Finding Dangerous Mucosa
Oral Cancer

- Squamous Cell Carcinoma
- Salivary Gland Adenocarcinoma
- Malignant Lymphoma
- Metastatic Carcinoma
- Sarcoma
• For Oral and Oropharyngeal Cancer:
  - USA: 35,000 cases per year
  - 50% 5-year survival rate
  - 93 people develop oral cancer every day
  - 1 person dies from oral cancer every hour
Etiologic Agents of Head and Neck Squamous Cell Carcinoma

- Actinic Radiation
- Alcohol
- Tobacco
- HPV
- EBV
What Does Oral Squamous Cell Carcinoma Look Like Clinically?

- **Exophytic**
  - Mass-forming
  - Fungating
  - Papillary
  - Verruciform

- **Endophytic**
  - Invasive
  - Burrowing
  - Ulcerated

- **Leukoplakic** - a white patch

- **Erythroplakic** - a red patch

- **Erythroleukoplakic**
  - a red-and-white patch
Early Diagnosis of Oral Cancer

- Identify precursor lesions
  - Leukoplakia
  - Erythroplakia

Be suspicious - biopsy clinically suspicious lesions
Soft Palate

Uvula

Hidden Pathology

Dorsal Tongue
Extraoral examination
- Inspect head and neck.
- Bimanually palpate lymph nodes and salivary glands.

Lips
- Inspect and palpate outer surfaces of lip and vermilion border.
- Inspect and palpate inner labial mucosa.

Buccal mucosa
- Inspect and palpate inner cheek lining.

Gingiva/alveolar ridge
- Inspect maxillary/mandibular gingiva and alveolar ridges on both the buccal and lingual aspects.

Tongue
- Have patient protrude tongue and inspect the dorsal surface.
- Have patient lift tongue and inspect the ventral surface.
- Grasping tongue with a piece of gauze and pulling it out to each side, inspect the lateral borders of the tongue from its tip back to the lingual tonsil region.
- Palpate tongue.

Floor of mouth
- Inspect and palpate floor of mouth.

Hard palate
- Inspect hard palate.

Soft palate and oropharynx
- Gently depressing the patient’s tongue with a mouth mirror or tongue blade, inspect the soft palate and oropharynx.
Leukoplakia

- A white patch or plaque that can’t be characterized clinically or pathologically as any other disease.

Rule of thumb: 20% of Leukoplakia will be dysplastic
Erythroplakia

• A red patch that can’t be characterized clinically or pathologically as any other disease.

Rule of thumb: 90% of Erythroplakia will be dysplastic
LEUKOPLAKIA REVISITED
A Clinicopathologic Study 3256 Oral Leukoplasias
CHARLES A. WALDRO, DDS,* AND WILLIAM G. SHAFER, DDS†

During a 15-year period, 3256 specimens clinically diagnosed as leukoplakia (“keratoses,” “white patches”) were submitted to the oral pathology laboratories of Indiana University School of Dentistry and Emory University School of Dentistry. These comprised 6.2% of the tissue specimens processed by these laboratories. The cases were analyzed as to age of occurrence, site of involvement, and pathologic findings. It was found that leukoplakia occurs with greater frequency in the 5th, 6th, and 7th decades; about half of the lesions involved the mandibular mucosa, mandibular sulcus, and buccal mucosa; leukoplakia was slightly more common in men (94.2%). Microscopic study showed that 80.1% of the leukoplasias were varying combinations of hyperkeratosis, hyperparakeratosis, and acanthosis without evidence of epithelial dysplasia. Mild to moderate epithelial dysplasia was noted in 12.2% of specimens, and severe epithelial dysplasia or carcinoma in situ was found in 4.5%. Infiltrating squamous cell carcinoma was diagnosed in 3.1% of specimens submitted with a clinical diagnosis of leukoplakia. The incidence of epithelial dysplasia, carcinoma in situ, or carcinoma varied between the anatomical locations of leukoplakia.

