

HISTOLOGY VIRTUAL LABORATORY

DERMAL SYSTEM

Purpose: This exercise is to identify the histological features of the integumentary system comprised of thick and thin skin, scalp, hair, nails, and glands.

I. SKIN - (Slides Derm 1 – 4, GI 1 & 2)

The skin is an organ that provides an external covering of the body. It consists of two major layers, the **epidermis** and the **dermis** separated by a basement membrane.

The epidermis is a dry stratified squamous epithelium with keratinized superficial layers. The epidermis is specialized depending upon the functional requirements placed upon the area, and may be used to distinguish between **thick skin** (palmer and plantar surfaces) and **thin skin** (body skin). It is a non-vascular layer. Nutrition is achieved by fluid transudation from the dermis.

The **dermis** (corium) is the subjacent dense bed of vascular connective tissue.

A still deeper layer is the **hypodermis**. While not part of the skin, it is often described in association with it. This layer contains large amounts of adipose tissue and is known as 'superficial fascia' in gross anatomy.

A. Epidermis

Slides **Derm 1 & 2** are sections from the palm and represents examples of “**thick**” skin. Slide **Derm 3** (section of scalp) and slide **Derm 4** (section of developing phalange), slides **GI 1 & 2** (from G-I system), contain examples of “**thin**” skin. The epidermis is composed of strata or layers. The deepest layer is the **stratum basale** (germinativum). The majority of the mitotic activity associated with the epidermis occurs in this layer.



The **stratum spinosum** also exhibits some mitotic activity. Desmosomal contacts between the cells in this layer are very numerous. Shrinkage during fixation causes the cells in this layer to lose contact with each other on all surfaces except at the sites of the desmosomes thus giving the cells a "spiny" appearance. The **stratum granulosum** is so-called due to an abundance of non-membrane bound **keratohyalin granules**. **Stratum lucidum** is a thin layer of flattened, eosinophilic, non-nucleated cells. **This layer appears only in thick skin.** The outermost layer, **stratum corneum**, consists of several layers of flat, keratinized cells. Nuclei and other cell organelles are absent. The cytoplasm is filled with keratin.

The epidermis projects downward into the dermis. These epithelial projections are called **epidermal ridges**. Consequently, the epithelial projections cause the connective tissue of the dermis to project upwards into the epidermis. These projections are termed **dermal papillae**.

B. Dermis

1. The dermis is subdivided into a **papillary layer** (subepithelial) and a **reticular layer**:
 - a. The papillary layer is thin and is composed of loose connective tissue. Fine collagenous **anchoring fibrils** extend from this layer into the basement membrane of the epidermis and into the underlying reticular layer of the dermis. They function to bind the epidermis to the dermis.
 - b. The reticular layer is relatively thick and is composed of irregular dense connective tissue. Located in this layer are: **blood vessels**, **lymphatic vessels**, **hair follicles** (thin skin only), **sebaceous glands**, and secretory parts of **sweat glands**.
 - c. Hair follicles (thin skin) and sweat glands are also present in the hypodermis.
2. Specialized nerve endings located in the dermis include:
 - a. **Meissner's corpuscles** - specialized for the reception of touch. They are distributed in the **dermal papillae**.
 - b. **Pacinian corpuscles** - specialized for the reception of pressure. They are most frequently found in the hypodermis.
3. Examine slides **GI 1 & 2** (lip) and **Derm 3** (scalp) and compare the layers with those of thick skin.
4. Examine slide 28 (scalp). Locate hair follicles, sebaceous glands, and arrector pili muscle (see below).

II. Hair - (Slide Derm 3 - scalp)

The individual hair consists of a free **shaft** and a **root**, which is embedded, in skin. Each hair arises as a tubular invagination of the epidermis, the **hair follicle**, which extends into the dermis. At its lower end, the follicle is enlarged and termed the **hair bulb**. Indenting the basal end of the bulb is a **papilla** of connective tissue.

Identify the **dermal root sheath**, **outer root sheath**, **inner root sheath**. The **cuticle**, **cortex**, and **medulla** are difficult to identify on this slide. Locate also **sebaceous glands**, and the **arrector pili muscle**.



III. Nails

The nail (Derm 4) is a specialization of the epidermis. It consists of flattened, keratinized cells in the form of scales referred to as the **nail plate**. The nail plate rests on a less specialized **nail bed**, which consists of a germinative layer of epidermis with dermis beneath it. The nail plate has a **free edge**, **body**, and a **root**. At the base of the exposed plate a crescentic whitish zone, the **lunula** may show.



The nail plate is contained within a U-shaped nail groove, formed by the skin. The nail groove is bordered by a skin fold termed the **nail fold**. The **proximal nail fold** is the epidermal layer, which overhangs the base of the nail root. The stratum corneum in this region extends forward out of the nail plate and is called the **eponychium** (commonly called the **cuticle**). The epidermis that passes under the nail plate near the free edge of the nail gives rise to a stratum corneum distally that is called **hyponychium**. The epithelium which lies beneath the root is relatively thick and functions to produce more nail. This epithelial region is called the **nail matrix**. Identify the structures mentioned above.