

BI 121 Lecture 11

Fun lab today! Lifetime data!
Thanks for being prepared!



I. Blood Cell Connections Q?

II. Lab 5 Review: Safety & Techniques Q?

III. Blood Glucose & Insulin LS pp 530-2, DC pp 110-2

IV. Introduction to Endocrinology LS ch 17, DC Module 13, SI Fox+

A. Endocrine vignette: Cushing's syndrome LS fig17-20 p 521-2

B. Endocrine system DC p 103 fig 13-1, LS fig 17-1, tab 17-1

C. What's an endocrine? + classes ~ LS pp 495 – 6

D. Hypothalamus (Master) – Pituitary (subcontroller)

DC pp 104-6 + LS pp 499-506

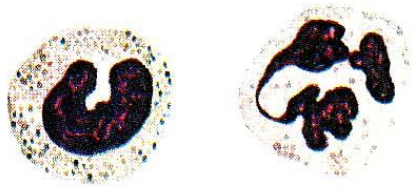
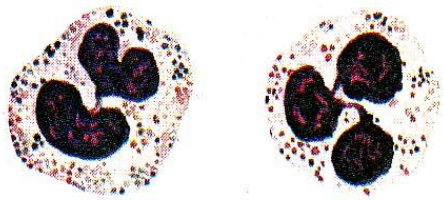
E. Posterior pituitary + hormones DC p 108, LS fig 17-4 p 502

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

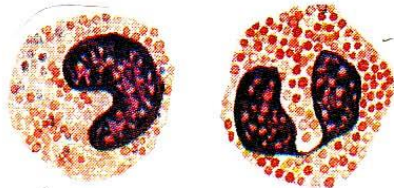
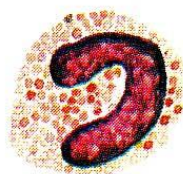
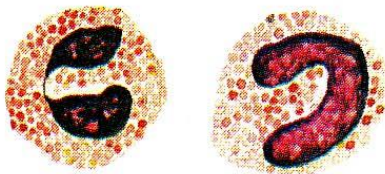
G. GH: Body builder's dream? Fountain of youth? LS pp 506-11

H. Peripheral endocrine organs DC pp 109-13, LS pp 513-36

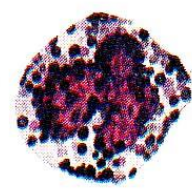
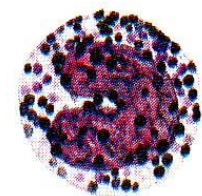
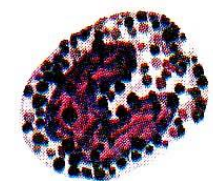
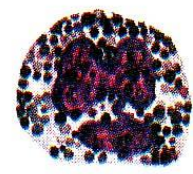
1. Pancreas 2. Thyroid 3. Adrenals



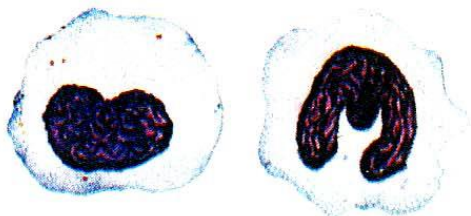
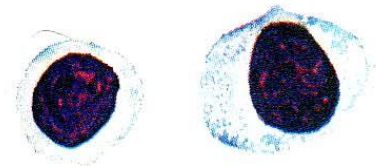
NEUTROPHILS



EOSINOPHILS



BASOPHILS



LYMPHOCYTES

MONOCYTES



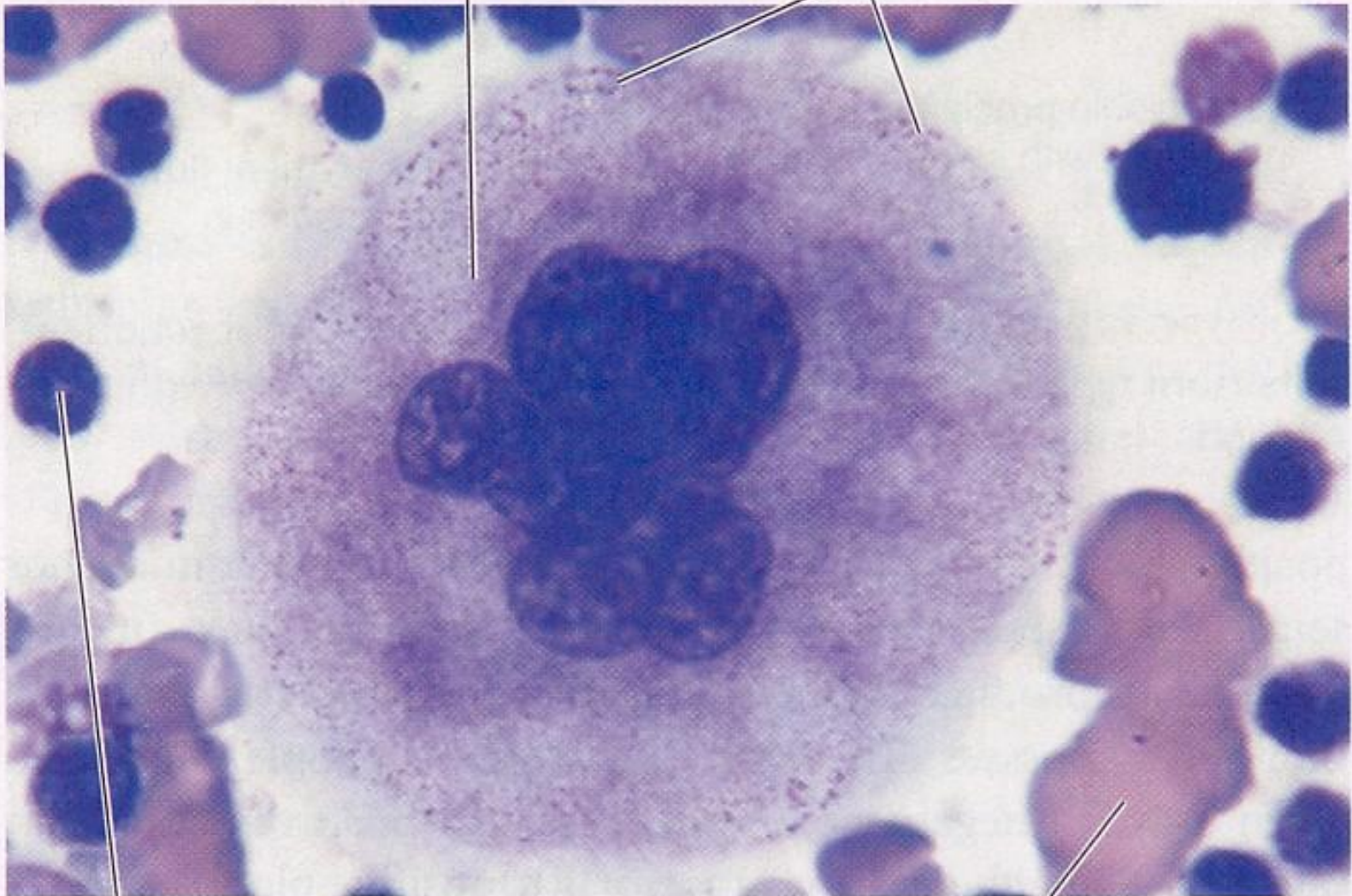
PLATELETS



ERYTHROCYTES

Megakaryocyte

Clusters of platelets
about to shed off



Carolina Biological/Visuals Unlimited

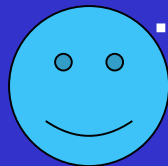
Developing
leukocyte

Cluster of developing
erythrocytes

No food, drink or gum in lab today! Thanks sincerely!



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



PREPARATION



WASH & DRY



ALCOHOL



SAMPLE+TESTS

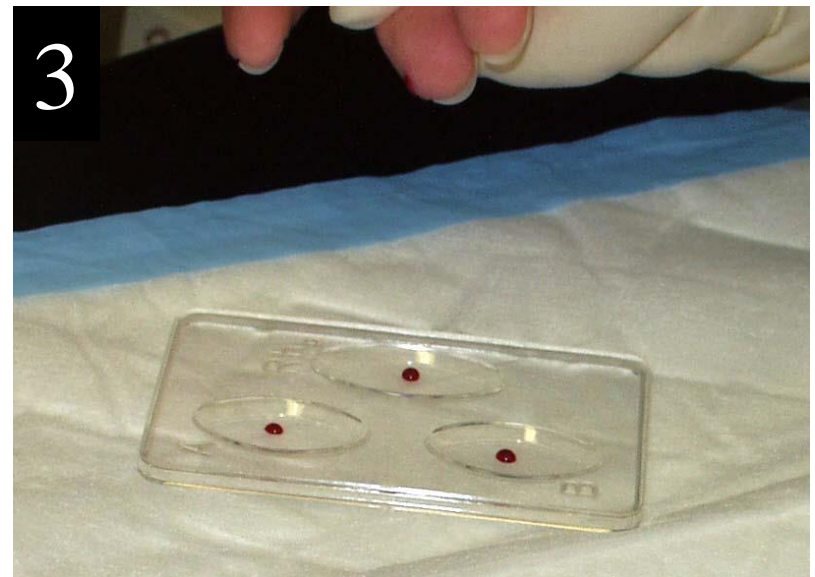


1

OBTAIN μ SAMPLE



BLOOD GLUCOSE

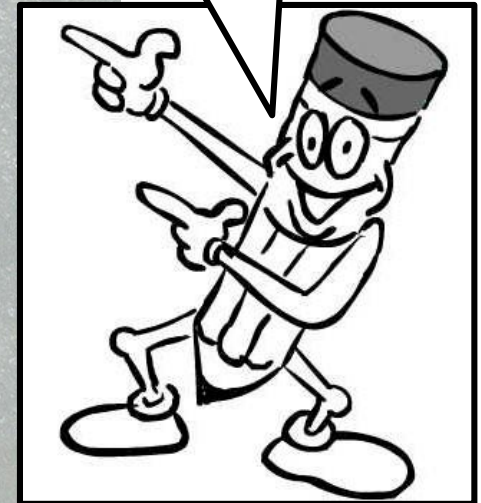


BLOOD TYPING

Glucose:
Sugar in Blood

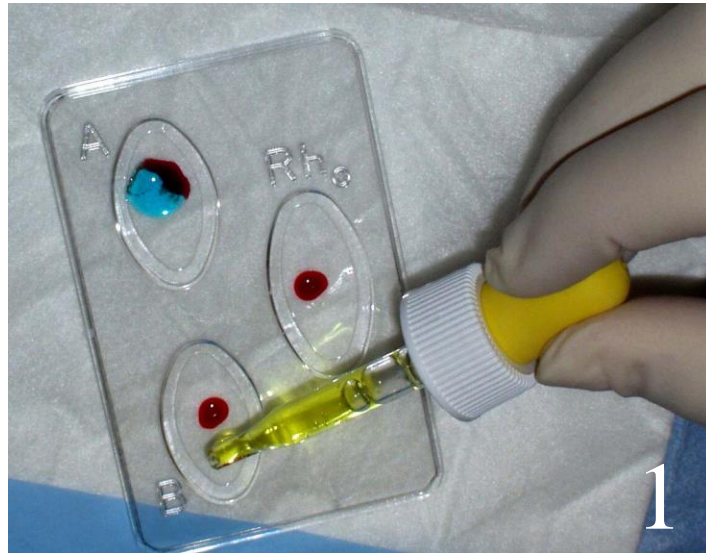


**NB: Read
& Record!**

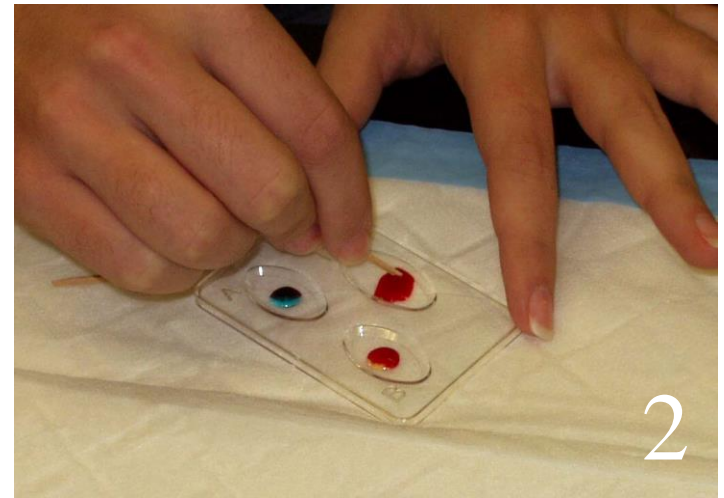


Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: \geq 126 mg/dL

BLOOD TYPING



ADD ANTISERA



MIX W/TOOTHPICKS



READ & RECORD!!

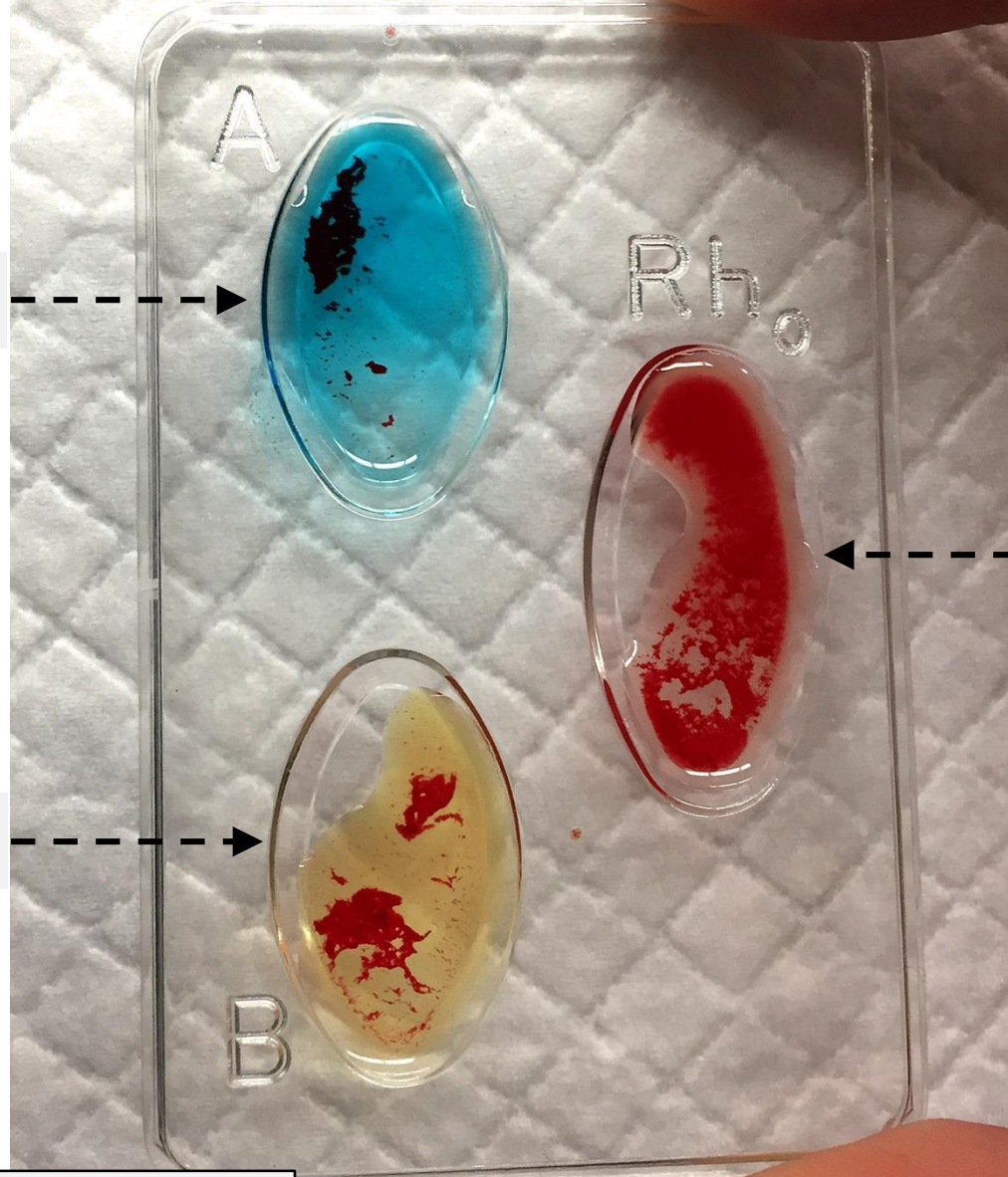
1^o Q? Clumping in Any Wells?

