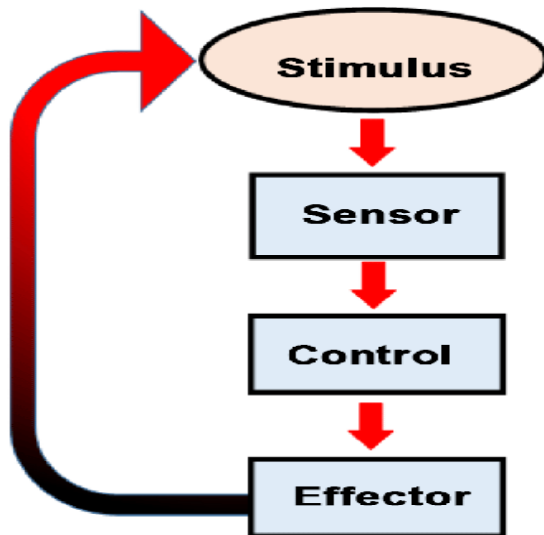


GRADE 8
HOMEOSTASIS

Homeostasis: is the maintenance of a constant internal environment.

Homeostasis is the control of internal conditions within set limits:



- Cells: change composition of blood as they remove nutrients and O₂ and add wastes and CO₂.
- Heart: keeps blood pressure constant to deliver oxygen and nutrients around body.
- Skin: to maintain heat exchange with external environment.
- Kidneys: regulate water and salt levels (osmoregulation) and the removal of wastes like urea (excretion).
- Lungs: regulate gas exchange Intestines: supply soluble nutrients and water to blood.
- Liver: regulates blood solutes and removes toxins.

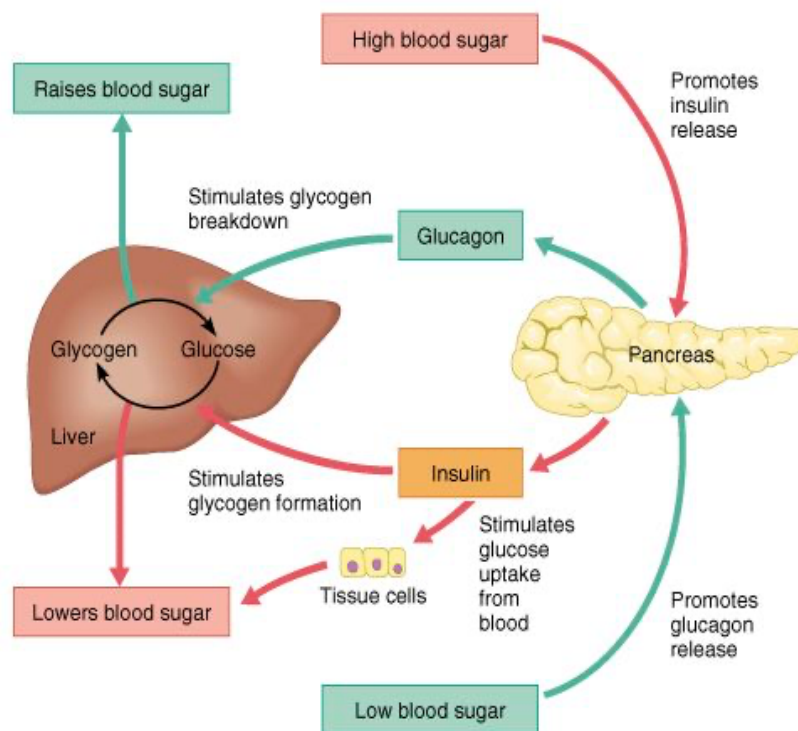
Negative feedback:

Homeostatic control is achieved using negative feedback mechanisms:

- if the level of something rises, control systems reduce it again
- if the level of something falls, control systems raise it again

Regulation of blood sugar:

- Blood glucose levels are monitored and controlled by the pancreas
- The pancreas produces and releases different hormones depending on the blood glucose level
- Insulin is released when blood glucose levels are high – the liver stores excess glucose as glycogen
- Glucagon is released when blood glucose levels are low – the liver converts stored glycogen into glucose and releases it into the blood.



