

BI 121 Lecture 10



...This Thursday more fun & data about me! Heck yeah!!

- I. Announcements** To make Lab 5 educational, fun & safe for all, **please read pp 5-1 thru 5-6 in LM twice before Thursday!** Remaining exams & notebooks returned > lecture. Key posted in glass box in Huestis near 120 HUE? Estimate grade? Q?
- II. Blood Chemistry Review** LS ch 11 + 17, DC Module 5, Q?
- III. Blood Glucose, Insulin Diabetes Connections** DC Module 13+...
- IV. Endocrinology Overview** LS ch 17, DC Module 13, SI Fox+
 - A. Vignette: Cushing's syndrome LS fig 17-20 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 (insulin – glucagon see-saw!) 2. Thyroid 3. Adrenals

👉😊...I ♥ U of O!

Students who succeed are usually those who:

- (1) **Attend** class regularly
- (2) **Ask** questions
- (3) **Come** to office hours & problem-solving sessions
- (4) **Study** outside class both alone & in study groups
- (5) **Seek** to understand methods & overarching principles/concepts rather than specific answers
- (6) **Teach** or tutor others &
- (7) **Discuss** concepts informally with fellow students.



Science Teaching Reconsidered, National Academy Press, 1997.

Q? What do I need on Exam II, if I want to get...?

A? You can actually calculate given assumptions...

e.g., 62 for Exam I & desire $\geq B-$ (assume ≥ 80)

**Assume 100% for lecture (20% of grade)
+ lab attendance & participation (20% of grade!)**

$$X = [\text{Hope for? } 80 - ((0.3 \times \text{Exam I } 62) + (0.2 \times \text{Lecture } 100) + (0.2 \times \text{Lab } 100))] / 0.3$$

$$X = [80 - [(18.6) + (20) + (20)]] / 0.3$$

$$X = [21.4] / 0.3 = 71.3$$

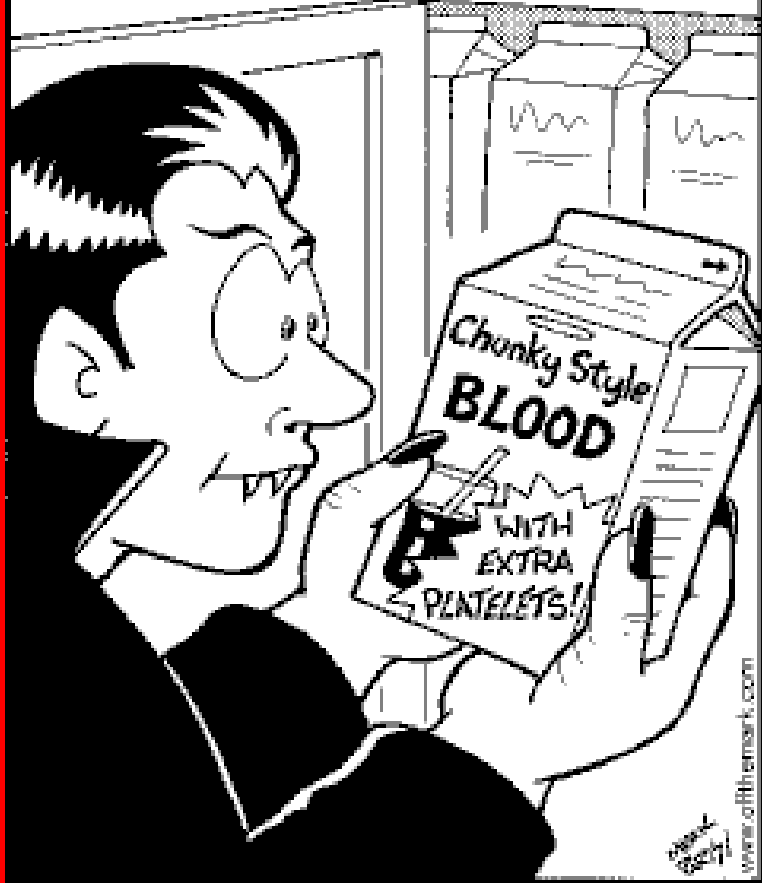
Need this on Exam II for B- for course!



...Fortunately, the lab buffers the grade!

off the mark by Mark Parisi
www.offthemark.com

ATLANTA HOME DEPARTMENT STORES. ©2007 MARK PARISI MarkParisi@aol.com



**Today & next time
we'll cover blood
chemistry to
ensure for
adequate lab prep
time & incubation.**

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



PREPARATION



WASH & DRY



ALCOHOL



SAMPLE+TESTS



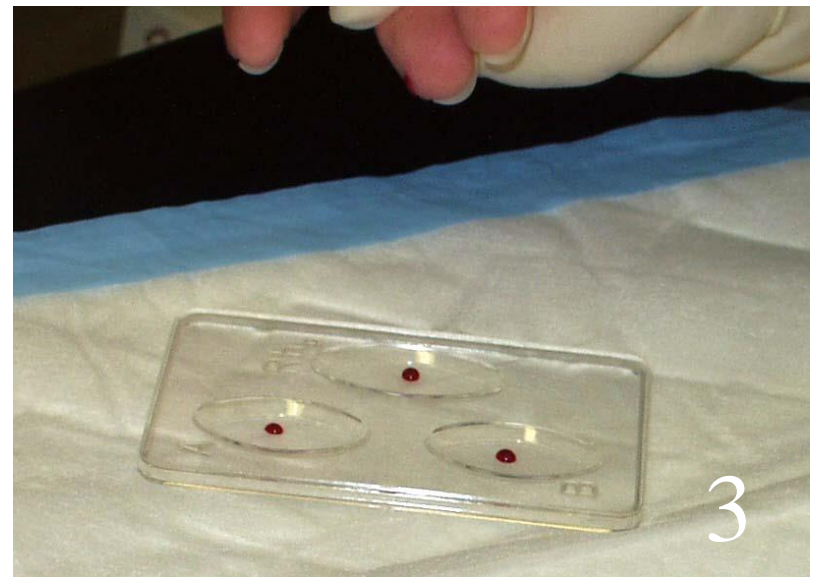
1

OBTAIN μ SAMPLE



2

BLOOD GLUCOSE



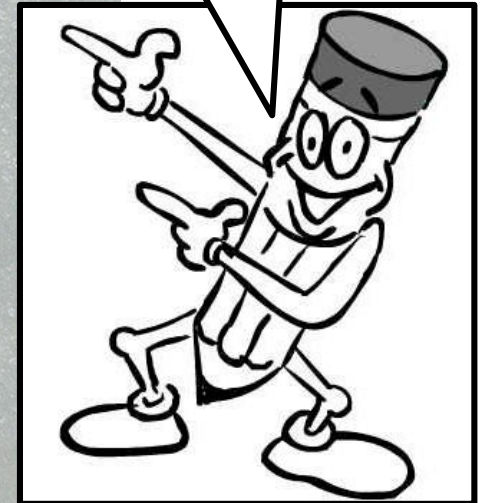
3

BLOOD TYPING

Glucose:
Sugar in Blood

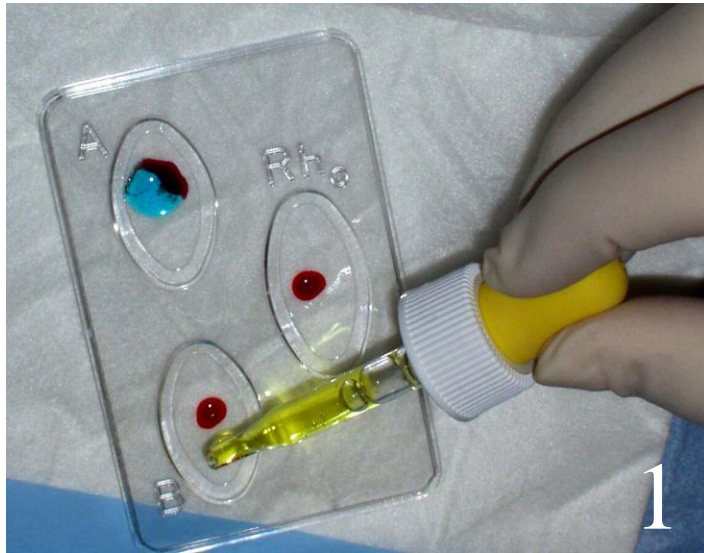


**NB: Read
& Record!**

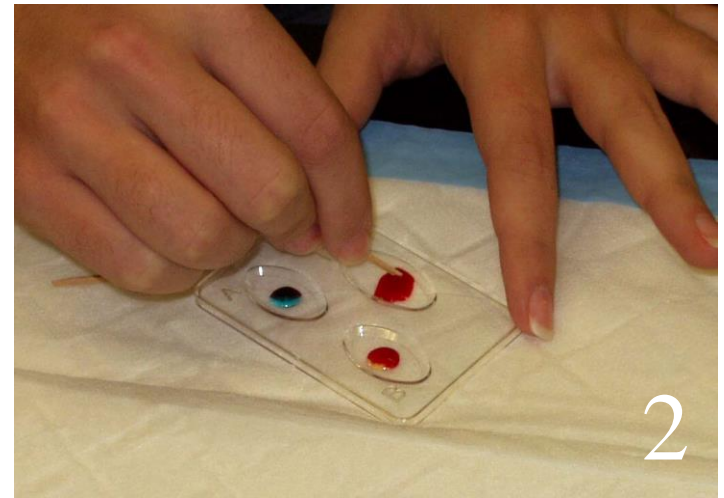


Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: \geq 126 mg/dL

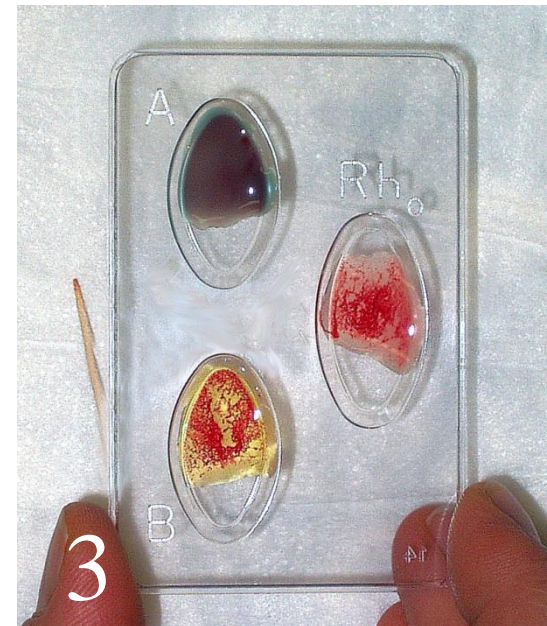
BLOOD TYPING



ADD ANTISERA



MIX W/TOOTHPICKS



READ & RECORD!!

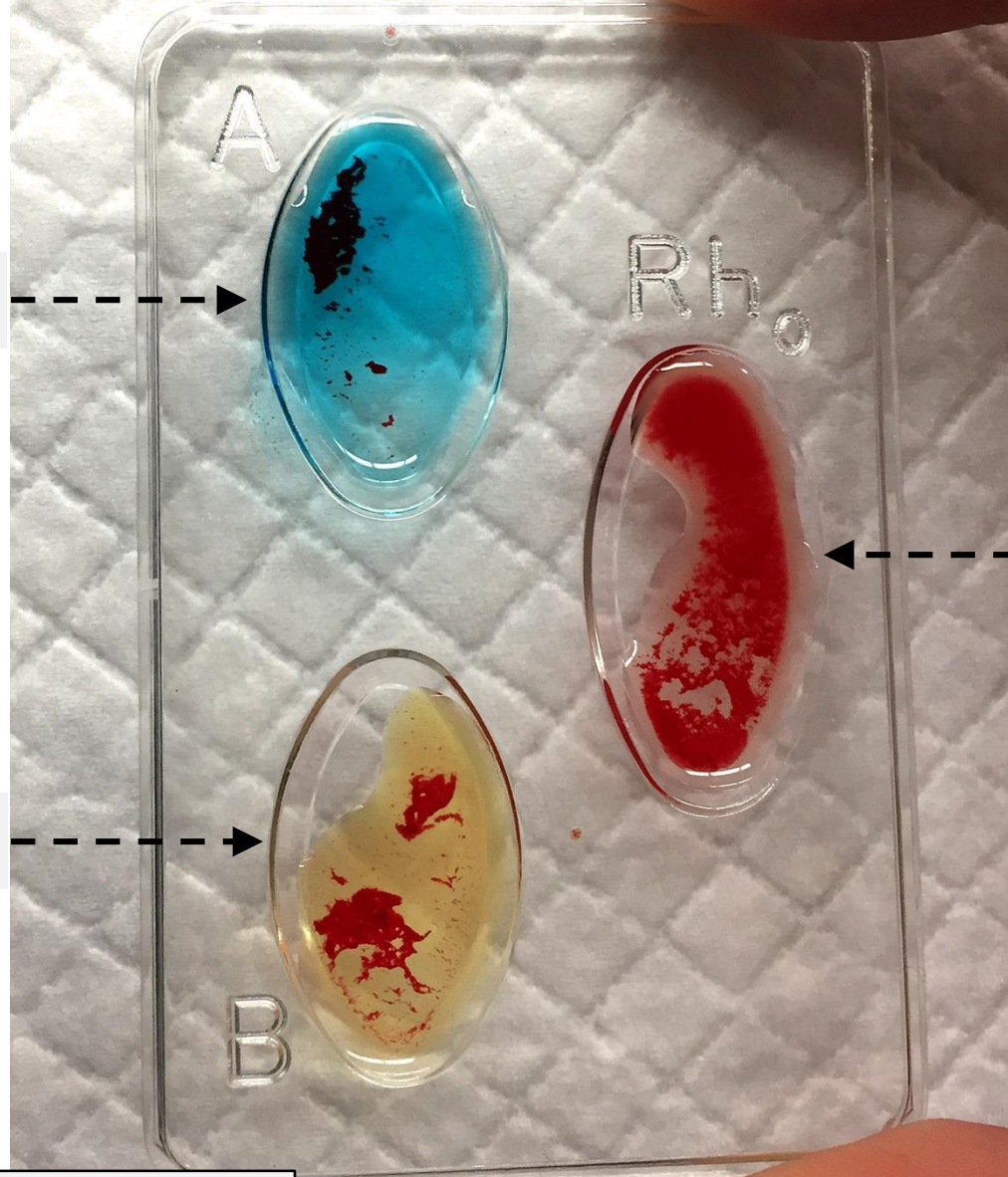
1^o Q? Clumping in Any Wells?