Type AB+

Here?

Here?

Here?

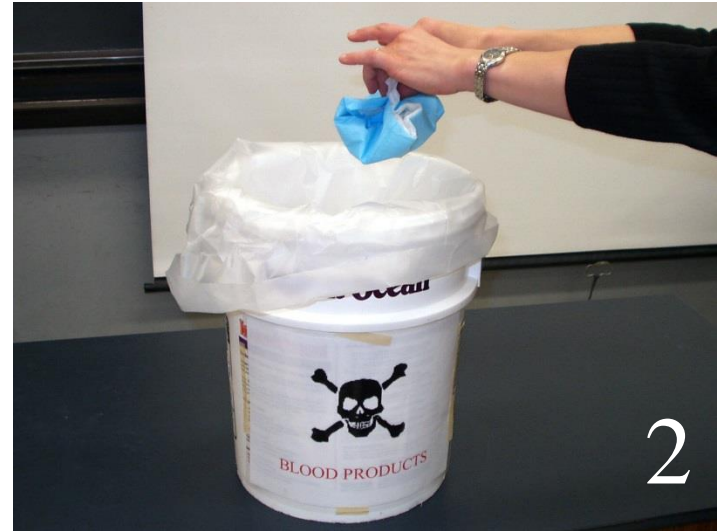


Source: S Wong, BI 121 Lab, 2016

CLEAN-UP!



FOLD DIAPER



BLOOD PRODUCTS

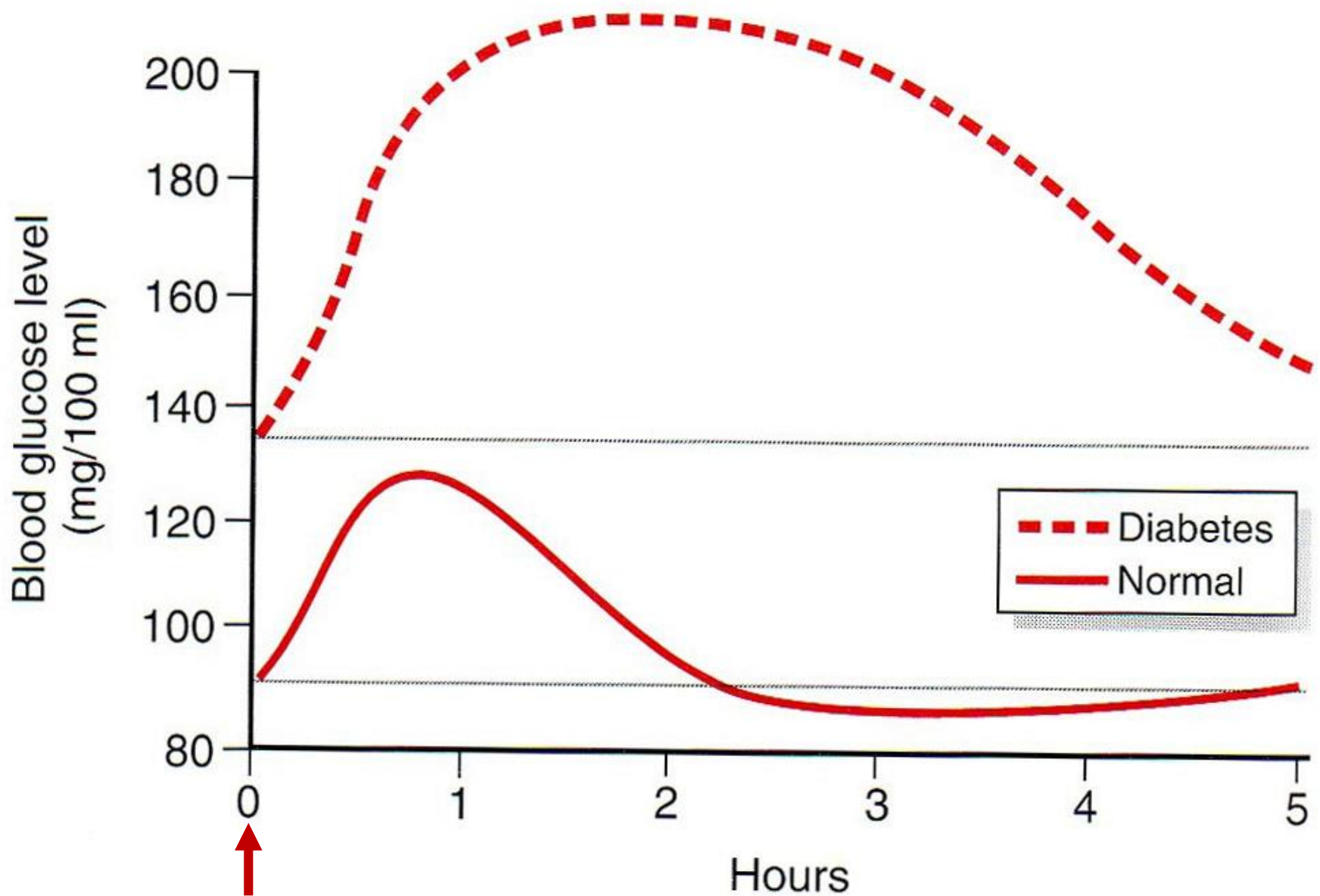


REWASH!!

Blood Chem Lab Q?



Diabetic & Normal Response to Glucose Load



Ingest Glucola or eat meal

Proinsulin with C-Connecting Peptide

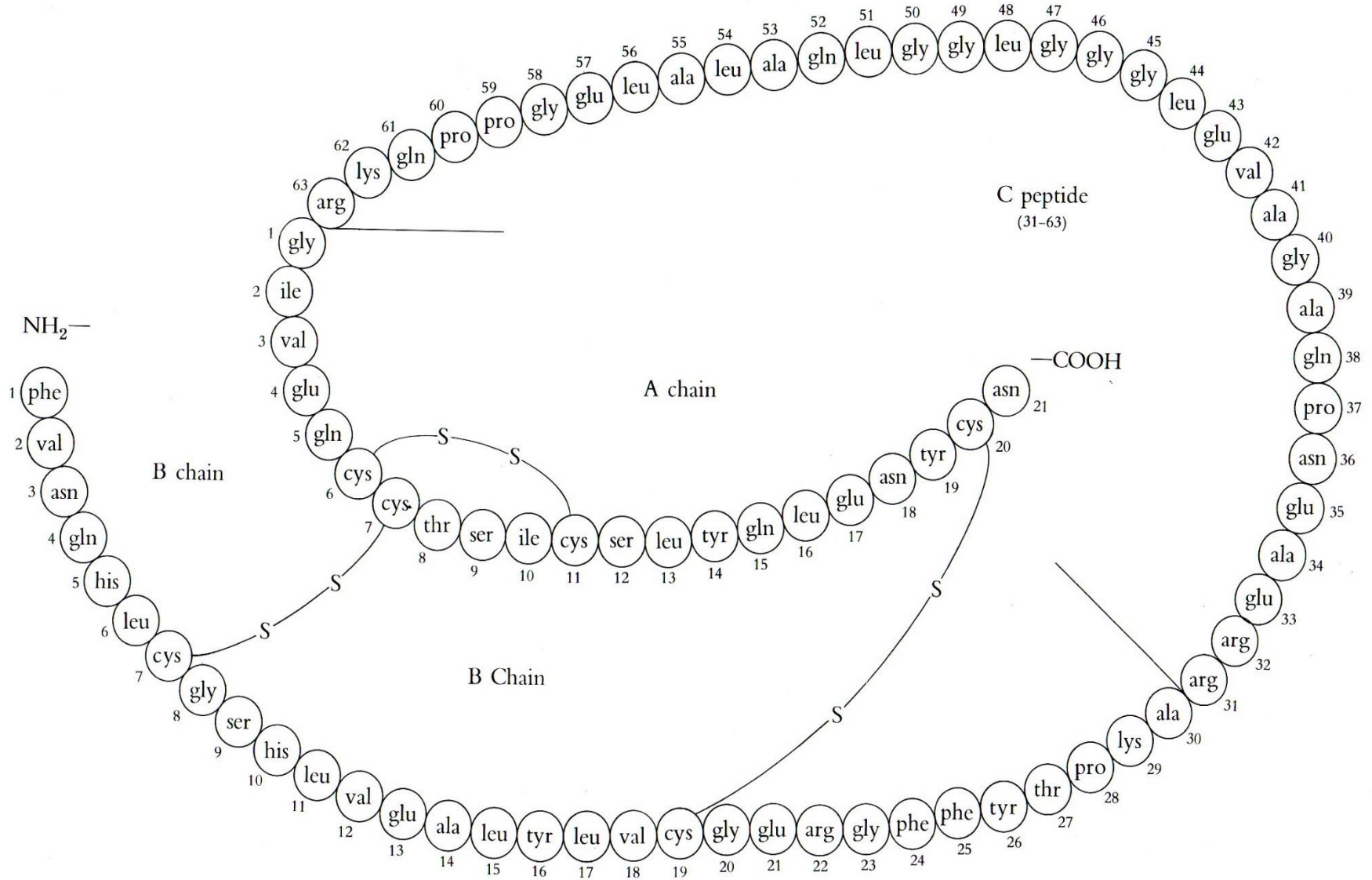
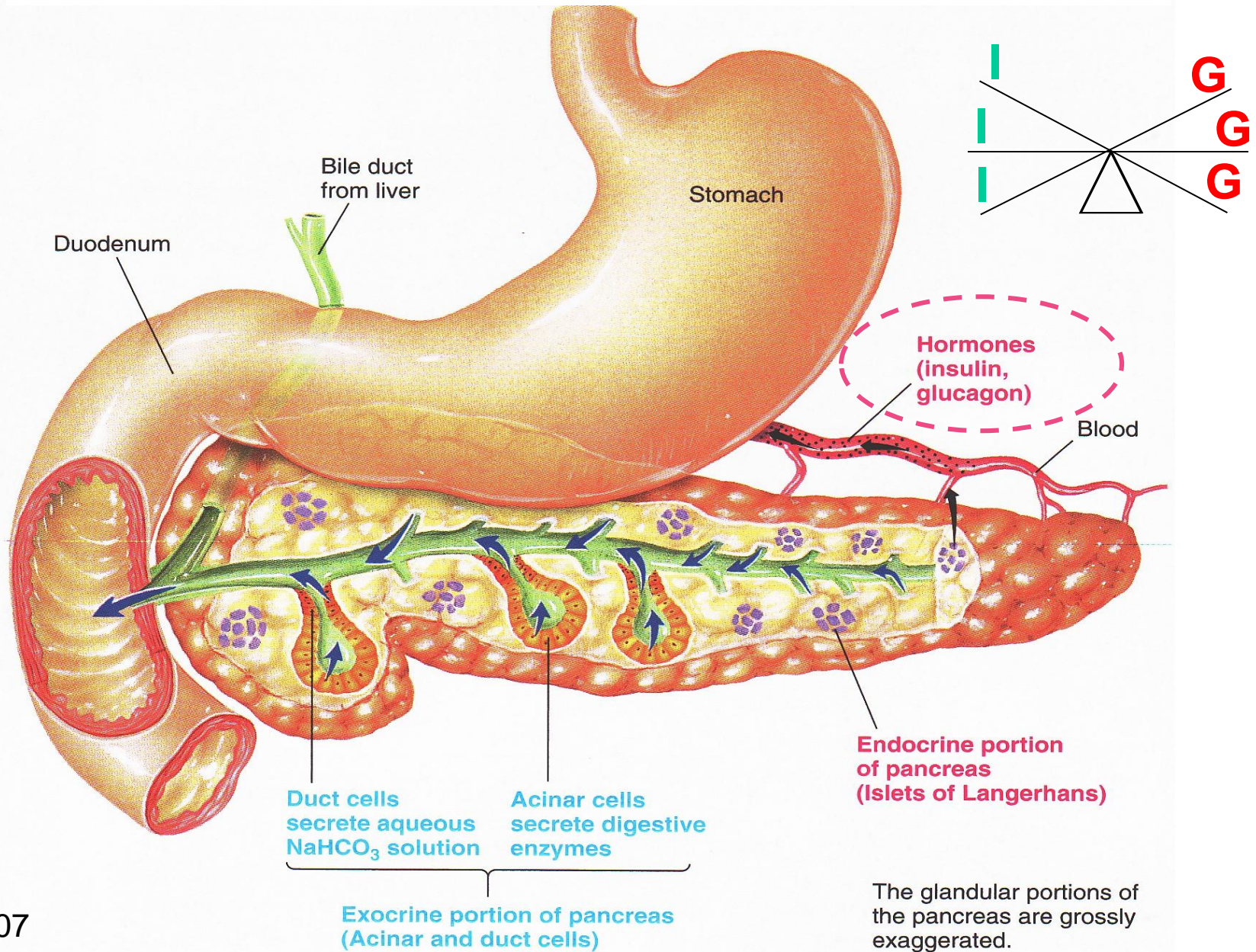


