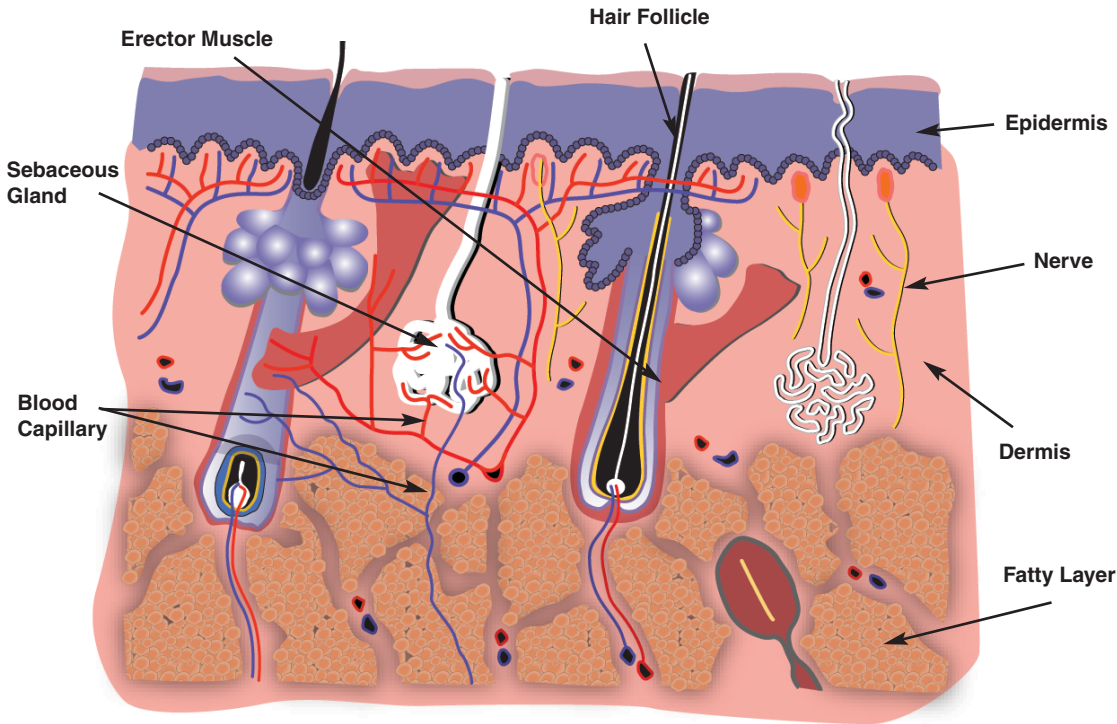


Structure of the Skin

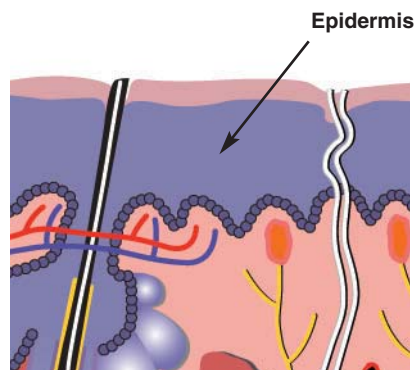


The skin is the largest organ in the human body and is very important for regulating the internal environment of the body. Key functions of the skin include:

- Protecting the body from invading microorganisms by providing a barrier
- Together with the skeleton the skin forms part of the rigid structure which houses the bodies organs
- Temperature regulation
- Ion regulation within the body
- Waterproof
- The sense of touch and a surface through which the body can interact with the outside world
- Friction ridge skin enables digits to grip objects which enables greater mobility and functionality
- Protecting the body from harmful UV rays

The Epidermis

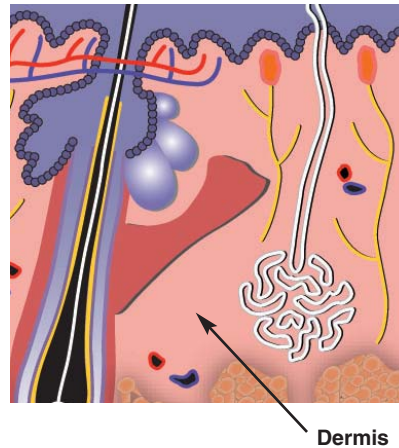
The outside layer of the skin consisting of the basal layer where new cells are continually being made through mitosis and move towards the surface where they die and form the outermost layer which is constantly being sloughed away through friction. This part of the skin contains the keratin and the oil released from the sebaceous glands which keeps the skin waterproof.



