

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 Connections** LS ch 11 p 303, ch 17 pp 525-36
Erythroblastosis fetalis, diabetes, insulin, glucagon
- III. 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

WOW!



SUPER



~ TOP 5-10!

EXCELLENT!!



~ TOP 15!

GREAT EFFORT



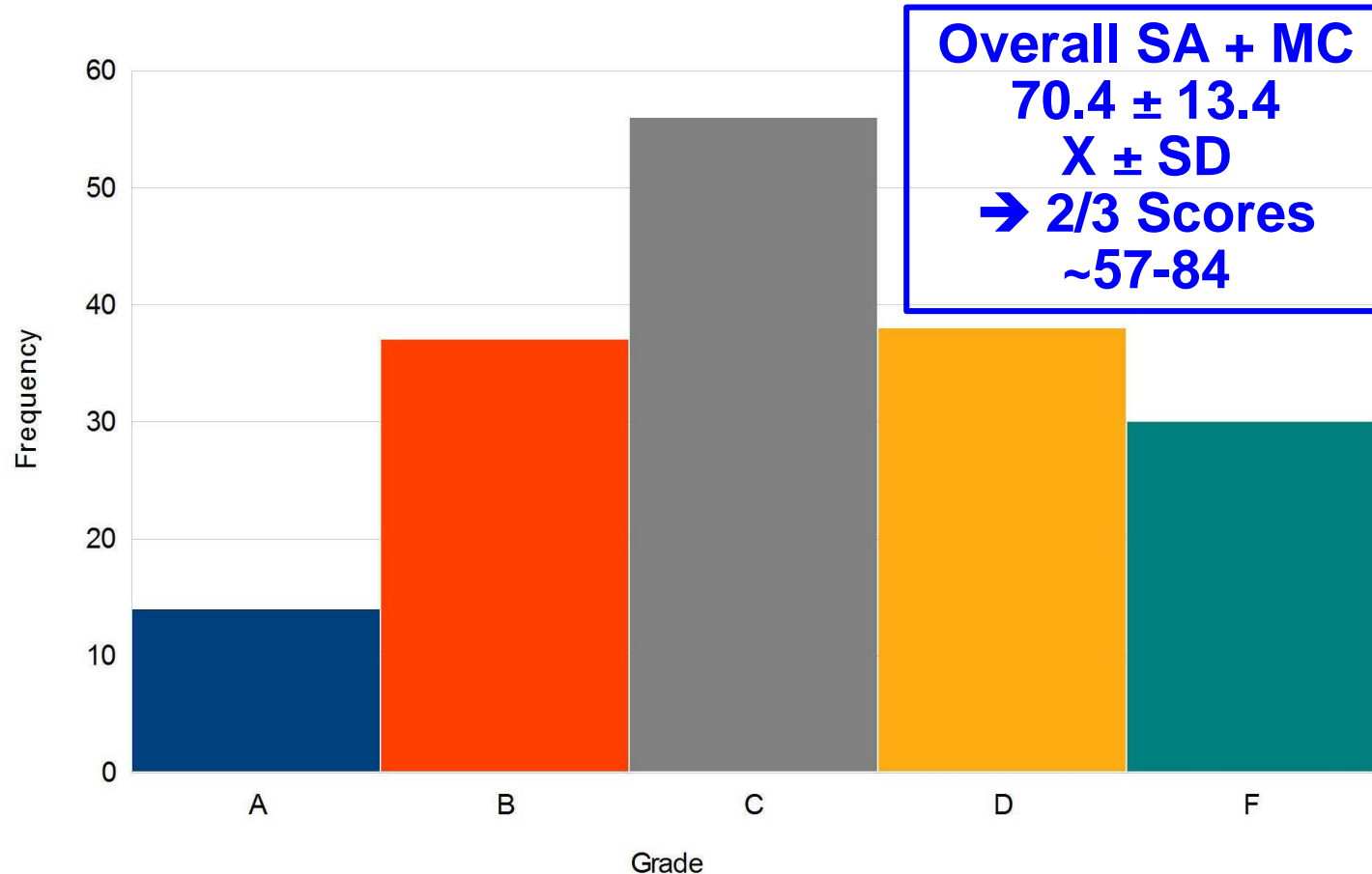
~ TOP 20-25!

Class Frequency Distribution Report for BI 121 Midterm F16, Multiple Choice, Part II

Overall

Mean Score: 71.50%

Grade	Percent Score	Raw Score	Frequency	Percent
A	90.00 - 100.00	36.00 - 40.00	14	8.00
B	80.00 - 89.99	32.00 - 35.99	37	21.14
C	70.00 - 79.99	28.00 - 31.99	56	32.00
D	60.00 - 69.99	24.00 - 27.99	38	21.71
F	0.00 - 59.99	0.00 - 23.99	30	17.14



👉 😊 ...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 the final, 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!

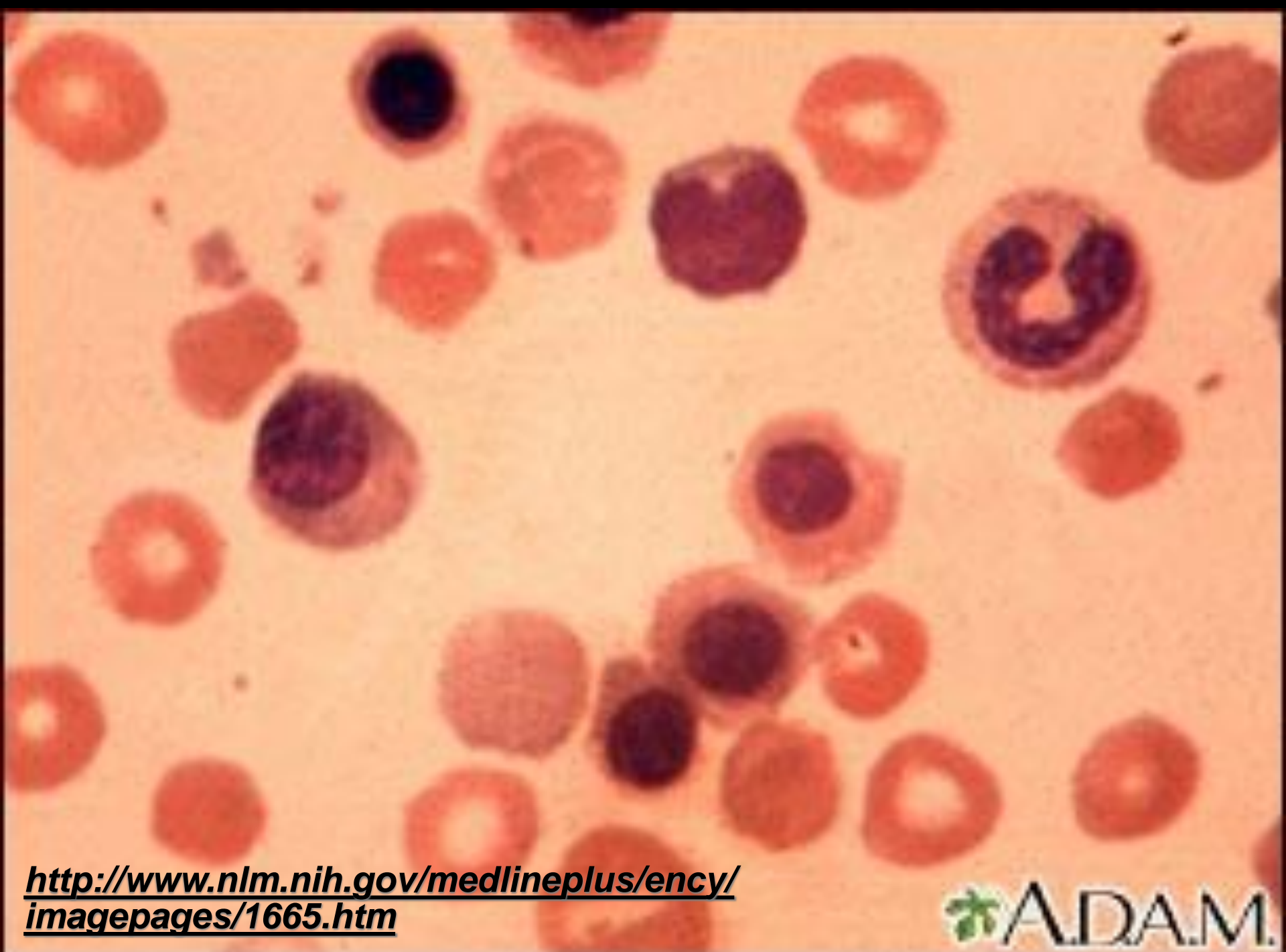


...Fortunately, the lab buffers the grade!

Erythroblastosis Fetalis?

**e.g., Rh- mom
Rh+ baby**

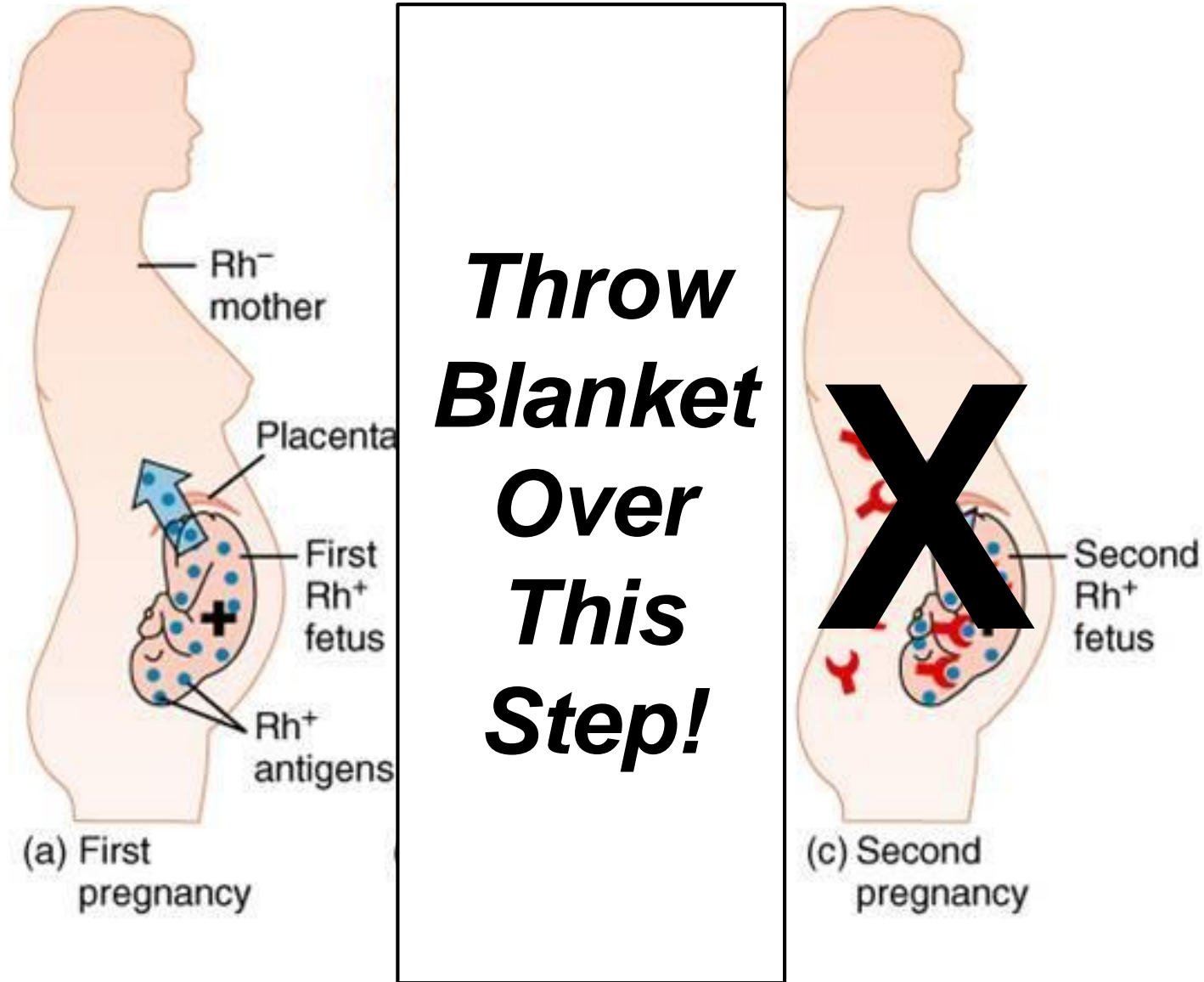
<https://www.nlm.nih.gov/medlineplus/rhincompatibility.html>



