Lecture title: Hormones of liver

Lecturer Affiliation: University of Mosul / College of Veterinary Medicine / Department of Physiology, Biochemistry and Pharmacology

Hormones of liver

Angiotensinogen

Angiotensinogen is a precursor of angiotensin that acts in the control of vasoconstriction and blood pressure.

Thrombopoietin (TPO)

It is a 330 amino acids glycoprotein hormone synthesized mainly by the liver, and to less extend by the kidney, it is key function is the stimulation of bone marrow precursor cells to convert to megakaryocytes, in which platelets (responsible for blood clotting) fragmented from these cells and the process known as megakaryocytopoiesis.

Insulin-like growth factor I (IGF-I)

IGF-I is a monomere of 70 amino acids (while IGF-II is a monomere of 67 amino acids), look like more potent than insulin as growth- promoting factor on almost every cell in the body, but less potent in inpromotion of glucose utilization.

Binding of IGF-I to it is tyrosine kinase specific receptor (IGF-IR) initiates intracellular AKT signaling that stimulate cell

growth and inhibit apoptosis.

Hormones of the kidney

1. Calcitriol

2. Erythropoietin (EPO)

Functions of EPO

1. The main action of EPO is the stimulation erythropoiesis by inducing of the proliferation, differentiation, and viability of erythroid progenitor cells.
2. EPO promote the activities of heme synthesis enzymes and repress the activity of heme degradation enzymes, thus the increased concentration of intracellular heme may induce erythroid differentiation.

Hormones of the heart

Natriuretic peptides refer to a peptide that induces natriuresis (the release of Na^+ through urine), there are many kinds of natriuretic peptides:

1. Atrial natriuretic peptide (ANP) is an 28 amino acids secreted from heart muscle cells (specially atria) it is a powerful vasodilator.

2. Brain natriuretic peptide (BNP), it is a 32 amino acid polypeptide released from heart ventricles, but it is named due to first discovered in the brain of pigs. The physiological actions of BNP are similar to those of ANP

Hormones of adipose tissue

Leptin

The name leptin due to Greek word "leptos" meaning thin, therefore leptin hormone known as "satiety hormone'. It is a polypeptide hormone made principally by adipose tissue and involved in regulation of energy balance (by inhibiting hunger). Leptin is opposed by the action of ghrelin.

Mechanism of action of leptin

- After secretion into blood stream, leptin crosses blood-brain barrier and then bind leptin receptor in hypothalamus, providing signals about the status of body energy stores.
- Leptin act to depress appetite, weight loss, rise physical activity, and modifications in metabolism and endocrine functions.
- Leptin is also interact with other hormones as insulin, IGF, GH, glucagon, and GC, as well as with cytokines and metabolites.

Ghrelin

Also called hunger hormone, it is a peptide hormone produced byghrelinergic cells in the GIT. It is name refer to growth hormone-releasing peptide, and in due to "release".

Actions of ghrelin

1. It is regulate the complex process of energy homeostasis that adjust both energy input and output, fat and glycogen storage, short-term heat loss, thus ghrelin increase body weight fat mass by triggering special receptors.
2. This hormone involved in inducing of appetite and feeding behavior.
3. Stimulation of ghrelin receptors (GHSR1a) is involve in mediating a wide variety of biological effects of ghrelin including stimulation of growth hormone release, induction of hunger, modulation of lipid and glucose metabolism, regulation of GIT motility and secretions, and regulation of immune functions.

Adiponectin

It is a polypeptide hormone composed of a long peptide of 224 amino acids. adiponectin is exclusively secreted from adipose tissue (also from placenta during pregnancy).

Functions of adiponectin

1. Modulation of certain metabolic functions as glucose regulation andfatty acid oxidation.
2. Glucose flux; by depress gluconeogenesis and stimulate glucoseuptake.
3. Promote lipid catabolism; induce beta-oxidation and triglyceride clearance.
4. Increase insulin sensitivity.
5. Control energy metabolism.

Resistin

It is a cysteine-rich peptide hormone derived from adipose tissue. In primates, dogs, and pigs, it is secreted by immune and epithelial cells, while in rodents it is secreted by adipose tissue. Resistin was discovered in 2001, and it is name, resistin, refer to insulin resistance in mice injected with this hormone.

Recently, it is documented that resistin involved in inflammatory response, in which it is rise the formation of inflammatory factors, also this hormone increase the level of LDL resulting in high risk of cardiovascular diseases.