

13 homeostasis



homeostasis 稳态

14 homeostasis

homeostasis

homeostasis

The maintenance of a constant internal environment

In the tissue fluid surrounding cells, the temperature, amount of water and concentration of glucose are kept almost constant

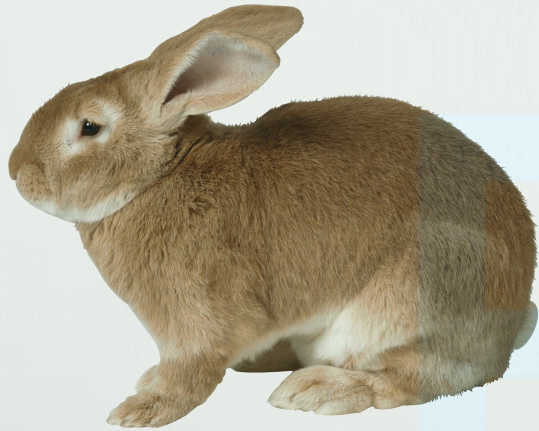
Temperature → help enzymes to work at the optimum rate

Water → keep cells are not damaged by absorbing or losing too much water by osmosis

Glucose → ensure there is always enough fuel for respiration

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Control of body temperature



endothermic



endothermic 恒温的



ectothermic

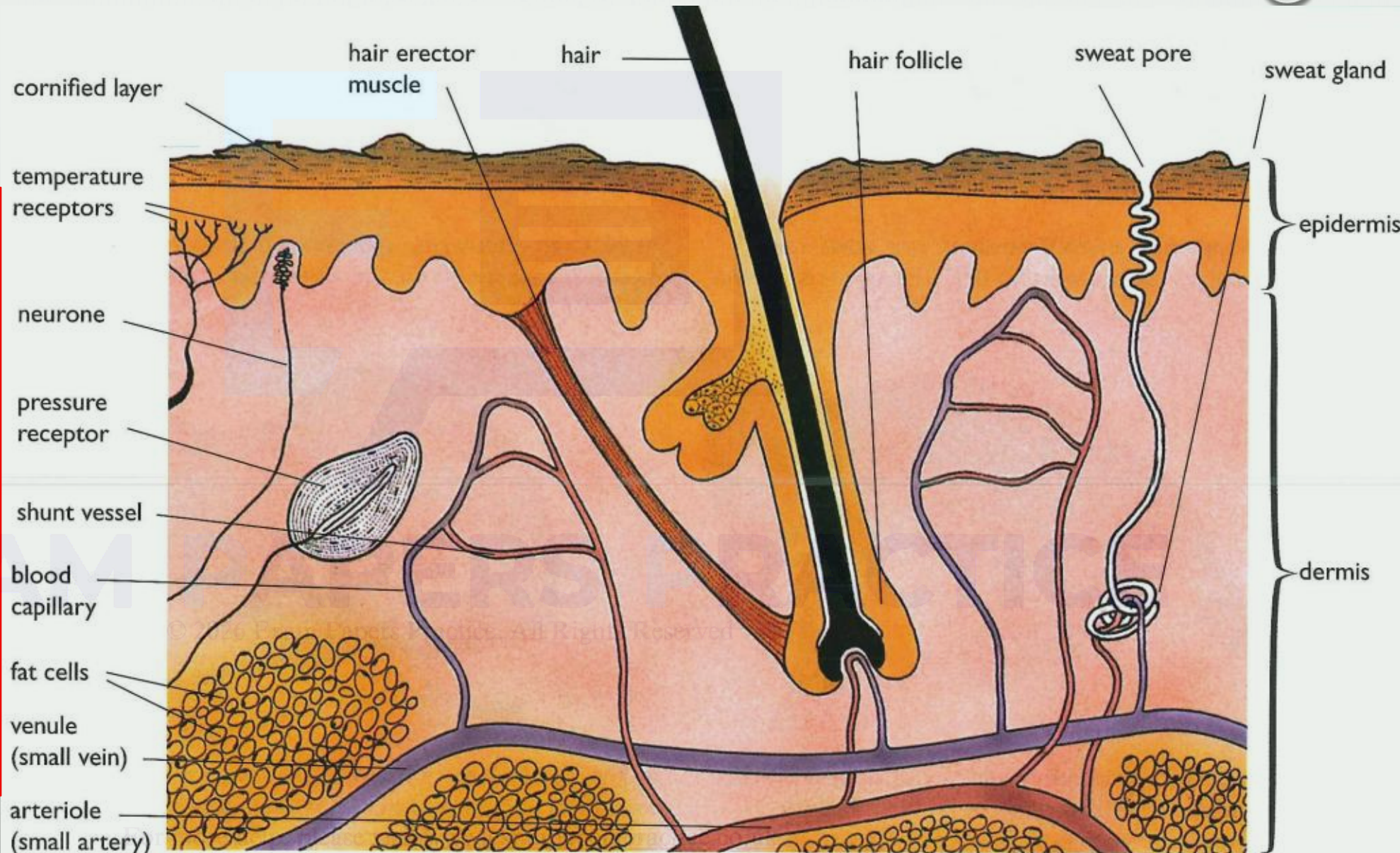


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Control of body temperature

skin

epidermis 表皮
dermis 真皮
cornified layer 角质层
keratin 角蛋白
hair erector muscle
立毛肌
sweat gland 汗腺
receptor
fat cell
neuron
adipose tissue 脂肪层
venule (small vein)
arteriole (small artery)



temperature control —— hypothalamus

- *Brain (hypothalamus) control internal temperature
- *Brain contains **temperature receptors** that sense the temperature of the blood running through it.

