

access

SPECIAL SUPPLEMENTARY ISSUE

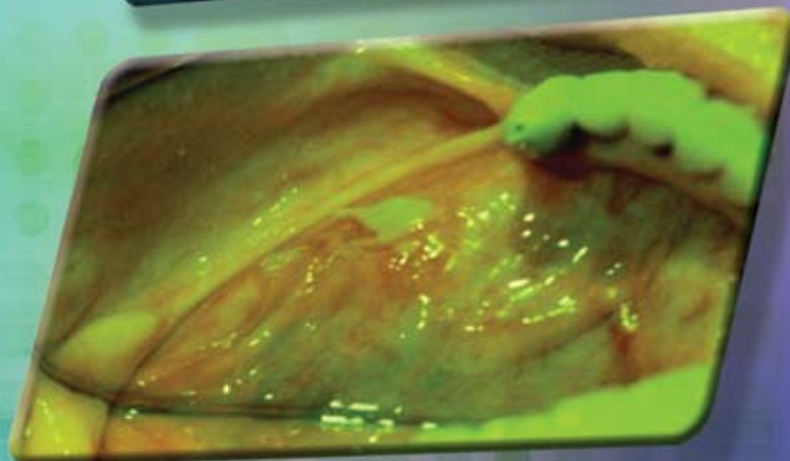


American
Dental
Hygienists'
Association

SEP-OCT 2011

Screening for Oral Cancer

By JoAnn R. Gurenlian,
RDH, PhD



Developed in
collaboration with
and sponsored
by DentaleZ

This supplement can also be
accessed online at
www.adha.org/CE_courses/

To obtain one hour of
continuing education credit,
complete the test at
[http://www.adha.org/CE_](http://www.adha.org/CE_courses/course23/test-23.htm)
[courses/course23/test-23.htm](http://www.adha.org/CE_courses/course23/test-23.htm)

Designed by DentalEZ®. Inspired by Hygienists.

New Simplicity® Hygiene Package
from DentalEZ®.

- Designed with the hygienist in mind
- Ideal combination of quality, affordability, and elegance



Delivery Unit

Chair-mounted unit puts everything a hygienist needs within easy reach and in one convenient location.

Comes complete with:

- 2-handpiece control block
- Saliva ejector
- Syringe
- **New DentalEZ Integrated Ultrasonic Scaler**
- Optional Prophy Star® 3

The New DentalEZ Integrated Ultrasonic Scaler

Utilizes proven magnetostrictive technology that effectively removes plaque, calculus and other deposits with ease. Complete internal design saves valuable space and eliminates extra clutter. Compatible with Cavitron® 30K inserts.



ErgoSure™ Hygiene Stool

Position yourself for success with a stool that focuses on ergonomics and personalized comfort and support. Three independent seat mechanisms allow effortless adjustment of seat height, seat tilt, and back in and out. Lumbar support is also fully adjustable. Available with one or two Free Motion Elbow Supports that allow full range of motion while reducing muscular tension and fatigue.



Simplicity Hygiene Chair

The quiet, stable and smooth hydraulic support system perfectly positions the patient for any treatment indication. Its thin tapered back provides better access to the oral cavity, and swing-down arms for easy patient entry/exit.



Simplicity Light

Brighten your workday with shadow-free illumination that provides maximum visibility into the entire oral cavity.



©2011 DentalEZ® Inc. All rights reserved. DentalEZ, Simplicity, Makes Your Practice Perfect and Star are registered trademarks and ErgoSure is a trademark of DentalEZ, Inc. Cavitron is a registered trademark of DENTSPLY International.



MAKES YOUR PRACTICE PERFECT®



To order, please contact your authorized dealer.
For more information call toll-free 866.DTE.INFO
or visit our Web site: www.dentalez.com

Visit our blog:
<http://blog.dentalez.com>

Follow us on  and 

Screening for Oral Cancer

By JoAnn R. Gurenlian, RDH, PhD

Working as an oral health provider offers many rewards and challenges. With one exception, oral diseases are not fatal. Most oral health conditions can be prevented or treated successfully with education and regular dental and dental hygiene care. Unfortunately, the one oral disease that can be life-threatening is the disease that is often overlooked with respect to emphasis on prevention and early detection in clinical practice settings.

According to the National Cancer Institute, it is estimated that 36,540 Americans will be diagnosed with oral and pharyngeal cancer and 7880 deaths will occur.¹ Sadly, of those newly diagnosed, only about 60 percent of those diagnosed with this disease will be alive in 2016.² Oral cancer is the 6th most common malignancy in the world.³ It is estimated that over 640,000 new cases will be identified worldwide on a yearly basis.⁴

Placing perspective on the magnitude of oral cancer, this disease kills approximately one person per hour, every day. It is more common than Hodgkin's disease, and cancers of the brain, liver and bone. Approximately \$3.2 billion is spent annually in the United States on treatment of this disease.⁴

The prognosis for oral and pharyngeal cancer varies depending upon when it is identified. Approximately 83 percent of patients with localized lesions survive beyond five years.² Prognosis is significantly worse when oral cancer has metastasized resulting in a 28 percent survival rate.⁵ Oral cancer has a high risk of producing second primary tumors. If a patient survives the initial diagnosis and treatment, they still have up to a 20 time higher risk of developing a second cancer.⁴

These statistics can be improved with emphasis on prevention and early detection. Unfortunately, oral and pharyngeal cancer is routinely discovered at a later stage in development when the cancer has already metastasized. Part of the problem is that early cancer is painless and not easily recognized by the patient. The other contributing element is that dental practitioners are not placing the same level of importance on early detection of oral cancer as they place on

the prevention and treatment of caries and periodontal disease.⁶ Therefore, this paper will highlight key elements of oral cancer as well as current approaches used for early detection.