Type AB+

Here?

Here?

Here?

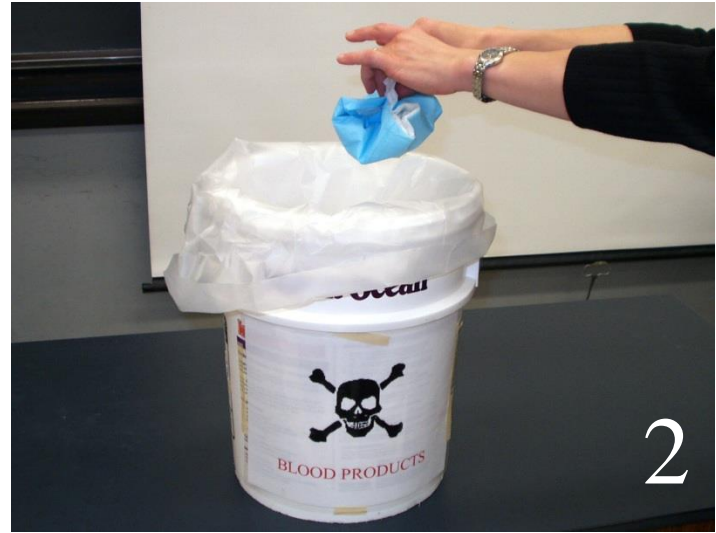


Source: S Wong, BI 121 Lab, 2016

CLEAN-UP!



FOLD DIAPER



BLOOD PRODUCTS



REWASH!!


Blood Chem Lab Q?



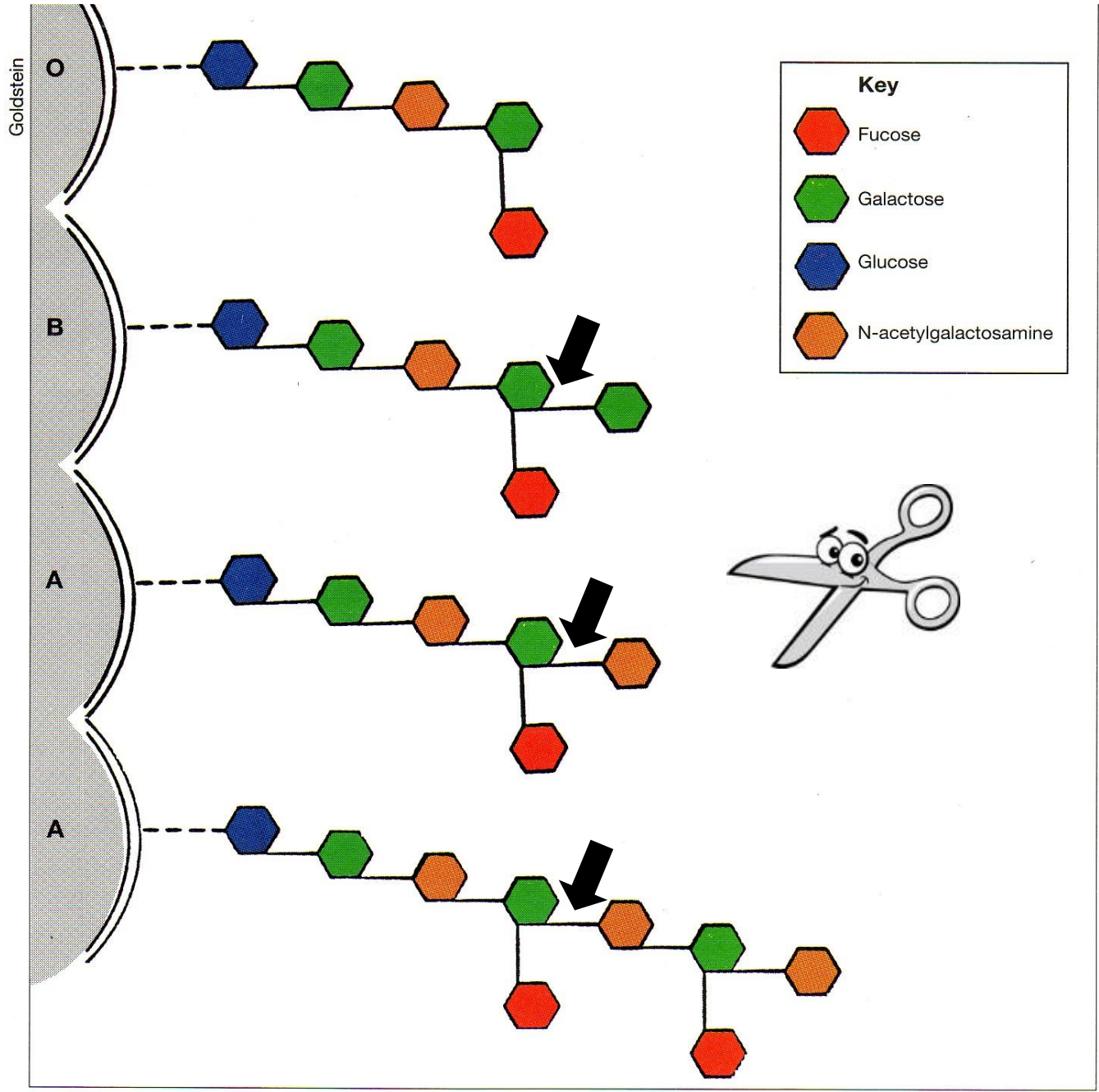
The Weekly Newsmagazine of Science

SCIENCE NEWS

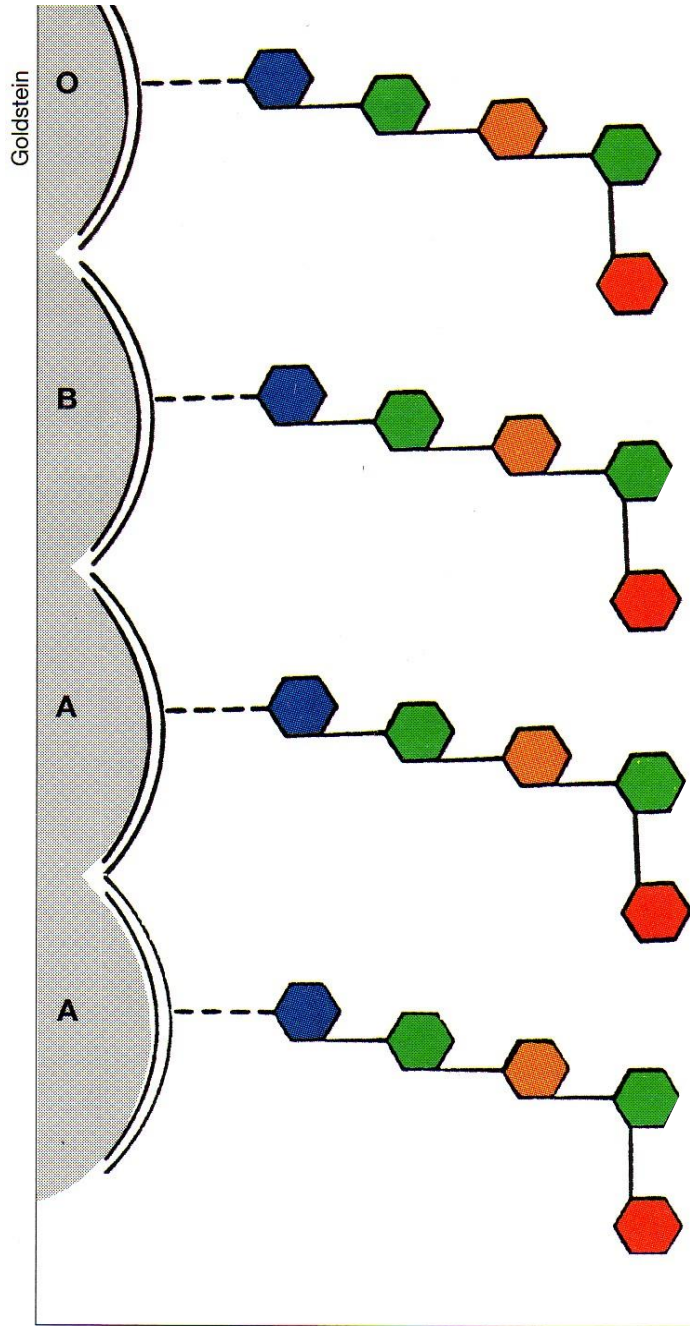
January 11, 1997
Vol. 151, No. 2
Pages 17-32







**Universal
Blood**

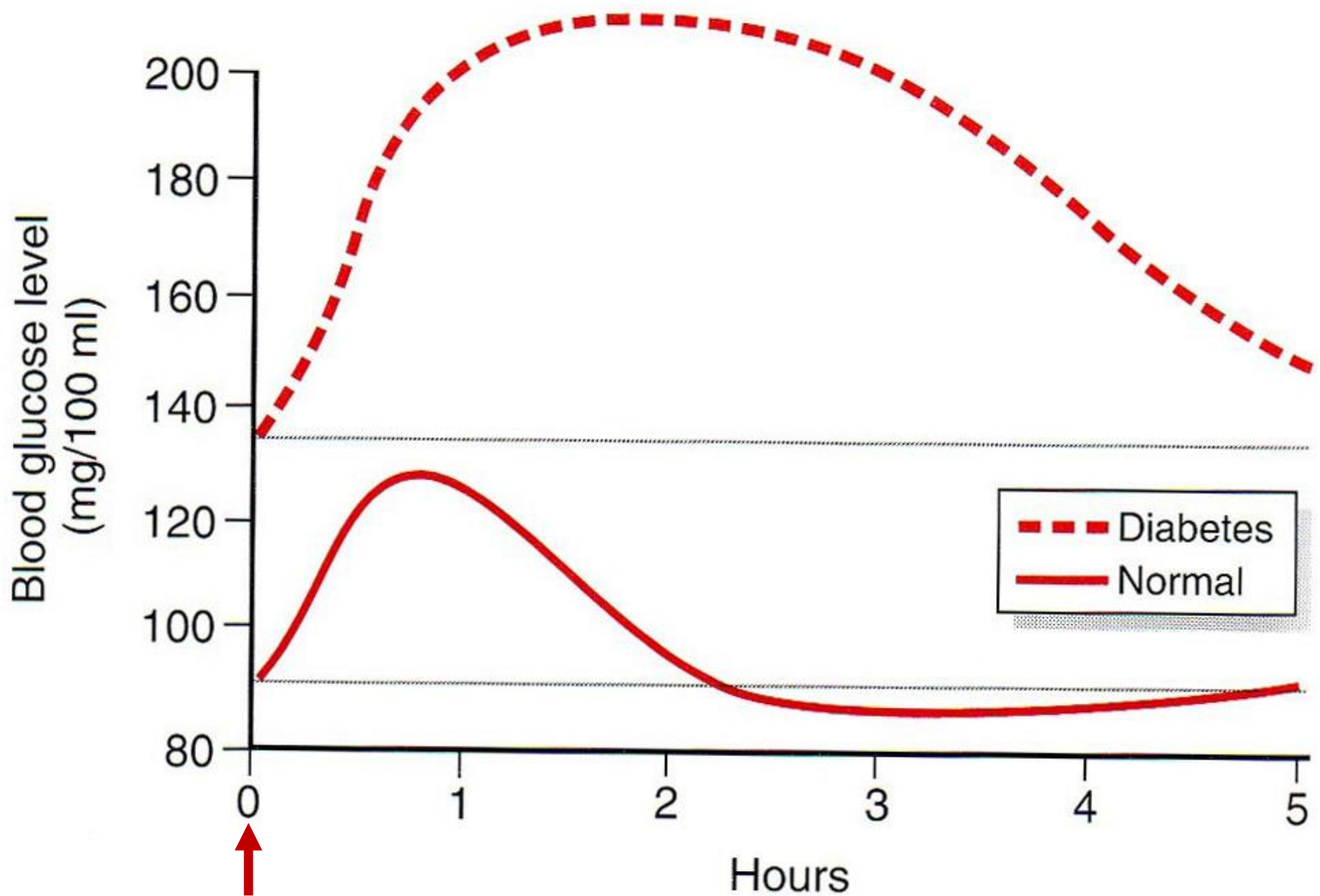


All like Type O!



