SHINE CONFERENCE

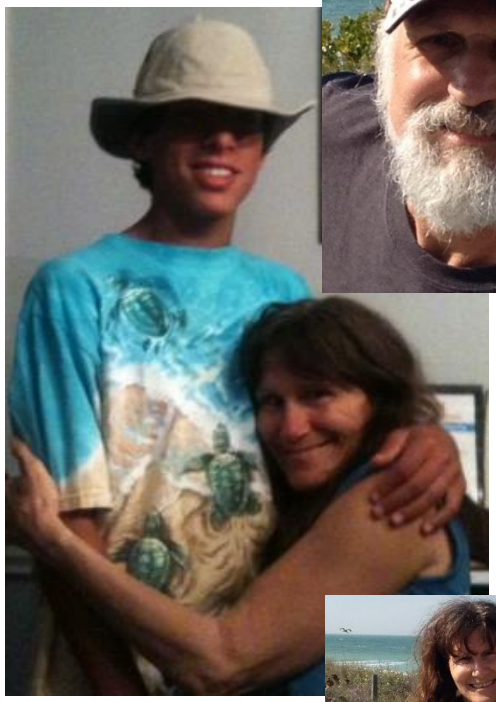
with Dr. Ritamarie Loscalzo (MS, DC, CCN, DACBN)

SCIENTIFIC AND HOLISTIC INVESTIGATION OF NUTRITIONAL ENDOCRINOLOGY

Why You Are HERE, NOW

- ✓Passionate
- ✓Dedicated
- ✓Compassionate
- ✓Determined
- ✓Unselfish
- ✓Unstoppable!

My Big WHY



What Do You Need to Succeed?

- ✓ Passion – a Big WHY
- ✓ Knowledge
- ✓ A System
- ✓ A Support Network
- ✓ Tools and Resources
- ✓ Superior Interview Skills – Knowing What to Ask
- ✓ Excellent Listening Skills
- ✓ Love and Understanding

- ✓ "Detective Skills" – Functional Assessment Tools
  - ➢ Labs
  - ➢ History Taking
  - ➢ Physical Evaluations
  - ➢ Home Tests
- ✓ A Complete Holistic Toolbox
- ✓ Determination to Succeed
- ✓ Comfort with Computer/Internet

Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

DAY 1

SHINE CONFERENCE

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SCIENTIFIC AND HOLISTIC INVESTIGATION OF NUTRITIONAL ENDOCRINOLOGY

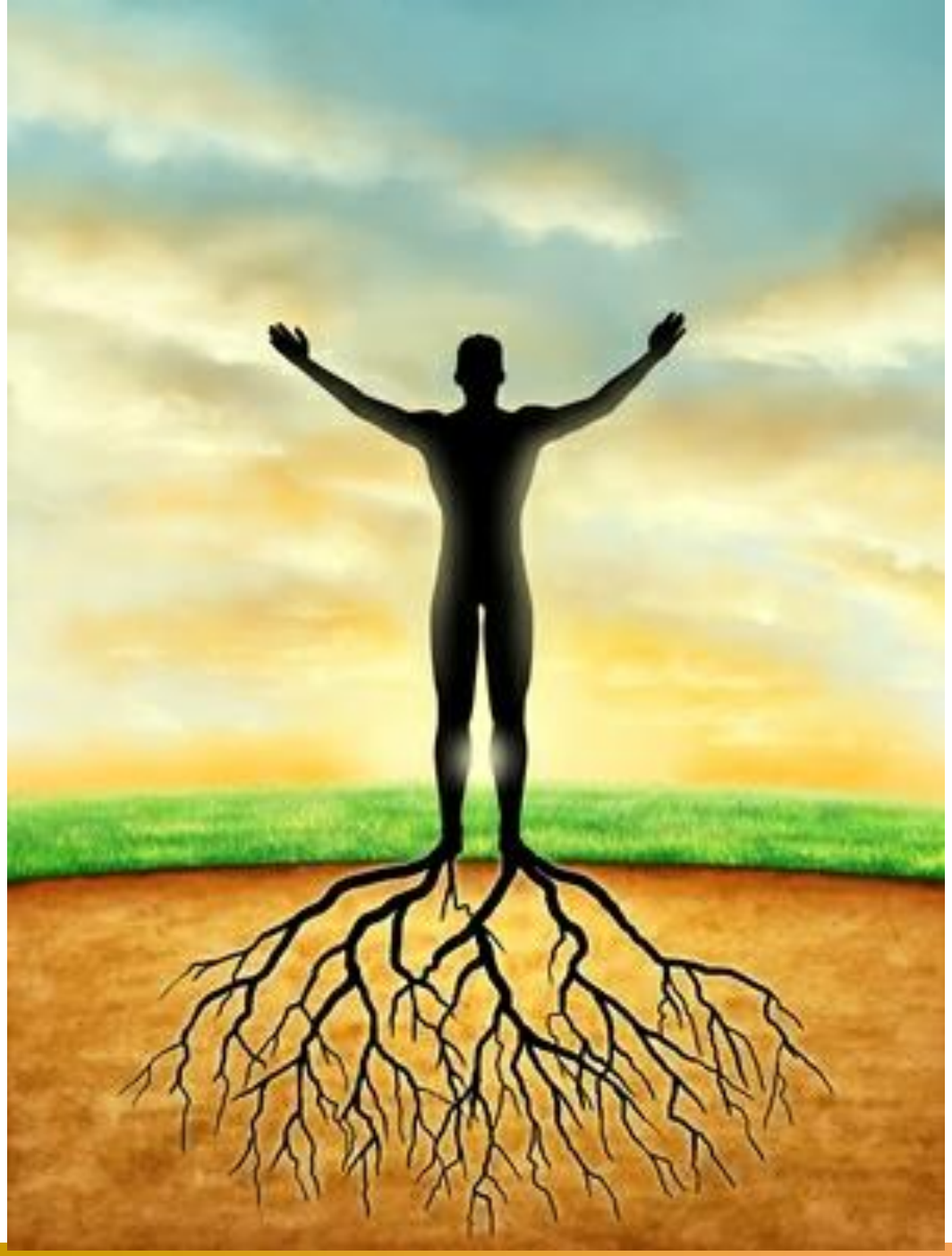
Nutritional Endocrinology Defined

- ✓Relationship between **nutrition and endocrine imbalances**
- ✓Impact of **nutrient deficiencies or excesses on** hormones
- ✓The **relationship between food and hormones**

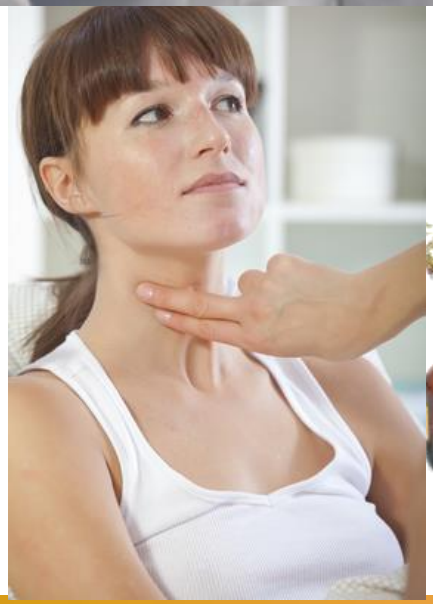
Endocrinology is not a subspecialty.

It is the Master Control Center

-- The key to unraveling the profound impact of hormone imbalance on EVERY system of the body!



Functional Medicine/Nutrition



history

genetics

energy

touch

labs

thoughts

emotions

environment

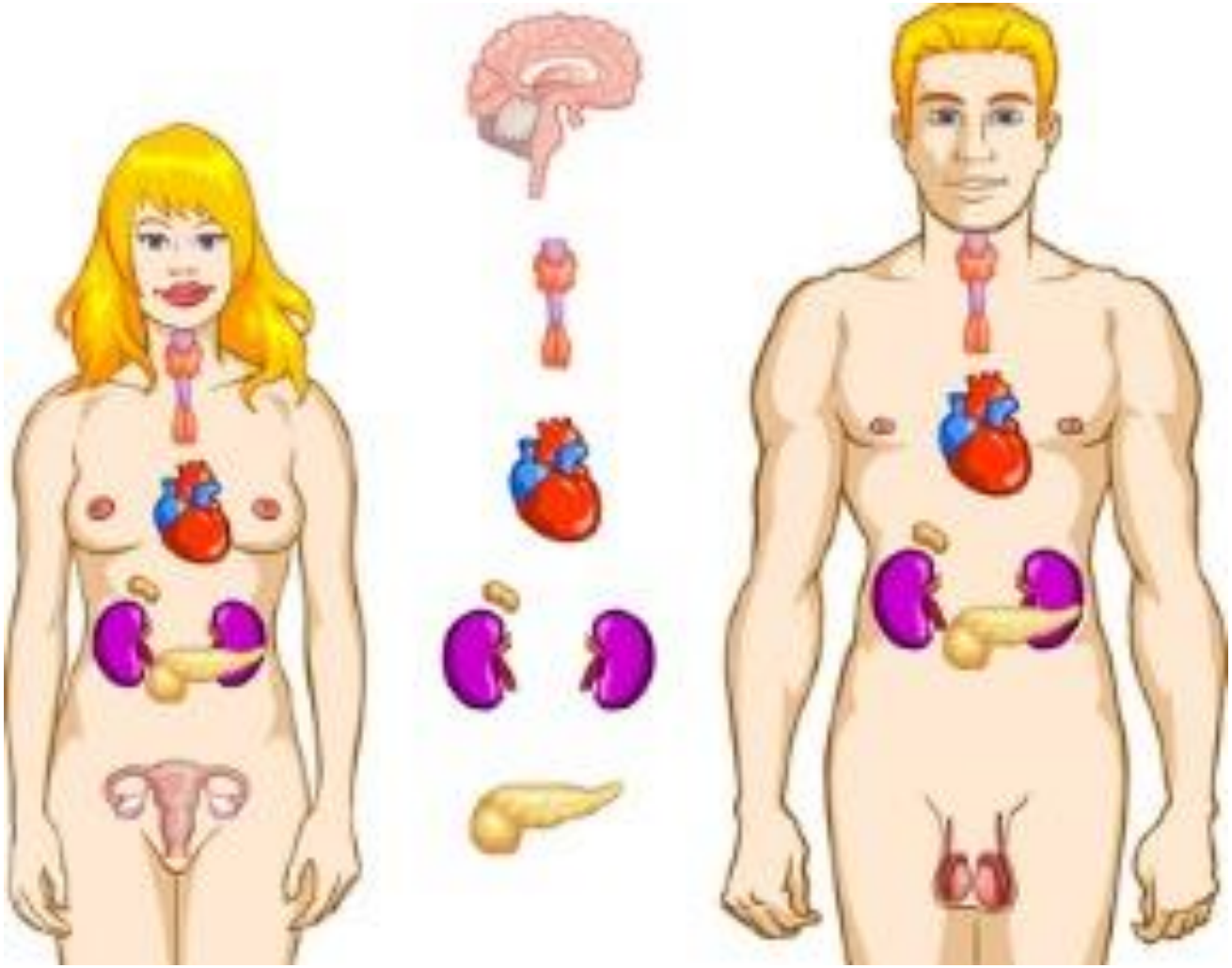
relationships

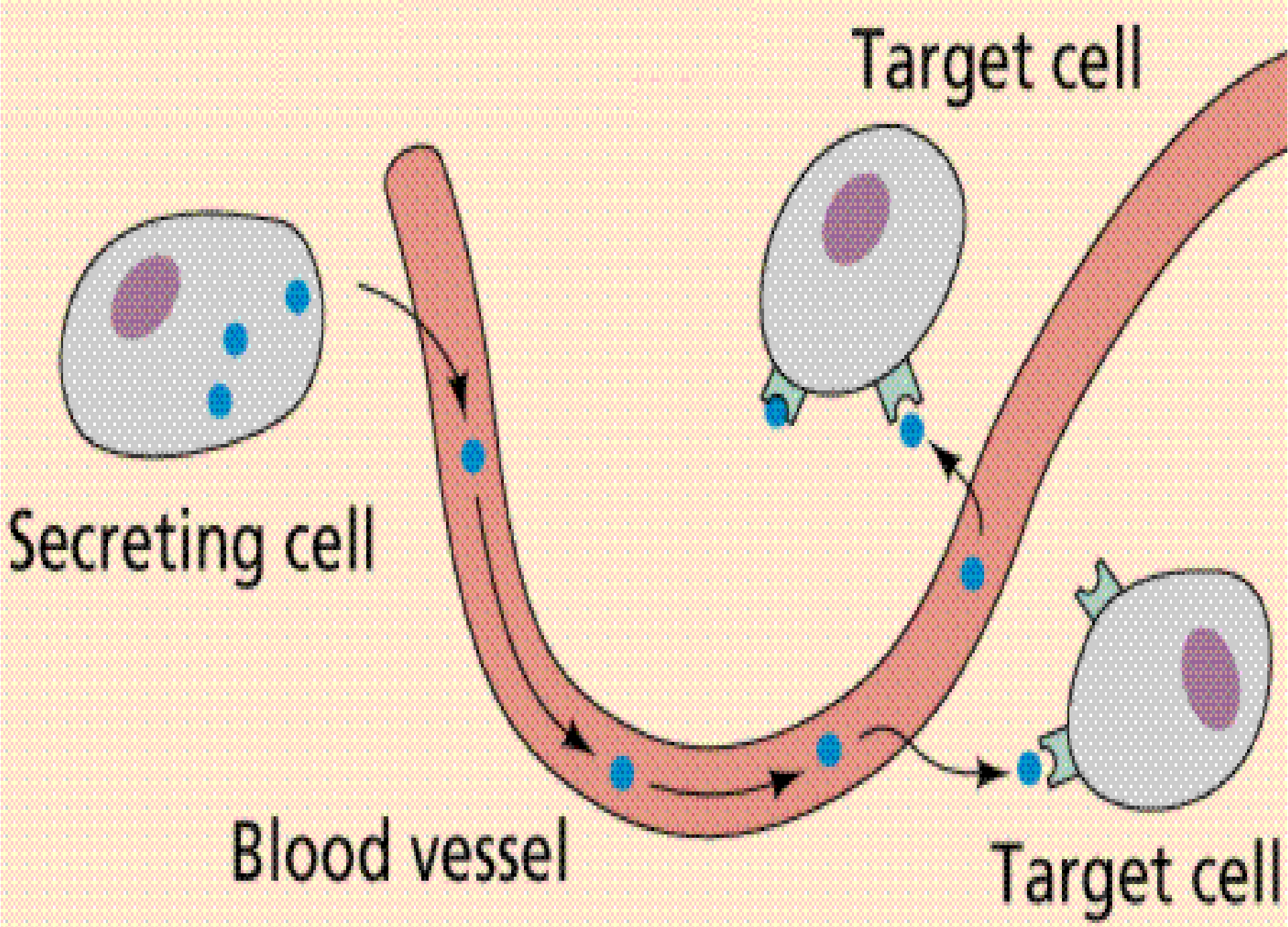
nutrition

What Exactly Are Hormones?

- ✓ Messengers of life
- ✓ **Chemicals secreted by glands:** usually directly into the blood stream
- ✓ Control <u>physiological and behavioral activities</u> such as the processes of digestion, metabolism, growth, reproduction, and mood control
- ✓ **Receptors** are located on a cell membrane or intracellularly within the cytoplasm of their target cell

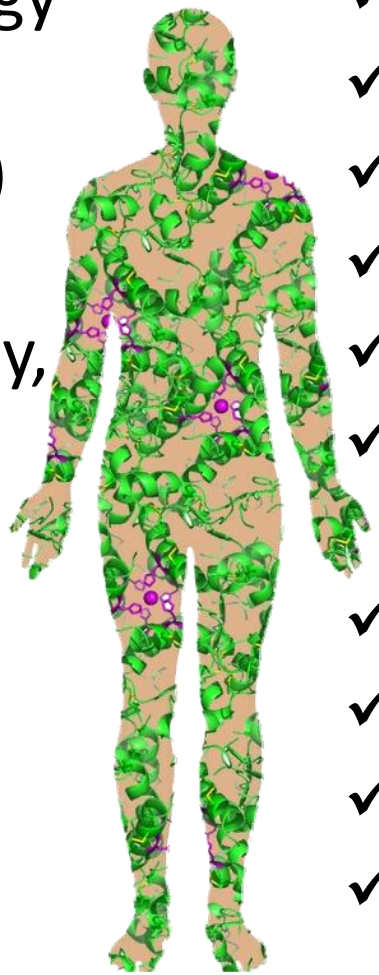
The Endocrine System





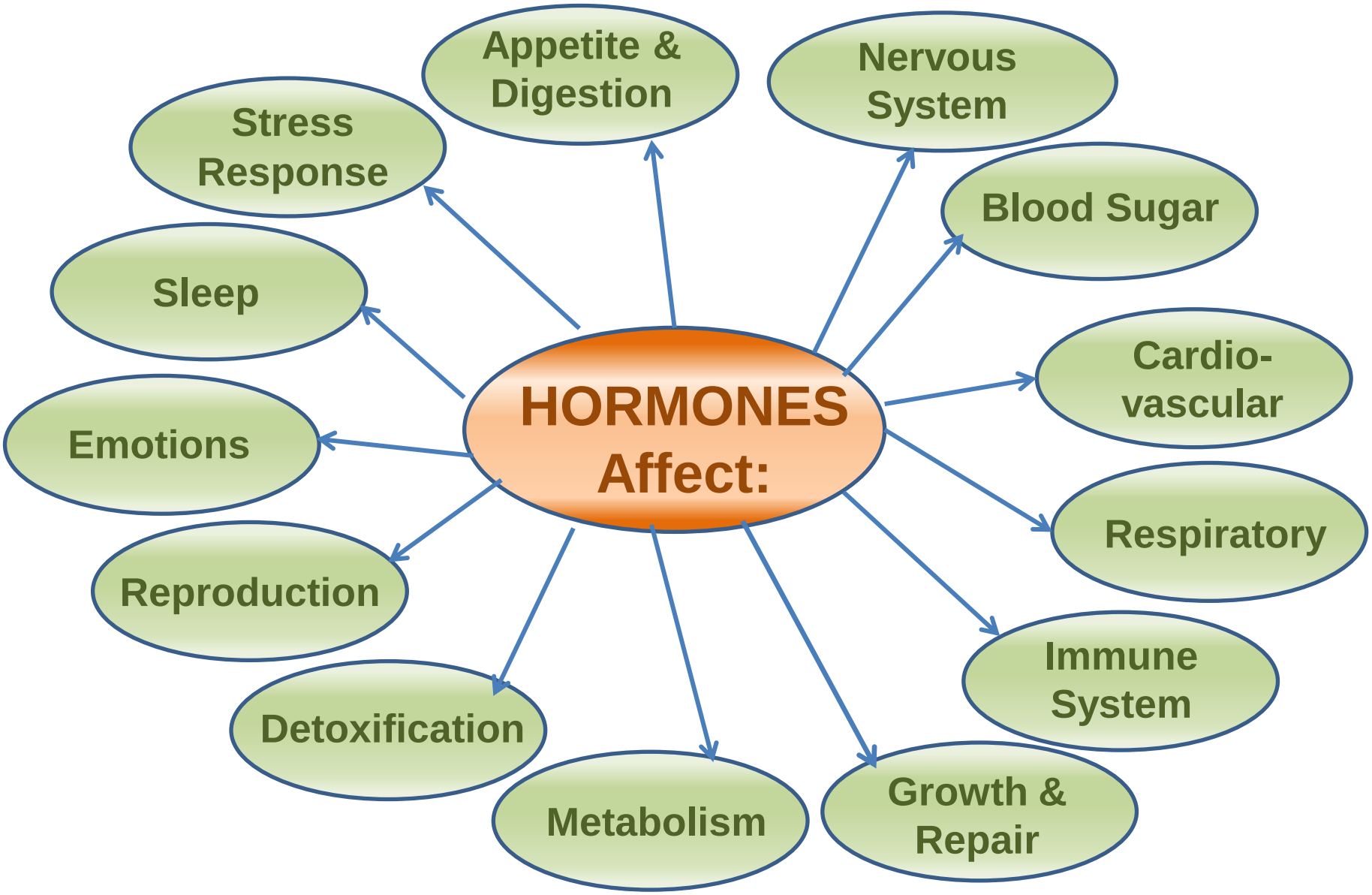
Connection Between Hormones And Persistent Symptoms