Oral Cancer Considerations

Over 90 percent of oral cancers are squamous cell carcinoma (SCC). These lesions present as leukoplakia, erythroplakia, or erythroleukoplakia. There are multiple risk factors for and causes of oral cancer as noted in Table I. Tobacco use

Table I. Risk Factors/Etiology of Oral Cancer

- History of tobacco use (all forms)
- Alcohol consumption
- Sexual history (multiple sex partners, unprotected sex, exposure to HPV)
- Exposure to ultraviolet light
- Exposure to ionizing radiation, arsenic or industrial chemicals
- Chronic irritation (poor oral hygiene, poor restorative dentistry)
- Pre-existing scars and burns
- Family history of cancer
- Personal history of cancer
- Age \geq 40 years
- Mucosal diseases (iron deficiency associated with Plummer-Vinson Syndrome, lichen planus)
- Immune system suppression
- Gender
- Race

Table II: Warning Signs of Oral Cancer

- A lump or thickening in the oral soft tissues
- Soreness or difficulty in chewing or swallowing
- Ear pain
- Difficulty moving the jaw or tongue
- Hoarseness
- Numbness of the tongue or other areas of the mouth
- Swelling of the jaw that causes dentures to fit poorly or become uncomfortable
- Repeated bleeding from the mouth or throat
- Red, white, or discolored lesions in the mouth or on the lips

and alcohol consumption are the most common risk factors and etiologies of oral cancer. Other cofactors include periodontal disease, poor oral hygiene, ill-fitting dentures, sharp teeth and edentulism.⁷ It is important to note, however that approximately 25 percent of patients with oral cancer do not fit the traditional profile and have no risk factors.⁸⁻¹²

More recent attention to risk factors for oral cancer have focused on exposure to the human papillomavirus (HPV), which has led to annual increases in the incidence of tonsillar and base-of-tongue cancers.¹³ Multiple sex partners and unprotected sex increases the risk of exposure to HPV. Although there are over 130 subtypes of HPV, subtype HPV-16 accounts for more than 90 percent of cases of HPV-SCC.¹³ Other types less frequently detected in oropharyngeal cancers include HPV- 6, 18, 31, 33, 35, 45, 52 and 58.^{14,15} As the evidence for an association between HPV and oropharyngeal cancer mounts,¹⁶⁻¹⁸ further research into HPV vaccination has been suggested as a means to demonstrate causality.¹³

As noted previously, oral cancer tends to be painless initially. In the absence of pain there are a variety of warning signs and symptoms that are associated with oral cancer. These warning signs of oral cancer are summarized in Table II. Signs and symptoms of oral cancer appear in Table III. These tables provide information that can be addressed with patients during prevention procedures that are part of oral health care assessment.

Screening Options for Early Detection

Those who have reviewed the evidence associated with adjunctive screening devices for oral cancer advocate the comprehensive oral examination (COE) as the "gold standard" for early detection.¹⁹ All dental and dental hygiene students are taught how to perform a COE; however, this procedure is not performed routinely on all patients once students transfer to licensed clinicians.^{6,20} Studies have demonstrated that not all dentists feel knowledgeable about the etiology of oral cancer or how to perform a COE.²¹⁻²⁴ Further, it has been noted in the report, *Healthy People 2010 and Healthy People 2010 Midcourse Review*, that only 13 percent of Americans recall having an oral examination performed in the past year.^{25,26} Healthy People 2020 targets the goal of increasing this statistic to 20 percent so that more individuals receive an annual COE.²⁷ To assist dental professionals with reviewing the procedure for performing an oral examination, the National Institute of Dental & Craniofacial Research of the National Institutes of Health has published a document entitled "Detecting Oral Cancer: A Guide for HealthCare Professionals." This

Table III: Signs and Symptoms of Oral Cancer

- Intraoral swelling on lips or neck
- Crust on lip
- Bleeding
- Rough spot
- Change in bite or occlusion
- Pain or tenderness
- Denture no longer fits
- Loose tooth or teeth
- Restriction of tongue or jaw movements
- Taste change
- Parasthesia
- Chronic cough
- Dry mouth
- Speech changes
- Color change
- Symptoms related to primary tumor elsewhere

guide is summarized as a sidebar accompanying this paper, and can be downloaded for free at www.nidcr.nih.gov.²⁸

Although the eye is a valuable tool in the performance of an oral examination, it is not the sole tool available for identifying early SCC. Other adjunctive devices that may be used in clinical practice include the OralCDx® Brush Test®, Vizilite®, VELScope®, and Identafi®. These devices are not meant to take the place of the COE; rather they are available to supplement and support oral cancer examinations and screenings.

In his editorial concerning oral cancer screening aids, Dr. Lingen discussed the need for adherence to suggested guidelines for research related to adjunctive screening devices. He noted that studies should clearly address sensitivity, specificity, or positive predictive value (PPV) of these devices. Further, these studies should provide these data in relation to the COE. Dr. Lingen advocated that research about these devices should be placed in the context in which they could demonstrate that there is improvement beyond COE alone.²⁹ This perspective provides the basis for discussing adjunctive screening devices. Definitions for these key terms are provided in Box 1.

■ Box 1: Definition of Terms

Sensitivity - the conditional probability that a person having a disease will be correctly identified by a clinical test; the number of true positive results divided by the number of true positive and false negative results.

Specificity - the probability that a person *not* having a disease will be correctly identified by a clinical test; the number of true negative results divided by the number of true negative and false positive results

Positive Predictive Value - the proportion of patients with positive test results who are correctly diagnosed. Its value depends on the prevalence of the disease, which may vary.

Negative Predictive Value - the proportion of patients with negative test results who are correctly diagnosed.

Brush biopsy is biopsy in which cells or tissues are obtained by manipulating tiny brushes against the tissue or lesion in question. This device has been used successfully for biopsies of bronchial, renal, ureter, bile, pancreatic, gastric and nasopharynx tissues. Applications of the brush biopsy system to the oral cavity have been developed through OralCDx[®], which is part of CDx Diagnostics™. This system is based on the microscopic study of cell samples from the oral cavity. A specialized brush is used to collect transepithelial cells onto a glass slide for surface oral and oropharyngeal mucosal abnormalities, which may include leukoplakia; erythroplakia; erythroleukoplakia and speckled leukoplakia. These samples are sent to a laboratory for staining and analysis. Computer-based imaging ranks the cells on the basis of abnormal morphology. A cytopathologist then interprets the results and findings are faxed to the dental office. Results are reported as “negative,” “positive,” or “atypical.” Abnormal results require follow-up with scalpel biopsy.

