background:** The incidence of sudden unexplained death (SUD) between the ages of 1 and 35 years is approximately 1-3 events per 100,000 person-years. A significant portion of these cases result from an underlying genetic etiology, which may be identified during postmortem genetic testing. Genetic counselors play an important role in the postmortem genetic testing process by working with medical examiners (MEs) to order specific genetic testing and to determine if surviving family members are also at risk. This study aimed to learn more about the experiences of genetic counselors who have considered or ordered postmortem genetic testing to gain insight into their understanding of the sudden death investigation.

**Methods:** An online survey was sent to members of the National Society of Genetic Counselors (NSGC). Inclusion criteria were genetic counselors who have previously considered or ordered postmortem genetic testing in sudden death cases. The survey asked about different aspects of the postmortem genetic testing process, including sample collection and insurance coverage, as well as opinions regarding the current state of postmortem genetic testing. **RESULTS:** Cardiovascular genetic counselors were significantly more willing to send out a sample when the decedent passes away at a younger age (ages 10, 18, 30, 40, and 50) compared to other specialty genetic counselors ( $p < 0.05$ , Chi-square). Additionally, cardiovascular genetic counselors were more likely to support that genetic counselors should act as educators about sample collection for postmortem genetic testing for medical providers ( $p = 0.001$ , Mann-Whitney U). Thirty-seven percent (7 of 19) of genetic counselors reported insurance covering some portion of genetic testing, and while the postmortem genetic testing process can be hindered due to cost and lack of insurance coverage, the majority of participating genetic counselors do not report feeling that these barriers discouraged them from pursuing postmortem genetic testing in the future. Finally, fresh and frozen blood had the most responses for successful DNA extractions, reinforcing NAME recommendations for appropriate types of samples to save for postmortem genetic testing.

**Conclusions:** Overall, participating genetic counselors have a very good understanding of when it is appropriate to send samples for postmortem genetic testing, and did not feel that suspected barriers of cost and lack of insurance coverage deters their sending of postmortem genetic testing. With the rapid decrease in costs for diagnostic genetic testing, it remains important that MEs are aware of NAME recommendations for sample collection and storage, to facilitate postmortem genetic testing and identify at-risk family members.

### 9.1 Assessing the Need for a Forensic Pathology Fellowship Match Program: Presentation and Panel Discussion

R.A. Quinton<sup>1</sup>, A. Baker<sup>2</sup>, J. Jentzen<sup>3</sup>, J. Lelinski<sup>4</sup>, B. Frost<sup>1</sup>  
<sup>1</sup>Southwestern Institute of Forensic Sciences, Dallas, Texas; <sup>2</sup>Hennepin County Medical Examiner, Minneapolis, Minnesota; <sup>3</sup>University of Michigan, Ann Arbor, Michigan; <sup>4</sup>Milwaukee County Medical Examiner, Milwaukee, Wisconsin

In 2011, Gastroenterology published a Letter from the Editor describing the dissolution of the gastroenterology fellowship match in 1999, the following seven years of “unheralded chaos,” and the eventual return to a match in 2006. Forensic pathology program directors may not describe our situation as “unheralded chaos,” but many issues plague our application process. There are 40 ACGME accredited fellowship programs for forensic pathology in the United States, several of which have been newly accredited within the last year. While some programs go unfilled, some are filling years in advance, and it is now common for residents to apply and accept offers early in their second (PGY-2) year. Residents who discover forensic pathology as a possible career choice during their third or fourth years of residency find that the positions most attractive to them have already filled.

More than fifty medical subspecialties participate in either the National Resident Matching Program (NRMP) or San Francisco match (SF). Historically there has been no participation from pathology fellowships, but in 2007 the Association of Pathology Chairs (APC) formally recommended that a match be implemented by the 2011-2012 recruitment year. Despite this recommendation, there are no pathology subspecialties currently participating in a match.

To participate in the NRMP, there must be participation by 75% of the programs and 75% representation of the total number of available fellowship positions. The SF match requires a minimum number (not percentage) of programs to participate, and there is no requirement for a percentage of total positions. In addition, the SF match allows for programs to hold a certain number of positions outside of the match for internal candidates. In forensic pathology, there has historically been an even split between programs interested in a match and those opposed, but recent years have shown an increased interest.

Those programs in favor of a match cite a number of factors, including a uniform timeline for the application process and reduction of pressure on applicants to accept early, time-sensitive offers. Those programs opposed to a match cite concerns about the cost of participation, the cost of travel for applicants, and possible loss of “home field advantage” in recruiting local residents.

As the need for forensic pathologists increases, we need to critically assess whether a match system would help or hinder recruitment. This panel will provide opinions for and against a fellowship match and also address questions from the audience.

### 9.2 Cognitive Bias in Forensic Pathology: What It Is, What It Is Not, and Why You Need to Care

A.M. Baker<sup>1</sup>, G.G. Davis<sup>2</sup>, R.L. Hanzlick<sup>3</sup>  
<sup>1</sup>Hennepin County Medical Examiner, Minneapolis, Minnesota; <sup>2</sup>Jefferson County Coroner/ Medical Examiner Office, Birmingham, Alabama; <sup>3</sup>Fulton County Medical Examiner's Office, Atlanta, Georgia

Concern about cognitive bias in the forensic sciences is a hot-button issue in many forensic disciplines, as well as in the Federally convened Organization of Scientific Area Committees (OSAC) and the National Commission on Forensic Sciences (NCFCS). Accusations of cognitive bias in forensic pathology began surfacing at national forensic science meetings approximately two years ago. Within both the OSAC and the NCFCS, committees dedicated to human factors—heavily populated by

attorneys and cognitive scientists—have touted ways to mitigate cognitive bias in the forensic sciences. In forensic pathology specifically, concerns about a particular bias—contextual bias—continue to be raised.

Problems in the application of the cognitive bias moniker to forensic pathology include attorneys using ‘cognitive bias’ as a catch-all term for anything they disagree with; seeding the scientific and legal literature with cases of ‘cognitive bias’ that are actually examples of incompetence, lack of qualifications, corruption, or fraud; theorizing that because some solutions might work on the bench, they can be made to work in forensic pathology; conflating the objective documentation of autopsies with the integrative practice of diagnosing cause of death and certification of manner of death; and trumpeting inappropriate courtroom admission of manner of death as examples of ‘errors’ in forensic pathology.

Proposed solutions to contextual bias in forensic pathology come under names such as linear sequential unmasking, context management, biasing information control, and information control arrangement. All such proposals center on limiting the amount of history—in particular, information deemed ‘task-irrelevant’—available to the pathologist performing the autopsy. One newly published paradigm from a leading cognitive scientist proposes forensic pathologists working in teams: one pathologist knowing the contextual data, and deciding which data (and when) to provide to the autopsy pathologist. To date, none of these proposals has been tested in forensic pathology, no catalog of what constitutes ‘task-irrelevant’ data in forensic pathology has been provided, and no risk/benefit analysis has been performed to ensure that limiting information prior to autopsies will not do more harm than good.

Claims of cognitive bias in forensic pathology, particularly contextual bias, are unlikely to recede in the foreseeable future. Forensic pathologists must understand human factors terminology, defend forensic pathology as the practice of medicine, support the independence of forensic pathology from law enforcement and prosecutor offices, and be prepared to rebut claims of contextual bias by individuals unfamiliar with the essential role that history plays in sound medical practice.

### 9.3 Collaboration with Outside Agencies for Proper Case Resolution: The Good, the Bad and the Ugly

L.L. Bush  
Virginia Commonwealth University, Richmond, Virginia

This presentation highlights the need for enhanced interagency collaboration in future by examining a case from the past. The most frequent outside agencies any medical examiners/coroners offices interact with include local and state law enforcement, federal agencies, attorneys, funeral homes, health institutions, organ procurement organizations and the media. Many agencies, particularly law enforcement and federal agencies, tend to have a silo mentality meaning these organizations do not want to share information or knowledge with other departments in the same region or potentially working on the same case. A silo mentality reduces investigative efficiency and can be a contributing factor in failing to successfully resolve a case. Breaking down the silo mentality is an important forensic goal for the future. On occasion, proper case resolution occurs in the face of poor interagency cooperation. The tragic case of fatal attraction described here illustrates this gratifying occurrence.

The decedent was a 21-year old white female US Navy servicemember living in Virginia Beach. She lived with two other sailors, a female friend and her stalker and ultimate killer, Jared Swartzmiller. Although Jared had pursued a romantic interest in the decedent for months, over a May 11 weekend she marries another sailor who was stationed in Florida. On May 16, Jared kills her and transports her body over 500 miles to a wooded location in Massachusetts after purchasing charcoal and lighter fluid on the way. He set her body on fire in a sleeping bag on a remote

road but it was discovered due to the smokey fire. Large bloodstains and blood spatter were present throughout the decedent's bedroom allowing local police and me to conclude she was killed in her Virginia bedroom. The Virginia prosecutor was intent on trying the case in Virginia. The Massachusetts prosecutor was just as intent on handling the case in Massachusetts, as it was an election year, and refused to cooperate with Virginia authorities. That prosecutor instructed the forensic pathologist not to produce a written autopsy report and released the body to a local funeral home without refrigeration, neglecting to notify either the Virginia authorities or the family, allowing the body to decompose. I was asked to perform a second autopsy for cause of death. Only minimal first autopsy findings were communicated by phone and first autopsy thumbnail photos were provided. The rest of the presentation describes cause of death autopsy findings, interagency cooperation and successful case resolution.

#### 9.4 Medical Examiners, Occupational Health, and Collaborative Practice

R.J. Harrison<sup>1</sup>, M. Hodgson<sup>2</sup>

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Almost 4,500 deaths, mostly traumatic, are attributed to workplace exposures in the US each year. Many deaths suspected of work-relatedness are attributed to non-occupational causes for a broad set of reasons, from simple lack of information about workplace exposures through lack of testing to lack of knowledge on the part of treating physicians and pathologists. A recent Fast Track Action Committee under the White House Science and Technology Policy Council has identified major gaps in resources and collaboration. Funding and laboratory constraints often lead, among others, to lack of toxicological testing. Collaboration among Federal and State agencies, i.e., the Occupational Safety and Health Administration, State Medical Examiners, and academic centers, could improve investigations. The authors will present in detail how one investigation of events initially attributed to non-occupational factors led to characterization of a new hazard in oil and gas production and to defining a set of solutions. These cases will address both the anatomic-pathologic uncertainties, the toxicologic investigations, and the engineering assessment to document relationships between exposures to a complex mixture of volatile organic compounds and central nervous system and cardiac events. The authors will present the principles that led to the identification of these cases and describe the collaborative spirit of inquiry required to identify the cause, including the Medical Examiners in several States. The authors will present a series of occupational cases with similar investigation strategies including use of antibody staining in a lung disease death; interactions of environmental factors such as heat and exposures such as hydrogen sulfide or carbon monoxide; and investigation strategies that require documentation of the workplace hazards, from electrocution to oxygen deficiency. Finally, the authors will describe several examples of successful outreach and relationship building between medical examiners and other State and Federal workplace agencies, with important implications for occupational disease and injury reporting.

#### 10.1 Investigating Sudden Unexplained Death In Childhood at the SUDC Registry and Research Collaborative: A Novel and Comprehensive Approach

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South Carolina; <sup>5</sup>Columbia University, New York, New York; <sup>6</sup>Arapahoe County Coroner, Centennial, Colorado; <sup>7</sup>NYC OCME, New York, New York; <sup>8</sup>Southern Minnesota Regional Medical Examiner's, Rochester, Minnesota; <sup>9</sup>Travis County Medical Examiner, Austin, Texas; <sup>10</sup>Hennepin County Medical Examiner, Minneapolis, Minnesota

Sudden unexplained death in children (SUDC) is the sudden and unexpected death of a child over the age of 12 months, which remains unexplained after a thorough case investigation is conducted. According to the CDC WONDER database, it is the fifth leading cause of death in children aged 1-4 years of age, but little research has been performed. The SUDC Registry and Research Collaborative (SUDCRRCC) was created in 2014 at the NYU Langone Medical Center. It aims to compile and interrogate the world's largest SUDC cohort to determine clinical and genetic risk factors associated with SUDC, and to scientifically assess with MRI and neuropathology, the brains of SUDC cases and controls to identify findings which may contribute to death. This multisite collaborative with Columbia University and the Mayo Clinic also integrates a 12 member Forensic Pathologist panel for adjudication of cases and assessing the comprehensiveness of the investigations. Additionally, Medical Examiner and Coroner office partners enable referrals from their population base of over 40 million, representing 4 states, 2 cities and 15 counties. As of April 2016, sixty-one cases of sudden unexpected child death have been enrolled with a mean age of 31.27M and median age of 21.5M. 57.4% were Males and 43% Females. Of the first 9 cases analyzed by whole exome sequencing, two clinically relevant findings were identified: 1) a CALM1 de novo mutation found previously causative in a separate individual and associated with long QT syndrome and catecholaminergic polymorphic ventricular tachycardia symptoms and 2) a SCN1A mutation in a child with a history of febrile seizures. The FP review panelists, who are blinded to the original cause of death certification, were consistent with the opinion of the original pathologist in 4/7 cases. SUDCRRCC studies will inform the development of screening tools and preventive strategies to reduce the number of children who die prematurely from sudden and unexpected death.

#### 10.2 Should Routine Metabolic Testing Continue to Be Standard Protocol in All Sudden Unexpected Infant Death Postmortem Examinations?

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**Introduction:** Rarely, sudden unexpected infant deaths are due to inborn errors of metabolism (IEMs). IEMs represent multiple uncommon genetic disorders caused by defects in a metabolic pathway leading to accumulation of toxic products or deficiency of essential compounds. Clinical presentation includes lethargy, poor feeding, vomiting, respiratory distress, infection, seizures, cardiomyopathy, jaundice, hepatic steatosis and/or hepatosplenomegaly. Infant autopsy protocols often require extensive ancillary testing including metabolic testing. The routine performance of metabolic testing in all unexpected infant deaths has been challenged in the literature. The purpose of this study is to determine the utility of postmortem metabolic testing in all infant deaths.

**Methods:** All autopsy cases of infants less than 12 months of age were retrieved from the files at the Hamilton Forensic Pathology Unit, Hamilton, ON from 1993 to 2014.

**Results:** A total of 324 cases were reviewed with 218 cases remaining after exclusion of non-natural deaths, still births and complications of prematurity. A total of 4 deaths were attributed to IEMs, representing 1.2% of all infant deaths. The diagnosed IEMs were galactosemia, SCAD deficiency, unspecified fatty oxidation disorder and mitochondrial depletion syndrome. IEMs were diagnosed using postmortem urine assays, electron microscopy and molecular studies. 7 false positives were recognized. **Discussion:** IEMs are rare causes of sudden unexpected infant deaths. In all of our cases, the case history and/or autopsy findings

suggested a possible diagnosis of IEM. Therefore, blindly performing metabolic testing on all infant autopsies should be re-evaluated, especially when nearly all infants have been assessed at birth by the newborn metabolic screen. Directed case specific metabolic testing should be considered after assessment of the case history and autopsy findings.

### 10.3 A Disease That Should Not Be of Our Time: A Diagnosis Only Fit for Where the Sun Rarely Shines.

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Rickets was a common metabolic disease of bone of a century ago in Europe, North America and East Asia, mainly due to deficiency of vitamin D but was largely eradicated in growing children by use of cod liver oil and the introduction of vitamin D fortification of milk in the 1930s in the US. Vitamin D deficiency (VDD) remains the most common form of metabolic bone disease that is entirely preventable and treatable. The radiological and histological features of rickets are distinctive and reflect the failure of cartilage to mineralise and undergo resorption.

The case of a 3-month old female infant who was born in the winter months in the arctic region of Canada is presented. She had exhibited with flu-like symptoms over the two days preceding her death but no medical attention was sought. She was found unresponsive after she had co-slept with a 6-year old sibling on a couch and could not be resuscitated. Post mortem skeletal survey reported features suggestive of rickets (diffuse decrease in mineralization of the bone with mild cupping and fraying of the distal radial, ulnar, tibial and fibular metaphyses) with periosteal reactions of the posterior aspect of the left 9<sup>th</sup> rib and mid diaphysis of the right femur and right fibula. Post mortem revealed a normally developed female infant with no external injuries. Internal examination identified bulbous swellings of the costochondral junctions of the ribs bilaterally and a posterior callus of the left 8<sup>th</sup> rib. The radiologically flagged and pathologically abnormal bones at autopsy were all excised, fixed, x-rayed, decalcified and examined histologically alongside an undecalcified section of rib. The histological findings of the decalcified and undecalcified sections of bone confirmed diagnostic features of rickets. The post mortem vitamin D concentration was consistent with mild to moderate deficiency. The posterior aspect of the lower lobe of the right lung was consolidated and correlated with lobar pneumonia histologically. *Streptococcus pneumoniae* and *Hemophilus influenzae* were isolated from the left lung. Both middle ears contained a mucoid exudate from with *S. pneumoniae* was isolated, with a separate isolate of *H. influenzae* from the right middle ear.