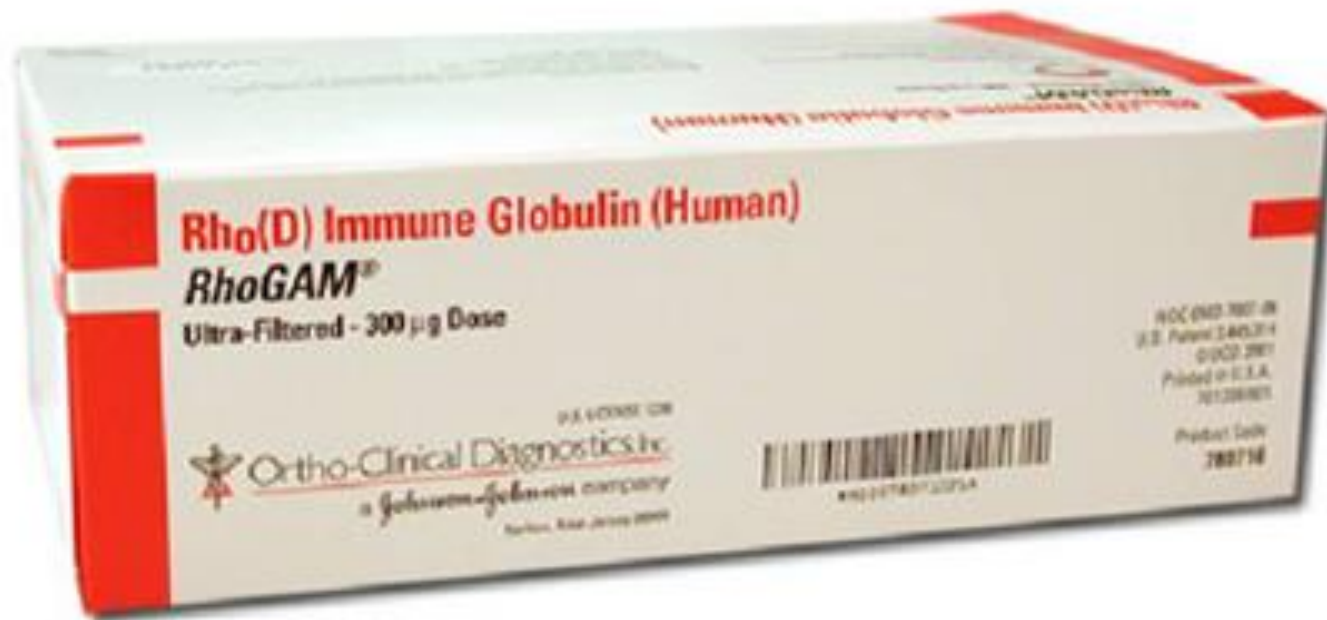
[http://www.nlm.nih.gov/medlineplus/ency/
imagepages/1665.htm](http://www.nlm.nih.gov/medlineplus/ency/imagepages/1665.htm)

 ADAM

Erythroblastosis Fetalis or Hemolytic Disease of the Unborn/Newborn

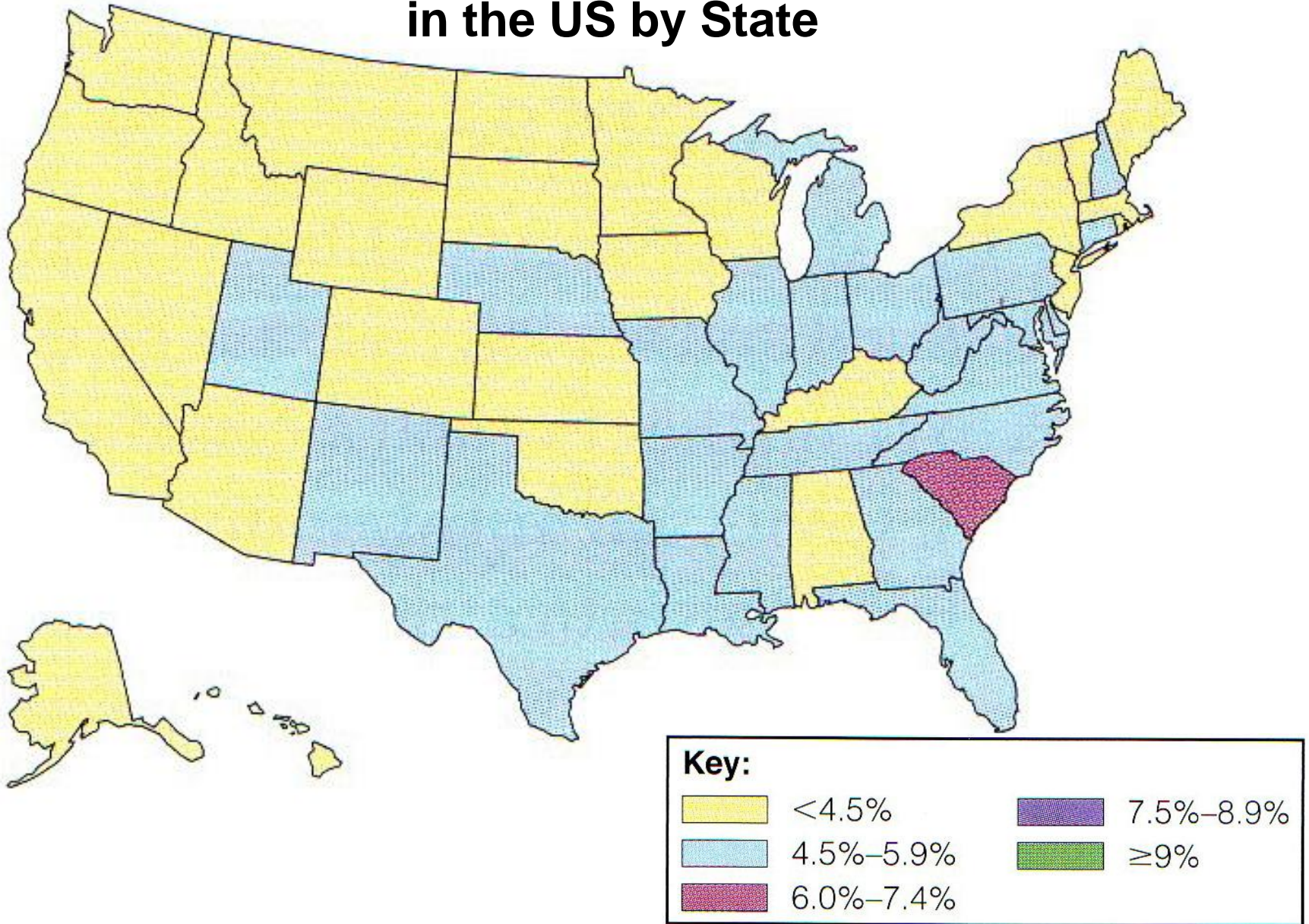


**Inject Mom with RhoGam \leq 48-72 hr
> each Rh+ Pregnancy**



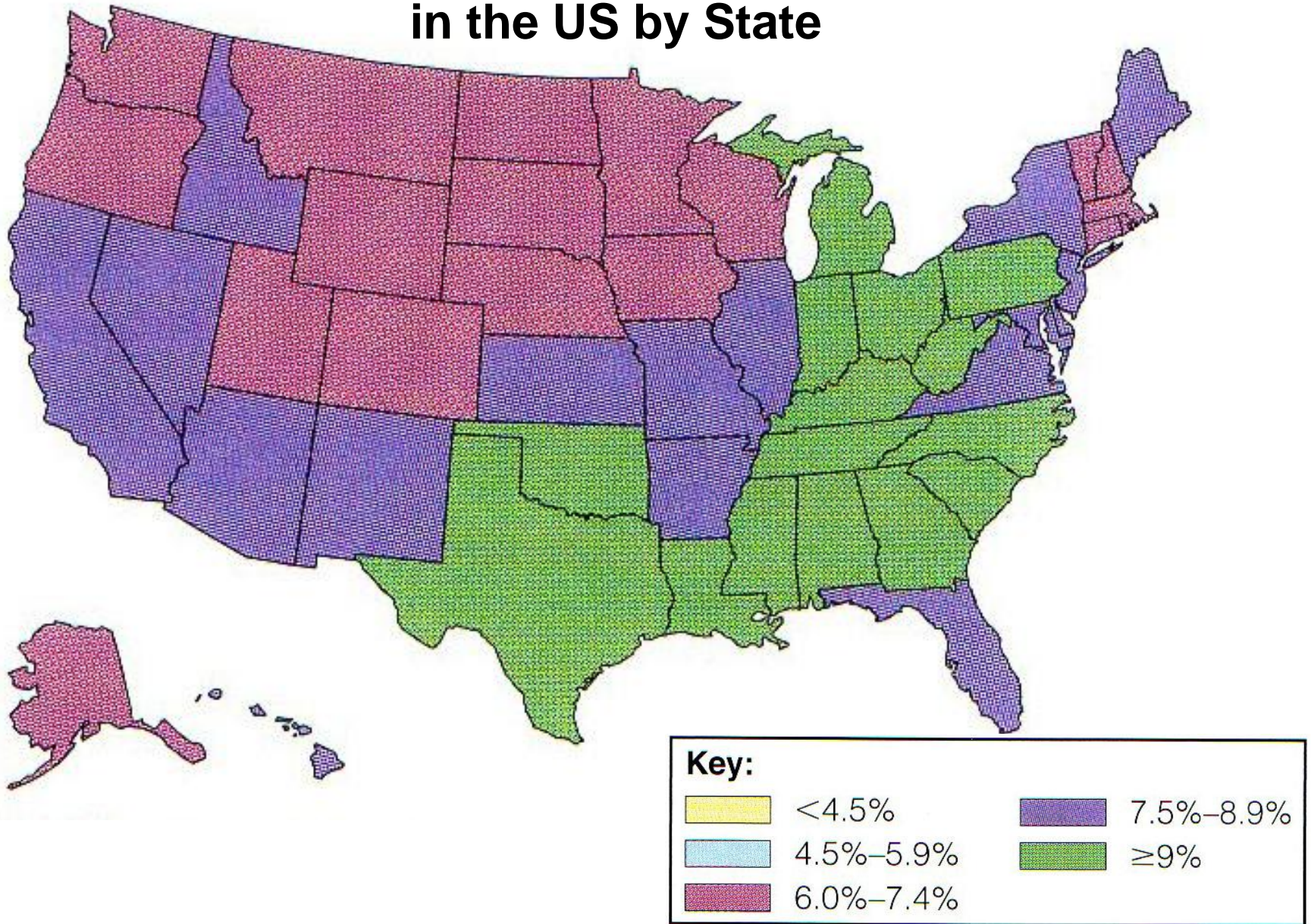
**The Blanket is RhoGam → Masks
the Mom's Immune System!**