The incidence of epithelial alteration, ranging from dysplasia to carcinoma, was 62.9% for lesions of the floor of the mouth, 24.2% for tongue lesions, and 24.9% for lip leukoplasias. The incidence of similar epithelial alterations in other sites varied from 18.8% for palatal lesions to 11.7% for leukoplasias of the retromolar area. The data suggest that there are regional differences in the incidence and character of leukoplakia in the United States. The Emory material, obtained almost exclusively from patients residing in the Southeastern United States, showed a proportionately higher total incidence, a lower male/female ratio, and a greater frequency of epithelial dysplasia, particularly in females, than the Indiana material, which came almost entirely from residents in the Northcentral United States.


In 1960, we presented a review of “Current Concepts of Leukoplakia,” which pointed out the marked discrepancy in use of this term and the wide range of opinions regarding the malignant potential of oral leukoplakia. A notable lack of well-documented clinicopathologic studies of significant numbers of cases also was found at that time. This served as a stimulus for a study of material which had been submitted to our laboratory.

From the Departments of Oral Pathology, Indiana University School of Dentistry, Indianapolis, IN; and Emory University School of Dentistry, Atlanta, GA.
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Address for reprints: Dr. Charles A. Waldron, Emory University School of Dentistry, Atlanta, GA 30322.

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ERYTHROPLAKIA OF THE ORAL CAVITY
WILLIAM G. SHAFER, DDS,† AND CHARLES A. WALDRO, DDS†

Erythroplakia of the oral cavity is a specific disease entity which must be differentiated from other specific or nonspecific inflammatory oral lesions, although this can only be done in most cases by biopsy. A series of 58 cases of oral erythroplakia has been retrieved from 65,354 consecutively accessioned biopsy-surgical specimens. The disease was found to have no apparent sex predilection (31 males and 27 females) and was most frequently seen during the 6th and 7th decades. The most common site of occurrence in females was the mandibular alveolar mucosa-mandibular gingival-mandibular sulcus, whereas this was the least common site in males. The floor of the mouth was the most common site in males, followed by the retromolar area in both males and females. The histologic findings emphasized the serious nature of the disease, since 91% of the specimens were either invasive carcinoma, carcinoma in situ, or severe epithelial dysplasia.


Erythroplasia is a lesion described by Queyrat in 1911 as occurring on the glans penis and representing a premalignant process, because of its frequent ultimate development into carcinoma. It generally appears as a flat or slightly elevated, red, velvety or slightly granular, often fissuring, rather sharply circumscribed, asymptomatic plaque, it has been discussed in detail by many authors. Blau and Hyman have published an excellent review of the disease, while Graham and Helwig have recently given a detailed analysis of 100 cases. Over the years, there has been considerable controversy as to whether erythroplasia of a mucosal surface is the same disease process as Bowen’s disease of the skin, because of similarities in the histologic appearance of the two conditions. Graham and Helwig have concluded that the two are different entities, based on an analysis of data of series of patients with erythroplasia and with Bowen’s disease. This conclusion was based on differences in race, ethnic origin, sex, age, duration, anatomical and clinical features, and the frequency of concomitant and associated cancer and cause of death. They concluded that erythroplasia is a distinct clinicopathologic entity. Earlier, Gorlin had reviewed the literature on Bowen’s disease of the oral cavity and reported an additional 6 cases. Howarth also had reported 3 cases of oral Bowen’s disease. The clinical descriptions of the lesions in these 6 cases of Gorlin and the 3 cases of Howarth, however, did not appear to resemble erythroplasia.

