

# Embryonal Integumentary system

The integumentary system is the largest organ system. It's function is to protect the body and acts as a site for receptors. It is comprised of the skin, hair, sweat glands and mammary glands.

## Skin

### Epidermis

This superficial layer develops from the surface ectoderm. At first only a single layer of these ectodermal cells cover the embryo, but by the beginning of the second month, the epithelium develops into periderm. This is a layer of flattened cells which are cast off and can be found in the amniotic fluid during the second part of interuterine life. As cells proliferate, an intermediate zone, the basal layer forms. At the end of the fourth month, four layers can be distinguished:

- Basal layer (germinative layer) – for the production of new cells. This layer later forms ridges which are seen in fingerprints.
- Spinous layer – has large polyhedral cells and tonofibrils
- Granular layer – contains keratohyaline granules
- Horny layer – forms the tough surface layer due to closely packed dead keratin containing cells.

The epidermis is invaded by cells from the neural crest during the first three months. These cells are responsible for pigmentation of the skin and hair. They synthesise the pigment melanin in melanosomes. Melanosomes are then transported down melanocytes via their dendrites, and transferred to keratinocytes of the skin and hair bulb.

### Dermis

This deep layer develops from the underlying mesenchyme, which has three sources:

1. Lateral plate mesoderm – supplies cells for dermis of limbs and body wall
2. Paraxial mesoderm- supplies cells for dermis in the back
3. Neural crest cells – supplies cells for dermis in the face and neck.

The corium of the dermis forms many irregular papillary, the dermal papillae, which project into the epidermis above it. Papillae contain a small capillary or sensory nerve ending. These projections develop during the third and fourth months of development. The second layer of the dermis is known as the sub corium. It contains large amounts of fatty tissue.

### Vernix caseosa

This is a whitish paste which covers the skin of a baby at birth. It is formed by secretions from sebaceous glands and degenerated epidermal cells and hairs. The function of the vernix is to protect the skin of the newborn against the amniotic fluid.

## Hair

Hair begins to develop by the end of the third month of embryonal development. It arises from the germinative layer, and then penetrates the underlying dermis where hair buds invaginate at their terminal ends (hair papillae). The hair papillae are filled with mesoderm in which nerve endings and vessels develop. the shaft of the hair forms when cells at the centre of hair buds become spindle-shaped and keratinised. Peripheral cells become cuboidal and give rise to the epithelial hair sheath. The dermal root sheath is formed by surrounding mesenchyme. Also from the mesenchyme develops a small smooth muscle, the arrector pilli muscle. it is attached to the dermal root sheath and serves the purpose of pushing the hair upwards. The first hairs appear on the eyebrows and upper surface of the lip. The first hairs that appear are known as lanugo, and are usually shed by birth. It is later replaced by more coarse hairs form new hair follicles. There is usually a small bud from the epithelial wall of the hair follicle which penetrates the mesoderm around it. cells from here go on to form sebaceous glands. Whereas, cells from the centre of the gland degenerate to form a fatty substance called sebum. this is secreted into the hair follicle, through which it reaches the skin.

Sebaceous glands, sweat glands and mammary glands all develop from epidermal proliferations.

## References

*T.W Sadler*, Langman's Medical Embryology 11th edition