A landmark study published in 1999 described the results of a multicenter study involving 35 academic institutions and 945 patients evaluating the detection of precancerous and cancerous oral lesions using the brush biopsy. Sensitivity was reported as 96 percent, specificity of “positive” lesions at 97 percent and “atypical” lesions at 90 percent.³⁰ A study comparing the brush biopsy results with follow-up scalpel biopsy was reported in 2002. Findings of this study of 243 patients with abnormal brush biopsies revealed a positive predictive value of “atypical” lesions as 38 percent and only 1 false negative case reported.³¹ In a study of 103 cases comparing the brush biopsy with scalpel biopsy on the same lesion, sensitivity was reported at 92.3 percent and specificity at 94.3 percent.³² A study conducted in Sweden provided a positive predictive value for “atypical” lesions as 42.9 percent and for “positive” lesions at 100 percent,³³ while Poate and colleagues reported PPV value of 44.1 percent and a negative predictive value of 60 percent (n=112).³⁴ In contrast, Bhopathi and colleagues performed a cross-sectional study of the brush biopsy in detecting dysplastic lesions by evaluating 152 pathology reports from scalpel biopsies of those who tested either “positive” or “atypical.” They found that the PPV was only 7.9 percent for “positive” lesions and 7.4 percent for “atypical” lesions. The proportion of false-positive was 92.1 percent. These authors noted that OralCDx[®] overestimated dysplastic lesions and produced a high number of false-positive results.³⁵

In their report of a systematic review of the literature on adjunctive techniques for oral cancer examination and diagnosis, Patton, Epstein and Kerr³⁶ evaluated studies performed related to the brush biopsy. They found inconsistencies in the specificities and PPVs across studies of the OralCDx[®] brush biopsy and noted weaknesses including lack of information about original clinical lesion diagnosis and failure to conduct histopathological examination on all suspicious lesions perhaps biasing the results related to sensitivity, specificity and PPV. These authors recommended that future studies could be improved by sampling lesions that have been present for a period of time (10–14 days) after the removal of the suspected etiology.³⁶

In their review of scientific evidence about Oral CDx[®], Reithman, et al.¹⁹ concluded that there was not enough evidence to support a recommendation for or against the use of this device in innocuous mucosal lesions. They indicated the belief that clinically suspicious lesions should be biopsied immediately; however, OralCDx[®] had relevance to be used for those patients with multiple lesions throughout the oral cavity, nonadherent patients, those individuals with disabilities who

may not be able to safely tolerate a scalpel biopsy procedure, and those with a history of previous upper airway and digestive tract cancer.¹⁹

Chemiluminescent light offers another way to enhance visualization techniques for oral cancer screening. ViziLite[®] Plus with TBlue[®] (from Zila Pharmaceuticals) combines a blue-white light energy source with toluidine blue staining. Patients pre-rinse with a 1 percent acetic acid solution, which is followed by examination of the oral cavity with a blue-white light source. Lesions that appear white are followed by TBlue[®] metachromatic dye so further evaluation and monitoring of changes can be made.

Although the eye is a valuable tool in the performance of an oral examination, it is not the sole tool available for identifying early SCC.

Kerr and colleagues reported on the effectiveness of ViziLite[®] to enhance visualization of mucosal lesions in 501 subjects. The findings demonstrated that this type of visualization can provide additional information, in particular with leukoplakias.³⁷ A study of ViziLite[®] with TBlue[®] was performed comparing this technique with conventional visual examination. Ninety-seven clinically suspicious lesions in 84 patients were evaluated. Results demonstrated that the brightness and sharpness of margins were improved in 61.8 percent of lesions using ViziLite[®]. The authors reported that biopsied lesions stained with toluidine blue reduced the false positive rate by 55.26 percent and the negative predictive value was 100 percent.³⁸ Ram and Siar conducted a study comparing ViziLite[®] with a 1 percent toluidine chloride mouth rinse. Forty-six lesions and 5 cases of normal oral mucosa from 40 subjects were examined with these technologies. Sensitivity reported for ViziLite[®] and toluidine chloride was 100 percent and 70.3 percent respectively, while specificity was noted to be 14.2 percent for ViziLite[®] and 25 percent for toluidine chloride.³⁹

Further analysis of studies related to chemiluminescence found concerns about the quality of the Ram and Siar study, and inconsistent accuracy values with specificity ranging from zero to 14 percent, PPVs of 18 to 80 percent, and negative predictive values (NPVs) of zero to 100 percent. Another limitation noted was that the studies involved only those patients who had been previously identified with visualized mucosal lesions.³⁶

Autofluorescence imaging provides another means of assessing potentially malignant oral pathoses. The VELscope[®] system (LED Dental Inc.) uses narrow emission fluorescence exposing oral mucosa to a blue light spectra. Tissue that is undergoing dysplastic or neoplastic changes will demonstrate a loss of fluorescence. Abnormal tissue appears as an irregular, dark area against normal, green fluorescence patterns found in surrounding healthy tissue. The device has been commercially available since 2006.

Most of the literature reported on the use of VELscope[®] has reflected case reports and observational studies.^{40–42} In a pilot study of 44 patients, Lane et al examined the effectiveness of autofluorescence direct visualization with histology. Results in terms of sensitivity and specificity were 98 percent and 100 percent respectively.⁴³ Scheer, et al reported on a recent study of 64 patients considered at risk for SCC. These individuals had biopsies performed following examination with the VELscope[®] device. Results revealed sensitivity of

■ Review of the Comprehensive Oral Examination

The Exam Review

The examination is conducted with the patient seated. Any intraoral prostheses are removed before starting. The extraoral and perioral tissues are examined first, followed by the intraoral tissues.

