Human Oral Mucosa
Development, Structure, and Function
1.1 ORAL MUCOSA: WHAT IS IT AND WHAT DOES IT DO?

Oral mucosa is a *mucous membrane*, a term used to describe the moist linings of body cavities that communicate with the exterior. These include the oral cavity, nasal passages, pharynx, gastrointestinal tract, and urinogenital regions. In the oral cavity, this lining is called the *oral mucous membrane* or *oral mucosa*. The exterior of the body has a dry covering, the skin, which is continuous with oral mucosa at the lips. Structurally, the oral mucosa resembles the skin in some respects and is very similar to the mucous membranes of the esophagus, cervix, and vagina (which will be considered in a subsequent chapter) but is totally different from the gastrointestinal mucosa.
Despite these differences, skin and the different mucosae all consist of two structurally different tissue components: a covering epithelium and an underlying connective tissue. These tissues function together so the various mucosae and skin can be considered as organs.

Form follows function, and it is easier to understand the complex structure of a tissue or organ when its function is known. This is particularly true of the oral mucosa, whose structure reflects a variety of functional adaptations. The major adaptations are a result of evolutionary changes that have taken place over a long time. However, small and usually reversible changes in structure of oral mucosa may be seen in response to function during the lifetime of an individual, but these are not heritable. The functions of oral mucosa and the tissue components subserving those functions are summarized in Table 1.1.

**Table 1.1  Functions of the oral mucosa.**

<table>
<thead>
<tr>
<th>Function</th>
<th>Structures involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td></td>
</tr>
<tr>
<td>Mechanical role</td>
<td>Friction/abrasion Epithelium (stratum corneum)</td>
</tr>
<tr>
<td></td>
<td>Compression/shearing Lamina propria (collagen/elastin)</td>
</tr>
<tr>
<td>Barrier role</td>
<td>Molecules Epithelium (superficial barrier)</td>
</tr>
<tr>
<td>Microorganisms</td>
<td></td>
</tr>
<tr>
<td>Sensory</td>
<td></td>
</tr>
<tr>
<td>Taste</td>
<td>Epithelium (taste buds)</td>
</tr>
<tr>
<td>Touch, temperature, pain</td>
<td>Epithelium and lamina propria (sensory receptors)</td>
</tr>
<tr>
<td>Synthesis/secrection</td>
<td>Saliva Minor salivary glands (lamina propria, submucosa)</td>
</tr>
<tr>
<td>Sebum</td>
<td>Sebaceous glands (lamina propria)</td>
</tr>
<tr>
<td>Esthetics</td>
<td>Vermilion border of lips</td>
</tr>
</tbody>
</table>
1.2 FUNCTIONS OF THE ORAL MUCOSA

The oral mucosa has a variety of functions of which the most important is protection of the deeper tissues and glands of the oral cavity. Other functions include sensory perception, synthesis, and secretion from glands located in the mucosa and an esthetic role represented by the mucocutaneous junction.

1.2.1 Protection

As a surface lining, the oral mucosa separates and protects deeper tissues and organs in the oral region from the environment of the oral cavity. The normal activities of seizing, biting, and chewing food expose the oral soft tissues to mechanical forces (compression, stretching, shearing) and surface abrasions (from hard particles in the diet). The oral mucosa shows a number of adaptations of both the epithelium and the connective tissue to withstand these mechanical insults. Furthermore, there is normally a resident population of microorganisms within the oral cavity that would cause infection if they gained access to the tissues. Many of these organisms also produce substances that have a toxic effect on tissues. The epithelium of the oral mucosa acts as the major barrier to penetration and also contributes to the immunoprotective system of the mucosa.

1.2.2 Sensation

The sensory function of the oral mucosa is important because it provides considerable information about events within the oral cavity, whereas the lips and tongue perceive stimuli outside the mouth. In the mouth, pharynx and epiglottis are receptors that respond to temperature, touch, and pain; there also are the taste buds, which are not found anywhere else in the body. These signal the traditional taste sensations of sweet, salty, sour, bitter, and umami (or savory), although it has been suggested recently that there is a “fat” taste (Laugerette et al., 2007). Certain receptors in the oral mucosa
probably respond to the “taste” of water and signal the satisfaction of thirst (de Araújo et al., 2003). Reflexes such as swallowing, gagging, retching, and salivating are also initiated by receptors in the oral mucosa.

1.2.3 Secretion

The major secretion associated with the oral mucosa is saliva, produced by the salivary glands, which contributes to the maintenance of a moist surface. The major salivary glands are situated distant from the mucosa, and their secretions pass through the mucosa via long ducts; however, many minor salivary glands are associated with the oral mucosa. Sebaceous glands are frequently present in the oral mucosa, and their secretions may have antimicrobial properties (see Chapter 2). Salivary glands secrete histatins, a family of low-molecular-weight histidine-rich proteins with antimicrobial activities. Oral epithelium is also capable of secreting a variety of antimicrobial factors such as defensins and cathelicidins, which participate in various aspects of innate immunity. These are described in Chapter 8.

1.2.4 Thermal regulation

In some animals (such as the dog), considerable body heat is dissipated through the oral mucosa by panting; for these animals, the mucosa plays a major role in the regulation of body temperature. The human oral mucosa, however, plays practically no role in regulating body temperature, and there are no obvious specializations of the blood vessels for controlling heat transfer such as arteriovenous shunts.

1.2.5 Esthetics

Skin color, texture, and appearance play an important role in signaling individual characteristics such as age, health, ethnicity, and so on. The oral mucosa is not normally visible except for the region where it joins the skin. Here, the ver-
milion zone of the lips represents a significant esthetic component, frequently enhanced with cosmetics in females.

REFERENCES