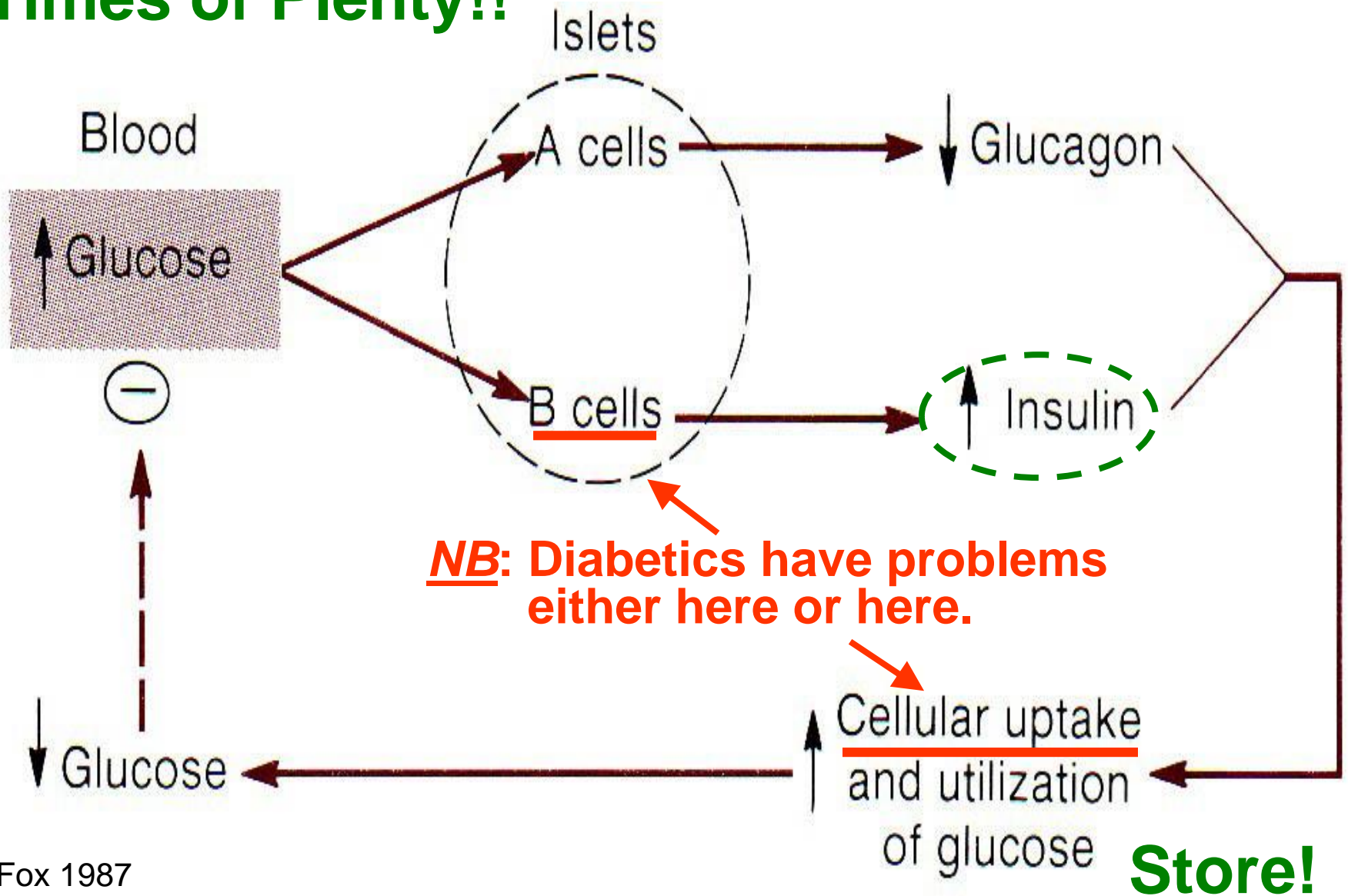
FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.



Endocrine Pancreas: Insulin (I) & Glucagon (G) See-Saw Hormones in Regulating Blood Glucose



Times of Plenty!!



Fox 1987

<https://ed.ted.com/lessons/what-does-the-pancreas-do-emma-bryce>

<https://www.youtube.com/watch?v=8dgoeYPoE-0>

TABLE
4-7

Warning Signs of Diabetes

These signs appear reliably in type 1 diabetes and, often, in the later stages of type 2 diabetes.

- Excessive urination and thirst
- Glucose in the urine
- Weight loss with nausea, easy tiring, weakness, or irritability
- Cravings for food, especially for sweets
- Frequent infections of the skin, gums, vagina, or urinary tract
- Vision disturbances; blurred vision
- Pain in the legs, feet, or fingers
- Slow healing of cuts and bruises
- Itching
- Drowsiness
- Abnormally high glucose in the blood

Diabetics must constantly juggle diet, exercise & medication to control blood glucose!

Medication



Exercise

Diet

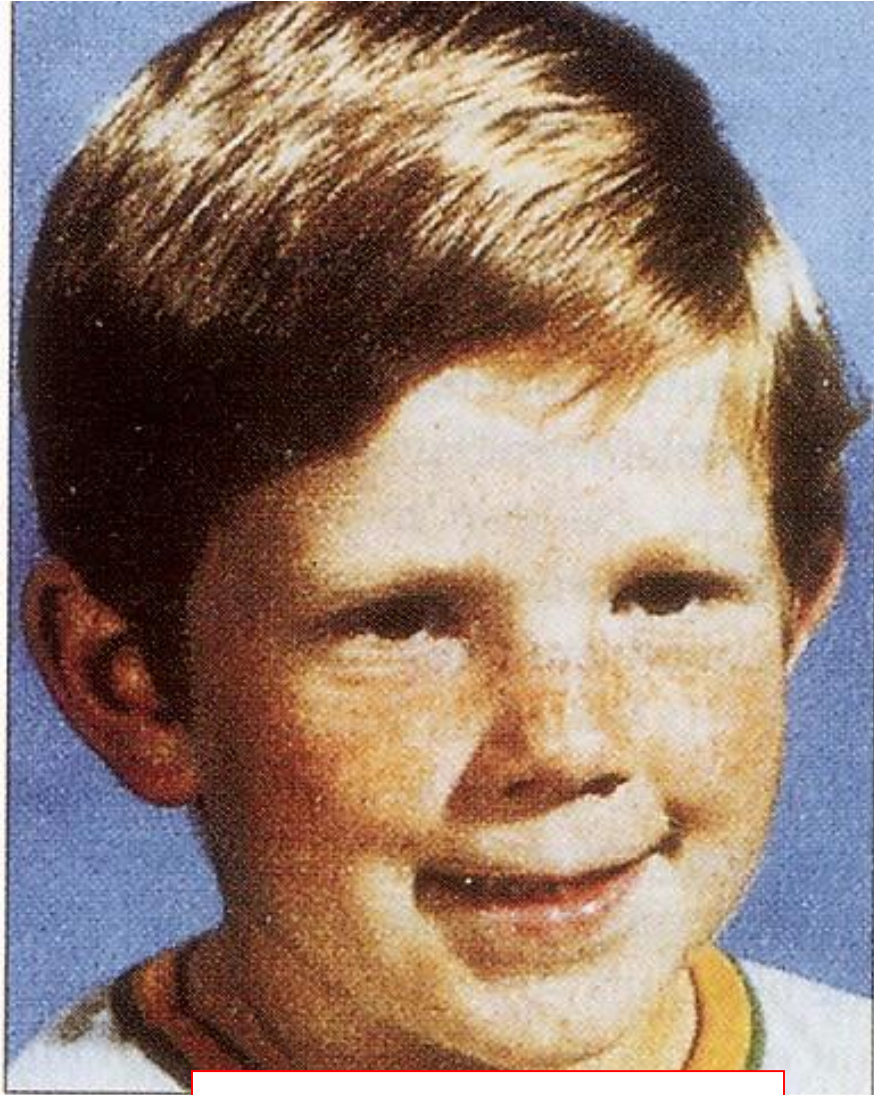
Like others, diabetics benefit from whole grains, vegetables, fruits, legumes & non-/low-fat milk products!



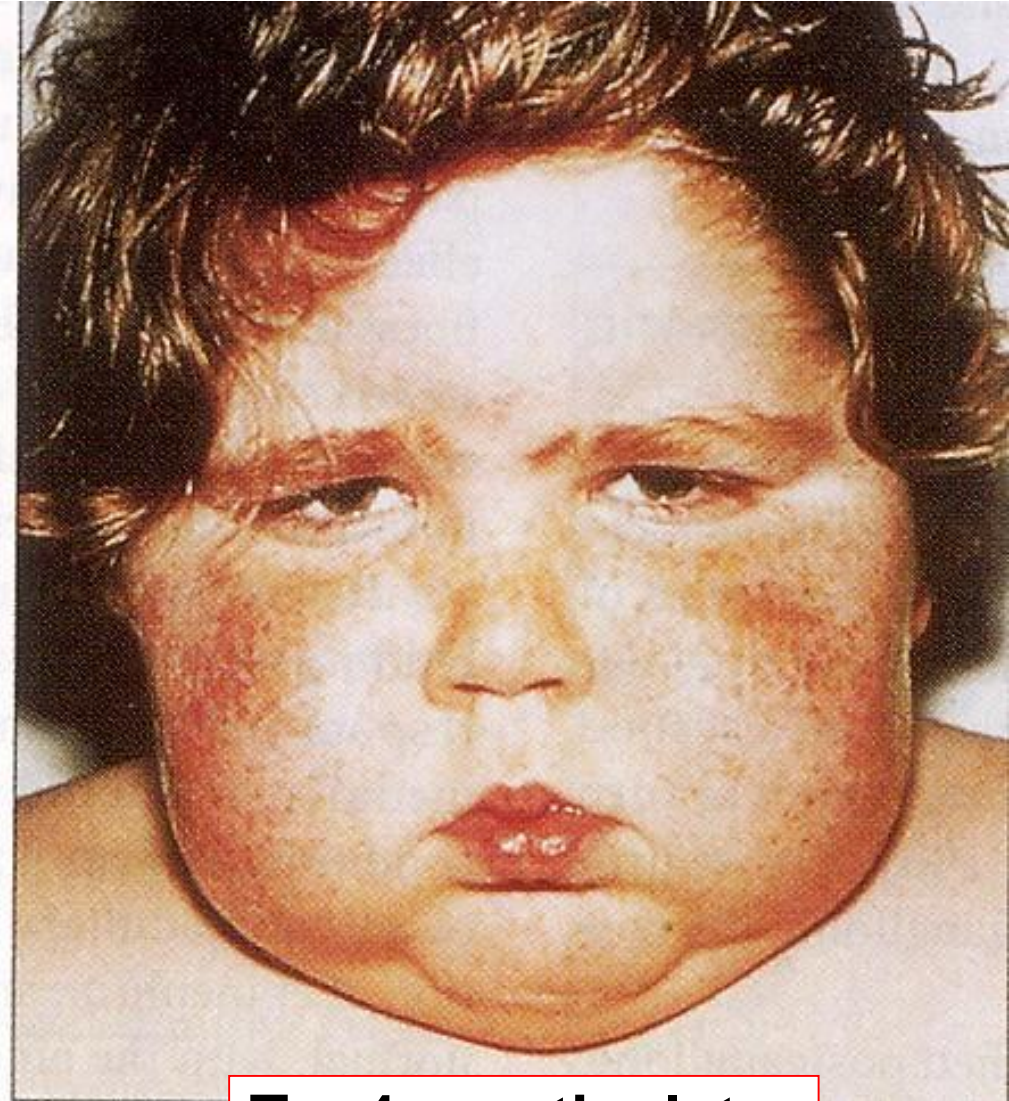
Discussion/Questions/Break!



***Cushing's Syndrome = Hypersecretion
of Cortisol: Hypothalamic (CRH),
Pituitary (ACTH), or Adrenal (Cortisol)***



T = 0, near normal

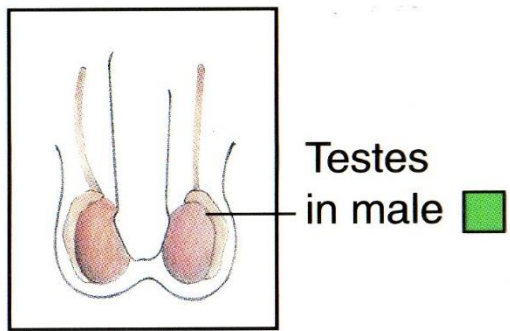
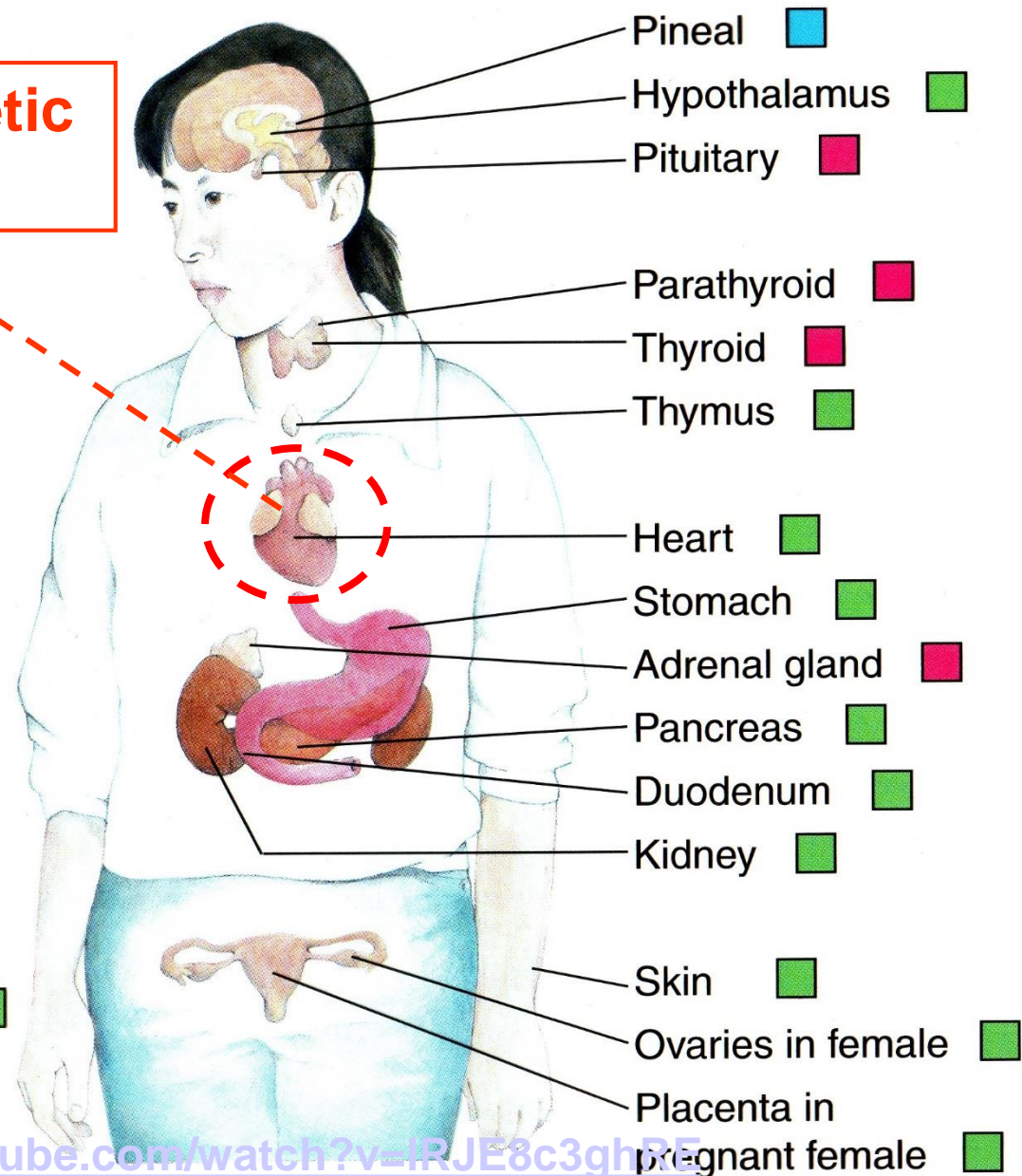


