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Dentin hypersensitivity

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Abstract:. Dentin hypersensitivity is one of the most commonly occurring clinical dental conditions, and up to 69% of the UK population has reported experiencing some form of tooth sensitivity. Although the etiology of DH is multi-factorial and not yet fully understood, it is attributed to the general increase in exposed root surfaces of the teeth from periodontal disease, toothbrush abrasion or cyclic loading fatigue of the thin enamel near the cemento-enamel junction.

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Dentin hypersensitivity (DH) is one of the most commonly occurring clinical dental conditions, and up to 69% of the UK population has reported experiencing some form of tooth sensitivity. Although the ***etiology*** of DH is multi-factorial and not yet fully understood, it is attributed to the general increase in exposed root surfaces of the teeth from periodontal disease, toothbrush abrasion or cyclic loading fatigue of the thin enamel near the cemento-enamel junction. The currently accepted ***theory*** for a DH mechanism is the hydrodynamic theory , which proposes that external stimuli such as cold, hot, tactile or osmotic pressure, when applied to exposed dentin, cause fluid movement within the dentinal tubules. This fluid movement stimulates mechanoreceptors near the base of the tubule trigger a pain response. (1)

Open tubules allow fluid flow through the tubules, which results in pressure changes that excite the nerve endings in the dental pulp. This is consistent with the observation that when DH is treated with a ***tubule-occluding agent,*** this will result in a reduction in DH. Occlusion of exposed dentinal tubules is therefore a common approach for treating DH. (2)

Existing resin-composite restorative materials and adhesives are essentially inert space fillings for lost tooth structure. Currently available dental materials can be used to repair or replace lost or diseased tissue but they do not regenerate it. Furthermore, resin-composite materials and their associated dentin bonding agents are formulated with reactive chemical species. If the materials are optimally polymerized on placement then they are widely considered to be sufficiently safe, in accordance with the European Medical Device Directive and ISO Standards. However, recent research has drawn attention to the potential adverse consequences of inadequate cure of such materials. Therefore, if such potential hazards could be avoided in future formulations, that would be beneficial. (2)

Strontium chloride is the active ingredient in the original Sensodyne® dentifrice (GlaxoSmithKline, London, UK) and was the first tubule occluding agent incorporated into a dentifrice; later products also contained strontium acetate. ***Fluoride*** was first

proposed as a desensitizing agent in 1941 and has subsequently been used in dentifrices, gels, mouth rinses and varnishes. Recently, a ***bioactive glass*** (NovaMin®, developed by NovaMin Technology Inc., Alachua, FL, USA) based on the original 45S5 Bioglass® (US Biomaterials Corp., Jacksonville, FL, USA) composition has been incorporated as a remineralising ingredient in dentifrice formulations for treating DH by precipitating ***hydroxycarbonate apatite*** *(HCA) onto the tooth surface and subsequentl*y occluding the dentinal tubules. However, concerns have been expressed over the long-term durability of HCA in the mouth, and formation of fluorapatite (FAp) rather than HCA is preferable, as it is more resistant to acid attack and would therefore dissolve less readily when teeth are exposed to acidic conditions. [(2)]

It was recently shown that ***fluoride-containing bioactive glasses*** form FAp rather than HCA in physiological solutions. Here a series of bioactive glasses (SiO_2–P_2O_5–CaO–CaF_2–SrO–SrF_2–ZnO–Na_2O–K_2O) were produced, which form FAp in physiological solutions, release strontium and fluoride for caries prevention, zinc for bactericidal properties and potassium, which is currently used as a desensitizing agent in dentifrices. [(2)]

Tooth surface loss may be due to ***erosion*** and a frequent reason for DS. The deposition of enamel-like materials that substitute for lost tooth structure is therefore an important research area. Restorative materials that exhibit even greater biomimetic design features could play a valuable role in this regard. A recently introduced technique of guided formation of an enamel-like fluorapatite layer on a mineral substrate has the potential to enable remineralization of superficial enamel defects and/or exposed dentin. The technique, biomimetic mineralization system utilizes the diffusion of calcium ions from solution into a glycerine enriched gelatine gel that contains phosphate and fluoride ions. When the conditioned gel is in direct contact with the exposed tooth surface, within 8 h, a firmly adhering mineral layer is formed on the tooth surface. [(2)]

References:

1. **Lyncha E, Brauerb DS, Karpukhinab N, Gillama DG, Hill RG.** Multi-component bioactive glasses of varying fluoride content for treating dentin hypersensitivity. Dental Materials 2012;28:168–178.
2. **Guentscha A, Seidler K, Nietzscheb S, Heftic AF, Preshawd PM, Wattse DC,f, Jandtf KD, Siguscha BW.** Biomimetic mineralization: Long-term observations in patients with dentin sensitivity. Dental Materials 2012; 28:457–464.