PHYSICAL & CHEMICAL INJURIES

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Learning objectives

1. **Describe the repertoire of physical and chemical injuries that can affect the oral hard and soft tissues.**
2. **Describe the repertoire of responses of oral soft tissues to trauma.**
3. **Discuss the aetiology, pathogenesis, the clinical and histopathologic features and the diagnosis and treatment of:**
   - Frictional keratosis
   - Linea alba
   - Morsicatio buccarum
   - Traumatic ulceration
   - Burns
4. **Discuss exfoliative cheilitis.**
5. **Discuss the aetiology, pathogenesis, the clinical and histopathologic features and the diagnosis and treatment of:**
   - Amalgam tattoos and other localized exogenous pigmentations
   - Smoker's melanosis
   - Drug related discoloration of oral mucosa
6. **Explain oral complication of radiation therapy.**

1. Benign alveolar ridge keratosis on retromolar pad, present bilaterally
2. Benign alveolar ridge keratosis of previously extracted teeth

Image courtesy of Almazyad A, Li C, Woo SB; 2020

Frictional keratosis on gingiva

Verrucous leukoplakia on gingiva

Image courtesy of Van der Waal, 2015

Histopathology

- Orthokeratosis or hyperparakeratosis (1)
- Shaggy keratin surface
- Prominent granular cell (2)
- Intracellular oedema – ballooned cells in spinous layer (3)
- Acanthosis (4)
- Lack of inflammation in superficial connective tissue (5)
- Features of dysplasia absent

