

Response and Regulation

The nervous system

We have 5 sense organs which contain **receptor cells**. These receptor cells **detect external stimuli** and send an **electrical signal** along **neurones** to the **central nervous system (CNS)** made up of the **brain** and **spinal cord** to coordinate a **response**.

Sense organ	Stimulus
Eye	Light
Ear	Sound
Nose	Chemical smells
Tongue	Chemical tastes
Skin	Pain, pressure, temperature

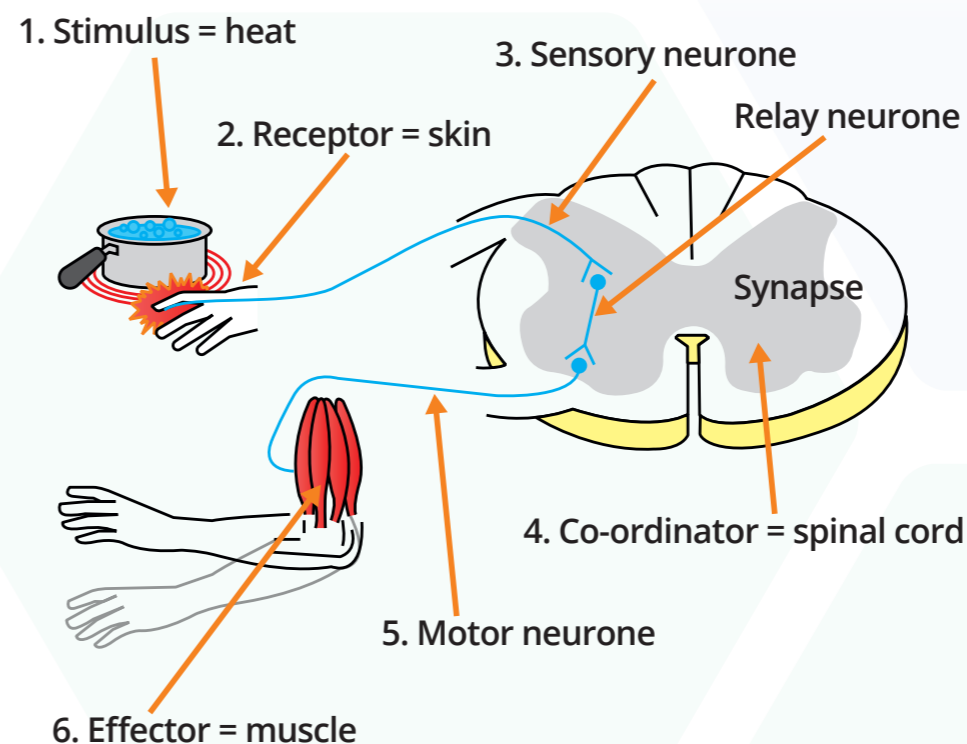
A reflex response is always:

- Rapid
- Automatic

and is generally protective.

A The reflex arc - Higher tier

This is the path taken by an electrical impulse from stimulus to response by an effector (muscle or gland). Withdrawal action reflex is shown here where an automatic reaction to the hot pan causes a quick withdrawal from the area.



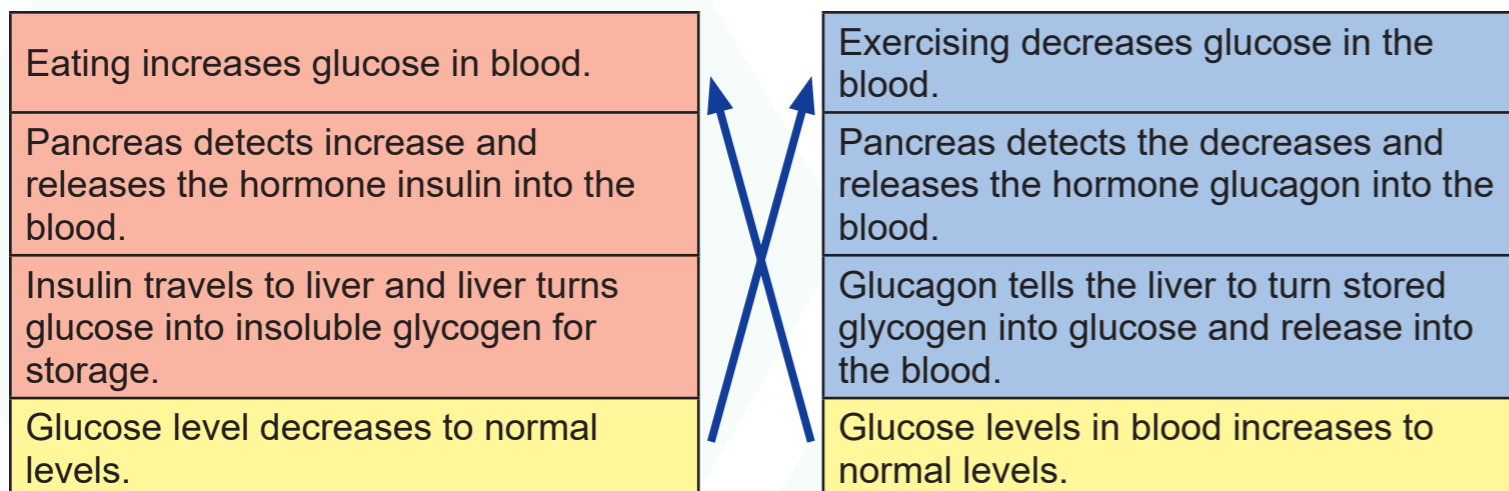
Negative feedback - Any change from the balance in optimal internal conditions results in the body's hormonal and nervous systems **compensating** for the change and **restoring the balance**.

