DISCLOSURE INFORMATION

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Continuing Medical Education committee members and those involved in the planning of this CME Event have no financial relationships to disclose.

Piedad Suarez

I have no financial relationships to disclose

I will not discuss off label use and/or investigational use in my presentation
"Saliva is not one of the popular bodily fluids. It lacks the drama of blood, the sincerity of sweat and the emotional appeal of tears."


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**SALIVA FUNCTIONS**

- Lubricatory proteins
- Antibacterial factors to regulate the distribution and numbers of oral microorganisms
- "Remineralizing" proteins
- Inorganic and organic buffers to neutralize proton production by cariogenic bacteria
- Appropriate viscosity contributing to food bolus formation
- Aiding initial stages of deglutition
SALIVA COMPOSITION

SALIVA
Is made up of several salivary and non-salivary components.
AGE CHANGES IN SALIVARY GLANDS AND SALIVARY SECRETION

There is not generalized diminution in salivary gland performance with increase age

Xerostomia
SALIVARY HYPOFUNCTION

Systemic Disease

Medications

Radiation therapy head and neck

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TABLE 1.
SYSTEMIC DISEASES AFFECTING SALIVARY GLANDS AND SALIVA

<table>
<thead>
<tr>
<th>SJOGREN’S SYNDROME</th>
<th>HORMONAL DYSFUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatoid diseases</td>
<td>Diabetes</td>
</tr>
<tr>
<td>Graft vs host disease</td>
<td>Pancreatitis</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>Adrenal-cortical diseases</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>Thyroiditis</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Acromegaly</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>Neurological diseases</td>
</tr>
<tr>
<td>Alcoholic cirrhosis</td>
<td>Parkinsonism</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Bell’s palsy</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>Cerebral palsy</td>
</tr>
</tbody>
</table>

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DRY MOUTH·PIEAD SUAREZ
CONDITIONS ASSOCIATED WITH SIALADENOSIS

Box 11.3

Conditions Associated with Sialadenosis

**ENDOCRINE DISORDERS**
- Diabetes mellitus
- Diabetes insipidus
- Acromegaly
- Hypothyroidism
- Pregnancy

**NUTRITIONAL CONDITIONS**
- General malnutrition
- Alchoholism
- Anorexia nervosa
- Bulimia

**NEUROGENIC MEDICATIONS**
- Antihypertensive drugs
- Psychotropic drugs
- Sympathomimetic drugs used for treating asthma
Cost-effectiveness landscape analysis of treatments addressing xerostomia in patients receiving head and neck radiation therapy.

Surgery 125, Headne, HN, Water, D, Zambelli, J, Barret, J, Graues, E, Printemps, T, Yosera, P, Lee, C, Page D.

Abstract

Head and neck (H&N) radiation therapy (RT) can induce irreversible damage to the salivary glands thereby causing long-term xerostomia or dry mouth in 60%–90% of the patients. Not only does xerostomia significantly impair patients’ quality-of-life (QOL), but it also has important medical sequelae, including high medical and dental costs. In this article, we review various measures to assess xerostomia and evaluate current and emerging solutions to address this condition in H&N cancer patients. These solutions typically seek to accomplish one of the four objectives: (1) to protect the salivary glands during RT; (2) to stimulate the remaining gland function; (3) to treat the symptoms of xerostomia; or (4) to regenerate the salivary glands. For each treatment, we assess its mechanisms of action, efficacy, safety, clinical utilization, and cost. We conclude that intensity-modulated radiation therapy is both the most widely used prevention approach and the most cost-effective existing solution and we highlight novel and promising techniques on the cost-effectiveness landscape.