I. The Extraoral Examination

- **Face:** (Figure 1) The extraoral assessment includes inspection of the face, head, and neck. The face, ears, and neck are observed, noting any asymmetry or changes on the skin such as crusts, fissuring, growths, and/or color change. The regional lymph node areas are bilaterally palpated to detect any enlarged nodes. If enlargement is detected, the examiner should determine the mobility and consistency of the nodes. A recommended order of examination includes the preauricular, submandibular, anterior cervical, posterior auricular, and posterior cervical regions.



Figure 1

II. Perioral and Intraoral Soft Tissue Examination

The perioral and intraoral examination procedure follows a seven-step systematic assessment of the lips; labial mucosa and sulcus; commissures, buccal mucosa, and sulcus; gingiva and alveolar ridge; tongue; floor of the mouth; and hard and soft palate.

- **Lips:** (Figure 2) Begin examination by observing the lips with the patient's mouth both closed and open. Note the color, texture and any surface abnormalities of the upper and lower vermillion borders.



Figure 2

- **Labial Mucosa:** (Figures 3 and 4) With the patient's mouth partially open, visually examine the labial mucosa and sulcus of the maxillary vestibule and frenum and the mandibular vestibule. Observe the color, texture, and any swelling or other abnormalities of the vestibular mucosa and gingiva.



Figure 3



Figure 4

- **Buccal Mucosa:** (Figures 5 and 6) Retract the buccal mucosa. Examine first the right then the left buccal mucosa extending from the labial commissure and back to the anterior tonsillar pillar. Note any change in pigmentation, color, texture, mobility, and other abnormalities of the mucosa, making sure that the commissures are examined carefully and are not covered by the retractors during the retraction of the cheek.



Figure 5



Figure 6

- **Gingiva:** (Figure 7) First, examine the buccal and labial aspects of the gingiva and alveolar ridges (processes) by starting with the right maxillary posterior gingiva and alveolar ridge and then move around the arch to the left posterior area. Drop to the left mandibular posterior gingiva and alveolar ridge and move around the arch to the right posterior area.



Figure 7

- Second, examine the palatal and lingual aspects as had been done on the facial side, from right to left on the palatal (maxilla) and left to right on the lingual (mandible).

- **Tongue:** (Figure 8) With the patient's tongue at rest, and mouth partially open, inspect the dorsum of the tongue for any swelling, ulceration, coating, or variation in size, color, or texture. Also note any change in the pattern of the papillae covering the surface of the tongue and examine the tip of the tongue. The patient should then protrude the tongue, and the examiner should note any abnormality of mobility or positioning.



Figure 8

(Figure 9) With the aid of mouth mirrors, inspect the right and left lateral margins of the tongue.



Figure 9

(Figure 10) Grasping the tip of the tongue with a piece of gauze will assist full protrusion and will aid examination of the more posterior aspects of the tongue's lateral borders



Figure 10

(Figure 11) Then examine the ventral surface. Palpate the tongue to detect growths.



Figure 11

- **Floor:** (Figure 12) With the tongue still elevated, inspect the floor of the mouth for changes in color, texture, swellings, or other surface abnormalities.



Figure 12

- **Palate:** (Figures 13 and 14) With the mouth wide open and the patient's head tilted back, gently depress the base of the tongue with a mouth mirror. First inspect the hard and then the soft palate.



Figure 13

(Figure 14) Examine all soft palate and oropharyngeal tissues.



Figure 14

(Figure 15) Bimanually palpate the floor of the mouth for any abnormalities. All mucosal or facial tissues that seem to be abnormal should be palpated.



Figure 15

Source: National Institute of Dental & Craniofacial Research, National Institutes of Health. Detecting Oral Cancer: A Guide for Health Care Professionals. National Institutes of Health. Bethesda, Md. May 12, 2011

Those who have reviewed the evidence associated with adjunctive screening devices for oral cancer advocate the comprehensive oral examination (COE) as the "gold standard" for early detection.

100 percent, specificity of 80.8 percent, PPV 54.5 percent and NPV was 100 percent. The authors noted that the group studied was high-risk and that additional histology controlled prospective studies in a general population were needed to determine the role of this imaging device as an adjunctive screening aid.⁴⁴

In contrast to the above studies, Mehrota, et al evaluated the ViziLite® and Velscope® in the detection of clinically innocuous precancerous and cancerous oral lesions. This cross sectional study involved 258 patients who were found to have clinically innocuous lesions. Of these individuals, 102 were in the Vizilite® group and underwent biopsy, while there were 156 subjects in the Velscope® group who were biopsied. Results of the Vizilite® group revealed that three had dysplasia and one had cancer. The sensitivity rate was 0 percent, specificity was 75.5 percent, PPV was 0 percent and NPV was 94.8 percent. Results of the VELSscope® group revealed that 11 had dysplasia, one had cancer, and six of these were detected with this device. The sensitivity rate was 50 percent, specificity was 38.9 percent, PPV was 6.4 percent and NPV was 90.3 percent. The authors concluded that use of these devices with a COE was not beneficial in identifying dysplasia or cancer, and that further studies were indicated prior to recommending these devices.⁴⁵

It is important to note that all these devices are considered safe and cost-effective for use in dental practice settings. More studies are needed to determine the efficacy of these devices in community settings and with low-risk populations.

