

Grade 12 NTI Day #5 Anatomy

Assignment: Please read the excerpt below as an independent reading assignment. Then read and answer the questions below the excerpt.

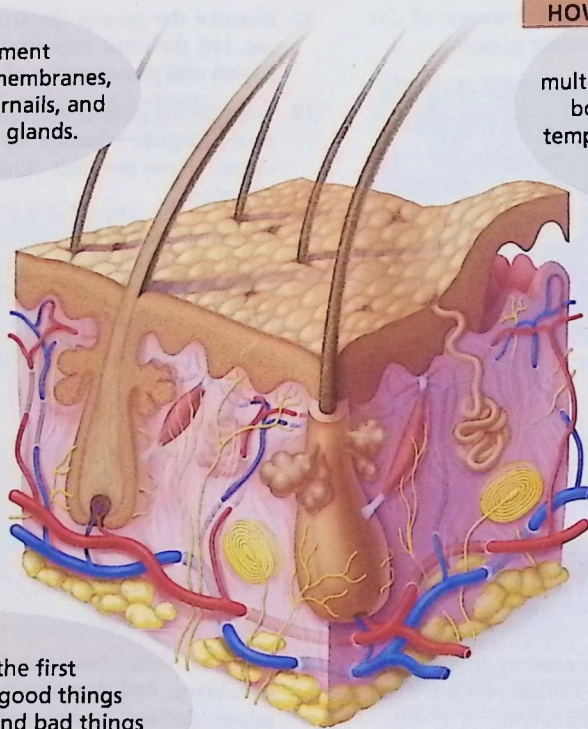
4 Skin and Body Membranes

WHAT

The integument includes body membranes, skin, hair, fingernails, and sweat and oil glands.

HOW

The skin has multiple layers that protect the body, help regulate body temperature, and help excrete wastes via sweat.



WHY

The skin is the first barrier to keep good things such as water in, and bad things such as harmful bacteria out.

Instructors may assign a related “Building Vocabulary” activity using Mastering A&P

Body membranes cover surfaces, line body cavities, and form protective (and often lubricating) sheets around organs. They fall into two major groups: (1) *epithelial membranes*, which include the cutaneous, mucous, and serous membranes; and (2) *connective tissue membranes*, represented by synovial membranes. The *cutaneous membrane*, generally called the *skin* or *integumentary system*, is the outer covering that we all rely on for protection. In this chapter, the skin will receive most of our attention, but first we will consider the other body membranes.

4.1 Classification of Body Membranes

Learning Objectives

- ✓ List the general functions of each membrane type—cutaneous, mucous, serous, and synovial—and give its location in the body.
- ✓ Compare the structure (tissue makeup) of the major membrane types.

The two major categories of body membranes—epithelial and connective tissue—are classified according to their tissue makeup.

4.1a Epithelial Membranes

The **epithelial membranes**, also called *covering* and *lining membranes*, include the cutaneous membrane (skin), the mucous membranes, and the serous membranes (Figure 4.1, p. 108). However, calling these membranes “epithelial” is misleading because it is not the whole story. Although they all *do* contain an epithelial layer, it is always combined with an underlying layer of connective tissue. Hence these membranes are actually simple organs. Because we will discuss the skin in detail shortly, we will list it here solely as a subcategory of the epithelial membranes.

Cutaneous Membrane

The **cutaneous** (ku-ta’ne-us) **membrane** is composed of two layers, the superficial *epidermis* and the underlying *dermis*. The epidermis is composed of stratified squamous epithelium, whereas the dermis is mostly dense irregular (fibrous) connective tissue. Unlike other epithelial membranes, the cutaneous membrane is exposed to air and is a dry membrane (Figure 4.1a).

Mucous Membranes

A **mucous** (myu’kus) **membrane** (**mucosa**) is composed of epithelium (the type varies with the site) resting on a loose (areolar) connective tissue membrane called a *lamina propria* (Figure 4.1b). This membrane type lines all body cavities that open to the exterior, such as those of the hollow organs of the respiratory, digestive, urinary, and reproductive tracts. Notice that the term *mucosa* refers only to the location of the epithelial membranes, *not* their cellular makeup, which varies. However, most mucosae contain either stratified squamous epithelium (as in the mouth and esophagus) or simple columnar epithelium (as in the rest of the digestive tract). In all cases, they are moist membranes that are almost continuously bathed in secretions or, in the case of the urinary mucosae, urine.