Homeostasis

Homeostasis is the **maintenance** of a **constant internal** environment.

Regulating Glucose

The amount of glucose in your blood is controlled by **hormones (chemical messengers)** that **travel in blood** from the gland where they are produced, in this case the **pancreas** to the target organ, in this case the **liver**.



Diabetes

Diabetes is a condition where you are unable to control your own blood glucose levels. In **Type I diabetes** the body does not release insulin. In **type II diabetes** the body cells do not respond to the chemical signal from insulin.

Symptoms:

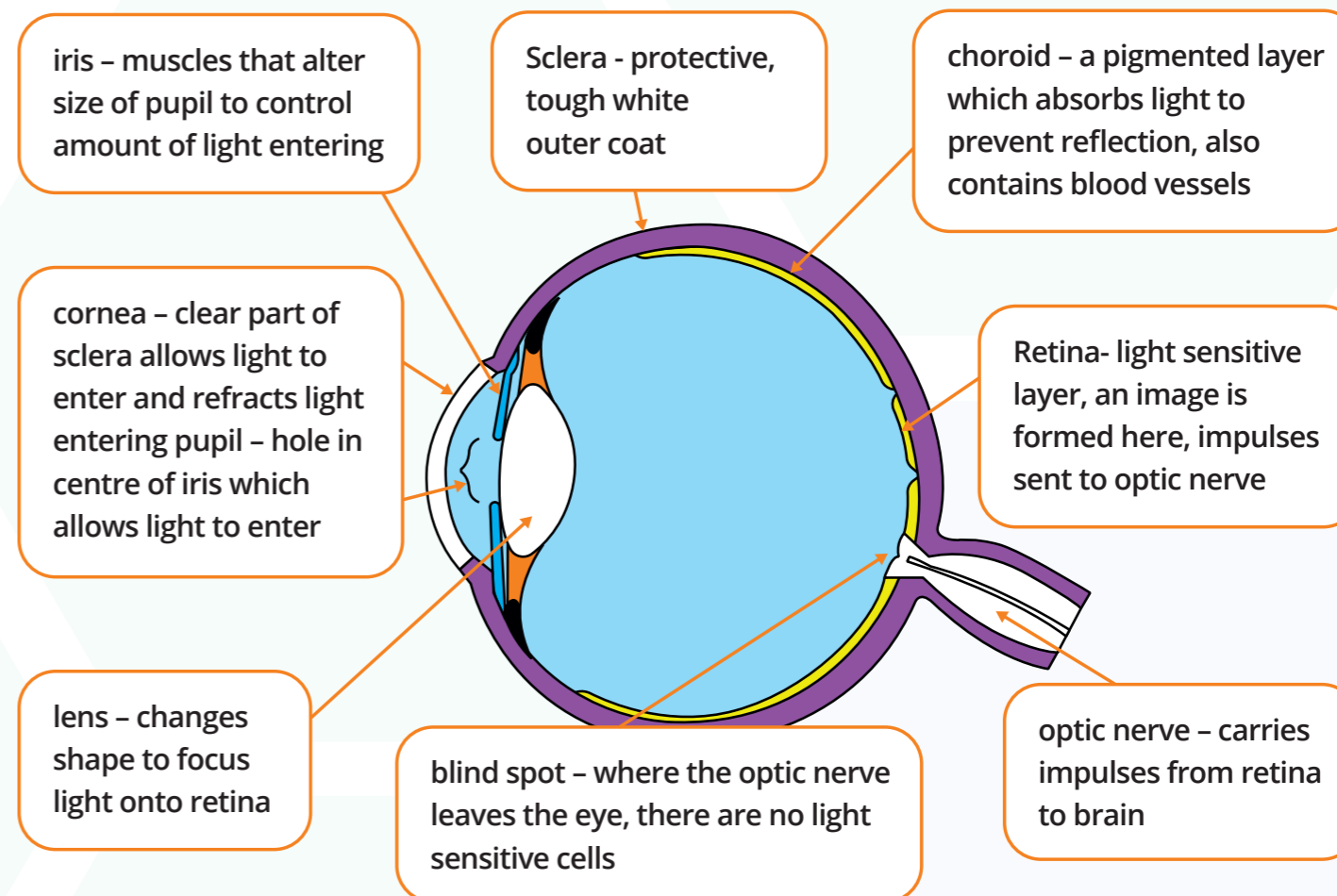
Glucose in urine detected by a Benedict's test.