One criticism of the VELSscope® system is that there have been no published studies assessing its effectiveness as a diagnostic adjunct in lower-risk populations.³⁶ Huff et al reported on an investigation of a low-risk population in a general dental practice setting. During the period of the study, 959 patients ages 12 and older received a standard COE. One year later, 905 patients received a conventional oral examination and VELSscope® examination. Results of this study revealed that the visual examination showed a prevalence of mucosal abnormalities of 0.83 percent, none of which were premalignant. Screening with the VELSscope® device yielded a 1.3 percent prevalence of mucosal abnormality, of which 83 percent were potentially premalignant.⁴⁶

Another device using autofluorescence technology is Identafi® (Dental EZ Group). This device utilizes three distinct wavelengths, white light, violet light, and green-amber light, to screen for oral cancer and premalignant dysplasia. This technology is based on multispectral optical imaging. The technology was developed and tested by observing changes in fluorescence between normal tissues and those patients who present with precancerous and cancerous lesions. Roblyer and colleagues⁴⁷ reported their imaging pilot study that demonstrated that patients with histologically confirmed neoplasia demonstrated decreased blue-green autofluorescence and increased red autofluorescence. Further, they could detect increased visibility of vasculature using narrow-band reflectance and orthogonal polarized reflectance. The authors concluded that multispectral imaging may provide information not available through fluorescence mode alone, and may be useful in “discriminating precancerous and cancerous tissue from normal and benign or inflammatory regions.”⁴⁷

Additional studies of this autofluorescence technology have focused on identifying optical devices that distinguish epithelial fluorescence from stromal fluorescence, using excitation wavelengths in the UV range to improve diagnostic accuracy,⁴⁸ and creating a computational model to study how tissue characteristics affect clinically measured spectra.⁴⁹ Another report presented an algorithm to objectively delineate neoplastic oral mucosa from autofluorescence imaging. In this study, an algorithm was applied to patient images and histologic sections of resected tissues were used as a validation measure. Results indicated 95.9 percent sensitivity and 96.2 percent specificity in a training set discriminating normal tissue from dysplasia and invasive carcinoma. The validation set revealed a sensitivity of 100 percent and specificity of 91.4 percent.⁵⁰

Clinical studies related to the use of Identafi® are limited. One paper provided an overview of a case report using this autofluorescence imaging to detect a metastatic palatal tumor that appeared clinically innocuous, but was confirmed as a metastatic SCC.⁵¹ Further research is needed to determine the efficacy of this device among patients in oral health practices.

It is important to note that all these devices are considered safe and cost-effective for use in dental practice settings. More studies are needed to determine the efficacy of these devices in community settings and with low-risk populations. Although reviewers have discussed the lack of adjunctive devices to distinguish between benign, premalignant, and malignant lesions as a major limitation of these tools,^{19,36} they fail to mention the obvious. The COE does not distinguish between these types of lesions as well. The fact is that all lesions considered suspect need to be biopsied to determine the definitive diagnosis. Eyes are only trained to see abnormal, not see into the cells of the tissue clinically.

Some screening tools are used to identify more details of a lesion once detected by a COE (i.e., OralCDx® Brush test®). Other screening tools (i.e., VELSscope®, Identafi®) are used to identify lesions that may not be detected during a visual COE. Therein lies the value of these adjunctive screening devices. While they may not provide a histologic analysis, these devices do provide additional information that may translate to early detection of premalignant and malignant lesions. The future relevance of these adjunctive devices for oral cancer screening and detection remains to be determined.

First Line of Defense

As a prevention specialist, dental hygienists are the first line of defense for assessing patients for risks and identifying signs of oral cancer. Teaching patients about oral cancer examinations and screenings, and performing regular oral cancer examinations at every appointment is part of the dental hygiene process of care and policy of the American Dental Hygienists' Association.^{52,53}

Some patients are not aware that any dental professional has ever performed a COE. Educating patients about this important component of dental hygiene assessment helps them appreciate the scope of responsibilities of their care provider. As well, it offers the patient an opportunity to ask questions about their oral health. Patients may not know that technological advances in screening for oral cancer exist and the benefits of using these devices. Teaching patients about these additional screening approaches will help them gain acceptance of their use in practice. Technological advances are fluid

and dynamic. As advances in adjunctive screening devices occur, dental hygienists can update their patients accordingly.

Engaging patients as active participants in the process of oral cancer awareness, examination, and screening is another important consideration. Patients can be asked to identify their risks for oral cancer. Table I in this paper can be modified and used as a tool that patients complete prior to their dental hygiene appointment. Reviewing perceptions of risk factors with the patient opens the door to discussing signs and symptoms of oral cancer and prevention strategies. For example, if a patient identifies that he smokes cigarettes daily and has a family history of cancer, an opportunity has presented itself for discussing the COE, adjunctive screening, and smoking cessation. If another patient identifies a risky sexual history, the hygienist can use that information to discuss the need for oral cancer evaluation and prevention strategies that may include HPV vaccination or DNA testing if deemed appropriate.

Another avenue of engaging active involvement of patients is to teach them how to perform an oral cancer self-examination. The concept of performing a self-examination is not new to patients. They may already be performing self-exams for other types of cancer early detection. Adding this examination process to their standard home care regimen helps the patient recognize their own responsibility in early recognition of oral health concerns. The sidebar accompanying this paper presents a review of the oral cancer examination procedure that both patients and clinicians can use to assist in the recognition and diagnosis of oral cancer.⁵⁴

Finally, and equally important for the benefit of the patient, is to teach them to advocate for and request a regular COE and subsequent adjunctive screening, as deemed appropriate, as part of every dental and dental hygiene appointment. There is no substitute for awareness.

