



PROCEEDINGS



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PROCEEDINGS
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H13 A Multinational Classification of Dental Resin Composites for Forensic Purposes

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Learning Overview: After attending this presentation, attendees will have a deeper understanding of the differences in spectra and matrix distribution of resin composites used in restorative dentistry, which are brand-specific as each formula is copyrighted.

Impact Statement: This presentation will impact the forensic science community by raising awareness about the potential for geographical discrimination through the assessment of resin composites found on the teeth of unidentified human remains. This information can be valuable in the identification process.

The identification of human remains relies on the collection and comparison of primary and secondary identifiers. When teeth and jaws are present, dental data can be pivotal in the identification process, both for the initial reconstruction of the biological profile and for the definitive identification, in conjunction with fingerprints and DNA comparison.

In dental autopsies, forensic odontologists record the odontogram of unidentified human remains, describing the presence, color, and type of restorations. Dental materials can be found and, in addition to a macroscopic description, can be subjected to various analyses to identify their composition and, potentially, the manufacturer.

To achieve this goal, the spectra of unknown resin composites must be compared with the microstructural data and spectra of known dental resin composites. In 2008, a database of dental resin composites was inaugurated in the United States, creating a spectral library with storage, query, and display utilities.¹ However, no such database exists for dental resin composites manufactured in other countries.

Therefore, a multinational database was generated by collecting dental resin composites from various countries, including Australia, Brazil, China, Germany, Japan, Italy, Luxembourg, Korea, and Switzerland, using Scanning Electron Microscopy with Energy-Dispersive X-ray Spectroscopy (SEM/EDS) and X-Ray Fluorescence (XRF).^{2,3} This approach obtained an archive of magnified images (2,000x, 5,000x, 10,000x), spectra, and information for each brand.

The advantage of the database is the possibility of comparing an unknown spectrum and composition of a dental resin specimen with those stored in the database with known samples from various nationalities. One of the challenging efforts in the human identification of missing and unidentified human remains is their geographical origin. Although several brands of dental materials are used worldwide and do not offer any specific information on the possible nationality, there are other dental materials that are country- or continent-specific, like the ones examined, thus allowing possible geographical localization.

The multinational-generated database is constantly updated with dental composites from other nationalities and is a library available to all forensic odontologists upon request.

References:

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Dental Resin Composite; Human Identification; SEMEDS