The biochemistry of vitamin D metabolism and the spectrum of pathophysiological effects of vitamin D deficiency will be reviewed. The radiological and histological features of vitamin D deficiency rickets will be presented as a means of highlighting a re-emergence of a public health concern that was largely eradicated.

### 10.4 Fatal Gunshot Wounds in Young Children

J.A. Prahlow, J. deJong

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Deaths from firearms-related injuries are relatively common within the United States. Although a vast majority of decedents are teenagers or adults, occasional gunshot wound deaths occur in young children. While it can be argued that most firearms-related deaths are tragic, those involving young children as victims are particularly troubling. This paper reports on a series of young child victims of lethal gunshot injuries, focusing on the circumstances of the shootings and discussion of preventive measures that might have avoided these tragic outcomes. Included in this presentation are several cases of gunshot wound deaths occurring in young children. They include a variety of situations, including

the following general scenarios: the child was an "innocent bystander" struck by gunfire that was intended for another individual; unsafe firearm handling and manipulation by another individual, resulting in the child being shot; unsafe storage of a loaded firearm with resultant accidental discharge of the weapon; the young child having ready access to a loaded and cocked handgun and subsequently shooting himself; and the child being considered a potential intended target (or being used as a "shield" by the intended target) and being shot by another individual. The details of each case are provided, and discussion will focus on realistic strategies that, if implemented, might prevent such deaths from occurring in the future.

Advocating for strategies that reduce gun violence extend across political and social spectrums. It is not the purpose of this presentation to enter into a political debate regarding gun control; however, the strategies presented will remain within the constraints of the U.S. Constitution, as previously and currently interpreted, which guarantees the citizens of the United States the right to legally own and use firearms. Within these parameters, many of the suggested strategies are relatively straightforward and nothing more than "common sense;" however, like most safety recommendations, their usefulness is dependent on firearms users' knowledge, understanding, and implementation of them. By highlighting these tragic cases, the authors hope to heighten awareness of the devastating consequences that can occur when existing gun laws and common sense safety measures are not universally followed/employed by gun users.

### 10.5 Shallow Water Blackout: The Deadly Combination of Hyperventilation and Prolonged Breath Holding

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Shallow-water blackout is a physiologic phenomenon characterized by hypoxic loss of consciousness caused by the combination of hyperventilation and prolonged breath holding. Hyperventilation artificially drives down carbon dioxide levels and marginally increases oxygen levels. The pH, directly related to carbon dioxide levels, provides the primary respiratory drive. The victims do not experience the urgent need to surface and breathe prior to losing consciousness. This phenomenon affects recreational and experienced swimmers and is seen in snorkeling, free diving, and spear fishing. Out of 162 classified breath-hold incidents reported by the Divers Alert Network from 2010 - 2013, 25% (40) were classified as hypoxic blackout; however this is a likely underestimate of fatalities. It is prevented by avoiding hyperventilation, avoiding prolonged breath holding underwater, and not swimming alone. Other causes of breath-holding fatalities include pre-existing medical conditions, animal-involved injury, environmental conditions/rough water, entanglement, and boat strikes.

Presented is a case of an unfortunate shallow water blackout drowning in an indoor pool in four feet of water that was captured on video surveillance. The lifeguard in attendance had poor visualization of the far end of the pool due to incoming glare from the sun. His body was eventually discovered by an observer and subsequent emergency resuscitative efforts were unsuccessful. Proper scene investigation proves challenging in many of these cases where the loss of consciousness is not directly witnessed. One important aspect of the physiology of this phenomenon not observed in this case is the effect of increased depth on the partial pressure of oxygen. At depth, the partial pressure of oxygen is physiologically increased. The event of surfacing decreases overall pressure and decreases the partial pressure of oxygen, increasing the risk of hypoxic loss of consciousness. The lack of pre-existing natural disease at autopsy, proper scene investigation, and understanding of the underlying physiology are essential to this diagnosis.



## 10.6 Excited Delirium Deaths Not Involving Police Custody

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Excited delirium is a syndromic diagnosis based on a collection of signs and symptoms that commonly associates an agitated delirium with sympathomimetic drug use. Features often associated with this diagnosis include agitation, delirium, hyperthermia, violence, insensitivity to pain, attraction to glass, tachypnea, tachycardia, "superhuman strength", profuse sweating, grunting, and statements about death. Other studies have suggested that there are specific neuroanatomic features associated with a predilection to this condition. Excited delirium has a significant mortality, but is not universally fatal.

The diagnosis of excited delirium has been criticized because its use is largely limited among physicians to the specialties of Emergency Medicine and Forensic Pathology, though there are analogous terms used by other specialties. Another criticism is that this diagnosis is only invoked in the context of police custody, and may thus be used as a way of deflecting criticism of police misbehavior. A few cases of excited delirium deaths have been described not involving police action, but they have involved some other form of institutionalization such as inpatient psychiatric care.

We present two cases of fatal excited delirium in which the death occurred before police arrived. The first case involved a domestic dispute in which a man started hallucinating, became delirious and violent, then jumped through a glass window and collapsed. He was found in asystole and pronounced dead by emergency medical personnel before the arrival of police. Postmortem toxicologic evaluation was positive for cocaine, amphetamine, delta-9-tetrahydrocannabinol, and benzodiazepines. In the second case, the decedent and a friend were "partying" when the decedent became agitated and irrational, and began throwing things in the house. This behavior waxed and waned over a period of a few hours. The decedent went into the yard surrounding the house and started throwing a barbeque grill around. The friend approached the decedent from behind, wrapping his arms around the decedent until he seemed to calm down. The friend then left to get another friend to get the decedent into a car to take him to the hospital. When he and the other friend returned, the decedent was prone and unresponsive. Postmortem toxicologic evaluation was positive for cocaine, benzoyllecgonine, cocaethylene, and alcohol. In neither case was there evidence of life-threatening trauma at autopsy.

A comparison of the features of these cases with those characteristic of in-custody death will be presented.

## 10.7 Aviation Mishaps: Role of the Medicolegal Death Investigation

*E.L. Mazuchowski*

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On September 17, 1908 an airplane piloted by Orville Wright with 1<sup>st</sup> Lieutenant Thomas Selfridge as the sole passenger was involved in a mishap at Fort Meyer, Virginia resulting in the death of 1<sup>st</sup> Lieutenant Selfridge. An investigation board deemed the mishap an accident that occurred when a propeller blade broke resulting in the loss of control of the aircraft with subsequent impact with the ground. The cause of 1<sup>st</sup> Lieutenant Selfridge's death was determined to be a compound comminuted fracture of the left side of the base of the skull. These findings resulted in a design change of the aircraft and the proposition of protective equipment for aviators.

Over the past century, the goals of an aviation mishap investigation involving a fatality have remained the same: identify the individuals involved; determine what caused the mishap to occur; determine the cause of death; and make recommendations for the prevention of future mishaps and deaths. The medicolegal death investigation is a critical part

of the overall mishap investigation. The medicolegal death investigation should be able to determine the identification of the decedent, the cause of death, and the manner of death. In addition, the following questions may also be answered: what was the nature and sequence of the traumatic events; what interactions between the decedent and aircraft structures resulted in injury; was there a lethal post-mishap environment; what role, if any, did the decedent's play in the mishap sequence; and would any modification of the aircraft or its equipment have improved the chances of survival or reduced the severity of the injuries. In order to provide this information a complete medicolegal investigation including scientific identification, radiography, external examination, internal examination, and toxicology must be performed. The forensic pathologist must be familiar with scientific identification techniques, advanced radiology techniques, accelerative injuries, patterned blunt force injuries, penetrating injuries, thermal injuries, drowning, mechanical asphyxia, and the interpretation of natural disease and toxicology results. In addition, they should be familiar with mishap investigation terms such as CREEP which stands for container, restraints, environment, energy absorption and post-mishap factors and how it relates to the medicolegal death investigation. A series of cases will be presented that highlights the role of the medicolegal death investigation in aviation mishaps, including pitfalls to be avoided.

## 11.1 FBI Next-Generation Identification (NGI)

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Beginning in 1999, the FBI began maintaining the world's largest person-centric database in an effort to increase identification services to the user community. This database provided automated latent and tenprint fingerprint searches, image storage, as well as text-based searches on descriptive information. With the advancement of technology, and the need to improve identification services, the FBI developed the Next-Generation Identification (NGI) system to meet evolving biometric business needs. Today, the term "biometrics" is not limited to just fingerprints. It also includes palm prints, irises, and facial recognition. In an effort to harness new technologies, and to improve identification services, the FBI's Criminal Justice Information Services Division developed NGI. The NGI system has improved the efficiency and accuracy of biometric services to address national and international criminal justice requirements. Capabilities available within NGI include current and emerging modalities such as the Interstate Photo System, text-based searches for images of scars, marks, and tattoos, fingerprint verification services and improved identity records.

Recently, the FBI has been successful in working with the medical examiner community in the identification of "unknown deceased" individuals leveraging NGI capabilities. The FBI feels that by providing this information to the 2016 NAME Annual Meeting it will allow us to reach a wider audience in the medical examiner community and provide valuable information that is available in identification services at the federal level. We are also hoping to host a national "Cold Case/Unknown Deceased" conference in FY 2017 seeking best practices from the medical examiner community and law enforcement community. We feel that NAME will provide us with valuable contacts by which we can build an agenda for that conference.

## 11.2 Nuclear DNA Profiles from Decomposed Bone Samples

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Human remains in advanced stages of decomposition are frequently found in Massachusetts and need to be identified by the Massachusetts Office of the Chief Medical Examiner (OCME). Standard methods of identification that we use include antemortem/postmortem comparisons of fingerprints, dental X-rays and other radiographs. In some cases these

methods are unsuccessful and identification needs to be made through DNA typing. Currently, the Massachusetts Office of the Chief Medical Examiner (OCME) sends a section of bone to the University of North Texas Health Sciences Center, Center for Human Identification (UNT) for nuclear or mitochondrial DNA typing. The UNT lab performs this service through a grant at minimal cost to the submitting agency. Unfortunately, the turnaround time from sample submission to final result is approximately 8 months. In addition, there are cases in which UNT cannot obtain a full DNA profile from the sample submitted.

We have begun using a method, the NetBio® ANDE™ Rapid DNA Analysis™ System, to more rapidly obtain a DNA profile from decomposed decedents needing identification. Using the Low DNA Content PowerPlex® 16 chemistry BioChipSet Cassette with the NetBio® ANDE™ Rapid DNA Analysis™ System, eight bone samples were incubated overnight in QIAGEN Proteinase K and a buffer provided by NetBio. The sample supernatants were then extracted and pipetted onto the BioChipSet Swab for analysis. In an automated run requiring less than two hours, the ANDE system produced a full PP16 profile (16/16 loci) on 6 of 8 samples, 1 full CODIS 13 profile (15/16 loci), and 1 partial profile (14/16 loci). The three uncalled loci resulted from high signal due to sample overload, which caused the peaks to exceed the analytical threshold. This technology will enable Medical Examiner offices to generate DNA profiles from decedents quickly with minimal preparation.

### 11.3 Performance, Validation, and Field Exercise Results Supporting Use of Rapid DNA in Mass Fatality Response Human Identification Operations

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DNA testing is becoming a routine identification method in mass fatality response human identification operations. DNA testing provides the strongest biometric evidence for the identification of human remains; is required when human remains are fragmented and require re-association; and is the only biometric that associates family members to one another through kinship evaluation. Rapid DNA integrates and automates the traditional DNA processes into a field-ready device that provides emergency response staff reliable results in 90 minutes to support these requirements.

The Department of Homeland Security Science and Technology Directorate (DHS S&T), in collaboration with the Departments of Justice and Defense, jointly funded the development of Rapid DNA technology. Rapid DNA is a disposable microfluidic biochip technology that can be operated in the lab or field with minimal training. Rapid DNA provides emergency response staff with reliable results and kinship determinations on five simultaneous samples within 90 minutes. Rapid DNA can expedite human remains identification, reunite families following a mass fatality and provide investigators with on-site "investigative-leads" to help personnel make informed decisions at the scene of a disaster.

Over the last year, DHS S&T has validated the Rapid DNA performance and successfully deployed it in mass fatality response exercises. Rapid DNA was used to generate DNA reference profiles while families were providing antemortem information in the Family Assistance Center / Victim Information Center (FAC/VIC). This allows the DNA team to immediately verify if the DNA samples are sufficient for identification purposes and to take appropriate action in obtaining additional samples if necessary. This approach reduces the time and cost associated with traditional DNA testing.

We will present our experience deploying the Rapid DNA instrumentation

both in the FAC/VIC and in the field. The presentations will include performance results, validation approaches, exercise participant feedback and recommendations for future use in mass fatality responses.

### 11.4 Delayed Identification 20 Years after Death: What a Long, Strange Trip It's Been

D.H. Price, W.M. Gunther

Virginia Office of the Chief Medical Examiner, Norfolk, Virginia

This presentation will review the history of forensic developments in identification that resulted in the eventual naming of a decedent, twenty years after his body was first examined. In June, 1995, a driver and passenger died in a motor vehicle collision. The driver was identified by license and registration; but no one knew who the passenger was; detectives speculated that he might be a hitchhiker. He was a young man wearing jeans and a Grateful Dead T-shirt. His only personal effects were a yellow cigarette lighter, four quarters, and a bead and macramé necklace. A note in his pocket was addressed to "Jason". A forensic artist depicted him without facial injuries; the driver's father did not recognize him. He was assigned the temporary name, Jason Doe, which he would bear for twenty years. Forensic examination found fatal head injuries, an intact appendix, tattoos, and a pierced left earlobe. Identification attempts in 1995 included a nationwide law enforcement teletype with a detailed description, and fingerprinting; no identification. A radiologist estimated by the unfused apophyses of the iliac bones that the decedent was 18 years old. A forensic dentist found 32 teeth present, including third molars, without caries or dental work. There was no additional information for nearly 15 years. Ten years after his death, DNA analysis began with unstained tissue slides during a paternity case investigation; techniques at that time could neither include nor exclude the father. Five years later, in 2010, new DNA extracts were made from tissue blocks and unstained slides; an unstained slide yielded two contributors; a tissue block 14-locus partial short tandem repeat (STR) DNA profile excluded the decedent from the father's family. Mitochondrial DNA sequencing in 2012 rendered no useful results. In January, 2015, unrelated friends tentatively identified a depiction of the decedent on the NamUs website, as a roommate they had known briefly in 1994, who was an avid follower of the Grateful Dead. This triggered new identification work, which brought new problems. Repeated DNA analyses were required to convince the family that this was their son; they had never reported him missing because they thought he was still alive. At last his cremains were returned to them, and his long, strange trip was over.

### 11.5 Missing in Harris County Day: A Successful Initiative to Identify Unknown Decedents

S.M. Derrick

Harris County Institute of Forensic Sciences, Houston, Texas

An inspiring new initiative is spreading rapidly across the United States in the form of "Missing in Name Your Location Days." Such events (Missing Days) are designed as a practical tool to reduce the large number of missing and unidentified decedents in the United States and along the neighboring borders of Mexico and Canada. Missing Days are planned and executed through collaboration between community leaders and forensic professionals from multiple fields, including pathologists, anthropologists, medicolegal death investigators, DNA scientists, and law enforcement officers. Although Missing Days are often statewide, the breadth of Texas geography and population is commensurate with a targeted approach. Missing in Harris County Day, the first of these events in Texas, was held in April 2015. As a direct result of Missing in Harris County Day, seven long term unknown decedents were positively identified through DNA or dental comparisons. Five of these decedents may never have been identified without the DNA sample obtained at the event. The second Missing in Harris County Day, which will also include Galveston County, is scheduled for May 14, 2016.