References

1. Oral Cavity and Pharynx Cancer Stat Fact Sheet. Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute. Bethesda, MD, Available at: <http://www.seer.cancer.gov/statfacts/html/oralcav.html>. Accessed July 2, 2011.
2. American Cancer Society. Oral Cancer. Available at: <http://www.cancer.org/acs/groups/content/@nho/documents/document/oral-cancerpdf.pdf>. Accessed July 2, 2011.
3. Lingen MW, Kalmar JR, Karrison T, Speight PM. Critical evaluation of diagnostic aids for the detection of oral cancer. *Oral Oncol* 2008;44(1):10-22.
4. The Oral Cancer Foundation web site. Oral Cancer Facts. Available at: <http://oralcancerfoundation.org/facts/index/htm>. Accessed June 28, 2011.
5. Oral Cancer Statistics. Oral Cancer in the United States. Available at: <http://www.nidcr.nih.gov/FactSheet2.pdf>. Accessed July 2, 2011.
6. Kammer C. Shine a light on oral cancer. *Dental Products Report*. October, 2009. Available at: <http://www.dentalproductsreport.com/articles/show/dpr1009>. Accessed May 3, 2011.
7. Bsoul SA, Huber MA, Terezhalmay GT. Squamous cell carcinoma of the oral tissues: A comprehensive review for oral healthcare providers. *J Contemp Dent Pract*. 2005;6(4):1-16.
8. Schantz SP, Yu GP. Head and neck cancer incidence trends in young Americans, 1973-1997, with a special analysis for tongue cancer. *Arch Otolaryngol Head Neck Surg*. Mar 2002;128(3):268-274.
9. Lingen M, Sturgis EM, Kies MS. Squamous cell carcinoma of the head and neck in nonsmokers: clinical and biologic characteristics and implications for management. *Curr Opin Oncol*. May 2001;13(3):176-182.
10. Shiboski CH, Shiboski SC, Silverman S, Jr. Trends in oral cancer rates in the United States, 1973-1996. *Community Dent Oral Epidemiol*. Aug 2000;28(4):249-25.
11. Llewellyn CD, Johnson NW, Warnakulasuriya KA. Risk factors for squamous cell carcinoma of the oral cavity in young people—a comprehensive literature review. *Oral Oncol*. Jul 2001;37(5):401-418.
12. Corcoran TP, Whiston DA. Oral cancer in young adults. *J Am Dent Assoc*. Jun 2000;131(6):726.
13. D'Souza G, Freimer AR, Viscidi R, Pawlita M, et al. Case-control study of human papillomavirus and oropharyngeal cancer. *N Engl J Med* 2007;356:1944-1956.
14. Machado J, Reis PP, Zhang T, Simpson C, et al. Low prevalence of human papillomavirus in oral cavity carcinomas. *Head & Neck Oncology* 2010. 2:6.
15. Gillison ML, Shah KV. Role of mucosal human papillomavirus in nongenital cancers. *J Natl Cancer Inst Monograph Chapter 9*. 2003;(31): 57-65.
16. Schwartz, SM, Daling JR, Doody DR, Wipf GC. Oral cancer risk in relation to sexual history and evidence of human papillomavirus infection. *J Natl Cancer Inst* 1998;90(21):1626-1636.
17. Herrero R, Castellsagué X, Pawlita M, Lissowska J, et al. Human papillomavirus and oral cancer: the international agency for research on cancer multicenter study. *J Natl Cancer Inst* 2003;95(23):1772-1783.
18. The HPV Connection- the human papillomavirus related to oral cancer. Oral Cancer Foundation. Available at <http://oralcancerfoundation.org>. Accessed 4/12/11.
19. Rethman MP, Carpenter W, Cohen EEW, Epstein J, et al. Evidence-based clinical recommendations regarding screening for oral squamous cell carcinomas. *J Am Dent Assoc* 2010;141(5):509-520.
20. Hein, C, Kunselman B, & Frese, P: Preliminary findings of consumer-patient's perceptions of dental hygienists' scope of practice/qualifications and the level of care being rendered. American Dental Hygienists' Association Annual Session, June, 2006.
21. Horowitz AM, Nourjah PA. Factors associated with having oral cancer examinations among US adults 40 years of age or older. *J Public Health Dent* 1996;56:331-5.
22. Horowitz AM, Drury TF, Goodman HS, Yellowitz JA. Oral pharyngeal cancer prevention and early detection: dentists' opinions and practices. *JADA* 2000;131:453-62.
23. Yellowitz JA, Horowitz AM, Drury TF, Goodman HS. Survey of U.S. dentists' knowledge and opinions about oral pharyngeal cancer. *JADA* 2000;131:653-61.
24. Horowitz AM, Siriphant P, Sheikh A, Child WL. Perspectives of Maryland dentists on oral cancer. *JADA* 2001;132:65-72.[Abstract/Free Full Text]
25. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Healthy People 2010: objective 21—oral health. Available at: "www.health.gov/healthypeople/Document/HTML/Volume2/21Oral.htm" (scroll down to Objective 21-7). Accessed Sept. 23, 2001.
26. U.S. Department of Health and Human Services. Healthy People 2010 Midcourse Review. Washington, D.C.: U.S. Government Printing Office, December 2006.
27. Healthy People 2020 Topics & Objectives. Available at <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx>. Accessed July 2, 2011.
28. National Institute of Dental & Craniofacial Research, National Institutes of Health. Detecting Oral Cancer: A Guide for Health Care Professionals. National Institutes of Health. Bethesda, MD. May 12, 2011.
29. Lingen MW. Oral cancer screening aids: where is the science? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;103(2):153-154.
30. Sciubba JJ and the U.S. Collaborative OralCDx Study Group. Improving detection of precancerous and cancerous oral lesions: Computer-assisted analysis of the oral brush biopsy. U.S. Collaborative OralCDx Group. *J Am Dent Assoc* 1999;130:1445-1457.
31. Svirsky JA, Burns JC, Carpenter WM, et al. Comparison of computer-assisted brush biopsy results with follow up scalpel biopsy and histology. *Gen Dent* 2002;50:500.
32. Scheifele C, Schmidt-Westhausen AM, Dietrich T, Reichart PA. The sensitivity and specificity of the OralCDx technique: evaluation of 103 cases. *Oral Oncol*. Sep 2004;40(8):824-828.
33. Kosicki DM, Riva C, Pajarola GF, et al. OralCDx brush biopsy. A tool for early diagnosis of oral squamous cell carcinoma. *Schweiz Monatsschr Zahnmed* 2007;117:222-227.

