INTEGUMENT

The integument consists of the skin, and a variety of skin derivatives. In humans, these include hair, nails and several types of glands. In other mammals, these cutaneous appendages include scales, quills, spines, claws, hooves, and horns. The skin consists of a superficial epithelial component, the epidermis, and an underlying layer of connective tissue, the dermis. Together these layers cover virtually the entire external body surface. The skin appendages derive from the epidermis and are therefore morphologically and functionally related to this epithelium. However, as you will see, in the adult some of these structures may have invaginated deeply into the dermis. Keep in mind that the epidermis and its derivatives are avascular; thus they depend on the underlying highly vascularized and innervated dermis for nutritional support.

The mammary glands (breast) will be examined in this lab since they are derived from, and reside within, the skin of the thorax.

Important cutaneous nerve receptors that are found in the skin will also be studied in this laboratory.

SKIN

The skin shows topographical diversity, ranging from thick to thin, rough to smooth, hairy to seemingly hairless (glabrous). In all cases the epidermal component consists of stratified squamous epithelium of varying thickness and degrees of cornification. Four different kinds of cells comprise the epidermis: keratinocytes, melanocytes, Langerhans cells, and Merkel cells.

A distinct basement membrane separates the epidermis from the underlying connective tissue dermis. The interface between these two strata, the dermoeipidermal junction, varies over the body from relatively smooth in thin skin to highly corrugated in thick skin. Based on the organization of the various connective tissue fibers, especially collagen, the dermis can be divided into two layers: an outer or superficial papillary layer and an inner or deep reticular layer.
The papillary layer tends to be loose, irregular fibrous connective tissue, while the reticular layer is dense, irregular fibrous connective tissue.

Beneath the dermis is a loose connective tissue layer of variable thickness and composition but usually containing considerable white adipose tissue. Its boundary with the overlying dermis is often indistinct. This subcutaneous layer, which corresponds to the superficial fascia of gross anatomy, is called the hypodermis.

**SOMATOSENSORY RECEPTORS**

Somatosensory receptors are abundant in skin (hairy and hairless). Most of these receptors are minute and require special staining methods to demonstrate. Two of the large encapsulated types (Meissner’s and Pacinian corpuscles) may be seen in routine H&E preparations. A summary of the various types of cutaneous receptors follows:

**Meissner’s corpuscles**: These consist of sensory nerve endings within a layered and encapsulated sensory organ in the dermal papilla.

**Pacinian corpuscles**: These structures, usually found in the deep dermis/hypodermis, are quite large. They have a single sensory axon that is encased in concentric layers of connective tissue (much like an onion).
Sensory receptors of the skin

Diagram of the sensory receptors in the skin. a. Epidermal free ending. b. Merkel ending. c. Pacinian corpuscle. d. Krause end bulb. e. Meissner's corpuscle. f. Ruffini corpuscle. Note that c-f are encapsulated, i.e., surrounded by a capsule of connective tissue.

GLANDS OF THE SKIN

The glands of the skin include sweat glands and sebaceous glands. Two types of sweat glands are seen, eccrine glands and apocrine glands. Apocrine sweat glands are more likely to be found in the axilla and perineum. Sebaceous glands are typically associated with a hair follicle.
MAMMARY GLAND (Breast)

The mammary glands are also developmental appendages of the skin. Each develops from about 20 cords of epidermal epithelial cells that penetrate into underlying connective tissue. Each cord develops into a lobe comprised of the rudiments of a compound tubular exocrine gland, which empties through its own lobar (lactiferous) duct at the nipple. After puberty, each lobar duct gives rise to several groups of smaller interlobular ducts. The development of the duct system and accumulation of fat account for enlargement of the mammary gland at this time. No further mammary gland development occurs until pregnancy. During pregnancy, the smaller interlobular ducts give rise to the many secretory portions of the glands, called alveoli, responsible for lactation. There are sebaceous glands (glands of Montgomery) the open onto the areola, providing lubrication.
CHECK LIST

Understand the morphology and components of thin and thick skin as well as its location on the body and the morphology of the layers of skin:
- epidermis
- dermoeipidermal junction
- dermis
- hypodermis (subcutis) (superficial fascia)
- papillary layer
- reticular layer

Learn the characteristics and contents of the epidermal strata:
- basale (germinativum)
- spinosum
- granulosum
- lucidum
- corneum

Recognize both the structure and function, in both LM and EM images, of the four types of cells of the epidermis:
- keratinocytes
- melanocytes
- Langerhans cells
- Merkel cells

Recognize the terms below related to pilosebaceous units:
- hair follicle
- hair bulb
- hair shaft
- dermal matrix
- dermal papilla
- sebaceous glands
- arrector pili muscle

Know the structure, location, secretory pattern and mode of secretion of:
- sebaceous glands
- eccrine (merocrine) sweat glands
- apocrine sweat glands

Know structure and function of:
- Meissner corpuscles
- Pacinian corpuscles

Understand the morphology of the mammary gland (breast) in resting and lactating tissue.