

INTERNATIONAL SYMPOSIUM ON HUMAN IDENTIFICATION

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The ISHI Report

News from the World of DNA Forensics

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The ISHI Report

Letter from the Editor

Forensic science is constantly evolving, and the start of 2025 brings new opportunities to enhance our methods, strengthen our collaborations, and improve the way we serve communities around the world. This issue of *The ISHI Repor*t showcases the cutting-edge advancements, powerful stories, and exciting updates shaping forensic DNA today.

At the heart of this year's ISHI conference is a keynote you won't want to miss. Dr. Ann Burgess, a trailblazer in forensic psychology, will take the stage alongside her granddaughter, Alexandra Burgess, to explore how criminal profiling has evolved—and where it's headed next. Dr. Burgess has spent decades studying violent offenders and advocating for trauma-informed investigations, and her work has shaped how forensic professionals approach behavioral analysis.

Scientific advancements in forensic DNA analysis continue to expand our capabilities in the lab. Dr. Caitlin McDonald is leading the charge in integrating artificial intelligence into PCR optimization, a game-changing development that could improve DNA success rates for degraded and trace samples while reducing backlogs. Meanwhile, Grace Choi introduces a new approach to forensic training using "living SOPs," offering labs a better way to scale expert knowledge and maintain precision in casework.

As forensic scientists, we are often called upon in times of crisis. When devastating wildfires swept through Chile, forensic geneticist José Manríquez Naveas and his team at the Servicio Médico Legal of Valparaíso used innovative DNA techniques to identify victims amid challenging conditions. Their work highlights how forensic science plays a crucial role in disaster victim identification (DVI), ensuring families receive answers in the wake of tragedy.

For those looking to strengthen their laboratory's DVI preparedness, ISHI is offering two specialized workshops this year:

- **Are You Prepared? – Developing and Testing DVI Response Plans** (Sunday, November 2, 8:30 AM – 5:00 PM) will provide hands-on training to help forensic labs develop, implement, and test their mass fatality response plans.
- **Field-Ready Forensics: Deploying Rapid DNA for Real-Time Identification and Crisis Response** (Monday, November 3, 1:30 – 4:30 PM) will explore how Rapid DNA technology can be deployed on-site to aid in crisis response scenarios.

Beyond the laboratory, forensic DNA is being used in unexpected and impactful ways. Dr. Daniel Vaněk shares how forensic genetics is disrupting illegal wildlife trafficking, identifying endangered species in the black market, and assisting law enforcement in dismantling smuggling networks. His work is a powerful reminder that forensic science has applications far beyond traditional casework.

As always, ISHI is about more than science—it's about community. This year, our off-site Wednesday night dinner event will take place at the Loggerhead Marinelife Center, where attendees can experience one of Florida's leading conservation and rehabilitation centers for sea turtles. Set against the beautiful backdrop of Juno Beach, this evening will offer a chance to connect with colleagues while learning about the incredible work being done to protect marine life.

Lastly, we are looking for the next generation of forensic leaders! Applications for this year's ISHI Student Ambassador Program are now open. If you're a student passionate about forensic DNA and eager to engage with industry experts, apply by May 4, 2025 through the portal on our website.

The forensic field is evolving faster than ever, and *The ISHI Report* is here to celebrate the scientific breakthroughs, inspiring people, and critical conversations shaping its future. We look forward to continuing this journey with you—at ISHI and beyond.

Warmly,

The Editorial Board

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Profiling the Criminal M

A Conversation with Dr. Ann Burgess

Interview written and conducted by Ann MacPherrigle, Promega

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For nearly five decades, Dr. Ann Burgess has been at the forefront of forensic psychology and criminal profiling, transforming the way investigators understand violent offenders. Her groundbreaking work with the F.B.I.'s Behavioral Science Unit laid the foundation for modern criminal profiling, and her research on trauma has shaped how forensic nurses, law enforcement, and mental health professionals approach victim advocacy.

At ISHI 36, Dr. Burgess, alongside her granddaughter Alexandra Burgess, will deliver a keynote address exploring the evolution of profiling and the impact of artificial intelligence on forensic investigations. Ahead of her presentation, she sat down with The ISHI Report to reflect on her career, discuss the urgent issue of missing and murdered Indigenous women (MMIW), and share her perspective on the future of forensic science.

What initially inspired you to explore the intersection of psychology and violent behavior, particularly as it relates to forensic investigations?

In 1972, Lynda Holmstrom invited me to participate in a research study on rape victims. She was interested in the topic from a sociology view of women's issues and my interest was from a clinical and treatment perspective. It wasn't until the FBI Academy's Behavioral Science Unit contacted me in 1975 to lecture to their special agents on rape victimology that I became interested in the intersection of psychology and violent behavior. I was asked to develop the methodology for a study of serial criminals that led to understanding the patterns and motives for murder. My initial interest was to try to understand what motivated someone to rape so I could interpret the response of the victim.

Are there any specific cases or projects that stand out as pivotal moments in your career or changed the way forensic nurses approach their work?

When Lynda Holmstrom and I completed our one year of interviewing and data collection on 146 persons admitted to Boston City Hospital for "rape", we wrote a number of articles for publication including the *Rape Trauma Syndrome*, the *Coping Behavior of the Rape Victim*, and *Rape: Power, Anger and Sexuality*. These research-based articles were widely used in nursing, psychiatry, psychology and social work to understand what existed about rape and paved the way for trauma-based counseling for victims. In addition, our work set the foundation for the sexual assault nurse examiner (SANE) and the development of the "rape kit" that was replicated across the United States.

What were the most significant challenges you faced in the early years of your career, and how did those experiences shape the field?

The primary challenge was confronting the rape culture that included **common rape myths**.

- Victims bear responsibility if they had been drinking,
- Most rapes are committed by strangers,
- The victim's clothing can lead to a sexual assault,
- It is not rape if the victim does not have bruises and injuries, and
- Rape is merely unwanted sex not a violent crime

Your team was the first to identify shared trauma among serial killers. Can you share how this discovery reshaped how investigators and psychologists understand violent behavior?

The importance of a history of childhood trauma or the absent father provided prevention data for clinicians working with child and adolescent offenders. The history needed to be dealt with by taking a careful child and family history and engaging consultation for the treatment.

Looking back, what do you hope your work has achieved for victims, and how do you see your contributions influencing the next generation of forensic professionals?

I hope my work has emphasized that rape is a traumatic experience, can happen to anyone, anywhere and trauma-based treatment is needed for the victim to recover.

The offender needs to be stopped and apprehended, or he will continue his violent behavior. People need to understand that thoughts drive behavior. A person's behavior is largely defined by his thoughts. Therefore, in order to prevent further victimization, it is important to understand the mindset of the offender, what makes them do it and what is the criminal's mind set.

Even in your late 80s, you're actively teaching and working on cases. What drives your continued passion for this work, and how has your approach evolved over the decades?

There is always something to be learned in each case that can be added to the knowledge base for clinical or legal intervention.

What lessons or advice do you give to your students and young professionals entering this field, particularly in balancing academic rigor with practical application?

Much of my work was due to being in the right place at the right time and agreeing to the challenge , i.e., joining partners in research, lecturing to unfamiliar groups (law enforcement), agreeing to unusual cases (Menendez brothers' case), etc.

Your current study on missing and murdered Indigenous women highlights an urgent and often overlooked issue. What have been your biggest findings or insights from this work so far, and how do you hope it will drive change?

The 33 cases of missing and murdered Indigenous women aged 50 years and older found that alcohol and/or illicit substance abuse was prevalent; known substance abuse history was identified in victim and/or offender for nearly 70% of cases. Many murders occurred off tribal land and were perpetrated by men, typically younger than their victims, with some form of relationship to them.

What unique challenges have you encountered in studying MMIW cases, and how do these challenges differ from other cases you've worked on throughout your career?

We found that the offender was known and/or identified in the majority of cases, with a significant portion resulting in guilty pleas or jury convictions. However, a notable portion of cases remained unsolved or ended with the offender's suicide.

How do you envision the results of your research on MMIW being used to improve investigations, advocacy, or policy?

The findings underscore the need for intervention strategies such as addressing substance abuse in adolescence, intervening early in relationship conflicts, training law enforcement in elder sexual homicide investigations, and providing clinical care for mental illness in cases involving family and partners. Additionally, the study highlights the necessity for a national database to track homicides involving elder Indigenous women, facilitating more effective prevention and response efforts.

Artificial intelligence is becoming a game-changer in many fields. How do you see AI complementing or transforming forensic psychology and behavioral analysis in the near future?

AI is one of my disappointments. My husband's work, as a computer engineer, was involved in the development of computers using AI and suggested it might be useful to propose for a study at the FBI Academy. I wrote a proposal in the 1990s only to have it rejected at the Unit Chief level with a statement that it was "too far out for work with serial criminals". If the project had been funded for $60,000, we would have been on the cutting edge of the new science by the year 2000.

What are the ethical challenges you foresee as AI and advanced forensic tools become more integrated into criminal investigations?

We are well into the use of machine learning and topic modeling with Alexandra's work that she will discuss.

How do you think modern technology and societal changes are influencing patterns of violent behavior, and how should investigators adapt?

First, we have moved from serial killers to the mass killer and second looking at the mindset of the criminal before he acts. Our work uses the 6-step model of "Pathway to Violence" as a major conceptual framework.

From her early studies on rape trauma syndrome to her contributions in identifying behavioral patterns among serial offenders, Dr. Ann Burgess has fundamentally reshaped forensic science. Her work has not only helped solve cases but has also driven essential reforms in victim care, forensic nursing, and investigative methodologies.

Now, as she looks toward the future, she sees both challenges and opportunities. The rise of artificial intelligence presents new possibilities for criminal profiling, but it also introduces ethical concerns that must be carefully navigated. As her granddaughter Alexandra Burgess joins her in this field, their intergenerational perspective offers a unique bridge between traditional investigative techniques and cutting-edge forensic technologies.

As forensic science continues to evolve, Dr. Burgess's insights remain as vital as ever. Her passion for understanding criminal behavior and advocating for victims serves as a reminder that forensic professionals do more than analyze evidence—they shape justice.

At ISHI 36 this year, attendees will have the rare opportunity to hear directly from one of the pioneers of forensic psychology. Whether you are a seasoned investigator or a student just entering the field, her wisdom offers invaluable lessons on the past, present, and future of forensic science.



Insights from Dr. Daniel Vaněk

Fighting Wildlife Trafficking with Forensic DNA

Written by: Tara Luther, Promega

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In a world where the illegal wildlife trade is the third most lucrative black market—after drugs and arms smuggling—the stakes have never been higher. Wildlife trafficking devastates endangered species, disrupts ecosystems, and fuels organized crime. But a quiet revolution is taking place in forensic science, where experts like Dr. Daniel Vaněk are using DNA technology to fight back.

From developing unique DNA assays to working with law enforcement to crack major cases, Dr. Vaněk's work demonstrates how forensic science can disrupt the illegal wildlife trade and provide justice for species on the brink of extinction.

A Career Built on Innovation and Resilience

Dr. Vaněk's journey into forensic science is as unconventional as it is inspiring. His career began in 1992 when he joined the Czech police force and became the first head of DNA operations in Czechoslovakia—later the Czech Republic. "I started my forensic career back in '92, when I joined Czech police," he explained. "I became the first head of all DNA operations in the Czech Republic." His work during this time set the foundation for the use of forensic DNA in criminal investigations across the region.

After a decade of leading forensic advancements in his home country, Dr. Vaněk took his expertise abroad, working for the International Commission on Missing Persons (ICMP) in Bosnia and Herzegovina. "I worked for ICMP, a humanitarian organization mainly sponsored by the United States and Dutch government," he said. During his three years there, he gained extensive experience working with bones from mass graves, often under challenging and emotionally charged conditions. "I've worked with tens of thousands of bones," he recalled, noting that the protocols he helped develop for degraded human DNA would later prove invaluable in wildlife forensics.

When Dr. Vaněk returned to the Czech Republic, he established his own private laboratory specializing in ancient and degraded DNA analysis. Over the years, his lab expanded into animal DNA typing, eventually becoming a global leader in the forensic analysis of big cats. "At this moment, we have the biggest database of physical samples and DNA profiles of big cats—almost 1,000 samples," he said. "That enables us to do more research and be more powerful during cases involving big cats and other endangered species".

Dr. Vaněk's unique career path—from law enforcement to humanitarian work to private research—has given him a rare perspective. "I think my biggest advantage is when I go to court to defend [our results]," he said. "With 30-plus years of experience, I can explain things simply to a jury, but I can also effectively respond to cross-examination when the other side tries to challenge me".

The Tiger Slaughterhouse Case: A Shocking Example of Wildlife Crime

When Czech authorities raided an illegal tiger slaughterhouse in 2018, it was a wake-up call. The operation revealed a grim reality: tigers, bred and raised in captivity, were being killed for their bones, skins, and other body parts, which were boiled down into "tiger broth" to be sold on the black market.

But Dr. Vaněk and his team were ready. "We had started preparing for this case two years earlier," he said. "We knew there was a demand from Czech customs and the Czech Environmental Inspectorate, so we developed the necessary technology in advance."

Over those two years, his lab refined methods to extract and analyze DNA from big cats, even under extreme conditions. "We created a basic set of STR markers that were highly discriminative for big cats," he explained. The team also built an extensive reference database of tiger DNA profiles, ensuring they could quickly identify samples when the time came.

When the raid happened, Dr. Vaněk's lab processed hundreds of samples collected from the crime scene. "We identified seven individual tigers, plus other protected species," he said. The DNA analysis proved crucial in linking the seized products to specific animals, providing irrefutable evidence of the slaughterhouse's activities.

