

Caries and calculus detection with KaVo DIAGNOdent laser technology

By Donna L. Catapano, RDH, BS, MA

Caries is a chronic infectious disease affecting both children and adults worldwide.^{1,2} Research within the last decade suggests that caries be treated as a preventable disease with emphasis placed on early detection and minimally invasive intervention to preserve healthy tooth structure.^{3,4}

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 decided after the caries process had been well established.^{5,6} 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.⁴ 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.⁶

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.⁶⁻⁸

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.^{6,9}

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® 3 and rinsed thoroughly.^{5,6}

When do you recommend using the DIAGNOdent?

It is recommended that DIAGNOdent be used as an adjunct before placing fissure sealants. It

See CRIES, Page 14

AD

The Whole Kit and Caboodle

On display at www.photomed.net - 24/7

Canon



The whole kit and caboodle. Everything, and all of it. That describes PhotoMed. We've got everything you need for clinical photography. PhotoMed clinical camera systems feature the best digital camera equipment available. Shown above are the PhotoMed/Canon G10 and the Canon 50D. We also feature clinical systems built around Canon's Rebel XS, Rebel XSi, EOS 40D and (soon) the 5D Mark II. Go to photomed.net for full info on each of these cameras.

We know that no one likes to spend time reading thick user manuals so your camera is delivered assembled, set and tested along with our concise custom instructions. And we include unlimited phone support and loan equipment if needed.

PhotoMed carries all of the accessories you may need: intraoral mirrors, retractors, Contrasters, printers, clinical photography books/training cds (Dr. Chris Orr's new interactive dental photography CD is a great way to train your staff) and recreational lenses from Sigma (the new 18-200 DC OS lens is a nice choice). Visit our website. Give us a call. Come see us at a dental meeting (there's a complete list of upcoming meetings at: www.photomed.net). We know you'll like us.



www.photomed.net • 800.998.7765

Mention the "kit and caboodle ad" when you order for some extra kilt!

PhotoMed
INTERNATIONAL

CARIES

From Page 13

will allow for higher potential for sealant success, assuring 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 case 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.⁶

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.¹⁰

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.^{5,6}

References

1. Darby M, Walsh M. Dental Hygiene Theory and Practice. 2nd ed. Elsevier Saunders, St. Louis, MO, 2005.
2. Francisco E, Azevedo S, Lyon L,

et al. Managing the risk of caries: new horizons for dental hygiene in caries risk assessment and management (CAMBRA). *Dim Dent Hyg.* 2008; 6(10):40–44.

3. Young DA. New caries detection technologies and modern caries management: merging the strategies. *Gen Den.* 2002; 50(4):320–331.
4. White JM, Eakle WS. Rationale and treatment approach in minimally invasive dentistry. *J Am Dent Ass.* Jun 2000; 131 Supp: 15S–19S.
5. Milicich S. Clinical applications of new advances in occlusal caries diagnosis. *N Z Dent J.* 2000 Mar; 96(432):23–26.
6. Blaes J. Laser fluorescence caries detection: a clinical and literature review of the DIAGNOdent. *ADA CERP.* 2007:2–8.
7. www.en.wikipedia.org/wiki/spectroscopy. Spectroscopy. Accessed Oct. 2008.
8. www.en.wikipedia.org/wiki/porphyrin. Porphyrins. Accessed Sept. 2008.
9. KaVo Dental. Scanning is believing. KaVo Dental Corp. Lake Zurich, IL, USA. www.kavousa.com.
10. KaVo Dental. Probing power. *Modern Solutions.* Sum 2008: 16.

AD

**The Leading Amalgam Separation Company SolmeteX®
Introduces the New Single Source Waste Compliance Program**



The new Single Source Waste Compliance Program includes the disposal of regulated dental waste, and will satisfy regulatory compliance between OSHA and the EPA. Your customized kit includes:

- OSHA training kit & manual
- Photo Chemical Recovery
- Amalgam Recovery
- Lead Foil Recovery
- Bio-hazard Disposal
- Sharps Disposal

The Hg5 Amalgam Separation Series is:

- Easy to use & virtually maintenance-free
- Affordable & cost-efficient
- Flexible & transparent
- Supported by responsive experts
- Environmentally friendly
- ISO 11143 Certified at greater than 99%



SolmeteX® recommends Sultan Purevac Hg Line Cleaner



Present this ad at the Greater NY Show at the SolmeteX Booth # 4901 and receive a \$50 gift card upon verified purchase of Amalgam Separator or new Waste Compliance Program.

Name of Dentist _____
 Address _____
 Phone _____
 Your dealer _____

For information about all SolmeteX products, contact your local dental dealer.
www.solmetex.com/dental.html



A Layne Christensen Company
 50 Bearfoot Rd, Northborough, MA 01532

About the author



Donna L. Catapano, RDH, BS, MA, is a dental hygiene graduate from Farmingdale State College in New York and joined their faculty as an adjunct clinical instructor in 2002. Prior to 2002, she worked as an adjunct clinical and laboratory instructor as well as an adjunct lecturer at New York University College of Dentistry. Catapano holds a master's degree from Hofstra University, where her research focused on the oral-systemic link between gingival inflammation and cardiovascular disease. Another area of research throughout her experience includes forensic odontology. She currently practices clinical dental hygiene full-time in private practice and intends to pursue a doctorate degree in science.