The occurrence of erythroplasia of the oral cavity, with clinical and microscopic features nearly identical to the penile lesions, has been recognized for a number of years. The lesion here is generally termed “erythroplakia” rather than “erythroplasia” so as to be analogous to its white patch counterpart “leukoplakia,” representing the Anglo-American version of the French “erythroplasie” and “leukoplakie,” respectively. It has been described in various detail in the oral cavity by Sachs and Sachs, Lindberg and his associates, Williamon, van Rensburg and Shear, Meshberg and his coworkers, Mehta and his associates, and Kramer. Shear has published an excellent review and discussion of erythroplakia of the mouth describing three clinical variations of the lesion: 1) homogeneous erythroplakia, 2)
Leukoplakia – A Clinical Diagnosis
Epithelial Dysplasia - a Histologic Diagnosis
Severe Epithelial Dysplasia
Carcinoma-in-Situ
Infiltrating Squamous Cell Carcinoma

- Skeletal muscle
- Nest of tumor cells
Grading Epithelial Dysplasia

- **Mild**
  - Lower 1/3
- **Moderate**
  - Middle 1/3
- **Severe**
  - Upper 1/3

- **Carcinoma in situ**
  - Full thickness change
Diagnostic Biopsy
Diagnosis of Oral Squamous Cell Carcinoma

- **Incisional or excisional biopsy** is required for definitive diagnosis

Get a manly biopsy!
Scalpel Biopsy
Scalpel Biopsy - Incisional

Fixation in 10% neutral, buffered formalin
Acu·Punch

BIOPSY PUNCH

STERILE • SHARP
FOR ONE TIME USE ONLY

Dist. by:
Acuderm Inc.
Ft. Lauderdale, Fl. 33314
Biopsy Artifacts
Local Anesthetic Injection Site with Fibrin Clot
Minor Salivary Gland Biopsy
Crush Artifact
Cautery Artifact
Forceps Squeeze
Forceps Squeeze
Pemphigus vs Saline Artifact
Suction Artifact
Freezing Artifact
Requirements for a Good Biopsy

- Representative
- Manly
- Orientable
- Undistorted
Staging of Oral Cancer
Oral Squamous Cell Carcinoma Staging: TNM Classification

Tumor size

Metastasis

• Regional lymph nodes
• Distant sites

Stage determines:

• Treatment
• Prognosis
Primary Tumor (T) Size

- **Tis**  CIS
- **T1**  <2 cm
- **T2**  2 to 4 cm
- **T3**  > 4 cm
- **T4**  Invades adjacent structures
Nodal Involvement (N)

- **N0**  No regional node metastasis
- **N1**  Metastasis - single ipsilateral node, < 3 cm
- **N2**  Metastasis - 3 to 6 cm
- **N3**  Metastasis > 6 cm
Distant Metastasis (M)

- **M0** No distant metastasis
- **M1** Distant metastasis
TNM Staging

- $T_2N_1M_0$
- $T_3N_3M_1$
- $T_4N_0M_0$
Stage Grouping

- **Stage 0**
  - Tis N0 M0

- **Stage I**
  - T1 N0 M0

- **Stage II**
  - T2 N0 M0

- **Stage III**
  - T3 N0 M0
  - T1 or T2 or T3 N1 M0

- **Stage IV**
  - Any T4 lesion
  - Any N2 or N3 lesion
  - Any M1 lesion
Clinical Stage and Survival Rates for Oral Cancer

<table>
<thead>
<tr>
<th>T1</th>
<th>T2</th>
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<td></td>
<td></td>
<td></td>
<td>I</td>
<td>I</td>
<td>IV</td>
</tr>
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Tumor Stage Determines Prognosis Treatment

- Higher stage $\rightarrow$ worse prognosis
- Higher stage $\rightarrow$ more aggressive treatment
### Five-Year Relative Survival Rates* by Stage at Diagnosis, 1995-2000