34. Poate TW, Buchanan JA, Hodgson TA, et al. An audit of the efficacy of the oral brush biopsy technique in a specialist Oral Medicine unit. *Oral Oncol*. Sep 2004;40(8):829-34.
35. Bhoopathi V, Kabani S, Mascarenhas AK. Low positive predictive value of the oral brush biopsy in detecting dysplastic oral lesions. *Cancer* 2009;115(5):1036-1040.
36. Patton, LL, Epstein JB, Kerr R. Adjunctive techniques for oral cancer examination and lesion diagnosis: a systematic review of the literature. *J Am Dent Assoc* 2008;139(7):896-905.
37. Kerr AR, Sirois DA, Epstein JB. Clinical examination of chemiluminescent lighting: an adjunct for oral mucosal examinations. *J Clin Dent* 2006;17(3):59-63.
38. Epstein JB, Silverman S Jr, Epstein JD, et al. Analysis of oral lesion biopsies identified and evaluated by visual examination, chemiluminescence and toluidine blue. *Oral Oncol* 2008 June;44(6):538-544.
39. Ram S, Siar CH. Chemiluminescence as a diagnostic aid in the detection of oral cancer and potentially malignant epithelial lesions. *Int J Oral Maxillofac Surg* 2005;Jul;34(5):521-527.
40. Kojs J, Truelove E. Detecting oral cancer: a new technique and case reports. *Dent Today* 2006;25:96-97.
41. Poh CF, Zhabg L, Anderson DW, et al. Fluorescence visualization of field alterations in tumor margins of oral cancer patients. *Clin Cancer Res* 2006;12:6716-6722.
42. Poh CF, Ng SP, Williams PM, et al. Direct fluorescence visualization of clinically occult high-risk oral premalignant disease using a simple hand-held device. *Head Neck* 2007;29:71-76.
43. Lane PM, Gilhuly T, Whitehead P, et al. Simple device for the direct visualization of oral-cavity tissue fluorescence. *J Biomed Opt*. 2006;11(2):024006.
44. Scheer M, Neugebauer J, Derman A, et al. Autofluorescence imaging of potentially malignant mucosa lesions. *Oral Sur Oral Med Oral Pathol Oral Radiol Endod* 2011;111:568-577.
45. Mehrotra R, Singh M, Thomas S, et al. A cross-sectional study evaluating chemiluminescence and autofluorescence in the detection of clinically innocuous precancerous and cancerous oral lesions. *J Am Dent Assoc* 2010;141(2):151-156.
46. Huff KD, Stark PC, Solomon LW. Sensitivity of direct tissue fluorescence visualization in screening for oral premalignant lesions in general practice. *Gen Dent* 2009 Jan-Feb;57(1):34-38.
47. Roblyer D, Richards-Kortum R, Sokolov K, et al. Multispectral optical imaging device for in vivo detection of oral neoplasia. *J Biomed Opt* 2008 March/April 13(2):024019.
48. Pavlova I, Williams M, El-Naggar A, et al. Understanding the biological basis of autofluorescence imaging for oral cancer detection: high-resolution fluorescence microscopy in viable tissue. *Clin Cancer Res* 2008;14(8):2396-2404.
49. Pavlova I, Weber CR, Schwarz RA, et al. Fluorescence spectroscopy of oral tissue; Monte Carlo modeling with site-specific tissue properties.
50. Roblyer D, Kurachi C, Stepanek V, et al. Objective detection and delineation of oral neoplasia using autofluorescence imaging. *Cancer Prev Res* 2009;2(5):423-431.
51. Vigneswara N, Koh S, Gillenwater A. Incidental detection of an occult oral malignancy with autofluorescence imaging: a case report. *Head & Neck Oncology* 2009,1:37. Available at <http://www.headandneckoncology.org/content/1/1/37>. Accessed July 13, 2011.
52. American Dental Hygienists' Association. Standards for clinical dental hygiene practice. Chicago: American Dental Hygienists Association. March 10, 2008. Available at www.adha.org. Accessed July 14, 2011.
53. American Dental Hygienists' Association. Policy manual. Chicago: American Dental Hygienists' Association. January 24, 2011. Available at www.adha.org. Accessed July 14, 2011.
54. National Institute of Dental & Craniofacial Research, National Institutes of Health. Detecting Oral Cancer: A Guide for Health Care Professionals. National Institutes of Health. Bethesda, MD. May 12, 2011.



JoAnn R. Gurenlian, RDH, PhD, is president of Gurenlian & Associates, and provides consulting services and continuing education programs to health care providers. She is a visiting scholar at Capella University, Department of Dental Hygiene, adjunct faculty at Burlington County College and graduate faculty at Idaho State University. The author is not affiliated with the sponsor of this supplement or any manufacturer of products mentioned. The supplement was developed in collaboration between the sponsor and the American Dental Hygienists' Association.

■ Support Organizations

Government

The National Cancer Institute

www.cancer.gov
1800-4-CANCER

National Health Information Center

www.health.gov/nhic
1-800-336-4797

National Institutes of Health

www.nlm.nih.gov

National Institute of Dental & Craniofacial Research

www.nidcr.nih.gov
1-301-496-4261

SEER Program

seer.cancer.gov

Cancer Organizations

American Cancer Society

www.cancer.org

Association of Cancer Online Resources

www.acor.org
1-212-226-5525

Cancer Care Inc.

www.cancercares.org
1-800-813-HOPE

The Oral Cancer Foundation

www.oralcancerfoundation.org

Head and Neck Cancer Alliance

www.headandneck.org

Professional Societies

American Association for Cancer Research

www.aacr.org
1-215-440-9300

American Head and Neck Society

www.headandneckcancer.org
1-310-437-0059

American Dental Association

www.ada.org
1-312-440-2500

American Dental Hygienists' Association

www.adha.org
1-312-440-8900

American Association of Oral and Maxillofacial Surgeons

www.aaoms.org
1-847-678-6200

Continuing Education Test Items

This special supplement to *Access* was developed in collaboration with and sponsored by DentalEZ.

This supplement can also be accessed online at www.adha.org/CE_courses/.