- ✓ Fatigue and lethargy
- ✓ Weight gain / weight loss (yo-yo)
- ✓ Insomnia
- ✓ Depression, anxiety, and mood swings
- ✓ Skin lesions
- ✓ Anorexia
- ✓ Cold intolerance
- ✓ Hair loss
- ✓ Headache



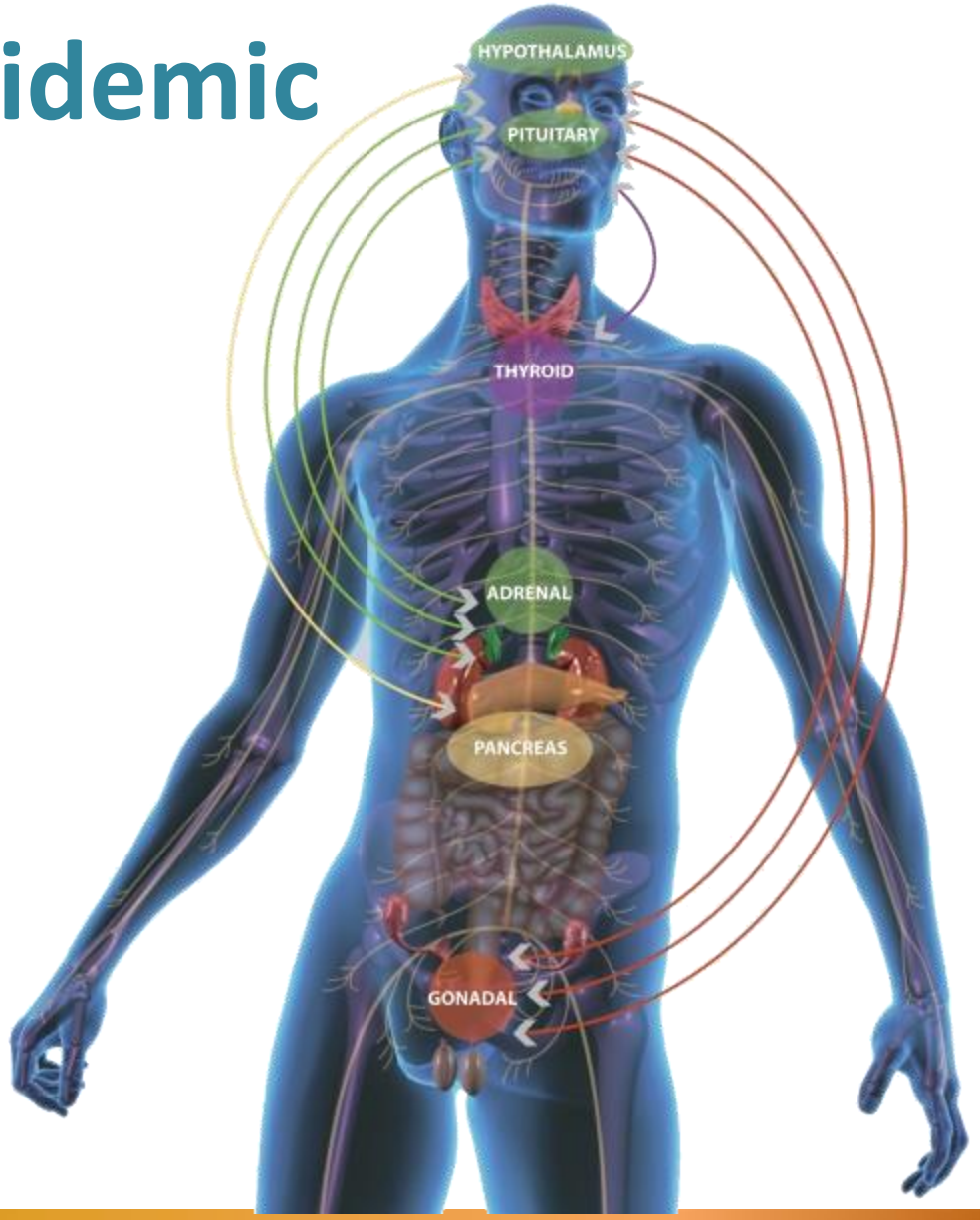
- ✓ Weakness
- ✓ Shortness of breath
- ✓ Brain fog
- ✓ Decreased libido
- ✓ insomnia
- ✓ Neuromuscular disturbances
- ✓ Impaired immune system
- ✓ High cholesterol
- ✓ Angina
- ✓ Cancer…

Hormonal Control of Function



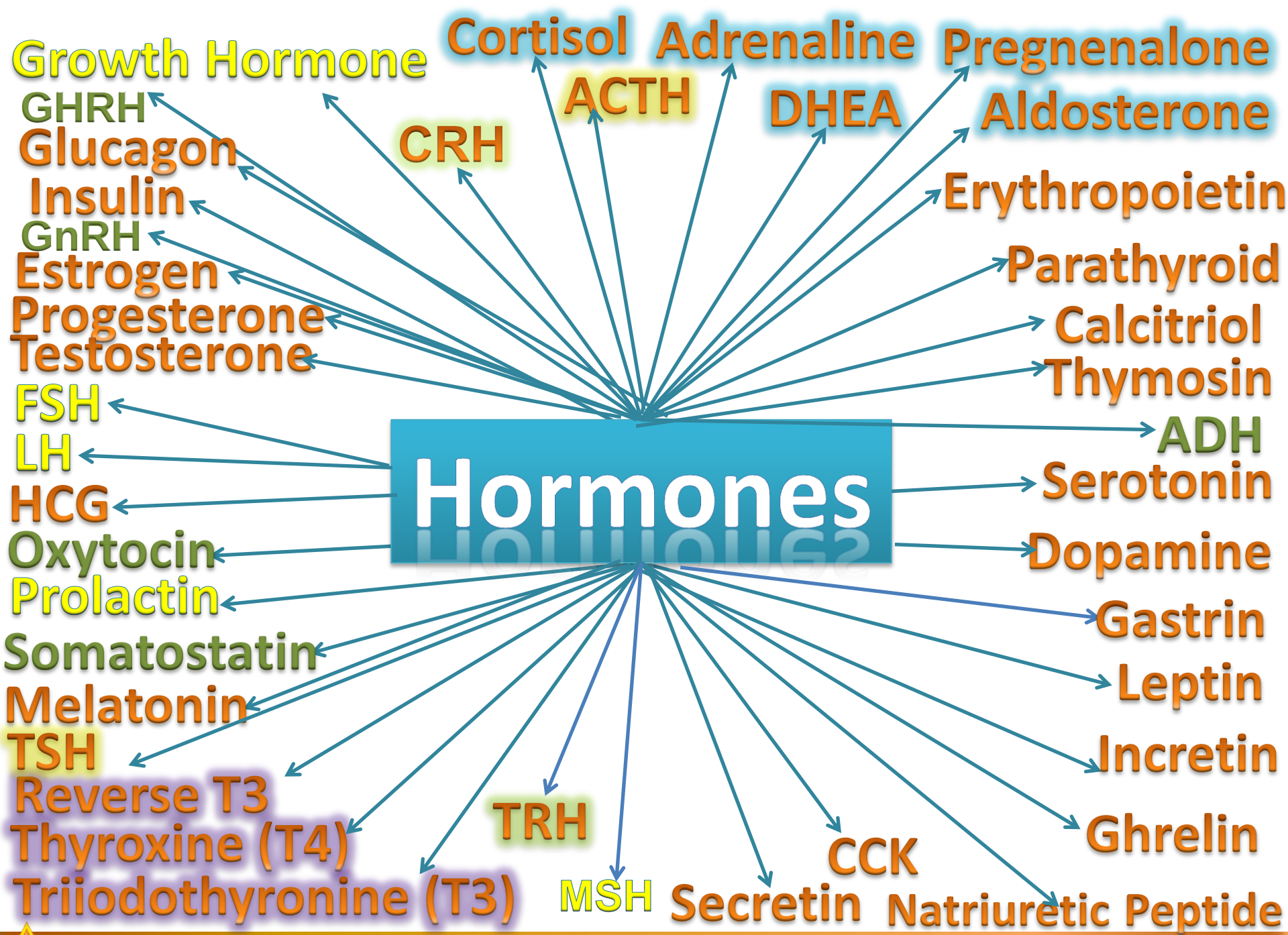
HPAT Axis Imbalance – The Modern Epidemic

