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The Center for Human Identification (CHI) is located at and has the full support of the University of North Texas Health Science Center (HSC) in Ft Worth. CHI is a unique institution in that it is:

1. A full service, accredited forensic DNA and anthropology laboratory system authorized by the State of Texas to perform criminal casework and missing persons identifications to support investigative leads;
2. Authorized by the FBI to enter and search genetic data in the Combined DNA Index System (CODIS);
3. A highly innovative and productive research entity; and
4. An education and training center for students, lawyers, judges, practitioners, and investigators.

I came from the FBI to join CHI at the HSC more than 12 years ago and have never looked back, for I have the honor and privilege to work with the most impressive team of scientists and supporting staff. They are the brightest, most capable, and dedicated team I have met in my almost 40 years of working in the forensic field. They apply their skills and talent diligently contributing their part to making a safer, healthier, and more secure society.

The past 30-40 years have witnessed tremendous leaps in the field of genomics. New technologies and bioinformatics constantly expand the frontiers of science and offer new solutions for improving the human condition. With scientific advances, however, CHI and its students and stakeholders have a responsibility to be better educated and trained, which are essential components to maintaining a high-quality system, providing meaningful results with confidence, and maintaining cutting edge research and innovation.

Equally important is for scientists to always remember that they serve in a greater infrastructure. At CHI, we combine advanced forensic testing methods, next generation research and development, continuing education and training resources, dynamic government partnerships, and digital and analytical innovations within one collaborative and nimble hub of subject matter experts – a world-renowned Center of Excellence.

Sincerely,

Bruce Budowle, PhD
Executive Director
The Center for Human Identification
University of North Texas Health Science Center at Fort Worth
With funding provided by the State of Texas and multiple Federal Government agencies, the Center for Human Identification (CHI) at the University of North Texas Health Science Center at Fort Worth is a world-renowned hub for forensic DNA testing; anthropological analysis; medicolegal training and education efforts; advanced research and development initiatives; digital and analytical innovation; and forward-thinking government and commercial partnerships. CHI is uniquely positioned as an accredited crime laboratory recognized as a criminal justice agency by the State of Texas, as well as a research and education Center operating within a university system.

CHI’s primary operational mission is to assist investigations seeking to provide answers for victims, their families, and the community; to develop investigative leads to assist in resolving criminal cases; and to provide information that may exculpate individuals who have been wrongly associated with crime scene evidence. By continuing to pursue advanced technologies and solutions, more cases can be assisted and even decades-old cases may be resolved.

What CHI Does
- Perform forensic genetic analyses and anthropological examinations to support criminal investigations and missing and unidentified persons identifications
  - Reduce casework backlog, particularly sexual assault cases, for the State of Texas
  - Interpret casework
  - Provide testimony support
- Provide expert consultation
- Manage the Texas Missing Persons DNA Database
  - CHI processes the United States’ majority of missing persons and family reference DNA profiles that reside within CODIS.
- Manage local CODIS Operations
- Improve forensic identification capabilities through an innovative research and development unit
- Train students and medicolegal professionals in various aspects of forensic genomics
- Train and enhance DNA testing and database capabilities in Central America
- Serve the State of Texas on various initiatives/task forces
  - Texas Governor’s Sexual Assault Survivor Task Force
  - State of Texas Human Trafficking Prevention Task Force
  - Texas Forensic Science Commission (2 commissioners)
  - Texas Attorney General’s Unresolved (Cold) Case Task Force
- Manage the National Missing and Unidentified Persons System (NamUs) for the US Department of Justice (through September 30, 2021)
  - CHI’s decades-long missing persons work will continue after the transition of NamUs

CHI Units
- Evidence
- Forensic Anthropology
- Forensic (DNA)
- Missing Persons
- CODIS
- Research & Development
- NamUs – Transitioning on October 1, 2021
- Information, Development, Engineering and Analytics (IDEA) – Starting formally on September 1, 2021

As an accredited criminal justice agency, CHI and its scientists must comply with all technical laboratory qualifications of the ANSI National Accreditation Board (ANAB). The Texas Forensic Science Commission (TFSC) licenses the analysts and technicians of the laboratory for the State of Texas and relies on ANAB for the accreditation process of the laboratory. Our operational laboratories are located on secure-access floors and access to the testing laboratories themselves is limited strictly to authorized personnel.
### Federal Funding