<table>
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<tr>
<th>Site</th>
<th>All Stages %</th>
<th>Local %</th>
<th>Regional %</th>
<th>Distant %</th>
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<tr>
<td>Breast (female)</td>
<td>87.7</td>
<td>97.5</td>
<td>80.4</td>
<td>25.5</td>
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<tr>
<td>Colon &amp; rectum</td>
<td>63.4</td>
<td>89.9</td>
<td>67.3</td>
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<tr>
<td>Esophagus</td>
<td>14.3</td>
<td>29.3</td>
<td>13.3</td>
<td>3.1</td>
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<tr>
<td>Kidney</td>
<td>63.9</td>
<td>91.1</td>
<td>59.1</td>
<td>9.3</td>
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<tr>
<td>Larynx</td>
<td>65.1</td>
<td>83.7</td>
<td>48.7</td>
<td>18.7</td>
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<tr>
<td>Liver</td>
<td>8.3</td>
<td>18.4</td>
<td>6.2</td>
<td>2.9</td>
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<tr>
<td>Lung &amp; bronchus</td>
<td>15.2</td>
<td>49.4</td>
<td>16.1</td>
<td>2.1</td>
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<tr>
<td>Melanoma</td>
<td>90.5</td>
<td>97.6</td>
<td>60.3</td>
<td>16.2</td>
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<td>Oral cavity</td>
<td>58.7</td>
<td>81.0</td>
<td>50.7</td>
<td>29.5</td>
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<table>
<thead>
<tr>
<th>Site</th>
<th>All Stages %</th>
<th>Local %</th>
<th>Regional %</th>
<th>Distant %</th>
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<td>Ovary†</td>
<td>44.0</td>
<td>93.5</td>
<td>68.8</td>
<td>28.5</td>
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<tr>
<td>Pancreas</td>
<td>4.4</td>
<td>15.2</td>
<td>6.8</td>
<td>1.8</td>
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<tr>
<td>Prostate‡</td>
<td>99.3</td>
<td>100.0</td>
<td>–</td>
<td>33.5</td>
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<tr>
<td>Stomach</td>
<td>23.3</td>
<td>58.4</td>
<td>22.5</td>
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<tr>
<td>Testis</td>
<td>95.9</td>
<td>99.4</td>
<td>95.9</td>
<td>71.8</td>
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<tr>
<td>Thyroid</td>
<td>96.5</td>
<td>99.6</td>
<td>96.3</td>
<td>61.0</td>
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<td>Urinary bladder</td>
<td>81.7</td>
<td>94.1</td>
<td>48.8</td>
<td>5.5</td>
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<tr>
<td>Uterine cervix</td>
<td>72.7</td>
<td>92.2</td>
<td>53.3</td>
<td>16.8</td>
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<tr>
<td>Uterine corpus</td>
<td>84.4</td>
<td>95.8</td>
<td>67.0</td>
<td>25.6</td>
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</table>

*Rates are adjusted for normal life expectancy and are based on cases diagnosed from 1995-2000, followed through 2001. †Recent changes in classification of ovarian cancer, namely excluding borderline tumors, has affected 1995-2000 survival rates. ‡The rate for local stage represents local and regional stages combined.

**Local:** An invasive malignant cancer confined entirely to the organ of origin. **Regional:** A malignant cancer that 1) has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; 2) involves regional lymph nodes by way of lymphatic system; or 3) has both regional extension and involvement of regional lymph nodes. **Distant:** A malignant cancer that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis to distant organs, tissues, or via the lymphatic system to distant lymph nodes.

**Source:** Surveillance, Epidemiology, and End Results Program, 1975-2001, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, MD, 2004.

American Cancer Society, Surveillance Research, 2005
Histologic Grading of Squamous Cell Carcinoma

- **Well** differentiated
- **Moderately** differentiated
- **Poorly** differentiated
Treatment of Head and Neck Squamous Cell Carcinoma

- Surgery
- Radiation
- Combined surgery and radiation
Multidisciplinary Head and Neck Tumor Board for Treatment Planning

- **Surgical** oncology
- **Medical** oncology
- **Radiation** oncology
- Radiology
- Pathology
- Dentistry - oral surgery, maxillofacial prosthodontics
- Speech pathology
- Social work
- Physical therapy
- Occupational therapy
Oral Cavity Cancer Five Year Survival by Stage - ACS

- All stages combined 59%
  - Local disease 81%
  - Regional metastasis 51%
  - Distant metastasis 30%
31F Cigarette Smoker with Painful Red and White Lesion of Ventral Tongue
Adjunctive Diagnostic Procedures
Adjunctive procedures