Key	
	Fucose
	Galactose
	Glucose
	N-acetylgalactosamine

Diabetic & Normal Response to Glucose Load



Ingest Glucola or eat meal

Proinsulin with C-Connecting Peptide

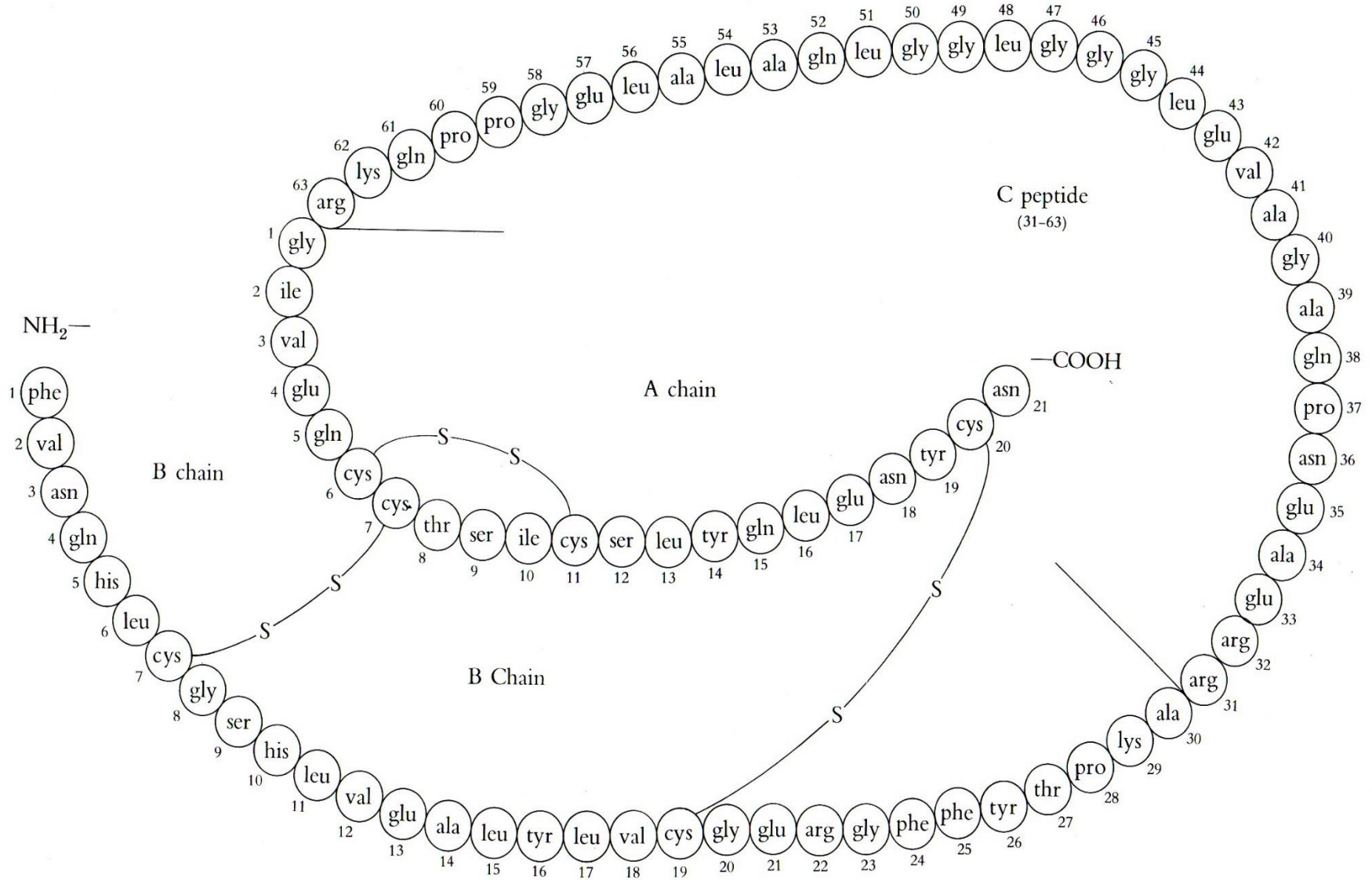
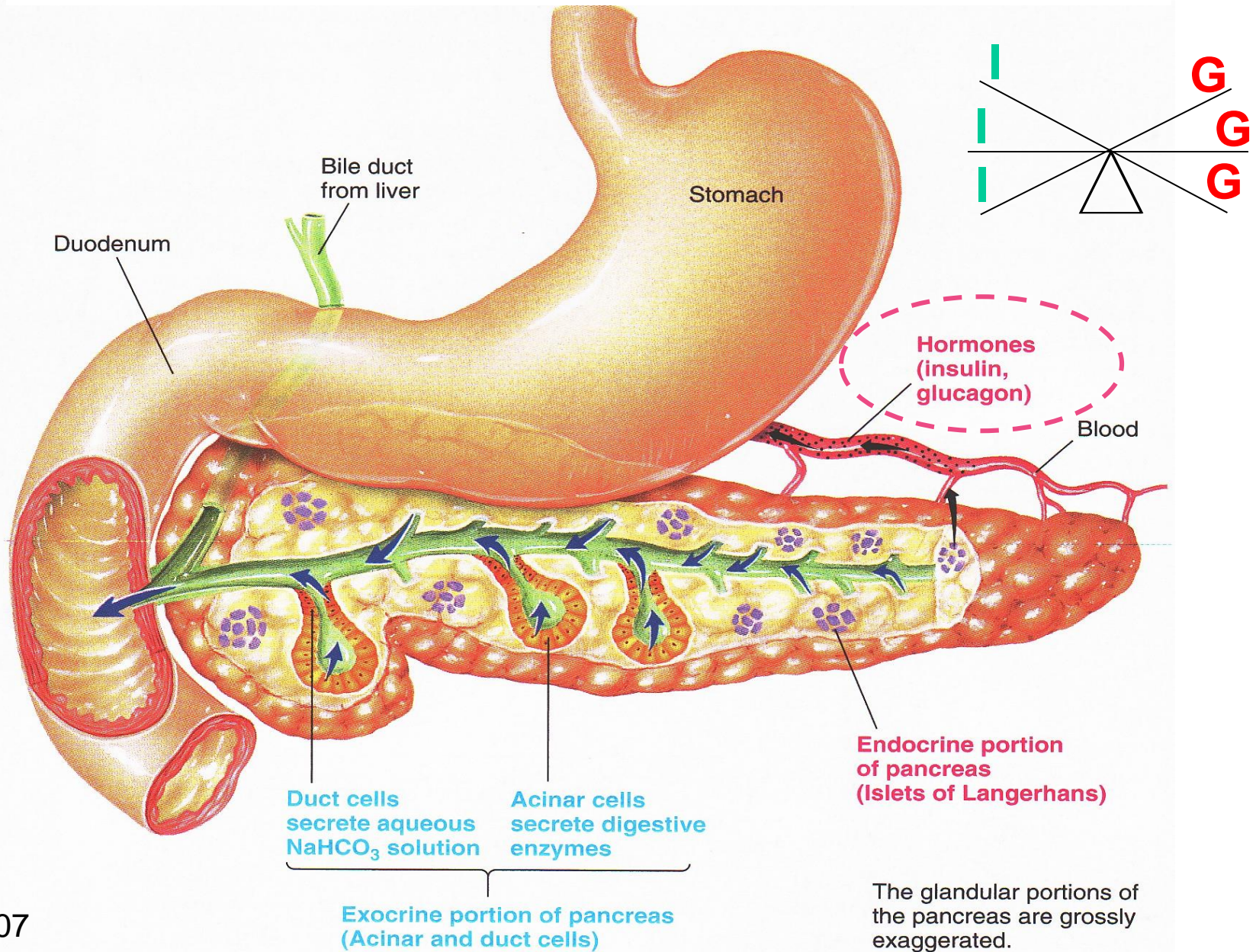


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

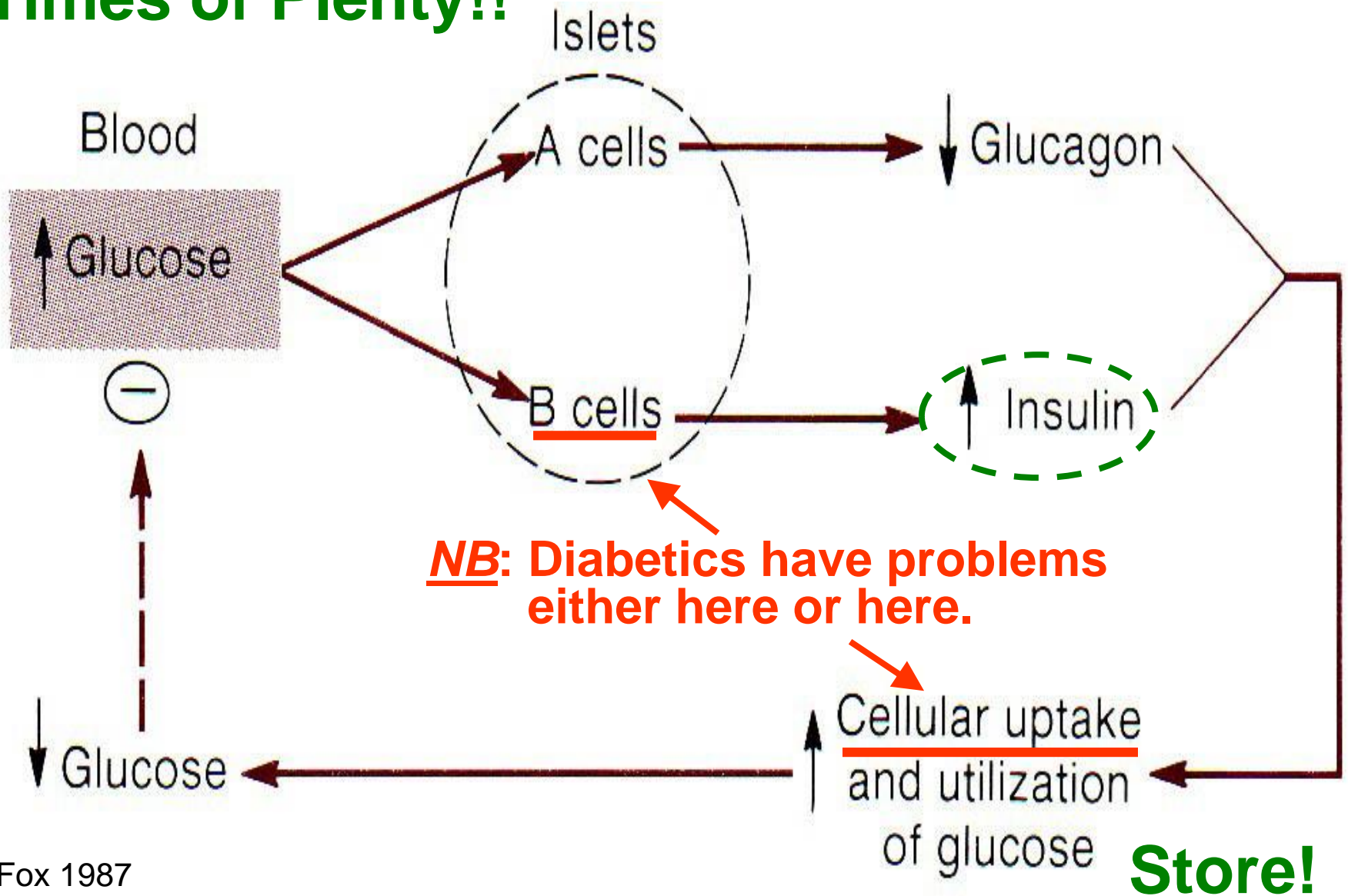


Endocrine Pancreas: Insulin (I) & Glucagon (G) See-Saw Hormones in Regulating Blood Glucose



The glandular portions of the pancreas are grossly exaggerated.

Times of Plenty!!

