

3rd International Conference on Forensic Research and Technology

October 06-08, 2014 Hilton San Antonio Airport, USA

Chemical element levels as a methodological tool in forensic science

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In many cases a previous impact on the structure and chemical composition of the bones is induced by cremation during funerary rituals, accident and other human activities. In this study, we have created a statistical classification of carbonized and cremated bones, as well as bones exposed to unknown thermal conditions to identify the degree of burning and to control the impact of diagenesis throughout chemical element analysis. Major elements, trace elements and Rare Earth Elements (REEs, lanthanides) in cremations have been determined employing ICP-OES. Samples from the inner part of their bones have been divided into “carbonized” indicating bones fired in reducing atmosphere, “cremated” for bones fired in oxidizing atmosphere and “unknown” for bones of unidentifiable burning. Furthermore, bone samples from the outer bone layer, unburned bones and soil samples have been analyzed. PCA have showed that bone samples obtained from the outer bone layer had a different elemental composition more similar to soil than samples of the inner bone layer. PLS-DA results obtained in this study have confirmed that changes in thermal conditions are associated to chemical transformations in the mineral part of the bones. When the thermal conditions in burned bones are uncertain or burned bones are environmentally contaminated, statistical tests may help to assess the condition of cremations according to the elemental profile of samples. The proposed method could be useful in forensic science investigations to select better preserved samples in different scenarios.

Biography

Gianni Gallelo is an Italian Researcher that has completed his PhD at the University of Valencia (Spain). He has been developing new methodological proposals since 2009 to overcome some scientific problems in different disciplines (forensic science, archaeology, biology and geology). Some of his results have been published in important indexed international journals.

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