- Vital staining - toluidine blue
- Exfoliative cytology
- Reflectance
- Fluorescence
- Transepithelial brush biopsy
Adjunctive Diagnostic Techniques

- Elective aids to incisional biopsy
- Not substitutes for biopsy
- Delays in obtaining biopsy
  - Delays in referral
  - Patient resistance
  - Medical reasons
  - Low index of suspicion
Toluidine Blue Vital Staining
Tolonium Chloride binds to DNA

A positive result means that there may be dysplastic cells present

A negative result does not exclude dysplasia

May be useful to accelerate biopsy or to identify an area to biopsy
Toluidine Blue Vital Staining
Toluidine Blue Vital Staining
Toluidine Blue Vital Staining
Toluidine Blue Vital Staining
Oral Exfoliative Cytology
Reliability of Oral Exfoliative Cytology

[Bar chart showing the reliability of oral exfoliative cytology across different oral regions, with the highest reliability for the floor of the mouth and the lowest for gingiva.]
Exfoliative Cytology
Exfoliative Cytology
Exfoliative Cytology
• **Contraindications**
  - Keratotic surface
  - Suspicious for malignancy

• **Indications**
  - Herpetic lesions
  - Candidiasis
Oral Exfoliative Cytology for Diagnosis of Viral Infections

Herpes
Viral Cytopathic Effect (CPE)

Normal Squames
Oral Exfoliative Cytology for Diagnosis of Fungal Infections

Candidal Yeast Forms
Oral Exfoliative Cytology for Diagnosis of Fungal Infections

Candidal Pseudohyphae
Evidence-based clinical recommendations regarding screening for oral squamous cell carcinomas

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The American Cancer Society (ACS) estimated that there would be 35,720 new cases of cancer of the oral and pharyngeal region in the United States in 2009, with 7,800 deaths from the disease. When focusing specifically on the oral cavity, ACS estimated that in 2008, there would be 23,110 new cases of cancer of the oral cavity (hereafter referred to as "oral cancer") and 5,370 deaths. Nearly 80% of these malignancies are squamous cell carcinomas. More than 97% of U.S. cases of these cancers occur among adults 35 years and older. Although the incidence rate (IR) of oral and pharyngeal cancers is decreasing overall, the IR of cancers of the tongue, oropharynx and tonsil is increasing. The 2002-2006 age-adjusted (to the 2000 U.S. population) IR of oral and pharyngeal cancers in the United States was 10.3 per 100,000 per year. The age-adjusted IR was more than twice as high among men (18.9) as among women (8.0), as was the mortality rate (men, 4.0; women, 1.5).

Abstract

Background. This article presents evidence-based clinical recommendations developed by a panel convened by the American Dental Association Council on Scientific Affairs. This report addresses the potential benefits and potential risks of screening for oral squamous cell carcinomas and the use of adjunctive screening aids to visualize and detect potentially malignant and malignant oral lesions.

Types of Studies Reviewed. The panel members conducted a systematic search of MEDLINE, identifying 329 systematic reviews and 1,489 recent clinical studies. They selected five systematic reviews and four clinical studies to use as a basis for developing recommendations.

Results. The panel concluded that screening by means of visual and tactile examination to detect potentially malignant and malignant lesions may result in detection of oral cancers at early stages of development, but that there is insufficient evidence to determine if screening alters disease-specific mortality in asymptomatic people seeking dental care.

Clinical Implications. The panel suggested that clinicians remain alert for signs of potentially malignant lesions or early-stage cancers while performing routine visual and tactile examinations in all patients, but particularly in those who use tobacco or who consume alcohol heavily. Additional research regarding oral cancer screening and the use of adjuncts is needed.