1994 Diabetes Prevalence in the US by State



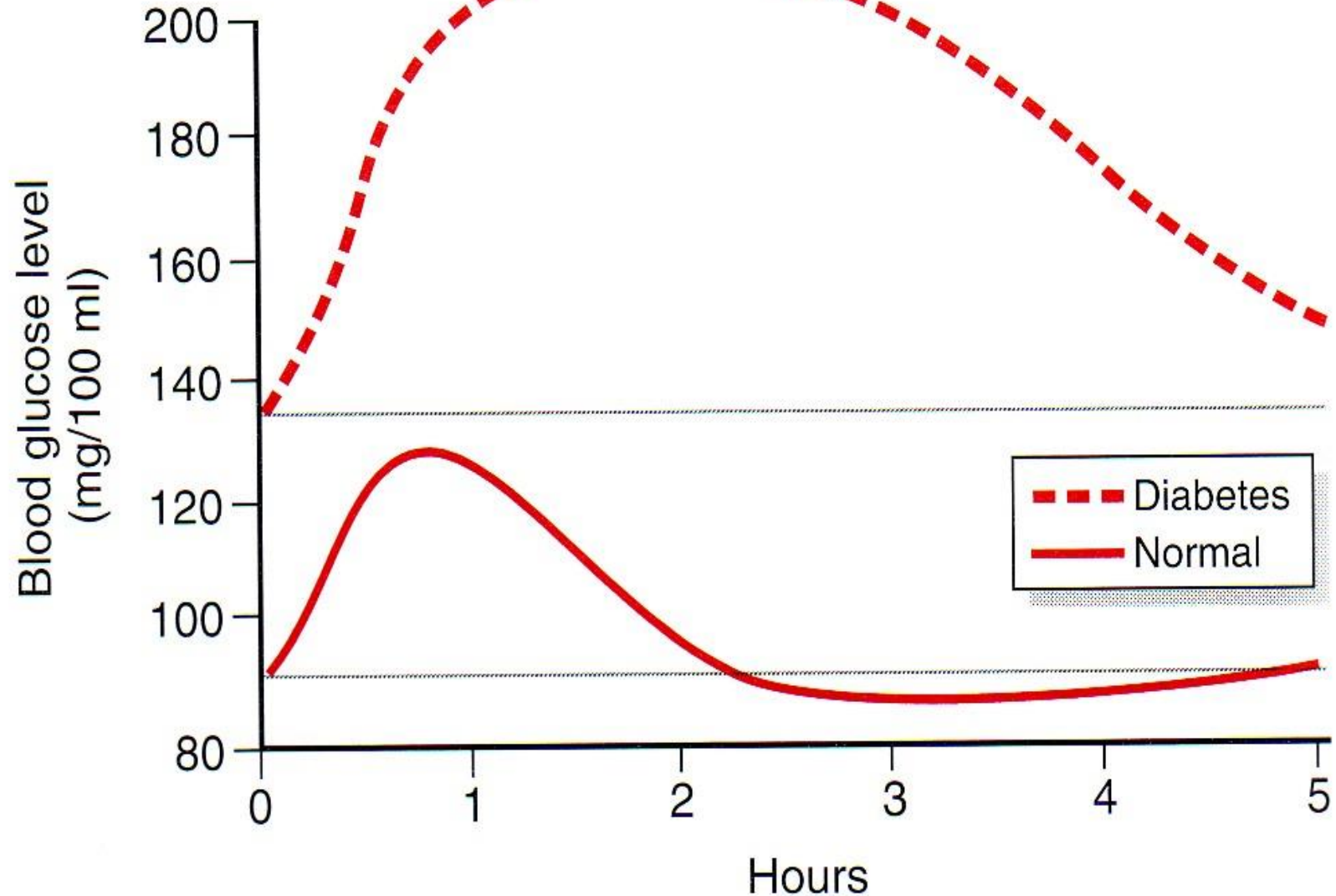
Source: Centers for Disease Control, Division of Diabetes Translation,
<http://www.cdc.gov/diabetes/statistics>, S&W 2014 fig 4-15 p139A.

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.

Diabetic & Normal Response to Glucose Load



Glucose:
Sugar in Blood



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

Proinsulin with C-Connecting Peptide

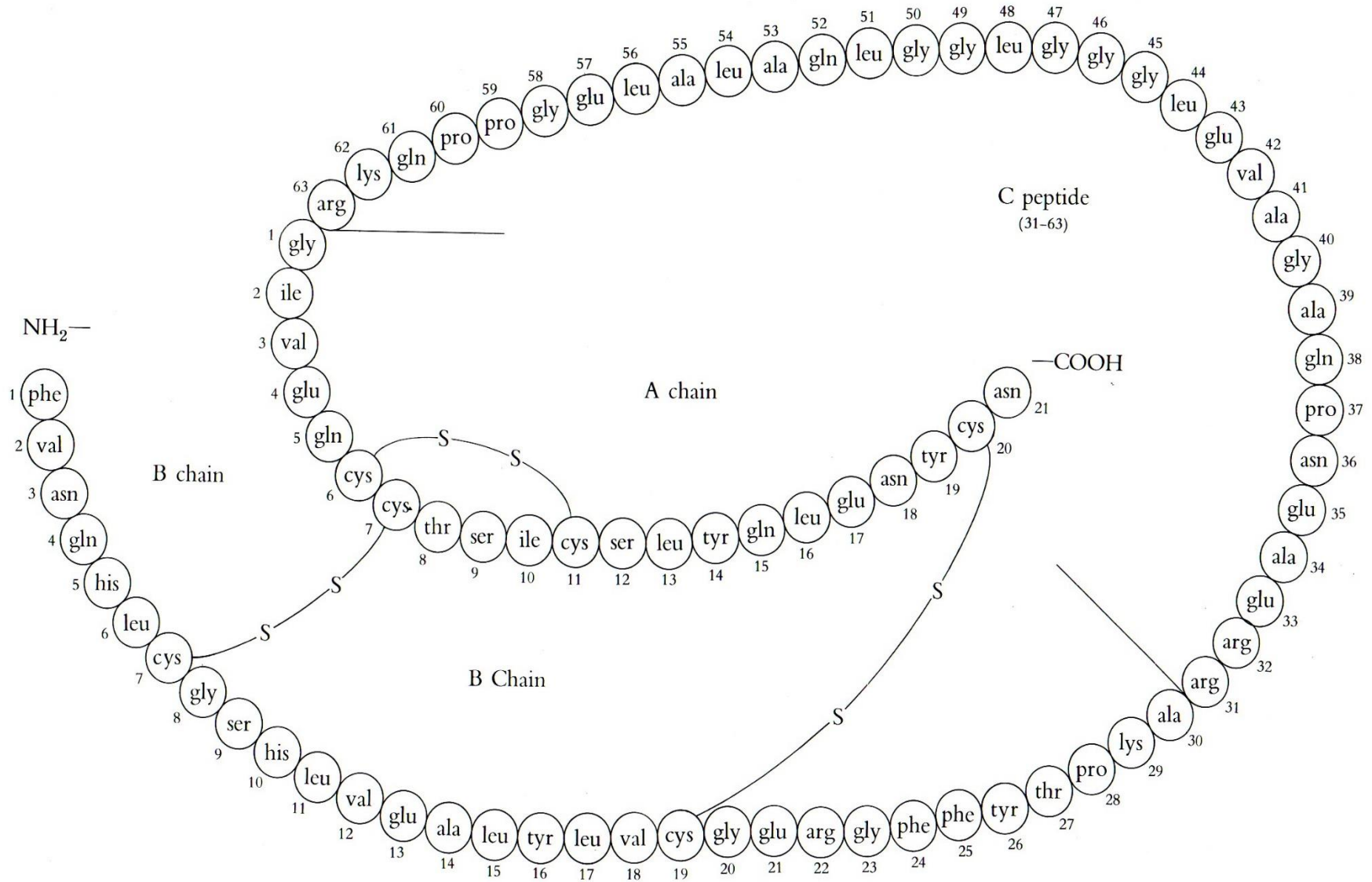
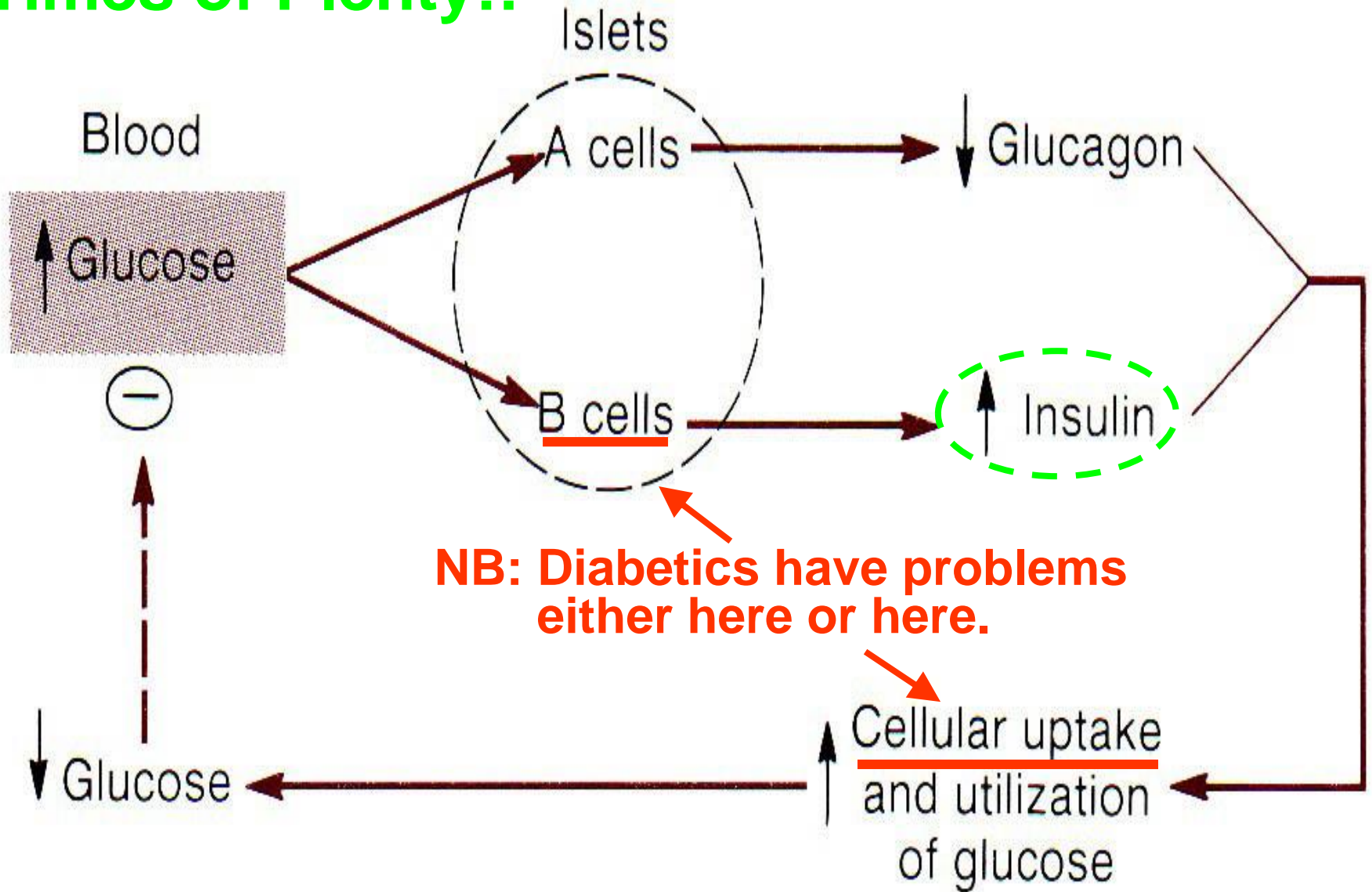


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

Times of Plenty!!

