

Healthy Outlook Blog

No More Drill and Fill: Canary Dental System Detects Cavities Early

By Jane Langille | Posted November 29 2011

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New Canadian device offers a radical shift to detect early dental caries

Hate the dentist's drill? A new Canadian dental device detects the size and depth of early cavities so that they can be treated, rather than needing to be drilled and filled later.

The Canary System is the brainchild of dentist [Stephen Abrams](#) and one of his patients, [Andreas Mandelis](#), Ph.D., a physicist with the Centre for Advanced Diffusion-Wave Technologies at the University of Toronto. Eleven years ago, while Mandelis was in the chair, Abrams complained about the difficulty of diagnosing tooth decay on the biting surface of a molar. Mandelis said he had a novel technology to image crystal structure, and their company Quantum Dental Technologies was born.



Over the next ten years, they developed a hand-held instrument the same size and weight as a dentist's drill. [The Canary System](#) uses a novel technology called PRT-LUM, a combination of Photothermal Radiometry and Modulated Luminescence.

Here's how it works. The device shines a low-energy pulsing laser light onto a tooth. That energy is absorbed and then radiates back as heat and glow, which are measured by a camera to determine enamel porosity and the extent of decay. Readings are converted to a Canary Number to indicate the extent of decay, and the result is displayed on a touch-screen monitor for immediate review. Patients receive a printed report and can access the confidential system from home to see their image scans and treatment plans.

Currently, dentists detect tooth decay using three methods: by performing a visual inspection; taking an x-ray; and using an explorer pick to check trouble spots. But none of these methods work well to detect small, early lesions, particularly those in-between teeth. While using the pick, Abrams says, "You are actually breaking down the enamel around that fissure, making it more difficult to re-crystallize."



The Canary System

Perhaps your dentist has recommended ‘watching’ an area until decay progresses. Abrams says, “You’re watching it until it develops a hole large enough to put in a filling, but if you think about it, you are really waiting for the end of the disease process that starts as soon as the enamel breaks down.”

The Canary System offers dentists and patients a radical shift from restorative to preventive dentistry. It can detect decay on smooth enamel, root surfaces, biting surfaces, between the teeth and around existing fillings. The scan is safe, non-invasive, painless, and one tooth scan takes about five seconds. The Canary System is different from many other laser light detectors on the market because the PRT-LUM technology can provide readings below the tooth’s surface, up to a depth of 5 mm.

To remineralize a small lesion, a hygienist applies a [priming varnish](#) and the dentist dispenses special higher-fluoride toothpaste such as [3M ESPE’s Clinpro 5000](#) for patients to use at home. Progress can be monitored with repeat scans in follow-up visits scheduled in three-month intervals.


In a clinical study, The Canary System showed no adverse effects, no tissue damage and proved that it could detect tooth decay as small as 50 microns (20 times smaller than a millimeter), regardless of whether the tooth was wet or dry, stained or had biofilm.

The [award-winning](#) device was approved for sale by Health Canada in April 2011. FDA 510(k) clearance for sale in the U.S. is pending and a submission for authorization to sell in the European Union is in progress.

Wouldn’t you prefer to heal cavities when they are small rather than have them drilled and filled later?

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Find out more about [The Canary System](#) and how it detects early dental decay. Watch a [video of Dr.](#)

 [Ben Abrams](#) explaining how The Canary System works. The Canary System has been featured in over 100 published research papers and abstracts in peer-reviewed dental and clinical journals. Read an article published in UK journal, *The Engineer*, “[Quantum canary detects tooth decay fast.](#)” You may also like our earlier post, “[Turning Adult Wisdom Teeth Into Stem Cells.](#)”


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