| Homeostasis – Key Regulatory Systems Summary |
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| **Regulation System** | **Endocrine System** | **Nervous System****[Sensory/effectors]** | **Issues & Impacts of imbalance** |
| **Glucose regulation** | **Adrenaline** (from **adrenal gland**) = helps convert glycogen to glucose**\*Insulin and glucagon** (from **pancreas**)If glucose is above limit **INSULIN** causes…- glycogenesis (changing glucose to glycogen)- cells to absorb glucose out of blood- inhibition of gluconeogenesis (stops body making glucose)If glucose is below limit **GLUCAGON** causes…- gluconeogenesis (changing glycogen to glucose)- cells release glucose into the blood- inhibition of glycogenesis (stops body making glycogen out of glucose) | Brain transmits nerve impulse to adrenal gland to secrete adrenaline | * [glucose] too 🡩 = hyperglycaemic

- excess glucose in urine- more urination and thirst* [glucose] too 🡫 = hypoglycaemic

**Diabetes mellitus**= reduced insulin production**Type I**- pancreas cells destroyed by the person’s immune system! Affects for lifetime.*- treat with insulin injection***Type II**- body cells resist insulin, which means glucose builds up in blood*- treat by diet/lifestyle/medications* |
| **Thermoregulation** | **Thyroxine** (from **thyroid gland**)- 🡩 production = 🡩 metabolism rate (generates heat)**Adrenaline** (from **adrenal gland**)- increases heart rate and respiration (generates heat) | **Sensory thermoreceptors:**Skin receptorsHypothalamus receptors**Effectors:**Shiver + sweatVasodilation/constrictionHair follicle muscles |  |
| **Metabolism Regulation** | **TSH** (thyroid stimulating hormone)- secreted from **pituitary gland**- stimulates **thyroxine** (T4/3) production in **thyroid gland****Thyroxine** (from **thyroid gland**)- causes increase in metabolism rates**Feedback =** - 🡩 [thyroxine] inhibits pituitary making more TSH- this leads to less TSH, and so less thyroxine from thyroid gland |  | **Hypothyroidism** - not enough thyroxine etc. from thyroid gland = can’t tolerate cold; poor memory; feel tired**Hyperthyroidism**- excessive production of thyroxine etc. from thyroid gland = can’t tolerate heat; rapid heart beat; can’t sleep |
| **Osmoregulation**Links to:* Blood volume
* Blood pressure
 | **ADH –** anti-diuretic hormone (from **pituitary gland**)Diuretic = cases increase urination (loss of water)Anti-diuretic = causes decrease urination (keep water) | **Sensory receptors:**Hypothalamus (osmoreceptors)- controls how much ADH is released from glandsBaroreceptors (detects blood pressure)- found in nephron- if blood pressure 🡫 they cause hormones to make blood vessels constrict and thus 🡩blood pressure**Feedback - High Osmolarity (**🡫**water)**1. Hypothalamus detects2. **ADH** production increases3. more water exits nephron back into blood4. less urination / water saved / back to normal | * [solutes] too 🡩 = enzymes affected;

Causes: dehydration; diarrhoea * [solutes] too 🡫= cells swell; too dilute for some metabolism

Causes: too much water; ADH not secreted properly**WHEN water enters blood…**- blood osmolarity decreases- blood volume increases- blood pressure increases**Hypotension** (low blood pressure)- light-headedness; dizzyCauses: dehydration; stress; some meds**Hypertension** (high blood pressure)- no symptoms but can lead to other complicationsCauses: obesity; genetic; smoking; lifestyle |
| **Carbon dioxide & pH**CO2 in blood = H2CO3 = H+ + HCO3- | **Adrenaline** & **thyroxine** both used to increase breathing rates to get rid of excess CO2 | **Sensory chemoreceptors:**- in the heart- in the medulla (brain stem); detect pH**Effectors:**- rib cage muscles, etc. | * 🡩 [H+] = acidic = breathing rate increases to get rid of excess CO2
* 🡫 [H+] = basic = respiratory alkalosis due to low CO2
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