Missing Days provide a genuine service to the public but also benefit medical examiners and coroners (ME/C), and law enforcement when cases open for identification and possible adjudication are closed. As of the most recent summary report from the National Missing and Unidentified Persons System (NamUs) in October 2014, the NamUs missing persons database contained 10,546 verified active cases (845 in Texas). The unidentified decedent cases, only entered by ME/C and their authorized registered users, contained 9,845 active cases (1337 in Texas, 345 in Harris County). Although these are significant numbers, there are many more cases that have not been reported to NamUs for various reasons. The fundamental mission of the Missing Days is to increase reporting into the NamUs searchable database and ensure that family reference DNA samples are entered into the CODIS missing persons system. This is accomplished through a combination of on-site availability to resources and public education at the Missing Day event.

The objectives of this paper are to describe the benefits of hosting a Missing Day and, based on the Harris County experience, the importance of ME/C leadership in planning and implementing the event. An overall description of the process, including successes and lessons learned, will be discussed. Case studies of the decedents identified through Missing in Harris County Day will also be presented.

#### 11.6 Partnering with Public Health: How Forensic Pathology Provide Evidence and Advocacy to Save Lives

J. Sharfstein<sup>1</sup>, D. Fowler<sup>2</sup>

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<sup>2</sup>Office of Chief Medical Examiner, State of Maryland, Baltimore, Maryland

This workshop will be led by the former health commissioner of Baltimore and health secretary of Maryland, Dr. Joshua M. Sharfstein, and the chief medical examiner of Maryland, Dr. David Fowler. Dr. Sharfstein and Dr. Fowler will discuss three specific collaborations that have had major impact in Maryland and beyond, including (1) collaboration on risks of over-the-counter cough and cold preparations, which led to their national removal from the market for children up to age 4; (2) collaboration on overdose, which led to a citywide and then statewide surveillance system, and supported an public health campaign for buprenorphine access that reduce heroin overdoses by 75%; (3) collaboration on the risks of baby bumper pads, which led to the first statewide ban on the sale of these potentially dangerous products. In describing these examples, Dr. Sharfstein and Fowler will discuss the principles of effective collaboration: communication about risks, participation in public health discussions, and coordinated advocacy. Drs. Sharfstein and Fowler will then present cases for discussion with the workshop participants, involving environmental exposures and consumer products. Participants will work in groups to develop and present for feedback a plan for engaging public health and achieving policy change. The final part of the workshop will be a discussion of the different roles of forensic pathology and public health, and how to respect these roles as part of collaborative work.

#### POSTER PRESENTATIONS

##### P1 Fatal Catecholamine-Induced Cardiotoxicity Associated with Pheochromocytoma: Report of a Postpartum Case and Review of the Literature

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Pheochromocytomas are chromaffin-cell derived neuroendocrine tumors of the adrenal medulla with the ability to synthesize and secrete excessive catecholamines. Common manifestations include paroxysmal or sustained hypertension, headache, sweating, and palpitations. Other less common manifestations have been described and can be life threatening, including

cardiovascular shock, myocardial infarction, arrhythmias, and cardiomyopathy. We report a case of a 31-year-old postpartum female with no significant past medical history who presented with headache and died suddenly in an emergency room. Autopsy revealed a pheochromocytoma of the right adrenal gland with significantly elevated metanephrine levels and acute myocardial toxicity. Sudden excessive catecholamine release can cause cardiovascular complications and be rapidly fatal without significant elevation of blood pressure. A review of catecholamine-induced cardiotoxicity will follow. Awareness of this association by the forensic pathologist is vital in order to properly classify the death and apprise relatives of the potential utility of genetic screening.

##### P2 Molecular Diagnoses of Cardiovascular Diseases Using a Multigene Panel on Sudden Cardiac Deaths

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**Background:** Sudden cardiac deaths are commonly encountered while forensic practice. A significant proportion of them are revealed to be negative autopsy, especially in Asian young adults, including Koreans. Molecular autopsy including postmortem genetic testing can be considered for these subjects.

**Material and methods:** We retrieved ten cases of sudden cardiac death revealing negative autopsy, and performed molecular genetic testing using a multigene panel of 98 genes related to the heart (hereditary heart disease, channelopathy, cardiomyopathy and etc.)

**Results:** 19 variants were identified in 12 genes amongst 98 genes and 18 variants were heterozygote and the other variant was homozygote.

**Discussion:** All variants identified in our cases were not the pathogenic mutation and their clinical significance was unknown. One variant (MYH7:c.77C>T, p.Ala26Val, heterozygote) identified in one of our case was reported to be found in the lineage of hypertrophic cardiomyopathy family. Another variant (c.5963T>G, p.Leu1988Arg, heterozygote) could be considered as a single nucleotide polymorphism related to long QT syndrome, but its allele frequency is known to be more than 1%. These features are not conclusive for confirmation of the pathogenic mutation.

**Conclusion:** Although our results are not conclusive and further research would be necessary, molecular autopsy could give us features of related genes in sudden cardiac deaths with negative autopsy.

##### P3 Association of Waist-Hip Ratio to Sudden Cardiac Death and Severe Coronary Atherosclerosis in Medicolegal Autopsies

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Various modifiable and non-modifiable risk factors, such as abdominal obesity, are known to affect the development of atherosclerotic cardiovascular disease and subsequent sudden cardiac death (SCD). There are various anthropometric measurements to assess central adiposity. The waist-hip ratio (WHR, i.e. waist circumference divided by hip circumference) is a surrogate marker of visceral obesity that has been shown in various studies to be a better predictor of cardiovascular risk than the body mass index (BMI), a measurement of generalized obesity.

**Objectives:** To determine whether there is any association of increased WHR with SCD or severe coronary atherosclerosis (SCA, coronary artery diameter stenosis  $\geq$  75%).

**Methods:** WHR measurements were determined prospectively on all medicolegal autopsies performed at the Hamilton Regional Forensic Pathology Unit during one year. The complete case reports were reviewed

and known cardiovascular risk factors (diabetes mellitus, hypertension, hyperlipidemia, cigarette smoking) were examined in addition to measurements of WHR, BMI and heart weight. Logistic modeling was performed to determine any association between the cardiovascular disease risk factors, WHR, BMI, heart weight, and SCD or SCA.

**Results:** 203 cases had complete data and satisfied inclusion criteria (age > 18 years, complete remains, none/minimal decomposition). There were 62 (30%) females and 141 (70%) males with a mean age of 52 years. SCD occurred in 46 (23%) individuals. WHR was not shown to be statistically significantly associated with either SCD [odds ratio (OR) = 1.1; 95% confidence interval (CI) = 0.7 to 1.8;  $p = 0.68$ ] or SCA (OR = 1.4; 95% CI = 0.9 to 2.2;  $p = 0.14$ ). BMI was shown to be significantly associated with SCA ( $p < 0.001$ ), and heart weight was shown to be significantly associated with both SCD and SCA ( $p < 0.001$ , both).

**Conclusion:** WHR, as a surrogate marker of central obesity and increased risk of atherosclerotic cardiovascular disease, has been shown not to be statistically significantly associated with either SCD or SCA in postmortem cases.

#### P4 Left-Dominant Arrhythmogenic Cardiomyopathy

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**Introduction:** Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D) is now a well-recognized entity that can cause sudden death. The literature to date reports the estimated prevalence of ARVC/D ranging from 1 in 2,000 to 1 in 5,000, with a male to female ratio of 3:1. Most commonly, ARVC/D has an autosomal dominant inheritance pattern with reduced penetrance and variable expression, with 12 linked genes involving various elements of the cardiac desmosome. Grossly at autopsy, the right ventricle may be paper thin and semi-translucent or the wall may be thickened by mature fat. Histologically, ARVC/D shows transmural fatty infiltration of the right ventricle with patchy fibrosis and chronic inflammatory cells. Similar findings in the ventricular septum and/or left ventricle have been assumed to be due to involvement by ARVC/D. Isolated histologic changes of subepicardial or intra-mural prominent fatty infiltration with fibrosis may be mis-diagnosed as a healed myocardial infarct or healed myocarditis by forensic pathologists. If the fatty infiltration with fibrosis is not in the area of a specific coronary artery distribution, it is unlikely due to a myocardial infarct. These isolated histologic findings are now interpreted as a subtype of ARVC/D, and has been dubbed left-dominant arrhythmogenic cardiomyopathy (LDAC) (also known as left-sided ARVC or arrhythmogenic left ventricular cardiomyopathy). Recognition of this entity is essential for accurately determining cause of death and for families of the deceased who can seek screening, genetic counseling, and treatment for this often fatal and progressive disease.

**Case Reports:** We present two cases of sudden cardiac death caused by left dominant arrhythmogenic cardiomyopathy. Both cases showed foci of myocyte replacement by mature adipose tissue admixed with dense fibrosis limited to the left ventricle. The first case was a 61 year old man found dead in bed with a medical history of hypertension and seizure disorder. The second case was a 33 year old woman who woke with cough and died suddenly. Her medical history included morbid obesity and hypertension.

**Conclusion:** Left-dominant arrhythmogenic cardiomyopathy is an autosomal dominant disease process with a 50 percent probability of inheritance. A careful family history should be taken in these cases, focusing on unexplained premature deaths, arrhythmia symptoms and conduction system disease. This entity must be recognized by the forensic pathologist investigating sudden, unexpected death in order to collect the

appropriate specimens for genetic testing and notify the family in order for first-degree relatives to be appropriately evaluated.

#### P5 Analysis of Sudden Cardiac Deaths of Young Adults in Forensic Autopsy Cases

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The World Health Organization (WHO) defines sudden cardiac death (SCD) as death due to cardiac causes within 1 hour of the onset of symptoms in a person with known or unknown cardiovascular disease. It is estimated that more than 7 million lives per year are lost to SCD worldwide. The objectives of the study are to (1) analyze the cause and risk factors SCD and (2) to improve the level of awareness of SCD and emergency treatment. This is a retrospective review of forensic autopsy cases from Tianjin Public Security Bureau (TPSB). This study focused on the clinical history, death scene presentation, and autopsy findings of SCD. A total of 11 SCD cases were identified by our review. Of the 11 cases, 10 were male and 1 female. The age ranged from 18 years to 38 years. Nine of the 11 individuals had significant medical history. One person had recent cold symptom. And the other person had occasional palpitations syncope in the past six months. Three of the individuals suddenly collapsed during altercation. The causes of SCD included myocarditis (N=4), rheumatic heart disease (N=2), atherosclerotic cardiovascular disease (N=1), hypertrophic cardiomyopathy (N=1), dilated cardiomyopathy (N=1), cardiac arrhythmia associated with lesions in the conduction system (N=2). In China, the number of SCD has increased in the recent years, especially in the young adults' population. The cause of sudden death in young adults with non-coronary heart disease, such as myocarditis and cardiomyopathy is a big concern. The detailed scene investigation findings and postmortem examination finding of SCD in young adults are presented. Key words: sudden cardiac death, young adult, myocarditis, cardiomyopathy, and forensic autopsy

#### P6 A Tale of Two Brothers: Two Cases of Adrenomyeloneuropathy

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Adrenomyeloneuropathy (AMN) is the adult variant of adrenoleukodystrophy. It is X-linked and about 50% of female carriers will manifest some symptoms. Clinically, it presents with ataxia, adrenal insufficiency, visual defects, bowel and bladder dysfunction, and seizures. The testes are also affected. The apparent biochemical abnormality is decreased activity of VLCF acyl-CoA synthetase, which causes increased levels of very long chain fatty acids (VLCFA). This eventually causes a lipotoxicity-induced demyelination. The disease progresses slowly to spastic paraparesis, disability, and death.

We present two cases of brothers, both of whom had been diagnosed with AMN prior to death and who died within two months of each other. The first died from injuries resulting from a traffic collision. He was not at fault and a witness noticed no problems with his driving. However, the family was surprised that he could drive. The second was found dead at home after the family had not heard from him for 24 hours. He was not able to care for himself and needed a walker to ambulate. He had not seen a doctor for 20 years, according to the family. Of interest, a third brother had previously committed suicide because he did not want to live with his AMN. The cause of death in the first case was certified as multiple blunt trauma, with no contribution of the AMN. The manner was accident. The cause of the death in the second case was certified as AMN. The manner was natural.

**P7 Pulmonary Tumor Microemboli Mimicking Acute Pulmonary Embolism as a Cause of Sudden Death**

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Pulmonary tumor microemboli, while not uncommon in patients with solid tumors, is a diagnosis rarely made antemortem. Clinically, patients may present with dyspnea, cough, chest or abdominal pain, symptoms of right heart failure, hypoxemia, and fulminant respiratory failure, all of which can mimic other intrathoracic processes. There is often no radiologic evidence. Tumor microemboli are distinct from tumor macroemboli, which would be expected to present like massive pulmonary thromboemboli. Microemboli, on the other hand, more closely mimic infection or interstitial lung disease, with diagnosis typically made at autopsy. Physiologically, pulmonary tumor microemboli may result in pulmonary hypertension, right ventricular failure and acute cor pulmonale via acute or chronic occlusion of small arteries and arterioles.

Herein we discuss a 66-year-old man with a history of diabetes and obstructive sleep apnea who originally presented to a local emergency department with altered mental status. Workup in the emergency department including abdominal ultrasound and liver function tests indicated hepatic encephalopathy due to previously undiagnosed cirrhosis. During his initial evaluation he was also diagnosed with acute respiratory failure and placed on 15 L of oxygen. The patient developed worsening hypoxemia, tachypnea and tachycardia, ultimately progressing to bradycardic arrest unresponsive to medical and electrical cardioversion. Due to the clinical suspicion of pulmonary thromboembolism, tissue plasminogen activator (TPA) was administered; however he ultimately expired despite aggressive resuscitation.

Autopsy examination was performed to clarify the etiology of his sudden cardiac arrest. Hepatic cirrhosis was confirmed, and he was found to have a previously undiagnosed intrahepatic cholangiocarcinoma with hemorrhagic tumor nodules diffusely involving the liver. The lungs were markedly edematous with a combined weight of 2550 grams; no gross evidence of neoplasia or large arterial emboli were present. Microscopically, the pulmonary small arteries and arterioles contained occlusive aggregates of tumor cells. No additional metastatic lesions were identified.

The forensic pathologist must be aware of tumor embolism as a possible cause of sudden death, and should consider autopsy in the setting of respiratory failure or when given a history suggestive of massive pulmonary embolism to rule out tumor macro- or microembolism, with or without a known underlying malignancy.

**P8 Acute Pancreatitis from Obstructive Cholelithiasis Presenting as Sudden, Unexpected Death: A Case Report and Review of the Literature**

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Acute pancreatitis is a fairly common medical condition ranging from mild and self-limiting to severe and even fatal. It can be induced by a variety of situations that all ultimately lead to inflammation, release of pancreatic enzymes, and auto digestion of the pancreas. The two most common causes of acute pancreatitis are long-term alcohol use and gallstones, totaling approximately 70-80% of cases. Gallstones may become lodged in the cystic duct or common bile duct creating obstruction. Other causes include idiopathic, hypercholesterolemia, endoscopic retrograde cholangiopancreatography (ERCP), and a variety of medications. Symptoms include nausea, vomiting, and abdominal pain, which may radiate to the back. Complications include pseudocysts, peritonitis, abscess formation, sepsis, multisystem organ failure and death. The

mortality rate ranges from 10-30% depending on the etiology, severity, and co-existing factors. Postmortem studies of fatal acute pancreatitis in the medicolegal autopsy population are sparse. Acute pancreatitis from obstructive cholelithiasis diagnosed at autopsy presenting as sudden death is rarely reported in the medical literature.

We report a case of a 29-year-old White non-Hispanic man who had a two-day history of worsening nausea, vomiting and diarrhea prior to being found dead in bed. The decedent had no other significant past medical history and no history of drug or alcohol use. Significant findings at autopsy included fat necrosis most concentrated around the pancreas with the pancreas demonstrating acute hemorrhagic necrotizing pancreatitis. The gallbladder contained greater than 20 yellow stones and an obstructive stone was found within the cystic duct.

In cases of sudden, unexpected death with a recent history of nonspecific gastrointestinal symptoms, acute pancreatitis must be on the differential diagnosis. When acute pancreatitis is suspected, the gallbladder, pancreas and proximal duodenum should be removed en bloc and the gallbladder, cystic duct and common bile duct should be carefully examined for obstructive stones. The obstruction may be transient or persistent. The typical location for biliary stone disease resulting in pancreatitis is at the sphincter of Oddi. However, even if no gallstones are impacted causing obstruction at the time of autopsy, gallstone pancreatitis cannot be excluded because a small stone that may have passed could have caused a brief harmful obstruction at one point in time. This case illustrates the importance of obtaining a thorough medical history and altering dissection and evisceration techniques to identify the etiology of acute pancreatitis in patients with nonspecific gastrointestinal symptoms presenting with sudden, unexpected death.

