Oral Health Care for Cancer Patients
Determining and Managing Salivary Gland Function in Cancer Patients: A Fact Sheet for Dental Professionals
Susan Zunt, DDS, MS

Background
Symptoms include dryness, burning sensation on the tongue, fissures on the tongue, atrophy of dorsal tongue surface, increased thirst, candidiasis, and increased dental caries and demineralization.

Salivary gland hypofunction is caused by both chemotherapy and/or radiation therapy and it also is a side effect of many common medications.

About 40% of patients receiving chemotherapy report dry mouth. It usually resolves itself within a year after treatment stops. More than 90% of patients who receive head and neck radiation have long-term dry mouth when the parotid gland is directly irradiated. Unfortunately, decreased salivary flow can be an irreversible problem in the case of head and neck radiation.

Decreased salivary flow can result in impaired lubrication of oral tissues leading to: (1) difficulty in speaking and/or swallowing, (2) decreased buffering capacity of saliva which increases risk for dental caries, (3) oral flora becoming more pathogenic, (4) dental plaque levels accumulating due to a patient's impaired oral hygiene, (5) demineralization of teeth occurs as well as tooth decay, (6) and possibly accelerated periodontal disease.

Pre-existing conditions and salivary hypofunction
Decreased salivary flow is in part affected by: diabetes, hypothyroidism, rheumatoid arthritis or other immune mediated diseases, chemotherapies and/or head and neck radiation.

A dental examination with a determination of salivary gland function prior to beginning cancer therapies is an important first step. Dental care may also be needed more frequently during cancer treatment.

Salivary Flow Rates
A person's average daily saliva flow rate should be between 0.5—1.5 liters per day. General guidelines for salivary flow rates are:

<table>
<thead>
<tr>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstimulated</td>
<td>0.3 mL/min</td>
</tr>
<tr>
<td>Stimulated</td>
<td>1-2 mL/min</td>
</tr>
<tr>
<td>Unstimulated (Indiana University School of Dentistry Standards)</td>
<td>≥ 0.2 mL/min</td>
</tr>
<tr>
<td>Stimulated (Indiana University School of Dentistry Standards)</td>
<td>≥1.0 mL/min</td>
</tr>
</tbody>
</table>

Measurement of Unstimulated Salivary Flow Using a Modified Schirmer Test
Recommended Modified Schirmer test strip: Schirmer test strips Eagle Vision (1-800-222-7584)

<table>
<thead>
<tr>
<th>Measurement (mm/3m)</th>
<th>Diagnosis</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤25 Dry mouth</td>
<td></td>
<td>1. Adequate water: 64 oz. non-caffeinate and non-alcoholic beverages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Oral hygiene instruction: brushing 2x daily, sodium lauryl sulfate-fluoride free toothpaste; floss daily</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Chlorhexidine if active carious lesions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Topical fluoride: 1.1% sodium fluoride gel at bedtime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Secretagogues (with functional tissue): e.g., pilocarpine 5 mg 3-4x daily and cevimeline, 30 mg 3x daily; OTC, e.g., OraMoist, 3-4x daily;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Re-evaluations every 6 mo</td>
</tr>
</tbody>
</table>

Note: Referral for blood test (e.g., oral medicine or oral surgery) for Alc, T4 and TSH, SS-A, SS-B, ANA and Rheumatoid factor (e.g., hypothyroidism, Sjogren’s)
Sialometry: Measuring Salivary Gland Hypofunction

Calibrated paper
- Modified Schirmer Test (MST)
  - Normal unstimulated saliva flow rate is 31 mm/3 minutes
  - <25 mm/3 minutes indicates severe hypofunction (dry mouth)

Volumetric Testing
- Unstimulated whole saliva averages for adults at 3–4 mL/5 minutes
- Stimulated whole saliva average adult rate is 12–14 mL/5 minutes
  - <0.1–0.2 mL/minute indicates hypofunction

Gravimetric Testing
- 1 gram of saliva = 1 milliliter of saliva
  - <0.1–0.2 g/minute or <0.2 mL/minute indicates hypofunction

If unstimulated flow rate is low, measure stimulated salivary flow rate
- Measuring stimulated salivary flow rate identifies the saliva rate of functional salivary gland tissue at a rate of >0.1–0.2 mL per minute
- To stimulate saliva flow have the patient chew paraffin wax for one minute (45 chews/min)
  - The suggested saliva collection time is 5 minutes after one minute of pre-stimulation.
  - Stimulated saliva flow rate in adult females is 8.6 mL/min and 10.1 mL/5 min in adult males
  - Using a test dose of a secretagogue may identify responders that may be candidates for secretagogue therapy (e.g., Salagen [pilocarpine], 5 mg for 30 min or Evoxac [cevimeline], 30 mg for 90 min
  - Nonresponders are more likely to have irreversible salivary gland damage. Nonresponders can be referred to an oral surgeon for a diagnostic labial salivary gland biopsy.

Salivary pH
- To test pH use pH test strips under the tongue (Colorometric paper strips from Carolina Biologicals [pH 5-10], www.carolina.com)
- Normal salivary pH is between 7.0–7.5
- Salivary pH decreases with decreased salivary flow
- Low pH contributes to mucosal discomfort

References

Brand Name | pH
---|---
Classic Coke | 2.62
Diet Coke | 2.62
Gatorade | 2.97
White wine | 3.0-3.6
Red wine | 3.1-3.7
Regular 7UP | 3.2
Tea, herbal | 3.2
Crystal Lite lemonade | 3.25
Diet 7UP | 3.54
Beer | 3.7-4.1
A&W Root Beer | 4.4
Coffee | 5.0
Tea, black | 5.7-7.2
Milk | 6.4-6.8
Water (Tap) | 7.0

Copyright, Susan Zunt, DDS, MS © 2010