Keywords: American Dental Association (ADA); biopsy; brush; cancer; carcinomas; squamous cell; evidence-based dentistry; mouth neoplasms; oral cancer; practice guidelines.
Adjunctive Screening Aids

- Devices intended to assist in lesion detection
  - Devices based on tissue reflectance
    - MicroLux/DL (AdDent, Danbury, CT)
    - Orascoptic DK (Orascoptic, Kerr, Middleton, WI)
    - ViziLite Plus (Zila, Phoenix, AZ)
  - Device based on autofluorescence
    - VELscope (LED Dental, Burnaby, BC, CA)
  - Device based on autofluorescence and tissue reflectance
    - Identifi 3000 (Trimira, Houston, TX)
- Device intended to assist in lesion assessment
  - Device based on transepithelial cytology
    - OralCDx BrushTest (OralCDx Laboratories, Suffern, NY)
Adjunctive Screening Aids

• There is insufficient evidence that commercial devices based on autofluorescence enhance visual detection of potentially malignant lesions beyond that achieved through a conventional visual and tactile examination (III)

• There is insufficient evidence that commercial devices based on tissue reflectance enhance visual detection of potentially malignant lesions beyond that achieved through a conventional visual and tactile examination (III)

• There is insufficient evidence to assess the validity of transepithelial cytology of seemingly innocuous mucosal lesions (III)

• In suspicious mucosal lesions with high potential for malignancy, transepithelial cytology has validity in identifying disaggregated dysplastic cells (III)

(A conclusion of “insufficient evidence” does not necessarily mean that the intervention is or is not effective, but instead means that the panel did not find sufficient evidence to support a recommendation)
• Under blue-white illumination, abnormal squamous epithelium is reported to be distinctly white (acetowhite)
MicroLux/DL
• DL = Diagnostic Light

• 1% Acetic acid rinse

• Blue-white (440nm) LED light source

• Tranlumination tip

• Lighted mirror
Microlux/DL - Oral Cancer Screening

Our practice continually looks for advances to ensure that we are providing the optimum level of oral health care to our patients. We are concerned about oral cancer and screen for it in every patient. When oral cancer is detected early, it is 90 percent curable, and patients can live healthy lives. Yet a majority of lesions are not identified early with an unaided visual examination. Late detection of oral cancer is the primary reason that both the incidence and mortality rates of oral cancer continue to increase. More than 25 percent of oral-cancer victims have no lifestyle risk factors.

**Oral-cancer risk profile**

- **Increased risk:** patients ages 18–39, sexually active patients (HPV 16/18)
- **High risk:** patients age 40 and older, tobacco users (any age, any type within 10 years)
- **Highest risk:** patients age 40 and older with lifestyle risk factors (tobacco and/or alcohol use), previous history of oral cancer

Microlux/DL is a simple rinse for the mouth. A chemiluminescent light is then used to reveal any abnormal tissue even before it is visible to the naked eye. We find that using Microlux/DL along with a standard oral cancer examination improves the ability to identify suspicious areas at their earliest stages. Microlux/DL is similar to proven early detection procedures for other cancers, such as mammography, Pap smear, and PSA. Microlux/DL is a simple and painless examination that gives the best chance to find oral abnormalities at the earliest possible stage. Early detection of precancerous tissue can minimize or eliminate the potentially disfiguring effects of oral cancer and possibly save a life. The Microlux/DL exam should be performed annually.
Orascoptic DK
• DK = Diagnostic Kit

• 1% Acetic acid rinse

• Blue-white (440nm) LED light source

• Tranlumination tip

• Lighted mirror
**Oral Lesion Screening**

The reality of oral cancer*:

- Each year over 30,000 Americans will be diagnosed with oral cancer.
- 1 out of 4 oral cancers detected are in patients who do not smoke or drink alcohol.
- When detected in later stages, the survival rate from oral cancer is just 50%.

A glimmer of hope*:

- When detected in its earliest stages, oral cancers have an 80% - 90% cure rate.

Physicians do not include an oral lesion screening in their annual patient exams. It is up to the dentist to identify abnormal tissue, preferably during its earliest stages when it is highly curable. The Orascoptic DK oral lesion screening instrument augments a conventional examination by improving the visualization of oral lesions.