T = 4 months later

Endocrine System

ANP = Atrial Natriuretic Polypeptide

- Solely endocrine function
- Mixed function
- Complete function uncertain



<https://www.youtube.com/watch?v=IRJE8c3ghRE>

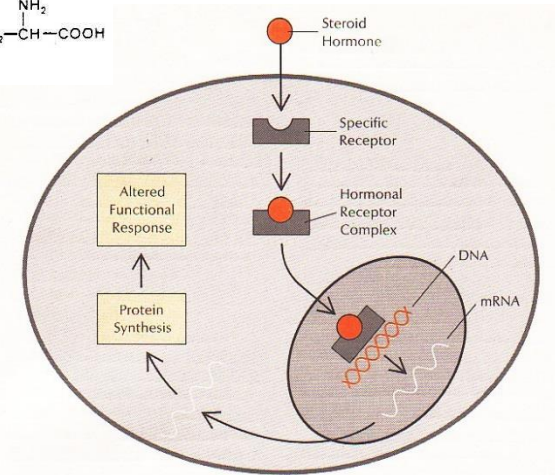
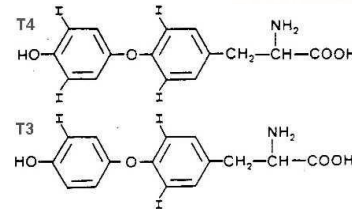
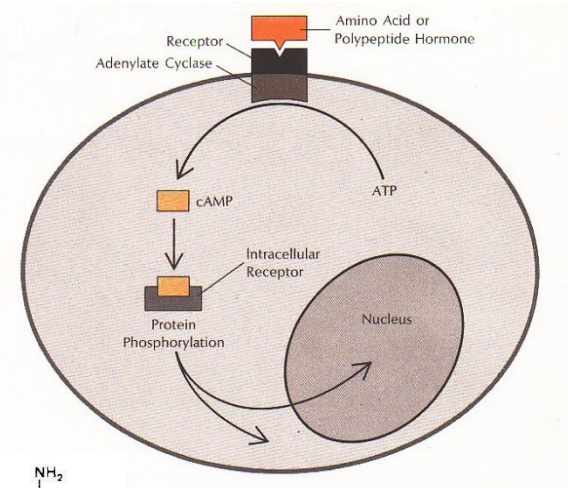
<https://www.hopkinsallchildrens.org/Patients-Families/Health->