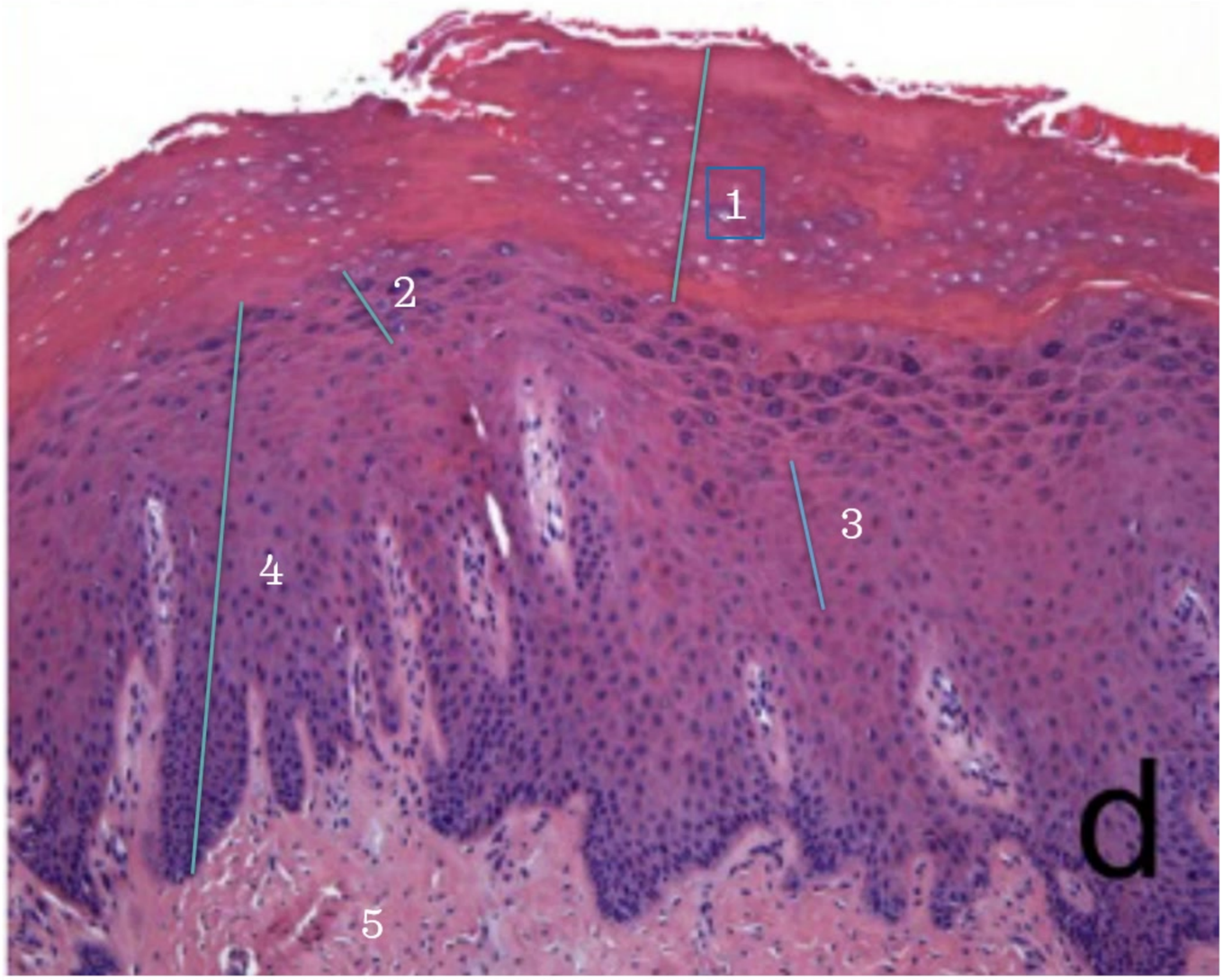


Image courtesy of Muller S, 2019

Frictional keratosis

Diagnosis:

- Need to distinguish from other oral potentially malignant disorders
- History: Is the patient aware of trauma? Any indication of possible mechanical trauma? Can the trauma be addressed?
- Clinical: Appearance. Address the trauma – eliminate after source of irritation eliminated
- Investigations: Biopsy of suspicious lesions (persistent) or when limited clinical information available

Treatment:

- Address the trauma
- Review in 2 weeks, lesion eliminated
- Chronic irritation may require habit awareness techniques
- Lesions do not undergo malignant transformation

Linea Alba

- “white line”
- Common alteration of the buccal mucosa associated with pressure, irritation or sucking trauma from teeth
- Due to parafunctional habits: cheek biting, clenching, teeth grinding