<table>
<thead>
<tr>
<th>Project</th>
<th>Award Number</th>
<th>Award Period</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>FY2018 Forensic DNA Laboratory Efficiency Improvement and Capacity Enhancement Program: Backlog Reduction of Missing Persons’ Samples</td>
<td>2018-DN-BX-0199</td>
<td>01/01/2019 – 06/30/2021</td>
<td>$2,260,781</td>
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<td>Dense DNA Data for Enhanced Missing Persons Identification</td>
<td>2019-DU-BX-0046</td>
<td>01/01/2020 – 12/31/2021</td>
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<td>Better Algorithms and Chemistry for Mixture Interpretation, Award Number</td>
<td>2018-DU-BX-0177</td>
<td>01/2019 – 06/30/2021</td>
<td>$694,525</td>
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<tr>
<td>Efficient and Effective SNP System for Analysis of Highly Degraded DNA Samples</td>
<td>2020-DQ-BX-0005</td>
<td>01/01/2021 – 12/31/2022</td>
<td>$444,725</td>
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<tr>
<td>Interpretation of Y Chromosome STRs for Missing Persons Cases</td>
<td>2020-DQ-BX-0018</td>
<td>01/01/2021 – 12/31/2021</td>
<td>$198,352</td>
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<td>Genetic Distance to improve Human ID from Skin Microbiome</td>
<td>2020-R2-CX-0046</td>
<td>01/01/2021 – 12/31/2022</td>
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<td>National Missing and Unidentified Persons System (NamUs)</td>
<td>2016-MU-BX-K007</td>
<td>02/01/2021 – 09/30/2021</td>
<td>$3,341,165</td>
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<td>VOGA/Tribal</td>
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<td>10/01/2020 – 09/30/2021</td>
<td>$4,288,467</td>
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### U.S. Department of State, Bureau of International Narcotics and Law Enforcement Affairs (INL)

<table>
<thead>
<tr>
<th>Project</th>
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<tr>
<td>Reducing Human Trafficking Through Forensics in Central America (Panama/Costa Rica)</td>
<td>S-INLEC-19-GR-0383</td>
<td>04/21/2021 – 03/29/2023</td>
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<td>Reducing Human Trafficking Through Forensics in Central America (Guatemala, El Salvador, Honduras)</td>
<td>S-INLEC-19-GR-0383</td>
<td>07/15/2021 – 07/15/2023</td>
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### State Funding

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<th>Award Period</th>
<th>Amount</th>
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<td>Forensic Genetic Research and Education: Prevention of Human Trafficking</td>
<td></td>
<td>06/01/2020 – 08/30/2021</td>
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<td>Strategy DNA Laboratory</td>
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<td>06/01/2020 – 08/30/2021</td>
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<tr>
<td>Rape Kit Testing: DNA Analysis of Sexual Assault Evidence</td>
<td>405-17-P012859</td>
<td>05/01/2020 – 08/30/2021</td>
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<tr>
<td>Texas Missing Persons and Human Identification Program</td>
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### Additional Funding

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<th>Project</th>
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</thead>
<tbody>
<tr>
<td>Signature Science, LLC Project</td>
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<td>07/02/2018 – 10/03/2021</td>
<td>$451,415.45</td>
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<td>Thermo Fisher Scientific LifeTech</td>
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<td>08/2021 – 12/31/2022</td>
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<td>NTT Data Project</td>
<td>PSC-18-D80</td>
<td>05/01/2020 – 08/31/2021</td>
<td>$11,638</td>
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The CHI Team

Leadership
Dr. Bruce Budowle, Executive Director
Dr. Michael Coble, Associate Director
Dr. Jianye Ge, Associate Director

Forensic Unit
2 Technical Leaders, 8 Analysts, 5 Technicians

Missing Persons Unit
1 Technical Leader, 1 Assistant Technical Leader, 7 Analysts, 5 Technicians

CODIS Unit
1 Administrator, 1 Alternate Administrator, 1 Data Analyst

Forensic Anthropology Unit
1 Director, 1 Associate Director, 2 Forensic Anthropologists

Research and Development Unit
6 Faculty, 1 Laboratory Manager, 2 Post-Doc Research Scientists, 5 Research Staff, 1 Bioinformatician, 1 PhD student, 1 INL International Coordinator

Administration
2 Records Management, 1 Legal Director, 1 Communication Director, 1 Quality Manager, 1 Deputy Quality Manager, 3 Operations, 6 IT Development
Law enforcement agencies submit evidence from criminal and missing and unidentified persons cases directly to CHI for appropriate forensic testing to be performed. The integrity of the evidence is maintained in every case by strict security and quality assurance standards at every step of the evidentiary chain of custody.