**P9 Undiagnosed Pheochromocytoma Simulating Malignant Hyperthermia.**

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**Introduction:** Pheochromocytomas are rare catecholamine-producing neuroendocrine tumors arising from chromaffin cells of the adrenal medulla or extraadrenal paraganglia. It is surgically curable, and can be lethal if remain undiagnosed. Autopsy studies have indicated that a significant proportion of pheochromocytomas remain undiagnosed during life. We report a patient diagnosed with malignant hyperthermia earlier, but later found to have pheochromocytoma on autopsy.

**Case report:** Following a pre-procedural pain block for elective right shoulder arthroscopy, 53 year-old hypertensive Caucasian male complained of chest pain which resolved in 15 minutes. EKG was normal. During induction in the operating room, he had increased blood pressure. Post-operatively, he developed pulmonary edema. His blood pressures dropped from 220s to 80s. He later developed malignant hyperthermia and died following unsuccessful attempts to stabilize him.

**Autopsy:** Autopsy revealed a 10 × 8 × 7.5 cm mahogany colored, circumscribed right adrenal encapsulated tumor weighing 530 grams. It was necrotic, hemorrhagic and cystic along the cut surface. Relicts of yellow-orange adrenal cortex were visible at the margin of the tumor, indicating that tumor clearly originated from the underlying adrenal gland. The left adrenal gland was unremarkable. H and E sections of the adrenal tumor showed hyper-cellularity with focal hemorrhage. Cells showed Zellballen i.e. alveolar pattern in vascular network, with finely granular basophilic cytoplasm and round to oval nuclei. They were slightly pleomorphic with rare mitoses. The immunohistochemical stains highlights synaptophysin and chromogranin in the tumor cells, confirming the diagnosis of pheochromocytoma. 24 hours urine sample collected before his death, showed >22727 microgram/gram CRT metanephrines and normetanephrines. Overall, findings were impressive for a hyperactive

tumor secreting high levels of catecholamines. The cause of death was established as the complications of pheochromocytoma during general anesthesia for shoulder arthroscopy and the manner of death was natural.

**Conclusion:** Hypermetabolic response during anesthesia and surgery is unusual and can be from several etiologies such as thyroid storm, malignant hyperthermia and pheochromocytoma. This case illustrates how pheochromocytoma can mimic malignant hyperthermia, and it should always be considered and managed appropriately in such scenarios to avoid untoward consequences. Pathologist should also be aware of this when conducting autopsy in cases with prior clinical diagnosis of malignant hyperthermia.

**P10 Simultaneous Sudden Death of Two Siblings During Sleep While in Police Custody: A Report of Two Cases**

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Sudden Adult Death Syndrome (SADS) refers to sudden unexpected death of young adults and the cause of death is unexplained after thorough death scene investigation and complete autopsy examination. Since it was first noted among Hmong refugees in the US in 1977, there have been many reports worldwide. Here, we present two rare cases in which two brothers died in different cells during sleep while they were at the detection center. One was a 47-year-old and the other was a 33-year-old. According to the report from the on duty officer, the two brothers woke up and went to the bathroom around 2 - 3 a.m. Then they went back to their separate cells with other inmates. The next morning, the older brother was found unconsciousness by his inmate. Resuscitation was performed at scene and he was pronounced dead on his way to the hospital. Three hours later, the younger brother was found unresponsive in bed. He was pronounced dead at scene. Because both brothers died while in police custody and they died almost simultaneously, their family strongly suspected foul play. Autopsies were conducted the next day. External examination revealed that both men were well developed and well nourished males. There was no evidence of recent injury. Internal examination revealed scattered petechiae on the surface of the heart and lungs. No other significant findings by gross examination. Histological examination of the older brother showed 75 - 90% atherosclerotic stenosis of the proximal and distal left anterior descending coronary artery. His heart weighed 415 grams. The younger brother had about 25% atherosclerotic stenosis of the proximal and distal left anterior descending coronary artery. His heart weighed 470 grams. Postmortem toxicological analysis was negative for alcohol and drugs. The cause of death of the 47-year-old brother was atherosclerotic cardiovascular disease coronary heart disease. The cause of death of the younger brother was certified as SDAS. Further investigation revealed that neither brother had any reported medical condition. However, according to the family, one of their brothers was found dead during sleep several years ago. The importance of thorough death scene investigation findings and review of medical and family history will be discussed. In addition, possible contributing factors, such as genetic component and the psychological impact in police custody will be addressed.

**P11 Unusual Brain "Abscesses" in an IV Drug Abuser**

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Drug overdose, infection, trauma, and AIDS-related complications are the most common causes of death worldwide among people who use intravenous drugs. We report a case of a 41-year old woman who expired shortly after presentation to the emergency department. Her family reported several days of fatigue and altered mental status; however, these symptoms were attributed to a history of intravenous drug use and a seizure disorder. Physical exam revealed an enlarged right inguinal lymph node and fixed and dilated pupils with a Glasgow Coma Scale score of 3. Imaging showed uncal herniation, cerebral edema, and

multiple ring-enhancing lesions. Initial differentials included septic emboli with abscess formation, toxoplasmosis (HIV-related infection), and lymphoma. Care was withdrawn due to poor prognosis, and the family requested an autopsy. To our surprise, what were clinically thought to be inguinal and brain "abscesses" were positive for S-100 and Melan-A and only focally positive for cytokeratin AE1/AE3, consistent with metastatic melanoma (despite unknown primary). This case highlights the importance of complete autopsies in cases that may seem to be clearly due to drug overdose or complications of drug abuse.

**P12 Zebras Make Hoofbeats, Too: A Fatal Case of Occult Budd-Chiari Syndrome**

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Budd-Chiari syndrome (BCS), or hepatic venous outflow obstruction, is a rare complication of the myeloproliferative neoplasms (MPN), including polycythemia vera. Often the onset of BCS is clinically silent, with the development of symptoms such as fever, abdominal pain and lower limb edema heralding a poor patient outcome.

We present a case of Budd-Chiari syndrome that was identified on autopsy. The patient, a 66-year old obese Caucasian female with a history of polycythemia vera, presented to an outside hospital with complaints of right upper quadrant pain, fever, nausea and vomiting concerning for acute cholecystitis. Laboratory workup showed elevated bilirubin and transaminases, and she subsequently underwent emergent cholecystectomy. Her post-operative recovery was complicated by progressive renal and liver failure of unclear etiology, thus she was transferred to our center for continued care. Her clinical picture was suspicious for a bile leak, though none could be identified by endoscopic retrograde cholangiopancreatography (ERCP). Her body habitus precluded imaging studies from appropriately visualizing the hepatic vasculature. The patient had a prolonged clinical course of worsening liver and renal failure, eventually progressing to encephalopathy and respiratory failure. Comfort care was initiated, and the patient unfortunately expired.

A limited autopsy demonstrated an obese Caucasian female with marked anasarca. Internal examination revealed hepatosplenomegaly with extensive bilateral occlusion of the hepatic veins, as well as multiple bilateral pulmonary emboli. The lungs and spleen demonstrated numerous gross infarcts. Histological examination of the hepatic veins demonstrated extensive organized thrombosis and massive perivenular necrosis with associated hemorrhage. The cause of death was attributed to multiorgan failure secondary to hepatic vein occlusion and subsequent necrosis, consistent with Budd-Chiari syndrome.

In retrospect, the patient's symptomatology prior to her cholecystectomy was suggestive of acute hepatic vein occlusion, but could easily be interpreted as acute cholecystitis. The patient's body habitus and worsening renal function limited the utility of imaging studies to identify a hepatic vein obstruction. We present this case to demonstrate the importance of an expanded differential diagnosis despite a seemingly common clinical presentation. While primary Budd-Chiari syndrome is rare, it should be considered in any patient with persistent, unexplained hepatopathy and a history of a myeloproliferative neoplasm.

**P13 WITHDRAWN**

**P14 Causes of Sudden Death in Schizophrenia Patients: A Forensic Autopsy Population Study**

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Schizophrenia is a detrimental psychiatric disorder, with an increased mortality from natural and non-natural causes and a much shorter life expectancy than in the general population. Subjects and methods: this study was a retrospective review of autopsy cases of all the individuals with medical history of schizophrenia investigated by the Office of the Chief Medical Examiner (OCME), in the State of Maryland over a 5-year period from 2008 to 2012. The cases were analyzed as to the general characteristic of the individuals (age, gender, and race); medical history; death scene investigation findings; autopsy and postmortem toxicological findings; and cause and manner of death. Result: from 2008 to 2012, a total of 391 schizophrenia patients were autopsied at the OCME because they died suddenly and unexpectedly. Their age ranged from 15 to 100 years with the mean age of 52 years. Of the 391 deaths, 191 (48.8%) were white, 185(47.3%) were African American, and 15(3.9%) were either Hispanic or Asian. The male and female ratio was 1.5:1. The majority of the deaths (251, 64.2%) were caused by natural diseases, 47 deaths (12.0%) were accidents, 45 deaths (11.5%) were suicides (11.5%), and 10 deaths (9.7%) were homicides. The manner of death remained undetermined in 38 cases (9.7%). Of the 251 natural deaths, 198 cases were due to cardiovascular diseases (50.6%). Atherosclerotic cardiovascular disease (ASCVD), hypertensive atherosclerotic cardiovascular disease (HASCVD) and hypertensive cardiovascular disease (HCVD) were the primary diagnoses of cardiac deaths (169 in total, 85.4%). Cause of death was listed as cardiac arrhythmia in 11 cases. This diagnosis was made based on postmortem scene investigation (sudden death with no evidence of suspicious), review of medical history (no history of any other medical diseases), complete autopsy with no identifiable macroscopic and microscopic abnormal findings, and negative toxicological tests. Of the 11 cardiac arrhythmia deaths, 7 patients were less than 40 years of age. Drug intoxication was the second most common cause of death in our study group (50 cases, 12.8%). In conclusion, the study shows high fatality caused by cardiovascular diseases and drug intoxication among schizophrenia patients, which calls attention of the medical community to closely monitor the high risk factors of sudden death among schizophrenia patients.

**P15 Sudden Death Due to Pulmonary Thromboembolism While in Police Custody: A Report of Three Autopsy Cases**

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Pulmonary embolism (PE) is a potentially life threatening complication of deep vein thrombosis (DVT) and can lead to sudden death. There are many risk factors for development of DVT. People who have a history of recent prolonged sitting (as with air travel) or bedrest are known at risk for developing DVT and PE. Sudden death from PE secondary to prolonged restraint in police custody are rarely reported in the literature of forensic sciences.

We present three cases of sudden death due to PE while they were in police custody.

Case 1 was a 42-year-old man who was arrested for theft. Reportedly, he was very combative during interrogation so that he was restrained in sitting position for four days in a local police station. His physical activities were limited to eating, drinking, sleeping in a restrained position, and going to bathroom. On the day 4, he suddenly collapsed. He was

transported to a local hospital and was pronounced dead after 3 hours of resuscitation.

Case 2 was a 43-year-old woman who was arrested for suspicion of economic crime. During inquisition, she was shackled in sitting position on a chair for about 20 hours. The subject was quiet almost of time. Reportedly, she was restrained in the sitting position during the entire interrogation without any physical movement except for drinking very little water. She suddenly collapsed when she got up to go bathroom. She was pronounced dead after about 2 hours of resuscitation.

Case 3 was a 48-year-old man who was found pale with abnormal breathing after 26 hours of restraint in a local police station. He died on arrival in a local hospital.

Postmortem examination revealed that all the three decedents died of pulmonary embolism due to deep vein thrombosis. No other significant natural diseases were found at autopsy. No drug or alcohol were detected. The detailed scene investigation findings will be presented and risk factors for sudden death during restrain in police custody will also be discussed.

**P16 Genomic Analysis of Oxygen-glucose Deprivation in Primary Culture Cortical Neurons**

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Cerebral ischemia-reperfusion injury (IRI) is a common clinical pathological process, and it is a key step in causing further ischemic organ damage. Understanding endogenous mechanisms of neuroprotection may have important clinical applications. However, the mechanism responsible for the cortical neurons to global ischemia remain are still not fully understood. To identify genes and pathways that are dysregulated as a consequence of cerebral ischemia, we investigated mRNA expression differences in mouse primary culture cortical neurons with oxygen-glucose deprivation (OGD) versus normal controls by differential RNA-seq analysis. Here we describe the RNA-seq data derived for two biological replicates of mouse primary culture cortical neurons with or without OGD, and present the bioinformatics pipeline used to test for differential gene expression and pathway enrichment analysis. A total of 7744 genes showed significant differential expression after OGD and were enriched for genes associated with neuroactive ligand-receptor interaction, calcium signaling and axon guidance. There was additional enrichment for genes involved in MAPK signaling, long-term potentiation (LTP), focal adhesion and ECM-receptor interaction. These findings improve the biological understanding of how the cortical neuron behaves after ischemia, and also illustrate some possible underlying molecular mechanisms of cerebral ischemia.

**P17 Intracerebral Glioneuronal Heterotopia: A Case Report of Sudden Death in a Young Adult Epileptic Patient**

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**Context:** Heterotopias of the brain and brainstem are a group of disorders that results from a failure of normal neuroblast migration during embryological development, thus leading to cytologically normal neurons and glial cells in abnormal locations<sup>1</sup>. The symptoms are variable depending on the location of the heterotopic tissue and may range from an asymptomatic course to severe epilepsy or mental retardation.

**Design:** Here we report a case of intracerebral glioneuronal heterotopia that presented as sudden death in a young adult in order to highlight the

importance of neuropathological examination of the brains in patients with a history of epilepsy.

**Results:** A 35-year-old man with a history of epilepsy since the age of 16 was found prone in his bed, cold to the touch, with rigor mortis and fixed lividity, by his family members doing a wellness check. The autopsy examination negative for evidence of trauma and toxicologic tests did not detect any substances of forensic significance. In the neuropathologic gross examination, the brain was non-edematous and without herniations. Areas consistent with heterotopic grey matter were observed extending from the ependyma of the lateral ventricle, within the cortical grey matter, and within the periventricular white matter. Microscopically, these areas showed subependymal gliosis with Rosenthal fibers-like structures and multiple corpora amylacea. Additionally, there were clusters of neurons within the white matter, including motor neurons, which lacked organization and were accompanied by gliosis and ectatic vessels, consistent with glioneuronal heterotopy. The remainder of the autopsy examination revealed no other abnormalities.

**Conclusions:** Intracerebral glioneuronal heterotopy may be present in patients with a history of epilepsy. Consideration of this entity as a part of the differential diagnoses in cases of sudden unexpected death in patients with epilepsy with or without evidence of a seizure may be helpful for accurate determination of the cause and manner of death.

#### **P18 A Case of Previously Unsuspected Huntington's Disease Diagnosed at Autopsy**

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Huntington's disease (HD) is a neurodegenerative disorder with a worldwide prevalence of 5 – 10 per 100,000. It is characterized by choreiform movements, behavioral disturbances, and eventual mental decline. Symptoms usually present between 30 and 50 years of age, and the diagnosis is made based on the combination of clinical symptoms, family history, and genetic testing. The inheritance pattern is autosomal dominant and the disease is caused by an elongation of the CAG repeat in the Huntingtin gene. There are several reports of diagnoses of Huntington's disease confirmed at autopsy in the literature, but to our knowledge there are no reports in the literature of new diagnoses of Huntington's disease being made at autopsy. We present a case of a 28-year-old male who at autopsy macroscopically showed bilateral lateral ventricle dilation and atrophy bilaterally of the head of the caudate nuclei, and microscopically showed bilateral severe neuronal loss and gliosis of the caudate and putamen nuclei. Genetic testing for the number of CAG repeats was undertaken.

