Forensic Technology
CENTER OF EXCELLENCE
A program of the National Institute of Justice

IN-BRIEF

Humanitarian and Human Rights Resource Center Webinar Series

"The biggest benefit was the knowledge of projects going on regarding human rights and forensic anthropology."

—Webinar Attendee

Overview

When individuals are killed or injured in global human and humanitarian crises, forensic tools and techniques can play a key role in bringing justice and public health and safety to victims and their families. In certain situations, such as mass disasters, political conflict, and refugee crises, responders must recover and identify decedents, care for living victims, and help reconstruct the events of the crisis. Forensic science techniques may include human remains identification, nursing, anthropology, odontology, pathology, toxicology and photography to help establish identities, uncover key investigative details, and support investigations in other more traditional applications (e.g., exhumation in homicide, missing persons). The Humanitarian and Human Rights Resource Center (HHRRC) of the American Academy of Forensic Sciences (AAFS) with support from the National Institute of Justice's Forensic Technology Center of Excellence (FTCoE) provides needed resources and support to further the application of modern forensic science to global humanitarian and human rights projects to impact resolution of these issues.

The FTCoE in collaboration with HHRRC hosted a four-part webinar series on select AAFS HHRRC projects addressing forensic applications and recent advances of global humanitarian and human rights projects requiring HHRRC assistance. This in-brief report highlights the content of the webinar series and the reception of the series by the forensic science community.

Objectives

- Illustrate how research supported by the HHRRC can improve knowledge of technologies and investigative practices that can be extended to more traditional forensic science investigations.
- Describe analysis methods exploring the detection of nerve agent exposure from human remains during human rights investigations.
- Demonstrate how collaborations between forensic anthropologists and analytical chemists aid the investigation of unidentified persons cases through stable isotope analysis.
- Describe the need to obtain forensic information from human remains for a complete understanding of mass atrocities from post-conflict sites around the globe.
- Support how dialogue among citizens, government institutions, and the scientific community contributes to the creation of strategies to find and examine human remains.
- Highlight the efforts of the HHRRC to have a positive impact in global humanitarian forensic science.

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Humanitarian and Human Rights Resource Center (HHRRC)

Dr. Douglas Ubelaker is the current chair of the AAFS HHRRC. He has been a member of AAFS since 1974 and achieved the status of Distinguished Fellow in 2016. Dr. Ubelaker has served the forensic science profession for more than 40 years and is regarded as one of the world's leading anthropologists.

This webinar series highlight projects that support the HHRRC efforts and utilize the resources of AAFS to apply modern forensic science techniques to global humanitarian and human rights issues. HHRRC projects are those selected for support by the International Advisory Council of the HHRRC led by Dr. Ubelaker and can include research applied to humanitarian and human rights projects, training materials and equipment, and advising or subject matter expertise. The HHRRC also aims to provide support and encouragement to AAFS members to increase their engagement in applying contemporary forensic science to global humanitarian matters. In addition to direct support for forensic studies, the HHRRC provides access to publications and educational materials to disseminate knowledge on the issues and application of contemporary forensic science and forensic medical principles. The HHRRC assists projects by making laboratory and analysis equipment available. To strengthen the available pool of advisors, the HHRRC established a database of volunteers willing to assist and make a difference in global humanitarian issues and possible violations of human rights.[1]

Presenters

During their respective webinars, the presenters provided an overview of their projects and how their work impacts the humanitarian and human rights issues they are addressing. **Table 1** summarizes the presentations included in the webinar series.

Access the archived webinars is available on the FTCoE website at the following link: https://forensiccoe.org/webinar/humanitarian-human-rights-resource-webinar-series/

Table 1. Summary of the HHRRC Webinar Series.

Webinar	Presenter(s)
Nerve Agent Uptake and Detection in Human Bone May 9, 2017	**Katie Rubin, MS, PhD Candidate** University of Florida
Analysis and Conservation of Remains in Cambodia May 16, 2017	**Julie Fleischman, MS, PhD Candidate** Michigan State University
Stable Isotope Forensics and Unknown Persons Investigations May 24, 2017	**Eric Bartelink, PhD** California State University, Chico
A Review of Forensic Anthropology in Mexico June 1, 2017	**Roxana Enriquez Farias** Mexican Forensic Anthropology Team **Juan Joel Hernández Olvera** Mexican Forensic Anthropology Team **Diana Bustos Rios** Mexican Forensic Anthropology Team

Nerve Agent Uptake and Detection in Human Bone

Presenter

Katie Rubin, MS
PhD Candidate | University of Florida

Objectives

- Describe how detecting nerve agent exposure from human remains recovered from mass graves would impact human rights investigations.
- Understand nerve agent pharmacodynamics and how their properties impact their adsorption into human bones.
- Determine if nerve agent metabolites are incorporated into bone tissue via ionic substitution.

