HOMEOSTASIS

HOMEOSTASIS is the maintenance of nearly (constant) conditions / stable environment in the body of the organism, so that enzymes control metabolism.
Homeostatis includes:

→ pH & concentration of water
→ Body temperature
→ Blood glucose.

⇒ NEGETIVE FEEDBACK:

Negetive feedback acts to ensure that:

- temperature
- blood glucose concentration
- water content in blood
- blood pH
- O_2 & CO_2 concentrations

are as close to pre-set levels as possible

⇒ CONTROLLING BLOOD GLUCOSE:

→ Cells need glucose for energy & therefore need a constant supply from the blood.

→ 2 Hormones - insulin & glucagon, control blood glucose levels. Both these hormones are secreted by pancreas & are transported to liver by bloodstream

→ When there is a high glucose concentration in blood.
- This change is detected by pancreas.
- The cells of pancreas release a hormone - insulin into the blood

- Insulin stimulates to absorb glucose from blood & convert it into glycogen – the storage compound

- Due to absorption, concentration of glucose falls in the blood

→ Consequences of high glucose level → due to high glucose concentration in the blood, water moves out of the cells & into the blood by osmosis. Cell is left insufficient water to carry out normal metabolic processes.

→ When there is low glucose concentration in blood:
- Other cells in the pancreas detect this change

- They secrete the hormone - glucagon into the bloodstream

- Glucagon stimulates liver cells to break glycogen to glucose.

- Glucose diffuses into the blood so the blood glucose concentration increases to normal

→ Consequences of low glucose level → cells cannot release enough energy. Brain cells are especially depended on glucose for respiration & die quite quickly if they are deprived of it.

⇒ THE SKIN:

→ largest organ in the body
→ protects the body from damage
→ stops pathogens from entering
→ prevents too much water loss
→ detects changes in temperature.

→ detects pressure (touch) & pain
→ loses heat by conduction, convection, radiation & evapouration

⇒ CONTROLLING BODY TEMPERATURE:
→ Normal body temperature is 37°C for warm blooded animals

→ The hypothalamus in the brain moniters the temperature of the blood running through it.
Nerves bring information to the brain about the temperature of the skin

→ IN THE HEAT:
– The hypothalamus detects an increase in temp. of the blood flowing through it.

– Temperature sensors in skin are stimulated by the high temperature & send information to the brain.

– The hypothalamus sends nerve impulses to structures in the skin

• ARTERIOLES:
They widen to allow an increase in blood flow through capillaries just beneath the skin surface.
This is called VASODILATION.
More heat is lost to the surroundings by convection & radiation.

- SWEAT GLANDS:
They produce lots of sweat
The sweat on the skin's surface evapourates & this cools the body

- HAIR on the body lays flat

→ IN THE COLD:
- The hypothalamus detects the decrease in temperature.

- It sends nerve impulses to structures in the skin

- ARTERIOLES:
They become narrower to reduce the blood flow through capillaries near the surface of the skin.
This is called VASOCONSTRICTION
Less heat is lost by radiation

- SWEAT GLANDS:
They stop producing sweat.

- SHIVERING:
Stimulated by hypothalamus.
Muscles contract & relax spontaneously & release heat from respiration.
Blood flows through the muscles & is warmed by this heat.

- METABOLISM increases.

- HAIR stands up. This acts as an insulator as it traps a thick layer of warm air next to skin preventing it from losing warmth.