CHAPTER

# 10 Chemical Coordination and Integration

| Source | Hormone | Target | Action |
|---|---|---|---|
| Hypothalamus | Releasing and Inhibiting Hormones | Pituitary | Controls release of tropic hormones by Pituitary |
| | ADH & Oxytocin | Sends them for storage in Posterior Pituitary for later release | |
| Anterior Pituitary (tropic hormones) | TSH (thyroid stimulating hormone)<br>ACTH (adrenocorticotropic hormone)<br>FSH (follicle stimulating hormone) LH (luteinizing hormone) | thyroid adrenal cortex ovaries, testes ovaries, testes | secretion of $T_4$ and $T_3$ secretion of glucocorticoids regulates oogenesis and spermatogenesis regulates oogenesis and spermatogenesis |
| Anterior Pituitary (hormones) | PRL (prolactin)<br>GH (growth hormone) | mammary glands bone, muscle | production of milk stimulates growth |
| Pancreas (alpha cells) | glucagon | liver | increases blood glucose |
| Pancreas (beta cells) | insulin | liver, muscles, fat | lowers blood glucose |
| Adrenal gland (medulla) | epinephrine (adrenalin) and norepinephrine (noradrenalin) | blood vessels, liver and heart | increases blood glucose, constricts blood vessels (fight or flight response) |
| Adrenal gland (cortex) | glucocorticoids (e.g., cortisol)<br>mineralocorticoids (e.g., aldosterone)<br>sex cooticoids | general kidney<br><br>body | increases blood glucose increases reabsorption of $Na^+$ and excretion of $K^+$<br>male like sexual characters. |
| Thyroid | $T_4$ (thyroxin) and $T_3$ (triiodothyronine) calcitonin | general bone | increases cellular metabolism lowers blood $Ca^{2+}$ |
| Parathyroid | PTH (parathyroid hormone) | bone | increases blood $Ca^{2+}$ |
| Testis | testosterone | testes, general | spermatogenesis, secondary sex characteristics |
| Ovary | estrogen progesteron | uterus, general uterus | menstrual cycle, secondary sex characteristics menstrual cycle, pregnancy |
| Pineal | melatonin | body | circadian rhythms |

## Mechanism of Hormone Action

- Hormones could be peptides ( insulin, glucagon), steroids ( testosterone), iodothyronines (thyroxine) or amino acid derivatives (epinephrine)
- Some hormones bind to extracellular receptors and generate secondary messengers which in-turn regulate cellular metabolism. Other hormones (steroid hormones) interact with intracellular receptors and bring about changes by influencing gene expression.