The epithelium of mucosae is often adapted for absorption or secretion. Although many mucosae secrete mucus, not all do. The mucosae of the respiratory and digestive tracts secrete large amounts of protective, lubricating mucus; that of the urinary tract does not.

Serous Membranes

A **serous membrane**, or **serosa**, is composed of a layer of simple squamous epithelium resting on a thin layer of areolar connective tissue. In contrast

to mucous membranes, which line open body cavities, serous membranes line compartments in the **ventral body cavity** that are closed to the exterior.

Serous membranes occur in pairs (Figure 4.1c). The *parietal* (pah-ri’ē-tal: *parie* = wall) *layer* lines a specific portion of the wall of the ventral body cavity. It folds in on itself to form the *visceral* (vis’er-al) *layer*, which covers the outside of the organ(s) in that cavity.

You can visualize the relationship between the serosal layers by pushing your fist into a limp balloon only partially filled with air (Figure 4.1d). The part of the balloon that clings to your fist can be compared to the visceral serosa clinging to the organ’s external surface. The outer wall of the balloon represents the parietal serosa that lines the walls of the cavity and that, unlike the balloon, is never exposed but is always fused to the cavity wall.

In the body, the serous layers are separated not by air but by a scanty amount of thin, clear fluid, called **serous fluid**, which is secreted by both membranes. Although there is a potential space between the two membranes, they tend to lie very close to each other. The lubricating serous fluid allows the organs to slide easily across the cavity walls and one another without friction or pain as they carry out their routine functions. This is extremely important when mobile organs such as the pumping heart and expanding lungs are involved.

The specific names of the serous membranes depend on their locations. The serosa lining the abdominal cavity and covering its organs is the **peritoneum** (per’i-to-ne’um). In the thorax, serous membranes isolate the lungs and heart from one another. The membranes surrounding the lungs are the **pleurae** (plo’re); those around the heart are the **pericardia** (per’i-kar’de-ah).

4.1b Connective Tissue Membranes

Synovial (si-no’ve-al) **membranes** are composed of loose areolar connective tissue and contain no epithelial cells at all. These membranes line the fibrous capsules surrounding joints (Figure 4.2, p. 109), where they provide a smooth surface and secrete a lubricating fluid. They also line small sacs of connective tissue called *bursae* (ber’sē) and the tubelike *tendon sheaths*. Both of these structures cushion organs moving against each other during muscle activity—such as the movement of a tendon across a bone’s surface. (Bursae and tendon sheaths will be discussed in more detail in Chapter 5.)