Challenges of Working with Wildlife DNA

Wildlife DNA analysis presents unique challenges. Samples often come from highly degraded or unconventional sources, such as rhino skin, feathers, tinctures, or solid broths made from boiled tiger bones. "Imagine boiling tiger bones for seven days and seven nights to create a solid broth," Dr. Vaněk said. "Even then, there are tiny amounts of proteins and DNA that can be used to identify the species."

Dr. Vaněk's expertise in ancient DNA and degraded samples allowed him to tackle these challenges head-on. "I've been working with degraded DNA for decades—it's my daily bread," he said. However, he noted that every case brings new obstacles. For example, tanning chemicals used on animal skins can alter mitochondrial DNA, requiring innovative methods to isolate and amplify the target sequences.

To overcome these challenges, Dr. Vaněk's team developed a suppressor that amplifies animal DNA while excluding human contamination. "It's the opposite of what you'd normally do in forensic DNA work," he explained. "But it allows us to focus solely on the species-specific DNA we need."

Innovating Species Identification

The evolution of species identification techniques has been key to combating wildlife trafficking. While traditional methods like Sanger sequencing remain the gold standard for single-species samples, more advanced methods are required for complex mixtures. "If you're dealing with something like a tincture that might contain DNA from multiple species, you need massively parallel sequencing or other advanced techniques," Dr. Vaněk explained.

His lab has also pioneered innovative approaches such as length polymorphism in mitochondrial DNA and isothermal amplification, which can provide results in minutes. "We're working on methods that can be used directly in the field," he said. "It's about making these tools accessible and practical for real-world use."



Educating the Next Generation

For Dr. Vaněk, forensic science isn't just a career—it's a passion he shares with students and young scientists around the world. "I've been teaching for 30 years, and I love the interaction with students," he said. Whether he's lecturing on forensic genetics or supervising thesis projects, Dr. Vaněk's goal is to inspire the next generation to innovate and push boundaries in the field.

One of his favorite ways to engage students is by sharing real-world cases, such as the tiger slaughterhouse investigation. "When I talk about animal DNA typing, I always include cases I've worked on," he said. "It fascinates them. They want to know more, and they bring their friends to my lectures. Suddenly, I have more students in the room than I started with."

Despite the enthusiasm from students, limited resources mean that Dr. Vaněk can only take on one or two graduate students at a time in his private lab. "Unfortunately, we're a private laboratory without external governmental funding, so I can only take the best students from my class," he said. Still, he views this as an opportunity to mentor the most passionate and talented individuals. "It's some pre-selection, and it helps me see how they interact and solve problems," he added.

Dr. Vaněk believes that education is a critical component in the fight against wildlife trafficking. "When students learn about cases like these, they start thinking differently about what forensic science can achieve," he said. "It's not just about solving crimes—it's about protecting the planet."

The Global Fight Against Wildlife Trafficking

Wildlife trafficking is a global problem, and Dr. Vaněk hopes his work will inspire similar efforts worldwide. "Every region has its own challenges," he said. "In Africa, it's ivory and rhino horn. In Asia, it's pangolins and tigers. But the technology we're developing in Prague can be adapted to fight trafficking anywhere."

Collaboration, he emphasized, is essential. "We need more specialized labs like the ones focusing on ivory in Washington, D.C., or rhino horn in South Africa," he said. "But we also need funding. Fighting wildlife trafficking isn't profitable, so it depends on governments and grants."

Caitlin McDonald's Perspective

Harnessing AI for Smarter Forensic DNA Analysis

Interview written and condensed by Tara Luther, Promega

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For decades, forensic DNA profiling has relied on polymerase chain reaction (PCR) technology to amplify genetic material for identification and casework. While forensic laboratories have seen significant advancements in DNA extraction, profiling, and interpretation, the fundamental PCR process itself has remained largely unchanged since its adoption in the 1990s. This standard approach, with its fixed cycling conditions, struggles to handle degraded, trace, and inhibited samples—leading to cases where no usable profile is obtained.

Recognizing this limitation, Caitlin McDonald, a PhD researcher at Flinders University, has been at the forefront of integrating artificial intelligence (AI) into forensic DNA analysis. Her work focuses on developing a machine-learning-driven "smart" PCR system that dynamically adjusts cycling conditions in real time, optimizing DNA amplification for each sample's unique properties. By leveraging AI, McDonald's research aims to improve success rates for challenging forensic samples, enhance profile quality, and streamline workflows in forensic laboratories.

In this interview, Caitlin McDonald discusses the challenges of traditional PCR, the potential of AI-driven optimization, and how this technology could revolutionize forensic DNA analysis and beyond.

How did you become interested in applying AI to PCR optimization?

Despite significant technological advancements over the past few decades, the success rate of generating DNA profiles from sub-optimal samples remains low. While considerable progress has been made in the DNA recovery, extraction and profiling processes within forensic science, there has been relatively little focus on optimizing the fundamental PCR process that underpins these steps. Recognizing this gap, we set out to enhance PCR efficiency (and profiling success) by re-evaluating the process at its core. Our research is specifically aimed at optimizing PCR conditions to improve DNA profile quality and success rates, particularly for challenging trace, inhibited and degraded samples.

Could you give us a high-level overview of your research on using machine learning to optimize PCR for forensic applications?

What specific problems in forensic DNA analysis are you aiming to solve?

My research focuses on using machine learning to optimize the PCR process for forensic DNA analysis, specifically addressing the challenges of profiling sub-optimal samples. In Australia, many samples submitted to forensic laboratories contain degraded DNA, inhibitory compounds, or low DNA quantities—all of which often result in poor or unusable genetic data using traditional PCR methods.

By integrating machine learning into the fundamental PCR process, we aim to monitor amplification in real time and dynamically adjust cycling conditions, effectively tailoring the process to a wide range of sample types — something traditional methods cannot achieve. This approach enhances amplification efficiency, improving success rates and DNA profile quality from trace and degraded samples. Ultimately, we aim to reduce the number of cases where no usable profile is obtained, thereby increasing the efficacy of forensic DNA analysis. In doing this, we hope to provide valuable evidence in cases where previously no conclusive genetic information could be obtained.

Your research suggests that current PCR methods haven't changed significantly since their introduction to forensics in the 1990s.

What are the key limitations of traditional PCR that AI-enhanced "smart" PCR aims to overcome?

Traditional PCR methods used in forensic DNA profiling follow a standardized, uniform cycling approach where reaction conditions remain fixed throughout the run. However, the chemical environment within a PCR tube is dynamic—reagents are depleted, and enzyme activity declines as amplification progresses which significantly affects efficiency. This is particularly problematic for sub-optimal samples, which are often highly complex and contain low template quantities, degradation and inhibitory compounds. The standard protocols for DNA profiling do not account for these variations within the tube, which may be contributing to poor quality DNA profiles from such samples.

Our smart PCR system aims to overcome these limitations by dynamically adjusting cycling conditions in response to real-time feedback from the reaction itself. By tailoring the process to each sample's unique characteristics, this approach has the potential to improve amplification success rates and enhance DNA profile quality, particularly for challenging samples that currently yield limited or non-informative profiles.

Can you explain how the machine learning model was trained to recognize and adjust PCR conditions in real time?

What kind of datasets and parameters were most critical in its development?

The ability to monitor PCR progress in real time and adjust cycling conditions in response is the goal we are working towards. In that pursuit we have developed a comprehensive databank of DNA profiles that characterizes the impact of altering specific elements in the PCR process, such as changing the denaturation timing, on the quality of the resulting profiles. It also highlighted the key features of the profiles affected by each change, such as allele balance and peak heights. This step was critical in the development of the model because, like any machine learning system, the quality of the dataset directly influences the accuracy and performance of the algorithm.

Once the databank was established, we developed a machine learning algorithm that used the PCR cycling conditions (parameters) as inputs and the features of the resulting DNA profiles as outputs. Using the training dataset, the model was taught to associate different cycling conditions with the quality of the profiles produced. Any PCR programs that produced "good" quality DNA profiles were attractive to the system, and programs that produced "poor" quality profiles were repulsive. Using this approach, our system is able to suggest cycling conditions that will improve amplification and ultimately DNA profile quality.

One of the more intriguing aspects of your work is the use of real-time fluorescence feedback to guide PCR cycling conditions.

How does this feedback loop function, and how does it differ from conventional static PCR processes?

Conventional static PCR processes, which are commonly used in forensic practice, require analysts to wait until the end of the amplification run and rely on downstream processing (such as separation using Capillary Electrophoresis and data analysis in GeneMapper) to assess whether amplification has been successful. In contrast, our system uses real-time fluorescence feedback to monitor the amplification process as it unfolds and aims to provide immediate insights into the reaction's progress. This real-time monitoring focuses on amplification efficiency, which serves as a proxy for assessing the effects of changing reaction conditions within the PCR tube.

Through our research we've identified specific alterations to cycling conditions that can enhance amplification efficiency. By integrating this knowledge into the system, we can dynamically adjust the PCR conditions during the run based on the real-time feedback. The system continuously monitors the amplification efficiency and can adjust the cycling conditions to optimize the process, which is something that the current static PCR methods cannot do. This capability would allow analysts to see whether the PCR is proceeding well in real time, offering an immediate opportunity to intervene in the process to optimize the genetic information that can be obtained.

Your research suggests that AI-driven PCR can reduce reaction time while maintaining DNA profile quality.

How significant are these time savings, and what impact could they have on forensic casework and rapid DNA analysis in the field?

In isolation, the time saving from an AI-driven PCR system may not seem particularly significant. However, when considering its broader impact on forensic workflows, the potential benefits become much more substantial.

A smart PCR system has the capability to consolidate both qPCR and endpoint PCR for DNA profiling into a single process, streamlining operational workflows. Additionally, by optimizing cycling conditions, it can accelerate amplification for ideal samples while also improving success rates from suboptimal ones. This, in turn, reduces the number of samples that would require repeated processing or ultimately yield no usable results which would save both time and resources.

While this technology is not intended as a direct replacement for rapid, field-based DNA analysis, it offers a powerful alternative for laboratory-based forensic casework. By increasing efficiency and improving overall profile quality, a smart PCR system has the potential to enhance sample throughput and reduce bottlenecks in the processing of challenging samples. There are many applications for a smart system outside forensic science and given the sheer volume of work that relies on PCR, even a very modest improvement could have very significant overall impacts.

In forensic labs, standardization and validation are critical.

What challenges do you foresee in integrating AI-driven PCR into accredited forensic workflows, and how might they be addressed?

The use of AI in forensic science raises interesting challenges, particularly in the public and legal arenas. AI is often perceived as a black box making unchecked decisions, but when implemented transparently and responsibly, it is simply another means of improving forensic processes. Therefore, gaining public and regulatory acceptance is key. Transparency in the methodologies used along with ensuring reproducibility will help build confidence and acceptance in forensic, just as with other technological advancements in the field.

A crucial step toward operational implementation would be sufficient trials to meet general acceptance by the forensic science community and move towards validation to allow accreditation. The Australian Government has also proposed AI guardrails to guide implementation of AI in high-risk settings, including forensic science, by providing a framework for meeting regulatory and ethical expectations. Aligning any AI systems with these guardrails will likely help with integration into accredited workflows.

Additionally, exploring compatibility with existing validated and commercially available forensic kits may help streamline adoption. Aligning this approach with established workflows could help expedite acceptance and implementation, making the transition to a smart PCR system more seamless within forensic laboratories.

Some forensic labs have started adopting Rapid DNA technologies for quick turnaround on DNA testing.

Could smart PCR be integrated into these existing systems, and how might it improve their effectiveness?

We have explored the compatibility of smart PCR with existing validated and commercially available systems in forensic laboratories. Our findings indicate that integrating a smart PCR process into these existing systems could indeed be done. The real challenge, however, does not lie in adapting existing systems, but rather in ensuring that reliable, reproducible, and validated methods can be implemented consistently across different laboratories. This is a common hurdle faced by any new method introduced to forensic practice and is not unique to our work.

That said, our research has demonstrated that a smart PCR system is not strictly necessary for improving PCR processes. Early indications show that there are adjustments that can be made to existing PCR workflows that can potentially enhance profile quality or reduce runtimes for certain samples, independent of the AI aspect. For example, altering cycling conditions across a PCR run to better account for the changes within the reaction tube can be implemented on current PCR machines without the need for AI. This was actually how we initially tested the concept.

So, to circle back to the question, yes, I believe this process could be integrated into existing systems in a number of ways and in doing so can ultimately enhance both the quality and efficiency of forensic DNA profiling.

You mention that AI-enhanced PCR has applications beyond forensics, including medical diagnostics and environmental monitoring.

Which field do you think will adopt this technology first, and why?

AI-enhanced PCR has potential applications far beyond forensic STR profiling. Within forensic science, it could be applied to areas such as microbial forensics, environmental DNA analysis, and RNA-based research. Beyond forensics this technology could transform many other PCR-dependent fields, including medical diagnostics, biotechnology, and environmental monitoring. Of these, I believe medical diagnostics is the most likely to adopt AI-enhanced PCR first.

The medical field has a pressing need for high-throughput, accurate, and efficient PCR-based testing, particularly in infectious disease detection, oncology, and genetic screening. Any optimization of this process could significantly reduce reaction times while maintaining or improving sensitivity, which is critical in clinical settings where rapid and reliable results directly impact patient care. Additionally, biotechnology companies are continuously developing new PCR applications, and integrating AI could help improve reaction efficiency, lower costs, and enhance automation in research and commercial settings.

While environmental monitoring is another promising area, it lacks the immediate demand to drive early adoption. Similarly, forensic implementation may take longer due to the rigorous validation and legal requirements for casework use. Given these factors, I feel that medical diagnostics is the most likely field to lead the adoption of AI-enhanced PCR, with biotechnology following close behind.

Looking ahead, what are the next steps for your research?

Are there any specific improvements or refinements you'd like to see in AI-driven PCR technology?

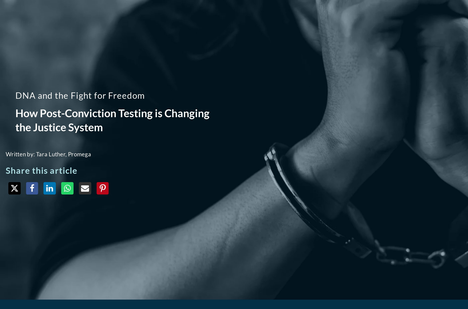
Our current focus is on collaborating with forensic providers to transition our smart PCR system into real-world casework settings. This includes assessing how the system performs with the diverse range of samples encountered in forensic laboratories. Additionally, we are investigating opportunities to refine the system further, ensuring that it meets the stringent requirements of forensic casework. Beyond STR profiling, we are also actively exploring potential applications within forensic science and in other PCR-dependent areas where the ability to dynamically optimize PCR conditions could have a profound impact.

Looking more broadly at AI-driven technology, one major improvement I'd like to see is greater accessibility to open-source AI tools. Currently, developing unique AI-driven systems faces numerous obstacles, from proprietary software limitations to restricted datasets, which make the development process more challenging. A shift toward more widespread open-source, customizable frameworks would accelerate innovation and make it easier for researchers to use AI in their own work. Such a movement could help drive the AI revolution forward, pushing both forensic and broader scientific research into the future.

As forensic science continues to evolve, AI-driven technologies like smart PCR offer the potential to transform DNA analysis, making it faster, more reliable, and better suited for challenging samples. Caitlin McDonald's research highlights how machine learning can be applied to fundamental forensic techniques, addressing long-standing limitations while paving the way for broader applications in medical diagnostics, environmental monitoring, and biotechnology.

While the road to forensic implementation involves rigorous validation and regulatory acceptance, the promise of AI-enhanced PCR is undeniable. Whether by improving current laboratory workflows or integrating into future forensic casework, this technology has the potential to enhance efficiency, increase investigative leads, and ultimately, strengthen the role of DNA evidence in the criminal justice system.

As McDonald and her colleagues continue refining this groundbreaking approach, one thing is certain: forensic DNA analysis is entering a new era—one where AI and automation work hand in hand to provide better, faster, and more reliable results.



DNA and the Fight for Freedom

How Post-Conviction Testing is Changing the Justice System

Written by: Tara Luther, Promega

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Innocence is supposed to be the foundation of the American legal system—the principle that individuals are considered not guilty until proven otherwise. But for those wrongfully convicted, the burden of proving their innocence often falls squarely on their shoulders, sometimes decades after they have been sent to prison.

The advent of forensic DNA testing has revolutionized criminal investigations, but its impact on post-conviction cases has been just as profound. With the right evidence, DNA can be used to overturn wrongful convictions, revealing inconsistencies, misidentifications, and even prosecutorial misconduct. Yet, as powerful as DNA testing is, securing the opportunity to have a case reexamined remains one of the greatest challenges in the justice system.

In the webinar Murder Was the Case They Gave Me: Post-Conviction DNA Testing in a Media-Driven World, legal experts, forensic scientists, and exonerees explored the legal roadblocks, forensic advancements, and emotional toll of fighting for justice long after a conviction.

This discussion underscored a sobering truth: DNA testing is a scientific breakthrough, but exoneration requires a legal battle, one that is often as grueling as the wrongful incarceration itself.

Missed the webinar? Watch it on-demand.

Watch the Webinar

The Impossible Fight: Legal Barriers to Post-Conviction DNA Testing

Defense attorney Oscar Michelen is no stranger to this fight. Having spent decades exonerating wrongfully convicted individuals, he knows firsthand that the legal system is built to uphold convictions, not revisit them.

Michelen explained how post-conviction cases operate under entirely different rules than initial trials. Once a jury has rendered a verdict, the presumption of innocence disappears, and the burden of proof shifts entirely to the defendant. In most states, a convicted individual cannot simply request DNA testing—they must convince a judge that the evidence will prove their innocence. "Judges don't want to reopen cases," Michelen said bluntly. "The system values finality over fairness."

He outlined several key obstacles that make post-conviction relief so difficult.

Limited Access to DNA Testing

While every state has some provision for post-conviction DNA testing, the laws vary dramatically. Some states require proof that DNA testing will definitely exonerate the individual—a nearly impossible standard, since lawyers cannot predict results before testing occurs. Others set arbitrary deadlines, allowing requests only within a few years of the conviction, which often expires long before DNA advancements make testing feasible. "In many states, you have to prove your innocence before you get access to the very evidence that could prove your innocence," Michelen said. "It's a Catch-22."

The Destruction of Evidence

One of the most devastating hurdles is that biological evidence is frequently lost or destroyed. Many crime labs and police departments discard evidence once a conviction is secured, especially in cases before DNA testing was standard practice. Without preserved evidence, exoneration through DNA becomes impossible. "In some cases, we've had to search old warehouses, evidence lockers, and even coroner's offices to find samples that should have been retained," Michelen explained. "And sometimes, we find out it was thrown out long ago."

Prosecutorial Resistance

Even when DNA evidence exists, district attorneys often fight against testing. Prosecutors may argue that a conviction was already upheld on appeal, or that new testing is unnecessary because of other evidence. Some worry about the implications of reopening old cases—admitting mistakes in one case could call into question their entire record. "Innocence shouldn't be a partisan issue, but too often, it is," Michelen said. "There's a fear that admitting to one mistake will open the floodgates for hundreds of others."

The Cost of Freedom

Even when all legal hurdles are overcome, the financial burden of post-conviction DNA testing is often placed on the defendant or their legal team. Many exonerees spend years in prison because they simply cannot afford the testing that would prove their innocence. "This isn't just about science," Michelen concluded. "It's about power, resources, and whether we truly believe in justice."



David McCallum: 29 Years Behind Bars for a Crime He Didn't Commit

The fight for justice is not just legal—it's deeply personal. No one knows this better than David McCallum, who was wrongfully convicted of murder at the age of 16 and spent 29 years in prison before being exonerated.

His case was based solely on a confession he made after hours of police interrogation. There was no physical evidence linking him to the crime, yet he was sentenced to life in prison.

In the webinar, McCallum shared his emotional journey—from the moment he realized he had been convicted to the decades he spent behind bars fighting to prove his innocence.

A Teenage Confession, A Lifetime Sentence

McCallum was just a teenager when he and his friend Willie Stuckey were arrested for the 1985 abduction and murder of Nathan Blenner. The two boys, overwhelmed by relentless police questioning, falsely confessed to the crime, believing that they would be allowed to go home if they cooperated.

But once their confessions were on record, there was no going back. Despite immediately recanting, both were convicted and sentenced to 25 years to life.

"It's impossible to explain what it feels like to hear that guilty verdict when you know you're innocent," McCallum said. "You want to scream, but no one will listen."

Decades of Fighting for Justice

McCallum's journey to freedom was not one he walked alone. A chance connection with Ray Klonsky and his father, Ken Klonsky, would set off a chain of events that ultimately led to his exoneration. The two formed a deep friendship with McCallum, with Ray initially reaching out in 2004 as a filmmaker but quickly becoming a tireless advocate for his release. "Ray was like a brother to me," McCallum shared. "He didn't just want to tell my story—he wanted to help me get home"

The Role of Hurricane Carter

Their fight was strengthened by none other than Rubin "Hurricane" Carter, the former middleweight boxer who had spent nearly 20 years wrongfully incarcerated before his own exoneration. Carter, who dedicated his life to freeing the innocent, saw McCallum's case as his final mission before passing away in 2014. "He told me, 'You will walk out of prison one day, and I want to see it happen before I die,'" McCallum recalled. "His belief in me gave me strength."

Carter's advocacy, along with relentless legal efforts and the media attention from *Fight for Justice: David & Me*, ultimately pushed the Brooklyn District Attorney's Conviction Review Unit to reinvestigate the case.

On October 15, 2014, McCallum was finally exonerated.

"I walked out, but Willie Stuckey should have been there too," McCallum said, referring to his childhood friend and co-defendant, who died in prison in 2001. "This isn't just about me. It's about everyone still fighting for their freedom."

The Science Behind Post-Conviction DNA Testing

Lisa Mertz and Krista Currie, both forensic DNA experts, detailed the role of forensic science in post-conviction cases. While DNA has exonerated hundreds of individuals, the process of testing decades-old evidence is far from straightforward.

Mertz and Currie outlined the key forensic challenges:

Finding the Evidence

Before any testing can begin, forensic teams must locate the original evidence. This process can take months, as records are often incomplete or missing entirely. In some cases, the only remaining DNA sample may be a degraded bloodstain or a single hair. "You have to reconstruct the history of the evidence—where it was stored, how it was handled, whether it was tested before," Mertz explained. "Every step in that chain of custody matters."

Contamination Risks

Older evidence is often stored in less-than-ideal conditions, making contamination a major concern. Forensic scientists must carefully distinguish between the original DNA and any external contaminants that may have been introduced over the years. "When we're dealing with evidence from 20, 30, even 40 years ago, contamination is always a factor," Currie said. "We have to be meticulous in our analysis."

The Evolution of DNA Testing

DNA testing methods have advanced significantly since the 1990s. Where early techniques required large, intact samples, modern methods—such as next-generation sequencing and forensic genetic genealogy—can extract DNA from degraded or trace samples. "We can now analyze evidence that would have been considered useless 10 years ago," Mertz noted. "That's a game-changer for post-conviction cases."

Forensic science has the potential to correct past mistakes, but only if the legal system allows it to do so.

This discussion mirrors another powerful story that will be shared at ISHI 36: that of Jeffrey Deskovic, who was wrongfully convicted of rape and murder at 16 and spent 16 years in prison before DNA evidence proved his innocence. Like McCallum, Deskovic has dedicated his life to criminal justice reform and post-conviction advocacy.

DNA may be the key to unlocking the truth, but as both McCallum's and Deskovic's cases show, justice requires more than science—it demands persistence, collaboration, and a willingness to confront systemic failures.

"No one should have to fight this hard for the truth," McCallum said. "But until the system changes, we will keep fighting."



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Restoring Dignity in the Aftermath

Stories and Lessons from Mass Fatality Identification

Written by: Tara Luther, Promega

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Mass fatality identification is not just forensic work—it's a mission to restore humanity in the wake of unimaginable tragedy. Whether responding to natural disasters, terrorist attacks, or catastrophic accidents, forensic professionals face one of the most challenging tasks in science: piecing together fragmented evidence to give names to the nameless.

At the 35th International Symposium on Human Identification (ISHI), four experts with decades of experience took the stage to share their stories. Mark Desire, Assistant Director at the New York City Office of Chief Medical Examiner; Kimberly Gin, Retired Coroner of Sacramento County; Julie Sikorsky, Forensic Scientist Supervisor at the Palm Beach County Sheriff's Office; and Adam Sharon, DNA Analyst at the Israeli National Center of Forensic Medicine, opened a window into the technical complexities, emotional toll, and evolving lessons of their work.

From the ashes of 9/11 to the wildfires in Maui, their stories revealed the resilience, innovation, and humanity that drives this field.

When the Unexpected Happens

No matter how meticulously forensic teams prepare, mass fatality responses are rife with unforeseen challenges. Each event brings its own unique complications, requiring professionals to think on their feet and adapt as new problems arise. Forensic work in these situations is as much about resilience as it is about science.

Kimberly Gin, who served as Sacramento County Coroner for years, shared a story that highlighted how even seemingly straightforward cases can unravel into unexpected complexity. Her team recovered a man who had died alone at home during a disaster. With a pristine STR profile and a reference sample provided by the man's daughter, they anticipated a quick identification.

"We thought, 'Wow, we have a family reference sample from his daughter. We're going to get this ID,'" Gin said. But the results didn't match. Confused, the team reanalyzed the data and double-checked for contamination. Still, no match.

The mystery lingered until investigators revisited the daughter. "She did several interviews with the local newspapers talking about her dad, but they just didn't match," she said. After further investigation, they discovered the daughter had been adopted—a critical detail that had not been noted during the initial intake.

"That [kind of mistake] happened quite a few times throughout [multiple] incidents," Gin admitted. "You think you're prepared, and each time you learn something new that you didn't know for the one before." From this experience, her team implemented a protocol of "just-in-time training," emphasizing the importance of asking pointed questions about biological relationships.

But this was just one of many lessons learned through hard experience. During the 2023 Maui wildfires, Gin's team encountered another unexpected issue. "We weren't prepared for [cases] where the person taking the reference sample didn't know how to do it, and our swabs were empty. There was nothing on them," she said. "You'd run them, and it would just be blank." Each time, new challenges forced the team to adjust protocols and improve training for everyone involved, from lab staff to field responders.

Similarly, Adam Sharon, working at the Israeli National Center of Forensic Medicine, faced challenges of scale during a large mass fatality event. His lab, typically handling boutique-level operations, was suddenly overwhelmed by a flood of samples. "We weren't prepared for such high volumes," Sharon said. "Our team had to pivot quickly, introducing automation to handle the workload."