Treatments:

- *Injecting insulin
- *pancreas transplants
- *low sugar/ carbohydrates diet

The eye- BIOLOGY ONLY

Two reflex actions studied occur in the eye. Blinking and the pupil reflex.



Response and Regulation

Regulating temperature

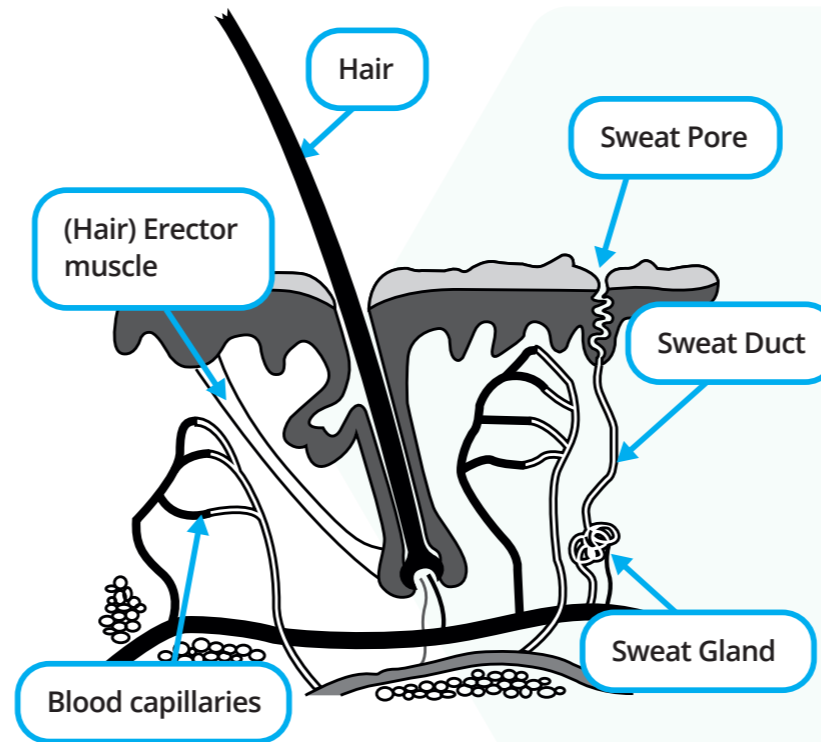
Too hot	Too cold
Hairs lie flat.	Hairs stand on end to trap a layer of insulating air over skin reducing heat loss
Sweating- A layer of liquid sweat made by sweat glands, carried up by sweat ducts and released by sweat pores onto the skin and evaporates removing heat energy.	Shivering- Involuntary contraction of the muscles increases respiration and the release of heat energy.
Vasodilation- Blood vessels in the skin widen so more heat from the blood is lost to the environment.	Vasoconstriction- Blood vessels in the skin get narrower so less heat is lost from the blood to the environment.

Lifestyle factors

Diet- A diet high in sugars and carbohydrates can lead to obesity and type II diabetes.

Drug and alcohol abuse can lead to dependence and **addiction** where people suffer **withdrawal** symptoms if they are unable to consume it.

Alcohol causes immediate **slowing of reaction times** and in the long term can cause **liver, circulatory and heart disease**.



Phototropism- Biology only

A tropism is a growth response in a plant to a one directional stimulus. It is caused by the release of the hormone auxin.