Summary

In this webinar, Ms. Rubin describes her work to develop accurate and reliable toxicological tests on skeletonized remains with the objective of detecting nerve agents and their analogues. Toxicological evidence can help determine the cause and manner of death in an individual, with this evidence playing a key role in identifying deaths from exposure to one or more toxic chemicals. Toxicology is of particular interest in humanitarian cases, especially in excavation of mass graves, since it may help confirm exposure to chemical weapons, such as nerve agents. Nerve agents are often organophosphates that block the signals between nerves and organs, leading to organ failure and sometimes asphyxiation and cardiac arrest. Chemicals such as sarin and tabun have been used in attacks on both military personnel and civilians.

In current practice, however, soft tissues remain the predominant matrices used in toxicology analysis during cause-of-death examination. This proves challenging when dealing with skeletonized remains, which are often recovered from mass graves during human rights investigations. In this webinar, Ms. Rubin explains her research investigating drug uptake by human bone and applying this to detect nerve agent exposure from human remains recovered from mass graves during human rights investigations.

Ms. Rubin describes isolated experimental case studies showing that drugs and their metabolites can be detected reliably in fresh and decomposed bone tissues. Experimental studies have also been designed to better understand drug exposure patterns and have shown that acute, not chronic, exposures yield the most robust results. This HHRRC study focuses on efforts to optimize the extraction method of nerve agents from bone. Ms. Rubin also describes bone biology; bone chemistry; nerve agent pharmacodynamics and pharmacokinetics; methods for isolating nerve agents from biological matrices; and methods for using bone as a toxicological matrix.

Additionally, she explains the methods established through this project to detect organophosphate nerve agents from skeletonized remains, using organophosphate pesticides as an initial model for chemical agents. These methods are critical because of both the chemical properties of the agents, which may make them more likely to incorporate into human bone tissue than other toxins, and their salience in human rights investigations.

Attendee Professions

"Very topical, super interesting and potentially applicable in real world situations."

—Webinar Attendee

Analysis and Conservation of Remains in Cambodia

Presenter

Julie Fleischman, MS
PhD Candidate | Michigan State University

Objectives

- Describe the importance of studying human skeletal remains from historically documented mass violence.
- Understand how forensic analysis of human remains contributes to a more complete understanding of mass atrocities.
- Illustrate the application of scientific analytical techniques to produce important information for each victim of the Krang Ta Chan tragedy.

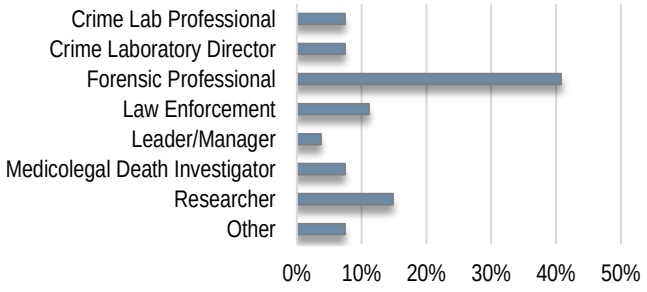
Summary

This webinar highlights an AAFS HHRRC project to analyze and preserve human remains from violence committed by the Khmer Rouge in Cambodia. Ms. Fleischman worked with the Cambodian Ministry of Culture and Fine Arts and a Cambodian project team to analyze and preserve remains from Krang Ta Chan, the site of a former Khmer Rouge detention and execution center. While much has been written about the history of Khmer Rouge violence, the work undertaken by this research team at Krang Ta Chan is one of the first large-scale efforts to analyze and preserve the millions of human remains that are a visceral reminder of a human rights tragedy.

After a civil war in the early 1970s, the Khmer Rouge regime came to power in Phnom Penh, Cambodia. Almost all Cambodians were forcibly relocated from cities to collective farms in the countryside. The conditions were severe, and according to historical estimates, approximately one quarter of nearly eight million Cambodians died from mistreatment, overwork, malnutrition, and violence. After the Khmer Rouge regime was overthrown in 1979, thousands of mass graves across the country were discovered and the bodies exhumed. Krang Ta Chan is one of nearly 20,000 mass gravesites throughout Cambodia resulting from the violence committed during the Khmer Rouge period. According to a witness, eight graves were exhumed at the site in 1979, revealing the remains of approximately 10,000 victims.