- ✓**H**ypothalamus
- ✓**P**ituitary
- ✓**A**drenal
- ✓**T**hyroid

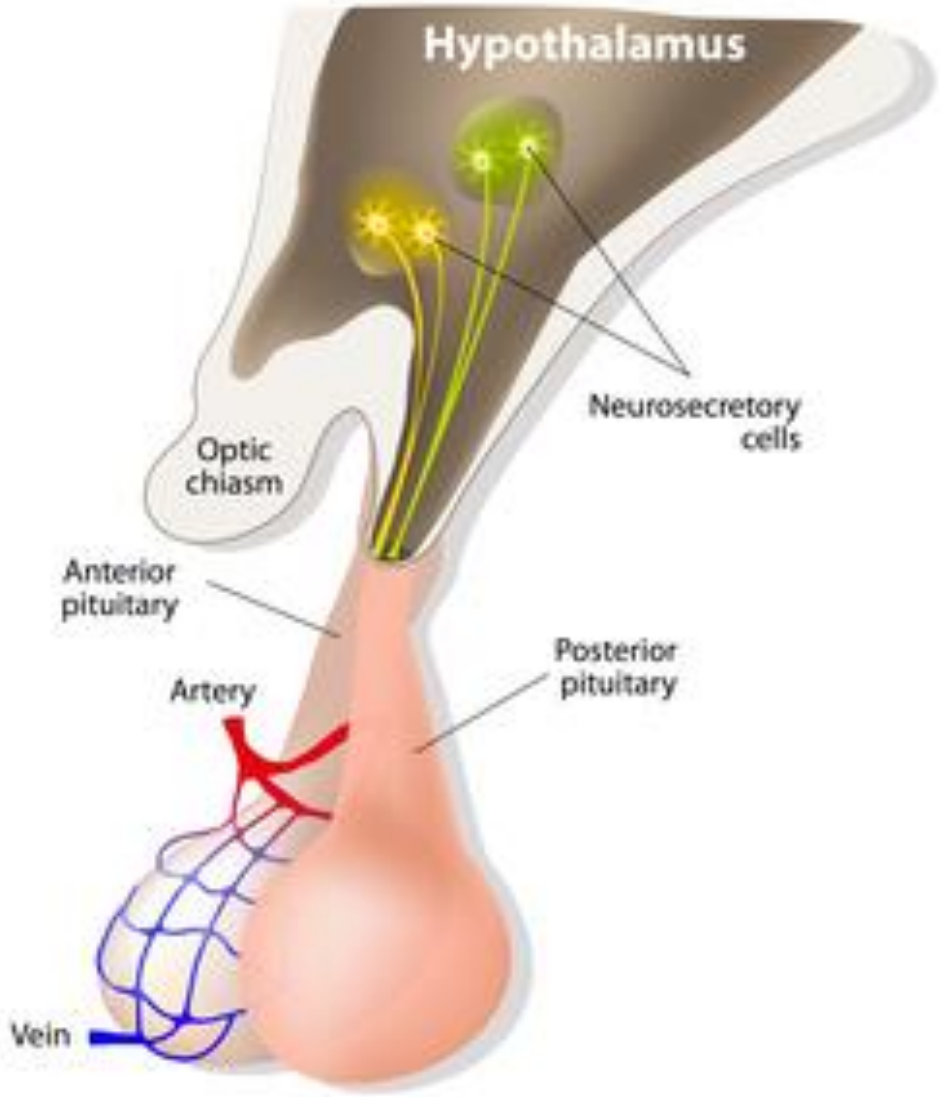


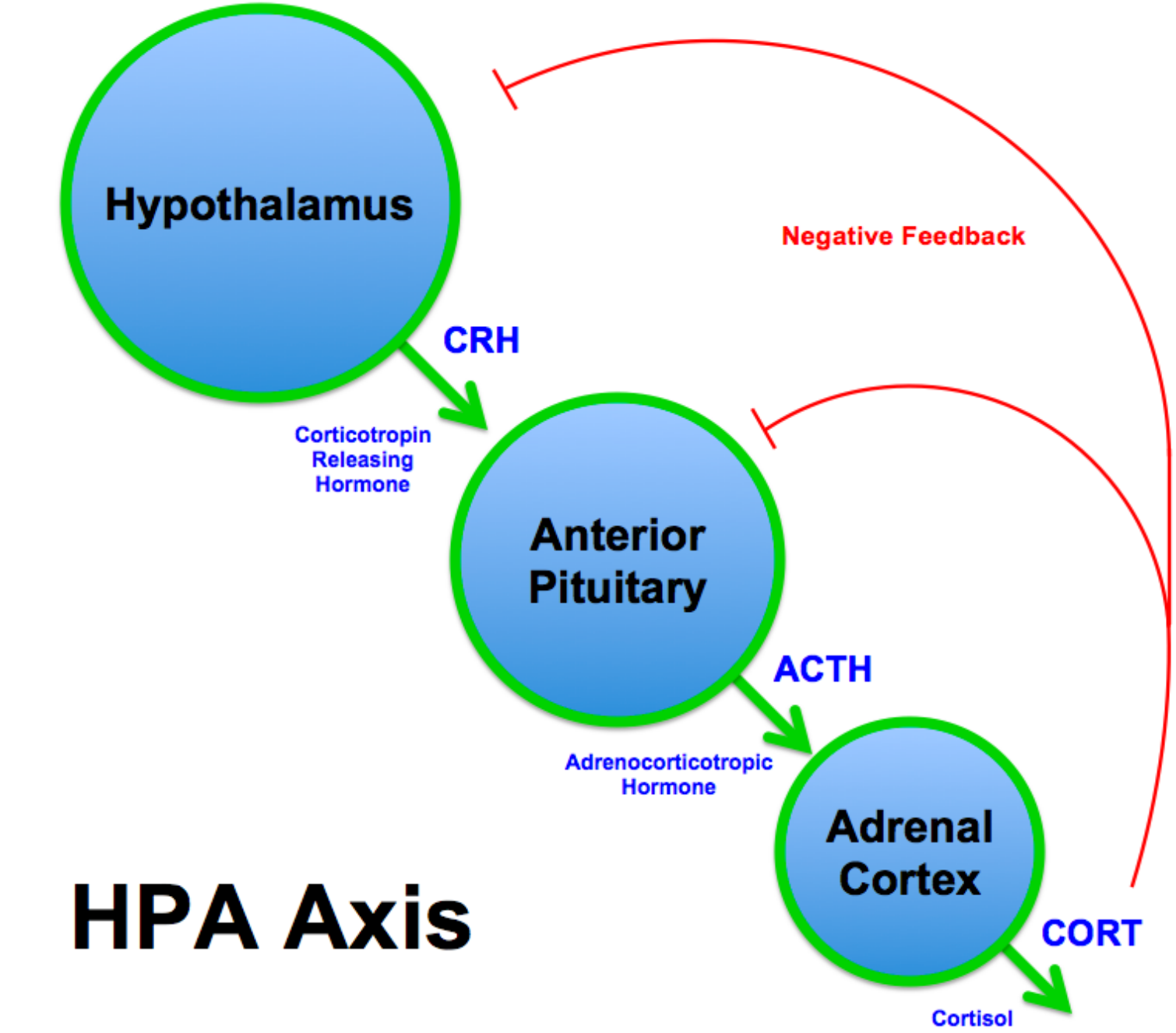
Stressors

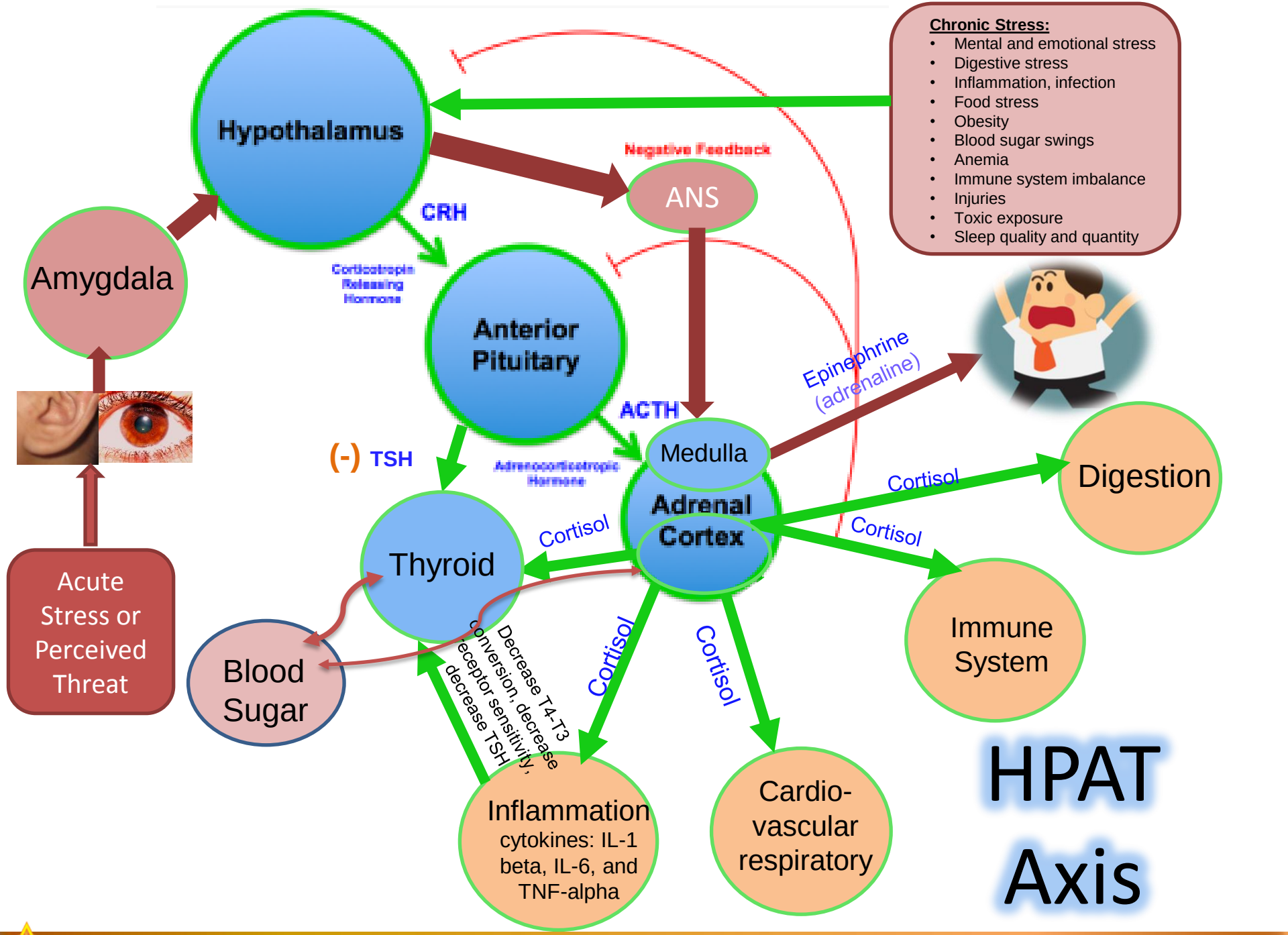
- ✓ Mental and emotional stress
- ✓ Digestive stress
- ✓ Inflammation
- ✓ Food stress
- ✓ Obesity
- ✓ Blood sugar swings
- ✓ Anemia
- ✓ Immune system imbalance
- ✓ Injuries
- ✓ Toxic exposure
- ✓ Sleep quality and quantity
- ✓ Eating too close to bedtime
- ✓ Infection



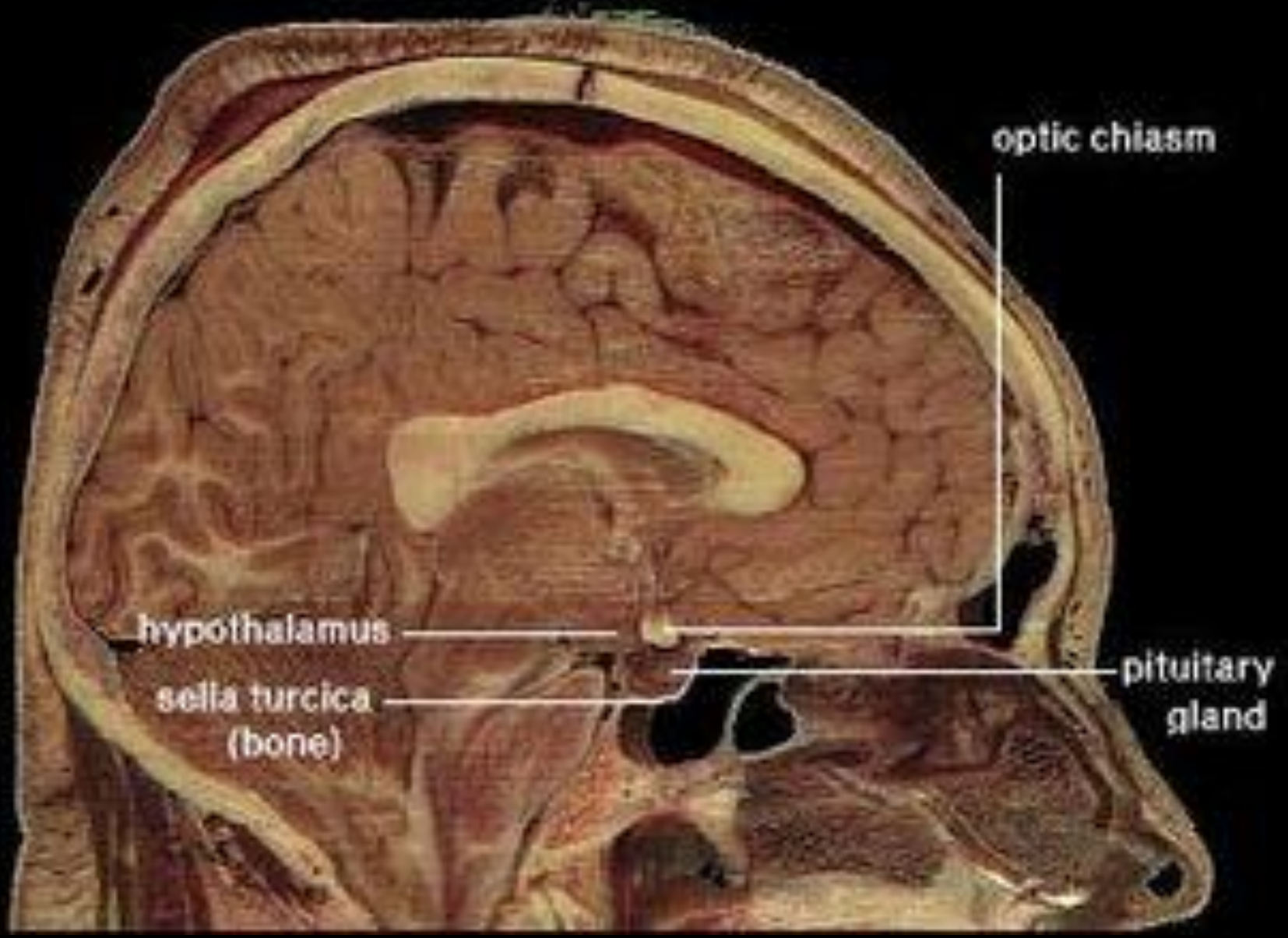
HYPOTHALAMUS AND PITUITARY GLAND

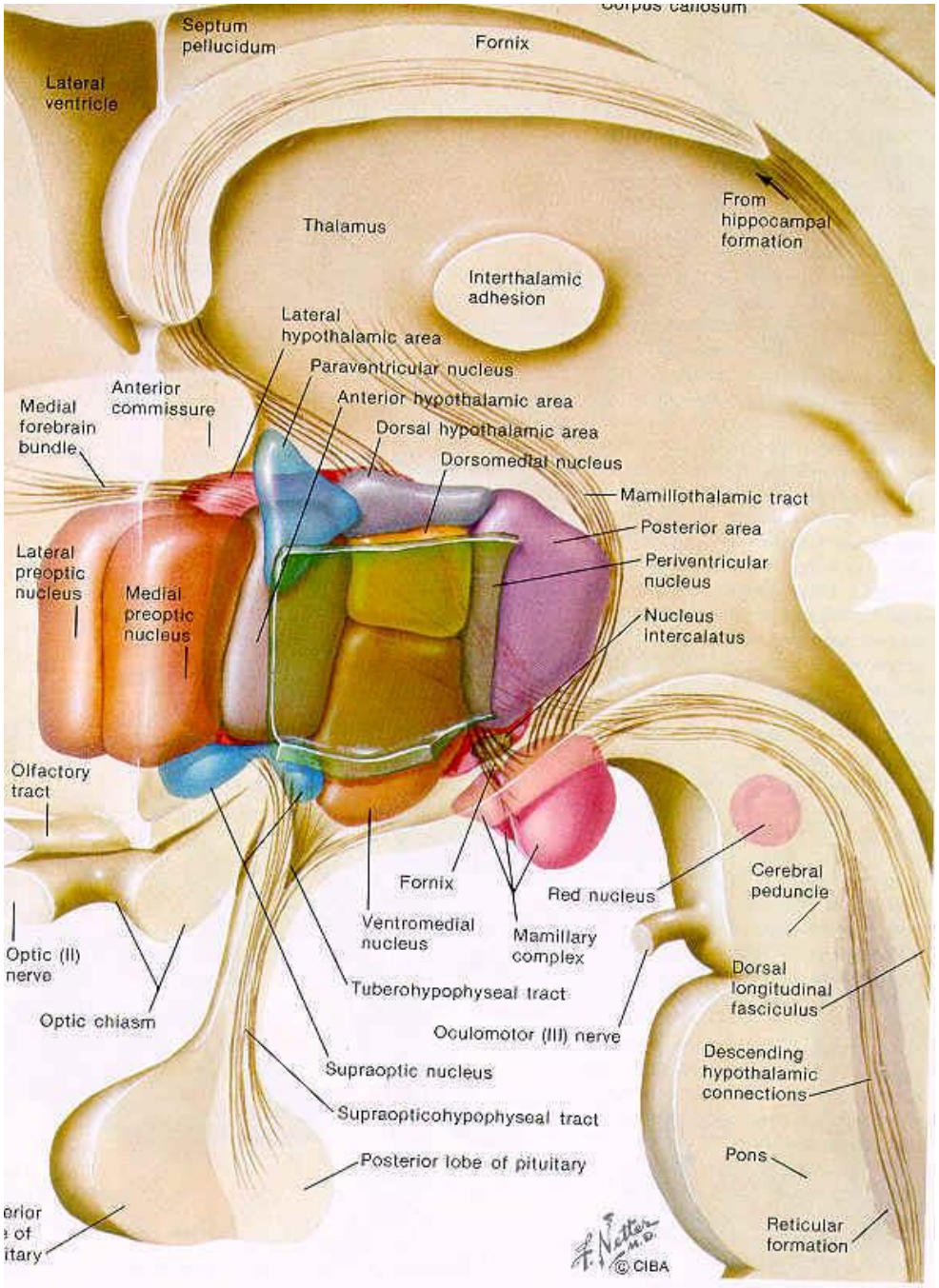


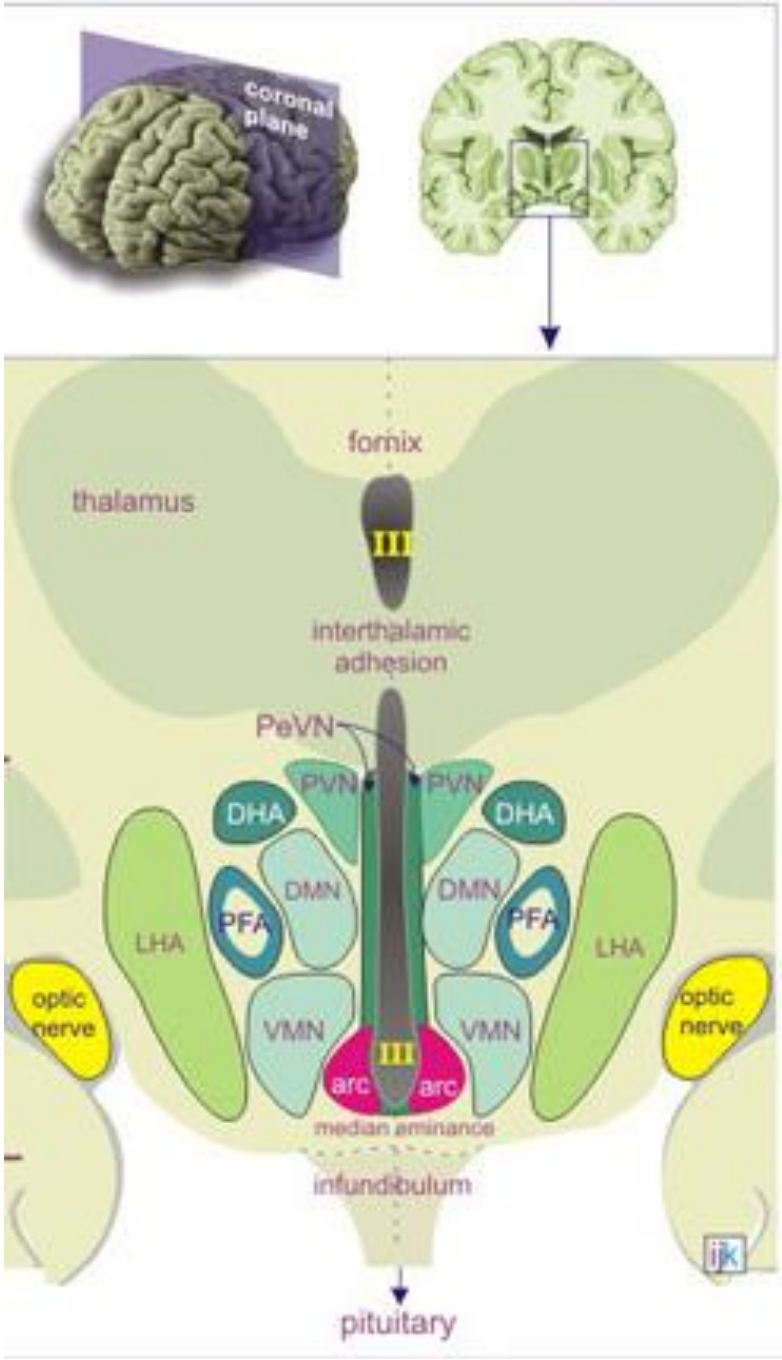




Hypothalamus




Septum pellucidum
Fornix
Lateral ventricle
Thalamus
From hippocampal formation
Interthalamic adhesion
Lateral hypothalamic area
Paraventricular nucleus
Anterior commissure
Anterior hypothalamic area
Medial forebrain bundle
Dorsal hypothalamic area
Dorsomedial nucleus
Mamillothalamic tract
Posterior area
Lateral preoptic nucleus
Periventricular nucleus
Medial preoptic nucleus
Nucleus intercalatus
Olfactory tract
Fornix
Red nucleus
Cerebral peduncle
Ventromedial nucleus
Mamillary complex
Optic (II) nerve
Tuberohypophyseal tract
Dorsal longitudinal fasciculus
Optic chiasm
Oculomotor (III) nerve
Supraoptic nucleus
Descending hypothalamic connections
Supraopticohypophyseal tract
Posterior lobe of pituitary
Pons
Reticular formation
© CIBA


coronal plane
fornix
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III
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optic nerve
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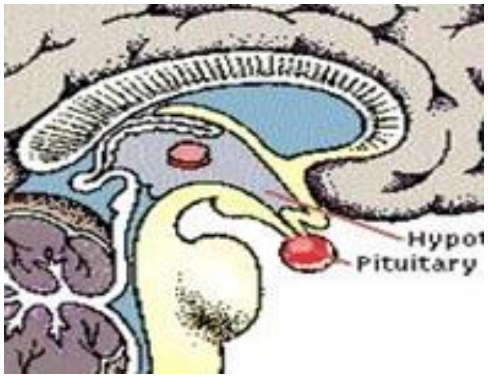
infundibulum
pituitary

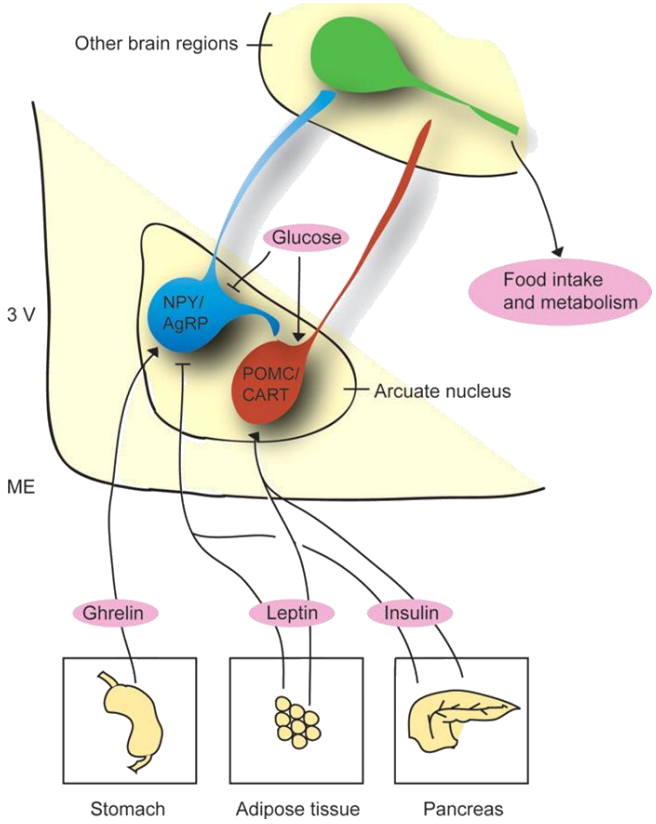
Hormones of the Hypothalamus



- ✓ **Thyrotropin-releasing hormone (TRH)**
- ✓ **Corticotropin-releasing hormone (CRH)**
- ✓ Gonadotropin-releasing hormone **(GnRH)**
- ✓ Growth hormone-releasing hormone **(GHRH)**
- ✓ Somatostatin: inhibits growth hormone **(GHIH)**
- ✓ Oxytocin: Uterine contraction, milk letdown **(OT)**
- ✓ Anti-diuretic Hormone: increases water retention **(ADH)**

The Hypothalamus Controls:

- ✓ Temperature
- ✓ Hunger
- ✓ Glucose and insulin levels
- ✓ Aspects of parenting and attachment behaviors
- ✓ Thirst
- ✓ Moods