Hormone/Endocrine Classifications

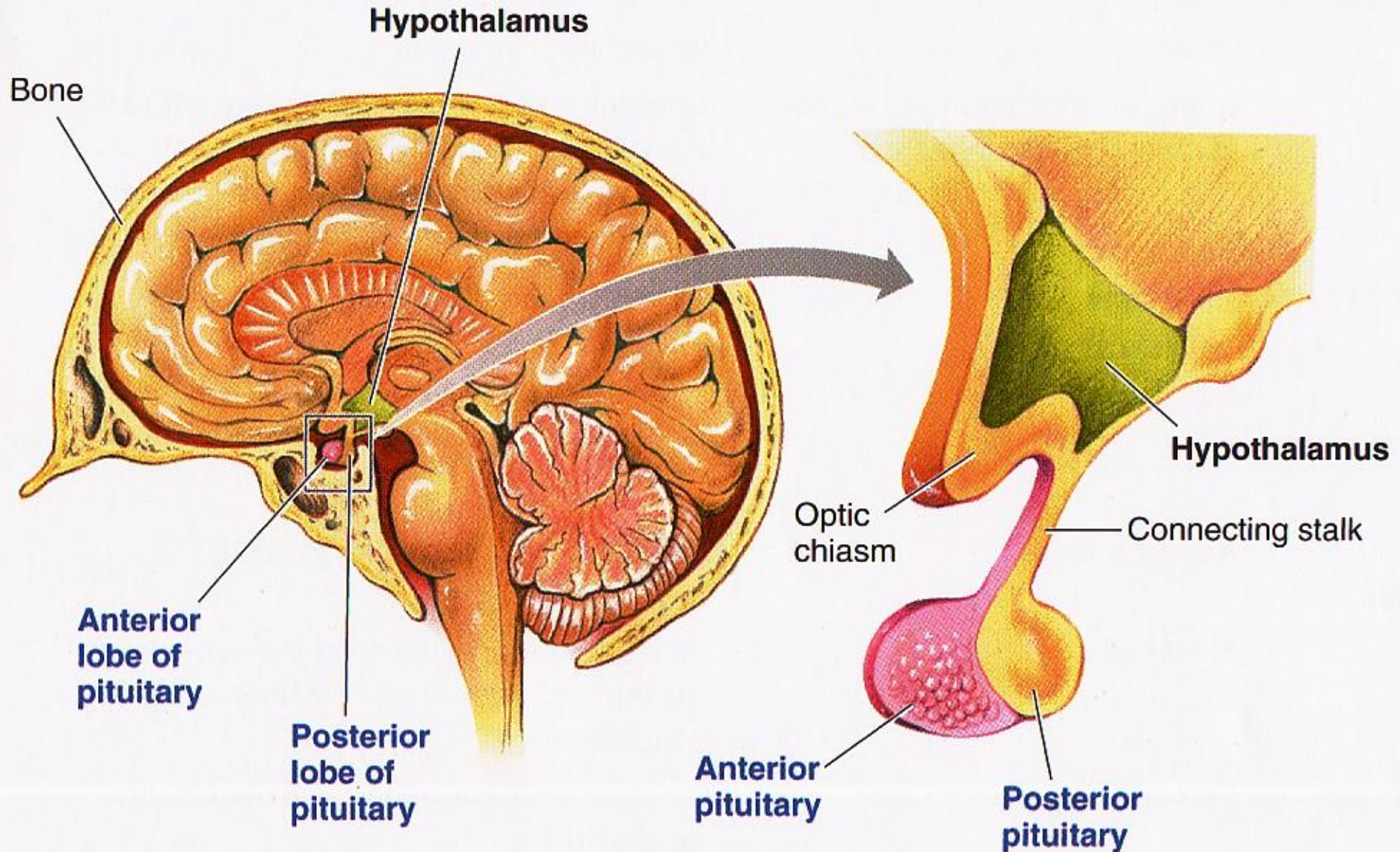
Exogenous



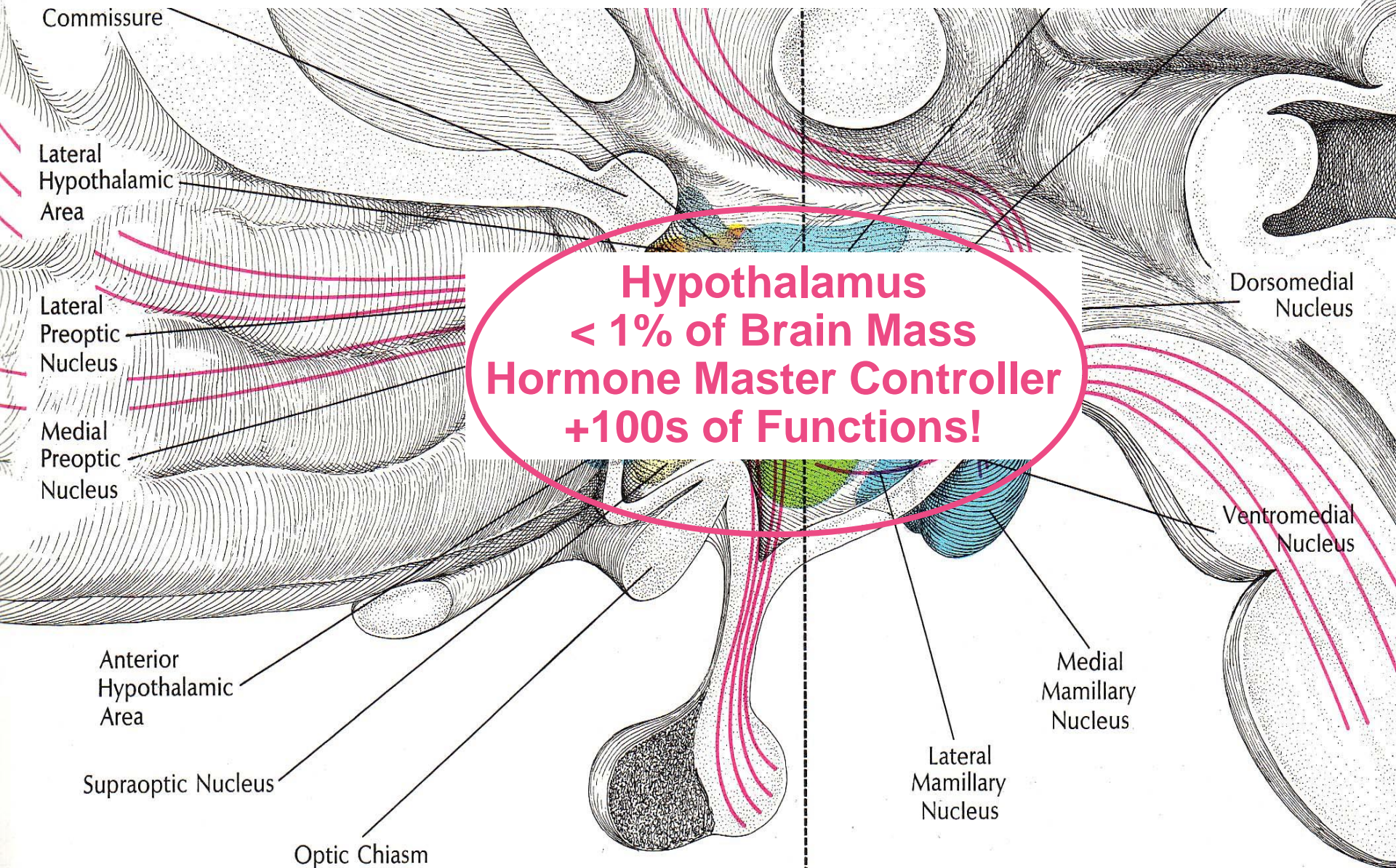
Endogenous

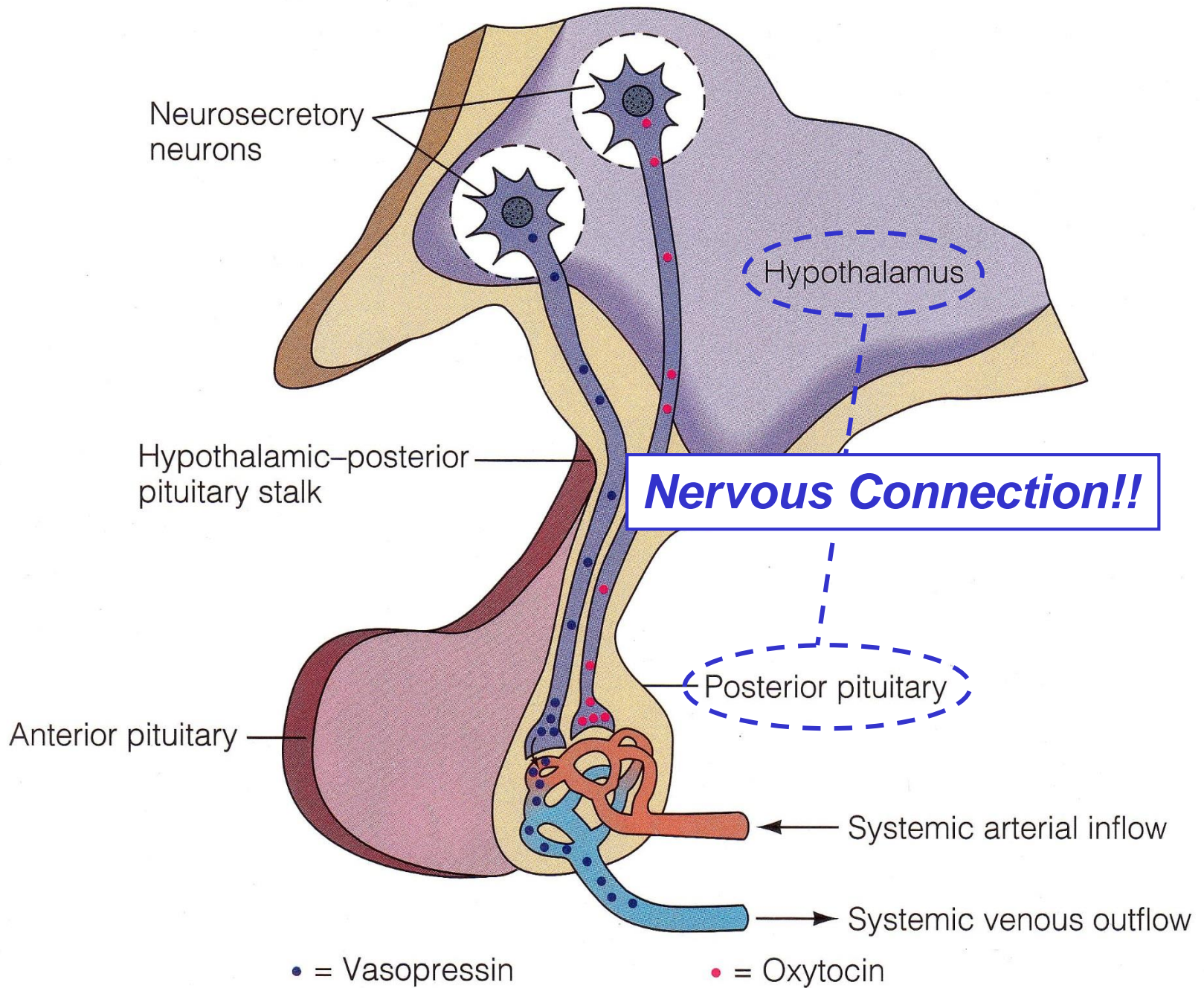


Hypothalamus & Pituitary: Intimate Relationship

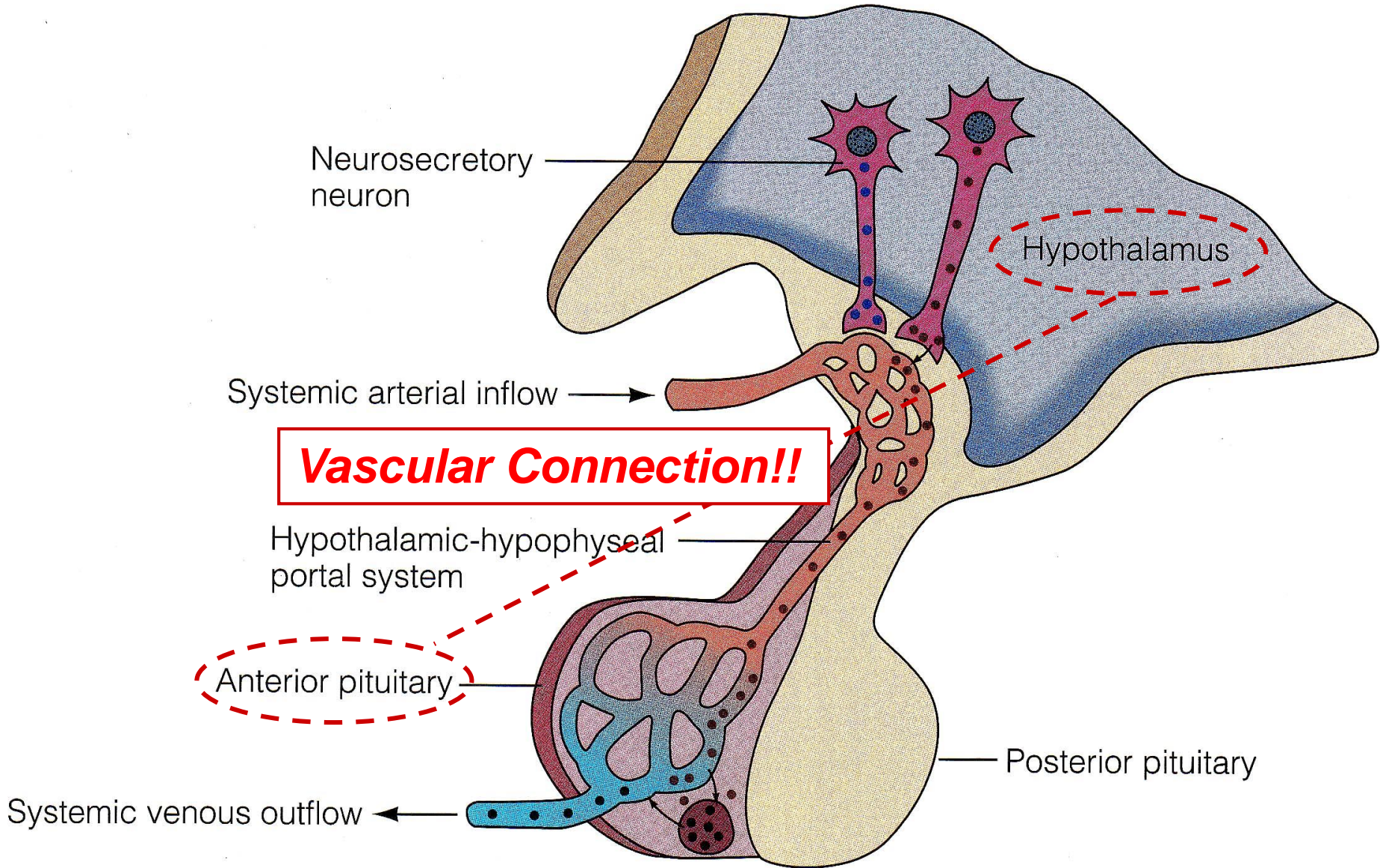


Good Things Come in Small Packages!



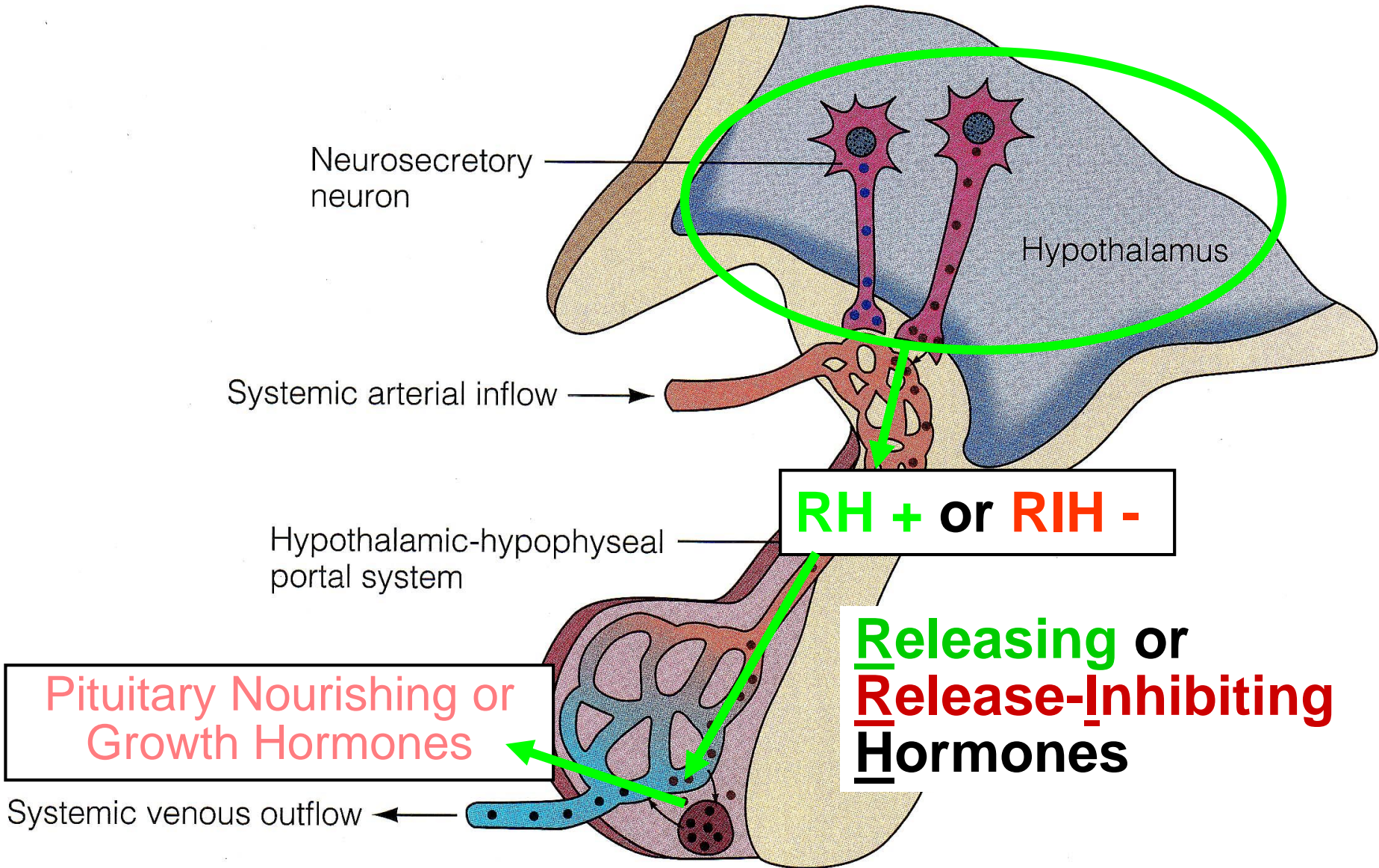


Hypothalamus-Anterior Pituitary Vascular Connection!