Automation proved critical in managing the surge, but Sharon noted that it didn't eliminate the emotional strain. "The finish line kept moving. Just when we thought we were done, more remains would come in," he said. "It felt endless, but you push forward because that's what the families are counting on".

Technology That Changes Lives

Advances in forensic technology are fundamentally changing how mass fatality cases are approached. Tools like Rapid DNA and investigative genetic genealogy (IGG) are providing faster, more accurate solutions, even in the most challenging scenarios. For families waiting for answers, these advancements can mean the difference between weeks of uncertainty and timely closure.

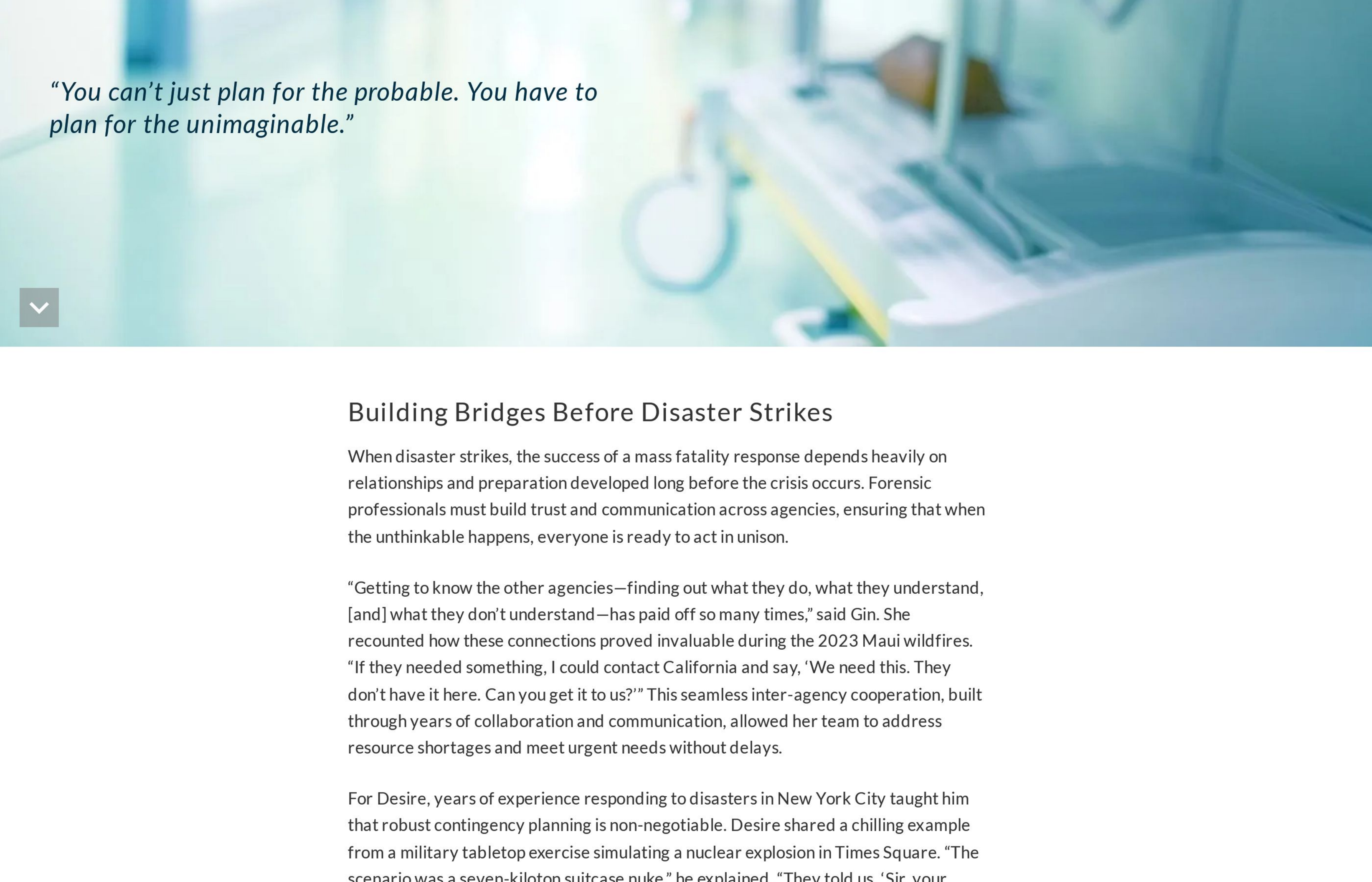
Mark Desire, whose career in forensic identification spans decades, has seen firsthand how Rapid DNA has transformed the field. Reflecting on the aftermath of 9/11, Desire recalled how time consuming identification was before this technology was available. "Back then, it took weeks, months, even years. Now, we can provide answers in hours," he said.

Rapid DNA technology allows teams to quickly process family reference samples and compare them to remains, sometimes delivering results while families are still on site. Desire described how his team integrates this technology at family assistance centers: "We might be able to bring an ME [medical examiner] in here so they don't have to go home and wait for a phone call or a knock at the door," he explained. "It's not just about the science—it's about compassion. Families shouldn't have to wait longer than they need to."

This immediacy is particularly crucial in mass casualty events where traditional methods would take too long. "We started using [Rapid DNA] for regular missing persons cases to keep everyone trained and ready," Desire added. "It's a great tool for smaller incidents, but we also know its limits. If you're dealing with a plane crash or something with hundreds of remains, you need to integrate it with traditional methods."

Investigative genetic genealogy (IGG) has also become a game-changer, particularly for cases involving undocumented individuals or victims without close biological relatives. Gin shared how her team has leveraged IGG to identify victims when traditional DNA matching falls short. "If you're not getting a hit on the ID… you might have to switch over and maybe try genealogy," she explained.

However, Gin cautioned about preserving samples for secondary analysis. "If you're not careful, you might use up all your sample on STR profiling and leave nothing for genealogy. You have to think strategically," she advised.



Building Bridges Before Disaster Strikes

When disaster strikes, the success of a mass fatality response depends heavily on relationships and preparation developed long before the crisis occurs. Forensic professionals must build trust and communication across agencies, ensuring that when the unthinkable happens, everyone is ready to act in unison.

"Getting to know the other agencies—finding out what they do, what they understand, [and] what they don't understand—has paid off so many times," said Gin. She recounted how these connections proved invaluable during the 2023 Maui wildfires. "If they needed something, I could contact California and say, 'We need this. They don't have it here. Can you get it to us?'" This seamless inter-agency cooperation, built through years of collaboration and communication, allowed her team to address resource shortages and meet urgent needs without delays.

For Desire, years of experience responding to disasters in New York City taught him that robust contingency planning is non-negotiable. Desire shared a chilling example from a military tabletop exercise simulating a nuclear explosion in Times Square. "The scenario was a seven-kiloton suitcase nuke," he explained. "They told us, 'Sir, your entire department has been killed. You are now a ghost.'" This stark scenario forced Desire's team to confront a terrifying possibility: What if their entire operation was wiped out in an instant?

"It was a wake-up call for all of us," Desire said. The exercise led to critical changes in contingency planning, including strategies for remote operations, redundant systems, and cross-training staff to ensure continuity of work. "You can't just plan for the probable. You have to plan for the unimaginable," he emphasized.

Sikorsky added another layer to the discussion: the importance of regularly revisiting and refining plans. "One of the things we've discovered," she said, "is that you can't just create a plan and leave it on a shelf. You need to make the time—deliberately make the time—to revisit it, refine it, and test it."

Sikorsky shared how her team conducts tabletop exercises and full-scale drills to evaluate their readiness. "We discovered that one of the technologies we had originally planned to use was no longer relevant because we don't even use it anymore," she explained. "That's why it's so important to take a fresh look at your resources and adjust your plans accordingly." These practice sessions have not only improved their response strategies but have also strengthened relationships across agencies by fostering open dialogue and collaboration.

In addition to revisiting plans, Sikorsky stressed the importance of involving everyone in the process, from senior management to field staff. "It's not enough for the leadership to know the plan. Everyone on the team needs to understand their role and how they fit into the larger picture," she said. "That means carving out time to sit down with your people, to explain things, to train them—not just once, but repeatedly."

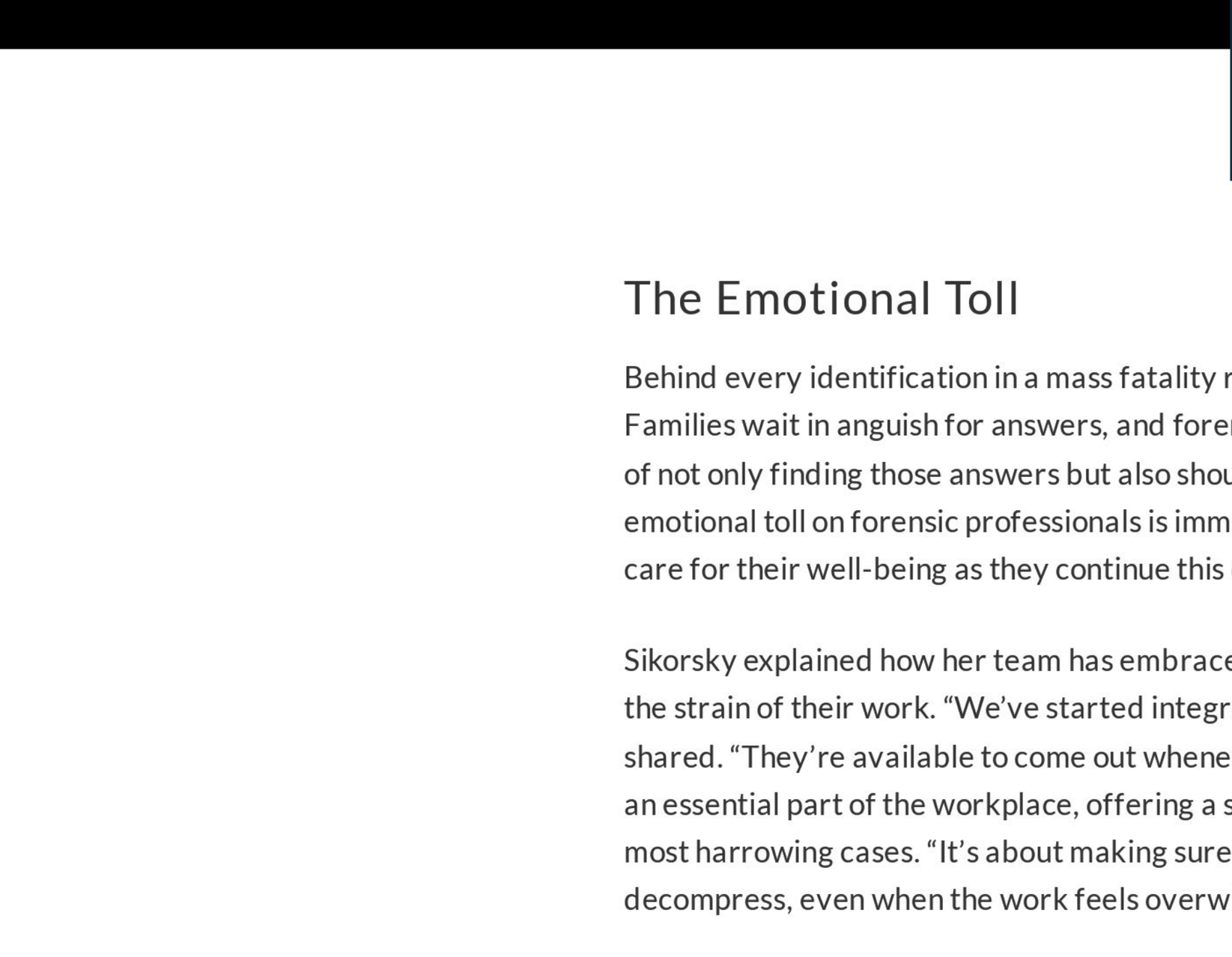
Forensic teams must also anticipate the unexpected, as both Gin and Desire emphasized. One lesson they both learned the hard way was the importance of backup resources. Gin recalled a moment during a disaster when her team needed specialized equipment that wasn't available locally. "Because of our relationships with neighboring states, I was able to make a call and get what we needed within hours," she said. "But without those connections, we would've been stuck."

Desire echoed the sentiment. "You can't wait until the disaster happens to figure out who you can call," he said. "Those relationships have to be in place years ahead of time." He urged forensic professionals to attend conferences like ISHI to meet their counterparts in other regions, exchange ideas, and establish lines of communication that could prove lifesaving in future crises.

Sikorsky added that preparedness isn't just about logistics—it's also about building trust within the team. "When something catastrophic happens, people need to trust that their leadership has thought things through," she said. "If you've practiced together, planned together, and communicated openly, that trust is already there. It makes all the difference when the pressure is on."

Even small, incremental changes can have a big impact. Sikorsky described how her lab has created a "living plan," a dynamic document that evolves as new technologies, challenges, and opportunities emerge. "This isn't something you write once and forget about. It's something you grow with," she said.

Ultimately, the panelists agreed that the key to a successful mass fatality response lies in a balance of preparation and adaptability. "You can't predict everything, but you can set yourself up to respond effectively by building those bridges ahead of time," Desire said. Gin nodded in agreement. "It's not just about being prepared—it's about being ready to adapt when everything changes," she said.



What does it take to identify victims in mass fatality incidents? At ISHI 35, a panel of forensic experts shared their experiences and insights on the challenges, emotional toll, and groundbreaking advancements in victim identification.

From real-world examples to innovative solutions, this conversation highlights the dedication and resilience of forensic professionals working to bring answers to families.