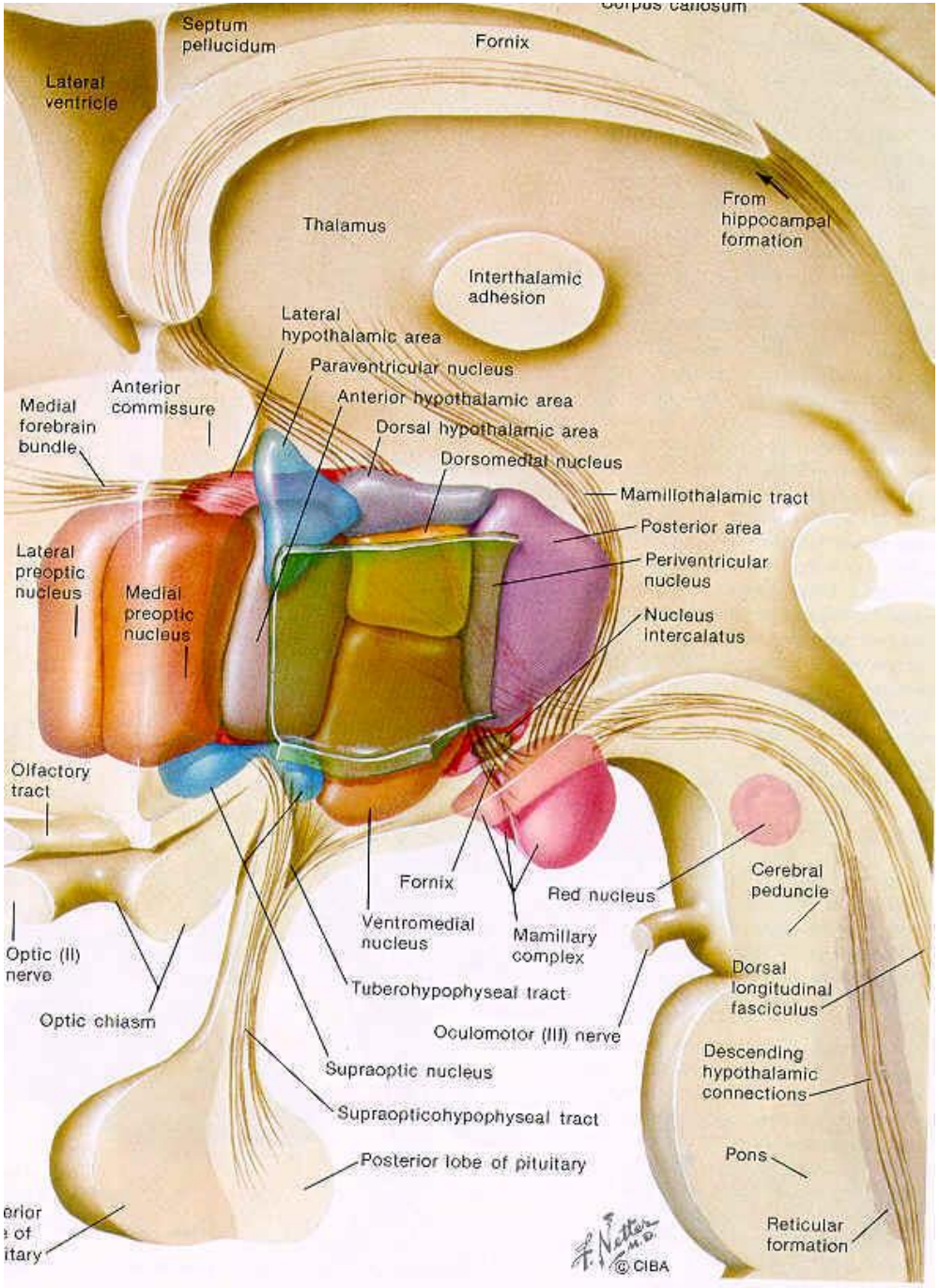
- ✓ Energy and fatigue
- ✓ Sleep
- ✓ Circadian rhythms
- ✓ Blood pressure
- ✓ Heart rate
- ✓ Growth and repair
- ✓ Gut motility
- ✓ Sex drive

Hypothalamus Hormone Details

Secreted hormone	Abbreviation	Produced by	Effect
Thyrotropin-releasing hormone	TRH	Parvocellular neurosecretory cells of the paraventricular nucleus	Stimulate thyroid-stimulating hormone (TSH) release from anterior pituitary (primarily)
(Prolactin-releasing hormone)	PRH	Parvocellular neurosecretory cells of the paraventricular nucleus	Stimulate prolactin release from anterior pituitary
Corticotropin-releasing hormone	CRH	Parvocellular neurosecretory cells of the paraventricular nucleus	Stimulate adrenocorticotropic hormone (ACTH) release from anterior pituitary
Dopamine (Prolactin-inhibiting hormone)	DA or PIH	Dopamine neurons of the arcuate nucleus	Inhibit prolactin release from anterior pituitary
Growth hormone-releasing hormone	GHRH	Neuroendocrine neurons of the arcuate nucleus	Stimulate growth hormone (GH) release from anterior pituitary
Gonadotropin-releasing hormone	GnRH	Neuroendocrine cells of the preoptic area	• Stimulate follicle-stimulating hormone (FSH) release from anterior pituitary • Stimulate luteinizing hormone (LH) release from anterior pituitary
Somatostatin (growth hormone-inhibiting hormone)	GHIH	Neuroendocrine cells of the periventricular nucleus	• Inhibit growth hormone (GH) release from anterior pituitary • Inhibit (moderately) thyroid-stimulating hormone (TSH) release from anterior pituitary

Additional Hypothalamus Jobs

Nucleus	Function/hormone released
Medial preoptic nucleus	• GnRH
Supraoptic nucleus	• Vasopressin (anti-diuretic hormone – ADH)
Paraventricular nucleus	• **Thyrotropin-releasing hormone (TRH)** • **Corticotropin-releasing hormone (CRH)** • Oxytocin • Somatostatin (growth hormone release inhibiting hormone – GIH)
Anterior hypothalamic nucleus	• Thermoregulation • Panting • Sweating • Thyrotropin (thyroid-stimulating hormone – TSH) inhibition
Suprachiasmatic nucleus	• Circadian rhythms
Lateral nucleus	• Thirst and hunger
Dorsomedial hypothalamic nucleus	• Blood pressure • Heart rate • GI stimulation
Ventromedial nucleus	• Satiety • Neuroendocrine control
Arcuate nucleus	• Growth hormone-releasing hormone (GHRH) • Appetite and glucose regulation (triggered by leptin, insulin, and glucose) • Dopamine
Lateral nucleus	• Thirst and hunger
Mammillary nuclei (part of mammillary bodies)	• Memory
Posterior nucleus	• Increase blood pressure • Pupillary dilation • Shivering • Vasopressin (ADH)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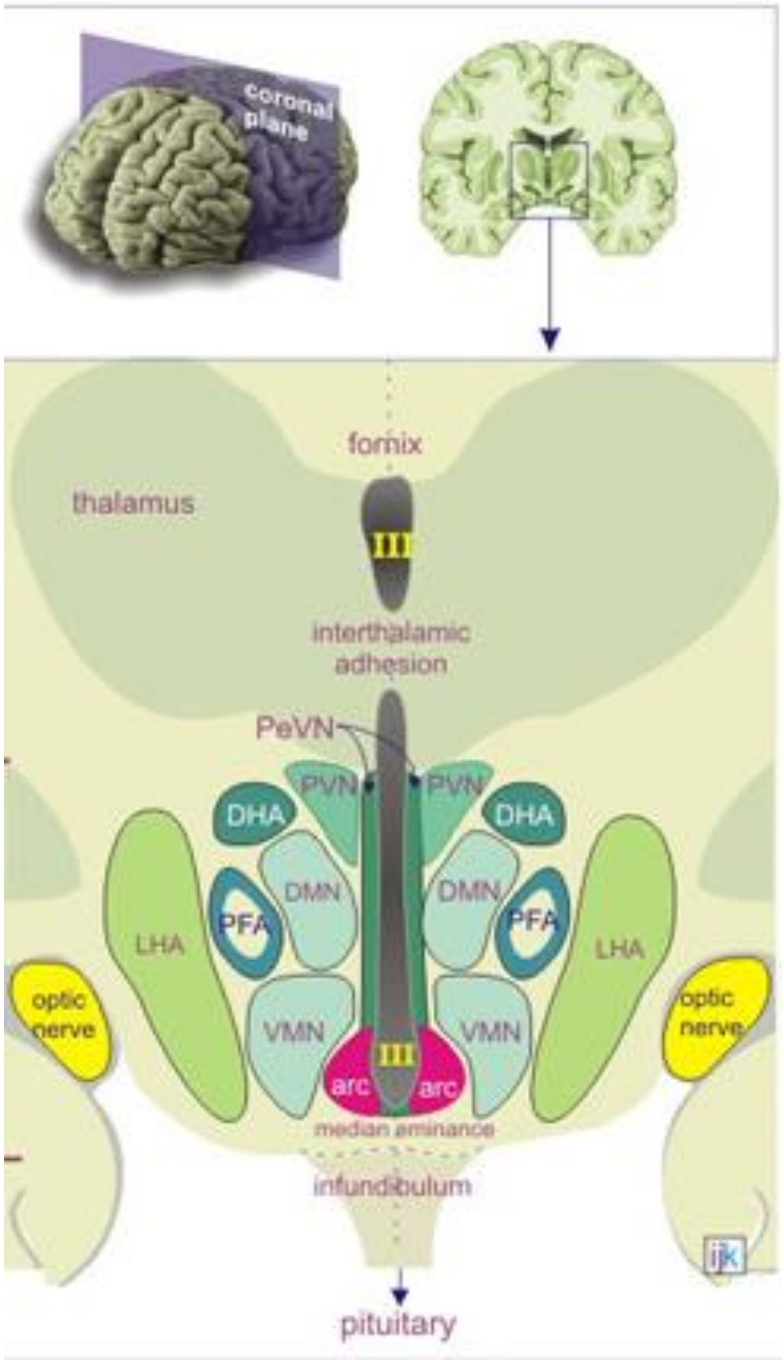
coronal plane
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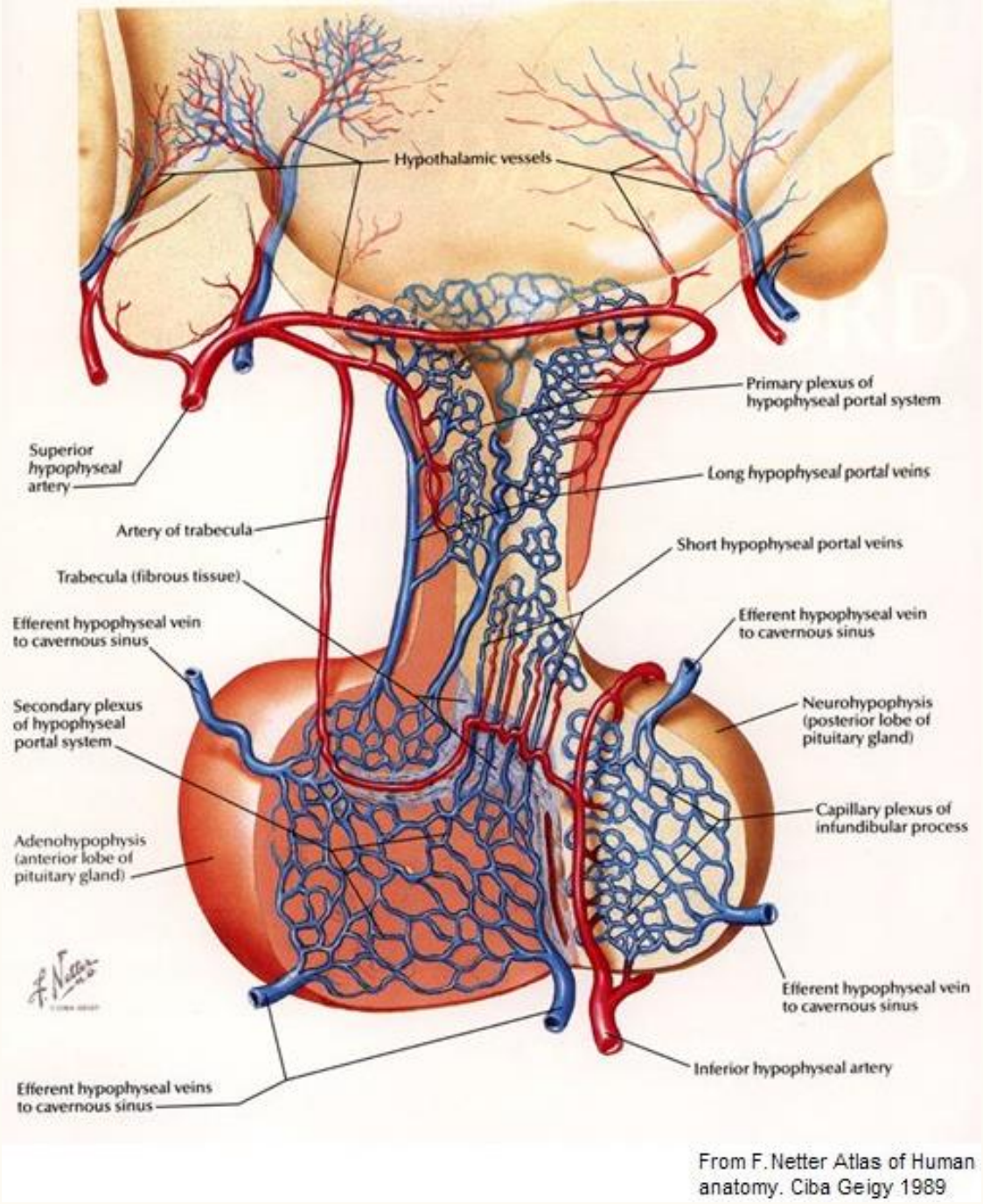
LHA
LHA
optic nerve
optic nerve
VMN
VMN
III
arc
arc
median eminance
infundibulum
pituitary

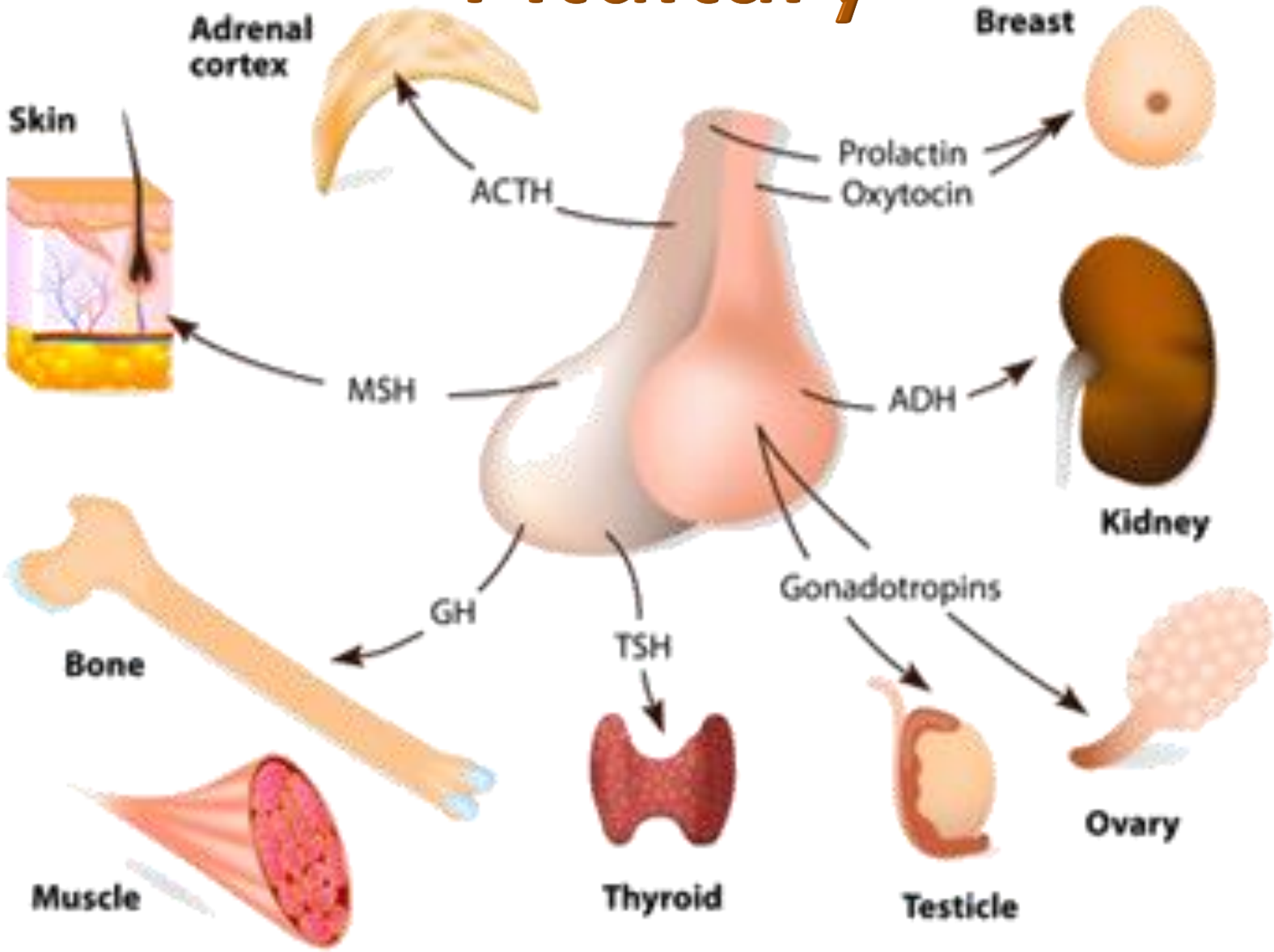


From F. Netter Atlas of Human anatomy. Ciba Geigy 1989

Things That Can Go Wrong With Hypothalamus (Uncommon)

- ✓ Damage due to malnutrition, including anorexia and bulimia
- ✓ Genetic disorders
- ✓ Radiation
- ✓ Surgery
- ✓ Head trauma
- ✓ Brain tumor
- ✓ Injury
- ✓ Infection