This webinar centers on the importance of studying human skeletal remains from historically documented mass violence. These skeletal remains can provide new and corroborative information, legal justice through quantifying forensic evidence, a better understanding of the demographic data, and healing for families through repatriation. The objectives of this project were to identify scientific methods to determine the victims age at death, sex, health conditions affecting the skeleton, and evidence of traumatic injuries before or around the time of death, or skeletonized changes occurring after death. The HHRRC also provided support of advanced skeletal training for the team members to further the project objectives and forensic anthropology in Cambodia. Analyzing and preserving the remains at Krang Ta Chan contribute to a more comprehensive understanding of the victims of the Khmer Rouge regime.

Attendee Professions



"It was beneficial to hear important information concerning the scientific analysis of human remains from mass killing."

—Webinar Attendee

Stable Isotope Forensics and Unidentified Persons Investigations

Presenter

Eric Bartelink, PhD
Forensic Anthropologist | California State University, Chico

Objectives

- Describe how stable isotope analysis can be useful in unidentified persons cases.
- Understand how developing baseline water profiles and studying variation in human diets has aided stable isotope forensic applications.
- Discuss the assumptions, challenges, and limitations of this humanitarian forensic approach to aid in the identification of human remains.

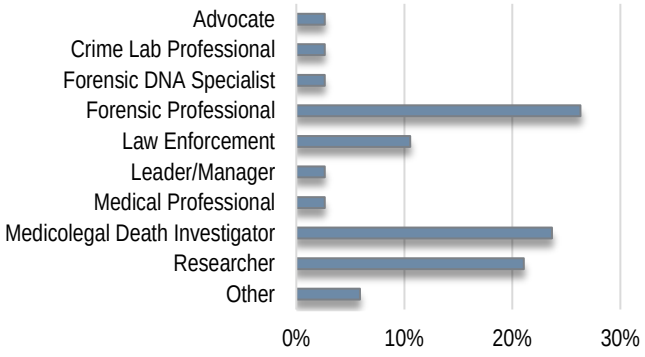
Summary

Stable isotope analysis can help provide valuable information for missing persons cases by predicting birthplace, region of origin, dietary preferences, recent travel history, and residence patterns of unknown decedents. Isotopes are present in food and water and are incorporated throughout the body over a person's lifetime. In stable isotope analysis, the ratios of different isotopes in bones or teeth are measured to trace the isotopes back to their sources which can provide information to the environment where a person lived.[2] Since 1999, more than 6,000 migrant deaths have occurred along the border, affecting Mexican, Central American, and South American nationals. The large volume of unidentified border crosser casework has created an unprecedented human identification challenge, especially given the lack of personal documentation, antemortem records, and DNA family reference samples for these individuals.

In 2013, the University of Indianapolis and Baylor University began large-scale exhumations to identify deceased border crossers buried in Falfurrias, Texas, using DNA and stable isotope sampling and temporary curation. Over the past several years, deceased border crossers have been buried at Sacred Heart Cemetery, in Falfurrias, but it has been challenging to identify and repatriate the remains. Collaborative work between the University of Indianapolis, Baylor, and Texas State University-San Marcos has resulted in a concerted effort to identify deceased migrants and repatriate them to family members.

Dr. Bartelink discusses the applications of stable isotope forensics for attributing human remains through an analysis of past and recent food and water consumption. These applications have been successful because of the recent development of baseline water and geological 'isoscape' maps for various regions and through defining regional and cultural variations in human diets. Case examples showed the ability of stable isotope forensics to narrow down possible places of origin for border crosser deaths in Texas and highlighted several challenges and limitations in the need for additional reference data for countries of origin. The development of higher-resolution isoscape maps will improve this humanitarian forensic approach to aid unidentified human remains cases from local jurisdictions, past wars and conflicts, victims of genocide, and undocumented border crossers.

Attendee Professions



"Case studies and visuals really helped me see the technology being put to work."