The Emotional Toll

Behind every identification in a mass fatality response lies a story of profound loss. Families wait in anguish for answers, and forensic teams bear the heavy responsibility of not only finding those answers but also shouldering the grief they witness. The emotional toll on forensic professionals is immense, requiring deliberate efforts to care for their well-being as they continue this deeply human work.

Sikorsky explained how her team has embraced mental health resources to cope with the strain of their work. "We've started integrating therapy dogs into the lab," she shared. "They're available to come out whenever needed." These dogs have become an essential part of the workplace, offering a sense of comfort and relief during the most harrowing cases. "It's about making sure people have a moment to breathe, to decompress, even when the work feels overwhelming," she explained.

The lab's approach doesn't stop there. Sikorsky introduced new protocols for even routine homicide cases, ensuring team members can access mental health support when needed. "We assess whether anyone needs extra counseling after difficult cases," she said. "Even when it's not a mass fatality, the work still takes a toll." Normalizing mental health conversations and providing support has created a more open, supportive environment in her lab.

Forensic professionals often connect directly with grieving families, which adds another emotional dimension to their work. Desire, who has worked on mass fatality responses since 9/11, shared how his team approaches these moments with care. "I have my team, the forensic scientists working on these cases, meet with the families. It's unheard of in most cases, but I want them to see that people still care," he said.

These interactions, though meaningful, can be deeply moving and difficult. Desire recounted the gratitude families expressed when they received confirmation of an identification. "When you tell them, 'We've identified your son or daughter,' and they start crying and thanking you, it's overwhelming," he said. "One mother told me, 'Thank you for giving me the chance to bury my child.' That's something you never forget."

Desire and his team also participate in memorial events, including the anniversary of 9/11, where families of the victims gather to remember their loved ones. "We go down to the Voices of Resilience event, and the families are there. The hugging, the crying—it's still raw, even after all these years," he shared. "But those moments remind you why you do this work. It's not just about identification—it's about healing."

The concept of vicarious trauma—emotional distress from exposure to others' suffering—has become a focal point for forensic teams. "We didn't used to talk about it much, but now we know it's real," Sikorsky said. She has implemented team bonding activities, such as watching movies together or sharing meals, to help staff decompress and connect outside of work. "It's a small thing, but it helps people feel like they're not alone in this," she explained.

Both Sikorsky and Desire emphasized that leadership plays a crucial role in creating a culture where vulnerability is accepted. Desire shared how he once noticed a young scientist struggling during a particularly difficult case. "I went to my boss and said, 'We need to do something.' We brought in counselors and made it a group session so no one felt singled out," he explained. The experience opened the door for others to share their feelings, fostering a stronger, healthier team dynamic.

In the world of mass fatality identification, the emotional toll is inevitable, but through compassion, connection, and support systems, forensic professionals find ways to sustain themselves while helping others heal.

A Mission of Humanity

At its heart, mass fatality work is about more than science—it's about compassion, dignity, and providing families with the answers they deserve.

"Every identification we make is another family who can start to heal," Desire said. "When you see the relief on their faces, you know it's worth everything."

From technological breakthroughs to human connection, the work of mass fatality identification is a powerful reminder of the resilience, compassion, and dedication of forensic professionals.

For forensic professionals seeking to enhance their preparedness for mass fatality events, ISHI will offer two hands-on workshops providing critical training in Disaster Victim Identification (DVI).

Are You Prepared? – Developing and Testing DVI Response Plans (Sunday, November 2, 8:30 AM – 5:00 PM) will guide participants through the process of building a robust DVI plan tailored to their organization. Led by experts from the Palm Beach County Sheriff's Office and Kentucky State Police, this full-day workshop covers resource assessment, defining roles and responsibilities, and testing response effectiveness through scenario-based exercises. Attendees will leave with a foundational DVI plan that can be further refined and implemented.

Field-Ready Forensics: Deploying Rapid DNA for Real-Time Identification and Crisis Response (Monday, November 3, 1:30 – 4:30 PM) will focus on integrating Rapid DNA technology into field operations during mass casualty events. Experts from CODIS laboratories will provide practical guidance on using mobile and temporary Rapid DNA systems for immediate victim identification, ensuring forensic teams are equipped to respond swiftly and effectively in critical situations.

Both workshops offer an invaluable opportunity to learn from seasoned professionals, engage in interactive exercises, and gain insights that will strengthen forensic responses in times of crisis.

More information available at www.ishinews.com/agenda.



Scaling Expert Knowledge through a "Living SOP"

Written by Grace Choi PhD, Founder of Larabee

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Every organization has "gold standard" ways of performing protocols and core techniques. These established methods ensure precise and consistent results while minimizing potential errors. The problem is that action-based procedures are difficult to train at scale. In-person guidance is the ideal method for teaching, but becomes increasingly difficult to do the larger the organization (or training audience). Written documentation and SOPs, on the other hand, are easy to distribute, but lack the clarity and depth of learning directly under the expert.

Timeless, apprentice-style teaching methods can teach us a great deal about how learning "happens," why and how current training gaps occur, and how we can approach asynchronous training protocols with preserving and rapidly disseminating expert knowledge in mind through a "living SOP."

An Outsider's Perspective

In 2004, shortly after graduating from college with a degree in economics, I enrolled in the French Culinary Institute in New York to pursue a career in the food industry. There, I was immersed in a new and unfamiliar world: mother sauces, knife techniques, any number of pastry doughs, plating conventions, and machinery. What knowledge I arrived with felt deeply insufficient compared to the mountain of information I had to absorb.

Of endless fascination was observing how people learn. In the early aughts, before the birth of "foodies," food blogs, and influencers, there were generally two types of people going to culinary school: younger individuals out of secondary or technical school, and professionals with tertiary educations desperate for a career change. The former seemed more at-ease than the latter, who were accustomed to (and rewarded for) scholastic aptitude.

As this audience knows, learning manual work is a vastly different experience from learning concepts and facts. In place of lecture halls is repetitive visual observation; in place of discourse is the deconstruction of movements; in place of memorization is the embodiment of tools and muscle memory. In tactile work, it's not enough to simply know how to do. Understanding the why and marrying it with the how is how individuals achieve expert status.

In the 20 years since, what I've come to discover is that the distinction between these different forms of knowledge is not often made. When tactile actions and physically executed skills are treated like concepts, or when there is an overreliance on written instructions, knowledge gaps, lagging competency, diminished confidence, and costly errors are the result.

My team and I began building Larabee as a way to improve how people learn actions and skills, envisioning a new framework for scaling expert knowledge with precision and speed. At the encouragement of biology professor Dr. Tara Scully from George Washington University, began exploring the field of forensic DNA analysis where, she argued, procedural precision was of critical importance.

To better understand what obstacles, if any, there were in training, I turned to casework supervisor Alyse Yacovone-Margetts, who generously lent me her time and insights. Against an ever-increasing backlog of work, the challenges consisted of:

- Difficulty training one-to-many (especially at larger organizations)
- Theory-practice gap among incoming analysts who lack basic skills or hands-on laboratory experience
- Delay between observation and processing (learning a procedure long before doing it)
- Irregular frequency of certain procedures causing the need for retraining or supervision
- New instrument, kit, or product adoption
- Reduction in face-to-face training time

The challenges you face in your labs mirror those we have seen across countless industries where actions and procedures are critical to operations. Across these industries, there are some organizations that are more focused on meeting compliance requirements than quality mentorship. But many are simply too overwhelmed to do more than take the "monkey see, monkey do" approach, are unaware that alternatives exist, or assume they are out of reach.

I believe we're at a turning point in how complex skills are taught and mastered. Please read on to learn more about procedural learning and what we believe the future of learning entails.

Mine the Gap: Procedural vs Declarative Knowledge

Think back to the first time you learned how to tie your shoes. If that isn't an easy memory to conjure up, what about learning how to drive a car? Knit a scarf? Tie a tie?

Each and every one of these skills has a few key similarities. They are:

- **Tactile.** Objects and tools have to be manipulated with your body or hands.
- **Sequential.** Tasks require step-by-step procedures in order to be accomplished.
- **Visual.** In order to learn these core skills, you have to see and copy the actions themselves.

By definition, these are the characteristics of a category of knowledge referred to as **procedural knowledge**. Procedural knowledge is a type of implicit memory involving physical or cognitive tasks, and is distinct from **declarative knowledge**, which is the knowledge of explicit or conscious information. If procedural knowledge represents the knowledge of how (riding a bike, performing surgical skills, typing on a keyboard), then declarative knowledge represents the knowledge of what (concepts, facts, principles, and memories).

Declarative knowledge is easy to put into words. Historical facts, philosophical theories, state capitals – this is all information that can be learned in a classroom or through a book or video. Procedural knowledge, on the other hand, is much harder to put into words. In order to learn it, you must see it. In order to become proficient, you must do it repeatedly. But once you achieve mastery and muscle memory occurs, it is knowledge that can stay with you for decades.

The problem is that procedural knowledge is often taught the way declarative knowledge is taught: in a classroom, through written instructions, or by sitting and watching a video. Each and every one of these resources is an ineffective form of guidance. In the classroom, learners are far too often passive recipients of information. Written instructions are actions that have been converted to words that have to be converted back into actions, making it subject, open to interpretation, and unclear. Videos provide visual demonstration, but how much is actually recalled when the time comes to conduct the procedure?

Good Training is Hard to Scale

What do culinary schools and medical training have in common? Both feed pressure-cooker careers, both rely heavily on hands-on operations and procedures, and both employ methods of teaching that prioritize observation, repetition, and guided improvement. Many culinary instructors rely on the "I do, you do, we do" model of teaching (also known as the "gradual release of responsibility" model), while medicine practices the "see one, do one, teach one" approach to internalizing the knowledge of skills and techniques.

Both fields of study demonstrate that in order to gain proficiency and mastery of tactile procedures, teaching must be both scaffolded and iterative. Visual observation, repetitive practice, and social engagement are paramount. This is not to say that written recipes, SOPs, and other forms of documentation aren't important; rather, they should serve as critical reference points rather than the primary resource for teaching.

Take a written recipe, for example. An average recipe will contain countless culinary-specific terms like "fold" or "julienne." For a novice who has no basis or experience for understanding, terms like these can be daunting. On the other hand, a proficient or expert registers these terms as clear directives without much conscious effort because they've already established a foundation of knowledge. In other words, written instructions are most helpful when a pre-existing framework for understanding already exists.

Undoubtedly, high-touch methods of instruction and guidance are difficult to scale. There are only so many experts and so much time. Shoulder-to-shoulder learning is significantly harder to accomplish when there are several sets of eyeballs, each representing different learning styles and any number of questions. At the same time, low-touch methods of instruction – written or linear video content – is infinitely scalable but not nearly as clear or effective. The ideal solution is an instructional format that adapts traditional apprenticeship pedagogy to the modern demands of consistency and scale.

Building Better Training: The Living SOP

When we think about modernizing training for the present day or taking a giant leap forward in scaling expert knowledge, it's easy to imagine that the solution resides in vanguard technologies like AR/VR and artificial intelligence. These technologies have significant value of which we are only beginning to understand, **but it's also critical not to lose sight of pedagogy**. High-tech solutions that do not discriminate between procedural and declarative knowledge, or treat all learning as one long linear journey, run the risk of being both expensive and insufficient.

At the same time, it has become much easier to vastly improve time to competency, minimize errors, scale precision and consistency, and preserve institutional knowledge. One such example is the work we are doing at Larabee. Our deep understanding of what makes for indelible learning experiences enables us to reimagine what's both possible and scalable. By emulating the social experience of instructional guidance, we have developed the capacity to **rapidly develop "living SOPs."** These:

- Meet the learners where they are
- Move at their pace
- Deconstruct complex actions with clarity
- Provide depth and context when needed
- Remove unnecessary obstacles
- Preserve expert knowledge

However you choose to approach or innovate on training, at the heart of every successful approach is something we refer to as **empathetic design**. Simply put: this is designing SOPs and curricula with the learner in mind, as opposed to the actions or sequences themselves. The latter are certainly critical, but we have found that when we start with a more comprehensive understanding of learner needs, obstacles, and the psychology of learning, we are better able to set them up for both success and growth.



Outcomes and Use Cases

We have discovered that when protocols are designed in a way that makes sense to the learner, we are able to minimize errors, boost consistency, and cut time to competency by 90%. Larabee SOPs do not replace precious face-to-face interaction but maximize the expert's time by allowing them to focus on honing practices and fine-tuning the learner's methods, as opposed to repetitive teaching.

Living SOPs that are evergreen and can be called up on demand are as applicable to first-time analysts as they are qualified case workers:

"If a lab is modular, training might happen in the beginning of the month but the analysts don't process until the end of the month," says Yacovone-Margetts. This delay between observation and doing applies to the adoption of new instruments, kits, and technologies, as well as specialized techniques that are specific but irregular, like bone crushing protocols. Living SOPs that maintain the integrity and clarity of instruction, minimize the time to learn or refresh, and enable faster product or technology adoption.

Looking Forward

As forensic science continues to advance, training methodologies must evolve to match. By recognizing the distinct nature of procedural and declarative knowledge, it's possible to build training systems that better serve analysts, laboratories, and the ultimate stakeholders awaiting DNA results. This understanding doesn't just improve training efficiency—it helps ensure that every analyst has the complete set of skills and knowledge needed to perform their crucial role in the justice system.

The future of forensic training lies not in choosing between traditional apprenticeship and modern educational methods, but in understanding how to combine them effectively. When we acknowledge that not all knowledge is alike, we can build training systems that truly prepare analysts for the complex challenges they face in modern forensic science.