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hypothalamus 下丘脑

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Control of body temperature

When temperature falls

Hypothalamus send nerve impulses to cause the following things to happen

Muscle work

→ Muscle shivering → generate heat

Metabolism increase

→ release more heat

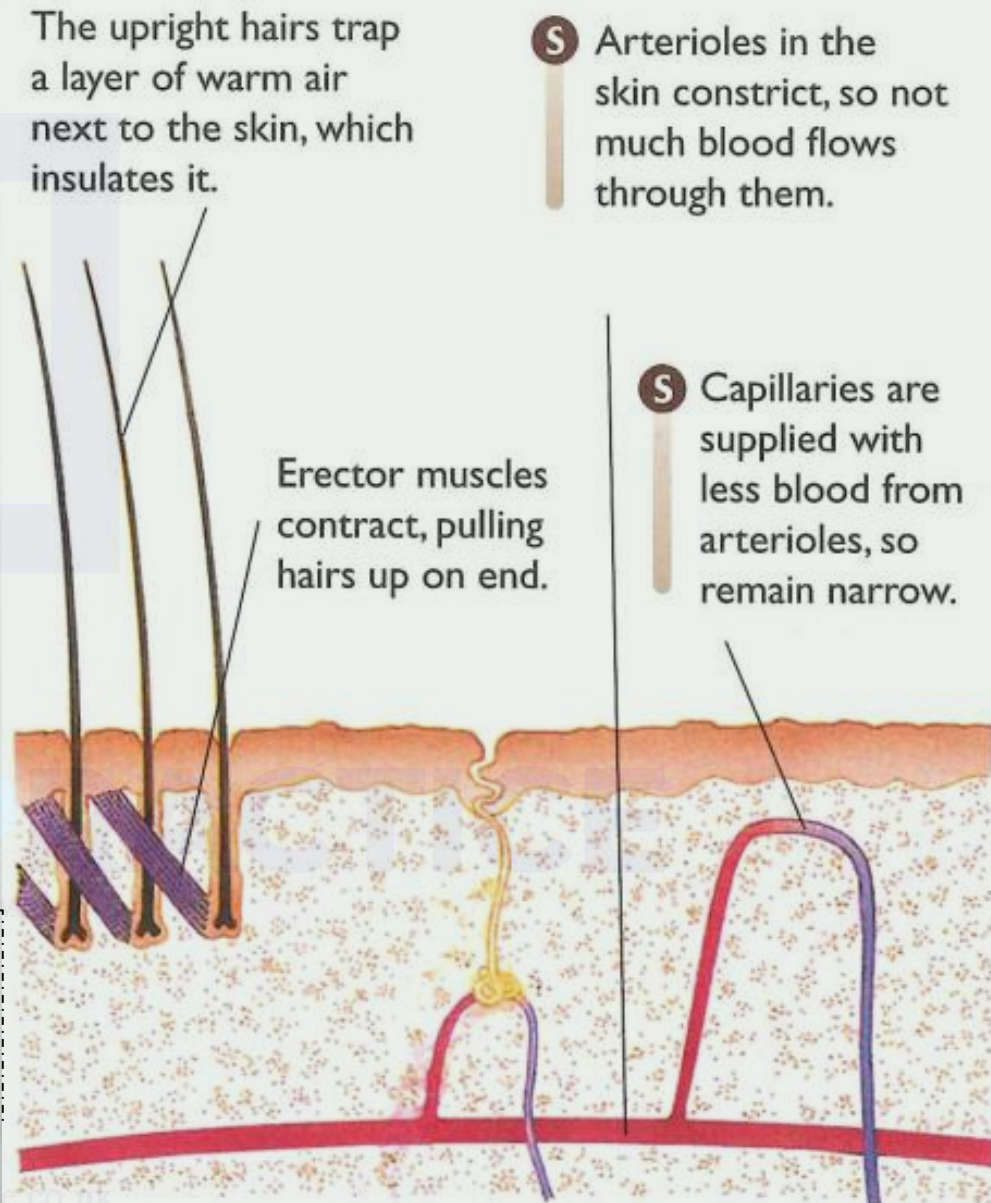
Hair stand up

→ erector muscles contract, hair stand up. This can insulate heat

