



A120 The Repository of Antemortem Injury Response (REPAIR): An Invaluable Online Resource for Known Age Fractures for Comparison and Research

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Learning Overview: After attending this presentation, attendees will better understand the Fracture Healing Database, how to contribute samples to the database, and how the database can be accessed and used as a comparative tool in cases involving cranial fracture repair.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by offering a tool for comparison and interpretation of cranial fractures as they relate to time since injury and the influence of age on healing variation.

The genesis of the cranial fracture healing project began as a persistent call for understanding and interpretation of cranial injuries within the context of accidental versus non-accidental trauma. As such, the goals of the project are to simultaneously create a method for human cranial fracture histology, build a database of cases with known injury times, conduct an evaluative intra- and inter-observer study to create a histomorphologic tool for evaluating cranial fracture healing, and provide an interpretive framework for inferring time since injury of cranial fractures.

Searchable and easy-to-use internet-based databases allow forensic practitioners to use and contribute data and conduct research to address specific needs in the medicolegal community. Therefore, a secure web-based data system was created for this project using Occupational Research and Assessment (ORA), since the company has experience with data management for medicolegal purposes. Varying levels of database access are granted dependent on the need of the particular user, including administrator, submitting agency, and forensic professional. Submitting agencies can enter their case information directly into the database, including relevant photographs, radiographs, and documents. Prior to these cases becoming visible to other submitting agencies or forensic professionals, administrators check the submitted data to ensure there is no personal health information or case numbers included prior to publishing.

The database is organized by case, with the accompanying demographic and injury information. Specifically, the data for each case includes information about the decedent's demographics, any medical conditions or medications that could affect bone healing, the injury circumstances, the injured cranial vault bone(s), the type of fracture (linear, depressed, comminuted, diastatic, or other), the time since fracture, surgical interventions related to the injury, when the surgical intervention occurred, and whether there was any insertion of hardware or other material. The database also includes data on each bone sample, including the specimen size, the decalcification agent (EDTA, nitric acid, hydrochloric acid), and the decalcification duration. Other accessible data includes: *in situ* radiography, contact radiography, postmortem examination photographs, and multiple photomicrographs of the four differently stained histologic slides (hematoxylin and eosin, Masson's trichrome, alcian blue hematoxylin/orange G, and Russell-Movat pentachrome). Likely, the most valuable tool in the database is the ability for users to access the photomicrographs that consist of an overall view of the sample, a detail of the fracture, and high magnification views (20X–40X) of the outer table, diploë, and inner table.

The database also provides a search tool for users who would like to find injuries with specific parameters (e.g., age of individual, time since injury, type of fracture). This feature can be used by forensic practitioners to find fractures of known age that may be similar to a case of interest.

Ultimately, this database and the attendant study will provide the tools necessary for understanding how cranial fractures heal in various age cohorts, aid in interpretation of cranial fracture healing rates, and provide a comparative database for investigators to estimate the age of a fracture for cases in which the injury time is unknown.

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