BI 121 Lecture 11

I. **Announcements** Blood Chem Lab today! Fun day!! Personal data!!! If you haven't already done so, please review Lab 5 in LM & in e-mail. Thanks sincerely! Lab Manual & Exam I remaining returns. Q from last t?

II. **Safety & Techniques Review for Blood Chem Lab** Q?

III. **Endocrine Connections**
   A. Hypothalamus-Anterior pituitary intimate circulation
   B. Anterior pituitary hormones DC pp 105-7, LS pp 502-6
   C. GH: Body builder's dream? Fountain of youth?
      LS pp 506-11
   D. Peripheral endocrine organs
      DC pp 109-13, LS pp 513-36
      1. Pancreas (insulin – glucagon see-saw!)
      2. Thyroid
      3. Adrenals

IV. **Introduction to the Nervous System** LS ch 5, DC Module 9
No food, drink or gum in lab today! Thanks sincerely!

...Healthy, tasty & fresh, but not in lab!!
PREPARATION

1. WASH & DRY

2. ALCOHOL

3.
OBTAIN μSAMPLE

BLOOD GLUCOSE

BLOOD TYPING
Glucose: Sugar in Blood

Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: ≥ 126 mg/dL

NB: Read & Record!

https://doihaveprediabetes.org/
BLOOD Typing

1. Add Antisera
2. Mix w/toothpicks
3. Read & record!!
10 Q? Clumping in Any Wells?

Here?

Type AB+

Here?

Here?

Source: S Wong, BI 121 Lab, 2016
CLEAN-UP!

1. **FOLD DIAPER**

2. **BLOOD PRODUCTS**

3. **REWASH!!**
Blood Chem Lab Q?
gfig 17-10
Progression & Development of Acromegaly

Age 13

Age 21

Age 35
Growth Hormone = Somatotrophic Hormone Body Builder’s Dream?
GH/STH Effects: Insulin Resistance/Type II Diabetes?

- ↑ Amino Acid uptake & Protein synthesis
- ↑ Lipolysis & Fatty Acid mobilization
- ↓ Glucose uptake (skeletal muscle & adipocytes)
- ↑ Glucose production (liver glycogenolysis)
- ↑ Insulin secretion

Mismatch!!
Increase GH naturally with exercise & sleep!!

Strenuous exercise

Time of day

Growth hormone (ng/ml plasma)

Sleep

ng/ml = nanograms per milliliter
Endocrine Pancreas: Insulin (I) & Glucagon (G) 
See-Saw Hormones in Regulating Blood Glucose

- Hormones (insulin, glucagon)

- Exocrine portion of pancreas
  (Acinar and duct cells)

- Duct cells secrete aqueous NaHCO₃ solution

- Acinar cells secrete digestive enzymes

- Endocrine portion of pancreas
  (Islets of Langerhans)

The glandular portions of the pancreas are grossly exaggerated.
FIGURE 13-12
Adrenal Gland  The adrenal glands sit atop the kidney and consist of an outer zone of cells, the adrenal cortex, which produces a variety of steroid hormones, and an inner zone, the adrenal medulla. The adrenal medulla produces adrenalin and noradrenalin.
Adrenals/Suprarenals

- Adrenal medulla
  - Mineralocorticoids (aldosterone)
  - Glucocorticoids (cortisol) and sex hormones (dehydroepiandosterone)
  - Catecholamines (epinephrine and norepinephrine)

- Adrenal cortex
  - Connective tissue capsule
  - Zona glomerulosa
  - Zona fasciculata
  - Zona reticularis

- Adrenal gland
Stress Promotes Cortisol Secretion

Metabolic fuels and building blocks available to help resist stress

- Blood glucose (by stimulating gluconeogenesis and inhibiting glucose uptake)
- Blood amino acids (by stimulating protein degradation)
- Blood fatty acids (by stimulating lipolysis)
Epinephrine 80%
Norepinephrine 20%

FiguRE 77-1
Secretion of adrenocortical hormones by the different zones of the adrenal cortex.

Guyton & Hall 2000
Questions + Discussion
Nervous System

CNS

PNS

input

output
Central nervous system (CNS)

Peripheral nervous system (PNS)

Afferent division
- Sensory stimuli
- Visceral stimuli

Efferent division
- Somatic nervous system
  - Motor neurons
- Autonomic nervous system
  - Sympathetic nervous system
  - Parasympathetic nervous system

Effector organs
(made up of muscle and gland tissue)

Input to CNS from periphery

Output from CNS to periphery

Stimuli in digestive tract

Digestive organs only

Enteric nervous system

KEY
- Central nervous system
- Peripheral nervous system
- Afferent division of PNS
- Efferent division of PNS
- Somatic nervous system
- Autonomic nervous system
- Enteric nervous system

LS 2012 fig 5-1
~99% of all neurons in humans! CNS ~100 billion interneurons!!
~ 90% of Cells w/in CNS are not neurons but glial cells = neuroglia or nerve glue!
A single nerve cell may have as many as 200,000 inputs!
Nerve cell with multiple axons grown by adding a mitogen/neurogen $\equiv$ nerve growth factor!
Sensory nerves especially, come in all shapes & sizes!

Figure 46-1
Several types of somatic sensory nerve endings.
Nerve Extremes: Far ends of the Continuum

A = Large to medium myelinated, up to 120 m/sec

C = Small unmyelinated, < 0.25 m/sec

α, β, γ, δ

IV
What is myelin?
Why is it important?

Lipid insulative coat
↑  v, conserves ions & ATP
A large myelinated "survival" nerve can conduct impulses the length of football field in < 1 second!
Saltatory/Leaping Conduction! Crucial Sensory & Motor Nerves

L. saltare to hop or leap! Fr. salt, sautier, sauté, leap, high air, vault

DC 2003