vasoconstriction

→ arterioles near skin contract, less blood flow, so reduce much heat loss

vasoconstriction 血管收缩 shiver 战栗



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Control of body temperature

When temperature rises

Hypothalamus send nerve impulses to cause the following things to happen

Hair lies flat

→ not insulate heat

vasodilation

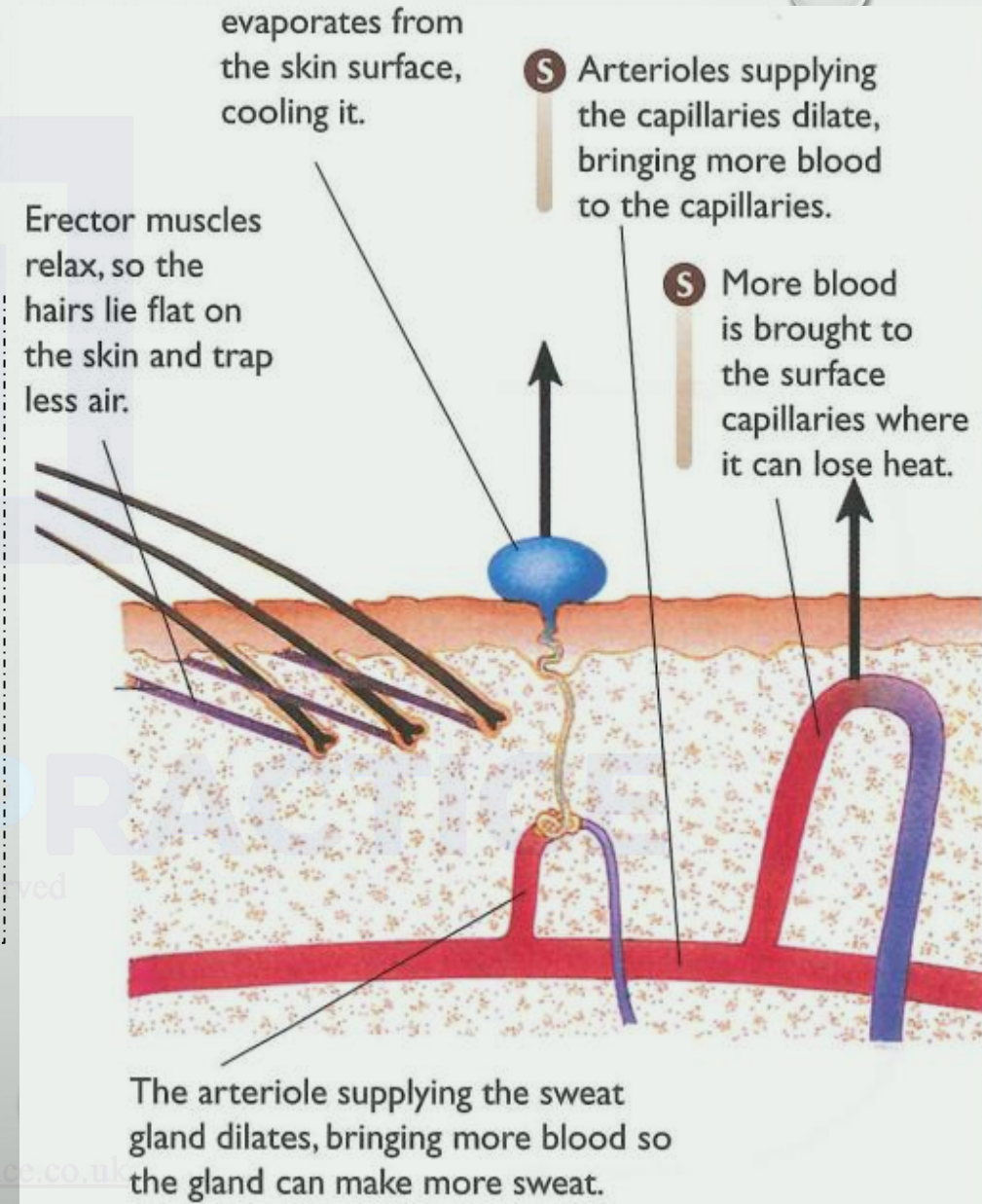
→ arterioles near skin relax, more blood flow, so increase much heat loss