All evidence submission forms for biological screening, anthropological analysis, and/or DNA testing of evidence are first reviewed by our Evidence Specialists to confirm the integrity of the packaging, and that the evidence meets the criteria for acceptable samples outlined in our policies.

The Evidence Unit Manager is Hector Saenz.

**Accessioned Evidence**

<table>
<thead>
<tr>
<th>Forensic Unit</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>Sexual Assault</td>
<td>970</td>
</tr>
<tr>
<td>Property Crimes</td>
<td>174</td>
</tr>
<tr>
<td>Paternity</td>
<td>59</td>
</tr>
<tr>
<td>Homicide</td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
</tr>
<tr>
<td>Aggravated Robbery</td>
<td>16</td>
</tr>
<tr>
<td>Aggravated Assault</td>
<td>9</td>
</tr>
<tr>
<td>Robbery</td>
<td>6</td>
</tr>
<tr>
<td>Assault</td>
<td>1</td>
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</table>

**Time period: 07/01/2020 - 06/30/2021**

**Missing Persons Unit**

<table>
<thead>
<tr>
<th>Missing Persons Unit</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Reference Sample (FRS)</td>
<td>518</td>
</tr>
<tr>
<td>Unidentified Human Remains (UHR)</td>
<td>390</td>
</tr>
<tr>
<td>Direct Reference Sample (DRS)</td>
<td>44</td>
</tr>
<tr>
<td>Unidentified Living Person (ULP)</td>
<td>5</td>
</tr>
</tbody>
</table>
Forensic anthropologists analyze skeletal remains to assist in human identification and/or determining the cause and manner of death.

The Forensic Anthropology Unit provides services to state and local law enforcement agencies, medical examiners, coroners, and Justices of the Peace. Analysis of skeletal remains can include the assessment of forensic significance; the creation of estimated biological profiles; comparisons with medical/dental records to support personal identifications; and the investigation of trauma to the remains.

CHI forensic anthropologists also support Texas law enforcement agencies by assisting with the search for, excavation, and field recovery of a site, ensuring the proper documentation and integrity of the remains.

The Forensic Anthropology Unit Director is Dr. Harrell Gill-King.

### Forensic Anthropology Unit

<table>
<thead>
<tr>
<th>Total Cases Analyzed</th>
<th>197</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases determined to be medicolegally significant</td>
<td>139</td>
</tr>
<tr>
<td>Cases determined to be non-human and not medicolegally significant</td>
<td>52</td>
</tr>
<tr>
<td>Cases determined to be human, but archeological/historical remains</td>
<td>6</td>
</tr>
</tbody>
</table>

*Time period: 07/01/2020 - 06/30/2021*

Field Searches and/or Recovery Efforts Assisted by Forensic Anthropology Unit in FY2021.
The Forensic Unit provides biological screening and DNA testing services for evidence submitted by law enforcement agencies seeking assistance with criminal investigations. Using state-of-the-art methods, CHI forensic technologists and analysts process evidence from cases ranging from homicide and sexual assault to property crimes. The generated DNA profiles are used to include or exclude an individual as a potential contributor of an evidence item. These profiles can provide answers to investigative questions and offer insight for investigators into the events that may have taken place at a crime scene.

Through state funding, the Forensic Unit assists the Texas Department of Public Safety (DPS) in reducing the backlog of sexual assault cases in Texas. In addition, the Forensic Unit receives federal funding from the US Department of Justice’s (DOJ) National Institute of Justice (NIJ) to process cases within the State of Texas. These funds enable the Unit to provide DNA testing services (i.e., autosomal and Y chromosome STR typing) to law enforcement in several North Texas counties at no charge to the agencies.

Our forensic DNA analysts are also called upon to give expert testimony in criminal cases on the forensic testing performed in a specific case, as well as general forensic DNA principles and processes. As it impacted so many other areas, in the past year the COVID-19 pandemic caused the temporary shutdown of Texas state courts, creating a trial backlog which will likely demand a very active testimony schedule for our analysts in the coming months.

In addition to standard casework analyses and comparisons, specialty testing services, such as forensic paternity and kinship analyses, are provided to law enforcement agencies statewide.

