

Outline the mechanisms by which the body controls temperature
The majority of candidates did well on this viva. Candidates were expected to know physiological mechanisms associated with defending against temperature fluctuations, sites of measurement of temperature, differences between sites, how NSAIDs reduced a fever and mechanisms of adverse effects associated with NSAIDs. Areas of weakness were failure to mention diurnal variation, thermoneutral zone and differences associated with neonates, newborns and children.

“What is the normal temperature and the thermoneutral zone?”

Normal body temperature is 36.3 to 37.3

Thermoneutral zone is where ambient temperature minimises the metabolic cost of body temperature maintenance (27-31 degrees C for naked 70kg male).

“What determines the body temperature?”

the skin is the primary effector for the control of body temperature

overall body temperature is a balance between heat loss and heat gain

“What are the factors that determine heat loss and heat gain?”

Heat Loss

Radiation (60% at rest)

Conduction (5%)

Convection (25%)

Evaporation (10%)

Behaviour

Heat gain

Basal metabolism

Shivering

Nonshivering thermogenesis

Exercise

Behaviour

“How does sweating effect heat loss?”

causes heat loss via evaporation (latent heat of vapourisation)

can dramatically increase % loss

0.58 kCal per gram of water

“What is the mechanism of NSAIDs in the control of temperature?”

It is believed that this effect is exerted via reduction in cox-3 (a subtype of cox-1) activity

Cox-3 is implicated in PGE2 production by the hypothalamus and resets the hypothalamic temp point

“What are the side effects of NSAID use?”

Renally they inhibit PGE2 which causes vasoconstriction and may affect renal function

Haematologically they may cause bleeding due to anti platelet actions and reduced TXA action

GIT results in decreased protective actions of prostaglandins

Selective Cox-2 inhibitors may alter the prostacyclin/TXA balance to favour aggregation and VTE

“What are the differences in temperature regulation between neonates, infants and children?”

Differences relate to the increased skin surface area to body size means that heat loss is accentuated

Increased brown fat in neonates and infants enabling increased nonshivering thermogenesis