#### **P19 Shaken But Not Forgotten**

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We present neuropathological findings of a 32-year-old man of being shaken during his infancy and had survived 31 years after suffering the traumatic abusive head injuries. He had neurological deficits and Gross examination of brain was remarkable for a small area of intraparenchymal bleed into the right frontal lobe. The hemorrhagic areas show subacute – chronic infarction with macrophages, neovascularization, loss of neurons and gliosis, and were consistent with history of hypotensive episodes due to septicemia due to lung infection. White and gray matter and deep brain nuclei were unremarkable on gross examination and routine histological stains. Sections of corpus callosum genu and splenium were stained with Bielschowsky (silver stain), Luxol fast blue, beta amyloid, phosphorylated Tau and neurofilaments stains to rule out diffuse axonal injury. Bielschowsky stain showed preservation of axonal cytoskeleton. Luxol fast blue was unremarkable for demyelination. Beta amyloid and Tau stains were negative for beta amyloid and Tau deposits, respectively. Phosphorylated neurofilaments staining showed relative loss of

expression in the corpus callosum highlighting the persistent cytoskeletal abnormalities that have been attributed to diffuse axonal injury. Traumatic injuries have been demonstrated to result in reductions in the inter filament spacing post injury, either due to altered phosphorylation or proteolysis of the side arms (NF compaction) (Siedler). NF compaction leads to decreased immunoreactivity to the neurofilaments stain, and can be seen as early as 6hrs (Ann Mae DiLeonardi). Our case showed loss of neurofilaments even after a prolonged survival of 32 years, suggestive of a far longer time-course of changes following injury. In acute and subacute setting of diffuse axonal injury  $\beta$ -Amyloid precursor protein (APP) accumulate in the axonal swelling and terminal bulbs and APP is enzymatically cleaved to generate A $\beta$  peptides. Geddes et.al showed axonal bulbs consistently lose positive  $\beta$ -APP labeling after about a week, and no labeling may be obtained if a nerve fiber was injured more than 30 days before death. In our case, immunohistochemical stains do not highlight the accumulation of A $\beta$  peptides. We propose use of neurofilaments immunohistochemical stain as a marker for ongoing axonal injuries in traumatic head injury cases with prolonged survival.

#### **P20 Primary Cardiac Tumors in Infancy: A Case Report**

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Primary cardiac tumors leading to sudden death in infancy are rare. Here, we describe a case of a primary cardiac fibroma that first presented as sudden death in an infant. An 8.36-month-old male infant, without any previous medical history, died suddenly in the city of Medellin-Antioquia, Colombia. The family stated that approximately 15 minutes after he received a bottle-feeding, the baby became cyanotic and subsequently lost consciousness. He was taken to the hospital immediately; however, he arrived lifeless. The forensic autopsy revealed a well developed infant with central and peripheral cyanosis, without signs of trauma. The internal examination revealed a single cardiac tumor in the anterior region of the left ventricle. The mass was white and whorled; microscopic findings were compatible with fibroma. The manner of death was natural due to cardiogenic shock and the cause of death was determined as a primary cardiac tumor.

Fibromas are the second most frequent primary tumor in the pediatric population, they can cause multiple symptoms including outflow obstruction, arrhythmias, syncopal episodes and sudden death. Grossly they are solitary, well-circumscribed intramural lesions, that are homogenous white in color. These tumors originate from fibroblasts of the connective tissue and the majority are located in the free wall of the left ventricle or the intraventricular septum. Histological examination shows an unencapsulated neoplasm comprised of fusiform cells without atypia that infiltrate and displace the normal underlying myocardium. There may be areas of calcification and occasional foci of necrosis or areas of cystic degeneration due to its large growth.

Consideration of this entity, information about the pre and postnatal history, along with the circumstances of the death, and autopsy findings are important for the accurate determination of the cause and manner of death. Also it is important to determine the prevalence of this entity in our population.

#### **P21 Pericardial Tamponade in a 2-Month Old Infant**

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This is the case report of the sudden unexpected death of a two-month old infant male due to an acute pericardial tamponade due to a ruptured coronary artery aneurysm due to Kawasaki's disease. The infant was a term delivery with no issues with pregnancy, delivery or neonatal period.



He was previously healthy except for recent congestion diagnosed as bronchitis. The mother was breast feeding when the infant suddenly became unresponsive and could not be resuscitated. A complete autopsy and infant death workup was performed including high resolution x-rays, metabolic screen, cultures (bacterial and viral) and toxicology. There was no evidence of injury. Cultures, metabolic screen and toxicology were negative. On autopsy 125 cubic centimeters of partly clotted blood was present in the pericardium. The coronary arteries were dilated and partly thrombosed and there were tears of the right and left coronary arteries. On histology there was fibrinous degeneration and lympho-histocytic infiltrates of the coronary artery walls. A similar vascular degeneration was present within vessels of the kidneys. The brain was examined by a neuropathologist and there were no findings except for ischemic changes. The diagnosis of Kawasaki's vasculitis was made. This is the leading cause of acquired heart disease of children. This disease occasionally first presents to the medical examiner's office as a sudden unexpected infant death.

**P22 A Complex Case of Loey's-Dietz Syndrome: An Autopsy Report and Review of the Literature**

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Loey's-Dietz syndrome, a rare autosomal dominant genetic disorder characterized by germline mutations in the transforming growth factor beta (TGF $\beta$ ) signaling pathway, is an inherited cause of predisposition to aneurysm formation in children. The underlying connective tissue disease results in dilation and weakening of arterial walls that can lead to aneurysmal rupture, dissection, and sudden cardiac death. In affected individuals, aortic surgery is often required early to prevent rupture or dissection of life-threatening aneurysms, with the timing and technique utilized dependent on the age of the patient, absolute dimension of the aorta, rate of progression of dilatation, genotype, and aortic valve function. A common route of aortic stabilization is via the Bentall procedure, where the aortic root is replaced with a porcine aortic valve attached to a Carpentier-Edwards conduit with a second conduit at the transverse arch anastomosed to the native transverse arch. While aortic root stabilization can prevent dissection, there is a risk of graft dehiscence in a growing child, as well as a nidus for infection due to the presence of synthetic material. We identified both of these therapy-related complications in an autopsy of a young girl with Loey's-Dietz syndrome.

We present a case of a 6-year old child with Loey's-Dietz syndrome who developed an annular aortic valve abscess and ascending septic dissection of the aorta due to *Staphylococcus aureus* valve endocarditis. A porcine aortic valve of a Bentall graft was identified as the source of infection. Porcine prosthetic valves increase the risk of infectious endocarditis, aortic stenosis, and sudden death. Endocarditis of porcine valves usually affects the cusps, with annular infection being uncommon, where both vegetations and annular abscess were identified in the decedent. Aortic valve endocarditis led to aortic insufficiency and stenosis with partial dehiscence of the graft material. The increased pressures within the aortic root caused further dilatation, surrounding the graft, leading to dissection of the aorta, hemodynamic decompensation and death. Within this case, multiple complications from Loey's-Dietz syndrome were seen in a single patient, including prosthetic valve infection, aortic root aneurysm and dissection, and septic emboli. Loey's-Dietz syndrome should be considered in the differential diagnosis, along with Marfan's and vascular Ehlers-Danlos' syndrome, when an aortic root aneurysm or dissection is seen in a child. Screening of family members should also be considered, due to the autosomal dominant inheritance of this disorder.

**P23 Fatal Rotavirus Infection in a Four-Year Old with Unsuspected Autoimmune Adrenal Insufficiency**

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The diagnosis of adrenal insufficiency is often delayed, as the presenting symptoms of fatigue, abdominal pain, and anorexia are vague and nonspecific. However, timely diagnosis and treatment with replacement steroids are needed to prevent fatal adrenal crisis. While the most common cause of primary adrenal insufficiency in childhood is congenital adrenal hyperplasia, a significant minority (up to 15%) is caused by autoimmune destruction of the gland. We present a case of a four year old, previously healthy child who had a one day history of nausea and vomiting, and was found unresponsive by her caretaker. Despite emergency rescue and transport to the hospital, she was pronounced dead. At autopsy, the adrenal glands were atrophied. Histologic examination revealed lymphocytic infiltration of the bilateral adrenal glands, consistent with autoimmune adrenal insufficiency. PCR detection was positive for rotavirus. The cause of death was determined to be adrenal crisis in the setting of rotavirus gastroenteritis due to adrenal insufficiency (Addison's Disease).

**P24 Secondary Pseudohypoaldosteronism Presenting as Sleep-Related Sudden Unexpected Infant Death**

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We present a case of a 2-month old formula-fed male infant who was placed to sleep supine and found unresponsive approximately 2 hours later. He was transported to a local emergency department where he was pronounced dead. His history was significant for premature birth at 30 weeks due to severe maternal preeclampsia with intrauterine growth restriction. He was discharged from the NICU eight days prior to his death.

Autopsy examination revealed a small-for-age infant with no gross pathologic findings. The adrenal glands were grossly and microscopically unremarkable. Histology revealed acute pyelonephritis. Vitreous electrolyte analysis demonstrated markedly decreased sodium (91 mmol/l) and chloride (81 mmol/l) with mild potassium elevation (10 mmol/l), consistent with antemortem hyponatremia. Postmortem metabolic screening for congenital adrenal hyperplasia (CAH 17-OHP) was negative.

Severe hyponatremia and hyperkalemia due to salt-wasting with resultant dehydration is life-threatening in the neonatal period. The differential for hyponatremia in infants includes natural causes such as vomiting and diarrhea, salt-wasting nephropathies, and endocrine dysfunctions, as well as external etiologies including water intoxication from diluted infant formula. Endocrine etiologies include primary aldosterone resistance as a result of congenital adrenal hyperplasia (CAH), adrenal hypoplasia (AHC), aldosterone synthase deficiency, or secondary aldosterone resistance (pseudohypoaldosteronism).

The underlying pathophysiology of aldosterone resistance (AR) or pseudohypoaldosteronism (PHA) is unresponsiveness of the renal tubules to aldosterone. Patients present with hyponatremia, hyperkalemia, and metabolic acidosis in the setting of elevated plasma aldosterone and renin. Primary AR encompasses a group of congenital disorders of the renal tubular epithelium resulting in mineralocorticoid resistance causing insufficient potassium and hydrogen secretion. Secondary AR, on the other hand, can occur as a result of genitourinary problems due to or resulting in obstruction, infection, or inflammation, to include obstructive uropathy, pyelonephritis, tubulointerstitial nephritis, and drug

effects. Renal inflammation is presumed to result in transient decreased responsiveness to aldosterone.

This case underscores the importance of vitreous electrolyte analysis in sudden unexpected infant deaths. The forensic pathologist must be aware of the possibility of congenital adrenal disorders in a baby who develops a salt-losing crisis in the first few weeks of life, or with decreased sodium and increased potassium on post-mortem vitreous analysis. In addition to congenital disorders, causes of secondary AR must be ruled out. Structural anomalies of the genitourinary tract may be significant contributors. A careful and detailed history is also needed from the infant's caretaker to exclude external sources such as water intoxication.

**P25 Rat Bite Fever with *Streptobacillus moniliformis* Meningitis and Myocarditis Resulting in the Death of a 7-Month Old Infant**

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Rat bite fever is a rare, systemic illness most commonly caused by *Streptobacillus moniliformis* in North America and *Spirillum minus* in Asia. The most common method of transmission is direct inoculation via a rodent or consuming contaminated food or water. The illness is characterized by relapsing fever, myalgias, and migratory arthralgias followed by a maculopapular rash on the extremities. The most serious complications of rat bite fever include bronchopneumonia, endocarditis, and meningitis. Although rat bite fever is easily treatable with antibiotics, when left untreated it can be a rapidly fatal illness.

We report the case of a previously healthy 7-month-old male who was bitten on the finger by a rat, which the family raised for their pet snakes. The infant presented to the emergency department with a fever and skin rash the day of the bite. At that time, he was diagnosed with a viral exanthem and sent home. Two days later, the infant returned to the emergency department with lethargy and jaundice. During his transfer to a larger medical facility, the infant went into cardiac arrest and eventually expired despite resuscitative efforts.

Post-mortem examination revealed an erythematous lesion on the upper outer region of the right arm, scleral icterus, cerebral edema with a brown fluid collection over the left temporal pole, bilateral ventricular dilation of the heart, and pulmonary edema with congestion. There were no overt bite marks appreciated on his fingers. Histopathological examination demonstrated meningitis and encephalitis of the brain, focal thromboemboli and congestive changes in the lungs, and the heart showed evidence of myocarditis. PCR testing of the brain tissue was positive for *S. moniliformis*. After forensic causation analysis, the cause of death was determined to be complications of meningitis and myocarditis by *S. moniliformis*. Although rat bite fever is a rare illness, it should remain as a differential diagnosis when there are pet rats in the house and in areas of poverty or poor sanitation.

**P26 Cerebral Toxoplasmosis: A Case Report with Correlation of Radiographic Imaging, Surgical Pathology, and Autopsy Findings**

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Toxoplasmosis is caused by infection with the protozoa *Toxoplasma gondii* that is transmitted by consumption of infectious oocysts in cat feces, consumption of tissue cysts in meat, and transplacental transfer of tachyzoites from mother to fetus. Cerebral toxoplasmosis is a potentially fatal disease that most commonly occurs in immunocompromised individuals, such as transplant patients and those infected with human immunodeficiency virus (HIV). If left untreated, the consequences can be catastrophic; however, accurate clinical diagnosis can be difficult as the imaging findings can overlap with lymphoma or metastatic disease. We

present the case of a 77-year-old woman with a recent history of diffuse large B-cell lymphoma, now in remission, and remote ductal carcinoma in situ of the left breast, who presented with worsening right sided weakness. Repeat magnetic resonance imaging (MRI) scans of the head were notable for multiple enhancing lesions throughout both cerebral hemispheres concerning for multifocal metastatic disease. A biopsy was performed and the histologic sections demonstrated a dense T-cell lymphocytic infiltrate consistent with encephalitis/vasculitis. No organisms were identified. Unfortunately, her neurological status rapidly declined and she died. The family requested and consented for an autopsy, which revealed multiple necrotic lesions in the brain. Microscopic examination with immunohistochemical staining for *Toxoplasma gondii* demonstrated numerous cysts and tachyzoites. The heart also demonstrated patchy myocarditis with rare toxoplasma cysts. Heightened awareness of the occurrence of cerebral toxoplasmosis is needed among practicing autopsy pathologists and medical examiners, as imaging can be non-specific and surgical biopsies non-contributory. This case emphasizes the importance of consented hospital autopsy cases for quality improvement by uncovering previously undiagnosed major findings that may affect patient outcome or treatment.

**P27 Rapidly Fatal *Bacillus cereus* Sepsis in a Neutropenic Pediatric Oncology Patient**

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We present the case of a 15-year-old male with history of chemotherapy related neutropenia who presented to Lurie Children's Hospital Emergency Department (ED) with abdominal pain and intractable vomiting. He had been discharged from the same institution five days earlier after multiple rounds of chemotherapy related to a recent diagnosis of Acute Myeloid Leukemia (AML). Aside from neutropenia, the patient was in relative good health, with a recent bone marrow biopsy free of residual disease. After several uneventful days at home, the patient went to a local Thai restaurant with a family member. Within 12 hours of food consumption, the patient developed abdominal pain and vomiting. He was taken to the Lurie Children's ED where he rapidly decompensated with profound hypotension and bilateral pulmonary edema. Blood cultures were drawn and revealed *Bacillus cereus* infection. Labs revealed profound neutropenia, thrombocytopenia, and elevated hepatic enzymes. The patient ultimately died 24 hours after the relevant meal. The family requested a below the neck autopsy. Gross findings included multiple ulcerations of the proximal duodenal mucosa and congested, edematous bilateral lungs. Histology revealed the unique finding of zonal coagulative necrosis throughout the liver. The necrosis was not associated with acute or chronic inflammation. Within the necrotic zones were multiple aggregates of gram positive bacilli compatible with *B. cereus*.

*B. cereus* emetic gastroenteritis is usually a self limiting disease with symptoms consisting of abdominal pain, nausea, and vomiting. Symptoms are initiated by a heat-stable enterotoxin produced by the spore-forming organism. Morphologically, *B. cereus* is a rod-shaped, gram positive bacterium which displays gray, opaque colonies on sheep agar plates. Immunocompetent patients usually display a 1 to 6 hour incubation period followed by a symptomatic period of approximately 9 to 12 hours. A review of the literature revealed several case reports and studies which suggest neutropenic patients with underlying hematologic malignancies are more susceptible to sepsis caused by *B. cereus* than other populations. AML, the underlying malignancy in this case, is the most common form of leukemia seen in cases of *B. cereus* sepsis. Autopsy findings also mirror those found in this case, with zonal liver coagulative necrosis and bacterial infiltration present with little accompanying inflammation. Given our findings and those present in the literature, we suspect the patient consumed food contaminated by *B. cereus* which was able to translocate through the chemotherapy damaged intestinal mucosa leading to clinical sepsis and the histological abnormalities of the liver.