The Forensic Unit Technical Leaders are Christina Capt and Melissa Haas.
Medical examiners and other medicolegal authorities across the country are routinely challenged with determining the identity of discovered human remains; over time the sheer number of unidentified waiting for identification has resulted in a silent mass disaster. These long-term “Jane” or “John Doe” cases are often referred to as “cold,” however, from the CHI perspective they simply are unresolved, awaiting assistance.

The Missing Persons Unit provides DNA testing (i.e., autosomal and Y chromosome STR typing and mitochondrial DNA (mtDNA) sequencing) of biological evidence related to the identification of missing and unknown persons. In addition, the Unit provides mtDNA sequencing of hair evidence related to Texas criminal investigations. To assist in the identifications of the missing and unidentified persons, the unit generates and compares DNA profiles from direct reference samples (DRS) and/or family reference samples (FRS) from family members of missing persons to those obtained from the unidentified human remains (UHR).

As custodian of the Texas Missing Persons DNA Database for almost two decades, CHI has long been committed to assisting in solving these cases. Funding through the State of Texas and the NIJ has allowed CHI to assist in thousands of missing and unidentified persons cases across the country. It is through this unit that DNA profiles are developed which can support identification of individuals who have been missing recently, as well as for decades, bringing resolution to family and friends. To date, CHI has processed the majority of the genetic profiles for unidentified human remains and family references that reside within CODIS for the United States.

The Missing Persons Unit Technical Leader is Dixie Peters.
The Combined DNA Index System (CODIS) is the FBI’s support program for criminal justice DNA databases, enabling federal, state, and local forensic laboratories to share and compare suspect DNA profiles electronically, allowing agencies to link evidence from violent crime scenes to known offenders and to link evidence from different cases.

Access to this system created the game-changing ability for law enforcement agencies to compare evidence from cases occurring in their own jurisdictions directly to other cases around the nation, as well as on an international level.

CODIS’ National DNA Index System (NDIS) also assists law enforcement in the investigation of missing and unidentified persons cases. The DNA profiles available for comparison in NDIS include direct reference samples (DRS), taken from the missing person, samples from unidentified human remains (UHR), and family reference samples (FRS), taken from family members of the missing person.

CHI is a CODIS participating laboratory that maintains and administers a local CODIS database, assisting with both violent crime and missing and unidentified persons investigations. DNA profiles generated by CHI’s Forensic Unit scientists are uploaded to CODIS from forensic casework, including sexual assault, homicide, robbery, aggravated assault, burglary, theft, and other violent crime. Associations made through CODIS searches provide investigative leads for law enforcement agencies – 4,101 have been made through CHI’s forensic casework submissions to date.

Through the long-time work of its Missing Persons Unit, CHI has current ownership of more than half the DNA specimens in the national CODIS missing persons indices. To date, 3,275 associations have been reported to the submitting agencies from this information.

The CODIS Unit Technical Leader is Melody Josserand.
Research and Development Unit

CHI is rather unique in that in addition to maintaining an operational crime laboratory it has a robust Research and Development Unit. The Research and Development Unit allows CHI to pursue cutting-edge technologies and solutions in genomics and in particular for enhancing forensic genomics.

CHI active research efforts support the service work done at CHI and the missions of HSC. Current projects underway within the unit include advanced bioinformatics software development, microbial forensics, human and wildlife trafficking prevention, exploring advanced genome applications, forensic DNA interpretation tools and strategies, and improving capabilities to analyze highly degraded DNA samples. CHI researchers collaborate substantially with scientists around the world and thus are involved in a number of international efforts.

In the past decade, CHI has published approximately two hundred peer-reviewed publications related to forensic genetics in human identification, microbial forensics, molecular autopsy, to name a few. In FY2021, CHI researchers produced 29 peer-reviewed papers:

**Analytics**


**Informatics**

Graph Algorithms for Mixture Interpretation, Benjamin Crysup, August Woerner, Jonathan King, Bruce Budowle, Genes (Basel), 12(2): 185, 2021.


**Kinship**


How many familial relationship testing results could be wrong?, Jianye Ge, Bruce Budowle, PLoS Genetics, 16(8):e1008929, 2020.
**Microbial Forensics**


**Mitochondrial DNA**


**Mixture Analysis**


**Population Data/Genetics**


**Trafficking**


**Validation**


**Magazine Articles**


*Probabilistic genotyping software has helped forensic labs close more cases and exonerate individuals wrongly accused of a crime*, Bruce Budowle, Route Fifty, 24 Feb 2021.