- Asymptomatic, horizontal linear white keratotic line/ridge on the buccal mucosa approximating the occlusal plane (often bilateral)
- Can be seen with scalloping of lateral border of tongue → associated with bruxism
- Often mistaken for leukoplakia
- Histopathology: hyperkeratosis overlying normal oral mucosa, on occasion intracellular oedema
- Usually clinical diagnosis
- No treatment required, no complications documented with it’s development
- Spontaneous regression may occur

Image courtesy of Neville B, Damm D., 2016

Morsicatio buccarum

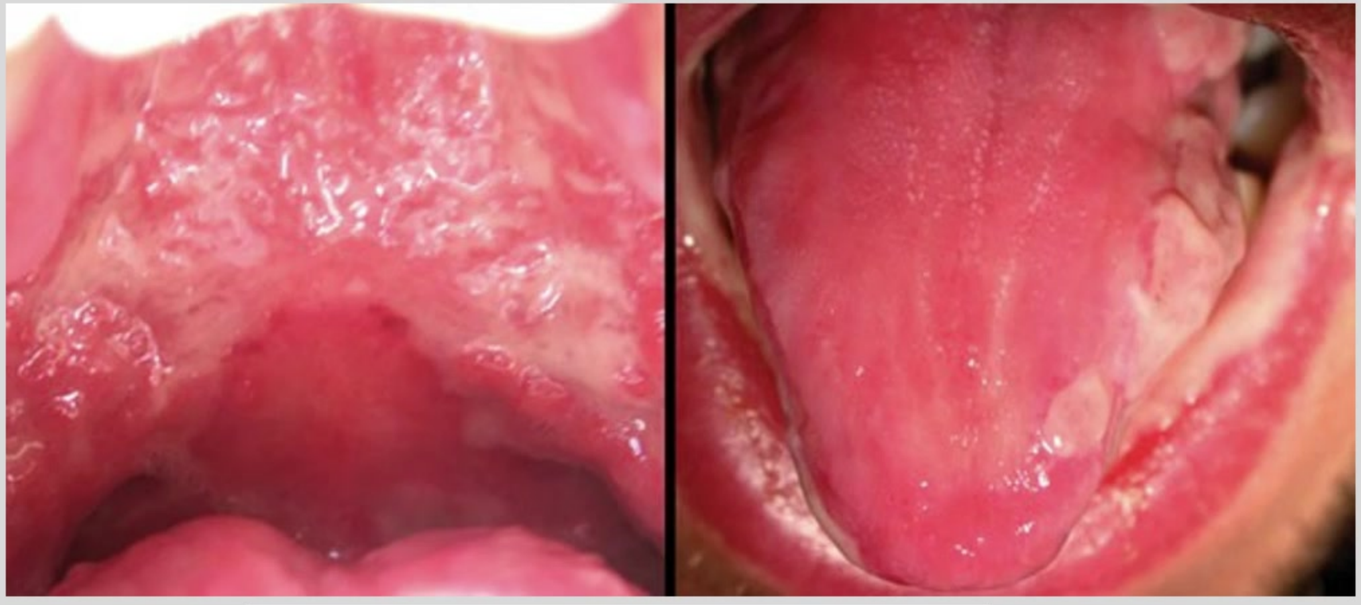
- Chronic bite keratosis

Traumatic ulcer from sharp tooth

Oral squamous cell carcinoma

Image courtesy of Contemporary Oral Medicine, 2019

Aspirin induced chemical burn noted on the buccal mucosa, with noted residual aspirin present on teeth
Image from: McKinney R et al., 2022



