

# Biomaterials in Endodontics

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Amongst the most revolutionary materials ever introduced in Endodontics is Mineral Trioxide Aggregate (MTA). MTA is a bio-material widely used to seal communications between the pulp cavity and the outer surface of the root. The advent of MTA constitutes a key advance in restorative dentistry given its diverse indications, namely, pulp protection, retrograde obturation, incomplete rhizogenesis and perforation repair.

MTA is composed primarily of Portland cement and a radiopacifier, which consists of bismuth oxide in its original formulation. However, the development of experimental cements with pure tricalcium silicate has shown that the latter is the single component of Portland cement that actually provides the greatest bio-activity. Furthermore, the addition of bismuth oxide to the MTA formulation is responsible for inducing deterioration of its mechanical properties and may promote tooth discoloration. Based on these concepts, new repair materials based on calcium silicate, especially tricalcium silicate, have been developed.

Currently, as well as restorative materials, calcium silicates are used for the development of root canal obturator materials. To fulfill this indication, the material must feature flow, for a correct filling of the root canal system, which has been accomplished by the addition of components that favor this property. Thus, bioactive endodontic cements, i.e., those with the capacity to stimulate repair by the deposition of mineralized tissue, are particularly worthy of note.

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In view of its aforementioned facets, the prospects for endodontic materials are currently focused on the development of materials based on calcium silicates in an attempt to combine the properties of biocompatibility and bioactivity, both of which are characteristic of materials based on calcium silicate, and both capable of affording sealing and flow (desirable features in endodontic cements). Thus, additional studies on calcium silicate based materials should first determine the specific indication of the material, whether for repair or as root canal obturator, to adjust the properties according to their clinical application.

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