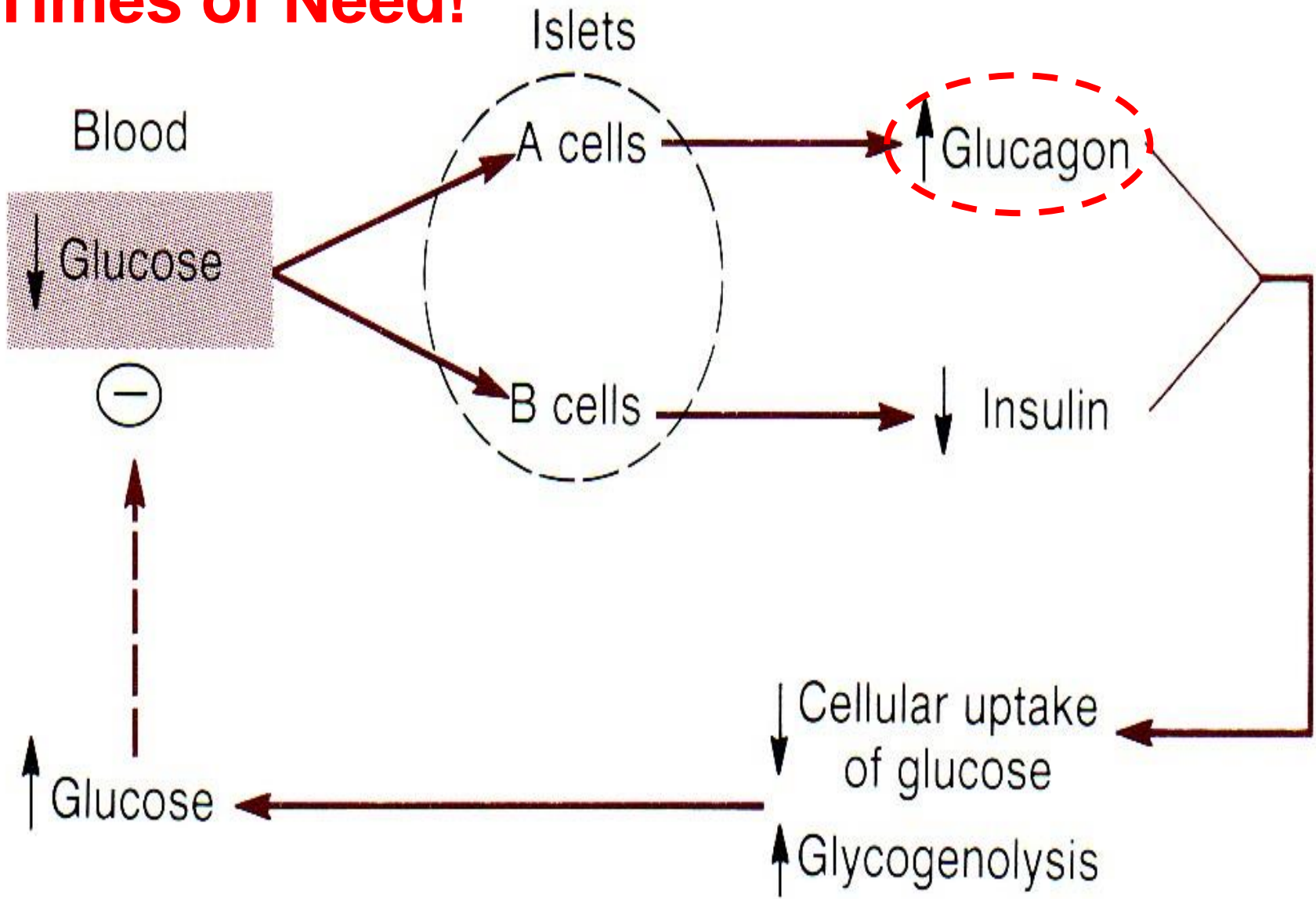


NB: Diabetics have problems either here or here.

Cellular uptake and utilization of glucose

Store!

Times of Need!



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



Exercise

Diet

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



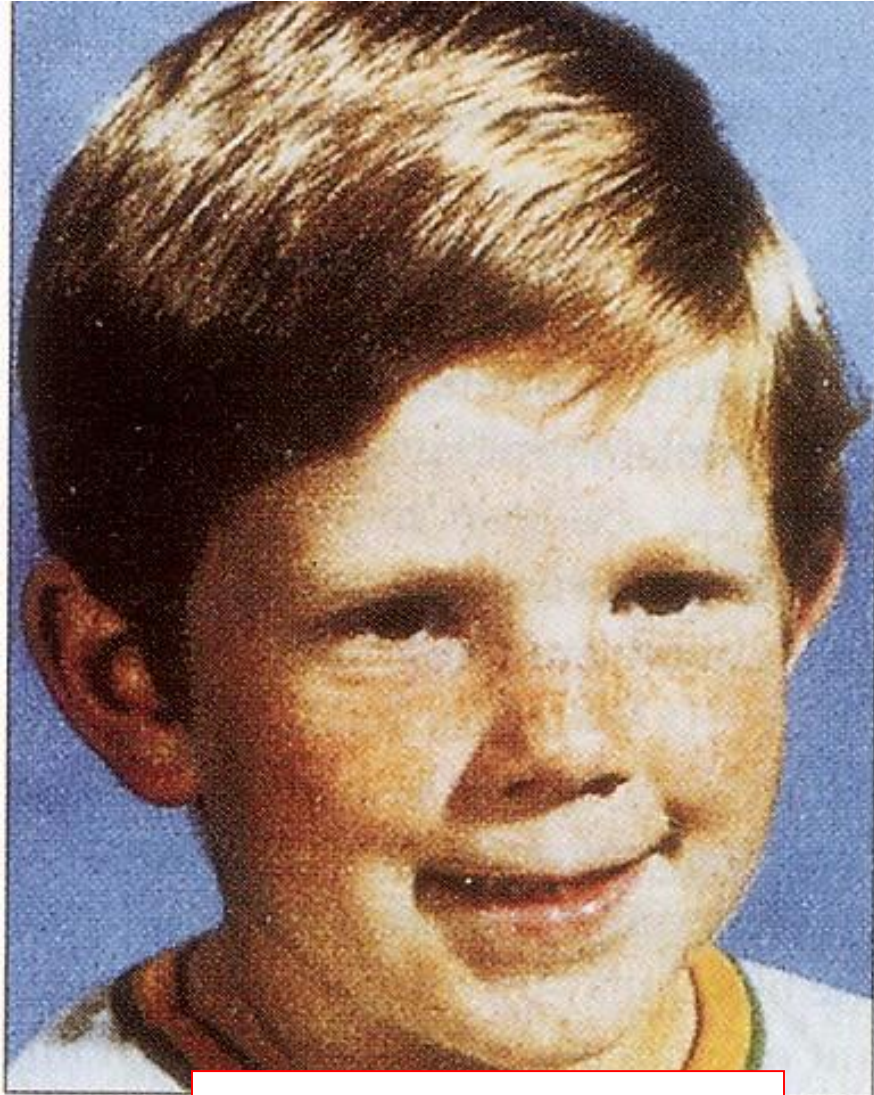
***Exercise is a must based on
its insulin-like effect!***



TIME OUT



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



T = 0, near normal

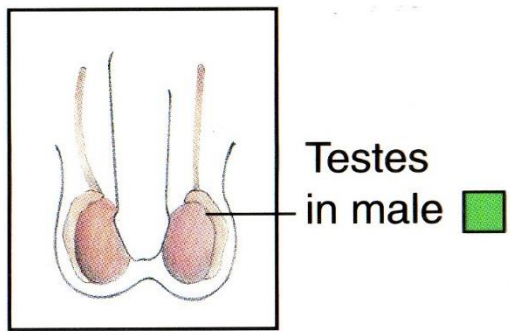
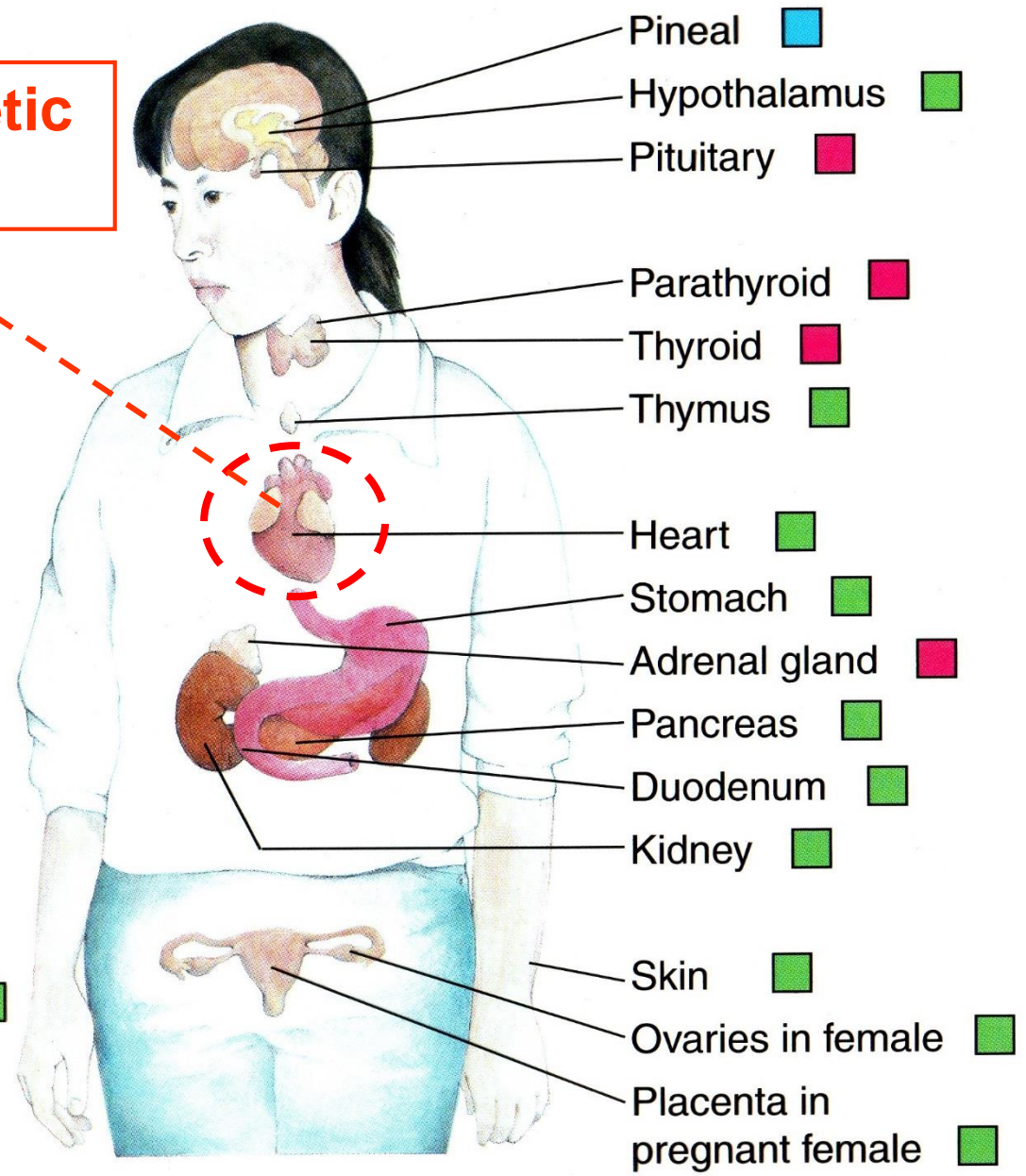


