

A Magic Wand for the Community Dental Office? Observations from the British Columbia Oral Cancer Prevention Program

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Editor's Note: *This article is in response to Dr. Balevi's article on the VELscope on p. 603.*

Oral cancer is a deadly disease. It is often diagnosed late with considerable spread, resulting in a high mortality rate and treatment-associated morbidity. New devices entering the market have stimulated a renewed interest in oral cancer screening among dental professionals. The British Columbia Oral Cancer Prevention Program (BC OCPP) is actively involved in research related to a variety of emerging technologies, including the intraoral application of devices aimed at improving visualization of oral mucosal abnormalities based on a better understanding of the molecular and pathological alterations associated with premalignancy and cancer.

One of these technologies, direct fluorescence visualization (FV), has a long history of use in the detection of cancerous and precancerous tissue at several sites, including the lung, cervix and skin.¹⁻³ In 2003, we began investigating the use of FV in the oral cavity, adapting the technology to an easy-to-use, handheld device to visualize oral mucosal change directly. A version of this technology has been commercialized by LED Dental Inc. (White Rock, B.C.) and is being marketed as VELscope.

Detecting Malignancy by Fluorescence Visualization

The VELscope emits a cone of blue light which, when directed into the mouth, excites various molecules (called fluorophores) within mucosal cells, causing them to absorb the light energy and re-emit it as visible autofluorescence. Alterations to tissue morphology and biochemistry, often associated with disease, result in a loss of fluorescence.⁴ Healthy oral tissue emits a pale green light, while altered tissues, which attenuate the passage of light, appear dark brown to black (loss of fluorescence). Thus, the device marks a change in the mucosal field that is sometimes associated with oral carcinogenesis. In our hands, it is used following completion of the health history as the second part of a 2-step clinical examination. The device is not meant to be diagnostic, but complements conventional visual and manual head and neck examination. In the hands of an experienced user, this information can help guide a decision for biopsy.

Testing the Use of the VELscope in Specialized Clinics

In British Columbia, we are following over 600 patients with oral cancer and precancers

in highly specialized referral clinics using the VELscope, as part of an ongoing longitudinal study. To date, our experience with FV has been very positive. The device detects most cancers and those precancers that pathologists consider to be at high risk of progression — all of which require treatment. The pathologist determines risk by assessing lesion biopsies for features commonly associated with cancer risk — termed dysplasia. Severe dysplasia is likely to progress and is treated by surgery in British Columbia.

Risk of progression to cancer of lower-grade lesions (mild or moderate) is less certain. Only a portion of such lesions will actually progress. Although there is no consensus on their management, such lesions should not be ignored. People with such changes should be followed closely and reassessed periodically. The VELscope detects a significant portion of these lesions. Our ongoing study will determine whether lower-grade lesions showing loss of fluorescence are more apt to progress to cancer.

In addition, the device identifies the field of change, which is often ill-defined clinically and can extend beyond the visible clinical lesion and be missed. The ability to define this field has been a challenge in both the detection and management of the disease. In our high-risk clinics, FV has been shown to highlight such changes in the mucosa, later proven by biopsy to be either dysplastic or malignant.⁵ Even when such biopsies show low-grade dysplasia, molecular analysis has revealed an increased presence of clones of cells with genetic alterations associated with a 30-fold increase in risk of progression.⁶ This information could be of value to surgical oncologists in determining surgical margins for both oral cancers and precancers.

Our experience in the BC OCPP high-risk clinics has enabled us to begin to understand and interpret oral tissue fluorescence. We have found it to be a useful adjunct to a comprehensive history and clinical examination. Although the VELscope is easy to use, the interpretation of findings can be challenging. The alterations in fluorescence are not restricted to malignant or pot-

entially malignant disease. For example, loss of fluorescence occurs in many benign mucosal conditions, such as geographic tongue, aphthous ulcers and tissue trauma, which often can be detected during clinical presentation. Training and experience are critical in minimizing false positives and optimizing the referral of patients for further assessment. Training in communication skills directed at reducing patient anxiety related to an abnormal screening result is also important. One should remember that screening is not diagnostic — it is the biopsy that is diagnostic.

Promoting the Use of Fluorescence Visualization in General Practice

The use of the VELscope has begun to spread to the general population and community dental clinics.

Currently, we are determining the prevalence of loss of fluorescence in patients in different community settings when the device is used by experienced clinicians. This is being done in a dental clinic in the Vancouver Downtown Eastside (a complex community characterized by poverty, high tobacco and alcohol consumption and drug use) and also at health fairs (serving hard-to-reach populations including immigrants and the elderly). Among the first 300 cases seen at the Vancouver Downtown Eastside clinic, 2 cancers and 9 oral premalignant lesions were identified. Patients seen at health fairs have been triaged to dysplasia referral clinics for further evaluation.

We are also developing and evaluating an educational module on oral cancer screening targeted at community dental offices that promotes the 2-step process described above. The first educational effort involved the participation of dentists and hygienists from 10 dental offices in the Greater Vancouver area, representing a wide range of practices. They received a 1-day training session (a didactic review of oral cancer, an introduction to FV and a hands-on training session in the 2-step clinical examination) and took a device (donated by the manufacturer) back to their offices. Over 3 months, 1,500 adult patients were examined. During this period of time, a community facilitator rotated through the clinics periodically, addressing concerns and reinforcing learning of the correct use of the device. Nine cases were confirmed by the facilitator as requiring follow-up; 5 of these had biopsies: 2 had mild to moderate dysplasia, 2 had oral lichen planus and 1 had denture epulis. Preliminary results from this training trial suggest that appropriate education can minimize problems in interpreting benign conditions that cause loss of fluorescence.

The dental practitioners shared their opinions on oral cancer screening and FV at the end of the trial period. They felt strongly that training with the device is required. Of note, the participants felt that the use of FV encouraged greater attention to oral cancer screening in their practices, leading to the identification of lesions that may have been

Quote from a community dentist in British Columbia about the importance of regular oral cancer screening:

"It doesn't really take very long. If you do it a whole bunch you get really fast at it... and you learn a bit more about what is normal... you might not know what something is but you know it is something you don't see all the time. Just do it."

otherwise overlooked. They reported an overwhelmingly positive response from their patients and said that use of the device stimulated dialogue about oral cancer.

Conclusion

FV has the potential to be an adjunctive screening tool that facilitates discrimination of soft tissue changes requiring follow-up. It will not replace a conventional clinical examination and requires a firm knowledge of oral mucosal diseases. As with any new procedure, the use of this device requires training and experience. Although evidence supports its use in high-risk clinics, its value in general practice remains to be determined.

There is no current evidence that using FV in general dental practice saves lives, but regular use of a high-quality screening examination could make a difference. FV has already stimulated interest in oral cancer screening among both dental professionals and the public. We now have an opportunity to build on this enthusiasm. ♦

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Members of the British Columbia Oral Cancer Prevention Program (front, from left): Dr. Williams, Dr. Poh, Dr. Zhang, Ms. Laronde; (back): Dr. Hislop, Dr. Rosin, Dr. MacAulay.

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