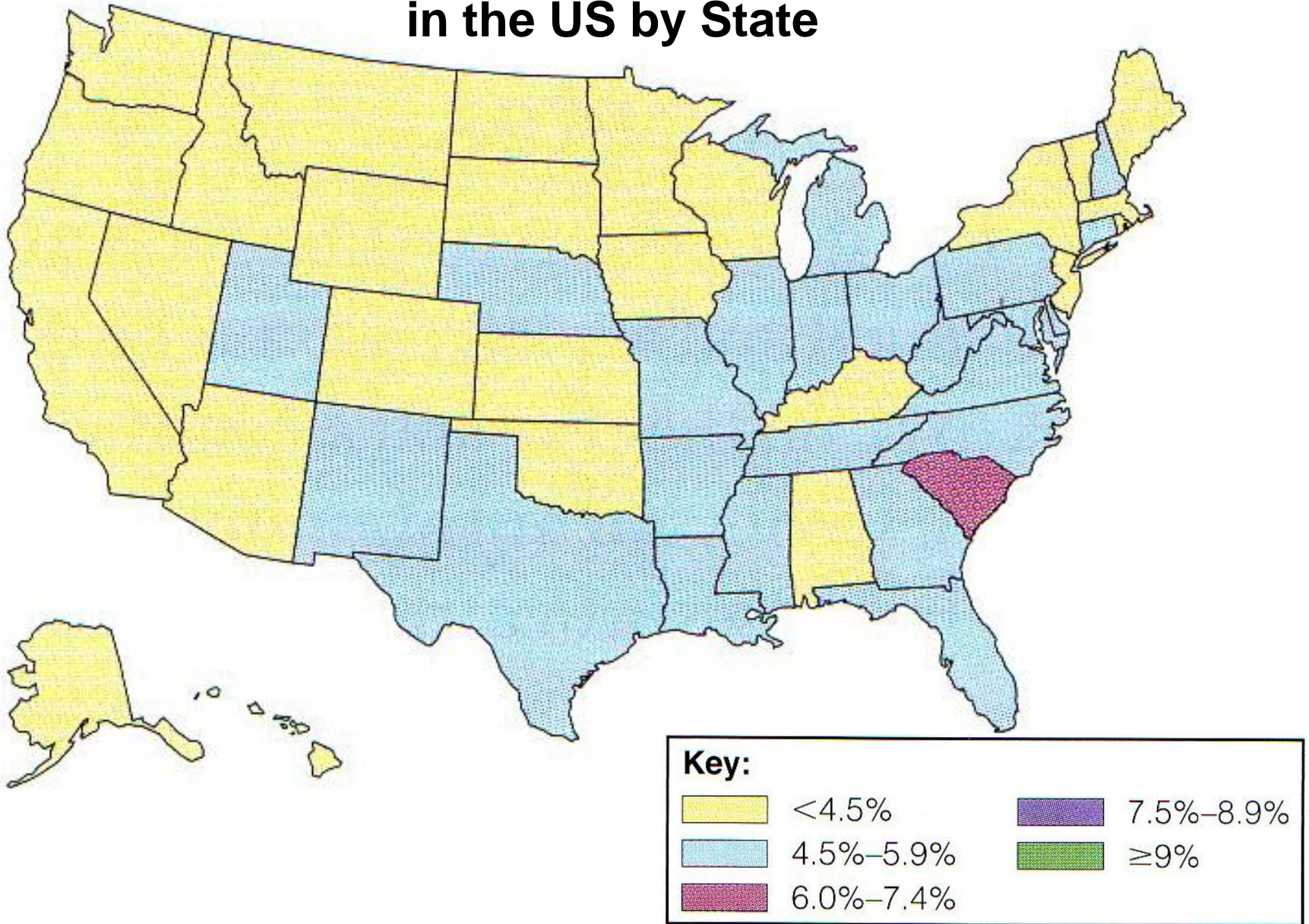


Fox 1987

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

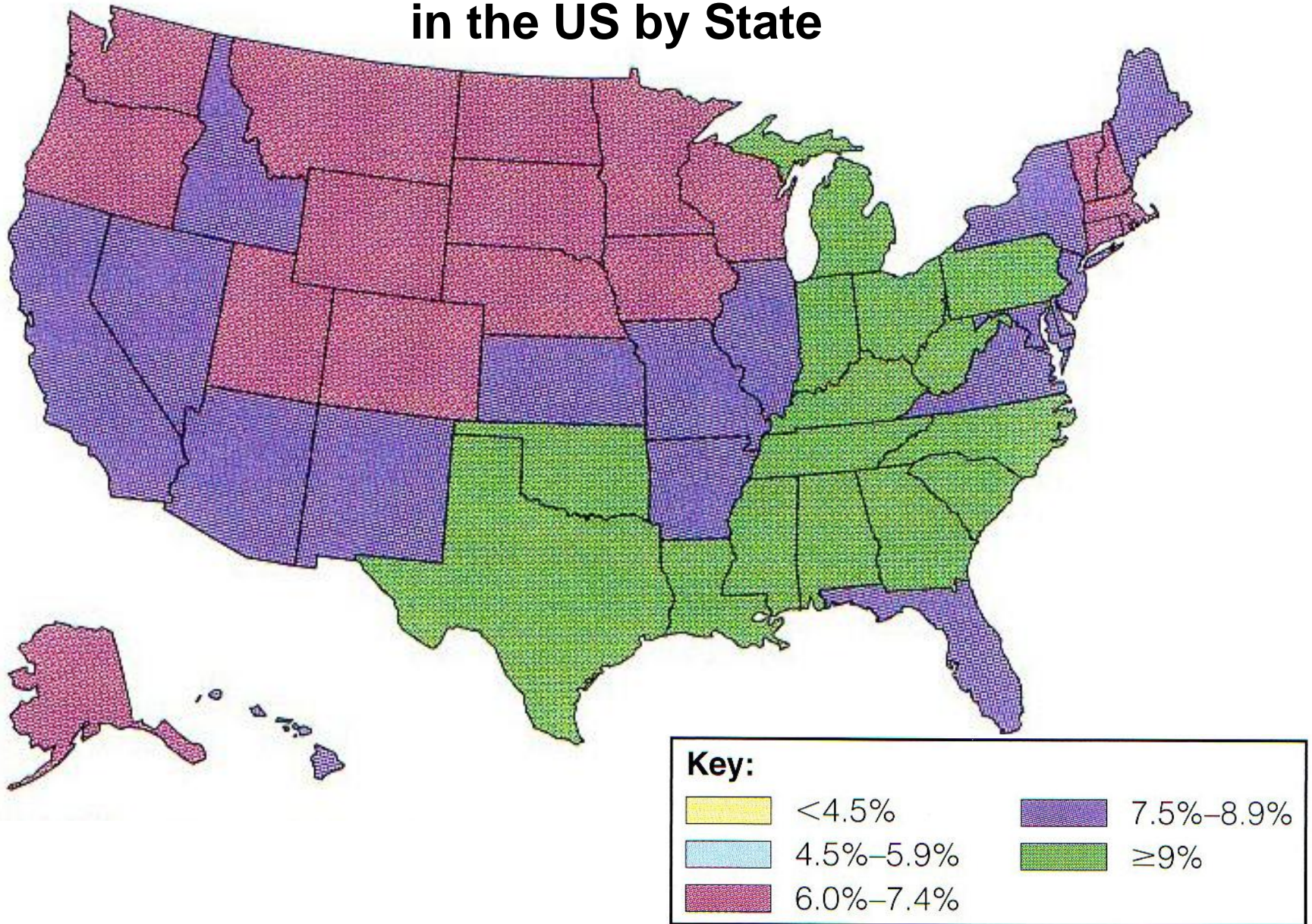
<https://www.youtube.com/watch?v=8dgoeYPoE-0>

1994 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation,
<http://www.cdc.gov/diabetes/statistics>, S&W 2014 fig 4-15 p139A.

2010 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation,
<http://www.cdc.gov/diabetes/statistics>, S&W 2014 fig 4-15 p139B.

Type 1 and Type 2 Diabetes Compared

	Type 1	Type 2
Percentage of cases	5–10%	90–95%
Age of onset	<30 years	>40 years ^a
Associated characteristics	Autoimmune diseases, viral infections, inherited factors	Obesity, aging, inherited factors
Primary problems	Destruction of pancreatic beta cells; insulin deficiency	Insulin resistance, insulin deficiency (relative to needs)
Insulin secretion	Little or none	Varies; may be normal, increased, or decreased
Requires insulin	Always	Sometimes
Older names	Juvenile-onset diabetes Insulin-dependent diabetes mellitus (IDDM)	Adult-onset diabetes Noninsulin-dependent diabetes mellitus (NIDDM)

Table 4–9

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



Diet

Exercise

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



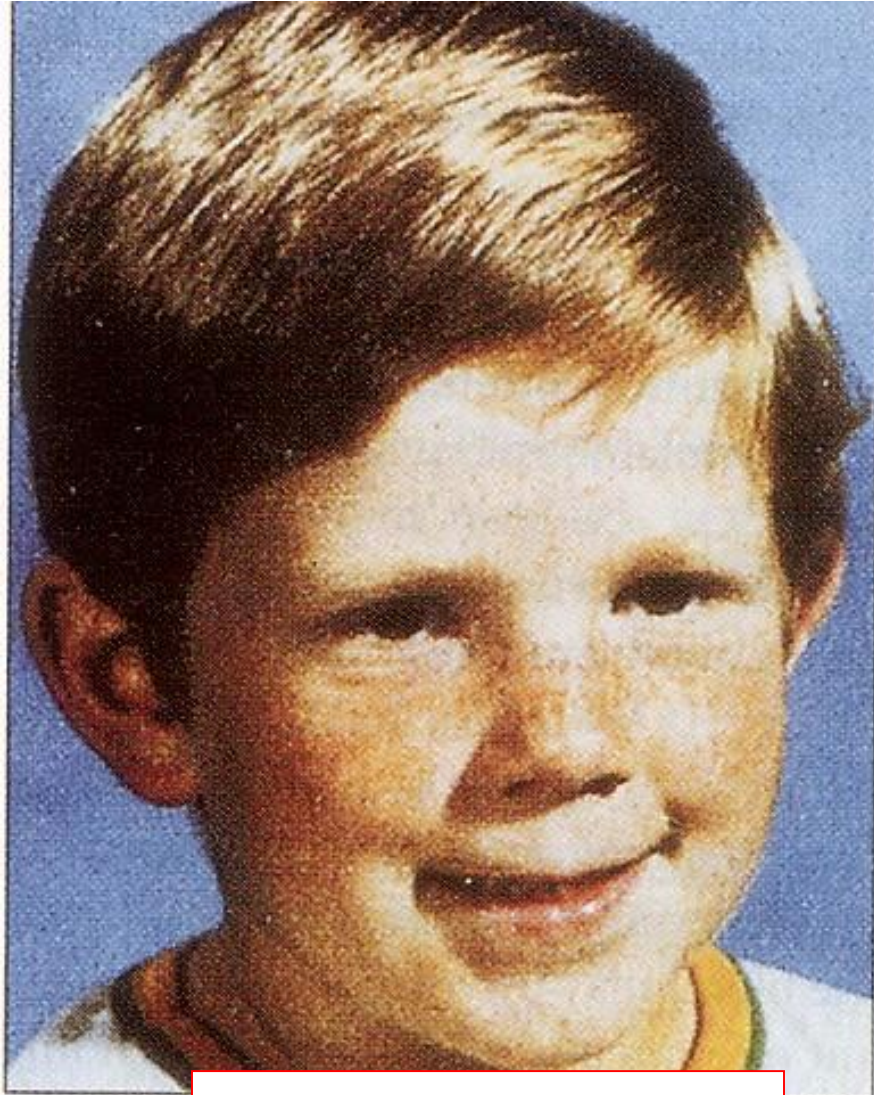
***Exercise is a must based on
its insulin-like effect!***