*Probabilistic genotyping in forensic DNA analysis*, Bruce Budowle, American County & City, 30 Nov 2020.

*Probabilistic genotyping: the forensic lab software used to crack cold cases*, Bruce Budowle, SelectScience, 11 Nov 2020.

**Book Chapters**

*Summary of forensic DNA kinship testing and the promise of genome age technology to improve processes*, Recent Progress on Forensic Sciences and DNA Transfer. Bruce Budowle, Laboratoire d’Hématologie Médico-Légale, Bordeaux, France, pp. 6-15 and 101-109, 2021.


- *Microbial Forensics: Concepts and Application from Epidemiology to Crime Investigations*, A. Sajantila, and Bruce Budowle.
- *Analysis of Forensic Mixtures*, Michael Coble, Bruce Budowle, H. Erlich.

**Patent Submissions**

*Forensic DNA mixture interpretation with single-cell profiling*, Jianye Ge, Bruce Budowle, Jonathan King, Amy Smuts

*Macrohaplotypes for forensic DNA mixture deconvolution*, Jianye Ge, Bruce Budowle, Jonathan King, Sammed Mandape
Since 2011, CHI has managed for the US DOJ’s NIJ the NamUs program, which consists of a central online repository of information related to missing and unidentified person cases that supports law enforcement, medical examiners, coroners, and the general public.

The NamUs program will transition to another organization on October 1, 2021.
To better support investigative and training efforts, CHI is developing multiple digital and information solutions. In partnership with the US Department of State’s Bureau of International Narcotics and Law Enforcement Affairs (INL), CHI is developing an advanced information system to support the identification of missing persons and prevention of human trafficking in five Central American countries. This project is designed to create a technological and medicolegal framework through which the countries can share information within and across international borders to identify missing persons; develop effective methods to collect and analyze relevant information in support of investigations; and engage stakeholders to support the program’s long-term sustainability.

Additional projects include the development of learning technologies to aid in the training of forensic professionals and provide education on human trafficking. Virtual reality (VR) technology is being utilized to provide more impactful learning and experiences. For example, a forensic professional will learn and practice common procedures in a virtual DNA lab; another VR tool will allow law enforcement and others agencies involved in preventing human trafficking to experience examples of grooming and recruitment often used on victims by traffickers. The efficacy of these VR modules will be assessed to measure learning, empathy and understanding of the content, and to inform future VR efforts.

The possibilities for digital and information innovation to address challenges confronted by the State of Texas cannot be overstated. To embrace these new opportunities and challenges, CHI has created its first IDEA Unit, which begins operations on September 1, 2021. This newly formed interdisciplinary team consists of professionals with expertise in a variety of technologies and investigative fields, including development of missing and unidentified persons systems, learning technology, data analytics, research, and evaluation.

Future projects will focus on the development of specialized reporting systems, creation of an unresolved cases system, and evaluation of human trafficking victimization.

The IDEA Unit Chief is Lynley Dungan.
Many conferences and events in all fields were postponed in the past year due to public health concerns. The presentations CHI experts were asked to give moved online to virtual audiences, where the discussion of these critical issues persevered.

**Bruce Budowle**


**Michael Coble**

“DNA in human identification” and “What’s done cannot be undone: The potential of forensic DNA testing”, 5th Lagos Forensic Symposium, 2021.

With T. Bille, J. Bright, “Exploring the advantages of amplifying the entire extract versus splitting the extract and interpreting replicates using a continuous model of interpretation”, 7th Annual Workshop on STRmix™ Implementation and Casework Approach, 2021.


“Probabilistic Genotyping, the LR and Bayes Theorem” and “Black Box or Expert-Software Pair”, AAFS 73rd Annual Scientific Meeting, 2021.


**Jianye Ge**


**Dawn Boswell**

“Understanding DNA Reports”, Bureau of Justice Assistance’s Upholding the Rule of Law and Preventing Wrongful Convictions Program, Quattrone Center for the Fair Administration of Justice, 2021.


**Linda LaRose**
The CHI Mission
To provide quality service through accurate and timely DNA test results, forensic anthropology and investigative support to law enforcement, medicolegal agencies and all stakeholders throughout the State of Texas, the USA and internationally. The Center for Human Identification is dedicated to research, education, training and the development of new technologies.