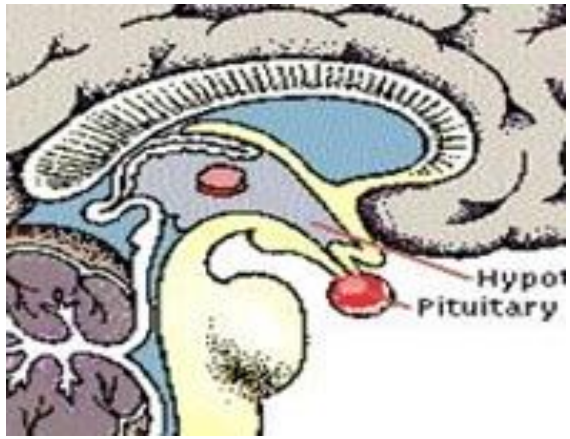
Pituitary



Pituitary Hormones

Anterior Lobe (Adenohypophysis)

- ✓ Thyroid Stimulating Hormone (TSH)
- ✓ Adrenocorticotropic Hormone (ACTH)
- ✓ Follicle-Stimulating Hormone **(FSH)**
- ✓ Luteinizing Hormone **(LH)**
- ✓ Prolactin **(PRL)**
- ✓ Growth Hormone **(GH)**
- ✓ Alpha Melanocyte-Stimulating Hormone **(α-MSH)**



Posterior Lobe (Neurohypophysis)**

- ✓ Anti-diuretic Hormone aka Vasopressin **(ADH)**
- ✓ Oxytocin **(OT)**

***Produced by hypothalamus, stored and secreted by posterior pituitary*

Pituitary Malfunctions

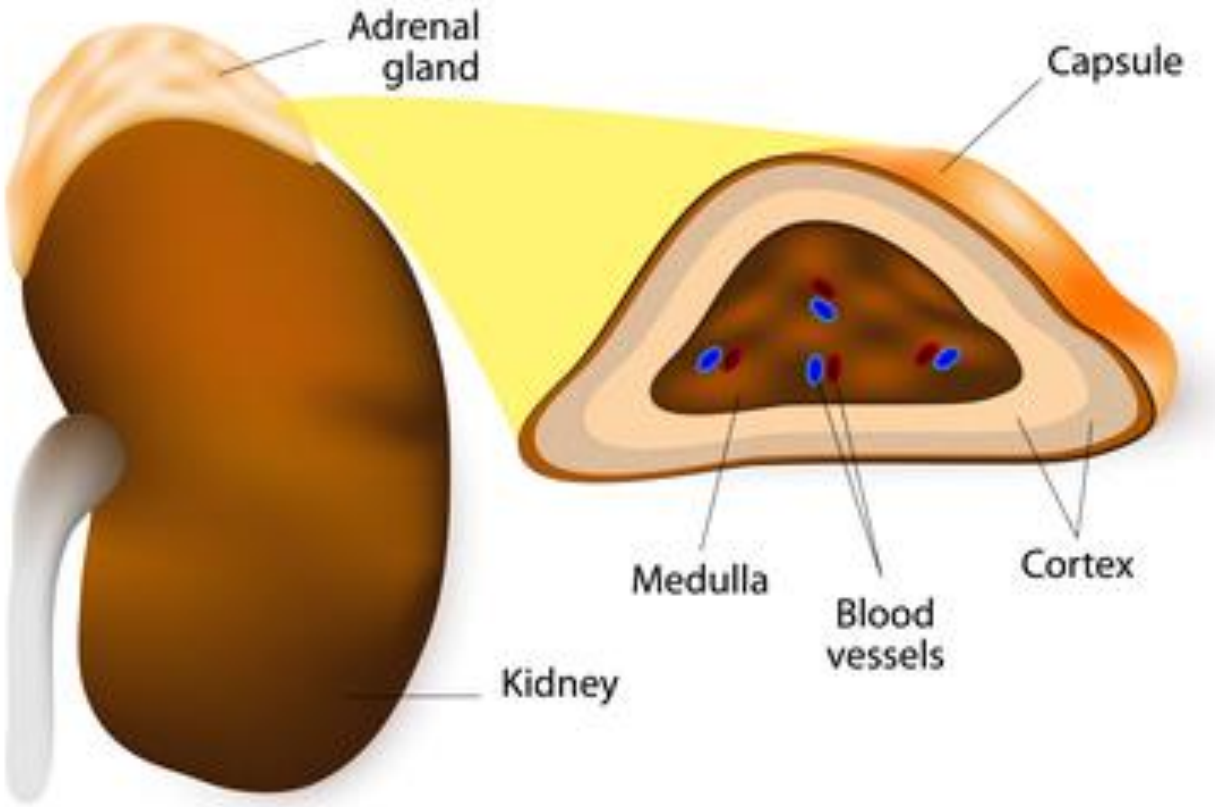
- ✓ Causes
  - ➢ Tumor
  - ➢ Insufficient blood supply

Hormone	Excess	Deficiency
Growth Hormone	Acromegaly	Dwarfism
ACTH	Cushing's	Addison's **
TSH	Hyperthyroid	Hypothyroid **
FSH, LH	Too many sex hormones hyperfertility	Infertility, anovulatory cycles

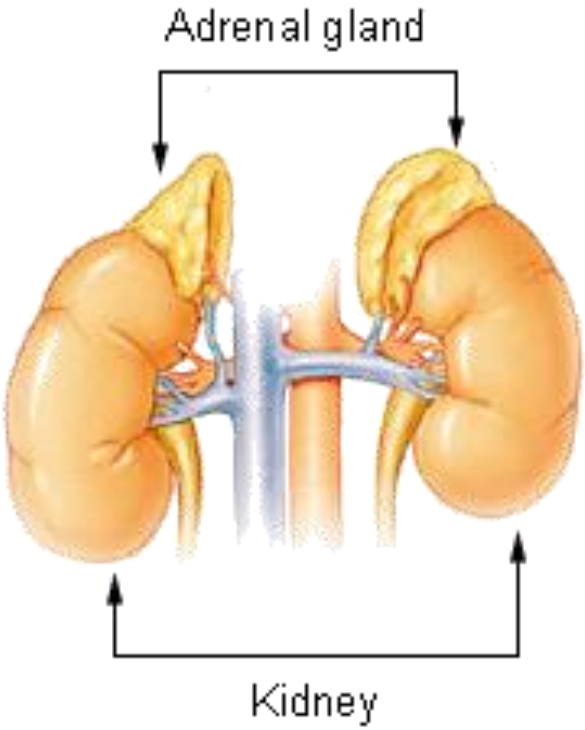
- ✓ Panhypopituitarism: under functioning of pituitary – all hormones affected

***Adrenals and thyroid often affected later in process*

Adrenal Glands



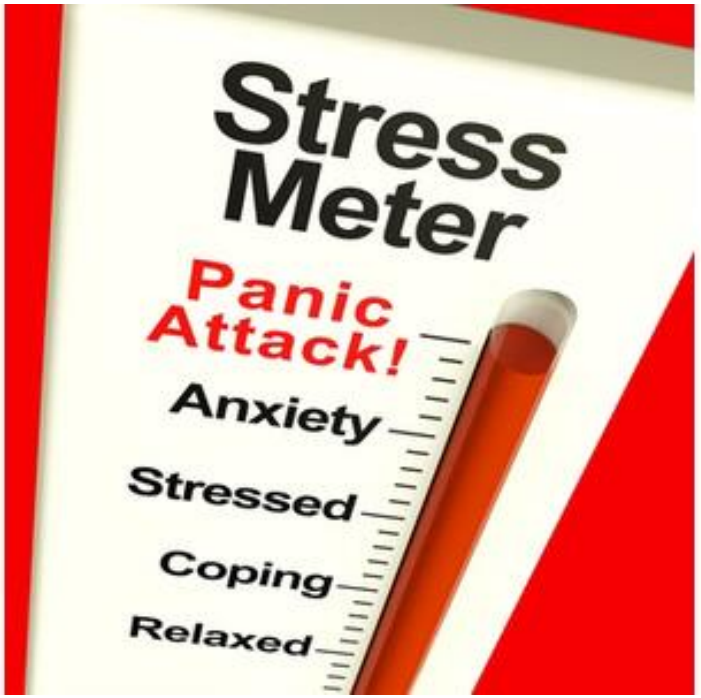
Adrenal Gland Anatomy and Function



- ✓ Two small glands, each weighing 3 to 5 grams
- ✓ Located above the kidneys
- ✓ One of the highest rates of blood flow per gram of tissue
- ✓ Highest concentration of vitamin C per gram of any tissue in the body
- ✓ The hormones released in a cycle with the highest value in the morning and the lowest value at night – Circadian Rhythm

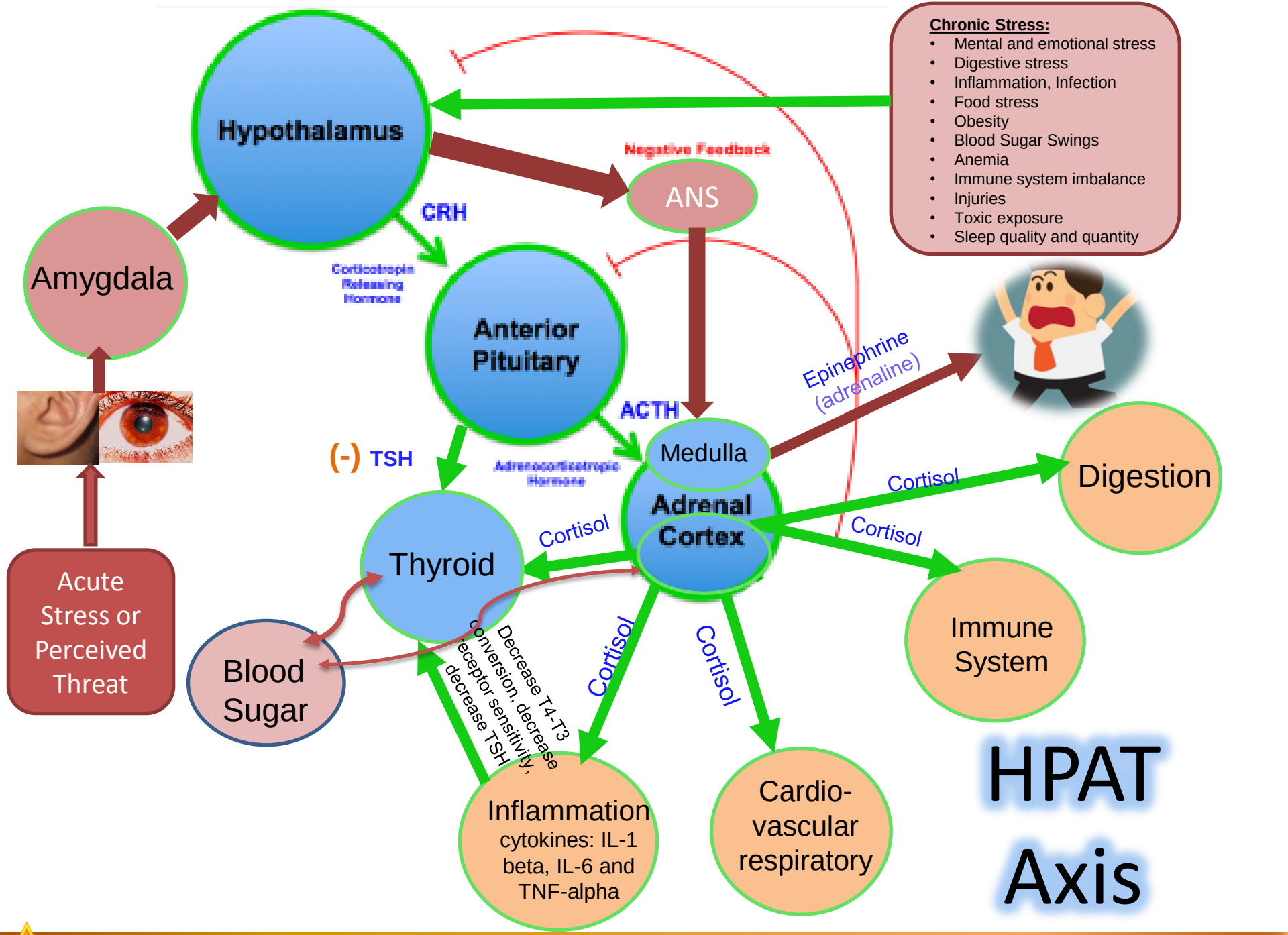
Stress

- ✓ A force that tends to strain or deform.
- ✓ A physical, chemical, or emotional factor that causes bodily or mental tension and may be a factor in disease causation.
- ✓ Hans Selye (1907-1982) first addressed it as a health challenge.



Chronic Stress

- ✓ Any stress that the body is subjected to on a regular basis
  - ➢ Physical – hidden pain and inflammation, past trauma
  - ➢ Emotional
  - ➢ Environmental
  - ➢ Food
- ✓ Compromises critical body systems
- ✓ Compromises ability to maintain health and ward off illness and disease

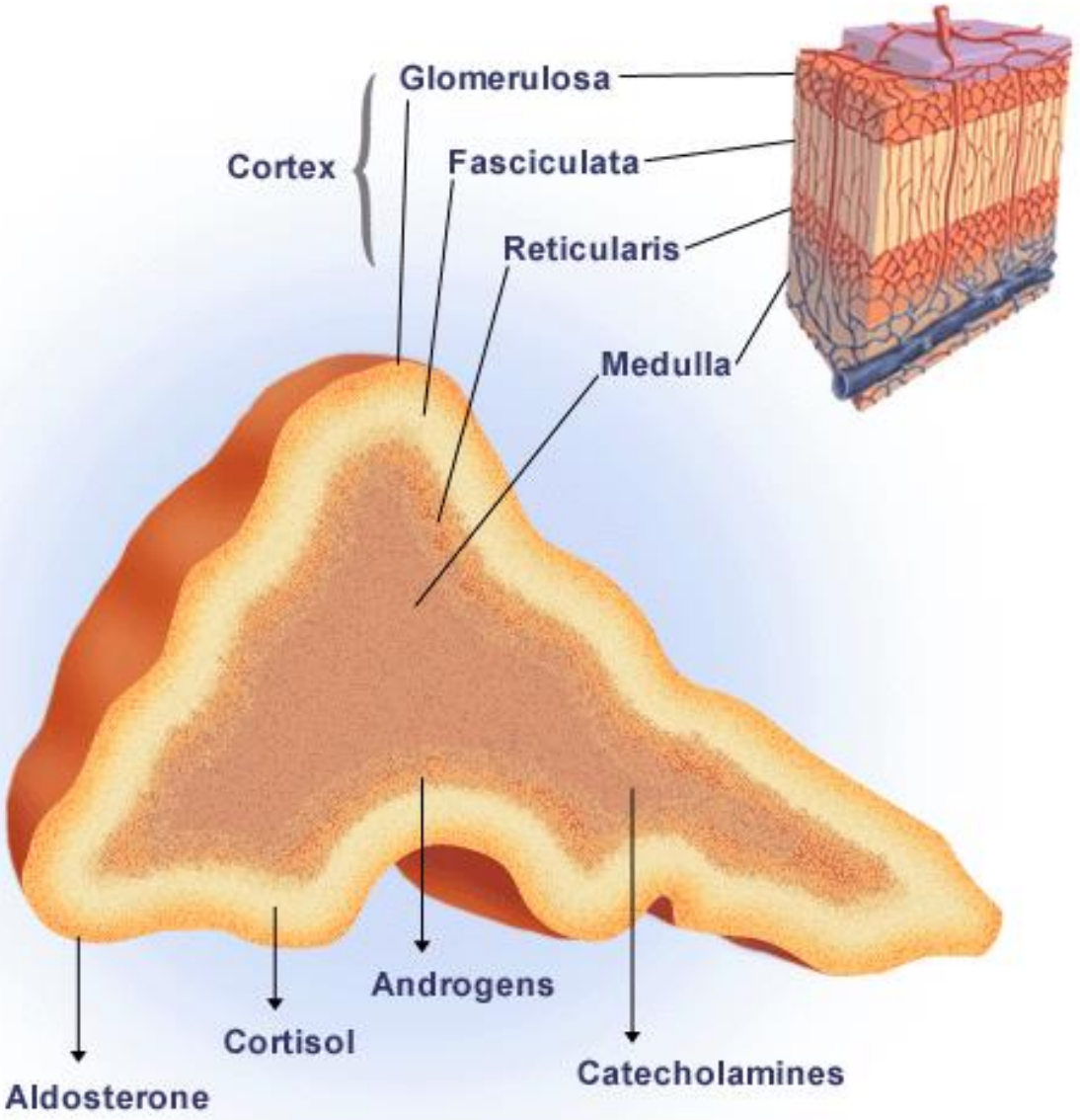


CHRONIC STRESS

- ✓ Costs trillions of dollars a year
- ✓ Largely ignored by mainstream medicine

Common Culprit Behind Virtually All Symptoms And Conditions

Adrenal Hormone Secretions



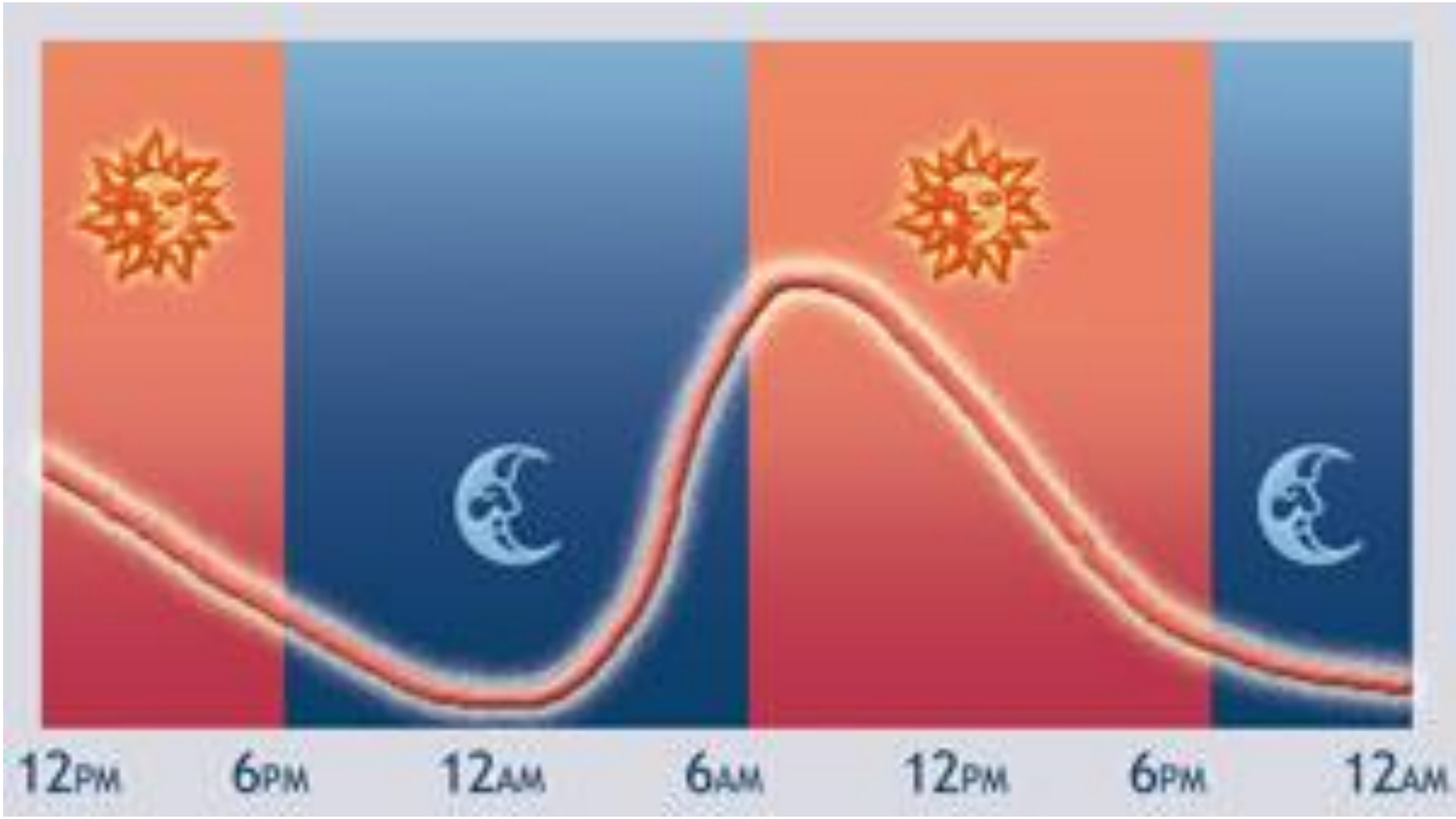
Outer Zone (Cortex)