TIME OUT



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



T = 0, near normal

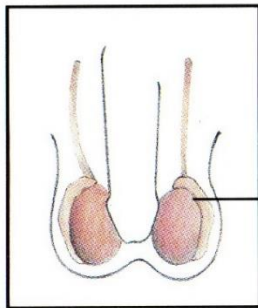


T = 4 months later

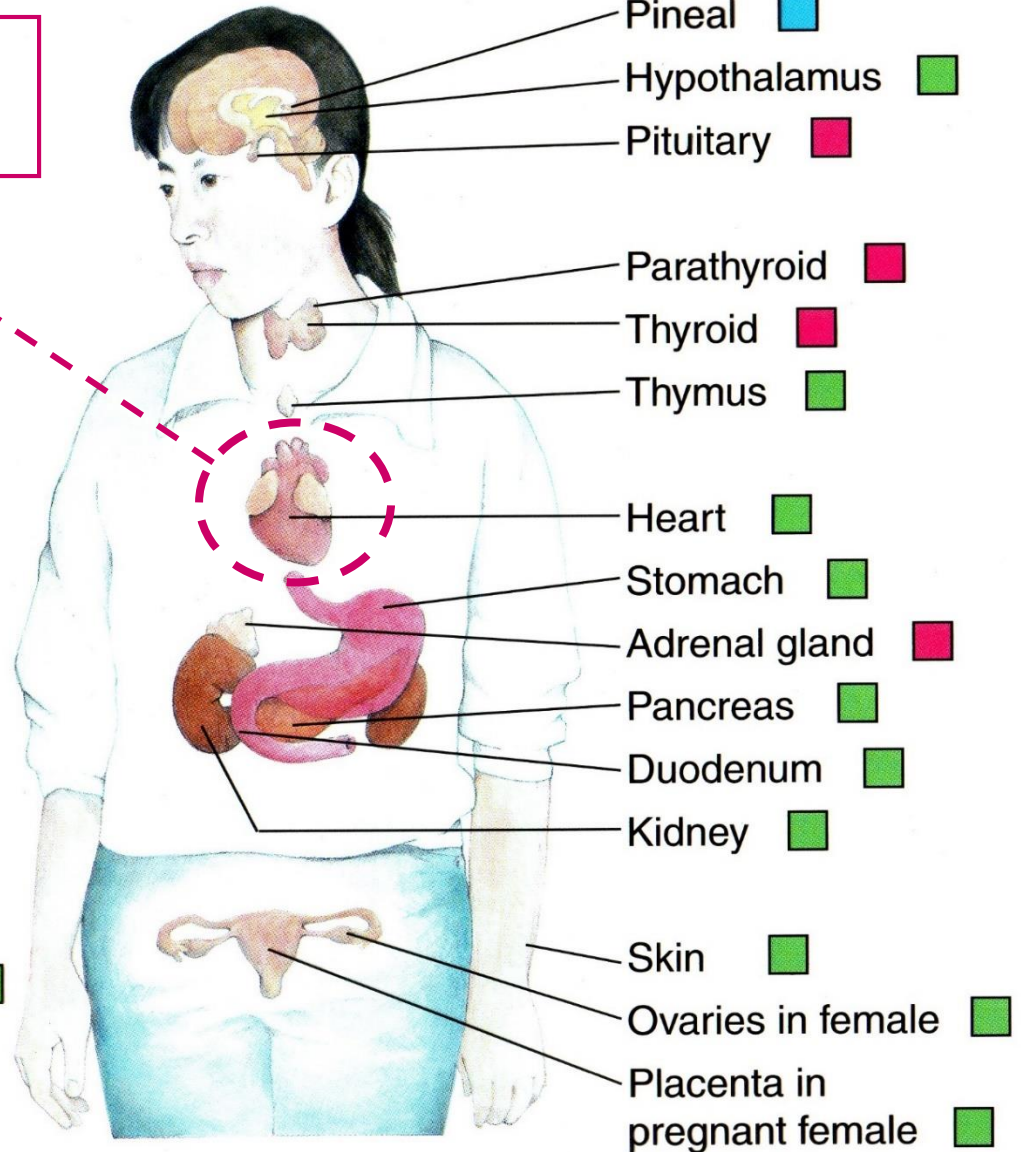
Endocrine System

ANP = Atrial Natriuretic Polypeptide

- Solely endocrine function
- Mixed function
- Complete function uncertain



Testes in male

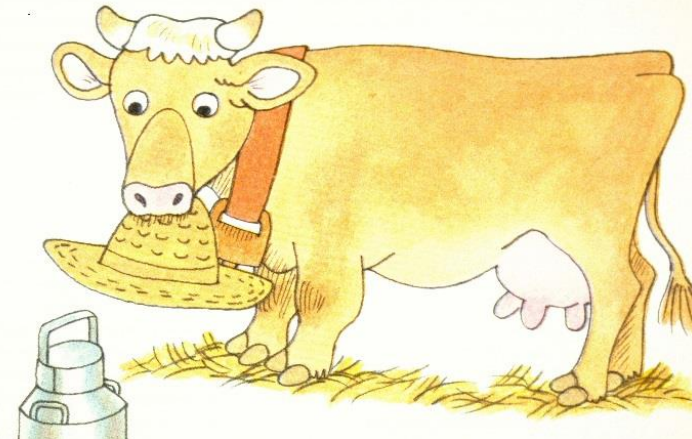


<https://www.youtube.com/watch?v=IRJE8c3qhRE>

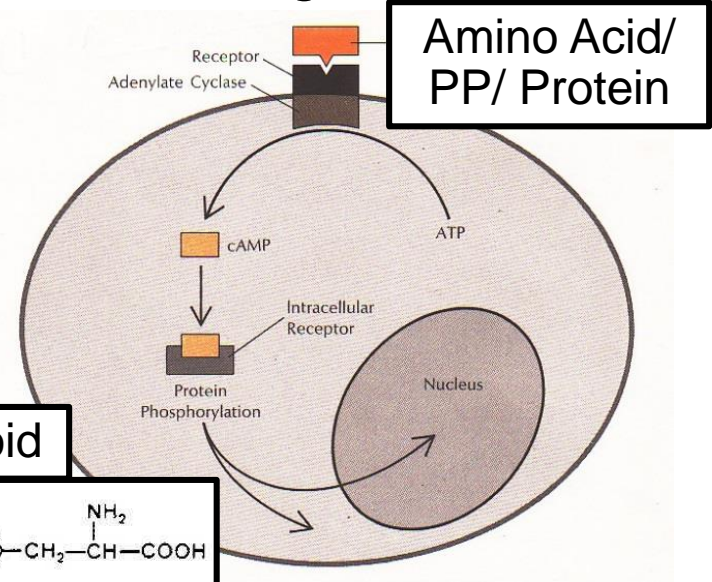
<https://www.hopkinsallchildrens.org/Patients-Families/Health-Library/HealthDocNew/Movie-Endocrine-System>

Hormone/Endocrine Classifications?

