Caries is a chronic infectious disease affecting both children and adults worldwide. Research within the last decade suggests that caries can be treated as a preventable disease with emphasis placed on early detection and minimally invasive intervention to preserve healthy tooth structure.

The advent of fluoridation has caused caries to retreat "underground," making fissure caries more challenging to diagnose. The "watch and wait" philosophy is not effective, because often enough the decision to treat the tooth is made after the caries process had been well established. Subsurface decay may then progress to the point of extensive excavation and loss of valuable tooth structure.

Traditional caries detection modes, visual, tactile and radiographic techniques, are quantitative, subject to operator interpretation and can produce varied diagnoses. Treatment and prevention of dental caries requires new strategies by the dental team. The adjunctive use of laser fluorescence by DIAGNOdent® raises early caries diagnosis beyond 90 percent.

What is laser fluorescence and how does it work?
Laser fluorescence is the use of visible light dispersed according to its wavelength. Fluorescence occurs as a result of light absorption when electromagnetic radiation comes in contact with tooth structure. When compared with healthy enamel and dentin, fluorescence increases in the presence of caries because lesions that contain cariogenic bacteria show significantly higher fluorescence than those without. Fluorescence is produced when bacterial complexes known as porphyrins are activated by red light.

What is DIAGNOdent and how does it quantify carious lesions?
DIAGNOdent (KaVo, Lake Zurich, Ill.) became available in 2001 allowing clinicians another clinical option for detection of carious lesions including Class I, II, V, and secondary decay existing at amalgam margins and around certain types of sealant materials. The DIAGNOdent is based on the laser fluorescence principle and emitted light is proportional to the scale of the carious lesion, allowing DIAGNOdent to indicate the severity of the lesion.

It operates at a wavelength of 655 nm. At this particular wavelength, clean healthy tooth structure exhibits little or no fluorescence, and results in very low display readings.

The DIAGNOdent handheld devices (tabletop and pen versions) emit the laser light and can specify the location and extent of the lesion in tooth structure. As the laser light is emitted on the tooth, the two-way handpiece optics permits the electronic unit to simultaneously quantify the reflected laser light energy. This degree of fluorescence is expressed in a numerical value (0-99) and displayed on the digital screen. An audible tone is emitted from the unit allowing the operator to hear changes in the scale values on the display.

Are there any false positive readings when using the DIAGNOdent?
When used properly, DIAGNOdent is over 90 percent accurate. The device has a high degree of sensitivity, making false positives very uncommon. However, false positives may arise when the operator fails to completely remove stain or debris. To ensure this does not occur on patients with heavy stain such as tobacco or coffee stain, pit and fissures should be treated with an air polisher such as the PROPHYflex® and rinsed thoroughly.

When do you recommend using the DIAGNOdent?
It is recommended that DIAGNOdent be used as an adjunct before placing fissure sealants. It is recommended that DIAGNOdent be used as an adjunct before placing fissure sealants. It is recommended that DIAGNOdent be used as an adjunct before placing fissure sealants. It is recommended that DIAGNOdent be used as an adjunct before placing fissure sealants.
will allow for higher potential for sealant success, assuming that the bonding agent will adhere. Other recommended uses include new patient exams as well as mapping the direction of decay on patients of record, allowing for higher ease acceptance. DIAGNOdent can improve the accuracy during caries excavation in conservative preparations where the access allows the tip to reach the floor of the cavity, alerting the operator if decay is still present.

Is DIAGNOdent able to detect calculus? Yes, DIAGNOdent is capable of detecting calculus. Used in conjunction with DIAGNOdent laser fluorescence detection technology, the DIAGNOdent Perio Probe tip was designed to detect calculus concretions in periodontal pockets up to 9 mm deep. Calculus fluoresces differently than healthy tooth structure; therefore, the probe detects the difference and sends a signal to the digital display while simultaneously emitting an audible tone to the operator, identifying calculus. The probe tip used in conjunction with standard root planing and scaling allows the clinician to preserve tooth structure and reduce operator fatigue.

Caries detection is more challenging due to fluoridation and remineralization agents. Conventional methods of caries detection are limiting, causing caries to go undetected much of the time until the lesion has reached an advanced stage. The adjunctive use of DIAGNOdent during examination raises diagnostic accuracy beyond 90 percent, allowing subsurface caries to become a historic phase. The quick, easy and safe use of DIAGNOdent allows for early and accurate diagnosis of caries, enabling successful prevention and minimal restorative intervention.

References