- Cortisol
- DHEA
- Aldosterone

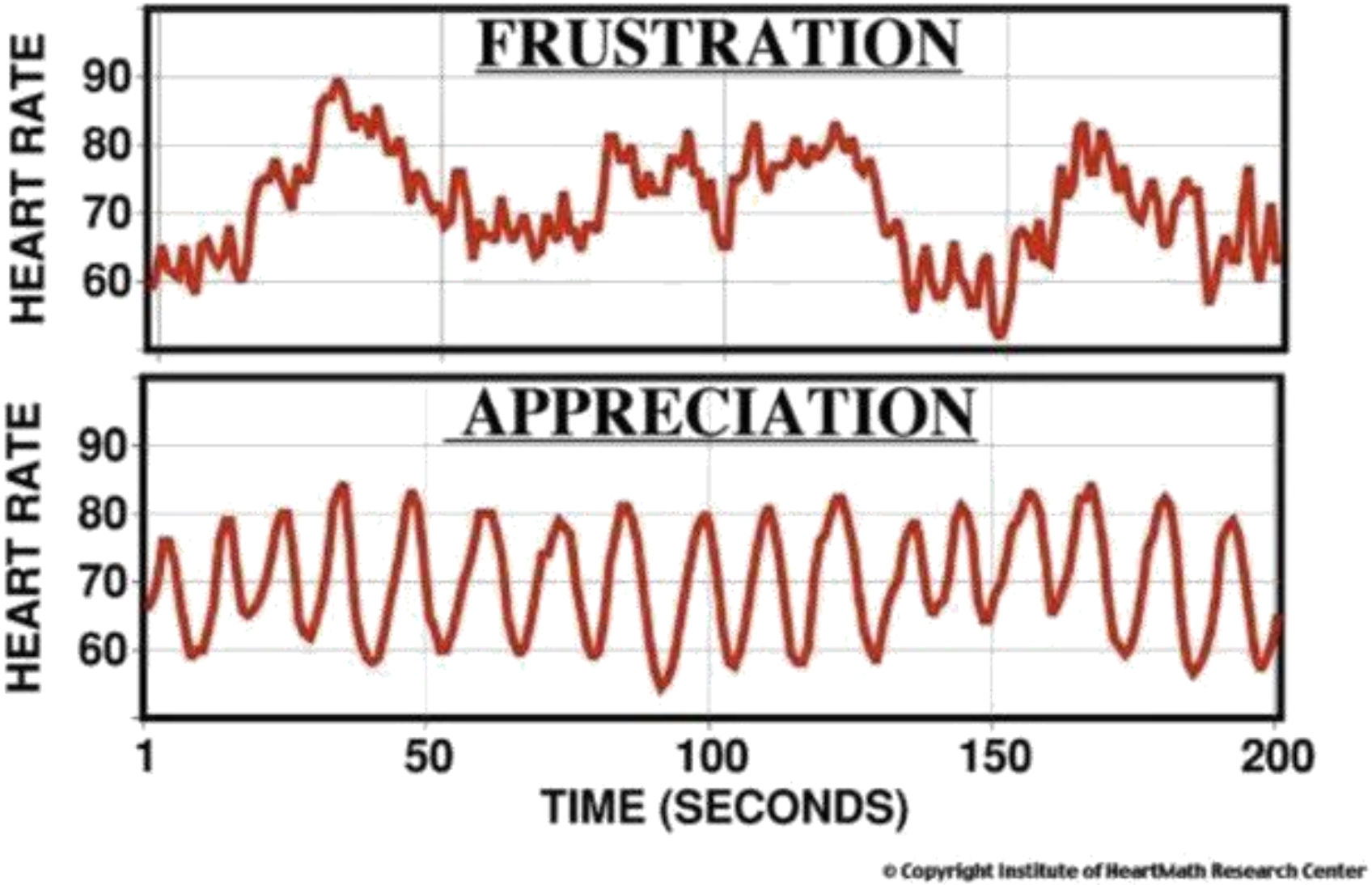
Inner Zone (Medulla)

- ✓ Catecholamines
  - Adrenaline aka Epinephrine
  - Noradrenaline aka Norepinephrine
- ✓ Androgens

Circadian Rhythm



Effect of Stress on Heart Rhythm



Ahhhhh…Happy Adrenals

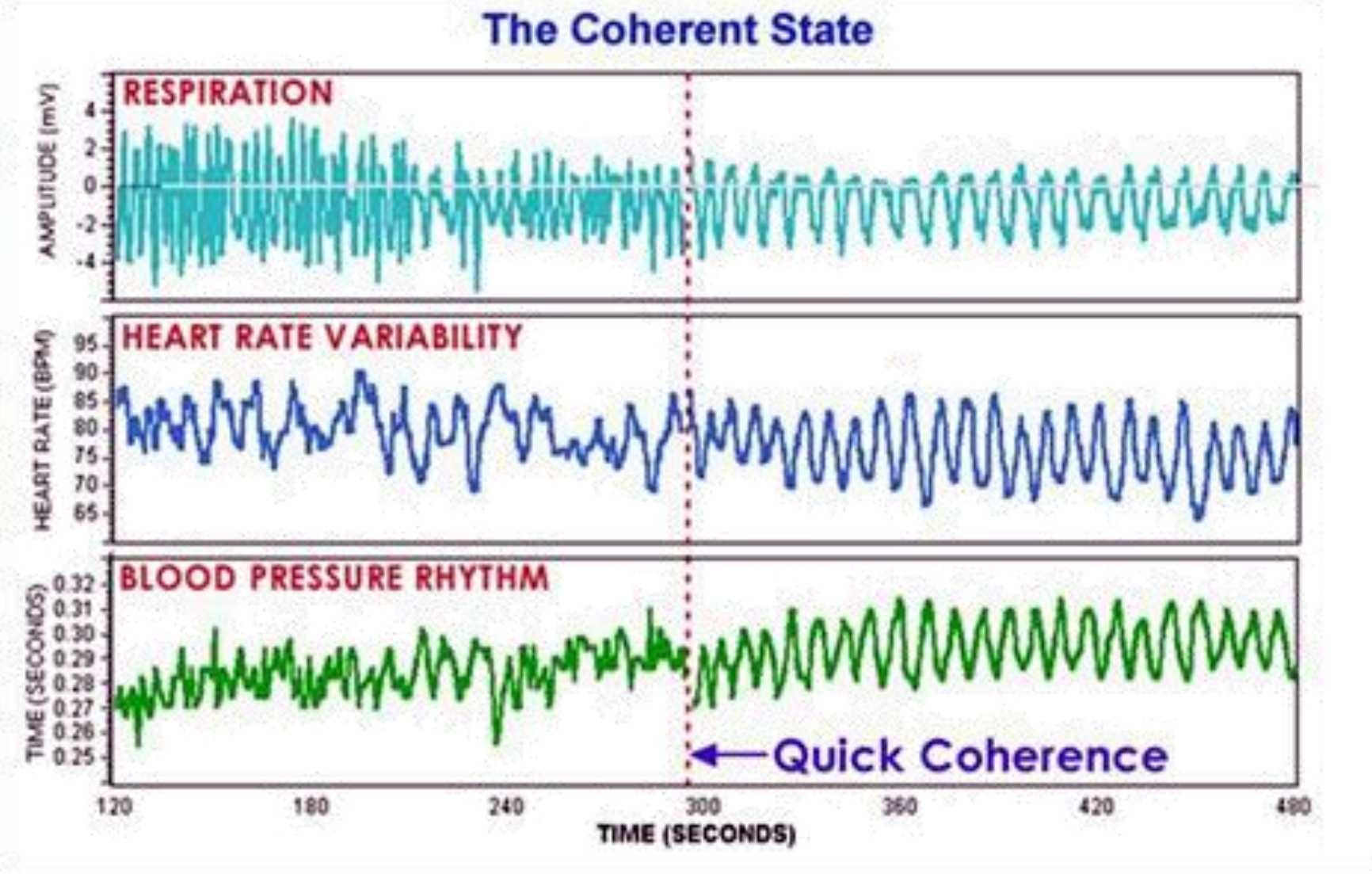
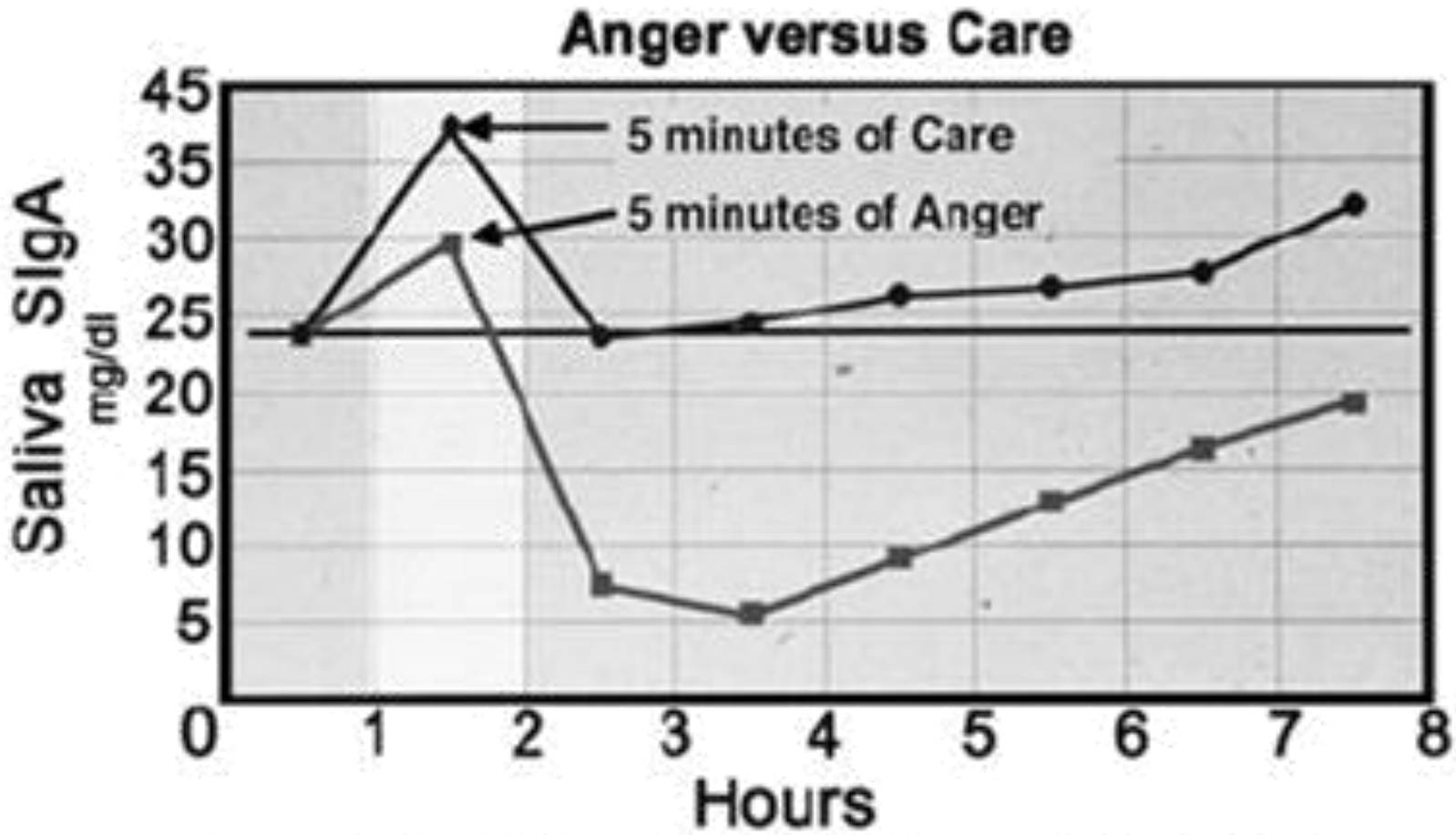


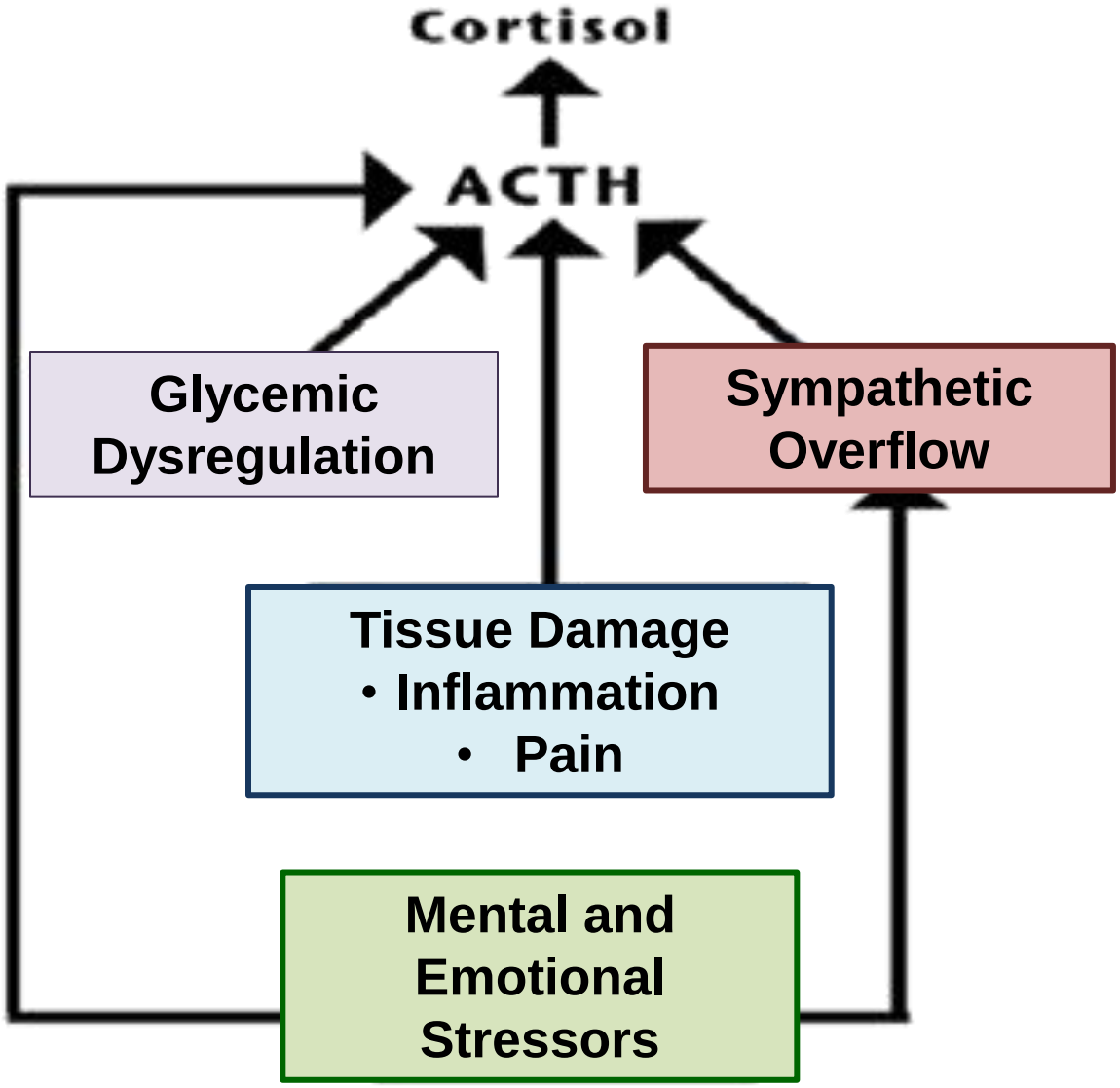
Figure 6. **Effect of Emotion on SIgA Release**