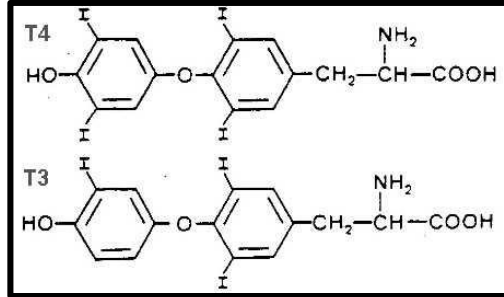
Exogenous



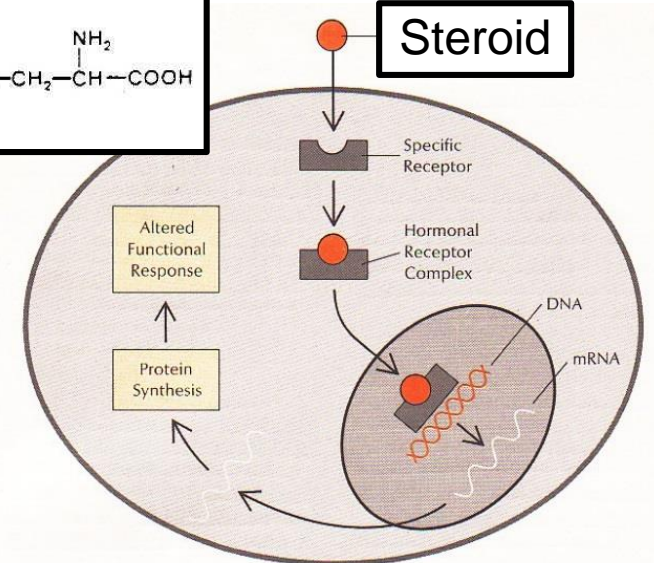
Endogenous



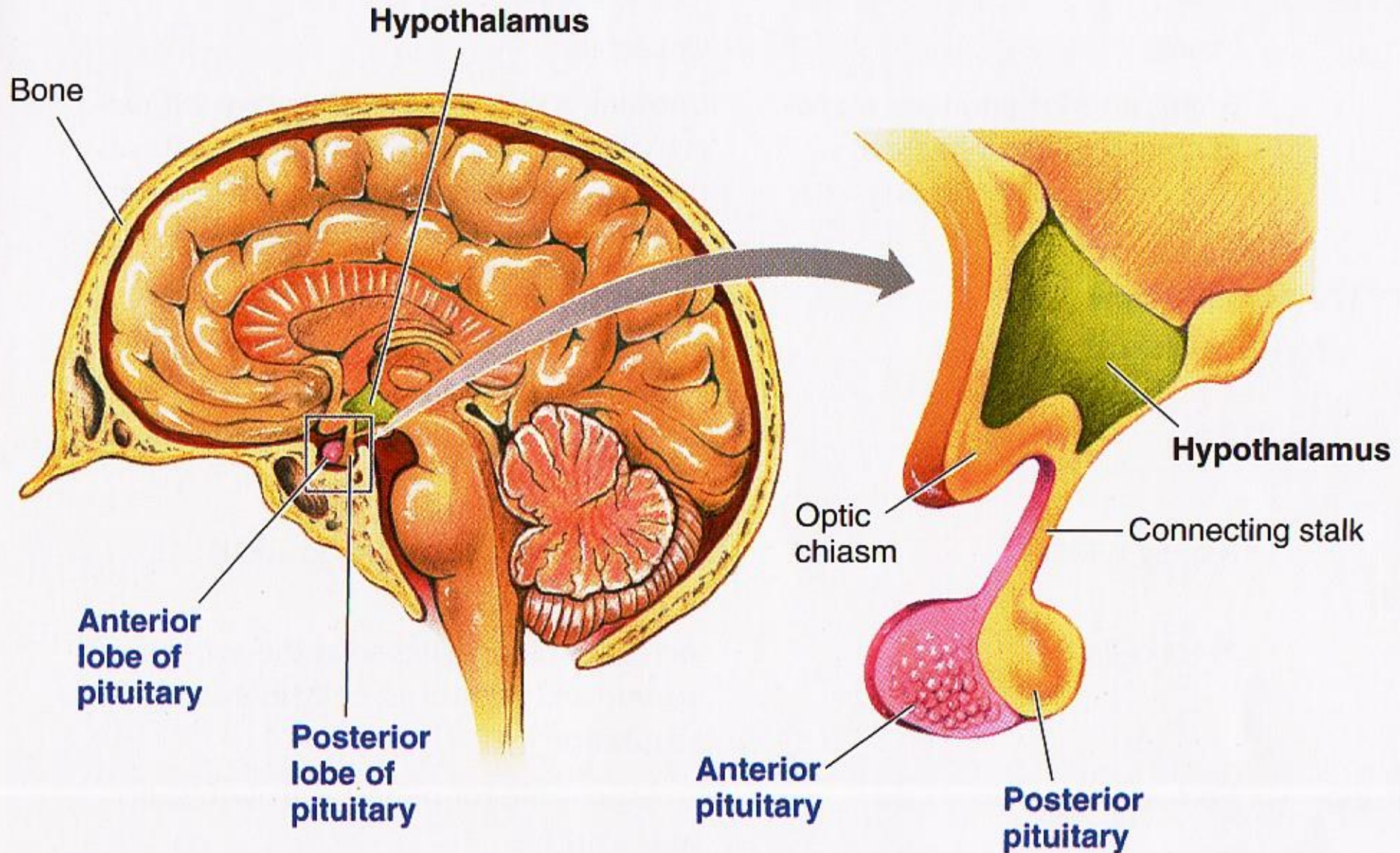
Thyroid



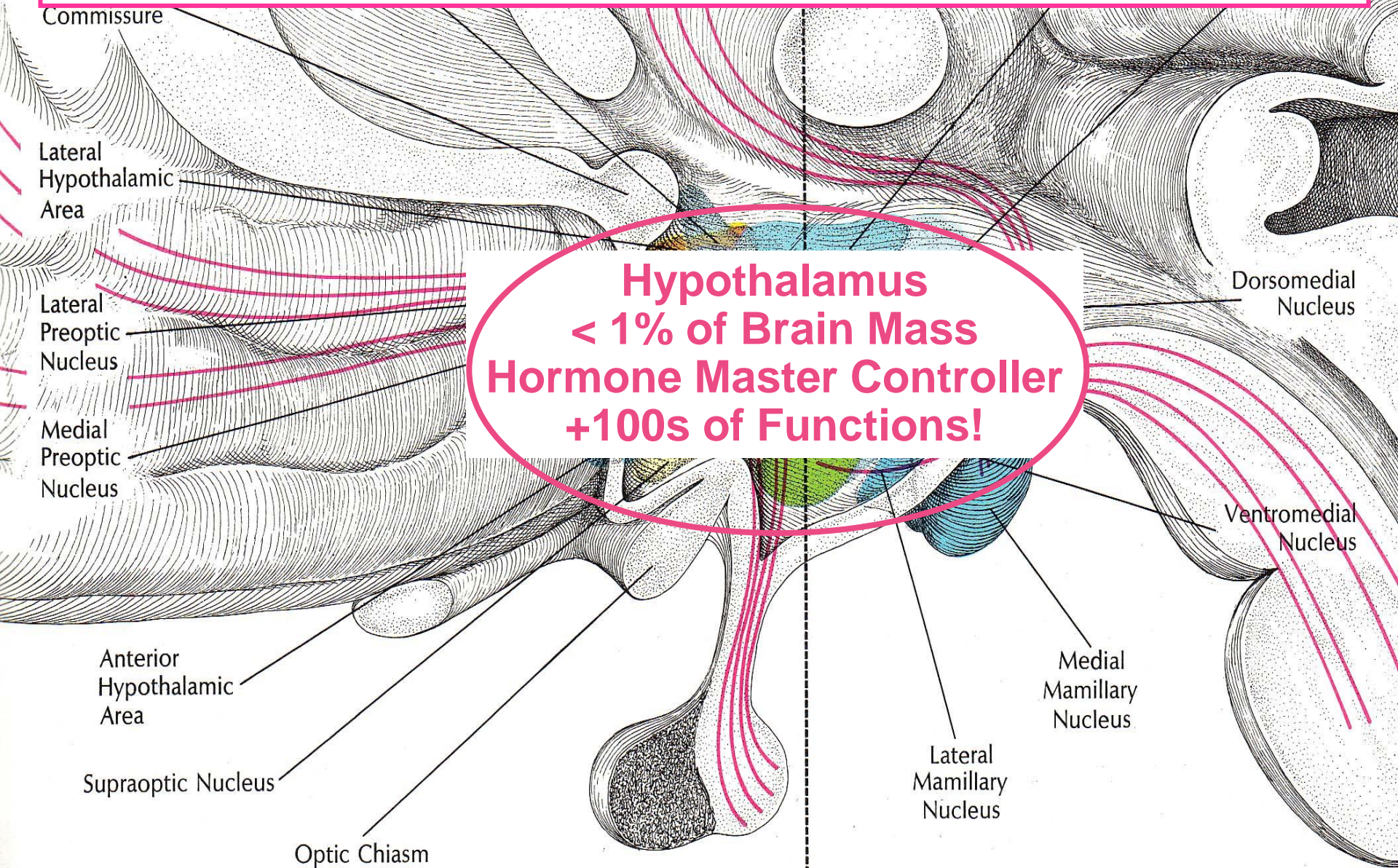
Steroid

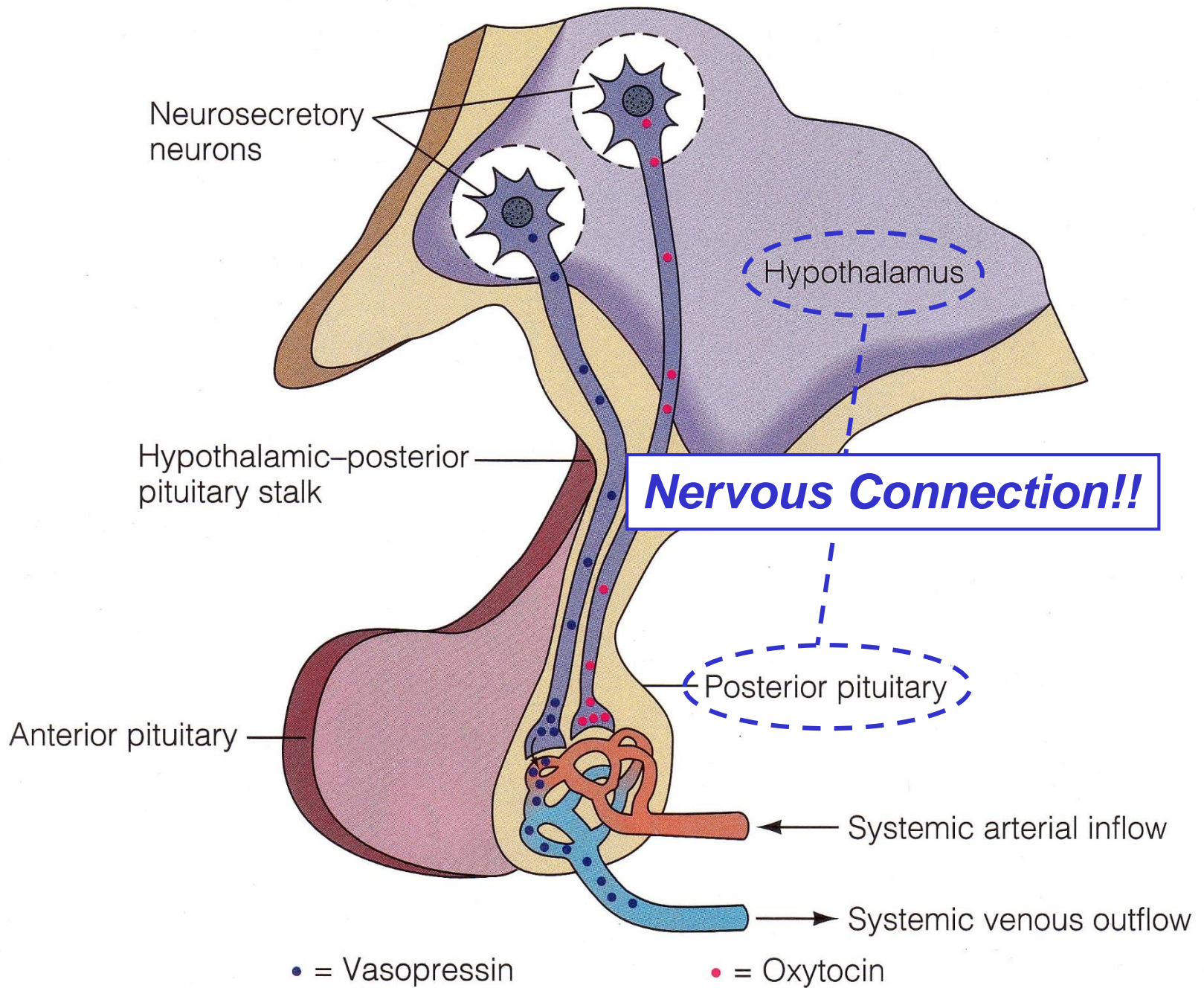


Hypothalamus & Pituitary: Intimate Relationship

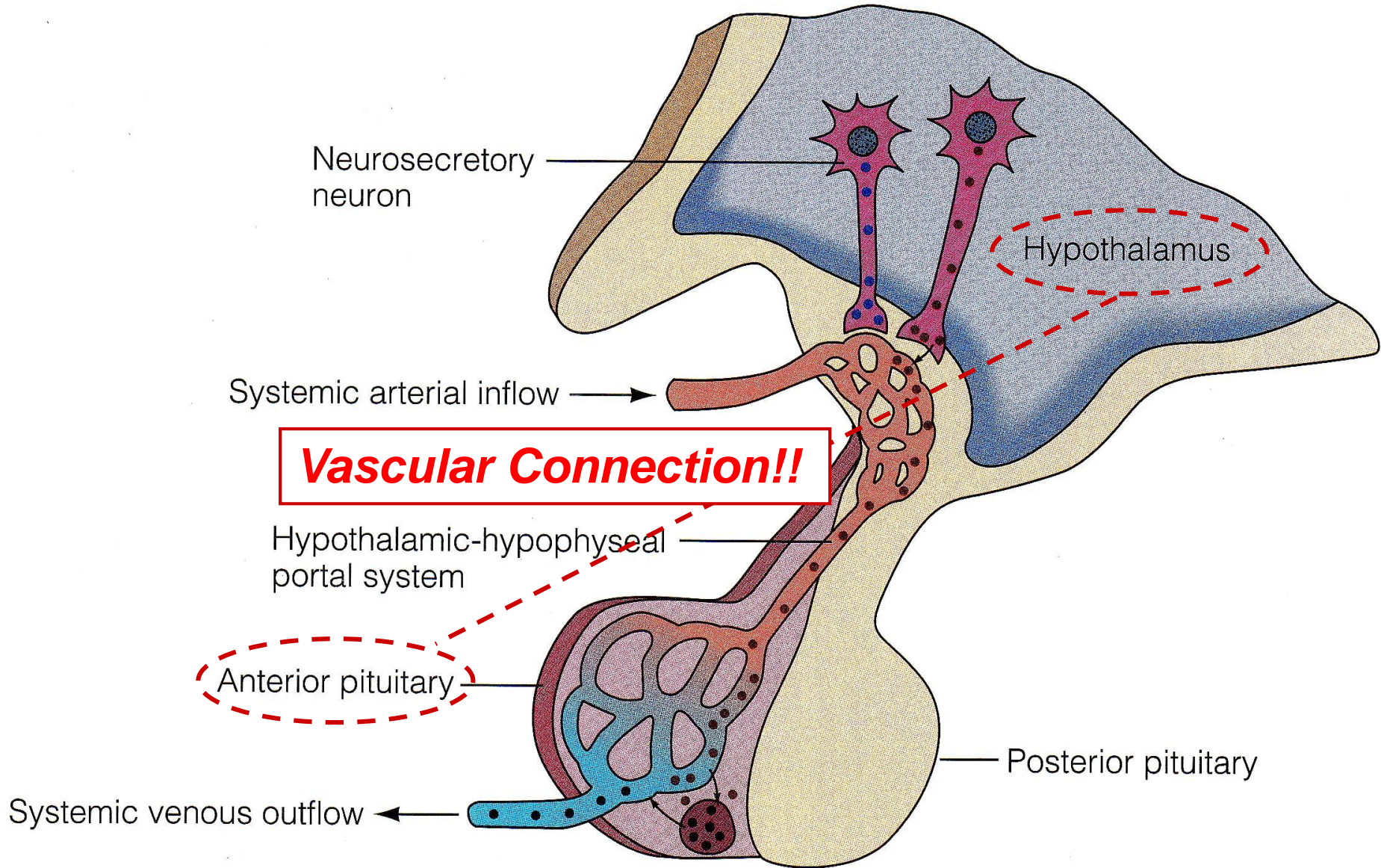


Good Things Come in Small Packages!



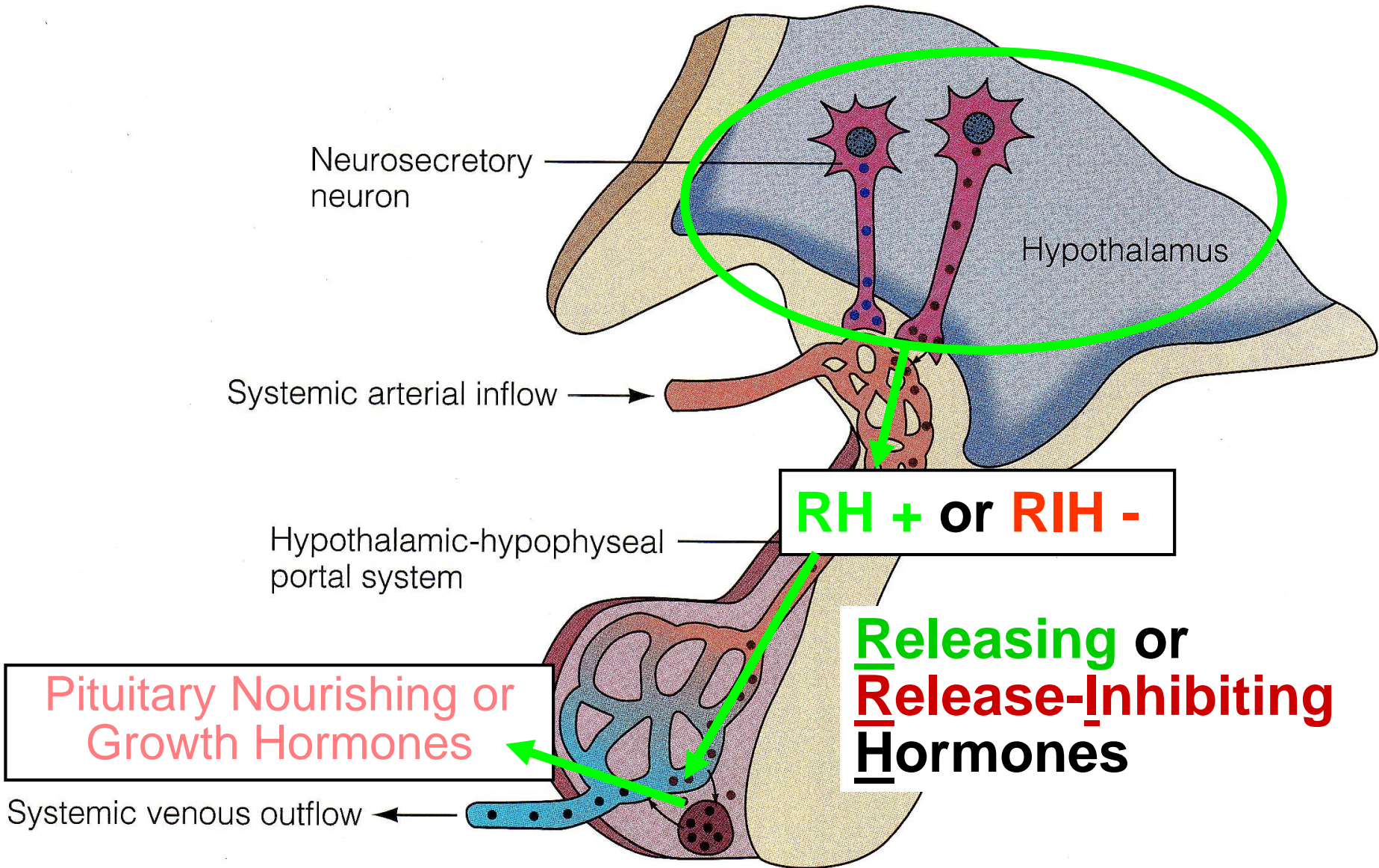


Hypothalamus-Anterior Pituitary Vascular Connection!