sweat

→ the sweat gland secrete sweat.

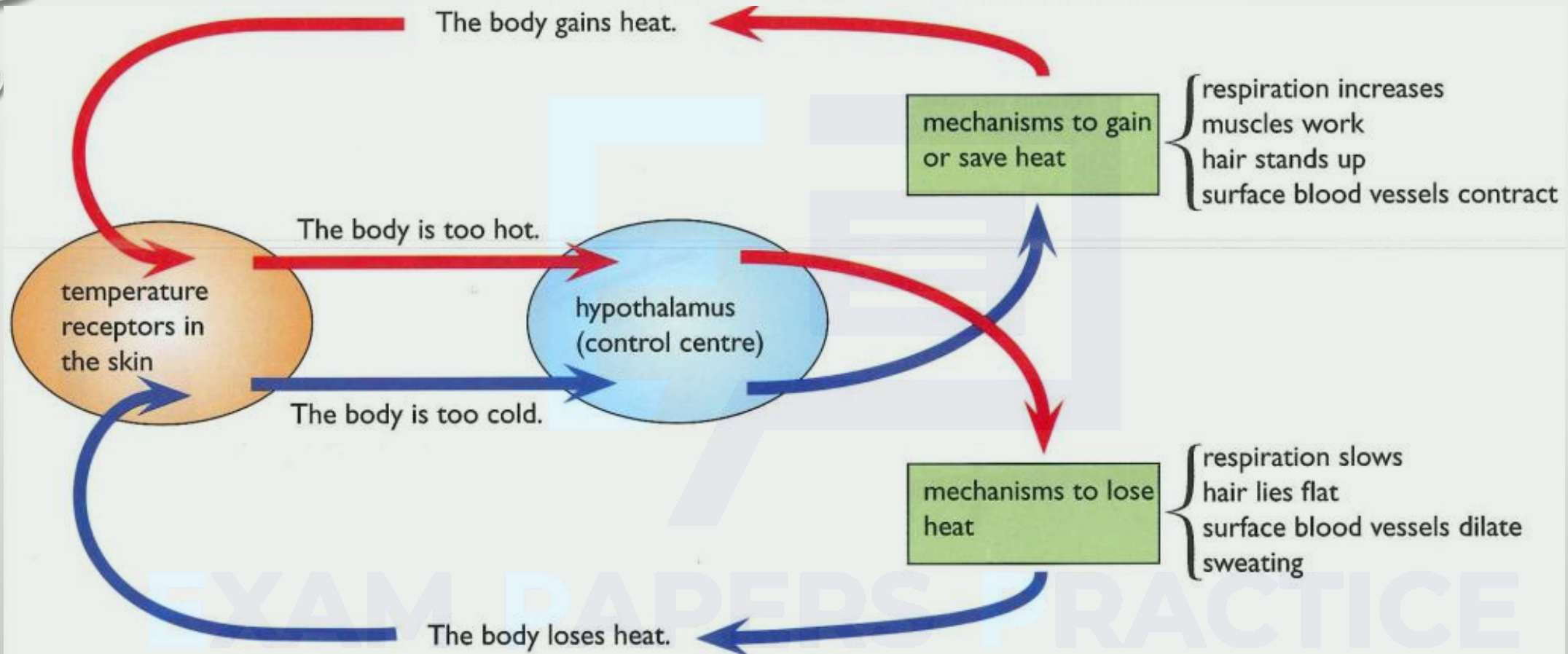
Evaporation take heat from the skin

vasodilation 血管舒张



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Control of body temperature



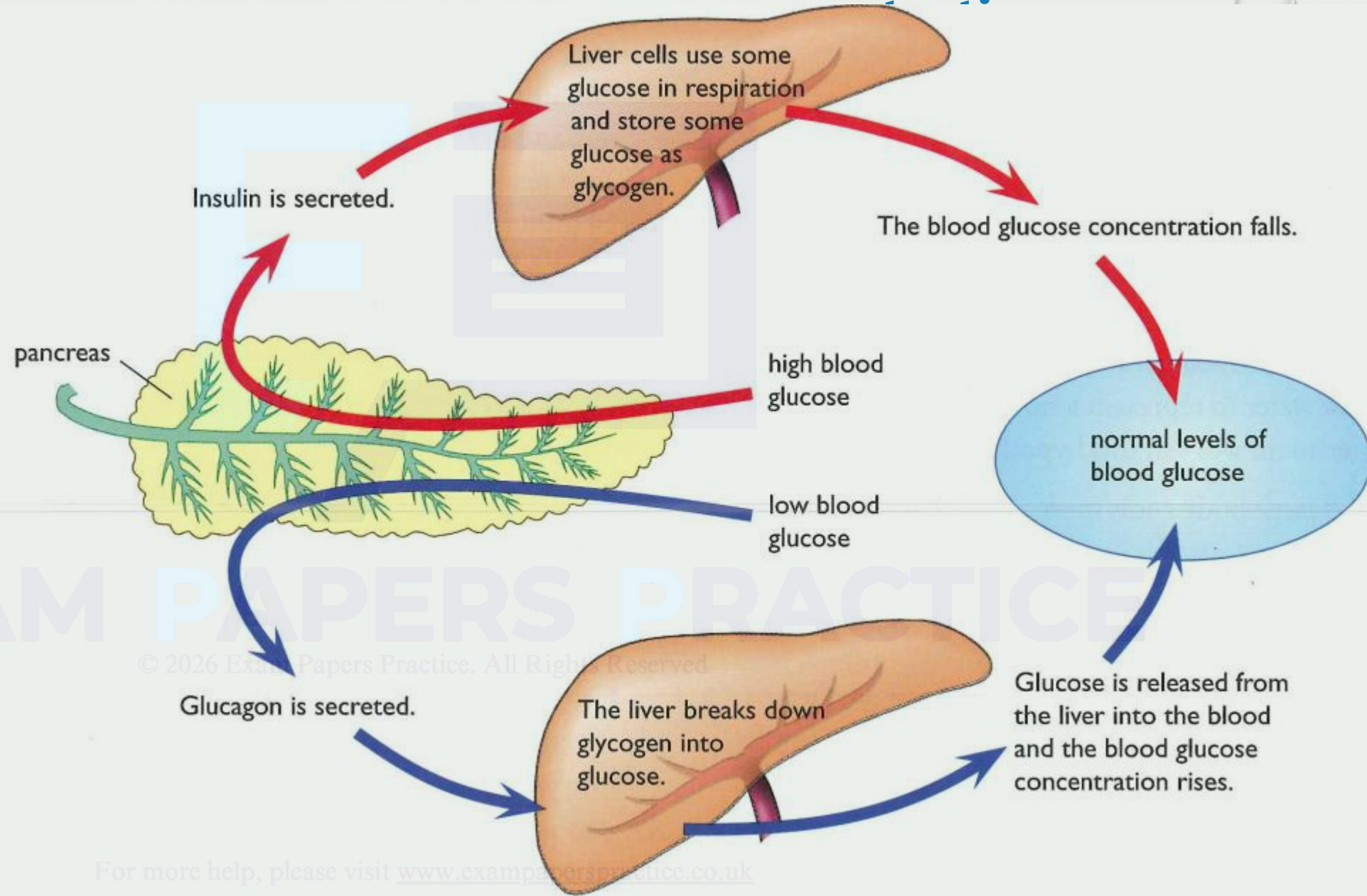
Negative feedback(负反馈)

As temperature of body rises above normal, hypothalamus monitor the change and control actions that help to reduce the temperature.

As temperature of body lower below normal, hypothalamus monitor the change and control another set of actions that help to raise the temperature.

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Control of blood glucose



pancreas
beta cell
insulin 胰岛素
glycogen 糖原
glucagon 胰高血糖素

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Control of blood glucose concentration

Type 1 diabetes

- Death of beta cells
- no insulin secreted
- blood glucose concentration go up and stay up

Symptoms of type 1 diabetes

dry mouth
blurred vision
feel very thirsty
heart rate and breathing rate increase

Treatments

- > Eat little and often
- > Avoid large amounts of carbohydrate
- > Inject insulin

Diabetes