The Dermis

This inner layer contains the functional structures of the skin;

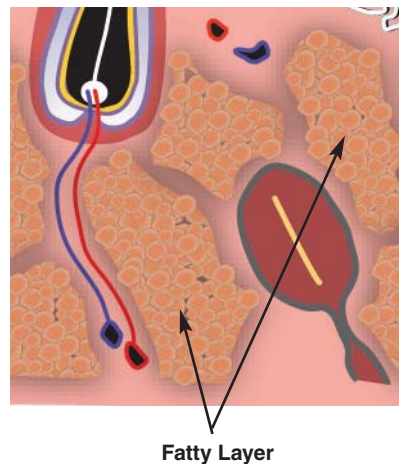
- Elastic fibres which make the skin resilient and unsusceptible to tearing
- Capillaries which supply the structures in the skin with oxygen and other important substances as well as helping to thermo regulate the body by vasodilatation or vasoconstriction
- Hair follicles grow in pits in the dermis and also can be moved by muscle fibres to be part of thermoregulation.
- Nerve fibres to activate muscles and glands and to transfer messages from the sensory cells to the brain.
- Sweat glands which open onto the surface as pores and release ions as sweat
- Sebaceous glands which produce oil which keeps hair free from dust and is antibacterial and helps to maintain the skin as waterproof.
- On the palms of the hands and feet eccrine glands produce a sweat chemically different to the sebaceous sweat.
- Pigment cells which produce melanin a dark pigment which helps protect the skin from dangerous UV rays, and causes the skin to tan.



Fat layer

This varies in thickness around the body and has several uses;

- As a store of fat for energy, many animals diets are affected by the seasons and so when food is plentiful fat reserves are 'stocked up' which can then be used when food is scarce.
- Insulation to protect internal organs from adverse temperatures, either hot or cold.
- On some parts of the body a layer of fat works as a shock absorber protecting the internal organs from violent shocks



The Skin and Homeostasis – Temperature Control

Homeostasis is the term used for the ways in which the body regulates key factors which form its internal environment. The skin is very important as part of the method by which the body regulates its temperature.

Contraction of hair erector muscles

Normally the hairs on human skin are erect because the erector muscles are contracted which traps a layer of warm air by the surface of the skin between the hairs. When the surface of the skin is too warm these muscles relax laying the hairs flat and so allowing the free movement of air over the skin and the loss of heat by convection.

Vasodilation of skin capillaries

When the body temperature is high the capillaries undergo vasodilation to allow blood to flow closer to the surface of the skin and so enable them to lose heat easier and benefit more from sweating. Similarly in cold adverse conditions the blood capillaries undergo vasoconstriction to prevent blood flowing to the skin, in extreme conditions which prevents cold blood from the extremities mixing with the warm blood in the body's core which can cause shock for the organs.

Sweat

When the body is hot the sweat glands in the skin are stimulated by the nerves to produce sweat, the eccrine glands produce a sweat composed chiefly of water and salts whereas the apocrine sweat glands produce sweat that contains much more oily sweat. Eccrine glands are distributed over the entirety of the bodies' surface but are concentrated heavily on the palm of the hand, soles of the feet (i.e. friction ridge skin) and the forehead areas.

Sweating helps lower a person's body temperature because the water constituent of the sweat will evaporate causing loss of heat, this method of losing heat may not always be ideal however as it loses essential water. A similar method of losing heat is shown when dogs pant as because they cannot sweat they lose heat through the evaporation of water from their tongue and lungs which are capillary rich hand so enables they to lose heat from their blood.

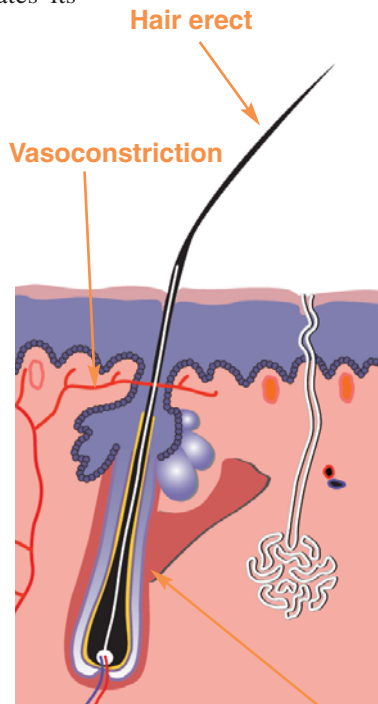


Fig 1
Cold Conditions Taught erector muscle

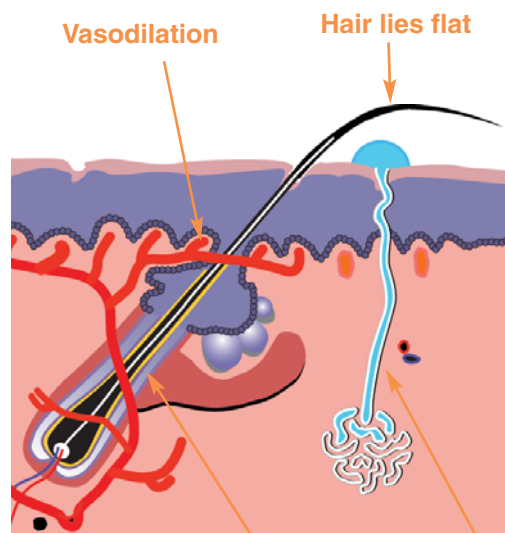


Fig 2
Hot Conditions Gland Producing sweat
Relaxed erector muscle