• = Hypophysiotropic hormones

• = Anterior pituitary hormone

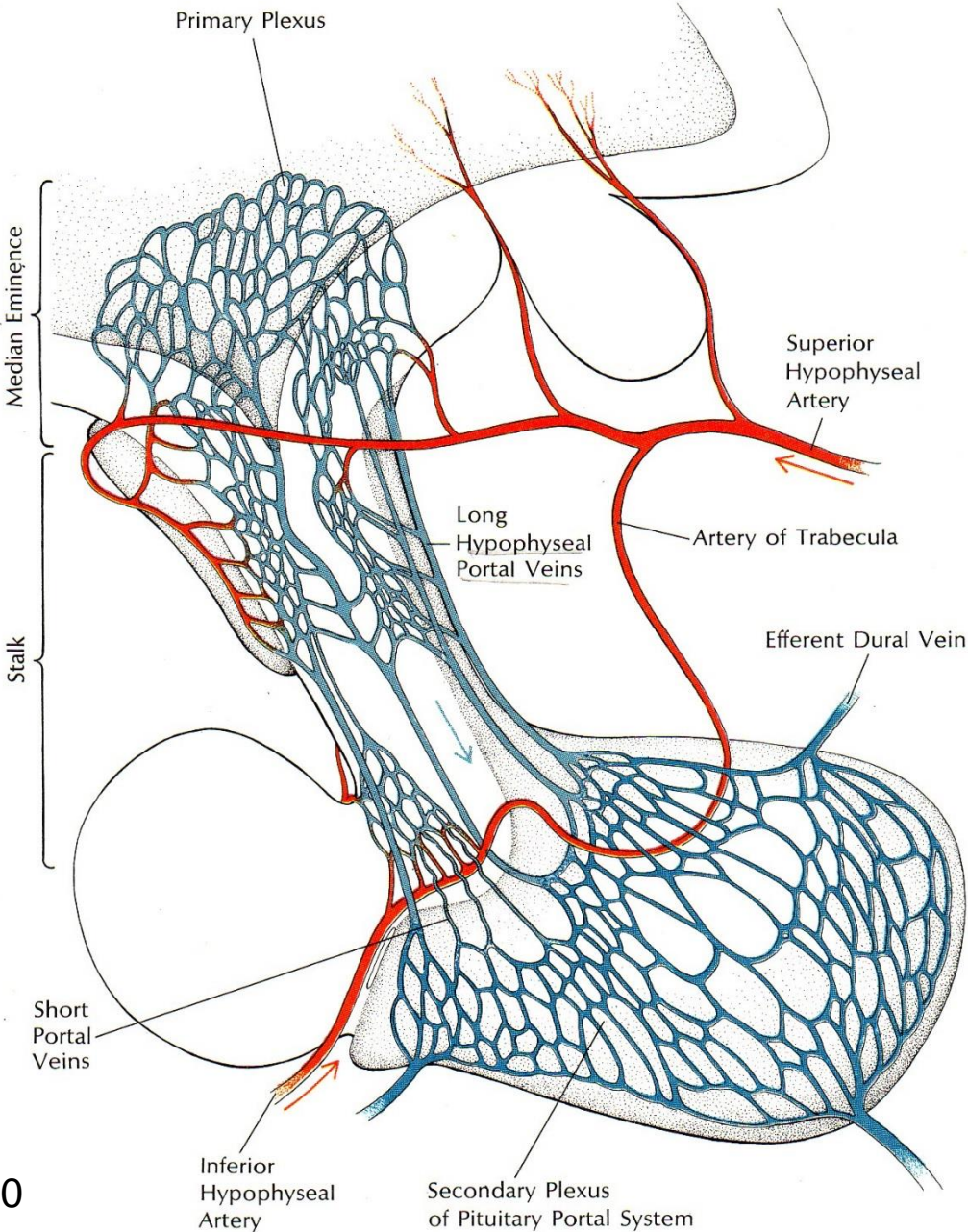


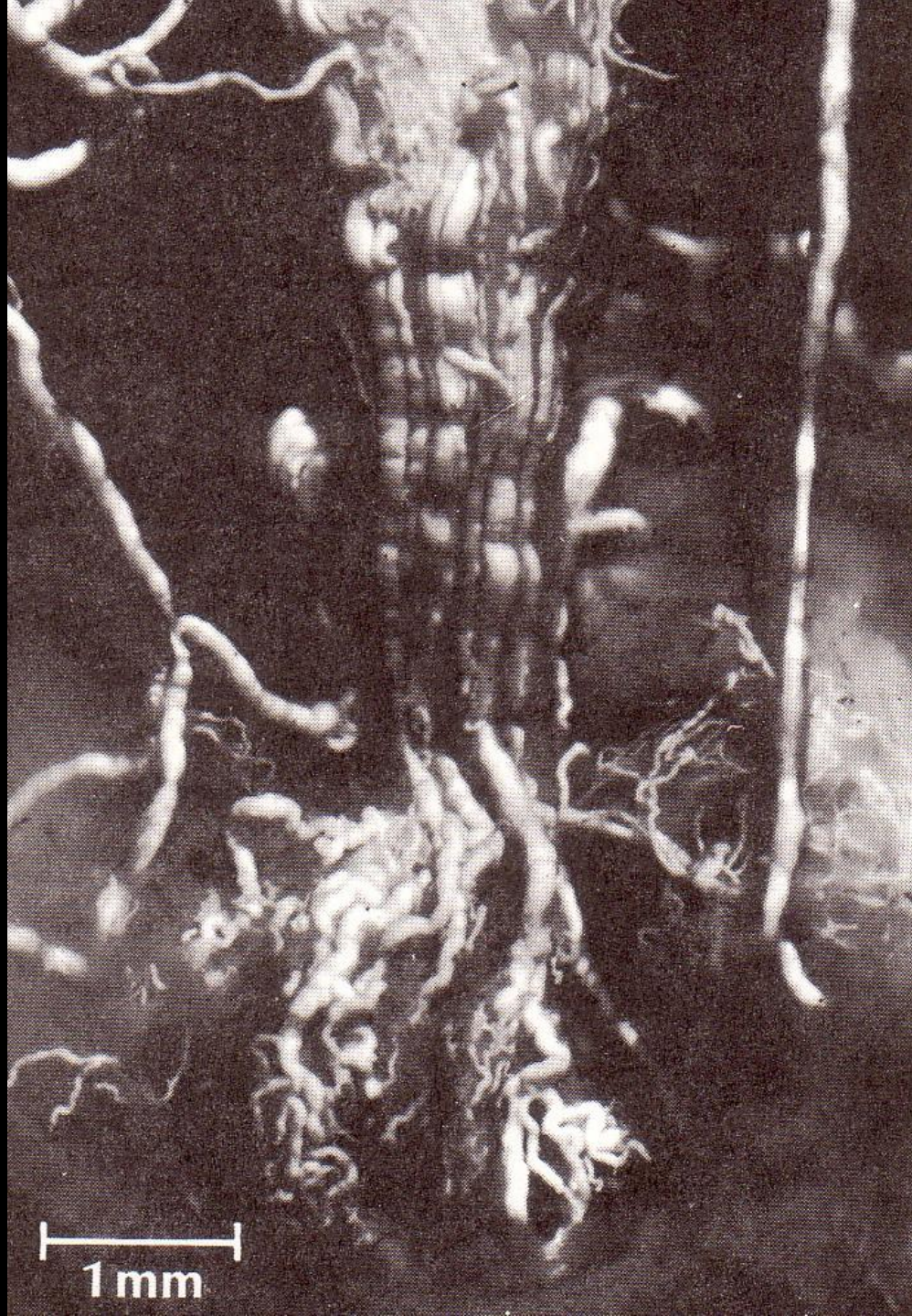
• • = Hypophysiotropic hormones

• = Anterior pituitary hormone

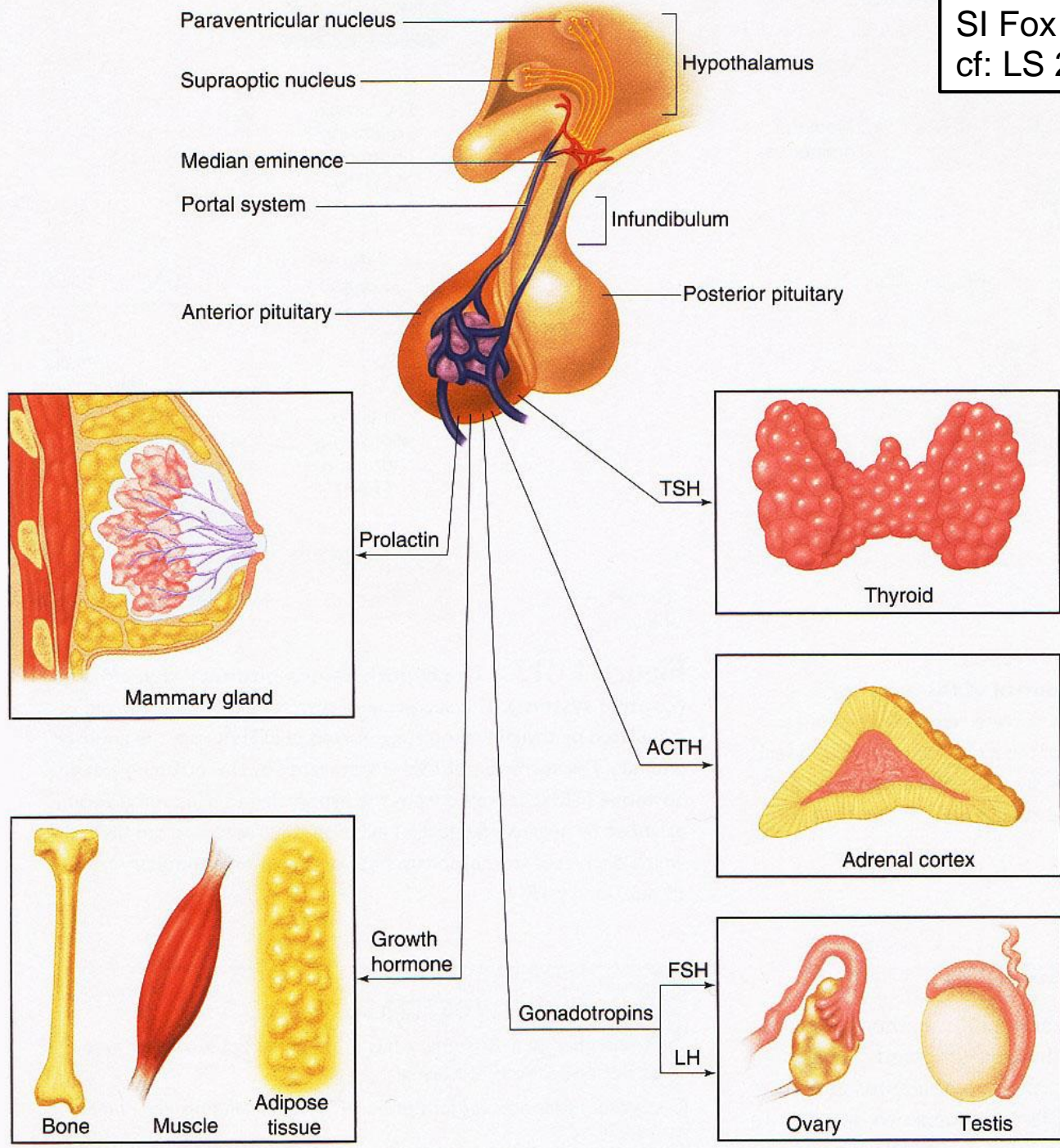
Hypophysis ≡ Pituitary

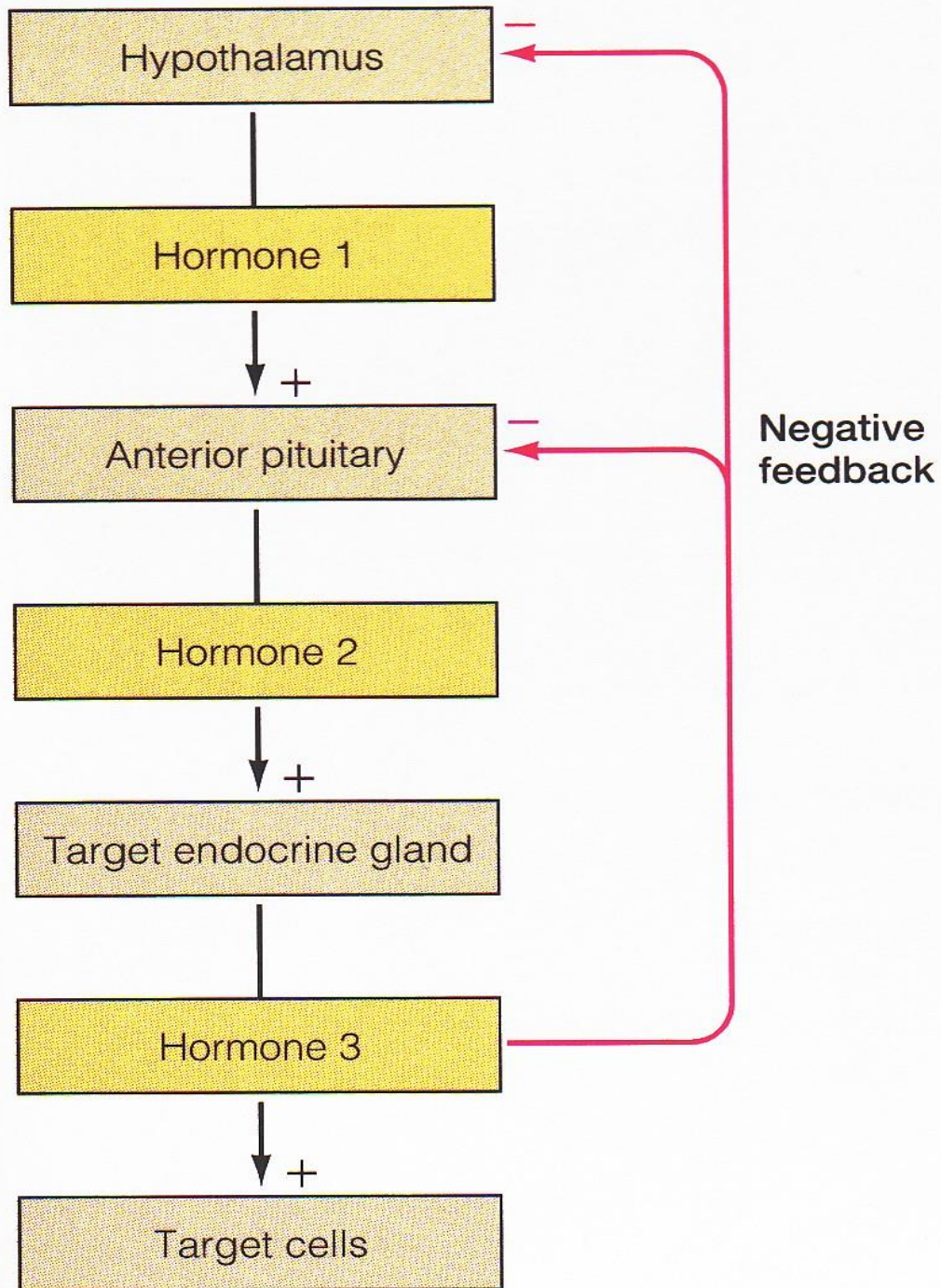
Capillary-Venule-Capillary Intimate Circulation





Krieger & Hughes 1980





**Often,
more than
simply 1
feedback
loop!**

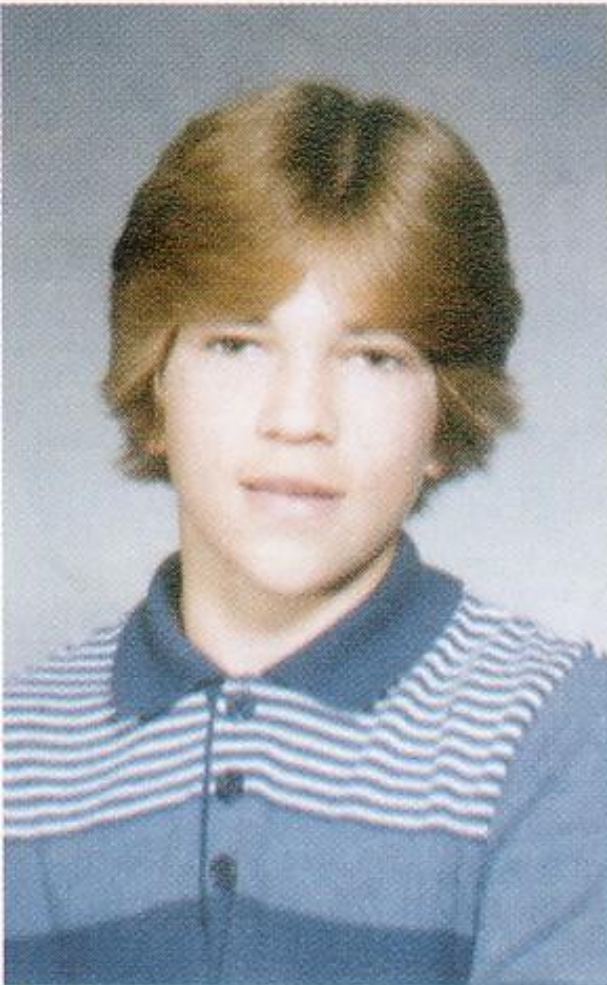




LS 2006, cf: LS 2012
fig 17-10

Progression & Development of Acromegaly

