Thermoregulation

Thermoregulation Definition

Maintenance of the internal environment within tolerable limits despite changes to the external environment.

The **hypothalamus** is the temperature monitoring centre.

Information is communicated by **electrical impulses** through **nerves** to the <u>effectors</u> which bring about **corrective responses** to return temperature to normal

Hypothalamus → (Nerve impulses) → **Effectors (corrective responses)**

Negative feedback

Corrective responses return system back to normal via **negative feedback.**

Too hot: make individual cooler

Three corrective responses

1. **Sweating increases**
   To increase evaporation of WATER to cool down skin
2. **Vasodilation of blood vessels (arterioles)**
   Increased blood flow to skin
   Increased heat loss
3. **Metabolic rate decreases**
   Less heat produced

Too Cold: make individual hotter

Four corrective responses

1. **Shivering increases**
   Generate heat by muscle contraction
2. **Vasoconstriction of blood vessels**
   Decreased blood flow to skin
   Decreased heat loss
3. **Hair erector muscles contract**
   Layer of insulating air trapped
4. **Metabolic rate increases**
   More heat produced

<u>Importance of regulating body temperature / thermoregulation in mammals</u>

1. For optimal enzyme activity
2. To maintain high diffusion rates

Conformers & Regulators

The ability of an organism to maintain its metabolic rate is affected by **external abiotic factors**.

1. pH
2. Salinity (Salmon able to move from fresh to sea water via pumps in their gills to remove Na)
3. Temperature

Regulators

Internal environment is kept constant despite changes to external environment.
High metabolic costs.
Wider range of ecological niches
Regulators use metabolism (thermoregulation) to control their internal environment
This regulation costs a lot of energy to achieve homeostasis.

Conformers

Internal environment (metabolism) is dependent on the external environment.
Low metabolic costs.
Narrow range of ecological niches.
Behavioural responses by conformers allow them to tolerate SOME variation in their external environment to maintain optimum metabolic rate.