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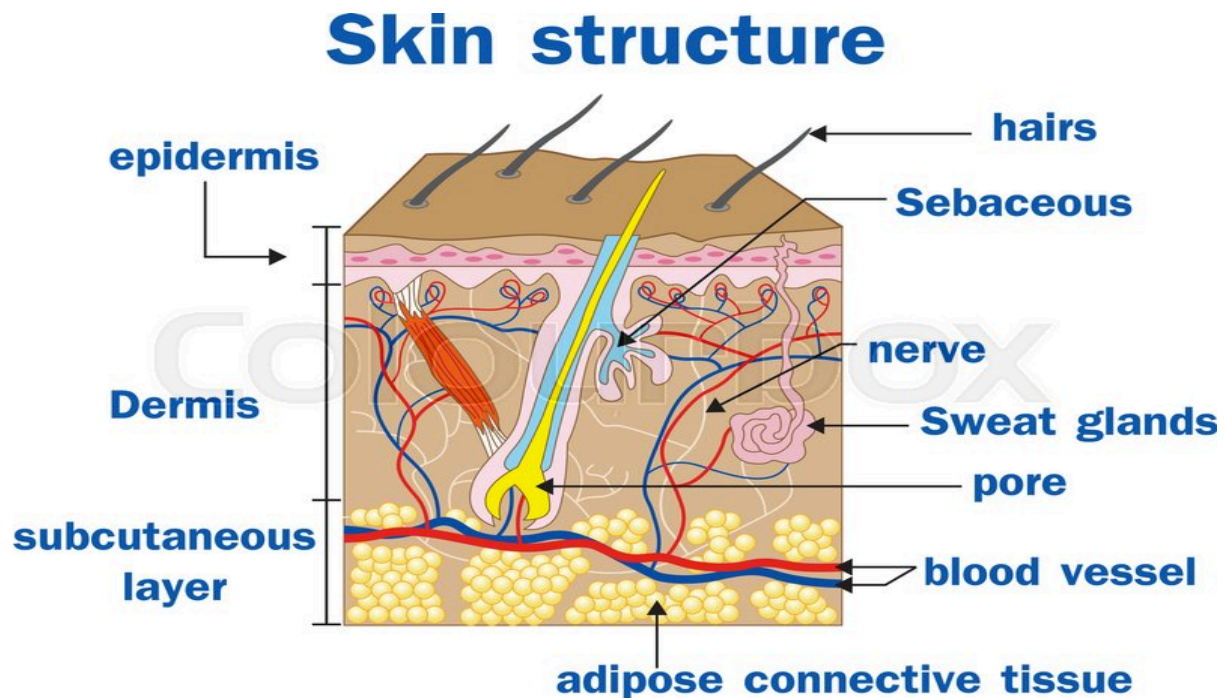
Diabetes:

- Diabetes is a condition in which the blood glucose levels remain too high.
- It can be treated by injecting insulin.
- The extra insulin causes the liver to convert glucose into glycogen, which reduces the blood glucose level. There are two types of diabetes – Type 1 and Type 2.

Type 1 diabetes is caused by the lack of insulin:

- Symptoms: feeling tired, thirsty, frequent urination and weight loss.
- Treatment: regular exercise, injecting insulin, and monitoring the diet.

Skin structure:



- The **basal layer** and the cells above it constitute the **epidermis**.
- There are specialised pigment cells in the basal layer and epidermis. These produce a black pigment, **melanin**, which gives the skin its colour. The more melanin, the darker the skin.
- The **dermis** contains connective tissue with hair follicles, sebaceous glands, sweat glands, blood vessels and nerve endings.
- There is a layer of adipose tissue (fat deposit) beneath the dermis.

Temperature regulation:

The human body is designed to function most efficiently at 37°C. If you become too hot or too cold, there are ways in which your body temperature can be controlled.

- **Insulation:** provided by fatty tissue retains heat. Hairs become erect to trap warm air by contracting erector muscles and vice versa.

- **Vasodilatation:** when it is hot, arterioles, which supply blood to the skin surface capillaries, dilate (become wider) to allow more blood near to skin surface to increase heat loss (face redder)
- **Vasoconstriction:** when it is cold, arterioles, which supply blood to the skin-surface capillaries, constrict (become smaller) to allow less blood near to skin surface to decrease heat loss
- **Sweating:** the water evaporates giving a cooling effect
- **Skin receptors:** sense heat and sensory neurons send impulses to the hypothalamus
- **Shivering:** muscular activity generates heat
- **Thermoregulatory center:** in the hypothalamus, it controls the use of corrective mechanisms (e.g. sweating and shivering).

Feedback mechanism of temperature control:

