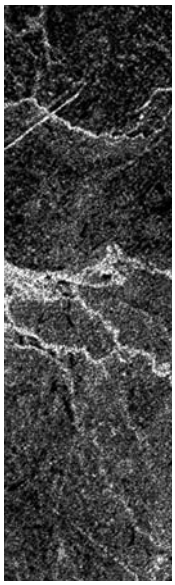

Ask the Experts

CARIES DETECTION

Guest Expert

Joel H. Berg, DDS, MS*

QUESTION: What is the status of some of these new caries detection devices that are being advertised?

ANSWER: Dental caries is the most prevalent disease in humans, affecting 97% of us in our lifetime. In spite of this, dental professionals primarily are using technologies that are more than 100 years old to diagnose its presence. These technologies include visual examination, radiography, and transillumination. Unfortunately, the very poor sensitivity of these technologies generally does not allow us to detect a caries lesion clinically until it is at least halfway through the enamel histologically. At this (late) stage of detection, the only option in most instances is surgical restorative intervention.

Recently, several methods for detecting caries lesions at an earlier stage have been developed. Before briefly looking at some of these techniques, it is important to distinguish *caries-detection* techniques from *caries-diagnosis* techniques. Any technique or technology that identifies the presence of a caries lesion, regardless of the stage of that lesion, is just that—a detection device. A *diagnosis* of dental caries can be made only after collecting all appropriate data from various sources of detection. In turn, all this information must be carefully juxtaposed with the patient's individual caries risk information (discussed below) to make conclusions about the diagnosis and subsequent recommended treatments.

Radiographs identify proximal lesions but at a later stage of progression than is desirable. Using intense white light transmitted via fiber-optic bundles, digital fiber-optic transillumination (DIFOTI; Electro-Optical Sciences, Inc., Irvington, NY, USA) technology can detect the differential scattering of light around small lesions at least as well as radiographs do. This has been documented in vitro. Although to date no clinical studies have duplicated this enhanced sensitivity, several clinical studies are currently under way in an attempt to corroborate anecdotal findings that DIFOTI might be a good indicator of the need to take black and white radiographs without unnecessary exposure to ionizing radiation. So far, without verifying clinical studies, DIFOTI can only be used to provide adjunctive detection data, which must be incorporated with other sources of data to make a diagnostic decision.

The DIAGNOdent system (KaVo, Lake Zurich, IL, USA) uses a point laser light source to elicit fluorescence of enamel. The collected fluorescence of the enamel changes within isolated areas where early caries lesions exist. This device, already well known in the marketplace, has been used by many to detect caries lesions in pits and fissures where visual examination is not certain. Bader and Shugars recently reviewed the literature concerning studies of DIAGNOdent.[1] They concluded that DIAGNOdent is more sensitive than conventional methods of caries detection but that the risk of overdiagnosis or false-positives raises concern that detection might imply diagnosis. In spite of this potential problem, DIAGN-

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Odent can be an effective corroborative tool when used in conjunction with other detection methods.

Another technology that is receiving some well-deserved attention is referred to as quantitative light-induced fluorescence" (QLF; Inspektor Research Systems BV, Amsterdam, the Netherlands). This technology uses visible light of a frequency similar to that of curing units to fluoresce the entire tooth simultaneously. As with DIAGNOdent, differences in fluorescence are translated via analysis and interpreted as amounts of demineralization. The intellectual property within this technology resides in its ability to detect very subtle changes in demineralization and, with repeated testing at subsequent times, to detect changes in remineralization. Such changes would demonstrate the efficacy of professional recommendations, including professionally applied therapies and home-care regimens. When fully implemented, this technology apparently will bring about a dramatic change in the way we are able to detect caries lesions clinically at an early stage. Patients will then be able to understand the regression of lesions that is a function of their own attention to professional directions. Unlike DIAGNOdent, this QLF technology has the ability to precisely superimpose subsequent measures over previous ones to minimize errors in detecting changes in the size and location of caries lesions.

Finally, we must always pay close attention to the overall caries risk of the patient. Because this is a long and potentially complex subject, I will not attempt to address it fully here. Clinicians must use whatever means are available and spend the required time to determine which patients in their practice are at greater risk than others of developing caries. Once this is determined, greater attention can be paid to the higher-risk patients. This may include (1) increased frequency of office visits, (2) additional home or professionally applied fluoride regimens, (3) chemotherapeutic rinse prescriptions, or (4) a combination of the above. The determination of greater caries risk can be made via either a combined historical/environmental screening analysis, such as the American Academy of Pediatric Dentistry's Caries Assessment Tool (CAT; available at <http://www.aapd.org>), or by using a variety of new-to-the-market technologies that assess risk factors such as the "acid-production potential" of the patient's plaque or counts of mutans streptococci.

As we move into this new world of caries management, a combined approach of risk assessment along with early lesion detection will facilitate our ability to treat lesions medically (remineralization), reducing the need to treat "escapee lesions" via surgical restorative intervention.

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SUGGESTED READING

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Editor's Note: If you have a question on any aspect of esthetic dentistry, please direct it to the associate editor, Edward J. Swift Jr, DMD, MS. We will forward questions to appropriate experts and print the answers in this regular feature.

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