

Lecture 21

Friday, July 16, 2021

13:11

Introduction to the Endocrine System

- Endocrine system - hormones
 - o Sleep/wake cycle, immune system, metabolic stuff (hypertrophy, atrophy, apoptosis, cell survival), sexual function ;) [sorry], hunger/thirst, fight/flight, moods [complicated af -- brain function]
 - [me right now, very impatient today]
- Neuro-endocrine system -
 - o Endocrine and nervous systems
 - o Hypothalamus (behind BBB, blood brain barrier)
 - o Multiple axis' - hypothalamic pituitary gonadal; hypothalamic pituitary adrenal, hypothalamic pituitary liver, etc.
- Endocrine:
 - o A system of glands (with some other cells) that secrete different types of messenger molecules into blood (generally into blood) to regulate cells, tissues, organs, systems, etc.
- Chemical messengers - short range v long range
 - o Chem messenger: a compound that transmits a message
 - o Hormones are long-ish range communicators; variability in concentration
 - o Neurotransmitters are communication to adjacent cells
- Main glands:
 - o Pineal
 - o Hypothalamus
 - o Parathyroid
 - o Adrenal
 - o Kidneys
 - o Pituitary
 - o Thyroid
 - o Pancreas
 - o Ovaries/testes
- Insulin (anabolic) and glucagon

- Blood sugar regulation
 - Insulin (polypeptide) needs to bind in order to penetrate barriers
 - Stimulates mTOR
- Cortisol - catabolic
- Pancreas
 - Insulin, glucagon
- Adrenal medulla/sympathetic nerves
 - Catecholamines (epi, norepi)
- Adrenal cortex
 - Cortisol
- Anterior pituitary
 - Growth hormone
- Liver
 - Insulin-like growth factor-1
- Testicle
 - Testosterone
- Thyroid
 - Thyroid hormones (t3/ t4)
- System of glands that secrete different types of messenger molecules
- Enter the bloodstream, travel around, eventually bind, and regulate stuff
- Neural signals from the brain are connected to remote glands throughout the body, and the hormones regulate cells and tissues all over the place
- Hypothalamus is considered link between endocrine and nervous systems
 - Production of substances that regulate pituitary function
 - Glandular secretions of the stomach and intestines
 - Heart rate and blood pressure
 - Fluid and electrolyte balance
 - Thirst and appetite
 - Body temp
 - Body weight
 - Sleep cycles
 - 6 F's
 - Fight, flight, fright, food, fluid, sex

- vasopressin - made in hypothalamus; released from posterior pituitary; anti-diuretic hormone
 - o Alcohol blocks vasopressin - what happens when you "break the seal" whilst drinking
- Corticotropin-releasing hormone; hypo-thal-adrenal;
- Growth hormone-releasing hormone
- Gonadotropin-releasing hormone; hypothalamus
- Thyrotropin-releasing hormone
- Prolactin-releasing hormone
- Oxytocin - cuddle and feel good
- Hypothalamus and pituitary in brain control the normal secretion of thyroid hormones which in turn controls metabolism
 - o Hypothalamic effects are often routed elsewhere
- Hypothalamus is CEO
- Pituitary regulates (because hypothalamus tells it to)
 - o General manager
 - o Stress, blood pressure, water balance (via kidney regulation), thyroid function/temp regulation
 - o Growth
 - o Reproduction/sex organ function
 - o Lactation (breast milk production)
 - o Releases?
 - Growth hormone
 - Thyroid-stimulating hormone
 - Adrenocorticotrophic hormone
 - Luteinizing hormone and follicle-stimulating hormone
 - Prolactin
- Several classes of hormones
 - o Polypeptide - target receptors that are integrated into cell membranes; initiates a signal transduction pathway
 - o Steroid - interact directly with the regulatory elements of the DNA
 - o Eicosanoids -
 - o Generally, in all cases, the cell's behavior changes