

ACE Panel Report

Bioactive Materials

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Survey Results

Data reflect the opinion of 318 ACE Panel member dentists in the United States.

Of the many **clinical properties** that can be used to **define a bioactive material**, respondents were most likely to identify

87% the ability to induce formation of reparative dentin for pulp capping.

82% the ability to favor tooth remineralization by releasing ions such as Ca^{2+} , F^- and PO_3^{3-} .

56% the ability to form hydroxyapatite on its surface to “occlude” a cement gap.

This question allowed for multiple answers

Most Commonly Used Bioactive Products

Cements

1. Ceramir Crown and Bridge QuikCap (Doxa Dental)
2. TheraCem (Bisco Dental)
3. ACTIVA BioACTIVE-CEMENT (Pulpdent)
4. BioCem Universal BioActive Cement (NuSmile)

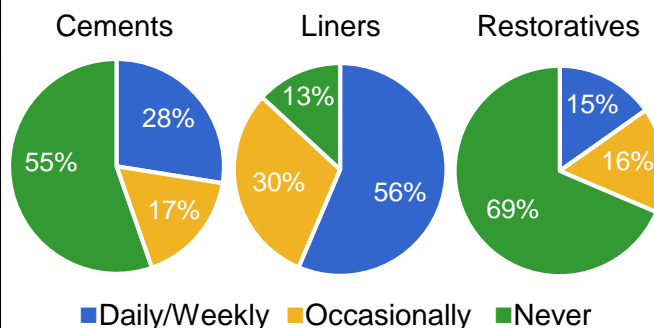
Liners

1. TheraCal LC (Bisco Dental)
2. Dycal Calcium Hydroxide Liner (Dentsply Sirona)
Life Pulp-Capping Material (Kerr)
3. MTA-Angelus (Angelus)
ProRoot MTA Root Repair Material (Dentsply Sirona)
4. Lime-Lite (Pulpdent)

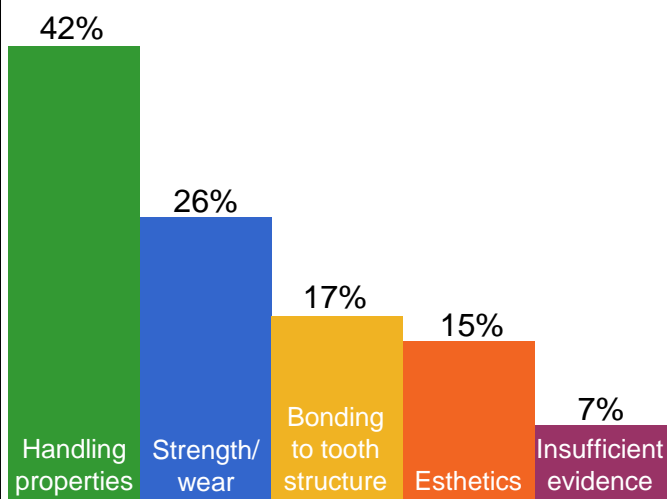
Restoratives

1. ACTIVA BioACTIVE-RESTORATIVE (Pulpdent)
2. Biodentine (Septodont)

Frequency of Use of Bioactive Materials



Concerns Regarding Bioactive Materials



This question allowed for multiple answers

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.

1. Kokubo T, et al. *J. Biomed. Mater. Res.* 1990;24: 721– 34; 2. Jefferies SR. *J Esthet Restor Dent.* 2014 Jan-Feb;26(1):14-26; 3. Jefferies SR, et al. *J Esthet Restor Dent.* 2015 May-Jun;27(3):155-66; 4. Gandolfi MG, et al. *J Appl Biomater Funct Mater.* 2015 Jan-Mar;13(1):43-60; 5. Tomson PL, et al. *Int Endod J.* 2017 Mar;50(3):281-292; 6. Cheng L, et al. *J Dent Res* 2017 Jul;96(8):855-863.