T = 4 months later

Endocrine System

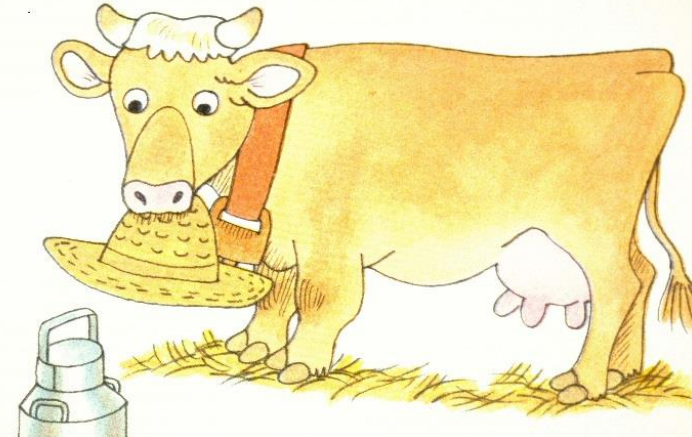
ANP = Atrial Natriuretic Polypeptide

- Solely endocrine function
- Mixed function
- Complete function uncertain

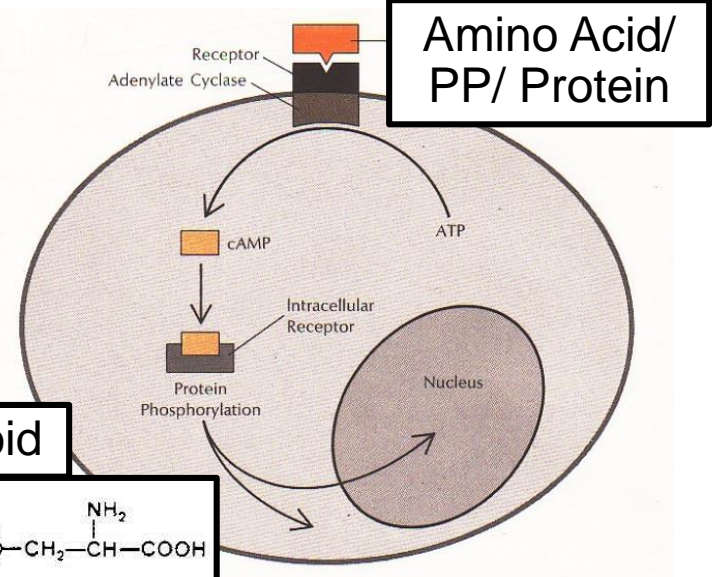


Hormone/Endocrine Classifications?

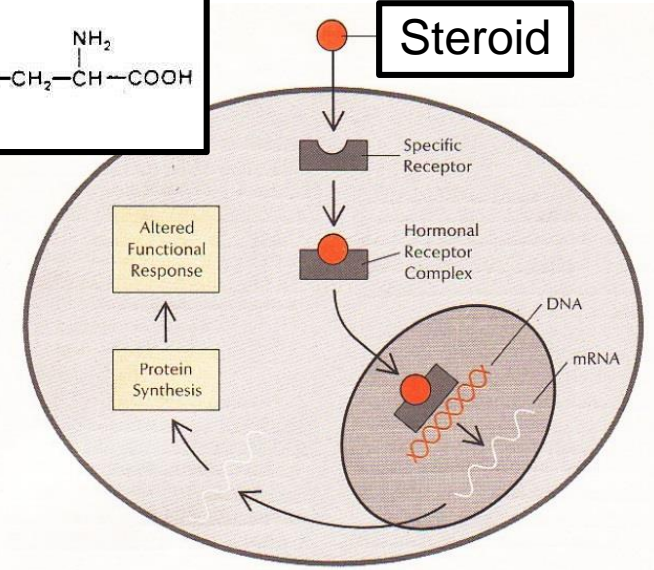
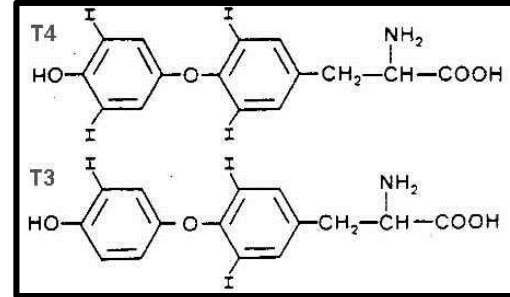
Exogenous



