

Title: Early detection of mutans streptococci bacteria
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The advancements in dentistry are redirecting our focus toward minimising invasive procedures with the emphasis today on the science of dental disease. By assessing the microbiological load and an individual's risk potential we can predict the development of dental disease; namely dental caries. Having this knowledge helps us to formulate appropriate therapies for sustainable long-term health.

ATP bioluminescence technology

Rapid microbial screening of mutans streptococci bacteria (measuring a total of the species of streptococci; namely *S. mutans* and *S. sobrinus*) can now be performed chair side in real time for cost-effective early caries detection and caries risk assessment.

Bioluminescence is the generation of light by a biological process. All cells produce some form of bioluminescence in their own unique wavelength, duration, timing and regularity of flashes, although the majority are not visible to the naked eye. Examples of visible bioluminescence are the American firefly and the New Zealand glow worms.

The light emission comes from a specific enzyme reaction and the amount of light is directly proportional to the amount of adenosine triphosphate (ATP) present (McElroy, 1947). ATP is present in all living cells and serves as an energy source for metabolic processes, namely RNA synthesis.

Bioluminescence occurs when a pigment (luciferin) is oxidised by an enzyme (luciferase) while in contact with the molecule ATP. Applications in dentistry are based on collecting oral bacteria, releasing the ATP from within the cell and measuring the amount of light generated.

The light emission is produced within seconds and measured using the CariScreen™ luminometer to reveal at chair side the presence of mutans streptococci bacteria. A high reading of relative light units (RLUs) indicates that a sample contains a high number of mutans streptococci bacteria.

In addition to the chair side screening, the CariCult™ offers a 24-hour culturing system that measures the CFUs (colon forming units). Culturing is considered the standard in measuring bacterial growth and acts as a confirmation to the initial screening.

Optimum level of care

For a patient that registers moderate to high RLUs, the CariFree™ system will address contributing factors (Caries Risk Assessment form) while also providing an immediate alcohol free antimicrobial course of action that directly attacks mutans streptococci bacteria in the biofilm layer with the daily use of the CariStat™ Treatment Rinse. In addition to routine flossing and brushing, the CariStat™ Treatment Rinse eliminates the mutans streptococci biofilm and the citrus flavoured Maintenance Rinse creates an environment that promotes healthy biofilm growth.

The benefits for the dental patient are the prevention and reduction in decay development at an affordable total treatment cost that is generally less than a small restoration.

ATP bioluminescence has been widely used in the pharmaceutical and personal care product industries and in dairy and food production plants for hygiene monitoring and finished product testing. Essology (Essential Technology) Pty Ltd is introducing this technology to dentistry with the CariFree system. For more information contact Peter on 0418 886 618 or email: info@essology.com