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Fig. 1. Treatment gap analysis. Synthesis of the solutions for addressing xerostomia in H&N cancer patients undergoing RT. The solutions are summarized in a graph showing the effectiveness of the solution at treating or preventing xerostomia versus the cost per treatment. The solutions are categorized according to the following criteria: treatment versus prevention and preclinical versus clinical stage. Each clinical availability is also estimated and represented as bubble size. Highlighted by the dashed circle is the treatment gap, which corresponds to the area of greatest innovation opportunity.
EATING DISORDERS
Anorexia Nervosa
Bulimia Nervosa

Pictures courtesy of Dr M. Navazesh

OVER 400 DRUGS...
- Tricyclic antidepressants
- Sedatives and tranquilizers
- Antihistamines
- Antihypertensive
- Cytotoxic Agents
- Anti-Parkinson drugs
Saliva - The Body’s Mirror

Scientists have long recognized that saliva serves as a mirror of health, in that it contains the full repertoire of proteins, hormones, antibodies, and other analyses frequently measured in blood tests.

Glick, 2006 Sialology, and who owns saliva anyway?
J Am Dent Assoc 137:262, 264

With these advances, pertinent questions arise, such as

- “Who owns saliva?”
- “Who should use saliva for diagnosing medical conditions?”
- Should dentists “own” saliva, since it emanates from the oral cavity?
- Should saliva be another means for disease screening and diagnosis “owned” by the entire healthcare community?
SALIVARY HYPOFUNCTION

Dry and friable oral mucosa

Impaired retention of removable prostheses

Antimicrobial activity

Fungal Infections

Lubrication

Caries

Difficulty with mastication, deglutition, speech

APPEARANCE

- Oral mucosa appears pale or atrophic
- Tongue may be devoid of papillae
- Tongue fissure and inflamed
- Salivary gland obstructions
- Bilateral or unilateral enlargement
- New and recurrent dental caries
- Difficulty chewing/swallowing
- Fungal infections
Table 1: Identifying Patients at Risk for Salivary Gland Hypofunction and its Complications

<table>
<thead>
<tr>
<th>CHIEF COMPLAINTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does patient complain of dry mouth?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRY MOUTH QUESTIONNAIRE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the amount of saliva in your mouth seem to be too little, too much, or you don’t notice?</td>
</tr>
<tr>
<td>1.</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEDICAL HISTORY AND REVIEW OF SYSTEMS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does patient have any known risk factors?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLINICAL EVALUATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does patient manifest any of the following conditions?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAJOR SALIVARY GLANDS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlarged?</td>
</tr>
<tr>
<td>Tender?</td>
</tr>
<tr>
<td>No saliva upon expectation?</td>
</tr>
<tr>
<td>NO Salisbury contact with pain or blood?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIPS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry?</td>
</tr>
<tr>
<td>Cracked?</td>
</tr>
<tr>
<td>Kynesthesia?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUCOSA/TONGUE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry?</td>
</tr>
<tr>
<td>Erythematous?</td>
</tr>
<tr>
<td>Lobulated?</td>
</tr>
<tr>
<td>Plaques?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DENTITION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed prosthetic appliances?</td>
</tr>
<tr>
<td>Removable partial or full dentures?</td>
</tr>
<tr>
<td>Cases involving mucosa, cervix, or root surface?</td>
</tr>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSIDER FURTHER DIAGNOSTIC WORK UP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocrine Evaluation</td>
</tr>
<tr>
<td>Serologic Evaluation</td>
</tr>
<tr>
<td>Microbiologic Analysis</td>
</tr>
<tr>
<td>Histologic Evaluation</td>
</tr>
<tr>
<td>Imaging</td>
</tr>
<tr>
<td>Nutrition Counseling</td>
</tr>
<tr>
<td>Medical Consult</td>
</tr>
<tr>
<td>Psychological Evaluation</td>
</tr>
</tbody>
</table>

DRY MOUTH PIEDAD SUAREZ
TREATMENT

For Drug-Induced Dysfunction

Salivary Substitutes

Symptomatic Treatment

Salivary Stimulants
Table 1: Presumptive topical salivary stimulants, oral rehydrations and salivary substitutes for dry mouth and xerostomia.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Product Description</th>
<th>Active Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sialogogues</td>
<td>Oral fluids</td>
<td>Salviae, water, glycerin, honey, propylene glycol, sorbitol, water, xylitol</td>
</tr>
<tr>
<td>Oral rinses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**WHAT DO YOU DO FOR YOUR DRY MOUTH?**