To obtain one hour of continuing education credit, complete the test at

http://www.adha.org/CE_courses/course23/test-23.htm

1. The prognosis for oral cancer depends upon when the cancer is diagnosed. Late detection of oral cancer increases the potential for mortality.
 - a. Both statements are true
 - b. Both statements are false
 - c. The first statement is true, the second statement is false
 - d. The first statement is false, the second statement is true
2. Early presentations of oral cancer include color changes and pain.
 - a. True
 - b. False
3. The majority of oral cancers are:
 - a. Mucoepidermoid carcinoma
 - b. Basal cell carcinoma
 - c. Verrucous carcinoma
 - d. Squamous cell carcinoma
4. The most common risk factors for oral and pharyngeal cancers are:
 - a. HPV and tobacco use
 - b. HIV and HPV
 - c. Alcohol and tobacco use
 - d. Family history of cancer and tobacco use
5. An example of chemiluminescent technology for the detection of oral cancer is:
 - a. OralCDx® Brush test®
 - b. ViziLite® Plus with TBlue®
 - c. VELscope®
 - d. Identafi®
 - e. a and b
 - f. b and c
 - g. c and d
6. An example of autofluorescence technology for the detection of oral cancer is:
 - a. OralCDx® Brush test®
 - b. ViziLite® Plus with TBlue®
 - c. VELscope®
 - d. Identafi®
 - e. a and b
 - f. b and c
 - g. c and d
7. An example of technology that uses computer-based imaging to rank the cells on the basis of abnormal morphology is:
 - a. OralCDx® Brush test®
 - b. ViziLite® Plus with TBlue®
 - c. VELscope®
 - d. Identafi®
 - e. a and b
 - f. b and c
 - g. c and d
8. The probability that a person having a disease will be correctly identified by a clinical test refers to:
 - a. Sensitivity
 - b. Specificity
 - c. Positive predictive value
 - d. Negative predictive value
9. One of the advantages of adjunctive devices over the COE is that they can distinguish between benign, premalignant, and malignant diseases.
 - a. True
 - b. False
10. The strongest research supporting its efficacy is found in which adjunctive device?
 - a. OralCDx® Brush test®
 - b. ViziLite® Plus with TBlue®
 - c. VELscope®
 - d. Identafi®
 - e. All of the above
 - f. None of the above
11. Improving oral cancer detection can be accomplished through:
 - a. Performing a COE on every patient
 - b. Teaching patients to perform an oral cancer self-examination
 - c. Using adjunctive screening devices
 - d. a and b
 - e. b and c
 - f. a, b, and c
12. Reasons why a COE are NOT routinely performed by oral health professionals include:
 - a. Lack of knowledge about the procedure
 - b. Lack of knowledge about detecting abnormalities
 - c. Disbelief that a COE is needed
 - d. a and b
 - e. b and c
 - f. a, b, and c
13. Performing a COE on patients is part of the standards of care for dental hygiene practice. Dental hygienists can augment the COE with adjunctive screening devices based on the patient's risk factors and scientific evidence.
 - a. Both statements are true
 - b. Both statements are false
 - c. The first statement is true, the second statement is false
 - d. The first statement is false, the second statement is true
14. Safety is a factor to consider when determining which adjunctive oral cancer screening device to use in practice. Only the OralCDx® Brush test® and the ViziLite® Plus with TBlue® have demonstrated safety standards sufficient for private practice settings.
 - a. Both statements are true
 - b. Both statements are false
 - c. The first statement is true, the second statement is false
 - d. The first statement is false, the second statement is true
15. Healthy People 2020 has targeted what percent of patients to have a routine COE on an annual basis?
 - a. 10 percent
 - b. 20 percent
 - c. 30 percent
 - d. 40 percent

Screen with Certainty.
Detect with Confidence.

Identafi®

Oral Cancer Screening Device

FREE Identafi® Training:
A hands-on, 3-hour seminar
Sign up today at Identafi.net

White light

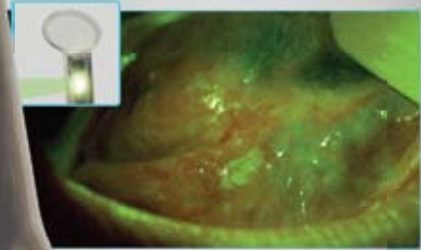
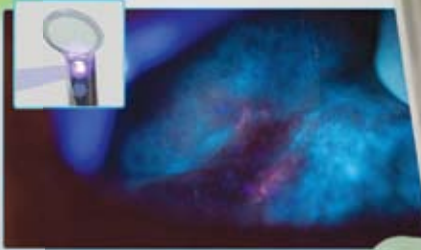
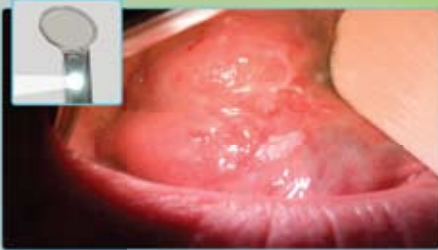
Conventional examination of tissue is performed using a highly concentrated White light.

Violet light

Patented 405nm Violet light enhances normal tissue's natural fluorescence; however, suspicious tissue will appear dark in color due to its loss of fluorescence.

Green-Amber light

Unique Green-Amber light helps observe the difference between normal and abnormal tissue's vasculature.



Utilizing three distinct wavelengths, Identafi® allows the clinician to see abnormal or suspicious tissue clearly.

As physicians of the mouth, dental professionals are in a unique and important position to help protect their patients from oral cancer. In fact, it is dental professionals who are the first line of defense against this potentially deadly disease.¹ As a company dedicated to supporting dental professionals' responsibility to assess and treat all aspects of their patients' oral health, we offer the Identafi® System. It's a simple yet effective screening tool that enhances visualization of mucosal abnormalities or premalignant dysplasia that may lead to oral cancer. When you scan with certainty, you detect with confidence. That's the Identafi® difference.

For more information about Identafi®,
visit www.Indentafi.net



REFERENCE: 1. Marder MZ. Ask the expert: What are the diagnostic protocols for oral cancer screenings? *J Am Dent Assoc* 2001;132:83-84.

©2011 DentalEZ® Inc. All rights reserved. StarDental®, DentalEZ, Makes Your Practice Perfect and Identafi are registered trademarks of DentalEZ, Inc.

DentalEZ MAKES YOUR PRACTICE PERFECT®



StarDental

To order, please contact your authorized dealer.
For more information call toll-free 866.DTE.INFO
or visit our Web site: www.dentalez.com

Visit our blog:
<http://blog.dentalez.com>

Follow us on and