

Problem Solvers 41-New Technologies in Dentistry; Cavity Diagnosis

Synonyms: Diagnodent, Spectra Caries Detection Aid, fluorescence technology, digital x-rays.

Many dentists are utilizing different technologies to diagnose decay. This problem solver will highlight new paradigms that are being investigated to diagnose decay.

With today's widespread use of fluoride, the presentation of pit and fissure cavities on the top of teeth can be harder to detect. Decay may often begin in the walls of the fissure or just beneath a small pit in the enamel. These beginning cavities or "incipient lesions," are hard to spot and the dental explorer may not even be able to detect the cavity. So use of a Diagnodent or Spectra Cavity Detection Aid, can be great tools for a dentist trying to provide minimally invasive dentistry. The smaller the cavity when found, the smaller and less invasive the filling.

One such technology involves utilization of a small laser device to evaluate teeth for cavities. For many years patients lived in fear of the tiny pick and prayed it wouldn't stick into a soft groove or pit when the dentist did the exam. This "stick" as well as visual cavity detection are still the main ways cavities are discovered. Now lasers are being used to screen teeth for cavities, as they are more sensitive to detecting soft carious lesions (cavities) than the traditional methods.

Could you tell me more about the new laser instrument that can better diagnose cavities?

One such device is called the Diagnodent. It is a light emitting laser device that when shined on a tooth will give a number between 1 and 99 that will help a dentist detect decay below the surface of the enamel. The more decayed the tooth structure, the higher the number. The number at which a dentist will perform a filling varies according to the individual dentist's discretion. According to some reports, this device is about 90% accurate. When describing this to my patients I tell them it's like a depth finder. It sends a signal through the enamel of the tooth and bounces back to the sensor. Hollow areas, which have tooth missing or cavities, will record numbers that are higher and they correspond to the depth of the cavity. A Diagnodent reading of 60 may have a really deep cavity that isn't easily found on a dental x-ray so the dentist can treat it before there is pain or need for a root canal.

Are there other types of caries detection devices?

Yes another type of device is called Spectra Aid.

This device works like a Doppler radar to detect cavities on the top of or in between teeth. The wand looks like an intra-oral camera and images are taken of the teeth; which are then sent to a computer so that the variations in the color of the tooth after illumination can be analyzed. Colors that are blue, red orange or yellow and numbers between 0 and 5 are displayed that are used to gauge the severity and depth of the decay.

How does this Spectra cavity device work?

It uses fluorescence by shining LED lights, which emit a high-energy violet blue light onto the tooth. This light will stimulate the by-products of bacteria found in decay (called porphyrins) to appear red on a monitor. Healthy non-carious teeth will fluoresce green by comparison! This device is approved by the FDA and is approved for a dentist to evaluate if decay is removed after initial cavity removal and is marketed to also be able to identify plaque and calculus on teeth.

Can cavity detection devices be wrong?

Yes they can give false positives. So it is important to realize they cannot be used next to old fillings or sealants with a high degree of reliability. The dentist will still use tools such as x-rays, explorers (dental picks), transillumination (shining a bright light through the tooth), and visual examination with magnification and illumination to provide a comprehensive cavity screening.

How can my dentist be sure they have removed all the decay my tooth?

Use of a caries detection aid like Spectra can help, as can caries stains. There are actual stains that can help a dentist distinguish between the bad bacteria laden layer and healthy tooth structure. The dentist will also use instruments called “spoon excavators” to feel if the tooth structure is soft and easily removed or firm and healthy.

Can cavities be detected with lasers between the teeth?

The new Spectra devices that are being marketed as being effective in diagnosing decay between the teeth but the dental x-ray is still the best way to diagnose these cavities.

Digital X-Rays:

Another technology that has helped dentists with diagnosis is digital x-rays. Dental offices that are moving to “paperless” offices have computers in the treatment rooms. These monitors can be used for digital x-rays if special sensors are hooked to the operatory computer. Some of the sensors are hard wired and others use blue tooth technology to send the image to the computer terminal. Digital x-rays can be seamlessly integrated with a computer file on the patient so the entire patient record can be a computer record with no paper involved.

What are the differences between traditional photographic film x-rays and digital x-rays?

The most significant difference is that the digital x-rays are much quicker. One does not have to wait for the time it takes to develop traditional x-rays. In case of digital dental x-ray, the picture can be enlarged to get a different view, color can be added to the x-ray and the image can have the contrast changed. As well, the image can be magnified or manipulated to better view a specific target area. Studies have also shown that there is less radiation exposure for digital x-rays but this has been a subject of some debate.

What are the problems with Digital x-rays?

Drawbacks for digital x-rays are that the sensors for digital x-rays are much larger and thicker than traditional x-ray film. This can cause discomfort in a patient’s mouth or inability for a patient to close properly or tolerate the sensors at all. Also, it has been argued that the digital x-rays are not quite as diagnostic as the traditional method and may be subject to some false positives if improperly calibrated.

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