Preventing, healing tooth decay with a bioactive peptide

Cavities, or dental caries, are the most widespread non-communicable disease globally, according to the World Health Organization. Having a cavity drilled and filled at the dentist's office can be painful, but untreated caries could lead to worse pain, tooth loss, infection, and even illness or death. Now, researchers in ACS Applied Materials & Interfaces report a bioactive peptide that coats tooth surfaces, helping prevent new cavities and heal existing ones in lab experiments.

Conventional treatment for dental cavities involves removing decayed tissue and filling the hole with materials, such as amalgam or composite resin. However, this procedure can damage healthy tissue and cause severe discomfort for patients. Hai Ming Wong, Quan Li Li and colleagues wanted to develop a two-pronged strategy to prevent and treat tooth decay: 1) prevent colonization of the tooth surface by the plaque-forming bacteria that cause cavities, and 2) reduce demineralization, or the dissolving of tooth enamel, while increasing remineralization, or repair.

The researchers based their anti-cavity coating on a natural antimicrobial peptide called H5. Produced by human salivary glands, H5 can adsorb onto tooth enamel and destroy a broad range of bacteria and fungi. To promote remineralization, the team added a phosphoserine group to one end of H5, which they thought could help attract more calcium ions to repair the enamel than natural H5. They tested the modified peptide on slices of human molars. Compared with natural H5, the new peptide adsorbed more strongly to the tooth surface, killed more bacteria and inhibited their adhesion, and protected teeth from demineralization. Surprisingly, however, both peptides promoted remineralization to a similar degree. After brushing, people could someday apply the modified peptide to their teeth as a varnish or gel to protect against tooth decay, the researchers say.


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