**P28 “When Opportunity Knocks”: A Case Report of Numerous Opportunistic Pathogens as a Source of Sepsis in a Patient with Extensive Metastatic Cancer**

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Multiple processes can occur in a patient with an uncontrolled tumor growth that can cause the patient to present appearing immunocompromised. At the molecular level, tumor cells are capable of secreting cytokines that directly affect the immune system. Vascular Endothelial Growth Factor in particular has been identified as a cytokine secreted that inhibits dendritic cell maturation, alters T:B cell ratios, and promotes angiogenesis to support tumor growth.

Here we present a 78-year Caucasian male with an extensive medical and surgical history who presented to the hospital due to an inability to tolerate oral intake due to gastric outlet obstruction. The patient's course of illness started approximately 4 months earlier with multiple admissions to outside hospitals for his symptoms. Multiple pancreatic duct brushing were attempted due to concerns of pancreatic cancer; however all cytology specimens were negative for carcinoma. During his time admitted, the patient was transferred multiple times to the intensive care unit due to recurring septic shock, however no source of sepsis was ever identified. After one month with progressively worsening symptoms, the patient's family withdrew aggressive treatment and he passed away.

Post-mortem examination showed the patient's entire biliary tract to be firm, thickened and dilated. Histological examination showed malignant cells consistent with gallbladder adenocarcinoma, pancreatobiliary type. Metastasis to neighboring organs, lymph nodes, and the urinary bladder was identified. Multiple opportunistic infections were identified that were not documented prior to the patient's death. Mucormycosis was identified in the alveolar space, the bronchial artery walls, and within the arterial lumen in the right upper lung lobe; and in the mucosa, submucosal artery walls, and the within the arterial lumen of the stomach. Cytomegalovirus infected cells were identified in the middle right and lower lung lobes, and in the sampled lymph nodes. Bacterial colonies were identified in the lower lung lobes, the intra-hepatic biliary ducts, and within the pseudomembranous ileocolitis.

This case demonstrates how disruptive malignant cells can be to a patient's immune system. In this reported case, the patient's immune system was so compromised from an uncontrolled malignancy that it mimicked the findings in untreated immunocompromised patients with multiple opportunistic pathogens being identified post-mortem.

**P29 A Preliminary Study on Postmortem Interval Estimation by HILIC-MS Based Metabolomics Approach of Postmortem Myocardium**

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Estimation of postmortem interval (PMI) is one important challenge in forensic pathology. It is difficult to obtain the true PMI because there are a set of factors that interfere with the estimation of PMI. Several methods have been used for the measurement of PMI and new approaches are also developed including some new methods and new materials. In this study, we used metabolomics technology to detect PMI-related metabolites. Metabolomics broadly aims to measure the systemic metabolic changes over time in multicellular systems and can be defined as the comprehensive analytical approach for the study of all low molecular weight biochemical, including sugars, amino acids, organic acids, nucleotides, and lipids from biological specimens, and

Metabolomics allows the analysis of hundreds of metabolites from complex biological samples with a high throughput, providing information regarding the metabolism of the organism, and is considered to be an unbiased and nontargeted approach.

Myocardium was collected through a realistic natural conditions animal model (0, 24, 48, 72, 96, and 120h; n=6), and combined HILIC-MS based on metabolomics was performed. Our results showed that the trend in PLS-DA was related to PMI and identified 251 metabolites that had more dependence on PMI. We found only eight qualitative kinds of metabolites by comparing the network database, although all of these metabolites might be suitable candidates for the estimation of PMI. The changes of concentrations of metabolites vary after death. We try to use a set of multiple parameters, which will increase the accuracy and stability of the estimation. In addition, we expect that HILIC-MS based metabolomics model can be sensitive enough to study death time with small amount of tissues, and help in understanding changes in endogenous metabolites with forensic investigations. All in all, we suggest that metabolomics of myocardium (even other tissues) can be used in the study of PMI by HILIC-MS in the future.

**P30 Correlation between Postmortem Interval and Degradation of 18S rRNA and Beta-Actin RNA in Liver after Death under the Condition of Variant Temperature**

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Postmortem interval (PMI) is the interval between the time when the dead body was examined and the time when the death occurred. The high error rate of the current methods for PMI estimation can not meet the needs of forensic casework in many occasions, so the forensic scholars have always been full of expectation for better new methods for PMI estimation. DNA and RNA degradation happens along with tissue autolysis after the death of the body until complete decomposition. To investigate the relationship between Ct values of mice liver and PMI under various ambient temperatures, mice were stored at 10°C, 15°C, 20°C, 25°C, and 30°C after execution, and total RNA was extracted from mice liver every 6 hours (PMI 6h to 72h). The levels of 18S rRNA and beta-actin RNA were examined using real-time PCR. The results were expressed by cycle threshold (Ct) values to explore relationship between PMI and Ct values, and the Interpolation functions were established to estimate PMI. In each group, Ct values increased along with extended PMI. The three-variable quintic surface equations were obtained after interpolation analysis on temperature range from 10°C to 30°C. The rule of Ct value changes at ambient temperature complied with three-variable quintic surface equation distribution. The three-variable quintic surface equation for 18S rRNA was  $f(x,y) = -426.9 + 30.82x + 44.48y - 1.297x^2 - 1.837x^*y - 1.388y^2 + 0.03438x^3 + 0.03817x^2y + 0.03867x^*y^2 + 0.02877y^3 - 0.0006129x^4 - 3.897e-07x^3y - 0.001223x^2y^2 + 0.0002566x^*y^3 - 0.0005374y^4 + 3.606e-06x^5 - 2.846e-06x^4y + 1.009e-05x^3y^2 - 3.439e-06x^2y^3 - 2.556e-07x^*y^4 + 2.664e-06y^5$  (R2= 0.9994). The three-variable quintic surface equation for beta-actin RNA was  $f(x,y) = -104.7 - 0.8324x + 0.2868y + 0.03114x^2 + 0.4716x^*y + 0.4078y^2 - 0.0004598x^3 - 0.01113x^2y - 0.03162x^*y^2 - 0.009044y^3 + 3.831e-06x^4 + 0.0001181x^3y + 0.0005082x^2y^2 + 0.0004224x^*y^3 + 9.099e-05y^4 + 5.105e-08x^5 - 7.57e-07x^4y - 1.092e-06x^3y^2 - 5.766e-06x^2y^3 + 1.805e-07x^*y^4 - 5.294e-07y^5$  (R2= 0.9963). Based on this study, measurement of interpolation function may be applicable for PMI estimation at ambient temperature.

**P31 Interpolation Analysis: A New Method In Estimating the Time of Death at Ambient Temperature**

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**Objective:** Determination of postmortem interval (PMI) is one of the most difficult and important work in forensic practice. Historically, there have been numerous models proposed to estimate time of death. However, medico-legal experts failed to achieve a breakthrough in the determination of the time of death, due to all postmortem changes are strongly influenced by unpredictable endogenous and environmental factors. Accumulated evidence indicates that ambient temperature is one of the main influencing factors. In this study, we applied mathematical method of interpolation function fitting to establish a three-dimensional surface equation of ATP postmortem changes. These mathematical methods are imposed to avoid or minimize the effects of ambient temperature variations.

**Methods:** Blood specimens were obtained from 48 volunteers. These specimens were stored at 10°C, 15°C, 20°C, 25°C, 30°C and 35°C temperature respectively. At different time points, ATP concentrations in the blood samples were measured using an ATP fluorescence rapid detector, and then displayed on the detector screen in the form of relative light units (RLU). Relationship between PMI and ATP degradation levels was investigated statistically by SPSS 17.0 and MATLAB 10.0 software. Statistical analysis, curve-fitting, interpolation analysis and surface-fitting were performed.

**Results:** The result showed blood ATP concentration decreased after sampling and the change rate of ATP concentrations were different at different temperature. The blood ATP concentration decreased more rapidly at higher temperature when compared to the lower temperature. However, there were a strong negative correlation between the blood ATP level at the same temperature and PMI. We obtained six regression equations ( $R^2=0.976-0.990$ ) with RLU values at PMIs of 228 h (10°C), 156 h (15°C), 116 h (20°C), 84 h (25°C), 64 h (30°C) and 56 h (35°C).

The changing rate of ATP concentration at different temperature at different PMI can be described by three-variable fourth degree equation. The interpolation function ( $R^2=0.959$ ) was established with PMI as the dependent variable (z), RLU value as independent variable (x) and temperature as independent variable (y).

**Conclusion:** We developed a mathematical model to estimate the PMI by introducing temperature variable, and widened the estimation from a two-dimensional surface to three-dimensional space. The theoretical and experimental investigations lay a solid foundation for potential application and exploratory studies, with the ultimate goal of increasing the accuracy of PMI estimation.

**P32 Postmortem Bacteriology and Postmortem Interval: Useful or Not?**

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**Background:** The utility of postmortem microbiology is an unsettled topic with contradictory literature. Many researchers postulate that positive autopsy cultures do not reflect clinical reality but are a result of agonal spread, transmigration of bacteria from the bowel, or external contamination at the time of collection. Our goal was to quantify and assess validity and reliability of pre and postmortem cultures over a defined time period in a major academic center.

**Design:** We performed a retrospective review of postmortem cultures from a large academic medical center. Our autopsy database was searched from 2001 through 2014. Premortem culture results were also obtained from within 31 days prior to death. Our population included all live-born autopsies (no intrauterine fetal demise). Data collected included age, gender, race, postmortem interval, cause of death, major diseases, types and results of pre and postmortem blood and tissue cultures.

**Results:** Two hundred and twenty-five cases were identified. Of these cases, 104 (80 adult and 20 pediatric) had premortem cultures performed. Of the cases with both pre and postmortem cultures, 32 showed positive pre and postmortem cultures, and 72 showed negative premortem cultures and positive postmortem cultures. The pediatric population had lower rates of conversion from negative premortem cultures to positive postmortem cultures. Our mean postmortem interval was 24.1 hours. When conversion rates were compared between short postmortem intervals, defined as less than 24.1 hours, and long postmortem intervals, defined as greater than 24 hours, the results were quite similar.

**Conclusion:** Our results indicate that an extended postmortem interval does not alter the percentages of positive postmortem cultures, particularly in relationship to premortem results. This finding mitigates against the common argument that positive postmortem culture results are created by transmigration of bacteria from degenerating bowel. Thus, postmortem cultures may have greater validity than previously considered. It may also be more likely that false positive results are created by contamination during collection. Informed by the results of the retrospective analysis, the second phase of this study will include prospective blood and tissue culture of patients with and without proven premortem sepsis including evaluation of soft tissue and bowel sites. Also, physical tools and the autopsy environment will be cultured to analyze them as possible influences on postmortem culture results. A standard for postmortem collection in hospital and forensic cases is long overdue and our future studies hope to elaborate on the optimal methods for avoiding contamination.

**P33 Rabbit Plasma-Based Postmortem Interval Determination with Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy in Combination with Chemometrics**

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Postmortem interval (PMI) determination is one of the most challenging tasks in forensic medicine due to a lack of accurate and reliable methods. It is especially difficult for late PMI determination. Although many attempts with various types of body fluids based on chemical methods have been made to solve this problem, few investigations are focused on blood samples. In this study, we employed an attenuated total reflection (ATR)-Fourier transform infrared (FTIR) spectroscopy coupled with principle component analysis (PCA) to monitor biochemical changes in rabbit plasma of increasing PMI. Partial least square-discrimination analysis (PLS-DA) was used based on the spectral data for PMI prediction in an independent sample set. Our results revealed that postmortem chemical changes in different compositions of the plasma was time-dependent and various components including proteins, lipids and nucleic acids contributed to the discrimination of the samples from different time points. A satisfactory prediction within 48h postmortem was performed by the combined PLS-DA model with a good fitting between actual and predicted PMI of 0.98 and with error of  $\pm 3.03$  h. In consideration of the simplicity and portability of ATR-FTIR, our study demonstrates the great potential of this technique as an alternative method to rapidly determine the time of death with body fluids at a crime scene.

### **P34 Gunshot Wound to the Head: Is It Suicide?**

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**Background:** In 2013, suicide was the tenth leading cause of death in the United States, accounting for 1.7% of deaths overall. This number is disproportionately represented in a medical examiner office's case load, with up to 10% of cases being classified as suicide in some offices. Firearm use accounts for a reported 32.3% of suicides in women and 56.9% of suicides in men. We present a case of an apparent firearm suicide by a right handed woman. The intermediate range gunshot wound was to the left temple, and the weapon was atypically positioned partially in the left hand. The body was discovered and reported to the local 911 dispatcher by her husband. Scene investigation did not reveal a suicide note.

**Methods:** Autopsy was performed in the usual manner, with a review of the literature.

**Results:** The cause of death was a gunshot wound to the left frontotemporal scalp, with a circular stippling pattern measuring 1.4 cm in diameter surrounding the entrance wound defect. The projectile traveled through the frontal lobes of the brain and was recovered from the right temporal epidural space. Recovered from the scene was a Lorcin L-22 .22 caliber semiautomatic pistol. Blood toxicology was negative for alcohol and illicit drugs.

**Discussion:** Most suicide gunshot wounds to the head are contact range, however, a small percentage of cases classified as suicides (1.9%) are intermediate range. The site in this case is typical for suicide with 74% of firearm entrance wounds being in the temple. The finding of a right handed woman with a left sided entrance wound does raise the suspicion for potential homicide, although suicide with the non-dominant hand has been reported in up to 7.4% of cases. Of greatest concern in this case is the highly atypical positioning of the weapon in the non-dominant hand, with the index finger through the trigger guard, from the right side of the pistol. The presence of a suicide note would have been supportive of suicide, but these are only present in about 25% of cases. Location of the wound(s), number of shots, range, gender, familiarity with and access to firearms, motive, position of the firearm, and social circumstances of each individual case should all be considered when determining the manner of death of an apparent firearm suicide. Following complete investigation and correlation with autopsy findings, this case was signed out as manner undetermined.

### **P35 Keyhole Lesions of the Skull: A Series of Three Cases and a Review of the Literature**

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We describe a case series of three gunshot wounds to the head with keyhole features. The first case involves a 26-year old female with a hard contact gunshot wound from a .38 caliber handgun to the forehead with keyhole features of the frontal bone. The second case involves a 70-year old female with a hard contact gunshot wound to the head from a .22 caliber revolver with keyhole features of the frontal bone. The third case involves a 30-year old male with a distant gunshot wound of the occipital bone from a handgun of unknown caliber, with keyhole features of the left posterior parietal bone.

The keyhole gunshot wound, in flat or rounded bones derived from intramembranous ossification such as the skull plates, is classically described as consisting of a rounded portion with internal beveling on the inner table coupled with a triangular portion with external beveling on the outer table as a result of the bullet striking at a tangential angle. Various hypotheses have been described to account for the juxtaposed features of

the keyhole lesion: a combination of entrance and exit wounds due to the tangential angle of the gunshot and the competing vertical and tangential force vectors, fragmentation of the bullet upon impact with a bullet fragment exiting and creating the triangular portion of external beveling, gases from the barrel expanding and separating the portions of the fractured skull creating the external beveling, and a sequence of radial and concentric fractures which create intersecting fracture lines that result in a loose chip that exposes external beveling.

This case series compares the characteristics of these wounds to the available literature regarding keyhole gunshot wound injuries to the skull. Features of these cases most closely correspond to the tangential angle and bullet fragmentation hypotheses. Scene investigation in one of these cases, correlated with autopsy findings, supported the bullet fragmentation hypothesis.

### **P36 Embolization of Fragmenting "Trocar" Ammunition**

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We describe a case of a gunshot wound with fragmenting ammunition consisting of eight relatively lightweight petals or "trocars" and a heavier bullet base. There was a single thoracoabdominal gunshot wound with an entrance wound of the right back. The bullet base traveled through the right kidney and right liver, coming to rest near the right 5<sup>th</sup> rib. The direction of the shot was forward, leftward and upward. As designed, the petals separated from the bullet base, and there were associated injuries of the right middle and lower lobes of the lung and the left atrium of the heart. Associated with the wounds, there was partial collapse of the right lung, right hemothorax (1,400 ml) and hemoperitoneum (100 ml). Bullet fragments were recovered in the soft tissue near the right kidney, in the right hemidiaphragm, pelvic soft tissue, the right middle lobe of lung and near the small bowel. There were also two bullet fragment emboli, one in the proximal right forearm and one in the right lower leg. These were not identified initially with radiographs of the chest and abdomen. Once the likely type of ammunition was determined, additional radiographs were performed in search of emboli. One embolus may have originated from the perforation of the left atrium. The precise origin of the other embolus was not found. This case describes the wound characteristics of a single round of fragmenting "trocar" ammunition and is a unique example of bullet fragment embolization.

