Epidermis Cells

Cyte = Cell

**Keratinocyte:** is a cell that produces keratin.

This keratin is with a “k” later you will find a carotene with a “C” which is a pigment.

This keratin is a water proofing material like cutin in a leaf.

90% of all epidermal cells are this type.

So, Stratified Squamous Epithelium cells are Keratinocytes.

**Melanocytes:**
A melanin containing or producing cell.

Melanin is one of the pigments. Like Carotene with a “C”.

Melanin is about 8% of the cells.

Melanocytes are producing melanin - a brownish black coloration of the skin.

Everyone no matter what race you are has the same number of melanocytes.

The difference in race is how fast those melanocytes are producing melanin.

That is the racial difference.

**Process:**
The melanocyte cells are found in the stratum basale layer, the deepest layer, one cell layer thick. They are antler shaped with projections moving up into the keratinocyte region.

Melanin is produced and released outside of the melanocytes up between the keratinocytes and they in turn eat it “Phagocytosis”

When you tan the UV light stimulates the melanocyte to increase its rate of production of melanin.

The keratinocytes then, due to mitotic division move up toward the surface where they flake off as dead skin. So, the color pigment also moves with the cell. Then your tan fades when the cells flake off.
Melanin is there to shade the DNA material from the UV-light

The darker the race the more production of melanin.

**Langerhans cell:** These cells are generated in the bone marrow and migrate to the epidermis.

They interact with the white blood cells called Helper T cells (lymphocytes).

They are easily damaged by UV-light

This is the most superficial immune cell that you have, it is your first line of defense in the skin against bacterial and viral invaders.

Two examples of how you can damage this cell: 1) Through antibody studies it was found that 90% of people in this country have herpes simplex 1 (oral herpes)

Not everyone gets fever blisters and doctors are not sure why. However in most people it is dormant.

If you are a person who is not dormant you may be aware that one of the triggers that give you blisters is being out in the sun a lot.

This is very common. The excess UV-light damages the Langerhans cell that was keeping the herpes in check. Now with not cell to stop it the herpes virus multiplies and you get blister.

The same effect from herpes zoster the “Chicken pox virus” and at an older age you end up with Shingles. Just from a bad sunburn.

You can also get Shingles when you are older when your immune system gets weaker.

**Merkel cell:** (Merkel disc or type one cutaneous mechanoreceptor)

Located in the stratum basale. It is a dendrite ending. This is not the root hair plexus which you feel when something brushes your hair on your arm. These are receptors of hairless skin.

Not to be confused with the corpuscle of touch “**Meissner's Corpuscle**” pg 96 - it is in the dermis and is superficial to Merkels which is not shown.

So what is the difference - If you slightly touch your fingers together so they tickle that is
Merkels. If you press harder you are doing Merkels and Meissners.

Another receptor besides Merkel and Meissner’s is **Pacinian Corpuscle**

Looks like a cross section of an onion. It is multilayered and its function is based on pressure.

Merkels and Meissners are found in the skin only but Pacinian corpuscles are found all over your body.

Like right now you are sitting and you feel a sensation of pressure on your behind the pacinian in your skin allow you to feel that.

When you are standing upright the pressure you feel in the joints of your body those are Pacinian also telling you about your body position.

When you pig out at a meal and you feel really stuffed those are pacinians

If you are having menstrual Cramps pacinians allow you to feel that pressure.

They are found in the viscera, skin and joints.

**Structure of Skin “Epidermis”**

It is made up of 5 stratum layers: Page 96 - from deep to superficial

1) Basale 2) Spinosum 3) Granulosum 4) Lucidum 5) Corneum

All are stratified squamous epithelium

1) **Basale** - one layer thick, cell is cuboidal to columnar shape cells containing melanocytes, continuous cell division occurs in this region. *(BIRTH)*

2) **Spinosum** - made up of several layers, they appear to be thorn like or spiny, active living normal Keratinocytes. They have not started to die yet. *(LIFE Middle age)*

3) **Granulosum** - Cells start to die, the first thing that you notice is that they have specs in the cytoplasm. Granules in the cytoplasm. It consists of 3-5 layers in thick skin and 2-3 in thin skin. They develop darkly staining granules of a substance called **Keratohyalin**. This compound is a precursor of keratin a water proofing protein. *(DEATH)*
4) **Lucidum** - Dead flat cell that are clear (Lucidus - clear)
Here the Keratohyalin becomes Eleidin which will become Keratin in the stratum Corneum.

