World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:18, No:10, 2024

Analysis of in Vitro Biocompatibility Studies of Silicate-Based Bioceramic Cements: A Scoping Review

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Abstract : Due to the increasing demand for biomaterials in the dental field, especially in endodontics, calcium silicate-based cements (CSCs) have gained prominence because of their biocompatibility and tissue regeneration capabilities. Originating from Mineral Trioxide Aggregate (MTA), the first bioceramic in endodontics derived from Portland cement, these materials are becoming increasingly prevalent in the market. For any drug released to the market, pharmacovigilance must ensure the absence of adverse health effects on consumers through rigorous toxicological testing. Although these materials have undergone in vitro and in vivo testing, such tests have typically been conducted over a limited period. Some effects may only become apparent after several years, and these studies are generally carried out on a non-specific population. However, the variety of calcium silicate-based products, including cement and sealers, raises questions about their toxicity, particularly considering potential long-term effects not addressed in existing studies. While the scientific literature includes comparative studies on the toxicity of these materials, the consistency of their conclusions is often controversial. Therefore, this project aims to map the scientific evidence from in vitro biocompatibility studies, including those investigating the toxicity of calcium silicate-based bioceramics.

Keywords : toxicity, toxicity test, bioceramics, calcium silicate, genotoxicity
Conference Title : ICD 2024 : International Conference on Dentistry
Conference Location : New York, United States
Conference Dates : October 10-11, 2024