To learn more about Larabee's approach to procedural learning, visit www.heylarabee.com. Dr. Choi and the Larabee team provide software demos as well as professional development seminars and webinars on procedural knowledge at no cost.

A Leader in the La

Welcoming Courtney Campbell to the ISHI Advisory Commmittee



Written by Tara Luther, Promega

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Forensic DNA is an ever-evolving field, requiring not only technical expertise but also leadership that fosters innovation, collaboration, and continuous learning. It's this combination of skills that makes Courtney Campbell such an exciting addition to the ISHI Advisory Committee. With two decades of experience at the Arizona Department of Public Safety (AZDPS), Courtney has not only been a key figure in forensic DNA analysis but also a mentor, problem solver, and advocate for scientific progress.

A Career Built on Passion and Progress

Courtney's journey into forensic DNA wasn't just a career move—it was a calling. Drawn to genetics and DNA from an early stage, she pursued a master's degree in forensic science with a focus on criminalistics, blending her love for science with a desire to make a tangible impact. Over the last 20 years at AZDPS, she's done exactly that.

As a Supervising Forensic Scientist, Courtney has trained more than 20 serology and DNA analysts, ensuring the next generation of forensic professionals is equipped with the skills and confidence needed to excel. She played a pivotal role in validating and implementing new technologies in the lab, improving efficiency and the reliability of forensic DNA testing. And perhaps most impressively, under her leadership as Casework DNA Technical Leader (2016-2024), the AZDPS lab reached an incredible milestone—reducing their backlog to zero cases older than 90 days. In an industry where backlogs can significantly delay justice, this accomplishment speaks volumes about her commitment to process improvement and operational excellence.



"I feel like I've worked a lot of cases, and I'm proud of that, but I'm also proud of the way I have led people and encouraged them in their careers. I like being in a supportive role, helping others troubleshoot problems, refining protocols, and making their lives easier."

A Leader Who Builds Others Up

When asked about what she's most proud of in her career, Courtney doesn't focus on a single case or breakthrough. Instead, she highlights the impact she's had on the people around her. "I feel like I've worked a lot of cases, and I'm proud of that, but I'm also proud of the way I have led people and encouraged them in their careers," she shares. "I like being in a supportive role, helping others troubleshoot problems, refining protocols, and making their lives easier."

This mindset of lifting others up is exactly what makes her a perfect fit for the ISHI Advisory Committee. ISHI has always been a space for forensic professionals to learn from one another, to push boundaries, and to grow as a community. Courtney's leadership, mentorship experience, and ability to navigate the ever-changing landscape of forensic DNA will be an invaluable asset as ISHI continues to shape the future of the field.



Embracing Change and Looking Ahead

Courtney often tells her team, "If you don't like change, you shouldn't be in forensic DNA." It's a philosophy that rings true in a discipline that is constantly evolving—whether through new sequencing technologies, rapid DNA applications, or advancements in investigative genetic genealogy. She's seen firsthand how quickly forensic DNA has grown over the past two decades, and she's eager to help guide discussions on where it's headed next.

Her first experience with ISHI, attending the Las Vegas conference, left a lasting impression. The sheer scale of the event, the networking opportunities, and the chance to engage with experts from across the world solidified her appreciation for the forensic DNA community. Now, as a member of the Advisory Committee, she's in a position to help shape the event that once inspired her—to ensure it remains a place where professionals come together to exchange ideas, challenge the status quo, and drive forensic science forward.

A New Chapter with ISHI

Outside of the lab, Courtney is just as dynamic. She's a dedicated soccer mom, an avid traveler, and a fan of video games and movies—proving that even forensic scientists need time to unwind. But whether she's on the field cheering for her daughter or exploring a new country, her passion for forensic DNA never wavers.

As ISHI welcomes Courtney Campbell to the Advisory Committee, we look forward to the expertise, leadership, and enthusiasm she brings to the table. Her track record of fostering innovation, mentoring the next generation, and embracing the future of forensic DNA makes her a valuable addition to the ISHI community.

Welcome to the team, Courtney!

Preserving Paradise

Inside Florida's Loggerhead Marinelife Center

Written by Katie Goebel, Promega



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Forty years ago, Eleanor Fletcher, affectionately known as "The Turtle Lady," embarked on a mission that would transform Juno Beach into a global hub for sea turtle conservation. Inspired by the remarkable abundance of nesting turtles on the local shoreline, Eleanor began pioneering research to understand and protect these ancient mariners. What started as informal lessons in her home evolved into Loggerhead Marinelife Center, a state-of-the-art facility dedicated to education, research, and the protection of marine life. Today, Juno Beach stands as one of the most active nesting sites in the world. Loggerhead Marinelife Center continues Eleanor's legacy, blending environmental stewardship with community engagement to safeguard sea turtles for generations to come.

This year, at ISHI, attendees will visit Loggerhead Marinelife Center (and its current patients) during the Wednesday night dinner event.

Why is Conservation Important?

Sea turtle conservation is critically important, particularly in areas like Palm Beach, where the beaches serve as vital nesting grounds for these endangered creatures. Thousands of hatchlings emerge from their nests along the southeastern U.S. coast each year, embarking on a perilous journey to the Atlantic Ocean. Loggerhead's 9.5-mile-long stretch had a record 25,025 nests in 2023. Unfortunately, only a fraction of these hatchlings, approximately one in 1,000 to 10,000 survive to adulthood. While natural predators such as raccoons, crabs, and birds present significant challenges, the greatest threats to sea turtle populations stem from human activities. Overharvesting of eggs, pollution, and incidental capture in fishing gear have driven many sea turtle species to the brink of extinction, underscoring the urgent need for conservation efforts.

Palm Beach's coastline is not only a haven for sea turtle nesting but also a frontline for addressing the impacts of human activity. Coastal development, nighttime beach driving, and recreational equipment like cabanas and beach furniture can disturb nesting females, hinder hatchlings' journey to the ocean, and compact sand over nests, reducing hatching success. Additionally, pollution from oil spills and urban runoff poses a grave risk, contaminating the food chain and contributing to diseases like fibropapillomatosis, which affects many sea turtles. Conservation measures, such as the use of Turtle Excluder Devices (TEDs) in fishing nets, beach preservation initiatives, and public education, play a crucial role in mitigating these threats. By prioritizing sea turtle conservation in Palm Beach, not only are these remarkable creatures protected, but also the delicate ecosystems they help sustain, ensuring a healthier ocean for future generations.

Organizations like the Loggerhead Marinelife Center play an integral role in these efforts, providing extensive conservation programs and rescuing and rehabilitating injured sea turtles. Through initiatives such as nest monitoring and public awareness campaigns, the center helps ensure that these extraordinary creatures, and the ecosystems they support, continue to thrive.



Rehabilitation Treatments

The Gordon and Patricia Gray Veterinary Hospital at Loggerhead is a cutting-edge facility dedicated to the specialized care of sea turtles. Equipped with advanced medical tools and a highly skilled veterinary team, the hospital offers a range of services, from diagnostic imaging to complex surgical procedures. The facility includes a treatment room, veterinary pharmacy, digital x-ray room, surgical suite, and necropsy room, each tailored to address the unique needs of sea turtle patients. Visitors can witness the compassionate care provided to these marine creatures through observation windows, fostering a deeper connection to ocean conservation.

Key areas of the hospital play vital roles in patient care. The treatment room, visible to the public, is the hub of daily medical procedures, including the administration of medications stored in its well-stocked pharmacy. Digital X-rays provide critical insights during initial assessments, revealing internal issues such as ingested fishhooks or respiratory conditions. For surgical interventions, the state-of-the-art suite is equipped with tools like an anesthesia machine and sterilized instruments, ensuring optimal outcomes. Even in cases of loss, the necropsy room facilitates detailed pathological studies, offering opportunities for public education. With generous donor support, this hospital has become not only a haven for sea turtles but also a global leader in teaching.





Conservation, Research, and Care

Loggerhead Marinelife Center (LMC) stands as a global beacon of ocean conservation, leveraging its expertise to tackle the myriad threats facing sea turtles today. Through initiatives like Project SHIELD, LMC collaborates with local stakeholders, including fishing piers, recreational boaters, and beachside hotels, to mitigate human impacts on marine life in Palm Beach County. By addressing issues such as pollution and promoting sustainable practices, the conservation team develops proactive solutions that extend beyond Florida, fostering partnerships with over 90 organizations across six continents to protect threatened and endangered sea turtles worldwide.

Central to LMC's mission is its dedication to research and care, which provides critical insights into sea turtle health and behavior. Behind every exhibit at the Center lies a team of professionals working tirelessly to support resident animals. Daily tasks, from food preparation and habitat maintenance to cleaning instruments and exhibits, ensure optimal care for these marine creatures. This hands-on approach allows the team to study animal genetics, nutrition, reproduction, and pharmacology—knowledge that informs global conservation strategies and strengthens LMC's role as an international leader in marine science.

LMC's research department, established by founder Eleanor Fletcher in 1969, boasts one of Florida's longest-running sea turtle monitoring programs. Each season, from March to October, the team documents sea turtle activity across 9.5 miles of beach, amassing one of the most comprehensive datasets in the world. This invaluable information shapes conservation policies and recovery strategies for sea turtle populations, not only in Florida but across the globe, ensuring a brighter future for these iconic marine species.

The Loggerhead Experience

LMC offers visitors a variety of engaging activities that provide a deeper understanding of marine life and conservation efforts. One such activity is the Juno Dunes Natural Area Hike, a 45–60-minute guided excursion led by one of LMC's experienced educators. This outdoor adventure takes guests through the coastal hammock habitat adjacent to the center, where they will learn about the vital role these ecosystems play in the environment. The hike includes plant and animal identification and culminates in a scenic view of the Atlantic Ocean, offering an enriching experience for nature lovers and eco-conscious visitors alike. In partnership with PBC Environmental Resources Management, LMC has adopted the Juno Dune Natural Area, furthering its commitment to local conservation efforts.

For those wanting a closer look at the nesting habits of sea turtles, the Turtle Walk program offers a unique opportunity to observe loggerhead sea turtles during their nesting season. Led by trained scouts with state-issued permits, this program allows guests to witness the incredible process of egg-laying on the beaches of Juno Beach. The walk begins with an educational presentation on the plight of sea turtles and the challenges they face, followed by a hands-on learning experience. If a turtle is spotted, participants have the rare chance to observe the nesting process up close, creating an unforgettable moment in the wild.

Another signature program at LMC is the Hatchling Release, where visitors can witness the excitement of sea turtle hatchlings making their journey to the ocean. The program begins with an educational session about the hatching process, followed by a walk to Juno Beach to see the hatchlings released into the wild. With permission from the Florida Fish and Wildlife Conservation Commission, LMC staff members lead the release, often accompanied by an excavation of sea turtle nests, allowing guests to observe the delicate process of caring for and protecting sea turtle eggs. This activity not only educates visitors about the life cycle of sea turtles but also allows them to directly contribute to the survival of this endangered species.





Leaving an Impact

The continued success of LMC is made possible through the generosity of their donors, whose support allows them to expand their impact each year. LMC has seen an increase in visitors from all over the world and can provide exceptional programming that engages people of all ages. Donors also enable their dedicated hospital staff to deliver the highest level of medical care to sea turtles in need. The LMC Development Office plays a vital role in connecting with supporters, offering outreach, and recognizing charitable contributions. Central to their mission is a commitment to listening to their donors and striving to exceed their expectations.

There are many ways to contribute, whether through gifts of cash, appreciated stock, or donations of goods and services. Each contribution helps LMC continue its work to protect ocean ecosystems, particularly the endangered sea turtles that rely on their efforts.

LMC stands as a testament to the power of community, education, and dedicated conservation efforts. From the hands-on experiences of witnessing turtle nesting to the vital research and rehabilitation taking place in the hospital, LMC provides a meaningful connection to the ocean and its delicate ecosystems. Through the continued generosity of donors, the commitment of its staff, and the engagement of visitors from around the world, LMC ensures that future generations will have the opportunity to learn from and protect the incredible sea turtles that call our shores home. Together, we can continue to make a lasting impact on the preservation of marine life and inspire a global movement toward ocean conservation.

We're Looking for our Next Student Ambassadors!

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Unlock Your Future in Forensic Science!

Are you a passionate student pursuing a degree in forensic science, eager to dive into the world of cutting-edge research and groundbreaking advancements? Look no further! The ISHI Student Ambassador Program is your exclusive gateway to unparalleled opportunities at the International Symposium on Human Identification (ISHI) conference.



Connection

Immerse yourself in an atmosphere buzzing with intellectual curiosity and expertise. As an ISHI Student Ambassador, we will showcase you and your research on our website and social channels, introducing you to other attendees and jumpstarting the networking process. At ISHI, you'll be granted VIP access to an extensive network of professionals, scientists, and industry leaders in forensic science. Forge connections that extend beyond the conference, opening doors to mentorship, collaborative research, and potential career opportunities. You'll also have access to all networking functions, including the Welcome Reception and Wednesday night off-site dinner event. Seize the chance to interact with those at the forefront of forensic science, expanding your network and fostering relationships that last a lifetime.





Opportunity

Picture yourself at the forefront of innovation, surrounded by experts who share your passion. The ISHI Student Ambassador Program offers more than just a conference; it's a launchpad for your future in forensic science. Gain insights into the latest technologies, methodologies, and breakthroughs that are shaping the industry. Receive complimentary registration to participate in pre- and post-conference workshops, panel discussions, and hands-on sessions that will elevate your understanding and skill set. Uncover internships, research opportunities, and potential collaborations that can set you on a trajectory towards success.





