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1 .Topic in Research Achievements in the Year 2006

Among several research programs that have been undertaken to establish an appropriate diagnostic method and to develop minimally invasive restorative and preventive therapy for primary and secondary caries ozone and fluoride-oligomer are being investigated as a disinfectant using the AMS.

On the other hand, a smaller version would allow *in vivo* pH-imaging characterization of caries lesions in the oral cavity. Recently, a micro-pH sensor using an Ion Sensitive Field Effect Transistor (ISFET) has been developed to overcome the problem of the glass and antimony electrode. The ISFET sensor is made of a Si-semiconductor, and the surface of this sensor is composed of tantalum oxide (Ta_2O_5). The ISFET electrode could record the pH from small volumes of fluid and the results agreed with the other pH sensitive electrodes. This sensor has the advantage of being simple to calibrate, it is stable after calibration, can be stored dry, is durable and has a short response time. This study was designed to evaluate the pH of the surface of active or arrested carious dentin from extracted teeth using a newly developed micro-pH sensor, and to compare the relationship between different pH measurement techniques.

In another line of study, the ultrastructure of the dentin-adhesive interface after *in vitro* sequential challenge by acidic and basic chemicals around adhesive restorations had been investigated successfully.

Ozone is one of nature's most powerful oxidants and is reactive towards many biomolecules. The potential of ozone was investigated on inactivation of cariogenic bacteria in single and consortium biofilms *in vitro* using *Streptococcus mutans MT8148, Streptococcus mutans* GS5, *Streptococcus gordonii* and *Lactobacillus casei* IAM 12473.Ozone has shown an antibacterial effect on cariogenic mutans streptococci (*Streptococcus mutans MT8148, Streptococcus mutans* GS5, *Streptococcus gordonii*) and lactobacilli cells embedded in water-insoluble glucans of the artificial biofilms. In a two dimensional electrophoresis (2DE) analysis it was understood that ozone destroys *S. mutans* cell membrane proteins.

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