* Statistics provided by the Oral Cancer Foundation

3 Reasons Why You Should Perform the Orascoptic® DK Exam

1. **Far-reaching patient health benefits.** This advanced oral lesion exam can literally save lives!

2. **Risk Management.** Failure to diagnose oral cancer is the #2 cause of dental malpractice. Consistent and comprehensive standard of care helps minimize malpractice risk for dental practices.

3. **Revenue.** The 3-minute DK exam can be performed by either a dentist or hygienist. Each exam typically returns a $40 profit and is covered by some insurance plans.

---

**Annual Profit**

<table>
<thead>
<tr>
<th># of Exams Per Week</th>
<th>5</th>
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**based on a $50 exam fee**
Vizilite Plus
Vizilite Plus

- Plus = Toluidine Blue
- 1% Acetic acid rinse
- Blue-white (440nm) LED light source
Visilite - Plus
THE DEADLY STATISTICS

Every hour of every day, one American dies of oral cancer. The mortality rate associated with oral cancer has not improved significantly in the last 40 years. The death rate in the United States for oral cancer is higher than that of cervical cancer, Hodgkin's disease, cancer of the brain, liver, testes, kidney, or ovary. More than 30,000 Americans will receive an oral cancer diagnosis this year. In five years, only 57% will still be alive. 27% of oral cancer victims do not use tobacco or alcohol and have no other lifestyle risk factors.

Oral cancer is one of the most curable diseases when it's caught early. That's why the ViziLite Plus exam has been developed. ViziLite Plus uses technology that has proven successful in identifying soft tissue abnormalities in other areas of the body. A ViziLite Plus exam is particularly important if you are at increased risk for developing oral cancer.

An annual ViziLite Plus exam, in combination with a regular visual examination, provides a comprehensive oral screening procedure for patients at increased risk for oral cancer. The ViziLite Plus exam is painless and fast, and could help save your life.

ViziLite Plus is performed immediately following a regular visual examination:
- First, you will be instructed to rinse with a cleansing solution
- Next, the overhead lighting will be dimmed.
- Then, your dental professional will examine your mouth using ViziLite Plus, a specially designed light technology

How ViziLite Plus Works
Visilite - Plus

Hygiene Excellence!
Rewards Program
Points Card

Use this card to keep track of your Hygiene Excellence point code stickers. (see instructions on back)
Velscope

Tissue Fluorescence
VELscope - Tissue Fluorescence

Fig. 1: Schematic diagram for optical tissue interrogation using fluorescence.
Fluorescence Visualization Detection of Field Alterations in Tumor Margins of Oral Cancer Patients

Catherine F. Poh,1,2,3 Lewei Zhang,1 Don W. Anderson,5 J. Scott Durham,5 P. Michele Williams,1,3 Robert W. Priddy,1 Ken W. Berean,6 Samson Ng,1 Olivia L. Tseng,7 Calum MacAulay,4 and Miriam P. Rosin2,7

Abstract

**Purpose:** Genetically altered cells could become widespread across the epithelium of patients with oral cancer, often in clinically and histologically normal tissue, and contribute to recurrent disease. Molecular approaches have begun to yield information on cancer/risk fields; tissue optics could further extend our understanding of alteration to phenotype as a result of molecular change.

**Experimental Design:** We used a simple hand-held device in the operating room to directly visualize subclinical field changes around oral cancers, documenting alteration to fluorescence. A total of 122 oral mucosa biopsies were obtained from 20 surgical specimens with each biopsy being assessed for location, fluorescence visualization (FV) status, histology, and loss of heterozygosity (LOH; 10 markers on three regions: 3p14, 9p21, and 17p13).

