NEWSLETTER
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NIOM
NORDIC INSTITUTE OF DENTAL MATERIALS

RESEACH | STANDARDIZATION | MATERIALS TESTING | INFORMATION

Disrupting the white matter

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Educating patients in mechanical biofilm disruption combined with supporting changes in life-style factors associated with oral biofilm associated diseases, is still the key to control oral biofilm to levels compatible with oral health of the individual.

Educating patients to control oral biofilm levels compatible with oral health for the individual is fundamental for the clinician.

Scanning electron microscopy image of a biofilm.

> *There are more animals living in the scum on the teeth in a man`s mouth, than there are men in a whole kingdom* [1].

This statement was written more than 300 years ago and is still valid. Bacteria in nature establish themselves on surfaces in a matrix-enclosed biofilm, at that time called the white matter. Educating patients to control oral biofilm levels compatible with oral health for the individual is fundamental for the clinician.

Many oral prophylactic agents predicted to be efficacious in the laboratory show marginal effect in vivo.

Oral biofilm-associated diseases, such as caries and periodontitis develop as a result of dysbiosis. Bacteria in biofilms are more resistant to antimicrobial compounds than their "free floating" counterparts. This property of biofilms challenges us in our daily work as dentists. Many oral prophylactic agents predicted to be efficacious in the laboratory show only marginal effect in vivo.

In view of the prevalence and costs of prevention and treatment of biofilm-induced dental diseases, there is a need for research to elucidate, in further detail, the complex properties and interplay among bacteria in oral biofilms.

[1] Dobell C. Antony Von Leeuwenhoek and his "little animals". 1932.

REFERENCE:
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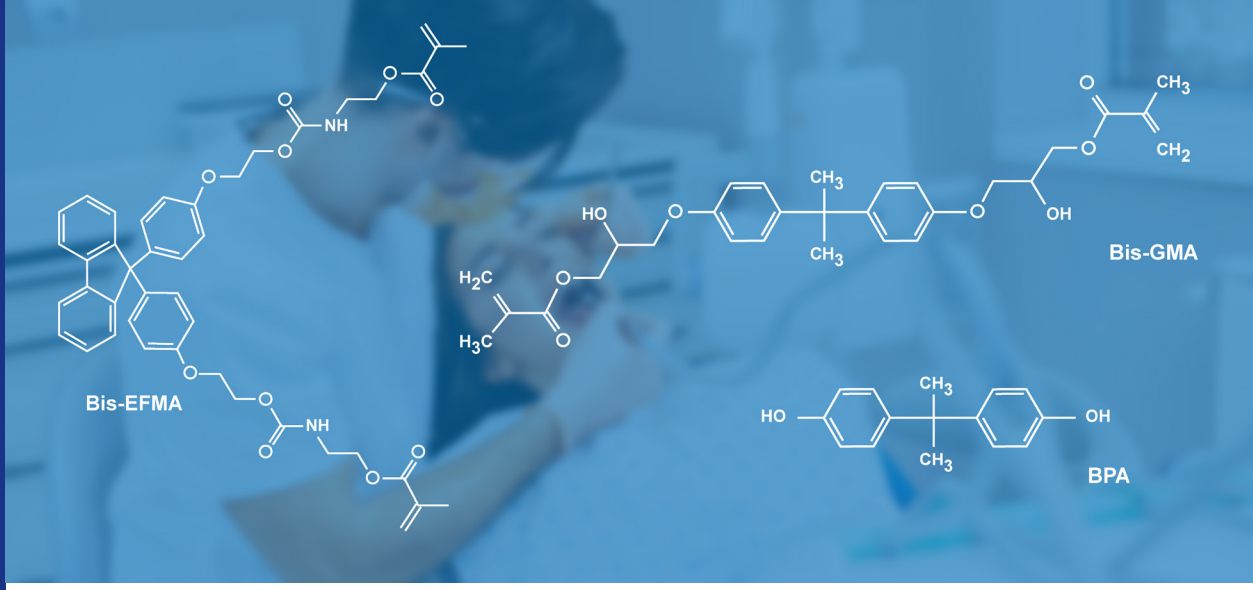

New BPA-free monomer for dental materials

Hilde M. Kopperud
Head of Laboratory dr. scient.

NIOM guest-researcher Jingwei He has successfully synthesized a BPA-free monomer, which has been evaluated for experimental materials. The conclusion is that the new monomer has potential to be used in commercial dental composites.

A new BPA-free monomer may substitute Bis-GMA as major monomer in commercial dental composites.

Bisphenol A (BPA) has been reported as one of many endocrine-disrupting compounds and can be found as a contamination in some dental materials, in particular, fissure sealants and composites albeit in small amounts. The chemical structure of BPA has similarities to that of estrogens and may therefore induce an unwanted biological response. The source of BPA in dental materials is usually the common monomer Bis-GMA. Investigations to find monomers that can replace Bis-GMA in these materials are therefore of interest, to rule out dental materials as a potential source of BPA-exposure.

In a recent project at NIOM, Dr. He synthesized a new BPA-free monomer abbreviated Bis-EFMA. This monomer does not have the core structure similar to BPA that Bis-GMA does (see figure). Dr. He then evaluated critical properties of composite materials based on the new monomer in comparison to a similar material with Bis-GMA and to a commercial composite.

The degree of conversion and the material properties of an experimental composite were of similar values as for a commercial material.

The degree of conversion of the experimental composite with Bis-EFMA was the same as for the commercial material and for the Bis-GMA-based composite. This indicates that the material properties also will show similar values to the commercial materials. Indeed, all the measured properties (except flexural strength after water immersion) were similar to or better than those of the commercial material. In particular, a lower polymerization shrinkage (2.1 vol-% vs 2.6 vol-%) and a higher depth of cure (5.4 mm vs. 3.4 mm) were found for the Bis-EFMA-composite.

An initial screening of cytotoxicity using the MTT-test showed greater viability of cells exposed to extract from the Bis-EFMA-based composite (viability ca. 87 %) compared to the commercial material (viability ca. 61 %) and the Bis-GMA-based composite (viability ca. 41 %).

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Preparation and characterization of Bis-GMA-free dental composites with dimethacrylate monomer derived from 9,9-Bis[4-(2-hydroxyethoxy)phenyl]fluorine.
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