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Behavior of teeth and restorative materials when exposed to different temperatures: A systematic review

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Abstract

Background: Teeth are recognized as the most indestructible elements of the human body, being considered one of the most resistant tissues, providing morphological, macroscopic or radiological analysis, allowing human identification, and having good resistance to environmental action. When exposed to different temperatures, restorative materials generally retain their original properties and respond in a predictable way, allowing for the possibility of accurate and legally acceptable identification [1-5]. **Objective:** Answer the following research question: what is the impact of different temperature ranges on dental pieces and restorative materials such as amalgam, composite resin, glass ionomer and metal-ceramic crowns? **Methods:** Search in the PubMed, B-On and ScienceDirect databases. The research was subject to duly identified inclusion and exclusion criteria and the studies were selected following the criteria of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram. The assessment of the methodological quality of the articles was carried out according to the Quality Assessment Tool For In Vitro Studies (QUIN) for in vitro studies. **Results:** Of a total of 46,639 potentially eligible articles, only 8 in vitro studies were included after applying the established inclusion and exclusion criteria. These studies suggest that restorative materials demonstrate the ability to resist elevated temperatures and present specific patterns of macroscopic and microscopic changes in different temperature ranges. **Conclusions:** Analysis of in vitro studies suggests that restorations performed with amalgam, ceramic/metal-ceramic crowns and endodontic procedures experience fewer changes, both in terms of chemical composition and in macroscopic or microscopic aspects, when compared to other restorative materials such as composite. These materials provide a source of forensic evidence following exposure to temperatures up to 1000°C, which can be used for comparison and positive identification of victims following exposure to high temperatures.

Keywords: high temperature; forensic dentistry; dental restoration; teeth

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