5) **Corneum** - Dead surface layers - In thick skin it is 25 - 30 layers thick, 3-5 in thin skin. This is what makes the callus on your feet and hands. The extra thick protective layer.

**Thick Skin**: Sole of foot palm of hand, lacks hair
All stratum layers are present, stratum corneum is about 25-30 layers thick.

**Thin Skin**: Eye lids and Male foreskin, has hair, most of the body is this skin.
All layers are present but the stratum corneum is only 3-5 layers thick.

**Structure of Skin “Dermis”**

**Papillary region (minor)**: (Areolar Connective tissue) where you will find the Merkels disc and Meissners corpuscles.

**Reticular Region (Major)**: (Dense irregular collagenous connective tissue)

Leather of an animal is this region - epidermis and papillary are scraped away and you have a very strong fiber because of all of the collagenous fibers running in different directions.

**View Model to show thick vs thin layers.**

**View dermal papilli** - in fingers and toes the ridges are so predominant that they make the surface bumpy and that is your fingerprint.

**HAIR:**

Found in the dermis, pg 96,
**Stratum Basale** (epidermis layer) the mitotic active layer dips down into the dermis.

Surrounds and forms the **sebaceous gland** which produces oil into the hair follicle.

Its also epidermis cells producing the hair in the hair bulb.
There is actually a matrix in the hair that is comparable to the stratum basale.

So a hair goes through all of the stratum - basale, spinosum, granulosum, lucidum and corneum. When the hair gets to the surface of the skin it is DEAD! Shaving!

Look at the outside of the hair pg 101 figure 4.6 - Notice the hair has scales on it that resemble shingles on a roof. Without conditioner they stand up like an open pine cone.

**GLANDS:**

1) **Sebaceous glands** that produce a substance called **Sebum** pg 99, that lubricated the hair and skin.

2) **Sudoriferous glands or sweat glands**: (Stratified cuboidal epithelium) Two types - **eccrine and apocrine** - It looks like a hose running down into the dermis and then it is bunched up at the bottom.

   1) Eccrine: most common all over the body,
   2) Apocrine is only in selected areas,

3) **Ceruminous**: it produces cerumen the wax material in your external ear. The book does not mention it but you should be aware of it.

Hair muscle - **arrector pili muscle** - stands the hair on end, it gives you goose bumps.

What type of muscle could this be? Cardiac, skeletal or smooth?

Skeletal is voluntary and smooth is involuntary - **SMOOTH** - you have not control over it!

In the nervous system we will talk about fight or flight - when you are scared the arrector pili muscle will make you hair stand on end. Like a cat that is fighting their hair stands on end!

Does not do us much good because we no longer have enough fur to help anymore.

**Skin Color**: We have already discussed **melanin** but what is a **freckle**? It is when melanin accumulates in patches. When people age they get what are called **liver spots** again like a freckle this is an accumulation of melanin. Neither of these tend to become cancerous.

**Albinism**: is the inability to produce melanin. The individuals have melanocytes but the cells can not synthesize melanin. Therefore melanin is absent from hair, skin, eyes. It turns out that the whole area inside your eye (coroid) just outside the retina that has a
large amount of melanin. It gives the entire inside of the eye ball a black coloration. The reason an albinos eyes are red is because you can see the blood vessels in the back of the eye.

**Vitiligo:** is the partial or complete loss of melanocytes in patches. This is more identifiable in blacks - M. Jackson has this and he has been criticized for trying to even out this light skin.

**Carotene:** a yellow orange pigment a precursor to V-A which is used to synthesize pigments needed for vision. It will turn your skin orange if you take in a lot of carrots. It is found in the stratum corneum and fatty areas of the subcutaneous layer.

**Hemoglobin:** the red color of blood. The color you have is the combination of all three pigments.

### Nails

On the top of pg 102 is a longitudinal section of a fingernail. Note the area Cuticle or Eponychium (epo-nick-eum). Nail grows from the nail matrix so if you slam your nail in a door and change the arrangement of those cells your nail will grow with those irregularities in it.

### Burns

1st degree burns you damage epidermis (pg 102-103)  
2nd degree you have destroyed the epidermis and you are damaging the dermis area.  
3rd you have destroyed all layers of skin and you need a skin graph to be replaced