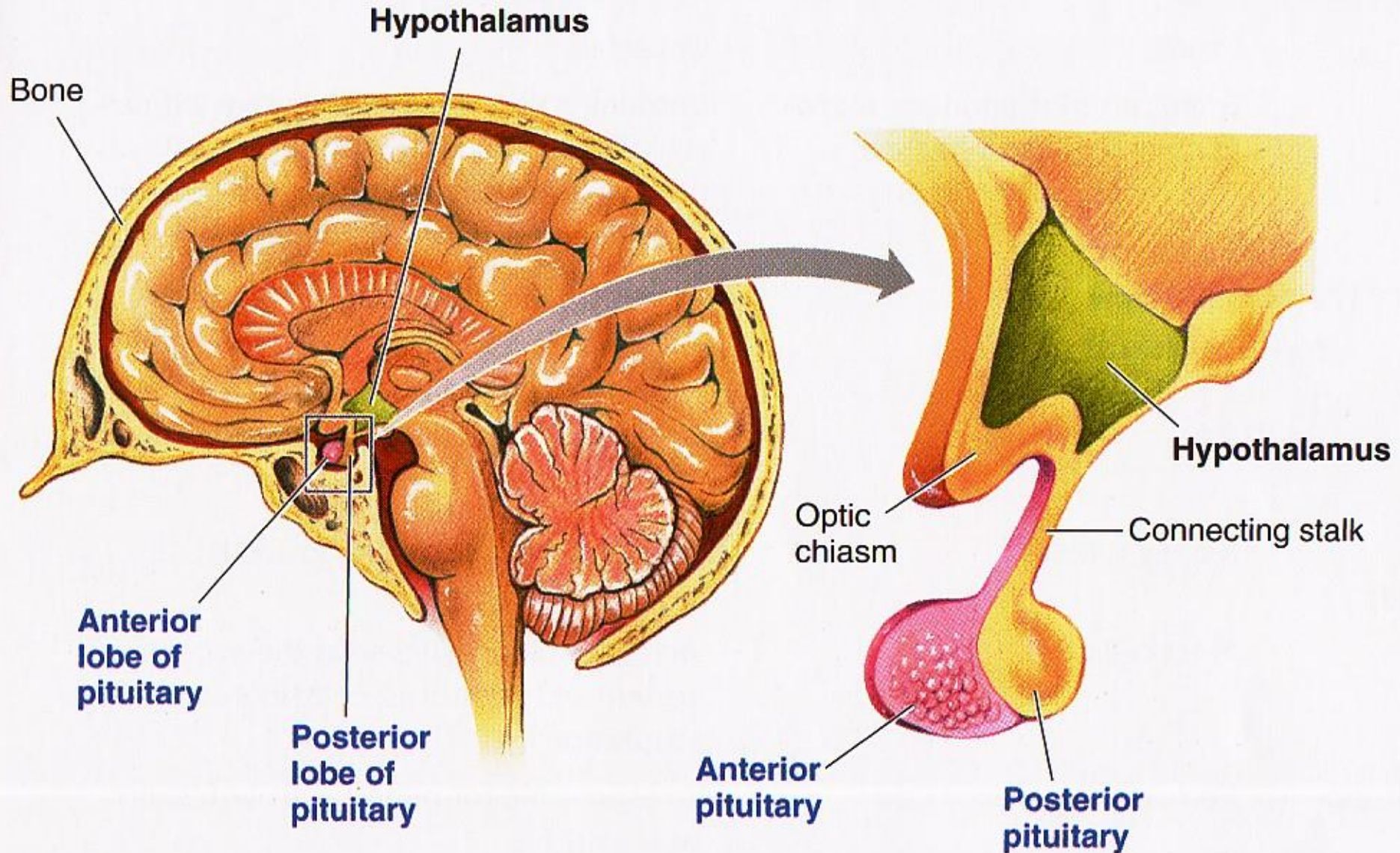
Endogenous



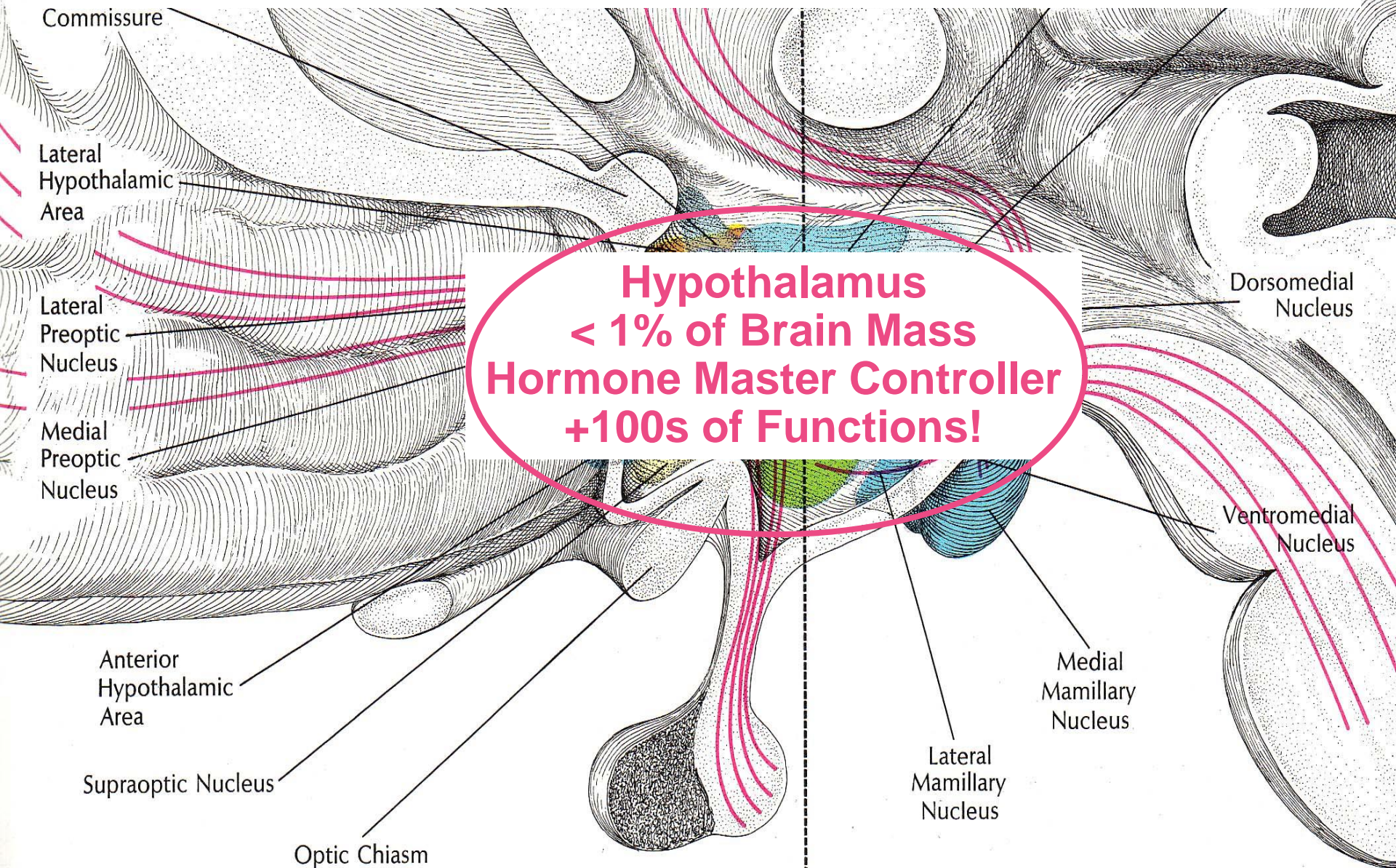
Thyroid

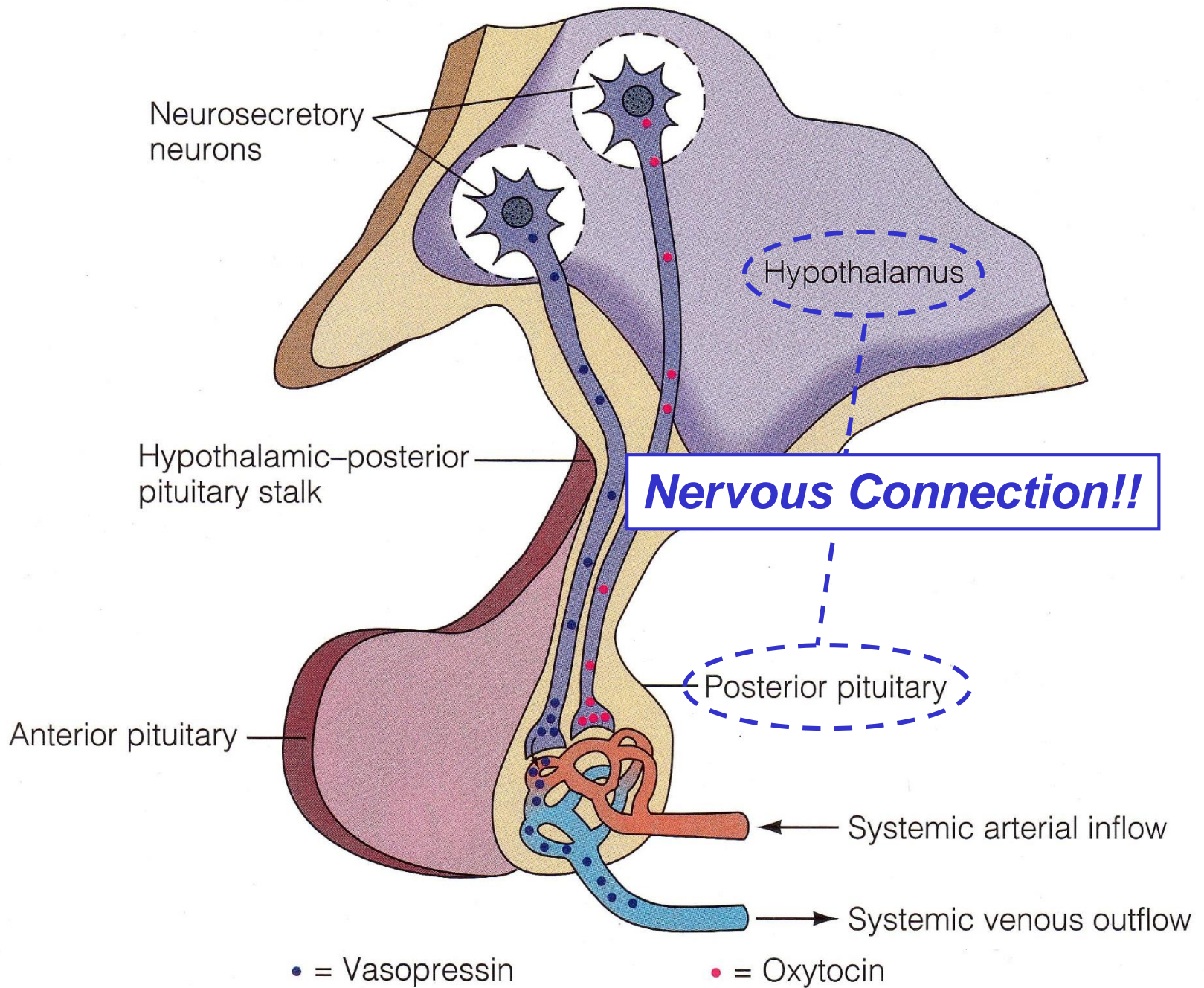


Hypothalamus & Pituitary: Intimate Relationship

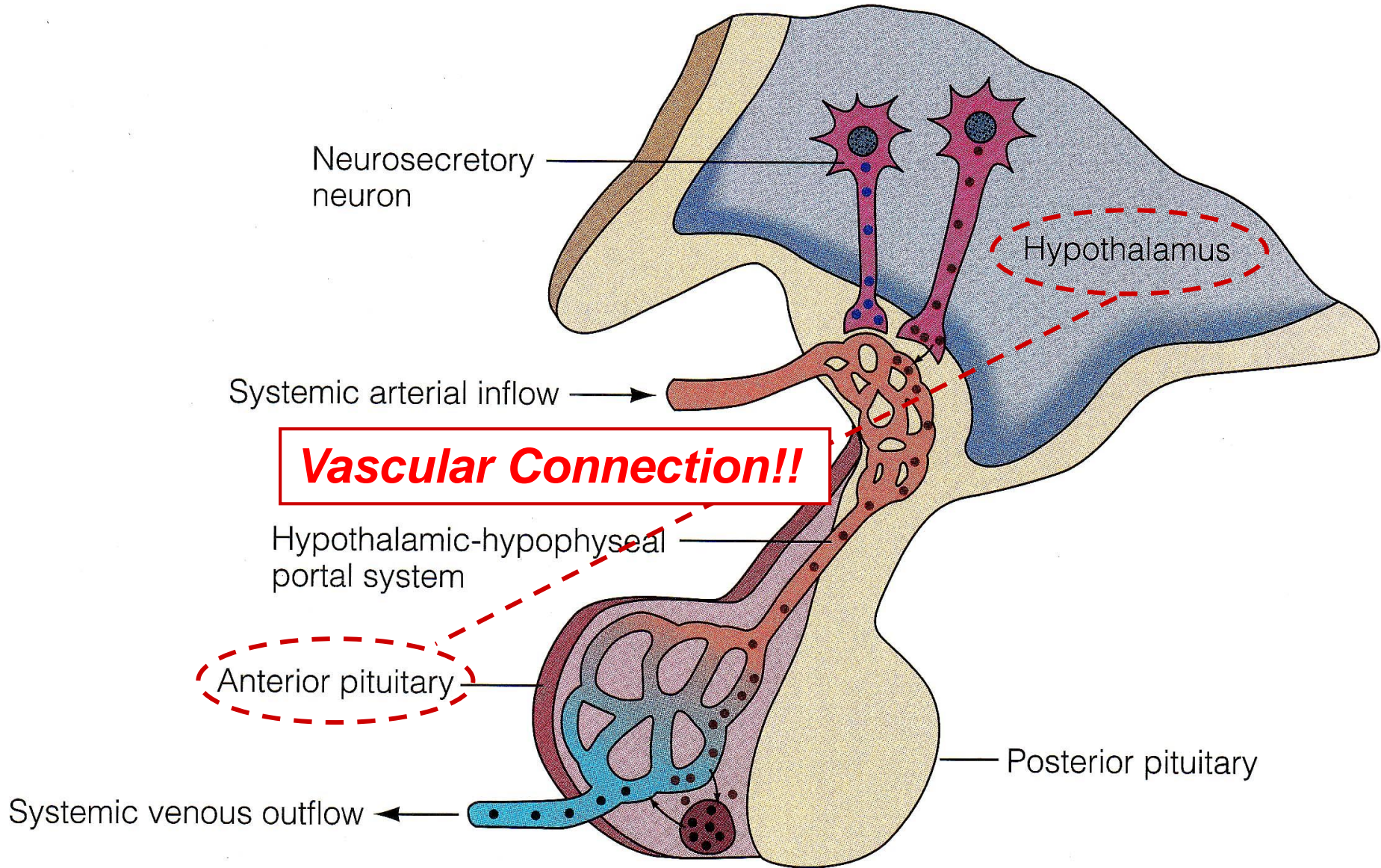


Good Things Come in Small Packages!



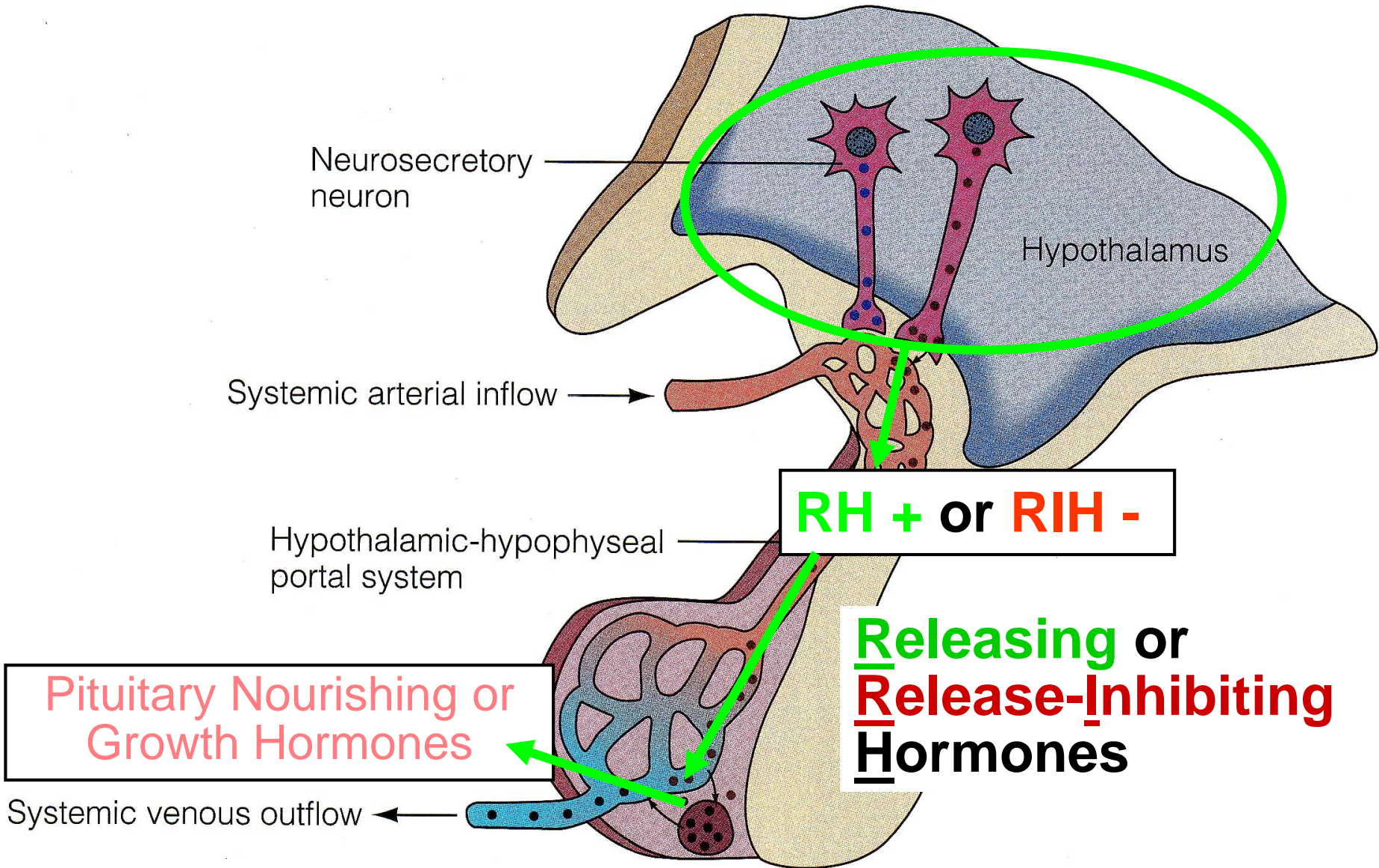


Hypothalamus-Anterior Pituitary Vascular Connection!