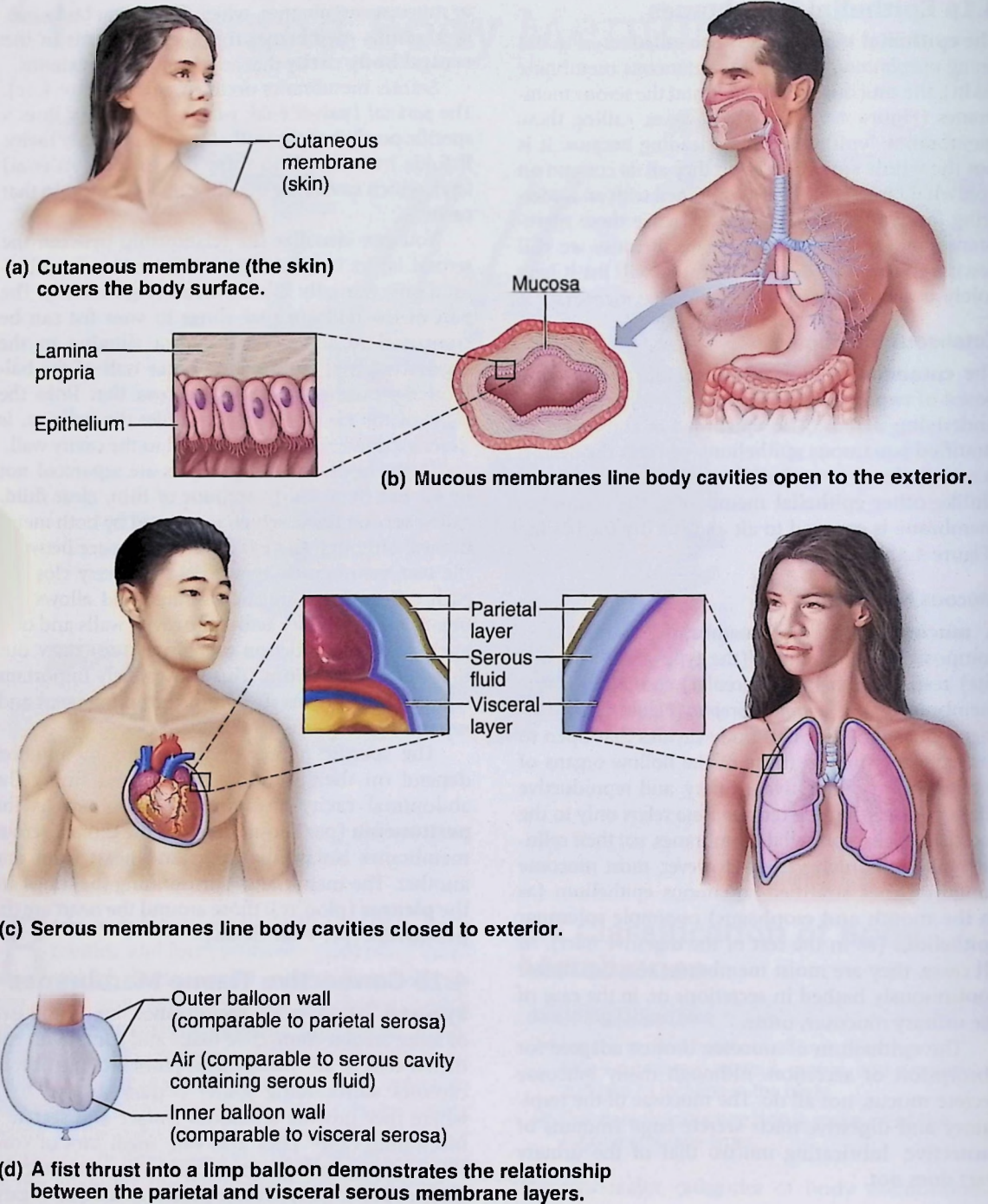


Figure 4.1 Classes of epithelial membranes.

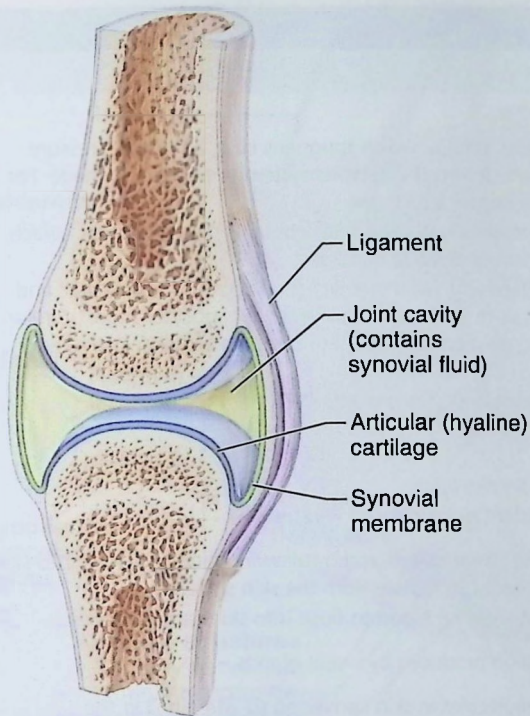


Figure 4.2 A typical synovial joint.

Anatomy
NTI Day #5 Worksheet

1. Which of the following is a characteristic of the cutaneous membrane?
 - a) It lines body cavities open to the exterior.
 - b) It is always a moist membrane.
 - c) It is composed of stratified squamous epithelium and dense connective tissue.
 - d) It secretes mucus for lubrication.

2. Where would you find a serous membrane?
 - a) Lining the joint cavities
 - b) Covering the exterior surface of the body
 - c) Lining the respiratory tract
 - d) Lining closed body cavities

3. Which layer of a serous membrane directly covers the organs within a cavity?
 - a) Parietal layer
 - b) Visceral layer
 - c) Synovial layer
 - d) Mucous layer

4. What type of tissue makes up synovial membranes?
 - a) Stratified squamous epithelium
 - b) Simple squamous epithelium
 - c) Loose areolar connective tissue
 - d) Dense fibrous connective tissue

5. What is the function of serous fluid between serous membranes?
 - a) It secretes mucus for lubrication.
 - b) It reduces friction between organs.
 - c) It forms a protective dry layer.
 - d) It supports the formation of tendons.