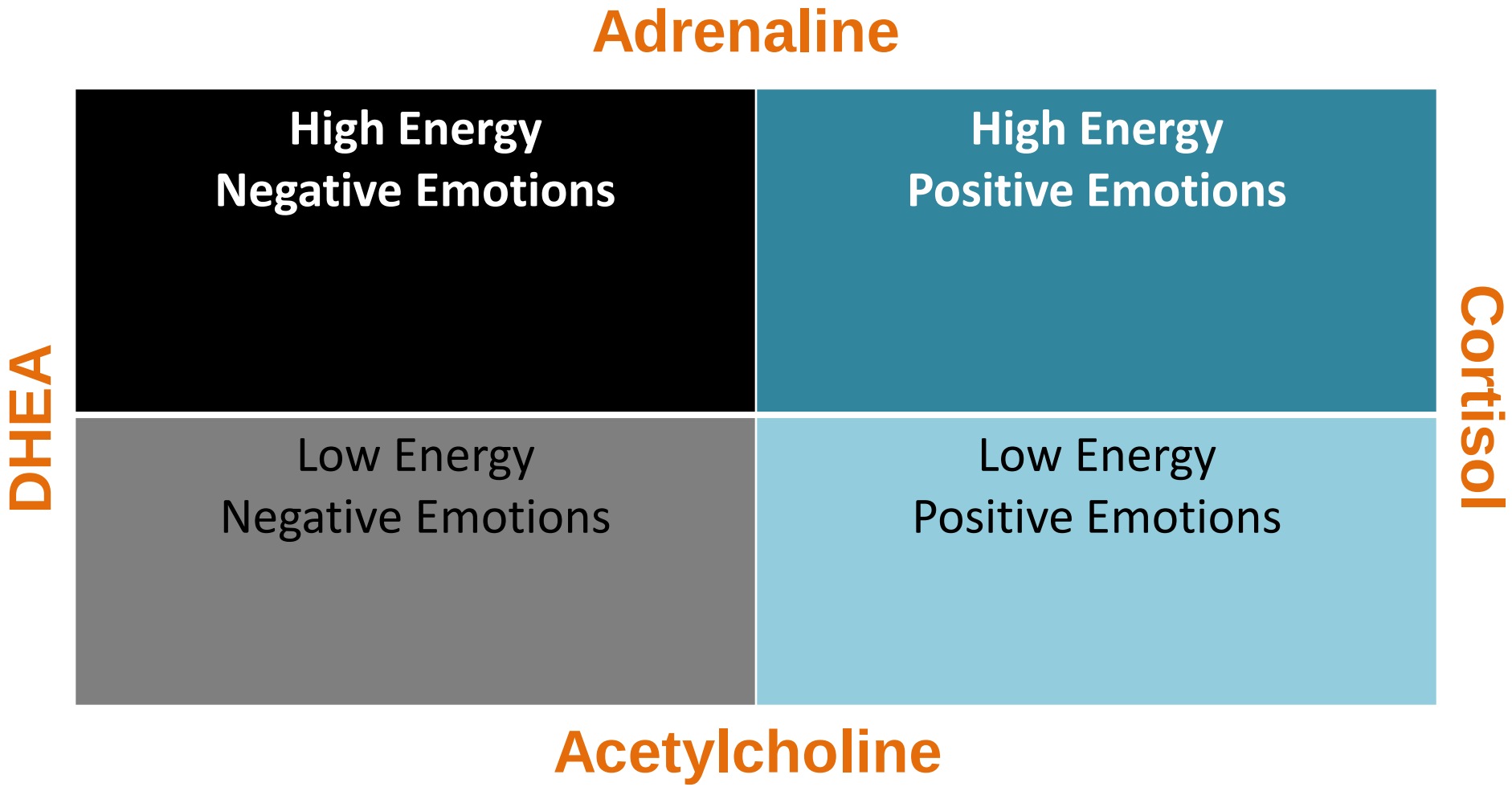
Autonomic System Imbalance Caused by Emotional Stress Inhibits SIgA Release

HeartMath Institute

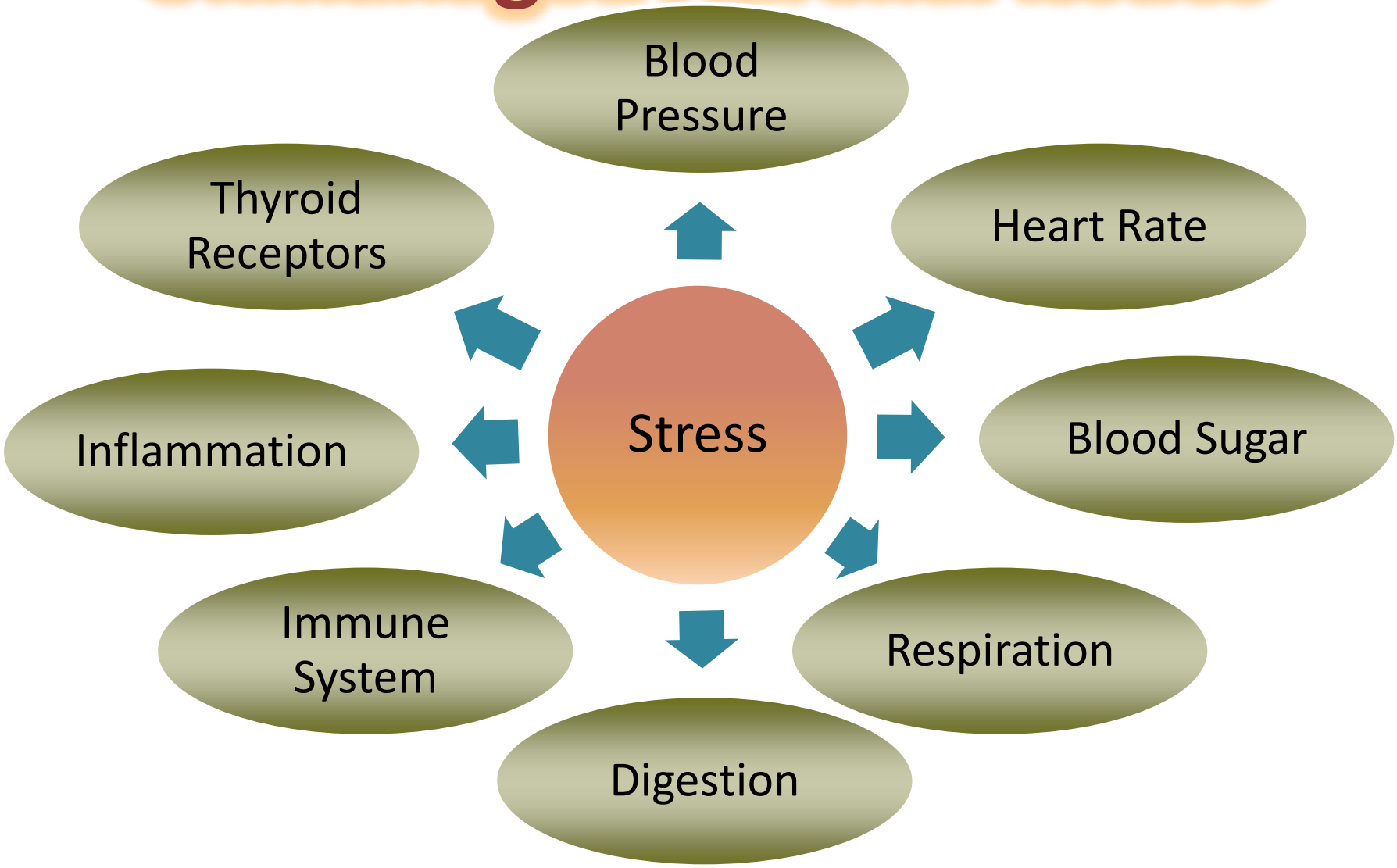
Inducers of Cortisol Release



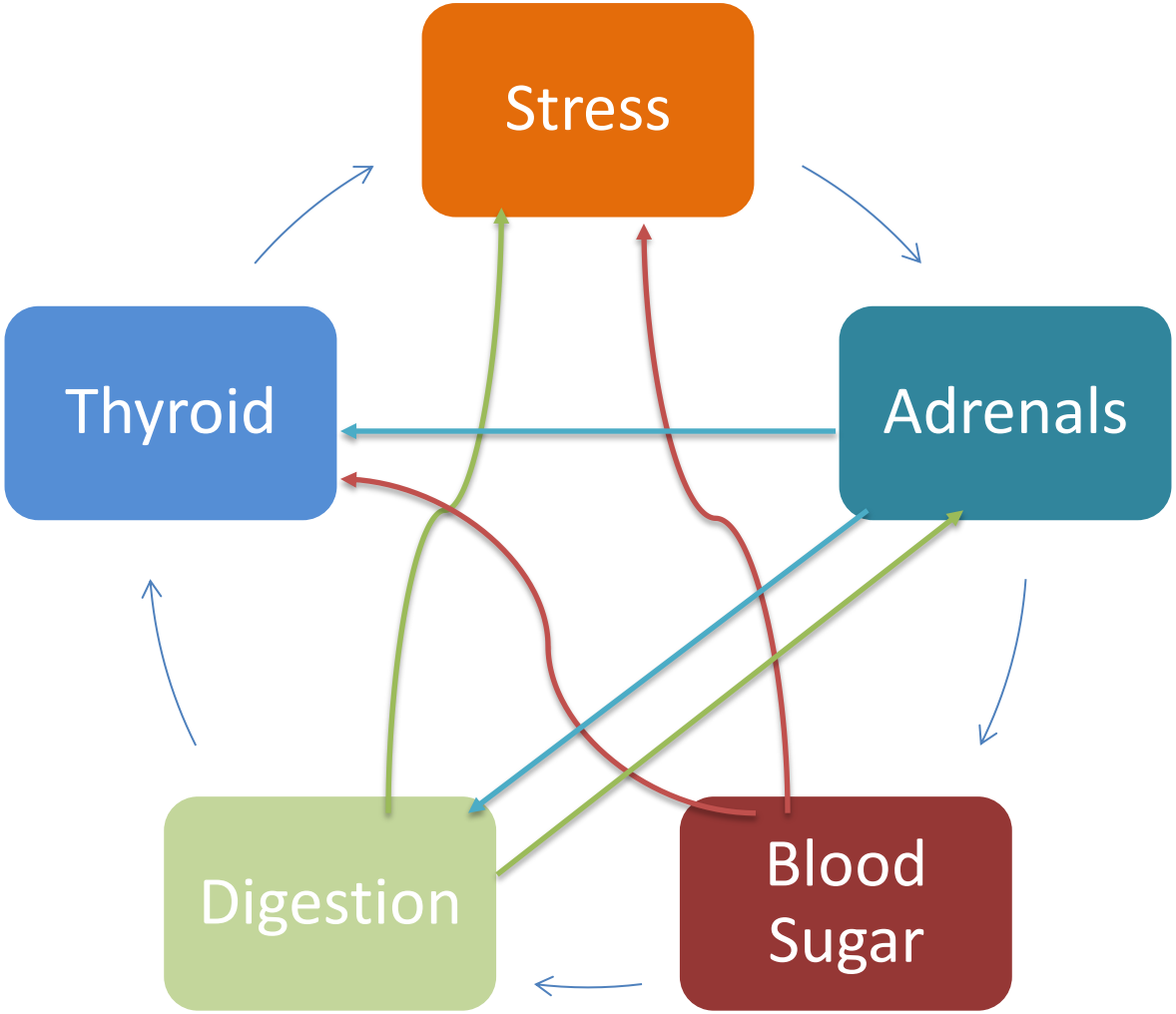
Emotional Landscape



Dangers Associated with Unmanaged Adrenal Issues

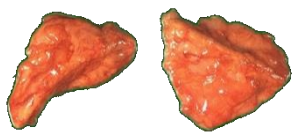


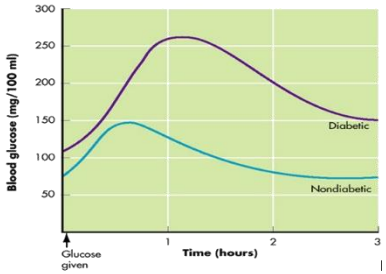
The Vicious Cycle

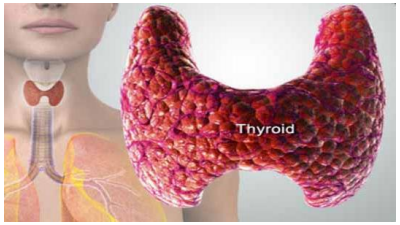


Breaking the Vicious Cycle

Manage Stress	Repair and Recharge Adrenal	Balance Blood Sugar	Heal and Optimize Digestion	Protect and Heal Thyroid







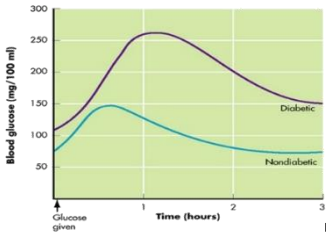
Order Matters!

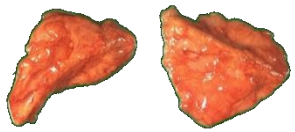
Digestive stress
Inflammation
Food stress
Obesity
Injuries
Toxic exposure
Sleep quality and quantity
Eating too close to bedtime
Infection

Transform Stress

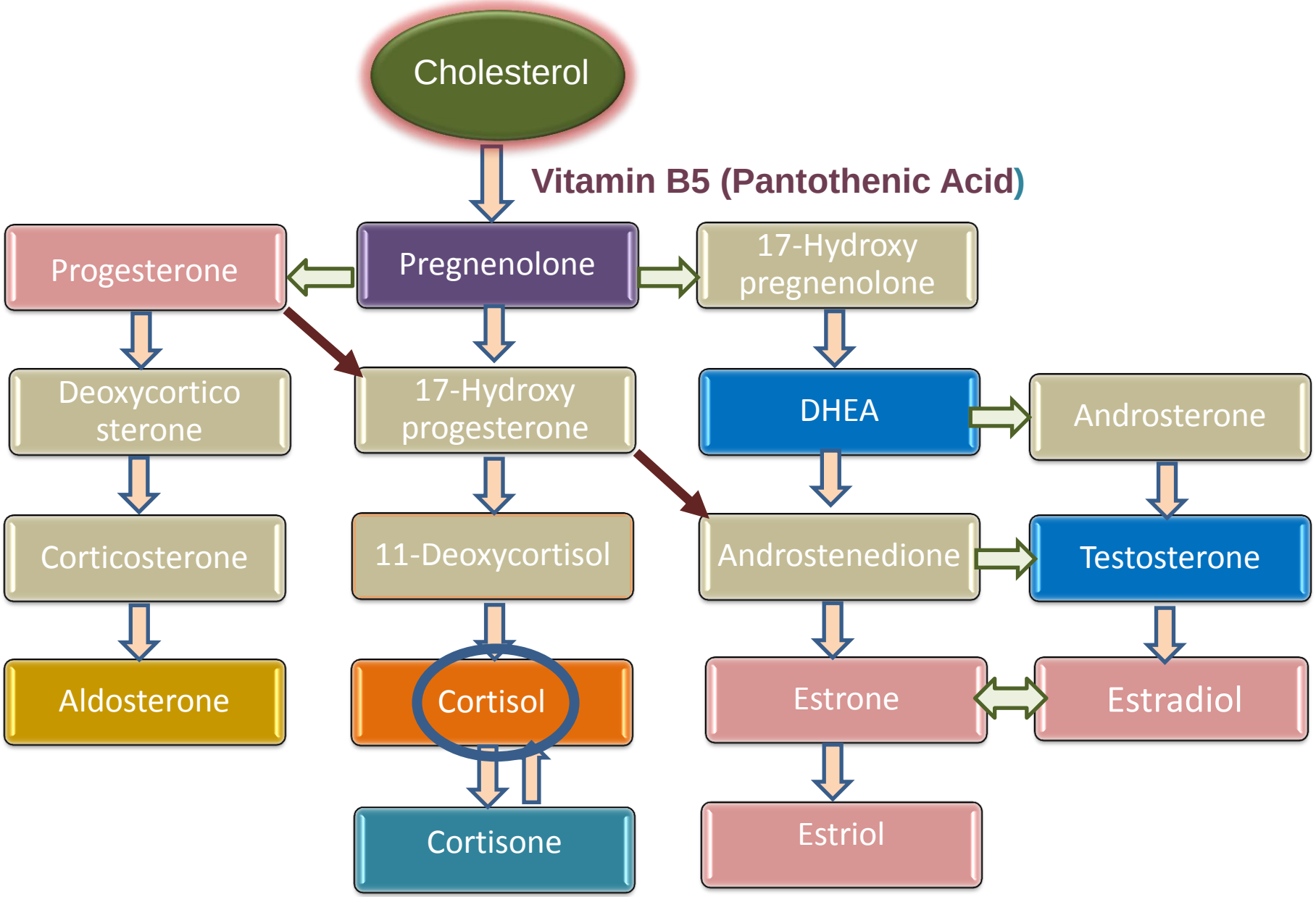
Calm
Balance
Serenity
Clarity
Joy
Love
Peace
Success

Heal and Optimize Digestion → Balance Blood Sugar → Repair and Recharge Adrenal → Protect and Heal Thyroid

