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 or on our website. Thanks sincerely! Lab Manual & Exam I Remaining Returns. Q2 Exam I?

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

III. **Endocrine Connections** LS ch 17, DC Module 13, SI Fox +…

A. Posterior pituitary storage site DC p 108, LS fig 17-4 p 502
B. Anterior pituitary hormones DC pp 105-7, LS pp 502-6
C. Endocrine feedback + reflexes LS p 540 fig 17-7
D. GH: Body builder's dream? Fountain of youth?
   LS pp 506-10, fig 17-10, 17-11
E. Peripheral endocrine organs DC pp 109-13, LS pp 513-36
   1. Pancreas (insulin – glucagon see-saw!)
   2. Thyroid
   3. Adrenals
No food, drink or gum in lab today! Thanks sincerely!

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

1. WASH & DRY

2. ALCOHOL

3. WASH & DRY
OBTAIN \( \mu \)SAMPLE

BLOOD GLUCOSE

BLOOD TYPING
BLOOD GLUCOSE

READ & RECORD!!
BLOOD TYPING

1. ADD ANTISERA

2. MIX W/TOOTHPICKS

3. READ & RECORD!!
CLEAN-UP!

1. FOLD DIAPER

2. BLOOD PRODUCTS

3. REWASH!!
Blood Chem Lab Q?
Hypothalamus-Posterior Pituitary Nervous Connection!

- Neurosecretory neurons
- Hypothalamic-posterior pituitary stalk
- Anterior pituitary
- Systemic arterial inflow
- Systemic venous outflow

=Nervous Connection!!=

- = Vasopressin
- = Oxytocin
Hypothalamus-Anterior Pituitary Vascular Connection!

Neurosecretory neuron

Systemic arterial inflow

Hypothalamic-hypophyseal portal system

Anterior pituitary

Systemic venous outflow

• = Hypophysiotropic hormones

• = Anterior pituitary hormone

LS 2007
Hypothalamus talks to Anterior Pituitary by way of RH & RIH!

- RH + or RIH -
- Neurosecretory neuron
- Systemic arterial inflow
- Hypothalamic-hypophyseal portal system
- Pituitary Nourishing or Growth Hormones
- Systemic venous outflow

- = Hypophysiotropic hormones
- = Anterior pituitary hormone

Hypophysis = Pituitary

LS 2007
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

Strenuous exercise

Sleep

ng/ml = nanograms per milliliter
Endocrine Pancreas: Insulin (I) & Glucagon (G)

See-Saw Hormones in Regulating Blood Glucose

- **Insulin (I)** and **Glucagon (G)**
- **Bile duct from liver**
- **Duodenum**
- **Stomach**
- **Hormones** (insulin, glucagon)
- **Blood**
- **Endocrine portion of pancreas** (Islets of Langerhans)
- **Duct cells** secrete aqueous NaHCO₃ solution
- **Acinar cells** secrete digestive enzymes
- **Exocrine portion of pancreas** (Acinar and duct cells)

The glandular portions of the pancreas are grossly exaggerated.
**Inadequate Iodine Promotes Goiter!**

Diagram showing the feedback mechanism involving the hypothalamus, anterior pituitary, thyroid, and the effects of low and adequate iodine levels on thyroid growth.
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.
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)

Stress → Hypothalamus → Corticotropin-releasing hormone (CRH) → Anterior pituitary → Adrenocorticotropic hormone (ACTH) → Adrenal cortex → Cortisol

Diurnal rhythm → Hypothalamus → Corticotropin-releasing hormone (CRH)
Epinephrine 80%
Norepinephrine 20%

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

Guyton & Hall 2000