Clinical Insight: Defining a ‘Bioactive Material’

In the field of dental biomaterials, the ability to form surface apatite-containing material (ACM), including hydroxyapatite, in a simulated body fluid (SBF) is defined as “bioactivity”.1,2 This property raises the possibility that ACM could be deposited on cement present at an open margin, on a restorative material at its interface with tooth structure, or on a liner in direct contact with the pulp.3 This ACM would serve the physical role of occluding the cement gap or tooth-restorative interface or the biologic role of interfacing with pulpal tissue to preserve pulp vitality.

The ability to release ions, including those present in tooth mineral, is a property associated with being “biointeractive”.4 Ions released from a “biointeractive” restorative material or cement may enter saliva, driving the process of remineralization in surrounding tooth structure. Some materials can be both “bioactive” and “biointeractive”. Additionally, calcium release and pH effects from a bioactive liner in contact or close to the pulp could cause the release of growth factors entombed in dentinal collagen, thereby stimulating odontoblasts to form reparative dentin.5

Emerging dental materials also show promise of another possible type of biointeractivity/bioactivity by their ability to prevent or reduce bacterial plaque.6 One approach is for these materials to release antibacterial agents such as silver or chlorhexidine. Another approach is to include molecules that prevent the attachment of biofilm to the restoration.