- Salivary buffering: toothpastes, bicarb rinse or spray (2 tsp baking soda in 8-12 oz H20, 4-6 x/day), Boost
- Palliative products: saliva substitutes
- Fluids and geriatrics
- Na+ and geriatrics

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**CAMBRA ANALYSIS**

- Risk categories: low, moderate, high (caries), extremely high (caries + dry mouth or special needs patients)
- Evaluate, phase, and execute!
PROTECTIVE FACTORS

- Diet Analysis and Recommendations
- Sealants
- Oral Hygiene
- Chemotherapeutics
- Fluorides
- Chlorhexidine
- Xylitol
- Calcium and Phosphates (CCP/ACP or Recaldent)
- Buffering

PH-LIFTING SNACKS

- **Casein**: cheese (dominant phosphoprotein)
- **Arginine-rich foods**: soy, seafood, dairy, nuts
FLUORIDE FORMS FOR GERIATRIC PATIENTS

- Substituting toothpastes
- Rx for 5000 ppm pastes/gels
- Compliance and success: who’s applying it?
  - gels vs. pastes vs. rinses
- Gels easier for helpers to apply & limit excess
- Fluoride varnishes vs. foam

...think it through!

CHLORHEXIDINE GLUCONATE 0.12%

- Caries Control: rinse 1 minute for one week
  a month, separated one hour from F toothpaste usage * re-evaluate at recall
- When to rinse?
- Spray/swab/varnish?
- 50-50 H2O or non-ROH
CALCIUM AND PHOSPHATES: RECALDENT

- For remineralization and root sensitivity
- Milk protein casein allergies: CCP-ACP
- MI Paste

SALIVA SUBSTITUTES

- Biotene products
- Sage Moist-Plus
- XeroLube
- Salivart
- MoiStir
- Stoppers4DryMouth, etc.
SYMPTOMATIC TREATMENT

- Sip water frequently
- Let ice melt in the mouth
- Restrict caffeine intake
- Avoid alcohol
- Humidify the sleeping area

SALIVARY STIMULANTS

- Pilocarpine HCL 5 mg
- Disp 90 tabs
- Sig: Take 1 tab tid before meals and 1 tab qhs

- May need 2-3 months to determine effectiveness
- Side effects: sweating, chills, diarrhea, increased need to urinate, flatulence
- May decrease vision in low light
- Avoid in patients with narrow-angle glaucoma
- Severe asthma and pulmonary disease
- Gastrointestinal ulcerations
- Careful with antihypertensive meds
- Many drug interactions
**SALIVARY STIMULANTS**

- Cevimeline HCl 30 mg
- Disp: 60 tabs
- Sig: Take one tablet tid. Dose may be raised to 45 mg

- Discontinue if no positive effect in 3 months
- Side effects are the same as those for pilocarpine
- This cholinergic agonist has a longer half life, only 3 doses/day

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**PERIODONTAL TREATMENT**

- Oral hygiene procedures
  - Maintaining the quality of
  - Oral hygiene critically important
- Surgery will produce desired result
  - Can the surgical result be maintained?
- Good results with non-surgical care
  - Needs to be aggressive
CASE #1

- 48 y/o Indian female
- CC: Urgent need for dental treatment because nobody wants to “touch her”
- Patient with History of Hodgkin's Lymphoma
- Bone marrow transplant
- Myastenia Gravis
- IV Bisphosphonate use
CASE #2

- 71 years old Hispanic female.
- CC: Dry mouth and multiple intraoral ulcers, as well as on her lower lip, ulcers present for five weeks. She also reports dry eyes for about 10 years.
- Past medical history significant for: hypercholesterolemia, varicose, liver biopsy.
- Medications: Vitamins, iron, and calcium supplements.
- Examination of her oral cavity reveals multiple ulcers in buccal and labial mucosa.
- Palate presents multiple petechiae.
- Tongue presents erythema and lack of papilla in the anterior third.

- Patchy and erythematous, changes of the tongue as well papillary atrophy
- Observe petechiae in her palate
REFERENCES

- http://drymouthfoundation.org
- http://www.sjogrens.org/home/about-sjogrens-syndrome/symptoms/dry-mouth
- www.cdc.gov
THANK YOU

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