—Webinar Attendee

A Review of Forensic Anthropology in Mexico

Presenters

Roxana Enriquez Farias
President | Mexican Forensic Anthropology Team

Juan Joel Hernández Olvera
Research Coordinator | Mexican Forensic Anthropology Team

Diana Bustos Rios
Social Documentation Area Coordinator | Mexican Forensic Anthropology Team

Objectives

- Discuss the role of forensic anthropologists in the identification of human remains with a focus on current acts of violence.
- Understand how forensic anthropologists can work with families and government institutions to improve the scientific integrity of human rights cases.
- Illustrate how providing forensic anthropology tools to the families of missing persons can help foster better communication with investigators.

Summary

The Mexican Forensic Anthropology Team is a non-profit civil association that began in 2013 and supports the families of persons who have, forcibly or involuntarily, disappeared. In this webinar, the Mexican Forensic Anthropology Team provided an overview of the development of forensic anthropology worldwide with a concentration on the social impact of forensic anthropology throughout Latin America.

Recently, the role of forensic anthropology in Mexico has changed. Initially, the main objective was to identify human remains (sex, age estimate, skeletal trauma, and biological ancestry). However, in the last two decades, South American and Mexican forensic anthropologists have been heavily involved in trials of human rights violations in Europe, Africa, South America, and, most recently, Mexico.

The Mexican Forensic Anthropology Team discussed the role of the forensic anthropologist and the how the process of identification is complicated by the violent manner in which the victim was treated. This webinar highlights the team's work including forensic medical services and interacting with families and government institutions. The team found that through teaching courses and workshops on forensic anthropology and the forensic investigative process relatives of the victims understand technical findings more thoroughly. Families with the necessary tools and information including how age is determined from human remains and what the states of decomposition are can better communicate with investigators searching for, locating, and identifying missing persons. Ultimately, this webinar illustrates how the Mexican Forensic Anthropology Team facilitates open, proactive, and responsible dialogue between citizens, government institutions, and the scientific community to create strategies to find and analyze human remains.

Attendee Professions

"It is great to see the topic of forensic anthropology presented in ways I had been unfamiliar."

—Webinar Attendee

Forensic Technology Center of Excellence

A program of the National Institute of Justice

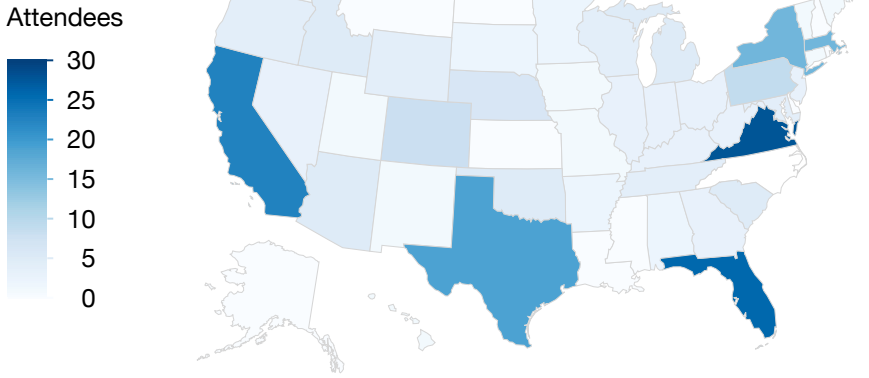
Humanitarian and Human Rights Resource Center Webinar Series

A Live Online Event Hosted by the Forensic Technology Center of Excellence

May 2017 – June 2018 | 4 Webinars | 6 Subject Matter Experts

Attendance Profile

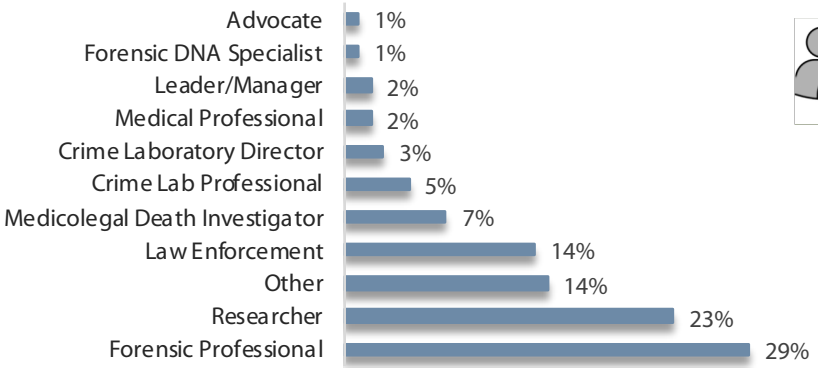
Attendees: 299



International Presence:

Brazil 2 • Canada 8 • Columbia 2 • Costa Rica 3 • Germany 1 • Hungary 1 • Italy 1 • Jordan 2 • Mexico 2 • Pakistan 1 • Poland 1 • Puerto Rico 1 • South Africa 2 • Switzerland 1 • Trinidad 1 • United Kingdom 6

Professions



Speakers

Eric Bartelink
Diana Bustos Rios
Roxana Enriquez Farias
Julie Fleischman
Juan Joel Hernández Olvera
Katie Rubin

Project Team

Humanitarian and Human Rights Resource Center
Douglas Ubelaker, PhD

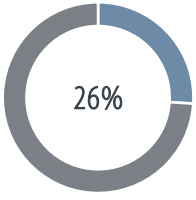
RTI International
Jeri Ropero-Miller, PhD
Josh Vickers

Feedback

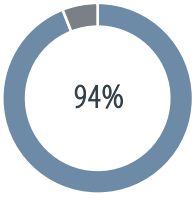
"This webinar was a good overall introduction to using isotopes to help identify persons. As a specialist in isotopic analysis, I appreciated the method used to explain the topic."

"The biggest benefit to this webinar was learning that Mexico is working with the US in identifying the deceased. I did not know this was happening or even possible. Great collaboration."

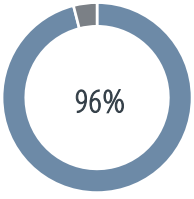
Survey Response Rate



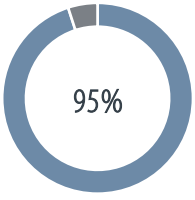
Interest in Topic



Objectives Met



Technical Quality



Access the archived content at forensicCOE.org

Event Performance Statement

About the FTCoE

The Forensic Technology Center of Excellence (FTCoE), led by RTI International, is supported by a cooperative agreement with the National Institute of Justice (NIJ) - the research and evaluation agency for the US Department of Justice - award 2016-MU-BX-K110. The FTCoE is committed to improving the practice and strengthening the impact of forensic science through effective knowledge transfer and education. One way the FTCoE accomplishes its mission is through hosting virtual educational opportunities that provide a setting in which practitioners, researchers, stakeholders, and other professionals can discuss and cultivate ideas. The FTCoE Project Team included Dr. Jeri Ropero-Miller and Mr. Josh Vickers. Dr. Jeri Ropero-Miller is a Senior Research Forensic Scientist at RTI International and serves as the Chief Scientist and Principal Investigator for the FTCoE. She is a Board-certified Forensic Toxicologist with Fellow status in the American Board of Forensic Toxicology (F-ABFT). Dr. Ropero-Miller has more than 20 years of experience conducting forensic toxicology, clinical chemistry, and hair drug-testing studies. Josh Vickers is a project management specialist and is responsible for the coordination, production, and hosting of all FTCoE webinars.

Summary

This in-brief report highlights the four-part webinar series on AAFS HHRRC supported projects that include the application of advanced forensic science methods to aid global humanitarian and human rights cases. The assistance provided by the HHRRC supported the use and evaluation of forensic technologies for humanitarian efforts. Topics in this webinar series include toxicology analysis on skeletonized human remains; stable isotope analysis as well as the application of forensic anthropology to aid the investigation of unidentified persons cases; and forensic analysis to more fully understand mass atrocities from post-conflict sites around the globe. These webinars highlight research supported by the AAFS HHRRC and NIJ that can improve technologies and investigative practices in the criminal justice community. For example, additional analysis of human remains could provide information for NIJ's National Missing and Unidentified Persons System (NamUs), a web-based system of forensic services and investigative tools to aid in the identification of the nation's missing and unidentified persons.[3]

Resources

[1] Ubelaker, D. H. (2017). The Humanitarian and Human Rights Resource Center: Support to address global forensic issues. *Forensic Sciences Research*, *2*(4), 210–212.
[2] Aggarwal, J., et. al. (2008). Application of heavy stable isotopes in forensic isotope geochemistry: A review. *Applied Geochemistry*, 23(2008), 2658-2666.
[3] Weiss, D., et. al. (2017). Lost but Not Forgotten: Finding the Nation's Missing. *NIJ Journal*, 279 (2017), 58-69. https://www.ncjrs.gov/pdffiles1/nij/250696.pdf

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