Age 13

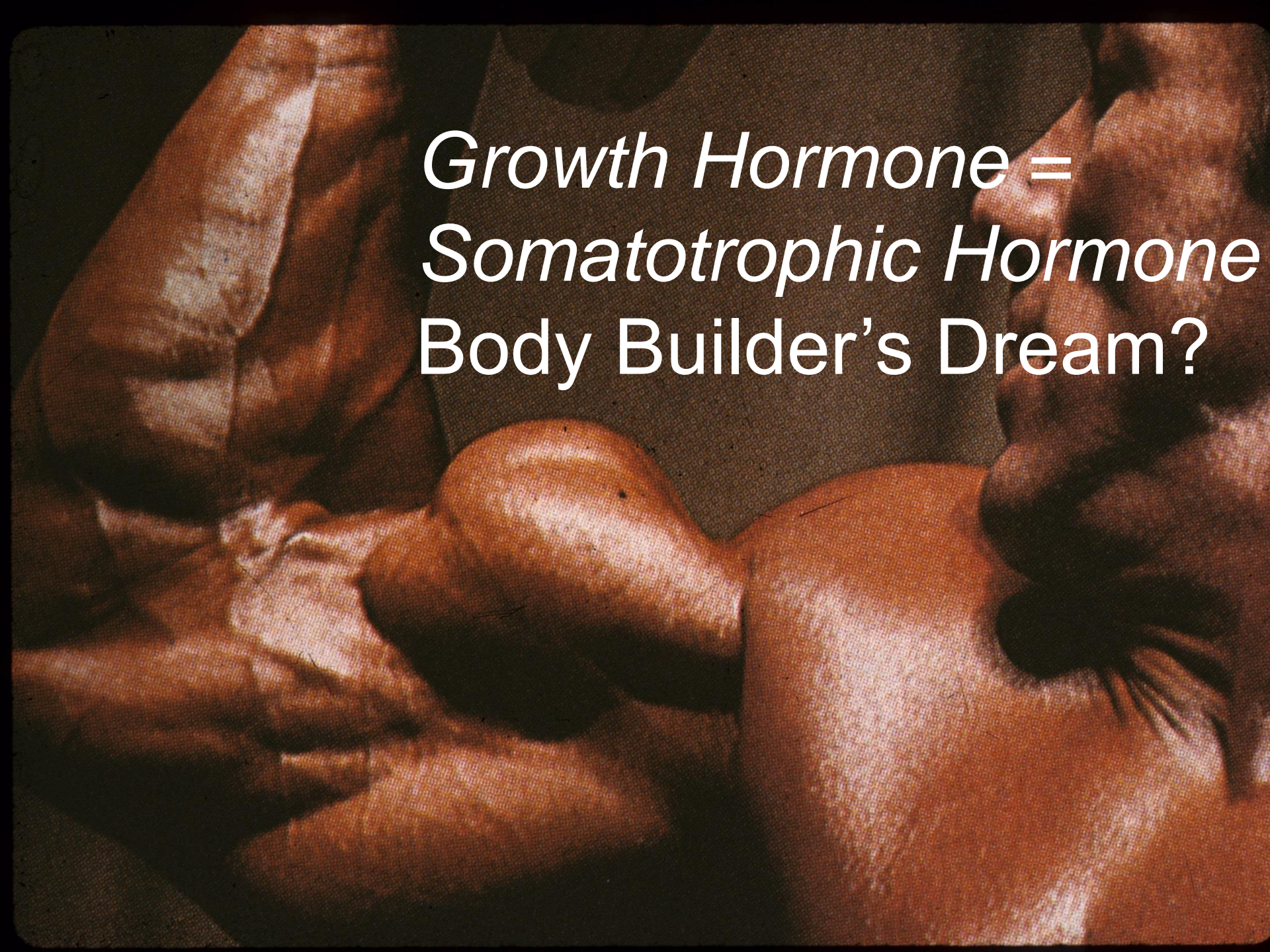


Age 21



Age 35





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

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

↑ Amino Acid uptake & Protein synthesis

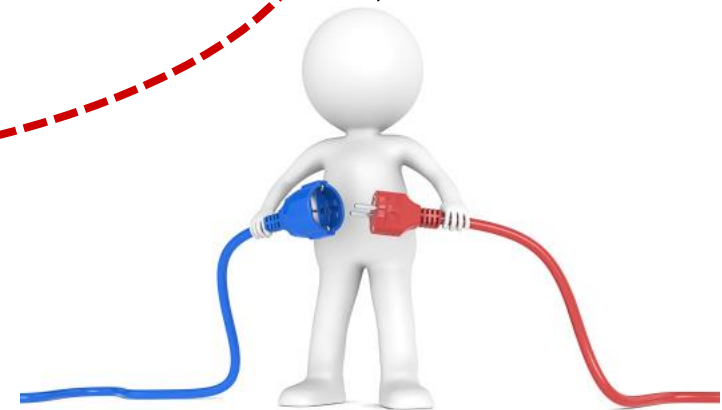
↑ Lipolysis & Fatty Acid mobilization

↓ Glucose uptake
(skeletal muscle & adipocytes)

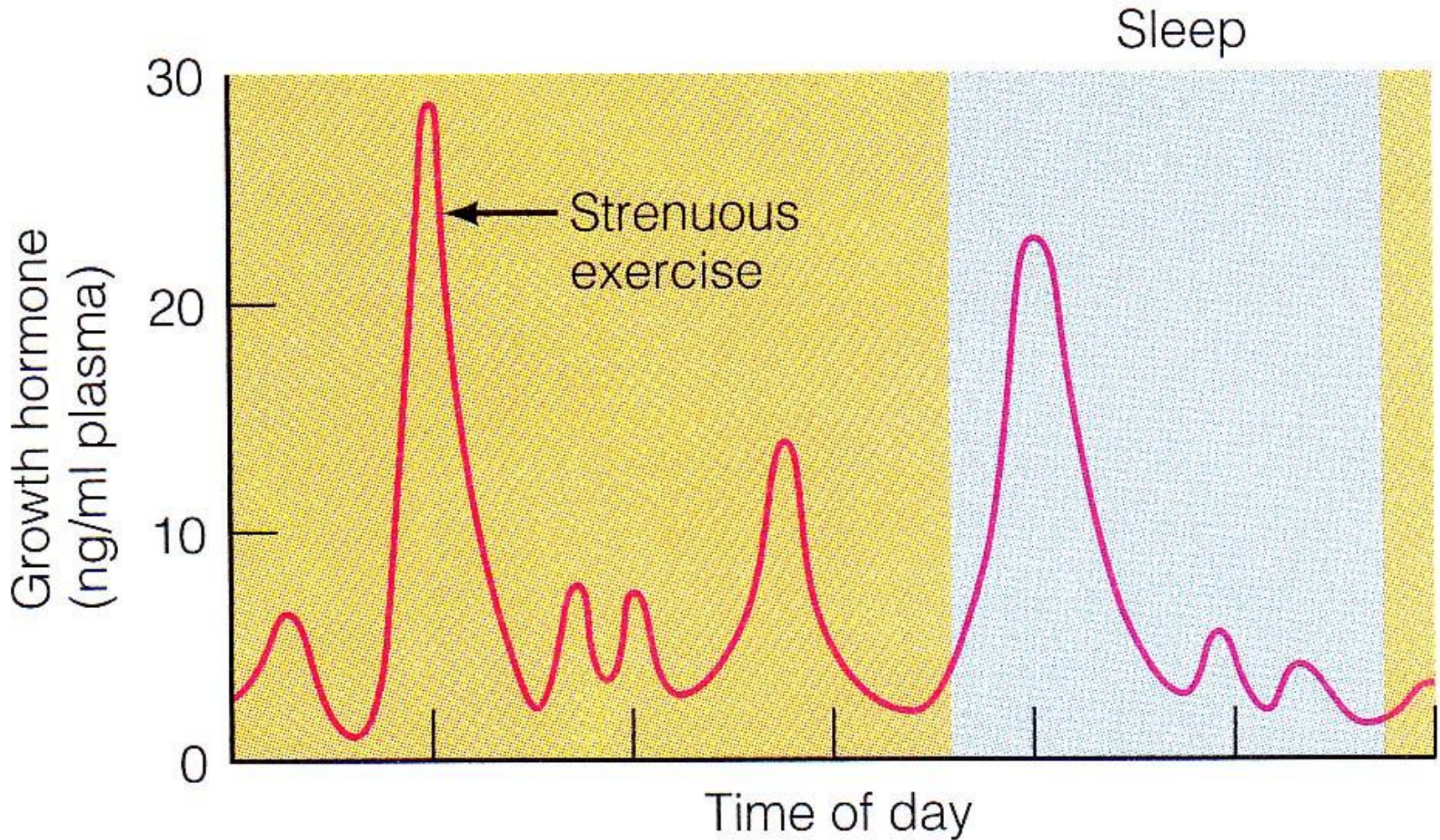
↑ Glucose production
(liver glycogenolysis)

↑ Insulin secretion

Mismatch!!



Increase GH naturally with exercise & sleep!!



ng/ml = nanograms per milliliter