Inspiration

Witness the power of inspiration as you attend captivating keynotes and presentations from trailblazers in forensic science. The ISHI conference is a melting pot of ideas, sparking creativity and motivation that will drive your academic and professional pursuits. Be inspired by real-world success stories, innovative research, and the impact forensic science has on society. The ISHI Student Ambassador Program is not just about attending a conference; it's about leaving with a renewed sense of purpose and passion for your chosen field. Present your scientific poster to an in-person audience, including mentors you'll be able to take selfies with later. We'll also record a video interview of your poster presentation to be shared on our social channels later, leading to further connections.

Interested in Applying?

Visit our webpage to see learn more about the next steps. Entries must be received by May 4, 2025.



ISHI 36 Workshops Announced

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Pre- and post-conference workshops have been announced for the 36th International Symposium on Human Identification. Topics covered include probabilistic genotyping, Rapid DNA, disaster victim identification, leadership, expert witness testimony, and more.

Registration is limited, so claim your spot early!

Shortened descriptions, dates, and costs are included below. For more information on any of the workshops, including speakers, visit our website.

Sunday, November 2

8:30am-12:30pm

Technical Leaders' Meeting

Topics to follow.

Cost

Registration - $275

Fee includes breakfast.

8:30am-5:30pm

Are You Prepared? – Developing and Testing DVI Response Plans

This workshop provides an introduction for forensic laboratories interested in developing and implementing a Disaster Victim Identification (DVI) response using DNA methodologies. Drawing from the experiences of the Palm Beach County Sheriff's Office and Kentucky State Police, the workshop covers key topics such as assessing available resources, determining specific needs, defining roles and responsibilities, and testing plan effectiveness through practical, scenario-based exercises. Attendees will engage in lectures, interactive discussions, and hands-on activities, including drafting a preliminary DVI plan tailored to their organization. By the end of the session, participants will have a foundational plan that can be further refined and implemented to enhance their DVI preparedness.

Cost

Registration - $425

Fee includes breakfast, lunch, breaks, and materials.

8:30am-5:30pm

Whole Genome Sequencing for Forensic Laboratories

In August 2023, the Center for Human Identification (CHI) at the University of North Texas Health Science Center became the first publicly accredited laboratory to implement SNP testing using MPS technologies for Forensic Genetic Genealogy (FGG). Since that time, the CHI has implemented a number of workflows for FGG cases, with the latest being whole genome sequencing (WGS).

This workshop will focus solely on WGS. The benefits of WGS will be discussed along with additional informatic and sequencing platform considerations. Molecular and bioinformatic workflows will be outlined and data from the CHI's developmental validation will be shared.

Cost

Registration - $425

Fee includes breakfast, lunch, breaks, and materials.

1:30 - 4:30pm

DNA Trainers' Meeting

Adult learners come with past experiences, may it be from school or from previous work. Meeting your learner where they're at and tailoring a DNA training program to their needs is very important. There is also pressure to get new staff trained and performing casework as soon as possible to alleviate the laboratory's accumulation of casework. All this must be balanced with the numerous standards and guidance from the community.

In this interactive workshop, DNA trainers and researchers will share best practices for training new hires in serology and DNA typing. We will share research from discussion with lab managers and DNA technical leaders from small, medium, and large labs on how they conduct training, including their processes and timelines. Sample training programs will be presented, and we will learn how to improve the efficiency and organization of the training process to onboard new hires and get them working on casework faster.

Cost

Registration - $275

Fee includes lunch

Monday, November 3

8:30am-5:30pm

Implementing a Forensic Rapid DNA Program

With the anticipated effective date of the new Forensic Rapid DNA Quality Assurance Standards (QAS) 18 and 19 in July 2025, this workshop aims to highlight key aspects of the updated QAS and NDIS Operational Procedures required to operate a Forensic Rapid DNA Program both within laboratories and in collaboration with Partner Agencies. Presenters from federal, state, and local CODIS laboratories will share implementation strategies and practical insights for successfully establishing a Forensic Rapid DNA Program. This session will serve as a solid foundation for the afternoon workshop: Field-Ready Forensics: Deploying Rapid DNA for Real-Time Identification and Crisis Response.

Cost

Registration - $275

Fee includes breakfast and materials.

8:30am - 5:00pm

Supporting your Laboratory through Legal Challenges to the Use of Probabilistic Genotyping

Forensic laboratories have increasingly adopted probabilistic genotyping (PG) methods for the interpretation of DNA mixtures.

Legal challenges at admissibility hearings span a range of topics including general acceptance, scope of the internal validation, defense access and source code, relatives, and the Likelihood Ratio.

This workshop will cover the key recommendations for internal validation. We will discuss experimental design to meet the recommendations, summarize published material addressing the key issues, and discuss common challenges to the use of PG methods. Using interactive engagement, we will provide the audience with strategies to address and to prepare for admissibility hearings for PG software.

Cost

Registration - $425

Fee includes breakfast, lunch, breaks, and materials.

8:30am - 5:00pm

From Report to Court: Effective Communication of DNA Evidence

A panel of experts in the criminal justice arena will examine expert testimony regarding DNA, how it's presented, and what effect it may have on deliberation and the final verdict. Topics to be addressed will include reporting and testimony following current recommend guidelines by the community (source, activity level propositions, etc.), best practices for trial preparation, admissibility hearings, and presenting and admitting expert testimony. The panel will include former and current scientists, lawyers, and judges. The workshop will conclude with an open discussion based on topics the attendees are most interested in.

Cost

Registration - $425

Fee includes breakfast, lunch, breaks, and materials.

1:30pm - 4:30pm

Field-Ready Forensics: Deploying Rapid DNA for Real-Time Identification and Crisis Response

This half-day workshop will focus on the mobile and temporary operation of Rapid DNA instruments, emphasizing their deployment in mass identification and Disaster Victim Identification (DVI) events. Building on the "Implementing a Forensic Rapid DNA Program" workshop, experts from CODIS laboratories will share practical use cases and strategies for using Rapid DNA in field-based, real-time analysis. Attendees will gain insights into successfully integrating Rapid DNA technology for mass casualty and crime scene operations, enhancing the ability to respond effectively in critical forensic and public safety scenarios.

Cost

Registration - $425

Fee includes lunch and materials.

9:00am - 5:00pm

Grupo Cientifico Latino-Americano de Trabajo Sobre Identificacion Humana

Description to be announced. This workshop will be presented entirely in Spanish.

Cost

Standard Registration - $100

Fee includes lunch and breaks.

Thursday, November 6

1:30 - 4:30pm

DNA & Firearms

This workshop will cover DNA and firearms from the crime scene to the courtroom. The presentations will kick off with the crime scene perspective on DNA collection from firearms. Next, you will hear the DNA analyst viewpoint on the best techniques for processing DNA from swabs collected from firearms as well as specialized protocols for spent shell casings, magazines, unique firearms, and DNA mixture interpretation. The law enforcement perspective of how DNA and firearms impact investigations will then be examined. Finally, attendees will hear from a prosecutor on testimony preparation, guidance, admissibility, transfer, and court proceedings for criminal cases involving firearms.

Cost

Registration - $275

Fee includes lunch and materials.

1:30 - 4:30pm

Forensic Science Validation

Validation is a critical part of the scientific process for assessing whether a technique is technically sound and can be used in laboratories to produce robust and defensible analytical results. In the forensic science context, validation is mandated for laboratories accredited under the ISO/IEC 17025 standard, yet the standard tells laboratories that methods must be validated but does not provide a rigorous framework describing how a method or technique can or should be validated. There is a critical need in the forensic science community for a scientifically based framework for how laboratories should approach validation. Not only would this serve as a means for strengthening the robustness of validation studies designed to support the use of forensic science methods implemented in operational practice, but it would also serve to promote greater consistency in how validation is approached across different laboratories and disciplines throughout forensic science community. In support of this effort, RTI is working with NIST to provide a generalized framework that is applicable across multiple laboratories and disciplines to guide how laboratories should perform a scientifically defensible validation study.

Cost

Registration - $275

Fee includes lunch and materials.

1:30 - 4:30pm

Leadership Collective

Description to follow.

Cost

Registration - $275

Fee includes lunch and materials.

Sign Up to Receive Future Issues In Your Inbox

Deadlines

February, 2025

ISHI Registration Opens

May 4, 2025

Student Ambassador Applications Due

June 8, 2025

Oral and Interesting Case Abstracts Due

August 3, 2025

Poster Abstracts Due

August 22, 2025

Early Registration Deadline

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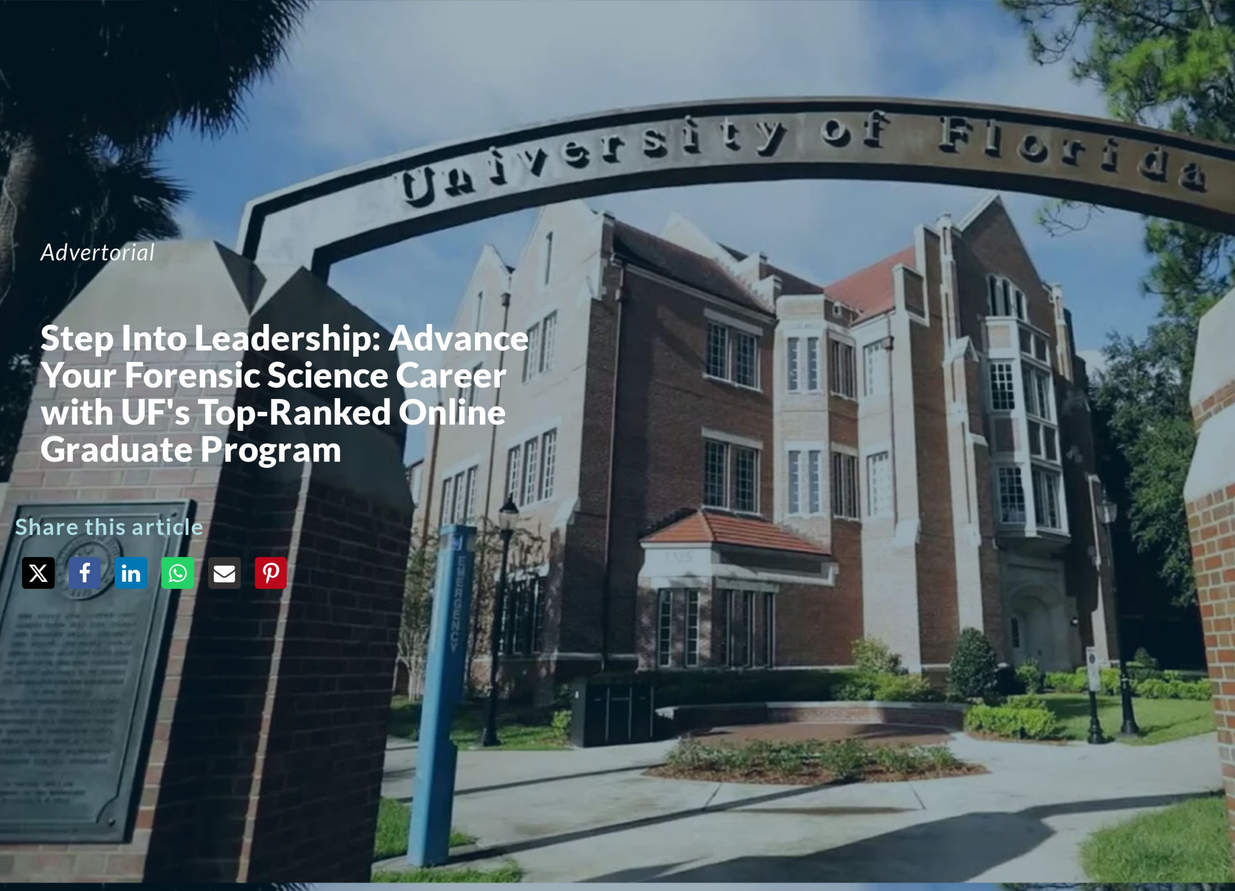

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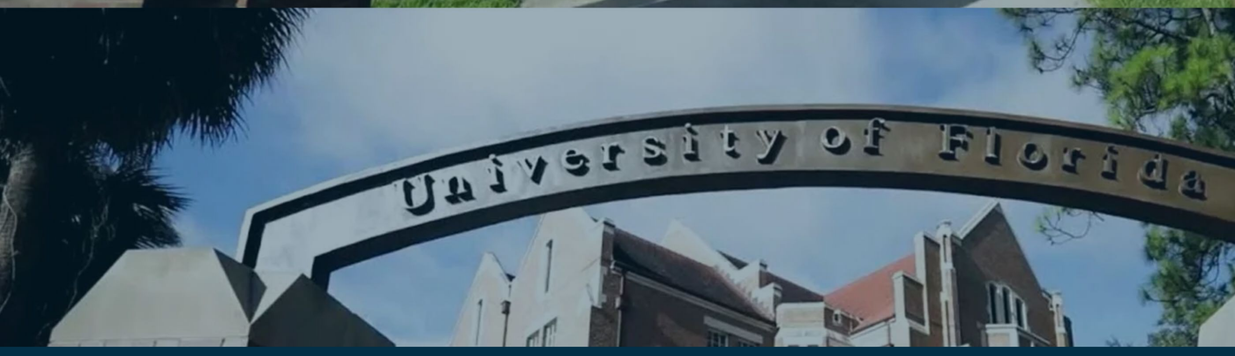

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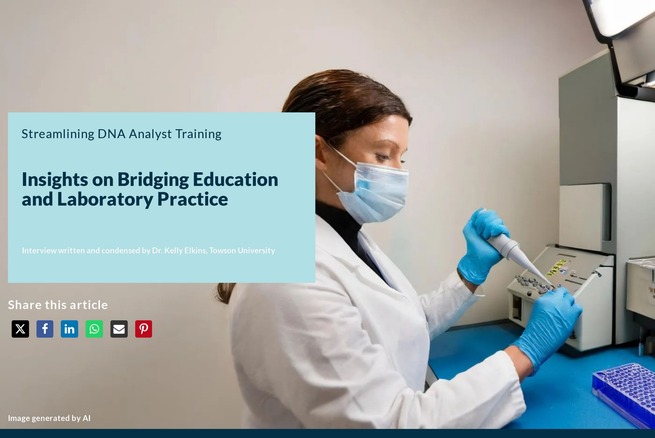
Don't believe it's possible? Hear from actual students who went through the program, like Joe Pasternak, M.S., a DNA Supervisor and Technical Leader with the State of Montana Forensic Science Division and Instructional Assistant Professor at the University of Florida,

"When I finished my program, I was fully eligible to become a technical leader and by a stroke of fate my technical leader at the time was offered a director position in the laboratory. I applied for and got promoted to his position. It was life-changing for me to have that opportunity."