Extensive ulceration of the palate and lateral aspects of tongue secondary to deliverate application of sulphuric acid
Image from: Fedele S et al., 2010

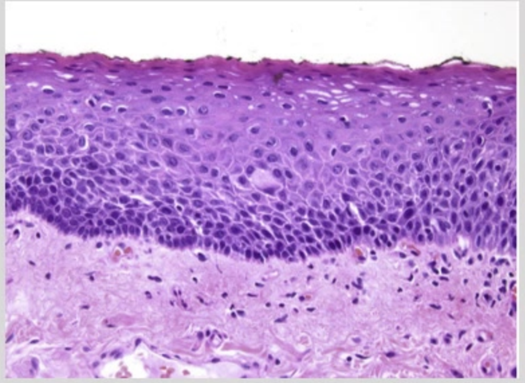
Fig. 1. A 79-year-old woman (patient 14) with exfoliative cheilitis involving both lips before (a) and after (b) 1 month of treatment with pimecrolimus ointment, showing partial response.

Fig. 2. A 77-year-old woman (patient 8) with exfoliative cheilitis involving primarily the lower lip before (a) and after (b) 1 month of treatment with pimecrolimus ointment, showing partial response.

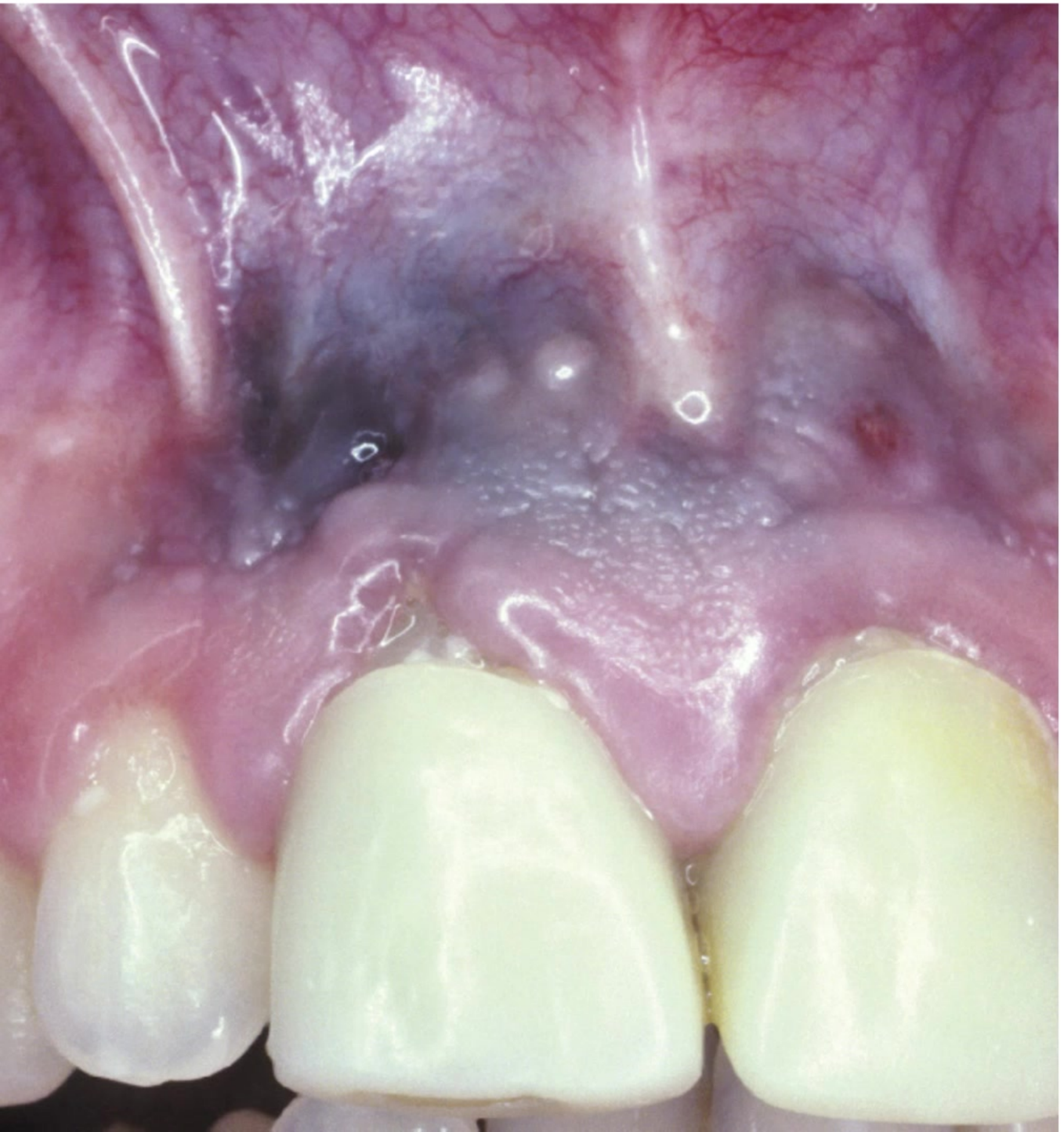
Almazrooa et al. 2013

Exfoliative cheilitis

- Histopathology: parakeratosis or hyperkeratosis, benign epithelial hyperplasia, acute or chronic inflammation and fibrosis, superficial fungal or bacterial microorganisms
- Management: difficult
  - Topical treatments include
    - Corticosteroids
    - Antibacterial and antifungal ointments
    - Sunscreen
    - Herbal products
    - Petroleum jelly
    - 2-3% salicylic acid ointment
    - 0.1% tacrolimus ointment
    - Cryotherapy with liquid nitrogen
- Systemic treatments: antidepressants, antifungal agents, corticosteroids



Almazrooa et al. 2013



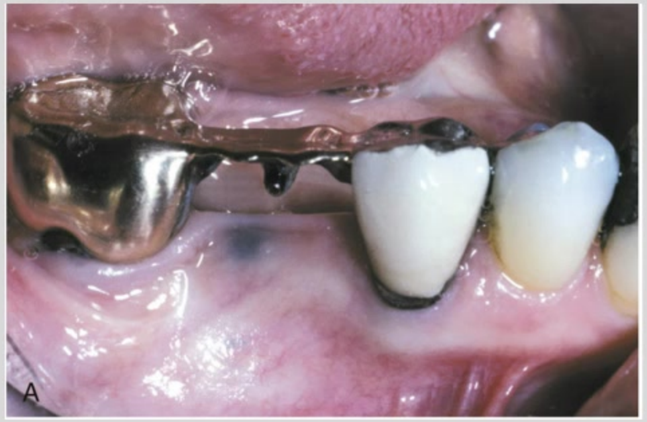
Amalgam tattoo and other exogenous pigmentation

- Amalgam tattoo
  - Implantation of dental amalgam in oral mucosa
  - Mucosal abrasion can be contaminated by amalgam dust within oral fluids
  - Broken amalgam pieces fall into extraction sites
  - Endodontic root fill procedures can be left within soft tissue at surgical sites
  - Metallic particles can be driven through oral mucosal from pressure of high speed air turbines

Image courtesy of Neville B, Damm D., 2016

Amalgam tattoo and other exogenous pigmentation

- Clinical Features:
  - Macules or slightly raised lesions
  - Black, blue, grey
  - Well-defined, irregular or diffuse borders
  - Lateral spread can occur for several months after pigmentation
  - Any mucosal surface – gingiva, alveolar mucosa, buccal mucosa
- Radiographic features: metallic fragments can be seen visibly – densely radiopaque



