

THE SKIN

THE BODY'S DEFENCE MECHANISM

The skin is a vital organ in the body's defence against external harm as well as playing a vital role in maintaining health, facilitating tasks such as temperature regulation and immune function. This article looks at how the skin is vital to well being and why damage in the form of trauma or wounds can have such a negative effect on patient's overall health.

Pauline Beldon is
Tissue Viability
Nurse Consultant
for Epsom and St
Helier Hospitals
NHS Trust

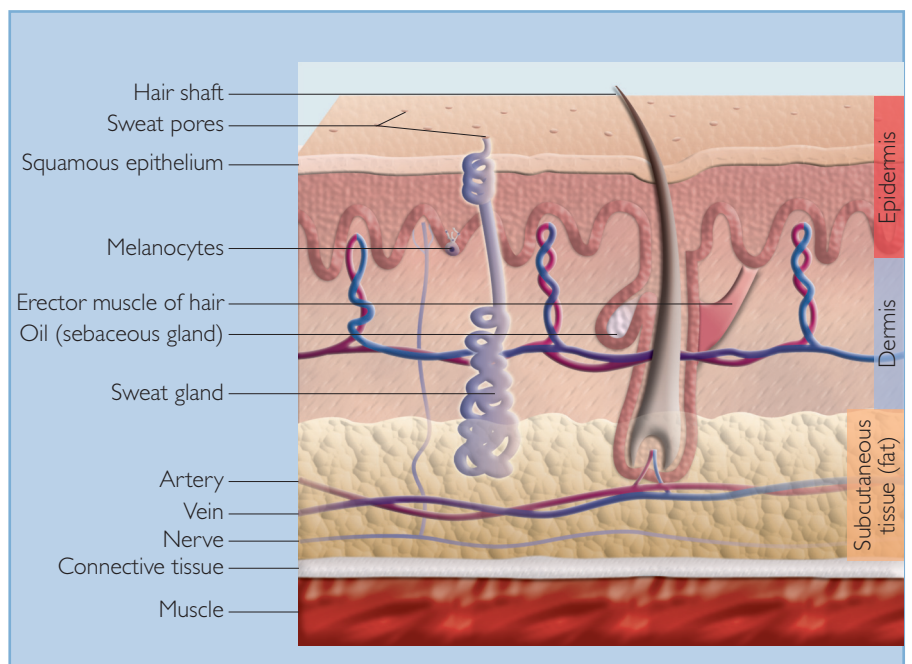


Figure 1. The anatomy of the skin.

The skin is an extraordinary organ with many different functions. It covers an area of approximately 2 square metres and provides about 10% of the entire body mass. Unlike other organs, the skin is exposed to the outside environment and so subjected to wear and tear from sunlight, clothing, chemicals and pollution, as well as trauma through burns, accidents or surgery.

The skin is often taken for granted and only truly appreciated when a problem arises, such as infection, dermatitis, sensitivity or injury. All those working with patients have

a responsibility to explain the importance of the skin and how good care can improve quality of life and skin integrity.

Physiology

The skin contains three layers, the epidermis, the dermis and the subcutaneous tissue:

▶▶ The epidermis: this is the outer layer of the skin. Its thickness varies depending on the area of the body covered, i.e. it is thinner on the eyelids than on the soles of the feet. The epidermis consists of five layers that continually push already formed cells through

to the layer above — the top layer of the epidermis, the stratum corneum, consists entirely of dead skin cells

▶▶ Dermis: this consists of two layers, the upper papillary layer and a lower, reticular layer, both of which contain three tissue types in varying degrees, collagen, elastic tissue and reticular fibres. The papillary layer comprises a thin layer of collagen fibres; the lower reticular layer is thicker and made of thick collagen fibres. The dermis contains hair follicles, sebaceous (oil) glands,

eccrine (sweat) glands, blood vessels and nerves

- ▶ Subcutaneous tissue: the bottom layer of the skin is made up of fat and connective tissue. It contains larger blood vessels and nerves and is vital in regulating temperature. The subcutaneous layer acts as a cushion and helps to store energy reserves. However, too much fat results in obesity and means the individual will be prone to disease; too little fat and the individual may suffer from malnutrition.

Certain elements of the skin have very particular roles:

- ▶ Melanocytes are the pigment cells and are present in everyone's skin to greater or lesser amounts. They give each person's skin its individual colour
- ▶ The muscles that control the hair follicles cause them to be raised when we're cold ('goose bumps'). This helps to trap warm air and keep the body heated
- ▶ Sebaceous or oil glands produce sebum, a greasy substance that helps to lubricate the skin
- ▶ Sweat glands allow the body to perspire and by doing so reduce its temperature
- ▶ Arteries supply the skin with oxygen and nutrients, veins remove metabolic waste and excess fluid.

Wider functions of the skin with regards to health

Sensation

The skin contains approximately one million nerve fibres, which enable the body to feel heat, cold, touch, pressure and pain. The nerves act as a warning system

telling us to move away from extreme heat or cold to prevent injury. The signals received cause the individual to move promptly away from the source of pain.

Temperature regulation

In order for the body to work effectively, it needs to both maintain an ambient temperature and prevent both heat loss and excessive body heat, both of which would cause organ damage. When excess heat or cold is perceived by the nerve fibres, those signals are passed to the hypothalamus in the brain, which then induces perspiration or shivering to either reduce or increase body temperature. Perspiration causes fluid and body salts to be lost via the sweat glands.

Vitamin D synthesis

Vitamin D is vital for the regulation of calcium, which affects the strength of bones — the skin produces vitamin D by absorbing sunlight.

Protection

The skin acts as an external barrier to bacteria, preventing infection and protecting the internal organs. The skin also protects the body from ultraviolet radiation using the pigment barrier formed from melanocyte cells found in the top of the papillary dermis and a protein layer found in the epidermis.

Regeneration

The skin is able to repair itself provided sufficient quantities of the basement reticular dermis survive injury.

Communication

Humans are the only mammals able to use facial expression and

touch as a means of expressing aggression, love, concern and friendship. Changes in the appearance of the skin, e.g. through scarring, age or skin disease, can alter how people perceive others.

Immune function

Specialist cells within the dermis (known as Langerhans and mast cells) prompt a reaction to potential allergens or bacteria, leading to the inflammation of the skin.

Ageing skin

Just as other organs within the body age and may not function as well, so it is with the skin. As the skin ages, the epidermis becomes thinner and flatter, there is a decrease in the number of the pigment-producing cells (melanocytes), which results in 'liver spots' in pale-skinned individuals. The elderly are also at increased risk of sun-induced cancers and skin disorders.

In the young there is a viable connection between the epidermis and the dermis, known as the dermal-epidermal junction. This this strong connection helps to prevent skin trauma, however it weakens with age.

With age, the blood supply to the dermis weakens, there are less elastic fibres and the amount of collagen is reduced, resulting in wrinkling. The reduced blood supply also means there are less oxygen and nutrients delivered to the skin. In a person with a normal build, there is a decrease in the amount of subcutaneous fat, making the elderly more susceptible to hypothermia in cold weather, but also hyperthermia in hot weather. **WE**