E87 The Development of a Protein Extraction Protocol in Burnt Bone

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The goal of this presentation is to illustrate how burnt bone is a common element at forensic and archaeological scenes. It can provide evidence concerning violent acts such as traumas and, in most cases, represents the unique biological evidence recovery at the scene. The isolation of biological molecules in burnt bone remains is a challenge in forensic and archaeological context because of the damage caused by temperature to the bone. The goal of this work was to design a strategy to perform a protein extraction from burnt bone to obtain biological information about the metabolic status of the subject.

This presentation will impact the forensic science community by presenting a non-demineralized extraction method to obtain proteins from the burnt bone in a single step, which can provide information regarding the premortem condition of the subject from biological material damaged by extreme temperatures.

Bone tissue holds valuable information regarding the physiological status of individuals because the cellular components and mineralized extracellular matrix participate in metabolic events.[1] The burnt bone is a common element of forensic and archaeological scenes; this can provide evidence about violent acts such as traumas and, in most cases, represents the unique biological evidence recovery at the scene. Frequently, the recuperation of biological molecules becomes difficult because of the damage caused by temperature in bone. Although there are several kits available in the market to perform DNA extraction, the isolation of other biological molecules in burnt bone remains a challenge in the forensic and archaeological context.[2,3] The proteins represent valuable biological information about premortem events, such as pathologies, metabolic events, nutritional habits, toxicological information, or even causes of death.[4]

Human remains were obtained from individuals registered in the National Institute of Forensic Sciences (INCIFO) in Mexico City and referred to the Amphitheater Department of Medicine Faculty of National Autonomous University of Mexico (UNAM). The samples were subjected to cremation under controlled conditions at a final temperature of 800°C for two hours. Fragments of rib and skull were recovered after cremation and washed two times with Phosphate Buffer Saline (PBS). The burnt bone was pulverized and all the contained proteins were extracted under reduced conditions, precipitated, quantified by the Bradford method, and evaluated by Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis (SDS-PAGE) and Western Blot (WB). After electrophoretic analysis and Coomassie blue staining of the non-demineralized extraction products, it was found that several proteins were revealed; meaning they support the cremation process and the non-demineralized method was feasible for recovering proteins from both bone samples. Additionally, due to the evident different electrophoretic pattern of bone samples (rib and skull), it could mean there is a specific expression of proteins between burnt rib and burnt skull. This suggests it can be possible to determine the expression of proteins in burnt bone tissue as an organ-specific method to provide information about the premortem condition of the subject.

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