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** LS ch 17, DC Module 13, SI Fox +…

A. Endocrine/hormone classes ~ LS pp 495 – 6

B. Hypothalamus (Master) – Pituitary (subcontroller)
   DC pp 104-6 + LS pp 499-506

C. Posterior pituitary+hormones DC p 108, LS fig 17-4 p 502

D. Anterior pituitary hormones DC pp 105-7, LS pp 502-6

E. Endocrine feedback + reflexes LS p 540 fig 17-7

F. GH: Body builder's dream? Fountain of youth?
   LS pp 506-10, fig 17-10, 17-11

G. Peripheral endocrine organs DC pp 109-13, LS pp 513-36
   1. Pancreas 2. Thyroid 3. Adrenals
No food, drink or gum in lab today! Thanks sincerely!

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

Record in Notebook w/dominant hand!
ADD ANTISERA

MIX W/TOOTHPICKS

READ & RECORD!!
Q? Clumping in Any Wells?

Type AB+

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

1. FOLD DIAPER
2. BLOOD PRODUCTS
3. REWASH!!
Blood Chem Lab Q?
Hormone/Endocrine Classifications?

Exogenous

Endogenous

Amino Acid/PP/Protein

Thyroid

Steroid
Hypothalamus & Pituitary: Intimate Relationship
Hypothalamus < 1% of Brain Mass
Hormone Master Controller +100s of Functions!
Good Things Come in Small Packages!

Kreiger & Hughes 1980
Nervous Connection!!

Neurosecretory neurons

Hypothalamic-posterior pituitary stalk

Anterior pituitary

Hypothalamus

Systemic arterial inflow

Systemic venous outflow

= Vasopressin

= Oxytocin

LS 2007
Pituitary Nourishing or Growth Hormones

Systemic arterial inflow

Hypothalamic-hypophyseal portal system

Neurosecretory neuron

Hypothalamus

RH + or RIH -

Releasing or Release-Inhibiting Hormones

Systemic venous outflow

= Hypophysiotropic hormones

= Anterior pituitary hormone

Hypophysis = Pituitary

LS 2007
Capillary-Venule-Capillary Intimate Circulation

Krieger & Hughes 1980
Hypothalamus

Hormone 1

Anterior pituitary

Hormone 2

Target endocrine gland

Hormone 3

Target cells

Negative feedback
fig 17-10
Progression & Development of Acromegaly

Age 13

Age 21

Age 35

LS 2012 fig 17-11
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
Increase GH naturally with exercise & sleep!!

Growth hormone (ng/ml plasma)

Time of day

Sleep

Strenuous exercise

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

Duodenum

Bile duct from liver

Stomach

Duct cells secrete aqueous NaHCO₃ solution

Acinar cells secrete digestive enzymes

Exocrine portion of pancreas (Acinar and duct cells)

Hormones (insulin, glucagon)

Blood

Endocrine portion of pancreas (Islets of Langerhans)

The glandular portions of the pancreas are grossly exaggerated.
Inadequate Iodine Promotes Goiter!
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
- Adrenal cortex

Mineralocorticoids (aldosterone)

Glucocorticoids (cortisol) and sex hormones (dehydroepiandrosterone)

Catecholamines (epinephrine and norepinephrine)

Connective tissue capsule

- Zona glomerulosa
- Zona fasciculata
- Zona reticularis

Medulla

Cortex

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