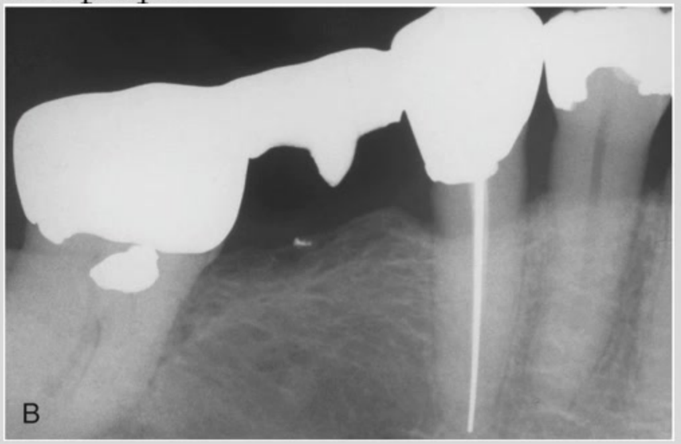


Image courtesy of Neville B, Damm D., 2016

Amalgam tattoo and other exogenous pigmentation

- Cosmetic tattooing – vermilion border of upper and lower lips
- Intentional tattooing – maxillary labial gingival in African countries
- Histopathology:
  - Pigmented fragments of metal within connective tissue
  - Scattered, large, dark, solid fragments or numerous fine, black, or dark-brown granules may be seen
  - Silver salts of dental amalgam preferentially stain reticulin fibers, especially those encircling nerves and vascular channels
- Diagnosis:
  - Obtain radiograph and demonstrate metallic fragments
  - Biopsy to rule out melanoma
- Treatment: no treatment required, or can be removed surgically if cosmetic issue

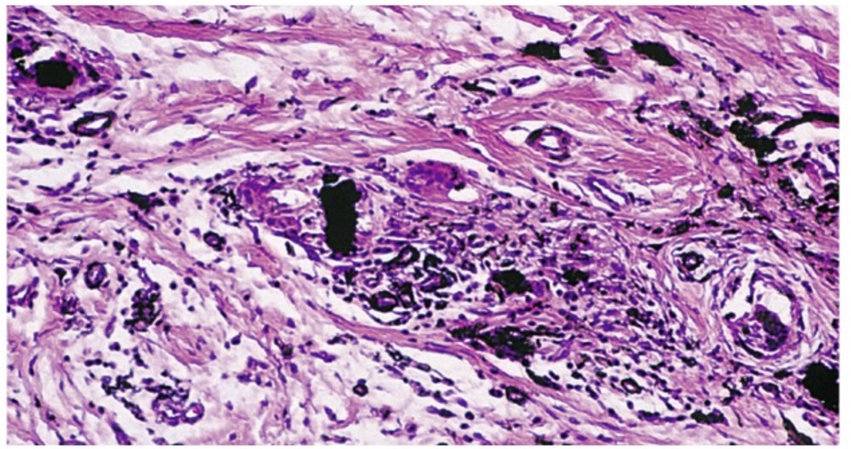


Image courtesy of Neville B, Damm D., 2016

Image courtesy of Neville B, Damm D., 2016

Smoker's melanosis

- Oral pigmentation increased significantly in heavy smokers
- Exposure to polycyclic amines (e.g., nicotine and benzpyrene) has been shown to stimulate melanin production by melanocytes that also are known to bind strongly to nicotine.
- Melanin production in the oral mucosa of smokers serves as a protective response against some of the harmful substances in tobacco smoke.

Smoker's melanosis

- Histopathology:
  - Increased melanin pigmentation of the basal cell layer of surface epithelium, similar to melanotic macule
  - Incontinent melanin pigmentation seen in superficial connective tissue
  - Scattered melanophages
- Diagnosis:
  - Smoking history
  - Clinical presentation
  - Medical history – rule out Petuz-Jeghers syndrome, drug related pigmentation, endocrine disturbance
  - Biopsy
- Management:
  - Cessation of smoking leads to gradual disappearance of lesion over 3 year period

Neville B, Damm D., 2016

Minocycline-related discolouration

Neville B, Damm D., 2016

Drug related discolouration of the oral mucosa

Histopathology:

- Dark brown granulated pigments in lamina propria
- Infiltration of fibroblasts and macrophages in subepithelial and perivascular areas

Diagnosis

- Medical history
- Clinical history
- Clinical examination +/- biopsy

Management:

- No long-term problems
- Discontinuing mediation results in gradual fading of areas of hyperpigmentation

Neville B, Damm D., 2016, Mallagray-Montero et al., 2022

Mucositis

Neville B, Damm D., 2016, Sroussi H et al., 2017

Oral complication of radiotherapy

- Candidiasis
  - Associated with mucosal pain, taste change, dysphagia
  - Pseudomembranous and erythematous candidiasis, angular cheilitis

- Neurosensory disorders: mucosal pain and taste dysfunction
  - Can be related to inflammation, ulceration, mucosal atrophy, mucosal neuropathy
  - Compounded by dry mouth
  - Mucosal sensitivity may persist long after clinical mucositis resolves
  - RT can cause neuroepithelial damage causing dysgeusia, or mucosal sensitivity (75% of cases)
  - Management: analgesics: topical, (NSAIDs), mild opioid combinations, Centrally acting medications, LLLT
  - Improvement of taste usually 3-6 months post-RT, but in some instances continue

Neville B, Damm D., 2016, Sroussi H et al., 2017

Neville B, Damm D., 2016, Sroussi H et al., 2017

Oral complication of radiotherapy

- Thank you!

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