• = Hypophysiotropic hormones

• = Anterior pituitary hormone

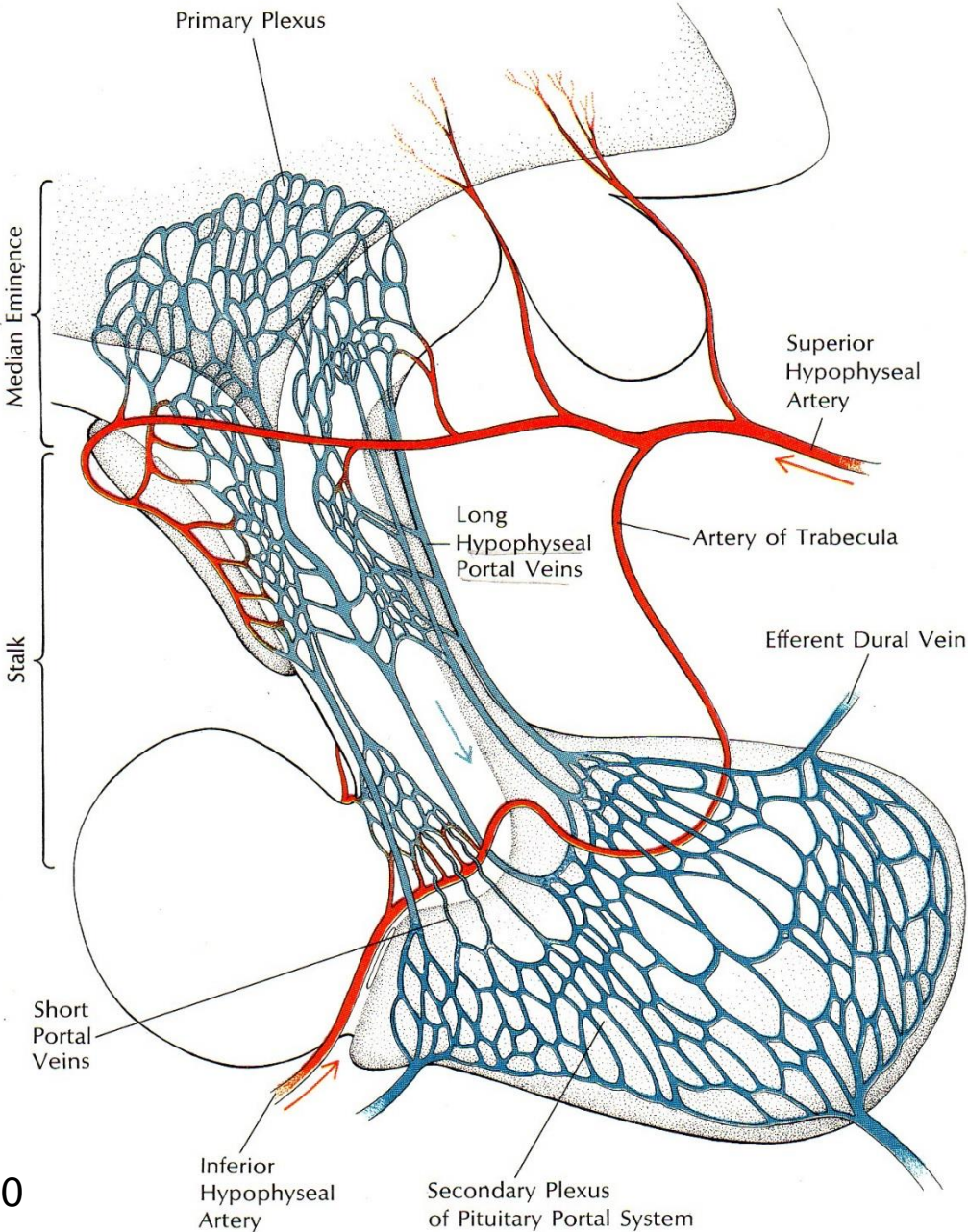


• • = Hypophysiotropic hormones

• = Anterior pituitary hormone

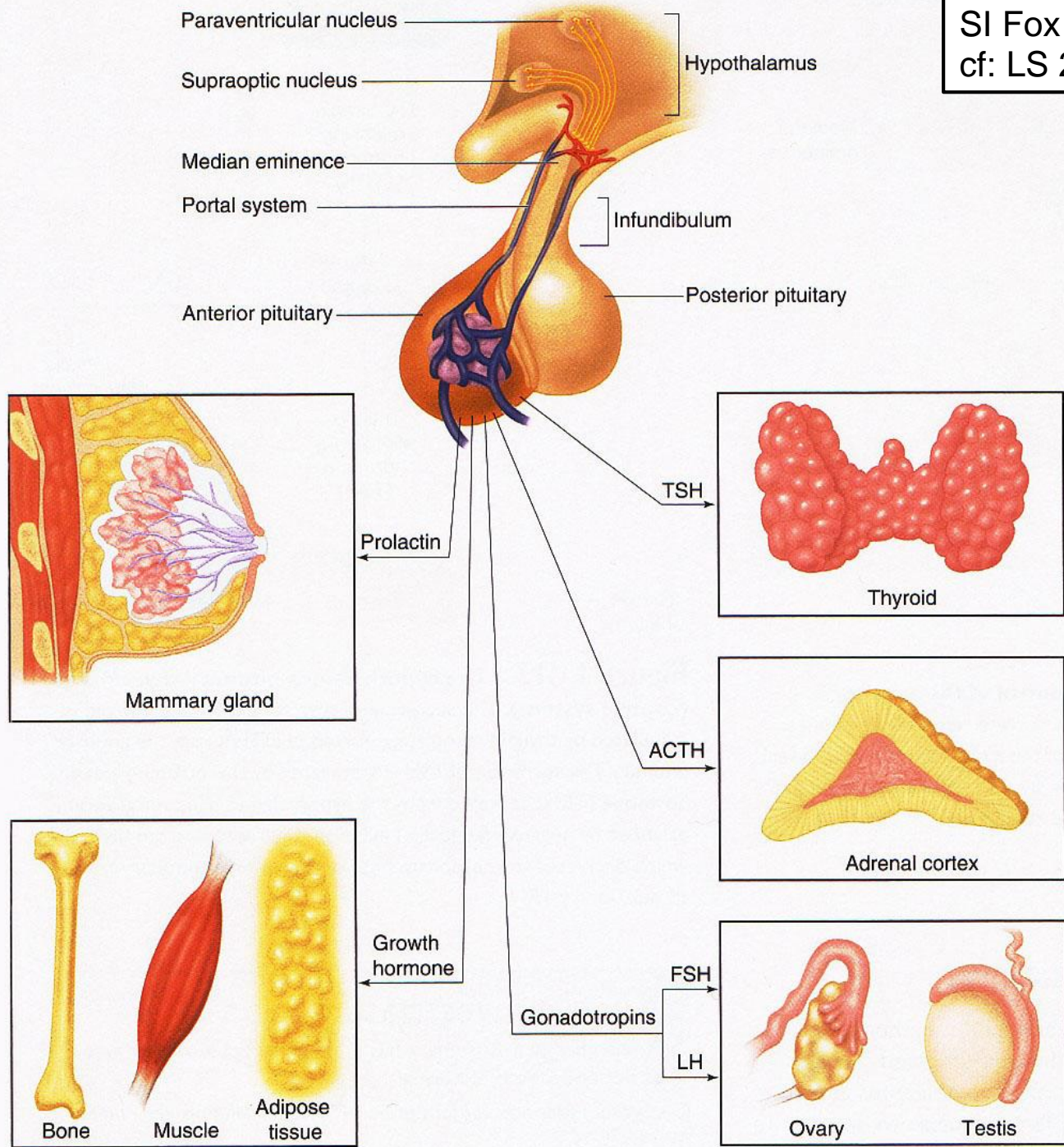
Hypophysis ≡ Pituitary

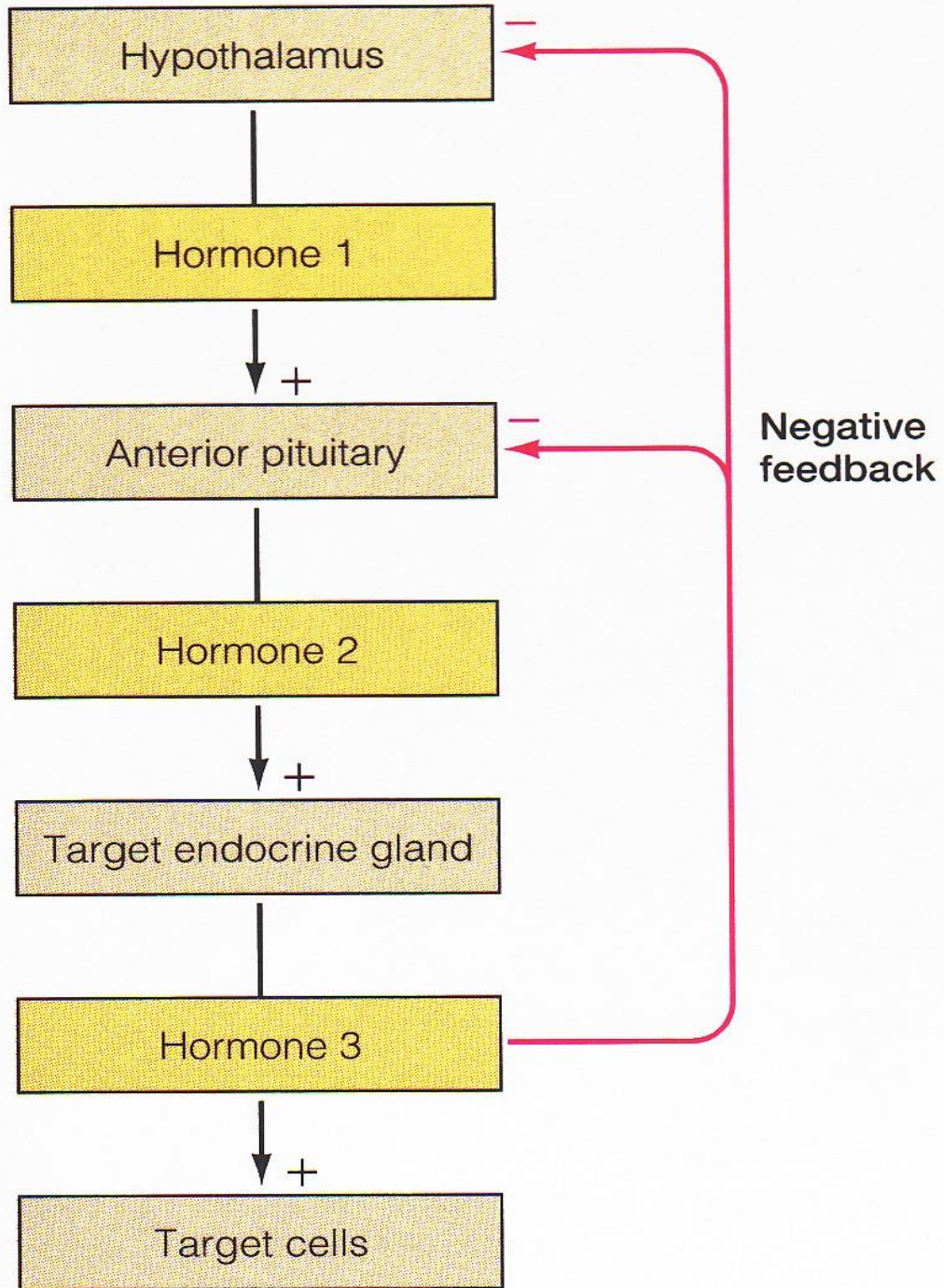
Capillary-Venule-Capillary Intimate Circulation