**Results:** All tumors showed FV loss (FVL). For 19 of the 20 tumors, the loss extended in at least one direction beyond the clinically visible tumor, with the extension varying from 4 to 25 mm. Thirty-two of 36 FVL biopsies showed histologic change (including 7 squamous cell carcinomas/carcinomas in situ, 10 severe dysplasias, and 15 mild/moderate dysplasias) compared with 1 of the 66 FV retained (FVR) biopsies. Molecular analysis on margins with low-grade or no dysplasia showed a significant association of LOH in FVL biopsies, with LOH at 3p and/or 9p (previously associated with local tumor recurrence) present in 12 of 19 FVL biopsies compared with 3 of 13 FVR biopsies ($P = 0.04$).

**Conclusions:** These data have, for the first time, shown that direct FV can identify subclinical high-risk fields with cancerous and precancerous changes in the operating room setting.
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Transition from Normal Epithelium to Dysplastic Epithelium
Leukoplakia - Recurrence - February 2008
Leukoplakia - Recurrence - February 2008
Leukoplakia - Retreatment - 6 Weeks Postop
Leukoplakia - Retreatment - 6 Weeks Postop
Leukoplakia - Retreatment - 6 Weeks Postop
Identafi 3000
Press Release - Trimira™ LLC:

• Identafi 3000 uses white, violet, and amber wavelengths of light to excite oral tissue in distinct and unique ways.

• Biochemical changes can be monitored with fluorescence, while morphological changes can be monitored with reflectance.

• This multiple wavelength technology identifies abnormal tissue with more accuracy than the single color approaches currently on the market.

• The ability to read metabolic and physiologic differences makes it easier to distinguish between normal and abnormal tissue.

• The combined system of fluorescence and reflectance uses the body's natural tissue properties as an adjunctive tool for oral mucosal examination.

http://www.youtube.com/watch?v=eopbcvYEUlw
http://www.youtube.com/watch?v=CE1IBE0d2dw
Fine Needle Aspiration Biopsy
Fine Needle Aspiration Biopsy
Fine Needle Aspiration Biopsy
Fine Needle Aspiration Biopsy
Transepithelial Brush Biopsy
Transepithelial Brush Biopsy

- Oralscan Laboratories, Suffern, NY
- OralCDx test kit
- Computer assisted oral brush biopsy analysis
Transepithelial Brush Biopsy

- Complete transepithelial sample
- Adequate sample
Transepithelial Brush Biopsy

- No anesthesia required
- Moisten brush and place either the side or the tip of brush on lesion
- Apply firm pressure and rotate 5 to 10 times
- Assess full thickness harvest by observing micro-bleeding
• **Negative** - no cellular abnormalities

• **Positive** - epithelial dysplasia or carcinoma
  - Scalpel biopsy indicated

• **Atypical** - abnormal epithelial changes
  - Scalpel biopsy indicated
• Drore Eisen, DDS, MD, Medical Director Oralscan Laboratories

• “The brush biopsy is used to test benign-appearing lesions that have been either watched or ignored in the past.”

• “These are lesions that dentists do not find sufficiently suspicious to warrant referral for scalpel biopsy, not those distinguished by signs and symptoms of malignancy, clear indications for scalpel biopsy.”
• 1999 - Squamous cell carcinoma of left soft palate - radiation therapy

• 2006 - Carcinoma-in-situ right soft palate - excised

• 2009 - Bit right tongue in January, seen in March
• Acute myelogenous leukemia
• Bone marrow transplant
• *Graft versus host disease*
• Scleroderma
• Leukoplakia
• Bone marrow transplant
• Graft vs Host disease
Verrucous Carcinoma
Verrucous Carcinoma
Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia

- High-risk, aggressive type of oral leukoplakia
- High potential for malignant transformation
- Not associated with tobacco use
- Women outnumber men
Proliferative Verrucous Leukoplakia

- Slow-growing
- Begins as hyperkeratosis
- Spreads to become multifocal and verruciform
- Resistant to therapy - recurs
- Malignant transformation
- Diagnosis often retrospective
Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia

Oct 1988
Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia

Oct 1988
Proliferative Verrucous Leukoplakia

Jan 1989
Proliferative Verrucous Leukoplakia

Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia
Proliferative Verrucous Leukoplakia