Applications for the program are accepted year-round for spring, summer or fall courses, and the GRE is no longer a requirement for admission. Apply to the University of Florida today *to join the next leaders in forensic science.*



Streamlining DNA Analyst Training

Insights on Bridging Education and Laboratory Practice

Interview written and condensed by Dr. Kelly Elkins, Towson University

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Forensic DNA analysts undergo extensive training to bridge the gap between their academic studies and the practical demands of crime laboratory work. However, with training programs often spanning up to two years, both new hires and forensic laboratories face significant challenges in balancing onboarding with the urgent need for casework. Recognizing this, Dr. Kelly Elkins and her team at Towson University conducted a comprehensive survey of DNA analyst training programs across U.S. forensic laboratories.

In this interview, Dr. Elkins shares the findings from this survey, exploring the resources, methodologies, and challenges shaping DNA analyst training today. From the critical role of hands-on practice to the need for more emphasis on troubleshooting and validation, her insights provide a roadmap for laboratories aiming to enhance their training programs while addressing resource constraints and workforce demands.

What initially led you and your team to conduct this survey on DNA analyst training in U.S. forensic laboratories? What gaps or needs in training inspired the project?

We were interested in training for a few reasons. First, new graduates of forensic programs reported long training periods of up to two years even after completing Masters degrees in Forensic Science. We wanted to understand the content and coverage the forensic laboratories are seeking and are assigning in training to help streamline the process. Long training programs have unintended ramifications for trainees and laboratories. University modules and courses should closely align to the content and terminology needed in testimony and sample analysis experience needed in the laboratory. Appropriate focus will alleviate the need for the laboratory to redo or retrain everything graduates learned in a course.

Secondly, students attend college and university for myriad reasons but one of the most common reasons students study forensic science is to get a job in a forensic science laboratory where they seek to make a difference. After four or six years (or more) of postsecondary education, students want to finally be able to make a difference and contribute to casework testing such as rape kit testing. They do not want to be hired and told it will be two more years of study and waiting to finally contribute to the efforts to make our communities safer. Additionally, forensic laboratory directors also want new hires to progress in training because they have backlogs and cases to test. Better understanding academic and laboratory capabilities and needs will allow better alignment of curriculum and laboratory training activities and hopefully reduce the time new hires spend in training.

The survey highlights a wide variety of resources that trainees are encouraged to study, from foundational books to laboratory-specific SOPs. Were there any resources that stood out as particularly essential or universally used across labs?

Numerous training resources are used especially Dr. John Butler's books, Advanced Topics in Forensic DNA Typing: Methodology, Advanced Topics in Forensic DNA Typing: Interpretation, and Fundamentals of DNA Typing, but also Forensic DNA Typing. Other frequently used resources include training manuals, SOPs, quality assurance documents, journal articles, books by other authors especially for statistics and probabilistic genotyping, manufacturer's manuals, ANSI/ASB standards, SWGDAM documents, OJP training resources and the NRC report.

Hands-on practice, shadowing, and readings were among the top training activities mentioned by respondents. In your experience, what makes these training methods so effective for new DNA analysts?

New hires are expected to know the theory and literature in their respective sections of the laboratory either prior to hire or following study and training. Most new hires need to additionally study and this is where readings are so important. Each laboratory has its own policies and procedures; new analysts need to learn these so shadowing is essential. One to one training is provided to new analysts in training. This is effective as trainees are provided individualized instruction and immediate feedback to develop and perfect their skills. To become a qualified analyst, each new hire must progress through hands-on practice, documented training samples and competency testing.

One area labs indicated they'd like to spend more time on in training is troubleshooting. How do you think labs could address this, and what are some specific challenges in troubleshooting that DNA analysts encounter?

We heard this from many respondents and interviewees. Trainees could be included in routine weekly freezer and instrument checks, software updates, validation of new instruments and tools, and troubleshooting errors and problems in testing that are noted or arise. Shadowing these activities will give the trainees insight into the decision making, steps and documentation that laboratory staff perform when troubleshooting as well as who they call for instrument maintenance authorizations and repairs. The challenge is taking trainees away from scheduled training tasks and new analysts away from casework. Incidents and issues that arise and warrant troubleshooting occur with little warning or regard to schedules.

Many labs reported using quizzes, oral exams, and final assessments to evaluate competency. In your opinion, are there specific assessment methods that seem particularly effective in gauging a trainee's readiness for casework?

Frequent quizzes, cumulative oral exams, and final written assessments are all useful tools for gauging a trainee's content knowledge and ability to explain concepts. Mock case sample processing and testimony best simulate the tasks and roles of the forensic scientist and readiness for casework.

In terms of training coordinators, it sounds like their role varies significantly depending on the lab's structure. Could you share any best practices for labs that have successfully implemented a training coordinator to support DNA analyst development?

The laboratory training and work assignment structure varies significantly depending on the laboratory structure. A forensic scientist may have many titles and roles including Forensic Scientist, Analyst, Technical Lead, Unit Supervisor, and Training Coordinator. Having a training coordinator is a best practice. The training coordinator creates or compiles and updates the training curriculum and reading list, reporting forms, practice and competency samples, conducts training modules, and monitors training daily activities and progress. The training coordinator writes and administers assessments including quizzes, examinations, oral examinations, and mock case testing and court testimony. As needed, the training coordinator will create a retraining plan and experiences. Training coordinators ensure that trainees have specific training activities each work day which makes training progress more efficiently.

For labs that lack the resources for an in-house training coordinator, what advice would you give to leaders or mentors who are balancing training with their casework responsibilities?

The training program needs to be organized with checklists and the trainees need to be self-directed and ask for help when they need it. Many laboratories are willing to share their training materials and reading lists with other laboratories developing their training programs. Scheduling a weekly check-in with mentees is another best practice.

Your survey noted that labs wanted to focus more on validation and root cause analysis in their training. How might labs integrate more of these critical skills into the training process, even with resource constraints?

The use of screenshots and previously documented troubleshooting and application of root cause analysis procedures could be used without additional consumable resources. Laboratories still need to schedule time for this training and refreshers but many laboratories are holding a day or afternoon a month for this.

Finally, based on the survey results, what do you see as the next steps for supporting and enhancing DNA analyst training across U.S. forensic labs? Are there areas where additional guidance or standardization could benefit the field as a whole?

There is a new Google group for trainers to share materials and best practices and we have launched a new website to host curriculum materials we have created for use in teaching and training.

West Palm Beach

A City That Offers More Than Just Sunshine

Written by: Tara Luther, Promega

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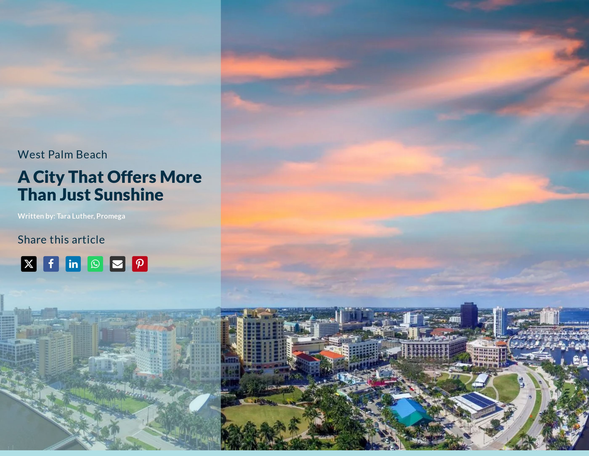

When people think of West Palm Beach, Florida, the first thing that comes to mind is often its sunny skies and warm coastal breeze. While the endless sunshine and pristine beaches are undeniably part of the charm, there's a lot more to this city than meets the eye. From its deep historical roots to its vibrant arts scene, West Palm Beach is a city that blends relaxation with innovation.

A City Built on Vision and Innovation

West Palm Beach's history is tied to one of Florida's most prominent figures—Henry Flagler. Back in 1894, Flagler founded West Palm Beach as a place to house the workers building his grand hotels in Palm Beach. What started as a workers' town has since evolved into a thriving urban center, but the sense of innovation that built the city remains strong.

Today, West Palm Beach is much more than just a gateway to Palm Beach's glitz and glamour. It's a city that has embraced modern development while still paying homage to its history. For a glimpse into that past, visit the Flagler Museum. Located in the grand estate where Henry Flagler once lived, the museum offers a fascinating look at Florida's early development and the man who helped shape it.



Flagler Museum

Where Culture and the Arts Come Alive

There's something about West Palm Beach that fosters creativity, and it shows. Take the Norton Museum of Art, for instance. With its impressive collection of American, European, and Chinese art, along with contemporary exhibitions, it's easy to get lost in its halls for an afternoon. Whether you're a seasoned art lover or someone who's just looking for a break from the day-to-day, the Norton provides a perfect retreat.

If performance arts are more your style, the Kravis Center for the Performing Arts is another gem in the city's crown. From Broadway productions to classical concerts, there's always something going on. It's not unusual to catch a world-class show or discover a local talent making waves in the arts scene. West Palm Beach's cultural energy spills into its streets, too. Just take a walk down Clematis Street and you'll be surrounded by murals, live music, and an ever-changing roster of festivals and events.

Explore the Great Outdoors

Sure, the weather here is fantastic year-round, but what makes West Palm Beach stand out is how seamlessly nature is woven into the fabric of the city. With an average of 234 days of sunshine annually, it's hard not to be tempted by the outdoors.

One place that really captures the essence of the region is Grassy Waters Preserve. It's part of the Everglades ecosystem, and if you've never had the chance to explore this unique landscape, you're in for a treat. Whether you prefer hiking, kayaking, or just watching the wildlife, it's a great way to spend a few hours reconnecting with nature. And if you're more into a casual stroll, the Flagler Drive waterfront promenade offers stunning views of the Intracoastal Waterway with plenty of places to stop and enjoy the scenery.

Looking for something more? Okeeheelee Park is a sprawling outdoor haven with biking trails, freshwater lakes, and endless space to relax or get moving. Whether you're into jogging, paddleboarding, or even just a picnic in the sun, you'll find that West Palm Beach knows how to do outdoor living right.



A Culinary Scene That Delivers

If there's one thing you don't want to overlook during your time in West Palm Beach, it's the food. The city's culinary scene is as diverse as it is delicious. Whether you're a seafood enthusiast, a lover of Southern comfort food, or someone who likes a more international flavor, there's something here for every palate.

Start with the seafood, because being this close to the ocean means fresh is an understatement. You'll find everything from lobster to snapper served in both upscale restaurants and casual beachside spots. The Regional Kitchen & Public House is known for its modern take on Southern cuisine, with dishes that feel familiar but elevated. If French cuisine is more your speed, Pistache French Bistro offers a cozy yet sophisticated dining experience right in the heart of downtown.

For something a bit more laid-back, you can't go wrong with the food truck scene. Clematis Street is a hotspot for quick and flavorful eats, offering everything from gourmet grilled cheese to tacos that rival the best of them.

Retail Therapy and Entertainment

If shopping and entertainment are on your list, you're in the right place. Rosemary Square (formerly CityPlace) is West Palm Beach's shopping and entertainment hub. This open-air plaza has everything from luxury retailers to local boutiques, plus plenty of dining options to recharge after a few hours of browsing. Grab a coffee, do a little people-watching, and take in the lively atmosphere.

For those with an eye for vintage, Antique Row is a must-visit. With its charming collection of shops, art galleries, and design studios, it's easy to spend a day exploring this quirky yet sophisticated part of town. Whether you're hunting for rare finds or simply looking to enjoy a quiet afternoon, this is the spot.



More Than Just a Gateway

One of the perks of West Palm Beach is its location. While the city itself has plenty to offer, it's also perfectly situated for those wanting to explore more of South Florida. Miami is just a short drive away if you're craving the fast pace of city life, while the quieter beaches of the Treasure Coast lie to the north. Palm Beach International Airport is right around the corner, making it easy to get here—or take off on your next adventure.

But while it's easy to talk about West Palm Beach as a "gateway," the truth is, it's a destination in its own right. There's an energy here—a mix of laid-back coastal living and a pulse of creativity and innovation—that sets it apart from other places.

West Palm Beach might be known for its sunshine but spend a little time here and you'll see it's so much more. From its deep cultural roots to its thriving culinary scene, this city offers a little bit of everything. Whether you're wandering through an art museum, kayaking through the wetlands, or simply enjoying the view from the waterfront, West Palm Beach is a place that invites you to explore, relax, and experience something new around every corner.

