ENDOCRINE CONTROL OF GROWTH

- Introduction to GH in general, chemistry, anaphylactic shock, GHBP, bioassays, GHRH, SS, glucostats and catecholamines
- GH regulates protein, fat and carbohydrate metabolism and is regulated by proteins, FFA, glucose and other factors. GH indirect effects are mediated by liver somatomedins (IGF)
- Mechanism of action: GHRH, SS, GH, IGF
- Pubertal growth spurt in humans, an example of activation of the GH axis
- Pathologies: dwarfism, gigantism, acromegalia, clinical tests. GH use/abuse

ENDOCRINE CONTROL OF BLOOD PRESSURE

Introduction concepts to remember: a) water, glucose, mineral metabolism; b) adrenal in stress and blood pressure

Renin - angiotensin (RAS) and kallikrein – kinin (KKS) systems: synthesis, secretion, receptors, mechanism of action, effects

Mineralocorticoids: aldosterone synthesis, secretion, receptors, mechanism of action, hormonal effects

Peptide hormones and paracrine factors: ANP, BNP, CNP, ET, adrenomedullin

Integration: response to hemorrhage and to dehydration

Pathophysiology: RAS & KKS involvement in hypertension and in hyperaldosteronism
Growth & Blood Pressure Control

Endocrine Control of Growth

GH secretion is controlled by hypothalamic neurohormones and IGF negative feedback. GH release is episodic and changes with age.
Main neurohormones involved in the control of GH and the effect of IGF on the bone growth plate, a classical bioassay for GH and its indirect growth effect.

Direct and indirect actions of GH on growth and metabolism. These effects require the absence of cortisone for optimal performance.
Effects of GHRH & SS are mediated by AC and PLC, while GH effects are mediated by single transmembrane domain receptors.

Insulin, IGF-1 and GH receptors (tyrosine kinase transmembrane receptors) are all involved in the control of puberty onset.
Endocrine Control of Growth

Endocrine pathologies related to GH and the IGF axis. Failures at all levels of the hierarchical control have been reported.

Endocrine Control of BP

Aldosterone secretion is stimulated by the renin-angiotensin-system and the ANS (S) reaching the glomerulus through renal nerves.
Aldosterone (a steroid) secretion is stimulated by the renin-angiotensin-system (RAS). The receptor for AgII is a GPCR.

Aldosterone, a mineralocorticoid secreted by adrenal's zona glomerulosa, rises Na reabsorption & K secretion, volemia & BP, and Na/H facilitated diffusion (alkalosis).
With hemorrhage, the vascular volume is decreased without a change in osmolality.

Dehydration may result from sweating, diarrhea, vomiting, fever, alcohol, insufficient fluid intake.

Growth & Blood Pressure Control

Question #07: Growth and blood pressure regulation
Your first draft report for this topic is due on Wed Nov 02. The question for this week is as follows:
Select a homeostatic event and/or physiological system involving growth OR blood pressure regulation as your structure, in which you can show the importance of structure/function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

a) Name the structure and the function on which your overall answer will be based? Be as specific as you can in delimiting the boundaries of your example (the most important part of your answer, since the following b, c, & d sub-questions are based on your answer to this first sub-question, a).

b) Why do you think that your structure and your function are related? Support your contention based on 3 lines of evidence on the chemistry, physics, anatomy or physiology involved in your example.

c) Which are the levels of organization involved in your example? Cite events occurring at its main level of organization and indicate how they relate to the whole body homeostatic level.

d) Which are the main feedback mechanisms involved in your example (cite at least two)? Expand on one of them and indicate an absolute requirement for that feedback to be operational.
Growth & Blood Pressure Control

structure

a) Which, increase or decrease?

function

b) How do you know?

c) Parts to total?

d) Two feedbacks and an absolute requirement?

Next week question
(after test #2)

Question #68: Control of the onset of puberty, cyclicity and aging
Your first draft report for this topic is due on Wed Nov 16. The question for this week is as follows:
Select a COMMON homeostatic event and/or physiological system involving the regulation of the onset of puberty, cyclicity AND aging as your structure, in which you can show the importance of structure/function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

a) Name the structure and the function on which your overall answer will be based? Be as specific as you can in delimiting the boundaries of your example (the most important part of your answer, since the following b, c, & d sub-questions are based on your answer to this first sub-question, a).

b) Why do you think that your structure and your function are related? Support your contention based on 3 lines of evidence on the chemistry, physics, anatomy or physiology involved in your example.

c) Which are the levels of organization involved in your example? Cite events occurring at its main level of organization and indicate how they relate to the whole body homeostatic level.

d) Which are the main feedback mechanisms involved in your example (cite at least two)? Expand on one of them and indicate an absolute requirement for that feedback to be operational.