• = Hypophysiotropic hormones

• = Anterior pituitary hormone

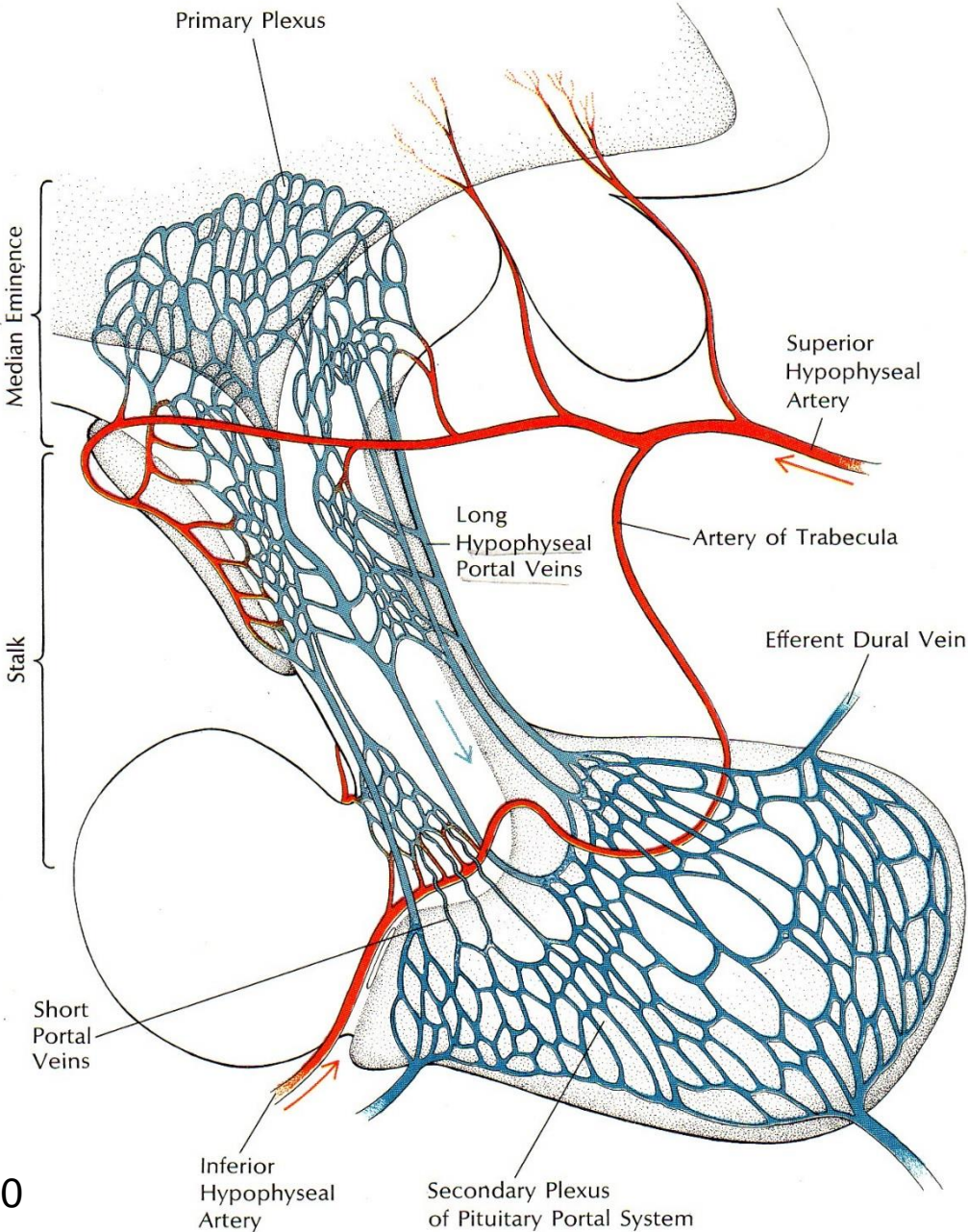


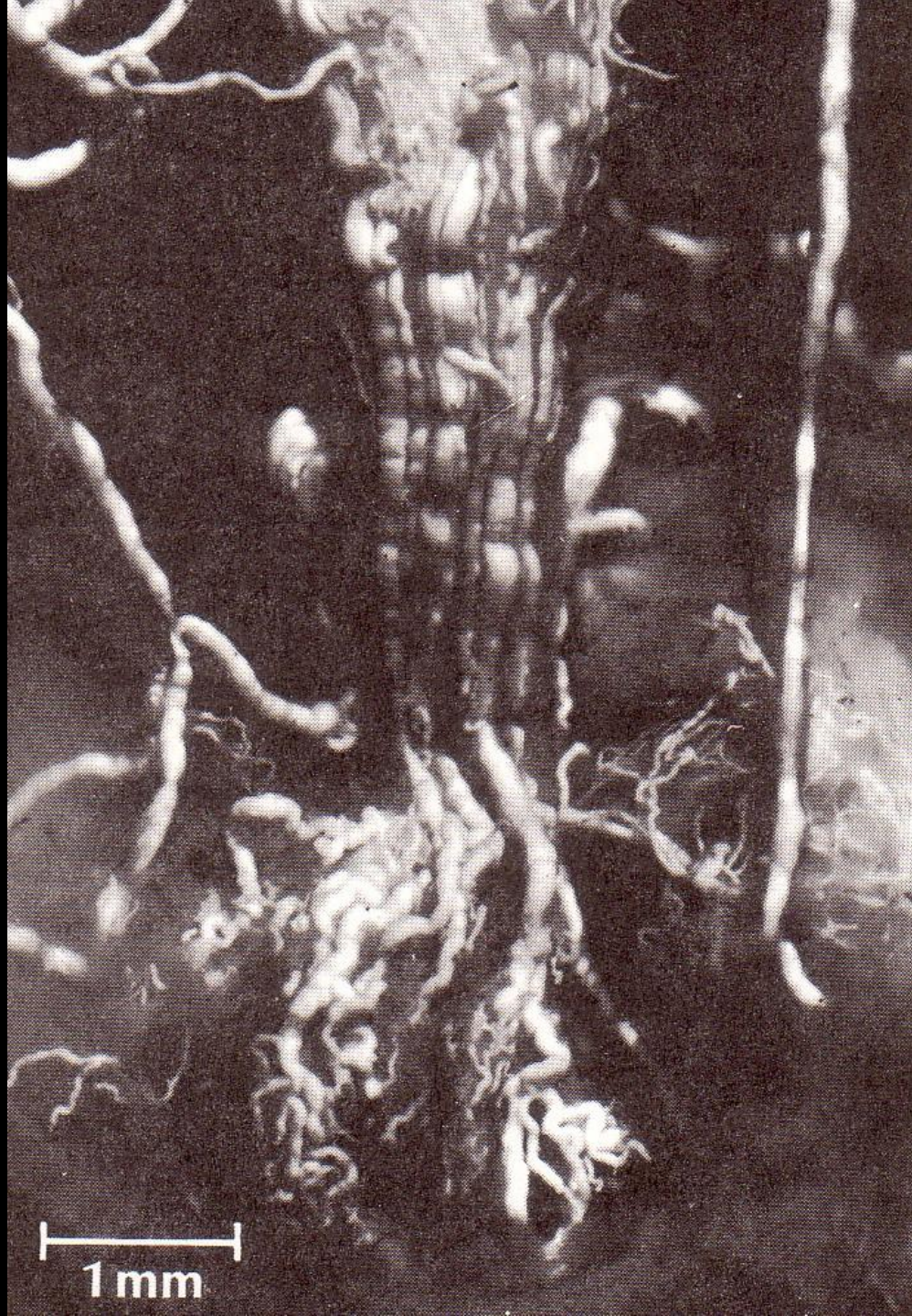
• • = Hypophysiotropic hormones

• = Anterior pituitary hormone

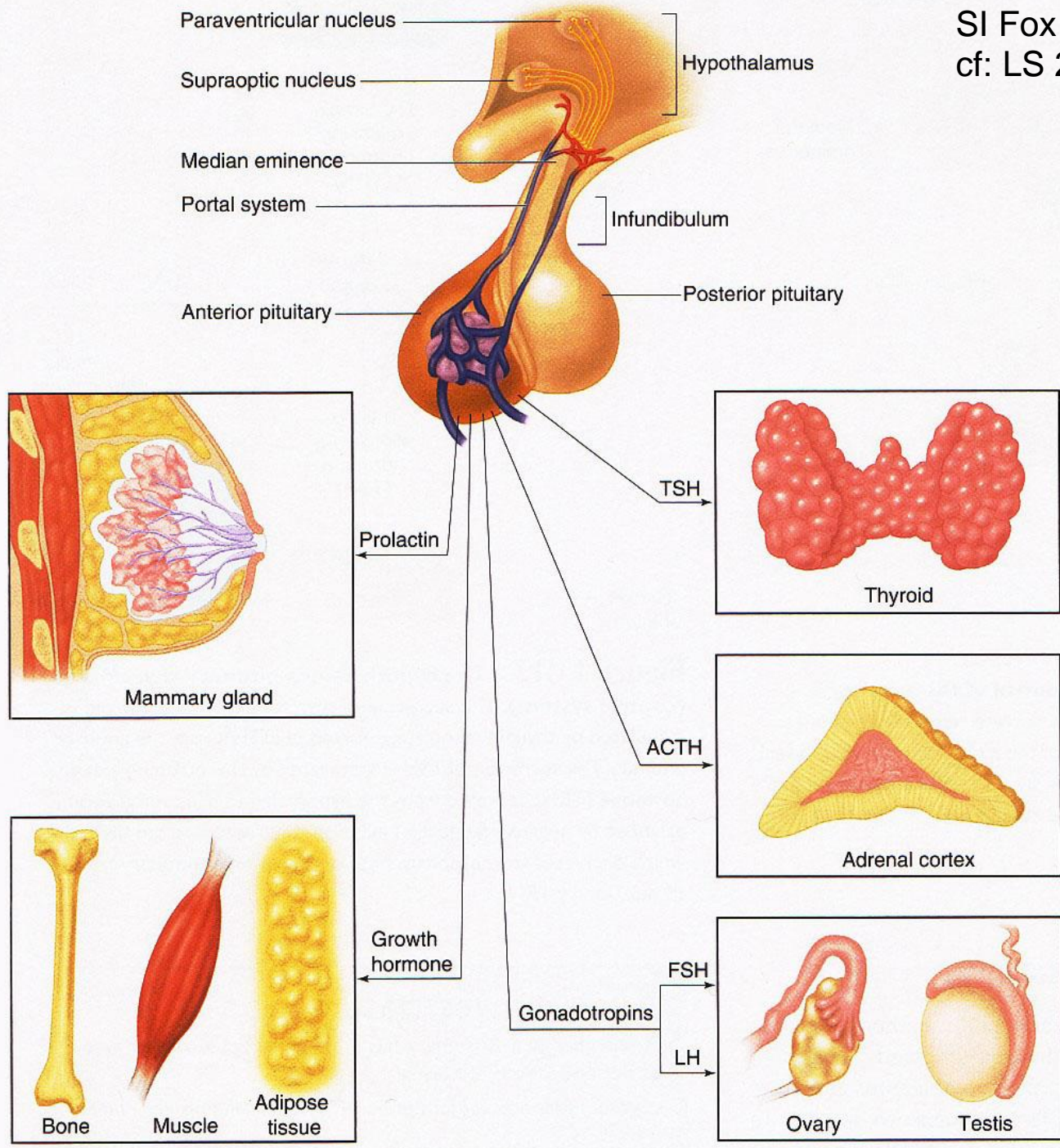
Hypophysis ≡ Pituitary

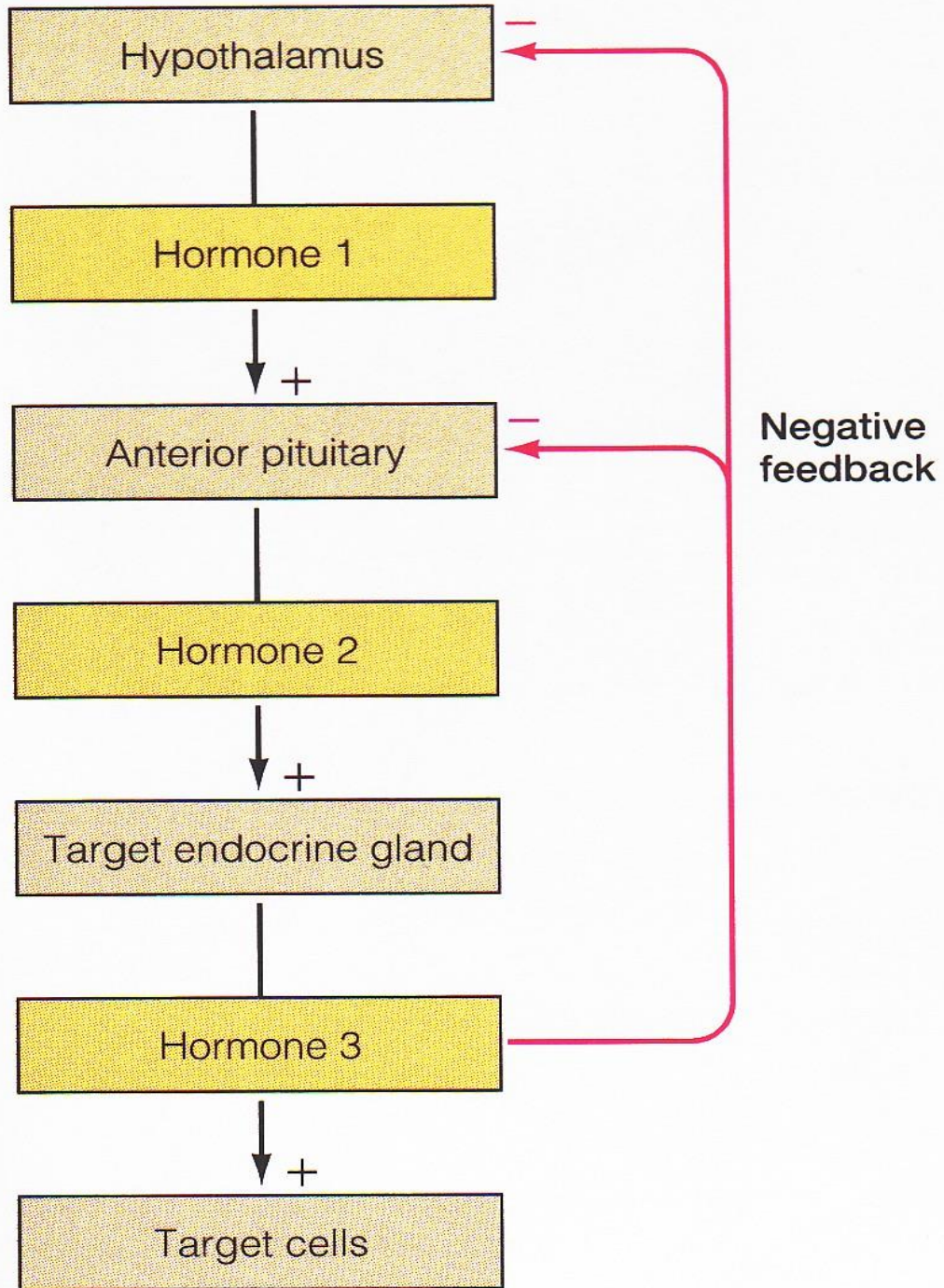
Capillary-Venule-Capillary Intimate Circulation





Krieger & Hughes 1980



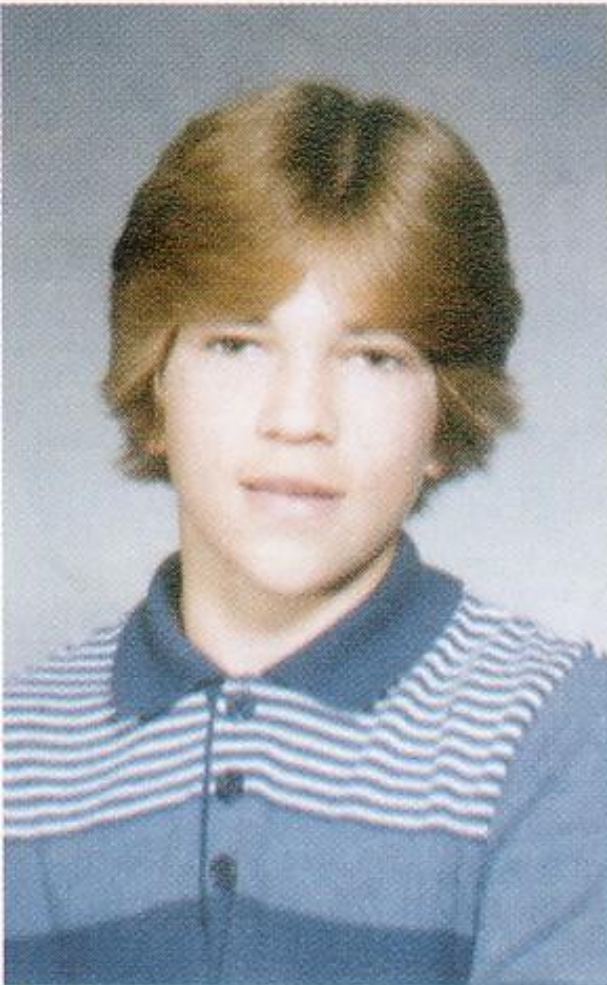




LS 2006, cf: LS 2012
fig 17-10

Progression & Development of Acromegaly

Age 13

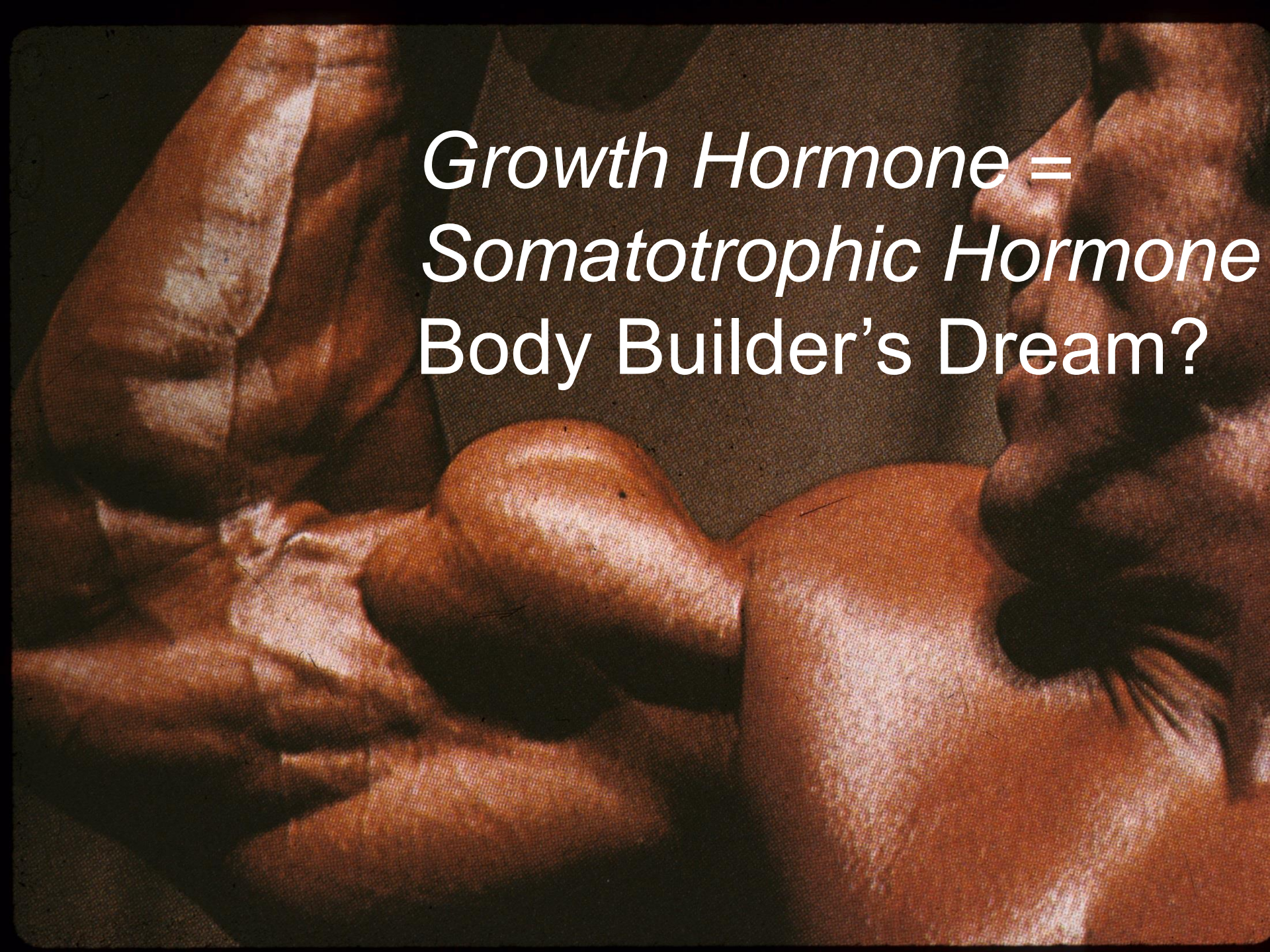


Age 21



Age 35





*Growth Hormone =
Somatotrophic Hormone
Body Builder's Dream?*

GH/STH Effects: Insulin Resistance/Type II Diabetes?