### **P38 Digital Forensic Evidence Cracking Ingenious Murder Cover Up**

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The increasing computational power of the mobile devices has been highly instrumental in the recent past. The information stored in mobile devices can ascertain the movement and location of an individual alongside his contact and communications with others. There are some unique considerations about mobile phones and associated devices if found as a source of evidence. A major advantage of mobile devices from a forensic perspective is that even deleted information can be recovered from mobile devices in criminal investigations. This is due to the utilization of *Flash memory chips* in which stored information can be erased block-by-block and mobile devices generally wait until a block is full before erasing data. Data associated with mobile phones is found in a number of locations viz: embedded memory, attached removable memory (Storage Device SD Card) and the Subscriber Identity Module (SIM) card. Mobile devices use radio waves to communicate over networks with various frequencies and follow standard communication protocols, the two most common being GSM and CDMA. GSM devices use SIM (Subscriber Identity Module) cards available in different shapes and sizes and comprise of a microprocessor with a unique Integrated Circuit Card Identifier (ICC-ID) containing the mobile country code (MCC), mobile

network code (MNC) and a serial number. A SIM card may also contain a Location Area Identity (LAI) and Temporary Mobile Subscriber Identity (TMSI) which generally change each time a device moves to a new location within the network [1].

Here is reported an unusual case of homicide of an unidentified female who had been strangled, body tied up and disposed in an ingenious manner of body sacking. In this case the recovery of SIM and memory card under the victim's undergarments at autopsy played a key role in the identification of the victim, assailant and motive of homicide. The SIM card handed over to the investigative authority tracked the suspect by the *IMSI method of phone tapping* and proved to be exclusively important by temporal, relational and functional analysis. The accused was found out to be the live in partner of the already married woman who had left her husband and children 4 - 5 years back.

The objective of this article is to emphasize the importance of digital evidence if found at autopsy. After this presentation, the attendees will learn about the basic mechanism of the mobile phones as an aid in solving crimes.

[1] [http://booksite.elsevier.com/9780123742681/Chapter\\_20\\_Final.pdf](http://booksite.elsevier.com/9780123742681/Chapter_20_Final.pdf)  
Digital Evidence on Mobile Devices

**P39 The Role of Computerized Tomography with 3D Reconstruction and Volume Rendering: A Prospective Study of all Lightning and Electrocutation Deaths Presenting to the Medico-Legal Laboratory of Pretoria (2013 – 2016)**

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The purpose of this study was to determine what value non-invasive virtual autopsy plays in lightning and electrocution cases. This was a joint study between the Department of Forensic Medicine, University of Pretoria and the Department of Radiology, University of Pretoria. We conducted a prospective study on all lightning- and electrocution deaths presenting to the Medico-Legal Laboratory of Pretoria from 1<sup>st</sup> June 2013 to 1<sup>st</sup> June 2016. All cases submitted for forensic examination had whole body computerized tomography with 3D reconstruction and volume rendering prior to medico-legal autopsy examination. All data was treated confidentially. This three-year prospective study was approved by the University of Pretoria's Ethics and Integrity Committee. A summary of the main findings for all low-voltage (<1000 V), high-voltage (>1000 V) and lightning cases will be discussed in the presentation.

**P40 Rupture of the Left Ventricle Due to Blunt Trauma without Concomitant Injury: A Case Report**

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The heart is relatively well protected within the thoracic cavity from all sides. It is rare that blunt trauma could lead to an isolated cardiac rupture without concomitant injury. Moreover, the heart is primarily ruptured on the thin-walled right ventricle and the atria. The left ventricle is least likely to suffer a rupture but has the highest lethality. Here we present a case of isolated left ventricular rupture due to blunt trauma. A 44-year-old female decedent was autopsied which showed about 250 ml blood and clot in the pericardial cavity and three parallel transmural rupture along the left edge of the ventricle. There was no obvious injury to the chest wall or thoracic viscera. Histological examination revealed no underlying cardiac pathology except myocardial interstitium bleeding. The other parts of the body and organs were unremarkable. The case investigation indicated that the decedent collapsed immediately after the suspect, her lover, swung his elbow to her chest and promptly died, although the suspect thought she played dead for a certain time. We describe and discuss the causality between blunt trauma and cardiac rupture. This case report

highlights the need for forensic pathologists to recognize that cardiac rupture may be caused by blunt chest trauma, even without fracture of the thorax bone and visible external injury. Also the forensic pathologist should pay attention to the possible involvement of cardiac resuscitation in the heart rupture.

**P41 Forensic Analysis of Sudden Death due to Vagal Inhibition: A Case Report with Literature Review**

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Sudden death due to vagal inhibition is a condition that occurs within seconds or a minute or two due to minor trauma or relatively simple and harmless peripheral stimulation. The common causes of vagal inhibition include pressure on the neck particularly on the carotid sinuses, unexpected blows to the larynx, chest, abdomen and genital organs, or sudden immersion of body in cold water. We reported a case of a 25-year-old man was fighting with another young man at a parking lot. According to the witnesses, the two men were wrestling and holding each other in the neck area, and suddenly both fell onto the ground while they were fighting. The other man got up, but the victim was found unconsciously with rapid breath. Resuscitation was performed at scene but unsuccessful. He was pronounced dead at scene. Autopsy was performed the next day. External examination revealed that a 25-year-old, well developed and well-nourished male. There were two abrasions (1.2×0.3cm and 0.3×0.1cm) on the right forehead, a 1×0.3cm abrasion with blood clot on right superciliary ridge, a 1×0.5cm scattered abrasion in the middle of eyebrows, and a 0.5×0.5cm abrasion in the middle of upper lip. Internal examination revealed no evidence of injury to the internal organs. There was no soft tissue hemorrhage in the neck. There were scattered petechiae on the surface of the heart. Histological study showed no significant pathological changes of the internal organs. Postmortem toxicological analysis was negative for alcohol and drugs. Because there was no evidence of injury or natural diseases identified at autopsy, the cause of death was classified as "undetermined". But sudden cardiac death due to vagal inhibition was likely the mechanism of his death. The sudden death due to vagal inhibition will be discussed and the literature will be reviewed. Key words: Sudden Death, Vagal Inhibition, Forensic Autopsy, Death Scene Investigation.

**P42 "Don't Try To Stop Me:" An Unusual Suicide By Circular Saw**

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Suicide by sharp force trauma represents a minority of cases within the forensic literature, accounting for approximately 1.6 – 3% of completed suicides, and typically involving a stabbing methodology. The use of power tools such as chainsaws, band- or circular saws represents an especially rare occurrence, with only a handful of case reports existing in the literature. The majority of these cases demonstrate injury to the anterior neck and vital vasculature, with associated hesitation or rehearsal marks in close proximity to the fatal wound.

Here we report a rare case of suicide by circular saw enacted by a 50-year old Caucasian male, involving an unusual hesitation wound at the lateral orbit, far removed from the fatal wound to the right anterior neck. The decedent experienced a brief period of post-injury survival, during which time he was able to verbally and physically threaten a responding police officer before succumbing to his injuries.

Post-mortem examination demonstrated sharp force injury to the right lateral temporal and periorbital regions with associated orbital fracture, in addition to multiple sharp force injuries to the right lateral neck, lacerating the right sternocleidomastoid and omohyoid muscles, and transecting right

jugular vein and right carotid artery. A superficial laceration to the left thumb was also identified. Post-mortem toxicology revealed a blood ethanol level of 0.221%. The cause of death was determined to be exsanguination, with the manner of death being suicide.

This case demonstrates a rare instance of a violent suicide by circular saw involving a brief period of post-injury survival wherein the decedent could possibly pose a threat to responding officers, thus emphasizing the importance of maintaining personal safety of first responders.

**P43 Traumatic Dissection of the Portal Vein: An Unusual Cause of Delayed Death Due To Blunt Force Abdominal Injury**

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**Introduction:** In the clinical setting injuries to abdominal visceral vessels resulting from blunt force trauma are uncommon, with an incidence of 5-10% of all abdominal vascular injuries. Abdominal trauma is a rare cause of portal vein thrombosis, and it is associated with lacerations of the liver or chronic liver disease. Here we report a case of a traumatic dissection of an arterIALIZED portal vein with delayed death due to venous thrombosis.

**Case report:** The deceased is a 61-year old male with a history of end stage cirrhosis due to Hepatitis C and chronic ethanolism. While walking alongside railroad tracks, the decedent was struck by a moving passenger train. He was transported to the hospital and diagnosed with multiple injuries including a subdural hematoma, right-sided rib and long bone fractures, liver lacerations, and transections of the small and large bowel. He was treated surgically and showed continued clinical improvement at which point he was extubated on post-injury day 9. His liver function was chronically decreased, but remained stable. Shortly after extubation, the decedent developed acute liver failure and died several hours later. Salient autopsy findings revealed end stage hepatic cirrhosis and organizing liver lacerations. Examination of the hepatic vessels showed a thickened and fibrotic portal vein with thrombotic occlusion. Hemorrhage was grossly evident within the thickened vessel wall. Microscopic sections of the portal vein showed arterIALIZATION and fibrosis of the vessel wall with emia, bowel perforation or sepsis. Similarities in abdominal distention are observed in late pregnancy, and associated with thrombus, characterized by layering of cellular elements into the lines of Zhan.

**Discussion:** In the absence of a transjugular intrahepatic portosystemic shunt procedure, the most likely explanation for the autopsy findings is that longstanding portal hypertension or a silent arteriovenous shunt initiated portal vein remodeling and arterIALIZATION. The structural changes in the portal vein allowed for dissection during the traumatic incident. The histologic appearance of the portal vein thrombus was consistent with the timing of the decedent's acute decompensation, thus providing an explanation for the abrupt hepatic failure and death. Blunt force injuries to the abdominal vasculature are uncommon in the clinical setting, as the energy required to damage the vessels is great and is typically associated with other non-survivable injuries. In this case, however, pre-existing liver disease allowed for traumatic dissection and thrombosis of the arterIALIZED portal vein resulting in delayed death following seemingly survivable blunt force trauma.

**P44 Fatal Dragging Deaths with Soft Tissue and Bone Friction/Grinding/Dragging Injuries**

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Vehicle versus pedestrian (and vehicle versus bicyclist) collisions frequently result in skin injuries that can be described as "friction abrasions." These injuries are often related to the victim making contact

with a hard road surface. When the victim is actually overrun by a motor vehicle, the skin trauma may be related to contact with the roadway, the undersurface of the vehicle, or both. In such instances, the cutaneous injuries are typically severe, sometimes with associated underlying soft or even bony injuries. If a victim is actually dragged underneath the vehicle for a substantial distance, relatively characteristic "friction/grinding" injuries can be produced, involving skin, soft tissue, and bone. Death is a frequent outcome, and there are often many lethal injuries identified at autopsy, making the determination of whether or not the victim was conscious while being dragged under the vehicle difficult, if not impossible. In this report, two cases of dragging deaths are presented, each with a substantial dragging distance and the presence of classic injury patterns.

A 45-year old woman was attempting to intervene in an altercation at a bar parking lot when she stood in front of a vehicle as one of the participants in the altercation was attempting to flee. The driver intentionally ran over the woman, and she became pinned under the vehicle. Instead of stopping, the driver drove 1.2 miles down a roadway before finally stopping. The victim was dead at the scene. Autopsy disclosed multiple severe injuries, with classic grinding-type injuries of several body regions, including the back, the extremities, and the head/skull.

A 53-year old man who was riding on a moped was struck by a pick-up truck. Witnesses stated that the man remained conscious initially, and was screaming for help, as he was dragged on the roadway, underneath the pickup truck for a total distance of 1,758 feet before coming to rest on the roadway, as the truck continued driving away. He was pronounced dead at the scene. At autopsy, the victim had extensive injuries, including characteristic dragging-type injuries of his legs, left elbow, and right toes. Although friction-abrasions are common in vehicle versus pedestrian (and bicyclist) incidents, extensive grinding injuries are less common, typically because drivers usually stop before driving great distances when a victim is pinned under the vehicle.

This report presents examples of classic "friction/grinding/dragging injuries" and addresses the difficulties incurred when faced with questions concerning consciousness and time of death.

**P45 WITHDRAWN**

**P46 What Happened? A Case Report of Electrocution and Review of the Literature**

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Despite often being preventable by simple safety measures, electrical injuries are relatively common accidents and up to 40 percent of serious electrical injuries result in death. Electrical injuries generate more than 5,000 visits to the emergency department per year and cause approximately 1,000 deaths each year in the United States. Fatal electrocutions in adults are most frequently job-related, high voltage electrocutions (greater than 600 to 1000 volts), and should be suspected in all deaths where the deceased was near an electrical device or using an electrical power tool or machinery. Sudden death following electrical shock results from the transmission of electrical current through the body – having entered through contact with the electrical source and exiting through another, more "grounded," contact. Death is most often attributable to ventricular fibrillation with passage of the current through the heart, but apnea (respiratory arrest) and asystole can also occur. Detailed scene investigation is critical in these types of cases, and autopsy is important in correlating findings with the scene investigation. Asystole, arrhythmia, and apnea can have non-specific findings at

autopsy. Burns are seen in nearly all high voltage electrocution deaths but less than half of low voltage electrocution deaths. These external findings generally do not help predict the path of current and can significantly underestimate the degree of internal thermal injury.

It is important for medical examiners and coroners to consider this entity and provide a thorough scene investigation with autopsy. Identification of an electrocution death and the source of electrocution may prevent subsequent injuries or death. A case pertaining to a young agricultural worker sustaining a high-voltage electrocution while on the job will be presented, including scene, autopsy, and histological findings. A literature review will be performed to support the case findings as well as demonstrate classic injuries, and histological and radiographic findings seen peri- and postmortem in death by electrocution.

**P47 An Unusual Suicide with a Firework Explosive in the Oral Cavity: A Case Report.**

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The use of fireworks to celebrate holidays or religion festivities is very common in many parts of the world. Nevertheless, accidents are not rare. But the intentional use of fireworks to promote injury is unusual, and it is even rarer to be self-inflicted. We report a case of a 32-year-old depressive man who committed suicide with a festive explosive known as "Spanish cracker" inserted within his oral cavity. The artifact had a great energy, which provoked complex fractures of both mandibular and maxillary bones, besides damage to other facial bones, and extensive lacerations of soft tissues. By that time, we expected a central nervous system (CNS) trauma as well, but it was not significant. What was found to justify his death was the large amount of blood in the airways, as well as the signs of asphyxiation.

**P48 A Suicidal Hanging with Injuries of the Cervical Spine: A Case Report**

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Cervical spine injuries are commonly associated with judicial hangings in which a long drop precedes the fracture of the cervical spine, which is the desired outcome. Injuries of the cervical spine are unusual in routine suicidal hangings and have been associated with a drop of some distance, complete suspension, anterior knot placement, obesity, degenerative disease of the cervical spine, diseases of the bone, and advanced age. We present a case of a 62 year old male with no known significant past medical history who was found hanging from a back porch trellis. Investigation revealed a text message from the decedent's phone that implied suicidal intent. The ligature was fashioned by braided rope threaded through another segment of the rope looped together and held by two steel rope clamps. There was an anterior suspension with the knot located on the anterior submental neck. The decedent was incompletely suspended with the heels off of the ground and immediately adjacent to a bench which introduced the possibility of a short drop. The circumferential ligature mark on the neck contained a braided pattern, corresponding to the rope. The posterior neck had a patterned injury where it was in contact with the steel rope clamp. Anterior and posterior neck dissections revealed focal hemorrhages in the soft tissues of the neck, a transverse fracture of the C6 vertebral body and C6-C7 disk space with corresponding compression and softening of the cervical spinal cord, and a posterior C1-C2 distraction. The cause of death was stated as blunt force injuries of the neck due to hanging. While injuries of the cervical spine are exceedingly uncommon in non-judicial hangings, they can occur and are associated with certain features specific to the mechanism of hanging and the individual. It is important that forensic pathologists are aware of the potential for cervical spine injuries in non-judicial hangings and the mechanisms which could potentiate them.

**P49 Homicide-Suicide in Cuyahoga County, Ohio 1991-2012**

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Homicide/Suicide (H/S) is defined as homicide(s) followed by perpetrator suicide within one week of the homicidal event. These are rare occurrences which share characteristics of homicide and suicide. Previous research has created various typologies for H/S classification and many events follow characteristic patterns, most frequently involving intimate partner (current or former) violence. Most previous studies have also involved relatively short study periods (approximately 5 years).