Krieger & Hughes 1980



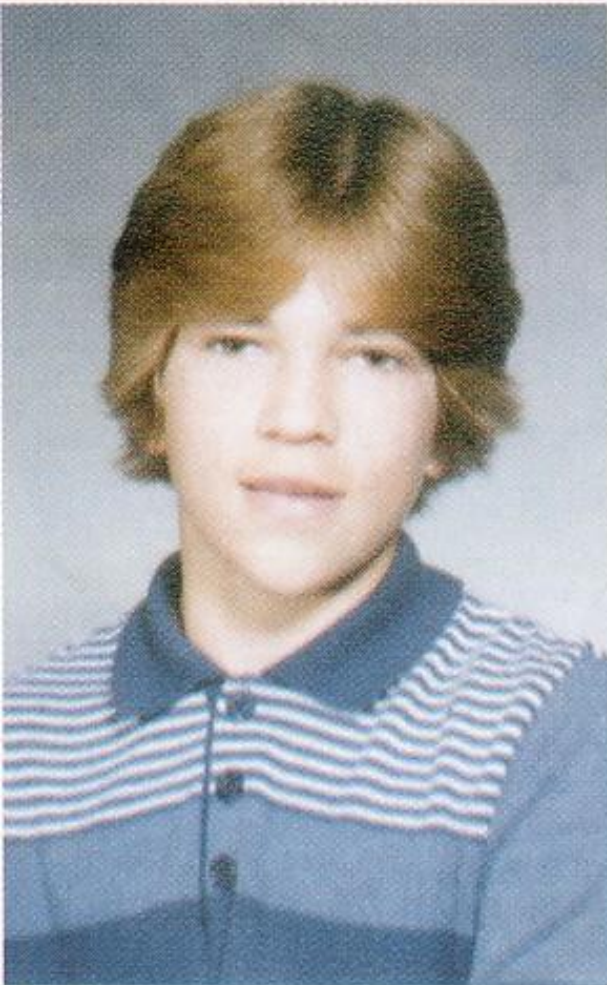




LS 2006, cf: LS 2012
fig 17-10

Progression & Development of Acromegaly

Age 13

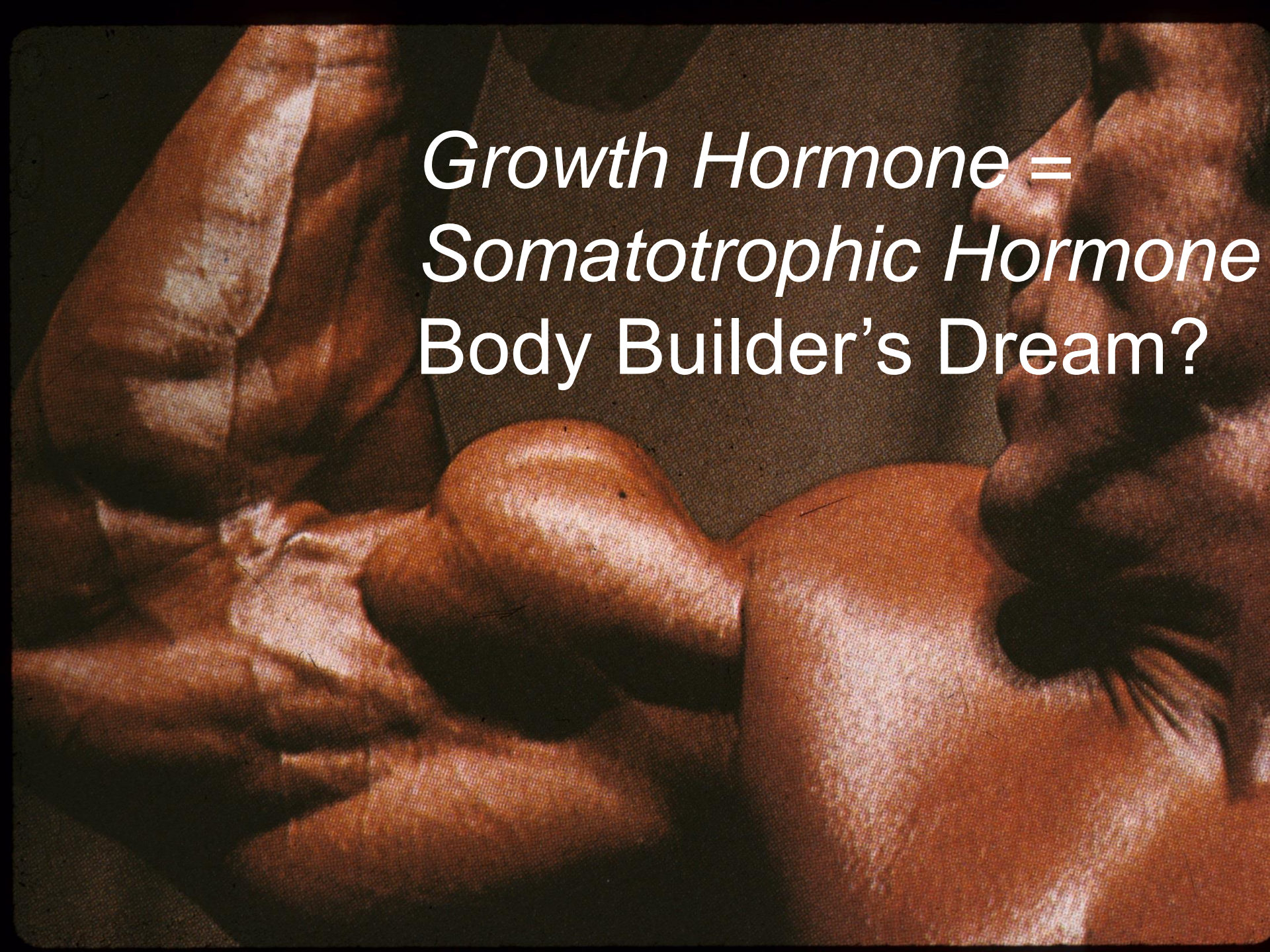


Age 21



Age 35





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

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

↑ Amino Acid uptake & Protein synthesis

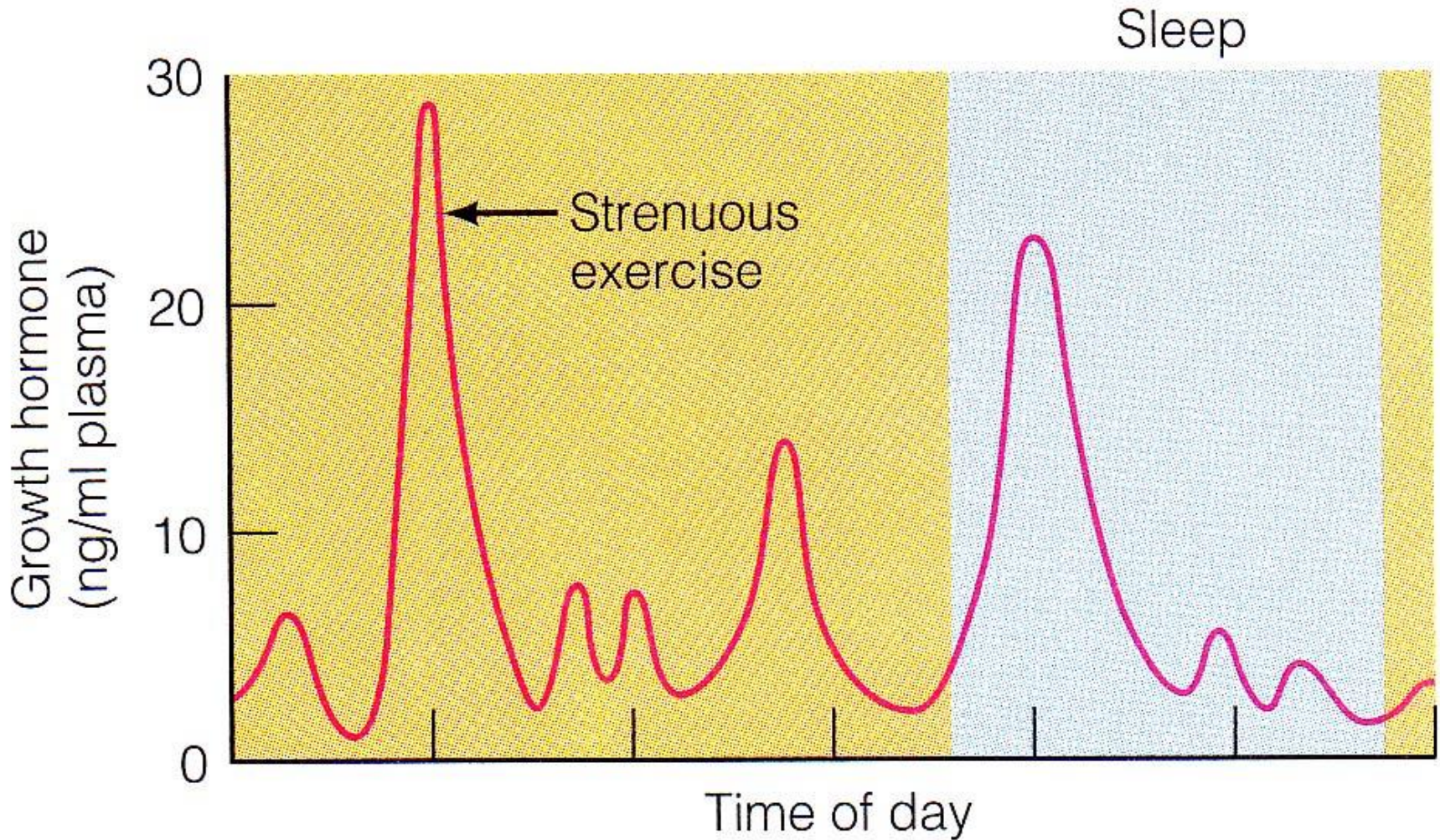
↑ Lipolysis & Fatty Acid mobilization

↓ Glucose uptake
(skeletal muscle & adipocytes)

↑ Glucose production
(liver glycogenolysis)

↑ Insulin secretion

Increase GH naturally with exercise & sleep!!



ng/ml = nanograms per milliliter