↑ Amino Acid uptake & Protein synthesis

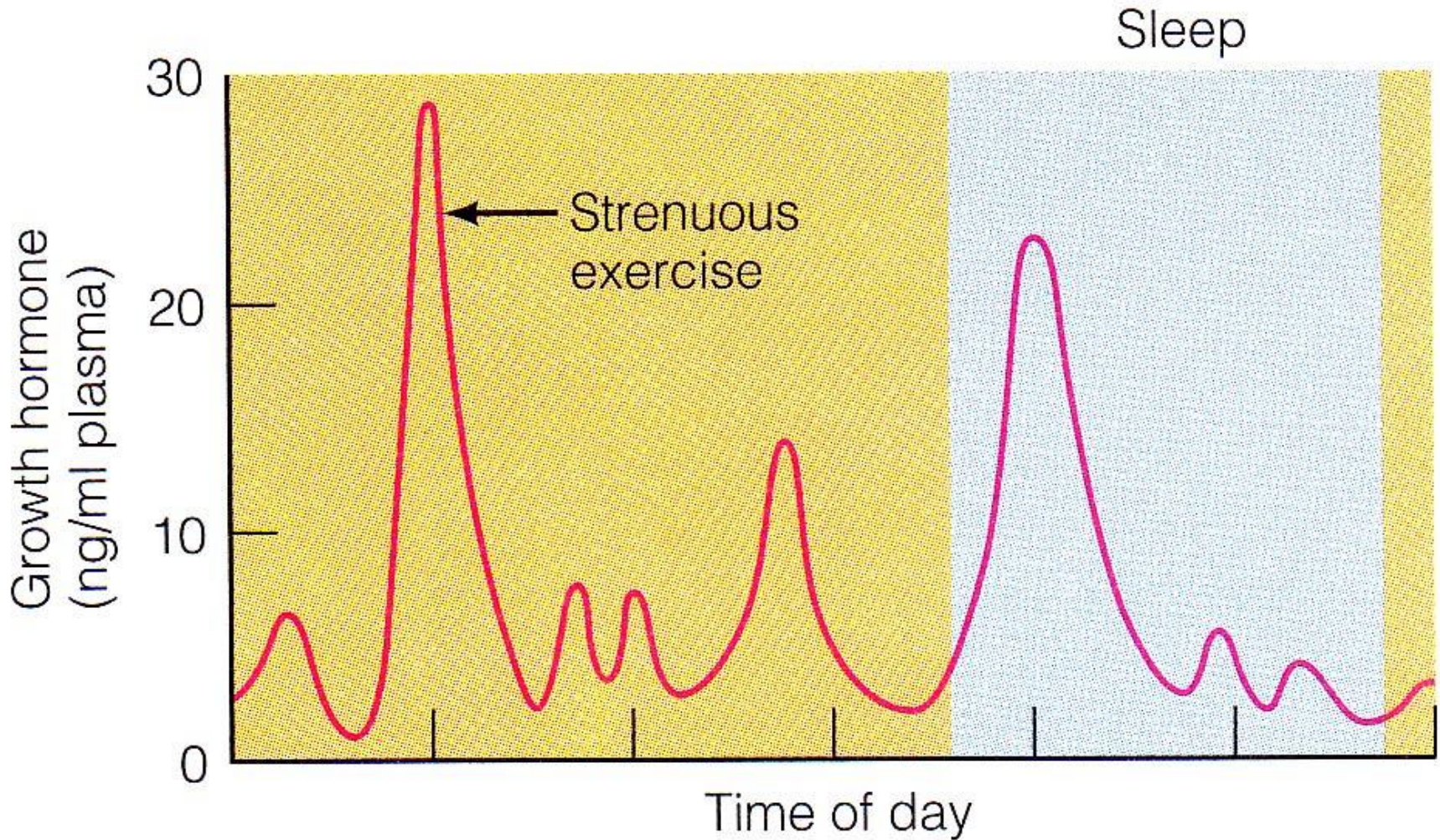
↑ Lipolysis & Fatty Acid mobilization

↓ Glucose uptake
(skeletal muscle & adipocytes)

↑ Glucose production
(liver glycogenolysis)

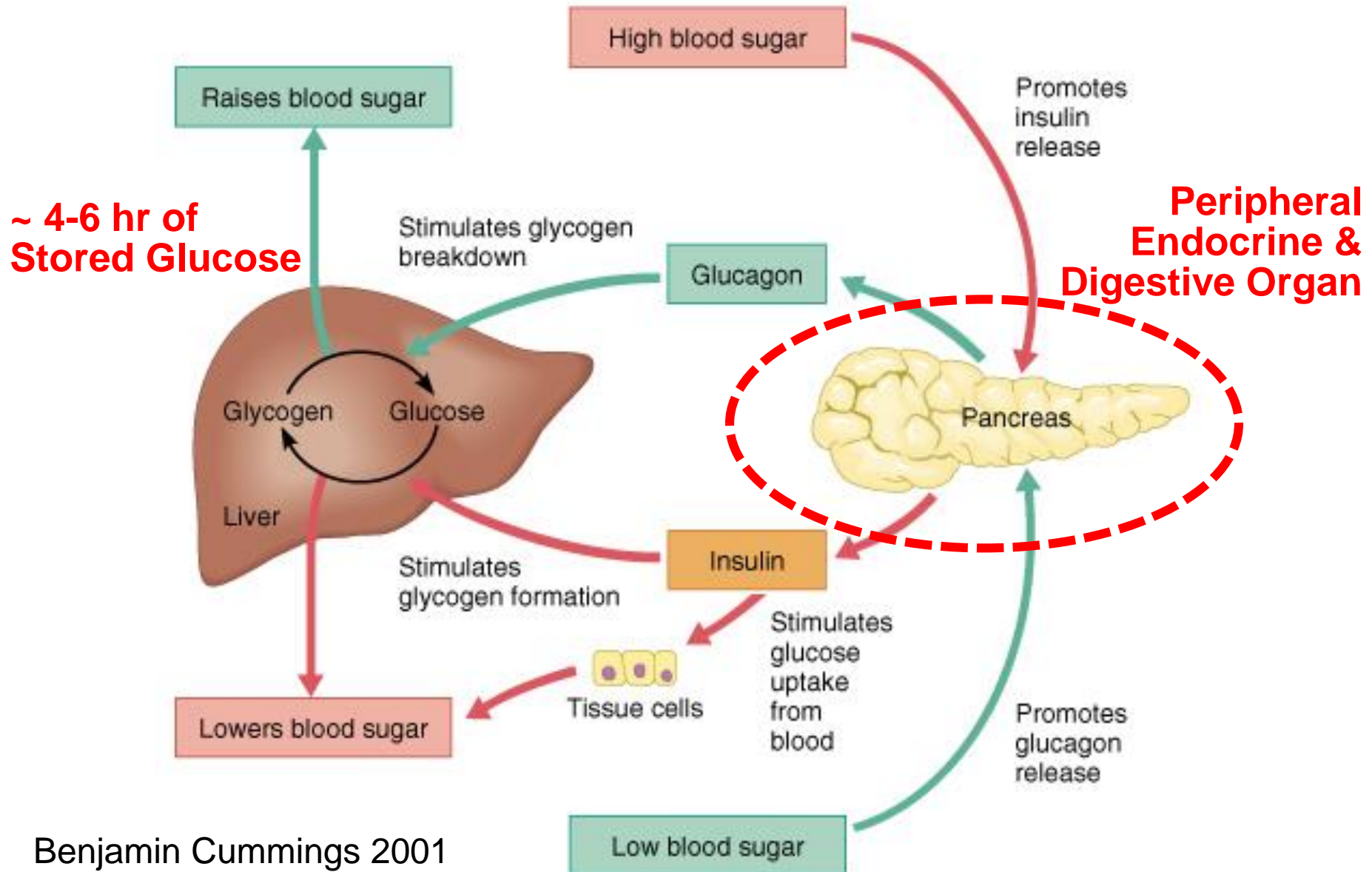
↑ Insulin secretion

Increase GH naturally with exercise & sleep!!



ng/ml = nanograms per milliliter

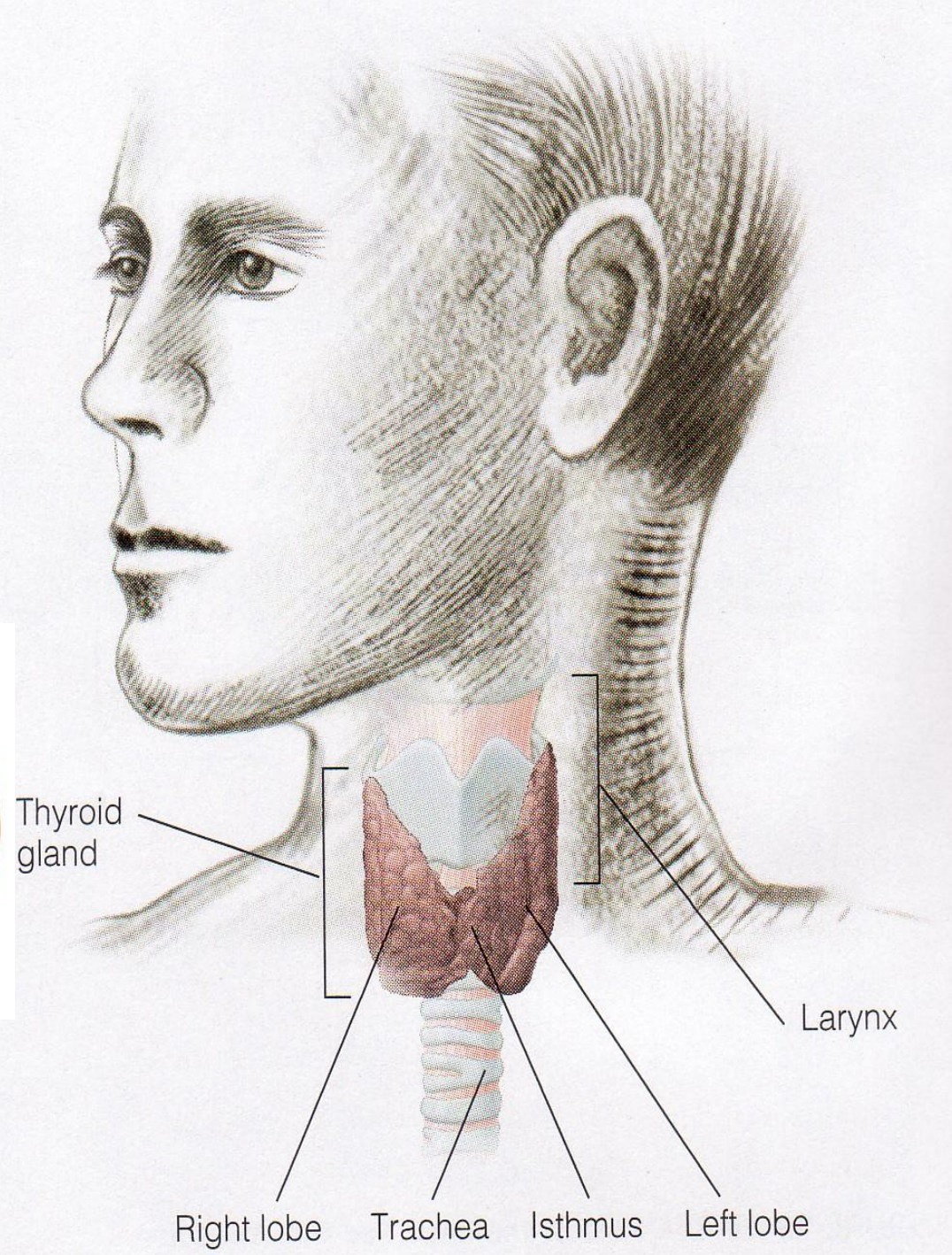
Insulin Stores Sugar, Glucagon Mobilizes Sugar!

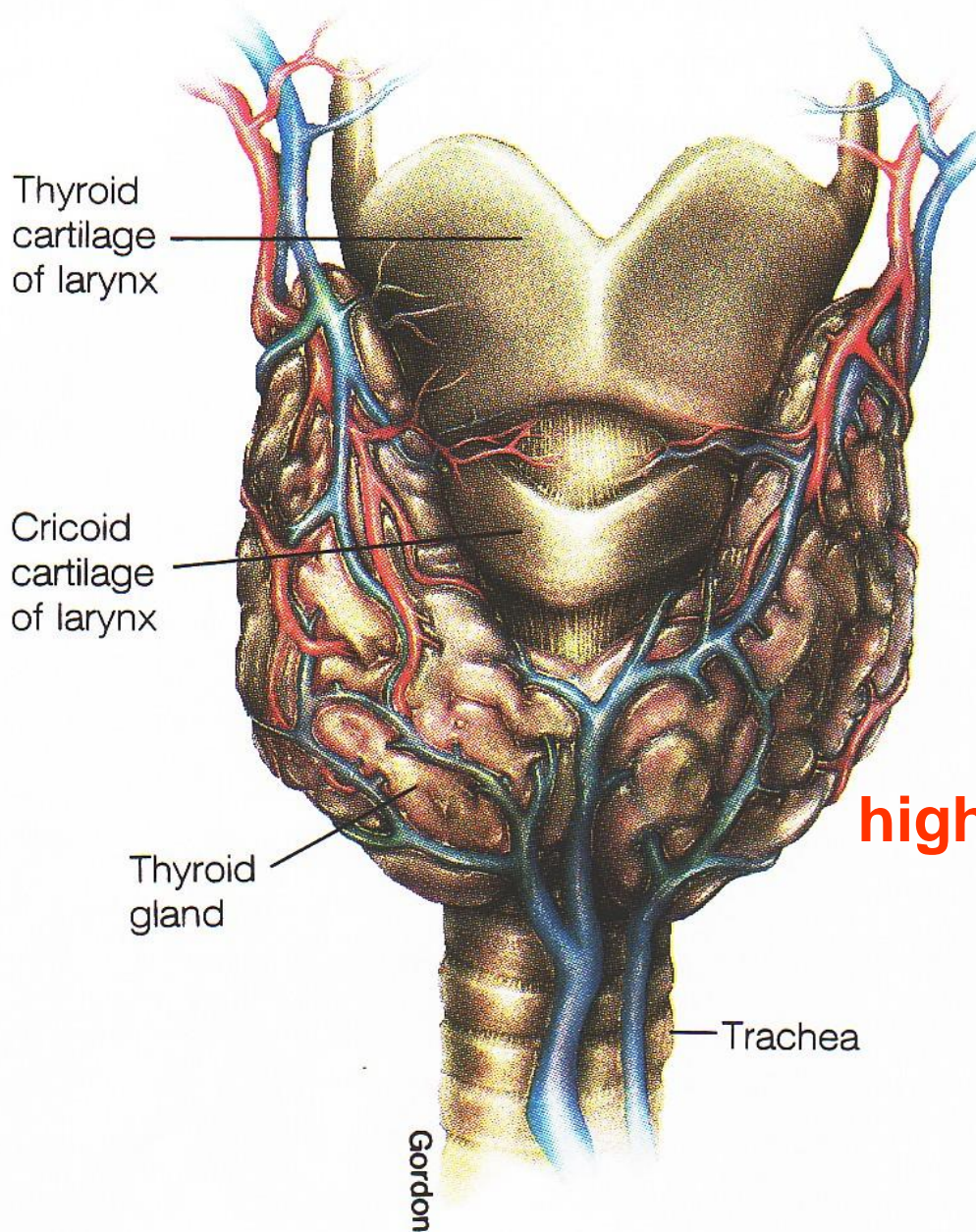


Benjamin Cummings 2001

<https://www.youtube.com/watch?v=y9Bdi4dnSlg>

<https://www.fuseschool.org>





**Thyroid →
metabolism
highly vascularized**

(a)

