Manuscript

[Heading]

Make caries light up

[Leader]

The “Fluorescence Aided Caries Excavation” method utilises the fluorescence properties of porphyrins, which originate from caries bacteria. They fluoresce red and thus indicate caries infected regions. FACE therefore provides assurance for the dentists regarding caries removal. University lecturer Dr. Andreas Braun, senior consultant at the Department of Operative Dentistry, University of Marburg, tested the method and sees several advantages compared to conventional methods.

[Body text]

Dr. Braun, how long have you been investigating fluorescence?

During the last 15 years I have become very familiar within this field, especially in caries diagnostics. Previously, I accompanied the introduction of a diagnostic terminal device at the University of Bonn. This was a fluorescence system for dentistry aimed at assessing the necessity of treating carious lesions. So putting it simple, it addressed the question: Does the user have to drill or not? Quantitative laser fluorescence methods, such as FACE, were also investigated and established in this period. It was proven that FACE is suitable for diagnosis. The advantage: It is a feedback system that tells the practitioner where he has to remove caries or whether he already removed the carious regions completely. Alongside diagnosis, I have also been interested in fluorescent-controlled caries removal for around two years now.

Manuscript

What have you been focussing on in this period?

Using various fluorescence systems, we attempted to assess the dental hard substance remaining after the caries is completely excavated. Here it was proven that the fluorescence appearance can change depending on its proximity to the pulp, which an untrained user might possibly confuse with caries. In deep cavities, inner tooth structures appear to influence the fluorescence image independent of a caries lesion. However, this modified fluorescence behaviour has to be clearly distinguished from a carious lesion,. For me this aspect paved the way into that line of research.

What exactly did you investigate?

We compared the conventional caries research methods with the FACE method. It was proven that the FACE method can distinguish well between caries and healthy dental hard substance.

How does FACE actually work?

The FACE method utilises the principle of fluorescence on dental hard substance. Porphyrins are found in the caries that originate in the process of carious decay in the dental hard substance. These porphyrins fluoresce at a particular red stimulation wavelength used. And this is exactly what is identified with the FACE system.

To which extent can FACE support users?

Healthy dental hard substance has a green fluorescence, diseased tissue a red fluorescence. When practitioners remove the red fluorescing region, they can be assured that this is caries. That results in a simplification of the treatment procedure. As mentioned before, it was possible to observe that the fluorescence near the pulp tissue deviates somewhat. Here exist structures of slightly grey-brown

appearance whose origin has to be found in the pulp or in the irritation dentine beneath a carious lesion. This means: FACE has to be considered in a more differentiated manner. Red fluorescent regions indicate caries, green ones are caries-free. Then there are also those grey-brown lesions in deep cavities as just described. These are not directly caused by caries.

Where does this appearance come from?

We are still investigating this. In case of deep carious lesions, the pulp produces a defence reaction. Dentine is reproduced in the inner space of the pulp, which keeps the caries at a distance from the nerve tissue. This secondary and tertiary dentine differs structurally from primary dentine. This may explain the different light appearence.

How do you rate FACE?

FACE is designed to help the dentist, as it contains additional diagnostic information – basically providing a second opinion. The system accelerates the working process compared to a conventional caries treatment, as there is no more switching of instruments between probe and drill or it is at least much reduced. Direct visible feedback shows which regions can or should be removed, making the treatment faster and therefore safer too: Because even hard-to-see small carious lesions in undercut regions can be detected with FACE.

[Résumé]

University lecturer Dr. Andreas Braun, is a senior consultant at the Department of Operative Dentistry, University of Marburg. He previously worked as a consultant at the Department of Periodontology, Operative and Preventive Dentistry at the University

of Bonn. He is also a member of the Scientific Committee of the German Society of Laser Dentistry (DGL).

Correspondence address:

Medical Center for Dental, Oral and Maxillo-facial Surgery,
Department of Operative Dentistry and Endodontics,
Georg-Voigt-Strasse 3
35039 Marburg

Tel: +49 6421-58-63240

e-mail: andreas.braun@staff.uni-marburg.de

Manuscript

[image material]

Dr. Andreas Braun