Cuyahoga County (metropolitan Cleveland) is the largest county in Ohio with an average population of 1.36 million over the study period. Cleveland represents approximately one-third of the population with the remainder of the county being primarily suburban and rural. The Cuyahoga County Coroner/Medical Examiner Office (CCC/MEO) investigates all deaths occurring under violent, suspicious or sudden/unexpected circumstances. For the present study, case files from CCC/MEO were reviewed and cases of H/S were identified for further study. Over the 22 years (1991-2012), 65 H/S events occurred for an annual incidence of 0.21/100000 (similar to previous reports). Just under half occurred in Cleveland proper. There were a total of 81 homicide victims. Most (80%) H/S involved a single victim. Females were the most common (76.5%) homicide victims while males accounted for most perpetrators (95%). Just over half of the victims and perpetrators were black and all H/S events were intraracial. Firearms were used in 95% of homicide cases and 97% of suicides. Perpetrators were generally older than victims with average ages of 42.5 years and 33.8 years, respectively. Positive toxicology for alcohol or drugs was noted in one-third of victims and one-half of perpetrators. Depression was present or could be inferred in 41.5% of perpetrators. No specific day of the week was associated with H/S.

The most common H/S subtype involved violence by a former or current intimate partner (58%). A clear history of domestic violence was noted in approximately 60% of these cases and 23% showed stalking behavior on the part of the perpetrator. Victims were killed at their own residence or a residence shared with the perpetrator in over half of cases.

**P50 Death Resulting from Pneumocephalus Complicating Endoscopic Food Bolus Retrieval in a Patient with Eosinophilic Esophagitis**

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Pneumocephalus has been reported as a complication of esophagogastroduodenoscopy (EGD) in a small number of cases, but there is no discussion of it in the literature in the setting of endoscopic food bolus retrieval. In this report, we present a death related to pneumocephalus occurring as a complication of endoscopic food removal from the esophagus.

A 40-year-old male presented with dysphagia and suprasternal discomfort twelve hours following chicken ingestion. On flexible endoscopy performed under intravenous sedation at an endoscopy center, the chicken was seen lodged in the lower third of the esophagus, and the esophageal mucosa was more friable than usual. The food bolus was reportedly difficult to snare, and the patient experienced tremendous gagging and coughing during the procedure. After successful retrieval of the food bolus, a mucosal laceration was noted at the site where the chicken had been lodged. Following the procedure, the patient was unarousable, and was emergently transported to a hospital. A subsequent head CT revealed pneumocephalus, while a chest CT



showed pneumomediastinum. The patient was later declared brain dead, and the case was referred for medicolegal autopsy.

At autopsy, the brain was examined first, with evidence of rare air bubbles within meningeal vessels, and numerous petechiae-like hemorrhages throughout the grey and white matter. The esophageal mucosa was focally discolored and had a partial thickness laceration. Microscopic examination of the esophagus was consistent with eosinophilic esophagitis

Eosinophilic esophagitis is a known risk factor for food bolus impaction, especially in children, but also in adults. The condition should be suspected in patients who present with food bolus impaction. Although rare, pneumocephalus is a possible complication of EGD for food bolus retrieval, even without full-thickness esophageal perforation. In patients unresponsive after endoscopy, the rapid radiographic detection of potential pneumocephalus should be encouraged, as it may allow for timely therapy and improved outcomes, or serve as a useful supplement to forensic autopsy in the event of patient death. Forensic pathologists should be aware that pneumocephalus may represent a potential mechanism of injury/death in patients experiencing esophageal trauma, including injury incurred during EGD.

#### **P51 Butyrylfentanyl and Acetylfentanyl Levels in Driving Under the Influence and Overdose Cases**

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Analogs of the drug fentanyl are becoming increasingly common in the United States. While the potency of fentanyl is well known and recommended thresholds for therapeutic levels and toxic levels have been published, less is known about fentanyl analogs. Our office has seen a large number of butyrylfentanyl and acetylfentanyl overdoses and a smaller number of driving under the influence cases with butyrylfentanyl present. The goal of this paper is to assist toxicologists, forensic pathologists and coroners in determining if a given level of butyrylfentanyl or acetylfentanyl is consistent with toxicity.

During the period of April 2015 to January 2016, 47 overdose deaths with butyrylfentanyl present and 10 overdose deaths with acetylfentanyl present were identified. During the same time period, 23 driving under the influence cases with butyrylfentanyl were identified. The level of butyrylfentanyl in overdose deaths ranged from 0.6 ug/L to 129.8 ug/L in blood. When butyrylfentanyl was the sole drug identified in a drug overdose death, the levels ranged from 3.4 ug/L to 85.7 ug/L in blood. The level of butyrylfentanyl in driving under the influence cases ranged from 2.3 ug/L to 51.4 ug/L in blood. The level of acetylfentanyl in overdose deaths ranged from 1.5 ug/L to 137.2 ug/L in blood. There were no cases where acetylfentanyl was the sole drug present. Other drugs present in the blood with butyrylfentanyl and acetylfentanyl included fentanyl, heroin (morphine), cocaine, oxycodone, hydrocodone, methadone, buprenorphine, trazodone, butalbital, phenobarbital, alprazolam, clonazepam, diazepam, quetiapine, sertraline, citalopram, pregabalin, diphenhydramine and ethanol.

Fentanyl analogs including butyrylfentanyl and acetylfentanyl are being seen with increasing frequency in the United States; however, there is little in the literature regarding blood levels in overdose and non-overdose situations. In our experience, acetylfentanyl was never seen alone as a sole cause of death without the contribution of other drugs or medications. When it was seen alone, the lethal range of butyrylfentanyl seemed similar to that of fentanyl, and like fentanyl, the level of butyrylfentanyl in non-overdose situations showed significant overlap with overdose levels.

#### **P52 Unusual Suicide Case by Self-Injection of Adrenaline in a 35-Year Old Female**

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Adrenaline auto-injectors provide life-saving pre-hospital treatment for individuals experiencing anaphylaxis in community setting. Errors in handling adrenaline auto-injectors have been reported. Most unintentional adrenaline administrations from auto-injectors are due to poor knowledge of proper use of the device among patients, families and health care professionals. Though, device malfunctions and deficiency in device design may also be occasionally implicated. Reports of adrenaline overdoses and their outcomes are limited in the medical literature. In most of these cases, accidental adrenaline administration results from medical error, and is generally followed by the rapid onset of agitation, tachycardia, hypertension, and dysrhythmias.

A 35-year-old Caucasian female was found dead outside her home, lying in the grass. Two adrenaline auto-injection devices (each containing 0.15 mg adrenaline) were found close to the body. A suicide note was discovered in the living room. The decedent's medical records showed that she had suffered from generalized anxiety disorder and severe depression since her husband's suicide seven months previously. At the autopsy, two fresh injection lesions on the left thigh were found. The heart weighed 260 g and the myocardium did not exhibit fibrosis or ischemic areas. The lungs were relatively edematous and congested. Histologic examination was unremarkable without evidence of subendocardial hemorrhage or acute myocardial ischemia in the heart. The postmortem toxicological screening revealed the presence of mirtazapine, citalopram, prazepam and ciamemazine in peripheral blood within therapeutic ranges. Catecholamines (adrenaline and noradrenaline), metanephrines (metanephrine, normetanephrine) and 3-methoxytyramine were analyzed in vitreous humor, urine, peripheral and cardiac blood using high-performance liquid chromatography with amperometric detection. The adrenaline concentration in cardiac blood (79.7 nmol/l) was markedly increased compared to the concentration found in peripheral blood (0.33 nmol/l). Analogously, metanephrine and normetanephrine levels in cardiac blood (30.02 and 19.37 nmol/l, respectively) were markedly increased compared to the concentrations found in peripheral blood (8.15 and 10.36 nmol/l, respectively). Catecholamines and metanephrines in vitreous were lower than or within plasma clinical reference values. Lastly, urine analysis revealed extremely high levels of all tested compounds (catecholamines, metanephrines and 3-methoxytyramine) compared to urinary clinical reference values.

Based on the results of all postmortem investigations, the cause of death was determined to be cardiac dysrhythmia and cardiac arrest following adrenaline self-injection, and the manner of death was listed as suicide. To the best of our knowledge, no case of suicide following adrenaline self-administration using a prefilled auto-injector has been reported in the forensic literature.

#### **P53 A Case of Suicide Using Diphenhydramine**

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Diphenhydramine (DPH), a histamine H1-receptor antagonist, is widely used as an over-the-counter allergy, cold and sleep aid. When taken according to the recommended prescribed dosage, serum concentrations rarely exceed 0.1 mg/L. Although considered relatively safe, side effects of DPH include anticholinergic effects such as mydriasis, dry mucous membranes, ileus and urinary retention. DPH penetrates the blood-brain

barrier, exhibiting muscarinic receptor blocking properties, producing sedation, anti-emesis, and hypnotic effects. Mild symptoms are noted after ingesting doses above 300 mg. Ingestion of 1,000 mg can cause psychosis, seizures and coma. A blood concentration of 8.0 mg/L is considered to be lethal. DPH can undergo postmortem redistribution with heart/femoral blood ratios of approximately 2.3:1.

The case we present is a 22-year old male with a history of anxiety, depression, suicidal ideation, and drug abuse who was found deceased in his apartment. Scene investigation revealed several empty diphenhydramine and dextromethorphan bottles. Numerous notes to family and friends were written on various objects including the refrigerator, bathroom mirror, and multiple pink balloons scattered throughout the apartment. Autopsy revealed cerebral edema, marked pulmonary edema and a mass of blue pills within the stomach. Toxicological analysis of heart blood revealed diphenhydramine and dextromethorphan at concentrations of 110 mg/L and 0.27 mg/L, respectively. The concentration of diphenhydramine was well above the lethal level. The cause of death was found to be diphenhydramine overdose. The manner of death was suicide.

Antihistamines are implicated in thousands of overdoses each year, mostly classified as mixed drug overdoses. Suicidal deaths due to antihistamine overdose are relatively rare. We reviewed all cases of suicide involving DPH intoxication from the years 1997 to 2016 at the Jackson County Medical Examiner's Office in Kansas City, MO. A total of 18 cases were identified. Of those, 14 were mixed drug intoxications, whereas four cases involved only DPH. One case involved DPH intoxication and subsequent suffocation using a plastic bag. The blood concentrations of DPH ranged from 0.248 – 110 mg/L with this case having the highest level. A review of literature reporting DPH overdose reveals only one other case with blood concentration levels higher than that seen in our presented case at 119 mg/L.

Diphenhydramine is considered a relatively safe drug. However, its easy accessibility and hallucinogenic properties make it a potential drug of abuse. Although relatively rare, diphenhydramine has been used as a means of suicide, as seen in our presented case.

#### **P54 Traditional Postmortem Toxicology Investigation Can Miss Drug Facilitated Sexual Assault Evidence**

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A Drug Facilitated Sexual Assault is a crime that occurs while the victim is under the influence of a drug that renders them incapacitated. Forensic toxicology laboratories design panels to detect drugs that can produce these effects. Lower Limits of Quantification are validated at concentrations that ensure appropriate sensitivity since, in a living individual, there may be an extended time period between the event and specimen collection. Scopes of analysis for DFSA investigations are usually distinctly different as compared to those applied in postmortem investigations. For example, DFSA scopes tend to exclude those drugs that are not known to quickly cause an individual to be obtunded and then to recover without significant medical intervention. For postmortem investigations, the analytical scopes are usually more comprehensive, have higher Reporting Limits and are intended to quantify agents across a wide analytical measurement range. While this strategy is appropriate for most cases, at times it becomes necessary from an analytical perspective to handle the case more like a traditional Drug Facilitated Sexual Assault.

To highlight this concept, we report the case of an eight-year old female who was abducted from a mobile home complex in 2009. Her body was located ten days later in an irrigation pond. Initial toxicology testing using a standard postmortem screen did not reveal the presence of any drugs in brain and liver tissue. When a list of medications that the suspect had was evaluated it was determined that additional testing was warranted. Part of

this further testing included a directed analysis for benzodiazepines by Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS). Results of analysis showed a trace concentration of alprazolam. Because of the nature of this case, a test by Ultra Performance Liquid Chromatography Tandem Mass Spectrometry (UPLC-MS/MS) was specifically developed to quantify low concentrations of alprazolam in different matrices. Results of testing showed alprazolam to be present in gastric fluid, brain and liver at concentrations of 18 ng/mL, 6.6 ng/g and 1.5 ng/g, respectively. Even though these concentrations are not directly related with a toxic outcome, it was relevant to the investigation as it allowed for a more complete interpretation regarding the events leading up to death. The purpose of this presentation is to highlight the need to apply the most appropriate style of analytical testing to each postmortem investigation.

#### **P55 Volatile Abuse in Allegheny County – A 10-Year Retrospective Study of Autopsy and DUI Samples**

*W.A. Ennis, K. Williams, J. Janssen, N. Love, A. Shakir  
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The deliberate inhalation of volatile substances in order to achieve intoxication can cause symptoms ranging from brief obtundation to severe permanent handicap and death. This retrospective study examines the incidence of volatile abuse (huffing) found in a busy medical examiner's office as well as those found in samples obtained during traffic stops for driving under the influence (DUI). During the 10-year period samples from a total of 24 deaths were associated with the abuse of volatile compounds. Additionally, 31 DUI samples from the Allegheny County Crime Laboratory were found to be positive of volatile compounds. The compounds involved included Isobutyl Alcohol (paint solvent/varnish remover), and Ethyl Chloride (gasoline additive), but 1,1-Difluoroethane (keyboard cleaner/gas duster) was the most common in Allegheny County, suspected or detected in 45/55 samples.

#### **P56 Human Biospecimen Collection Programs to Accelerate Biomedical Research**

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*National Disease Research Interchange, Philadelphia, Pennsylvania*  
The National Disease Research Interchange (NDRI) is a non-profit organization that serves as the link between individuals wishing to donate organs and tissues for research and the nation's leading investigators who are working to find new treatments or cures for a wide range of diseases. NDRI receives funding and oversight from the National Institutes of Health (NIH) to make biospecimens available to researchers in academia and non-profit organizations. NDRI's Donor Programs give individuals and their families an opportunity to leave a meaningful legacy for their loved ones, by providing a simple mechanism through which tissues and organs can be donated for research after death. NDRI works with patients and next-of-kin to obtain consent for donation and takes care of recovering tissues and providing them to approved researchers. To identify donors and coordinate these recoveries, NDRI partners with a nationwide network of Organ Procurement Organizations (OPOs), Tissue Banks, Hospitals, Medical Examiners and funeral homes; these industry professionals help champion the last wishes of donors and ultimately serve NDRI's registered research projects with biospecimens for their studies. NDRI's recovery network is critical for our participation in several ongoing research initiatives including efforts focused on neurological diseases such as Autism and traumatic brain injury (TBI), as well as the LungMAP initiative aimed to address lung diseases that develop during fetal growth and early childhood. In addition, NDRI's Private Donor Program is an excellent resource to support rare disease and HIV/AIDS researchers. Our private donor registry allows our recovery sites to collect various tissues from each donor with recoveries completed < 24 hours post mortem. Our high-quality biospecimens are commonly utilized to establish primary cell cultures and for rigorous molecular methodologies,

such as RNAseq. NDRI specializes in establishing researcher specific protocols for donor eligibility and organ and tissue collection procedures for optimal biospecimens sampling and preservation. These well annotated samples provided through our collaboration with our nationwide network of recovery partners are needed to continue the vital work to discover new therapies for both common and rare diseases.

**P57 Sudden Death Associated with Non-Toxic Megacolon**

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Two cases of sudden death associated with massive abdominal distention are presented. At autopsy, the first case was found to have massive colonic air distention without underlying anatomic causes, which was clinically consistent with Ogilvie's Syndrome. The second case was observed to have similar severe bowel loop distention, but on opening was packed with fecal material. Microscopic examination of the bowel demonstrated an absence of nerve ganglia elements, consistent with a diagnosis of Hirschsprung's disease. Neither case was associated with ischemia, bowel perforation or sepsis. Similarities in abdominal distention are observed in late pregnancy, and associated with compromised respiration and venous return. The exaggerated degree of distention in our cases, beyond that which is seen even in late gestation, allows us to draw the conclusion that there was severe compromise of respiratory effort from mechanical force exerted on the diaphragm, and compromise of venous return due to inferior vena cava compression. Ultimately, mechanical displacement of the diaphragm and inferior vena cava is proposed as the mechanism of death.

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