<https://ed.ted.com/lessons/how-does-the-thyroid-manage-your-metabolism-emma-bryce>

DC 2003









Adrenal gland

Cortisol

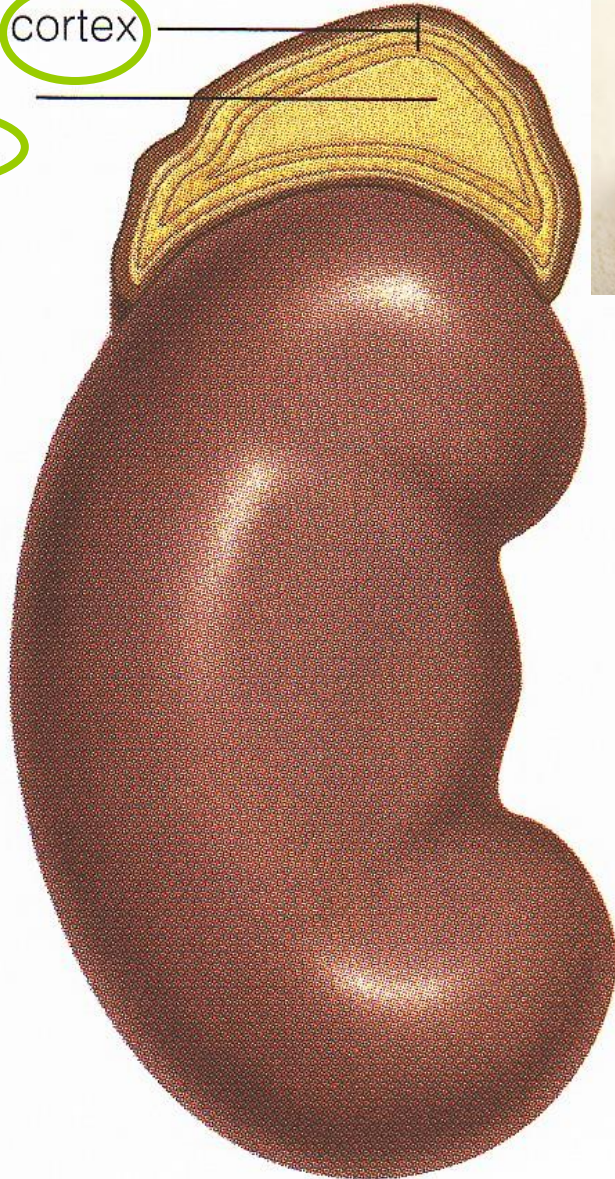
Adrenal cortex

Adrenal medulla

**Adrenalin
Hormones**

Kidney

**Stress
hormones!**



Adrenals/Suprarenals



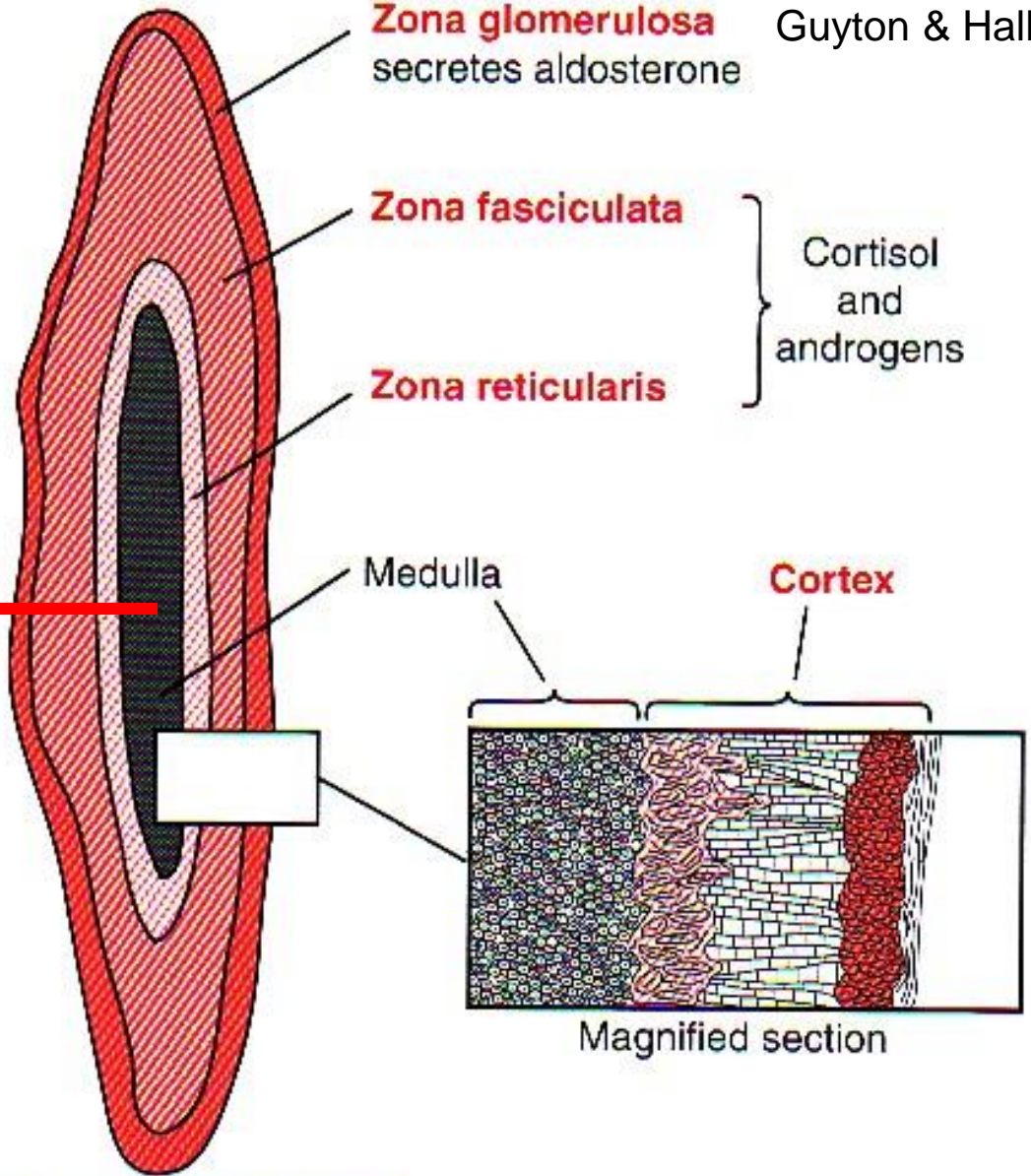
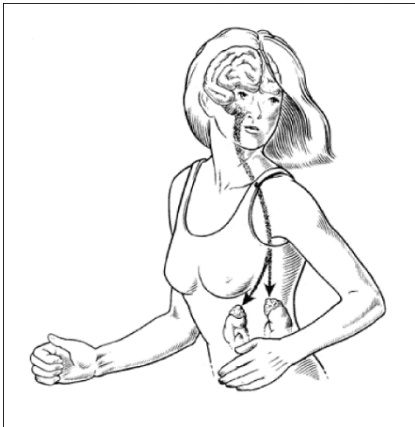
FIGURE 13-12

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.

BI 121!!



**Epinephrine
80%
Norepinephrine
20%**



Zona glomerulosa
secretes aldosterone

Guyton & Hall 2000

Zona fasciculata

Cortisol
and
androgens

Zona reticularis

Medulla

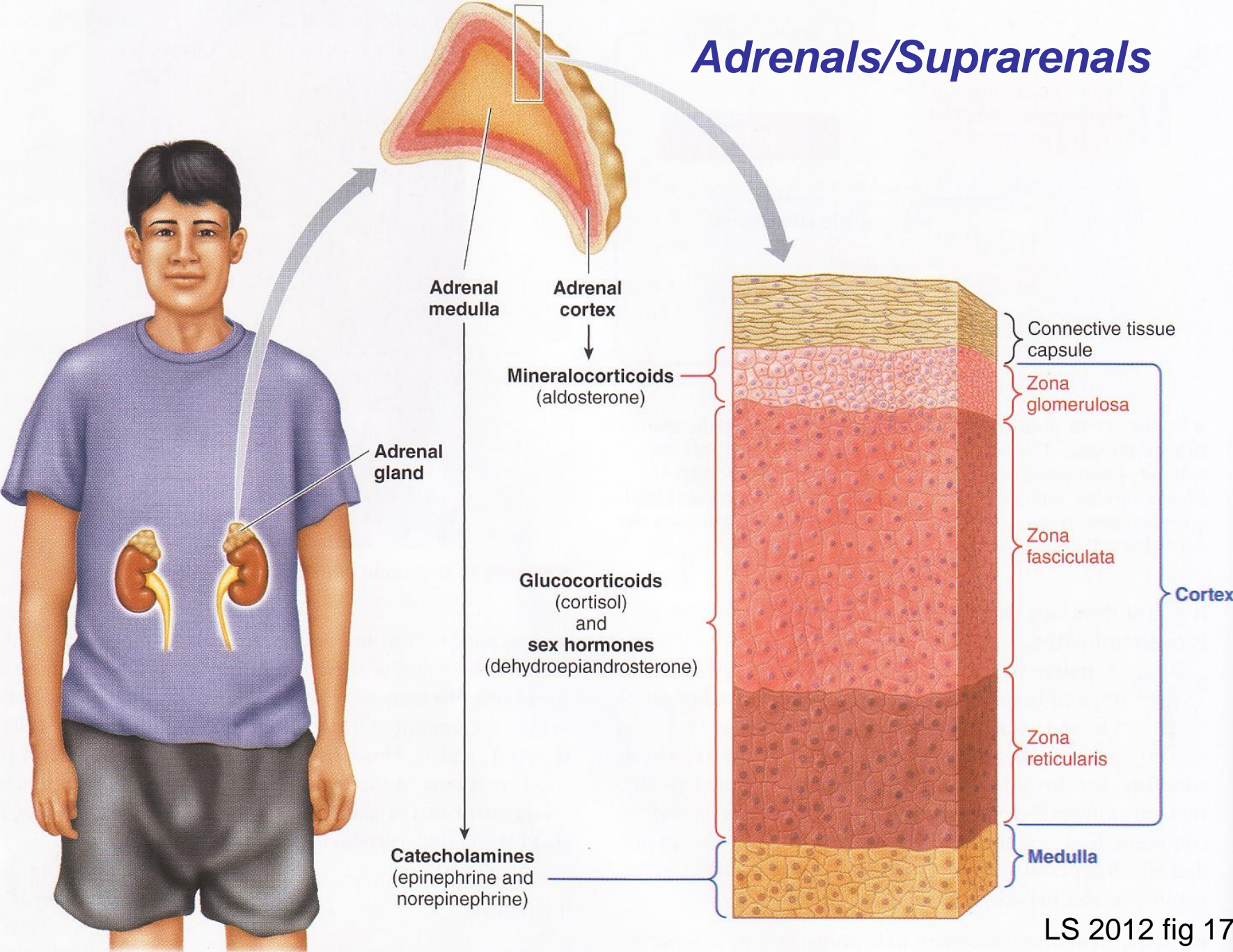
Cortex

Magnified section

FIGURE 77 - 1

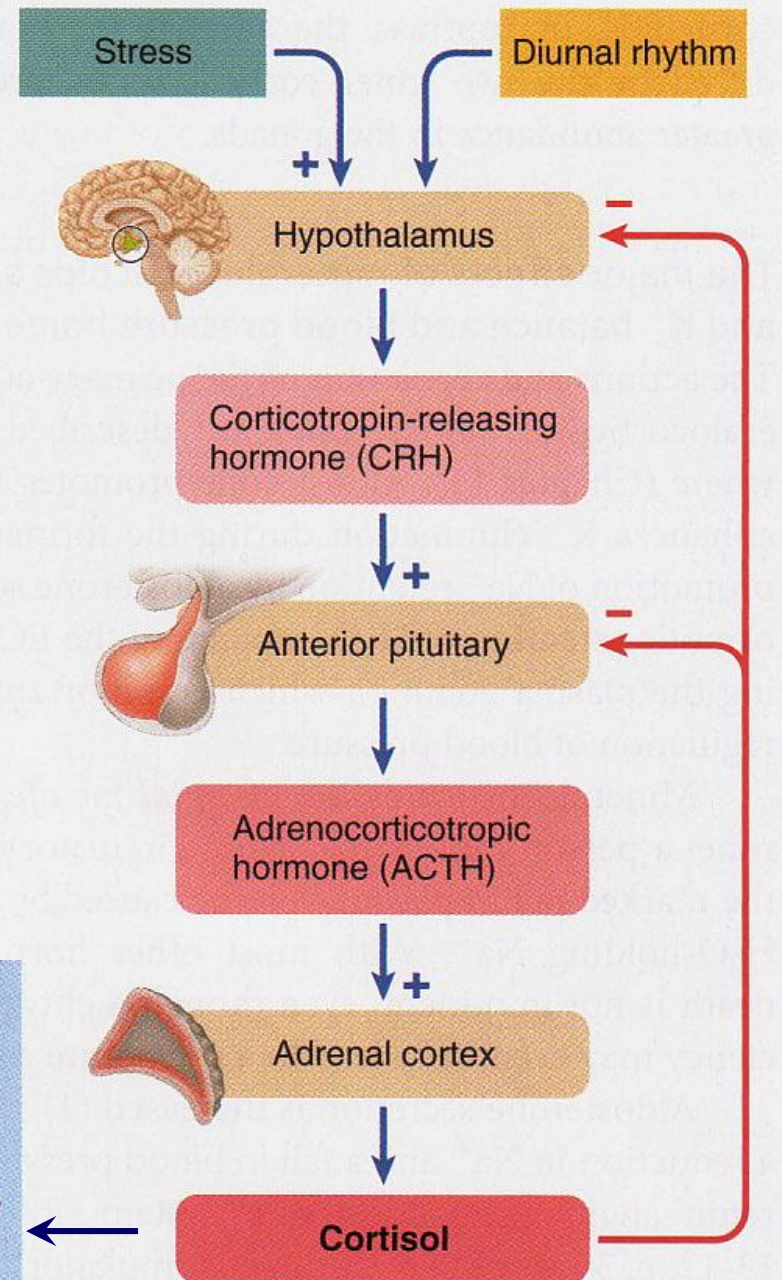
Secretion of adrenocortical hormones by the different zones of the adrenal cortex.

Adrenals/Suprarenals



LS 2012 fig 17-18

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)

Questions + Discussion