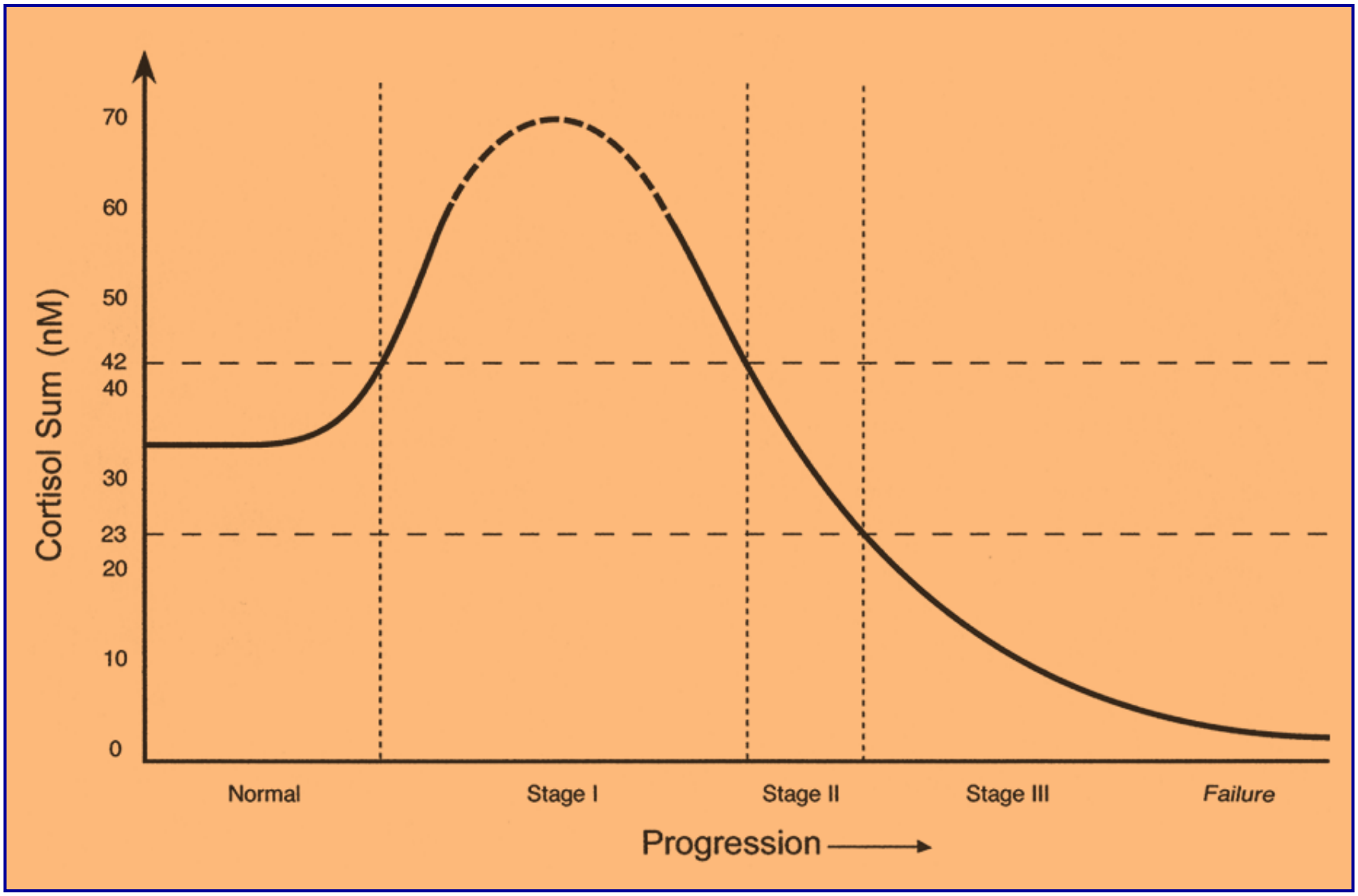




Male/Female Hormones/Stress Interaction



Progression of Stages in Adrenal Exhaustion



Adrenal Fatigue – Stage 1
Tired and Wired

- ✓ Sympathetic Dominant State
  - ➢ DHEA low
  - ➢ Cortisol high
- ✓ Draining Your Reserves
- ✓ Negative Effects of Cortisol
- ✓ Slump in Mid-Afternoon
- ✓ Wired at Bedtime

Adrenal Fatigue – Stage 2 Reserves Becoming Depleted

- ✓ Sympathetic Dominant State
  - ➢ DHEA low
  - ➢ Cortisol normal, with possible low dips
- ✓ Low Reserves
- ✓ Immune System Compromised

Adrenal Fatigue – Stage 3 Exhaustion

- ✓ Sympathetic Dominant State
  - ➢ DHEA low
  - ➢ Cortisol low
- ✓ Suffering From Negative Effects of Chronic Elevated Cortisol
- ✓ Low Libido
- ✓ Sex Hormone Imbalances
- ✓ Accelerated Aging
- ✓ Poor Memory

HPA Impact on Thyroid

- ✓ Inflammatory **cytokines IL-1 beta, IL-6, and TNF-alpha** released during the stress response
- ✓ IL-1 beta, IL-6, and TNF-alpha **down-regulate the HPA axis** and **reduce levels of thyroid stimulating hormone (TSH)**
- ✓ A single injection of **tumor necrosis factor alpha (TNF-alpha)** reduced serum TSH, T3, free T4, free T3 and hypothalamic TRH for 5 days.
- ✓ **TNF-alpha** was also found to **decrease the conversion of T4 to T3,** reduce thyroid hormone uptake, and decrease the **sensitivity of the thyroid to TSH**.

Thyroid. 2007 Oct;17(10):1005-11. **Chemokine orchestration of autoimmune thyroiditis.** Kimura H[1], Caturegli P.

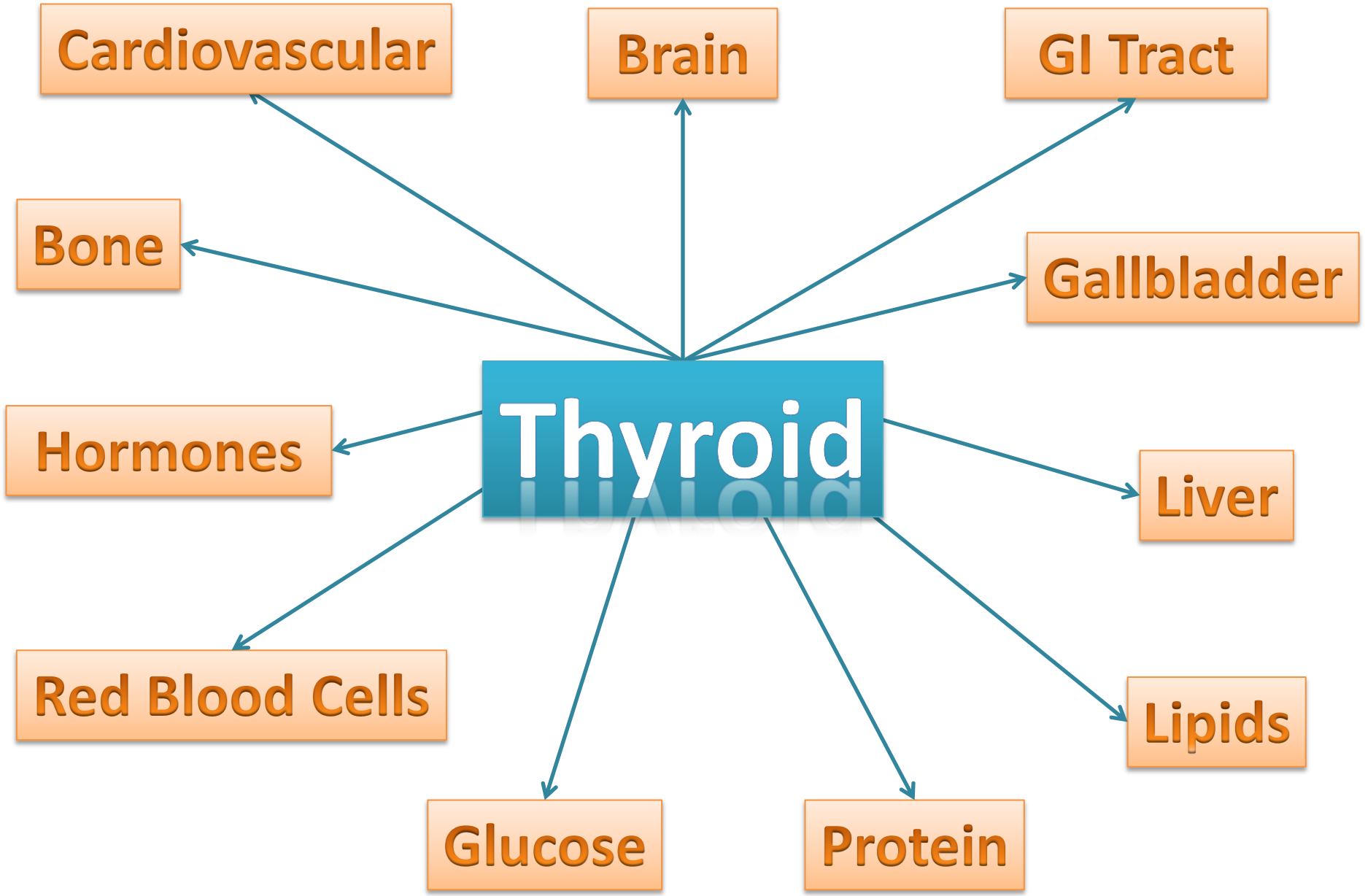
http://www.ncbi.nlm.nih.gov/pubmed/1906893

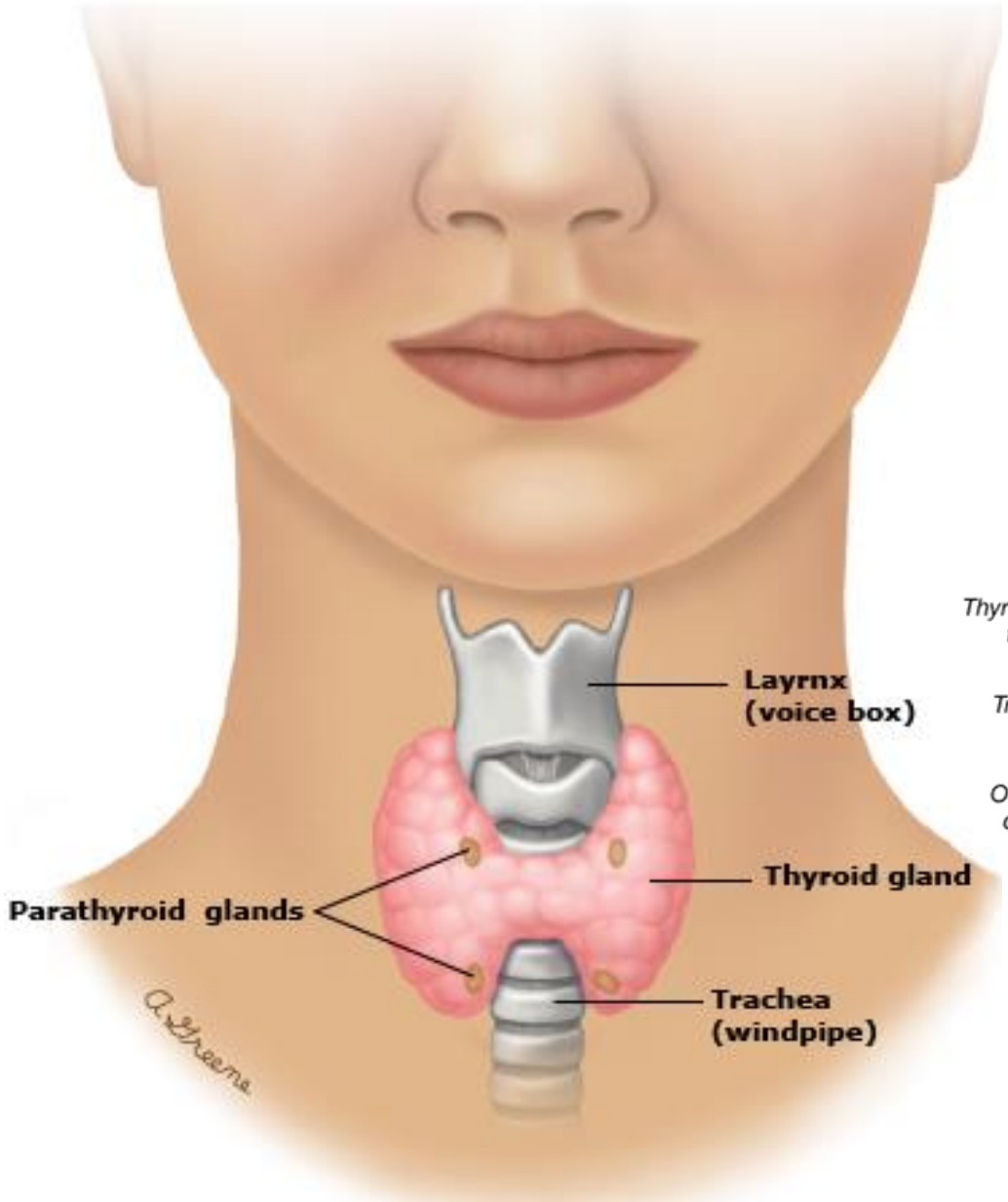
http://chriskresser.com/5-ways-that-stress-causes-hypothyroid-symptoms

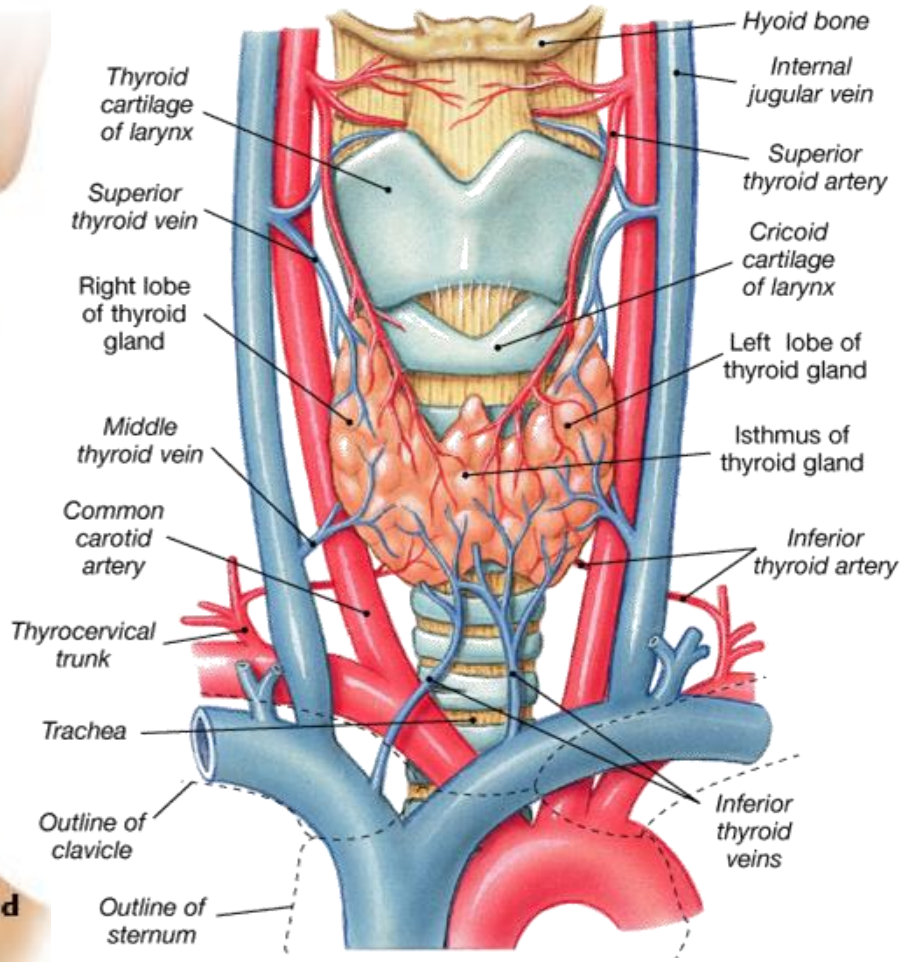
More HPA Impact on Thyroid

- ✓ Th1 and Th2, IL-6, TNF-alpha, IFN-gamma and IL-1 beta **suppress the conversion of T4 to T3.**
- ✓ **As IL-6 rises, T3 falls.**
- ✓ Inflammatory cytokines in the healthy resulted in a **rapid reduction of serum T3** and TSH levels, increase in reverse T3, and minimal change in T4
- ✓ **Adrenal stress weakens immune barriers** and promotes poor immune system regulation, which can lead to autoimmune thyroiditis
- ✓ Inflammatory cytokines **suppress thyroid receptor site sensitivity**.
- ✓ Prolonged cortisol elevations decrease liver clearance of excess estrogens leading to increased thyroid binding globulin (TBG)

Thyroid. 2007 Oct;17(10):1005-11. ***Chemokine orchestration of autoimmune thyroiditis.*** *Kimura H[1], Caturegli P.*
http://www.ncbi.nlm.nih.gov/pubmed/1906893
http://chriskresser.com/5-ways-that-stress-causes-hypothyroid-symptoms



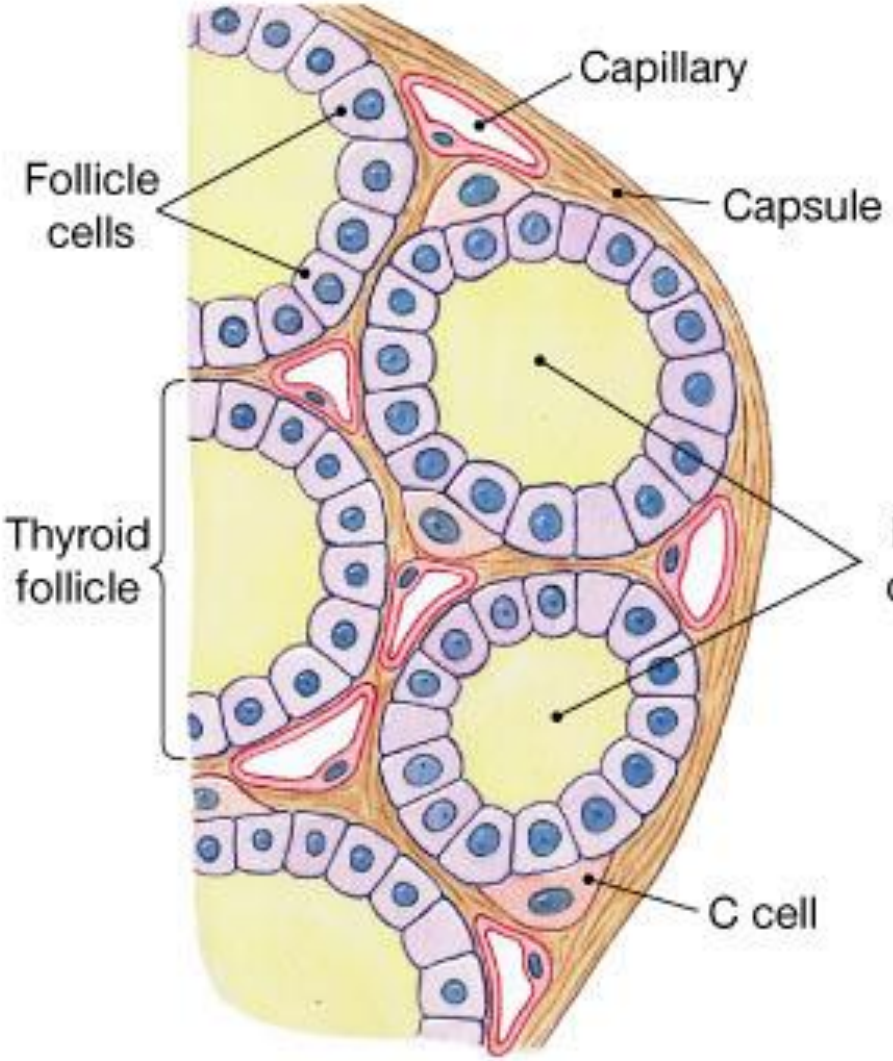




The Thyroid Gland – Histology

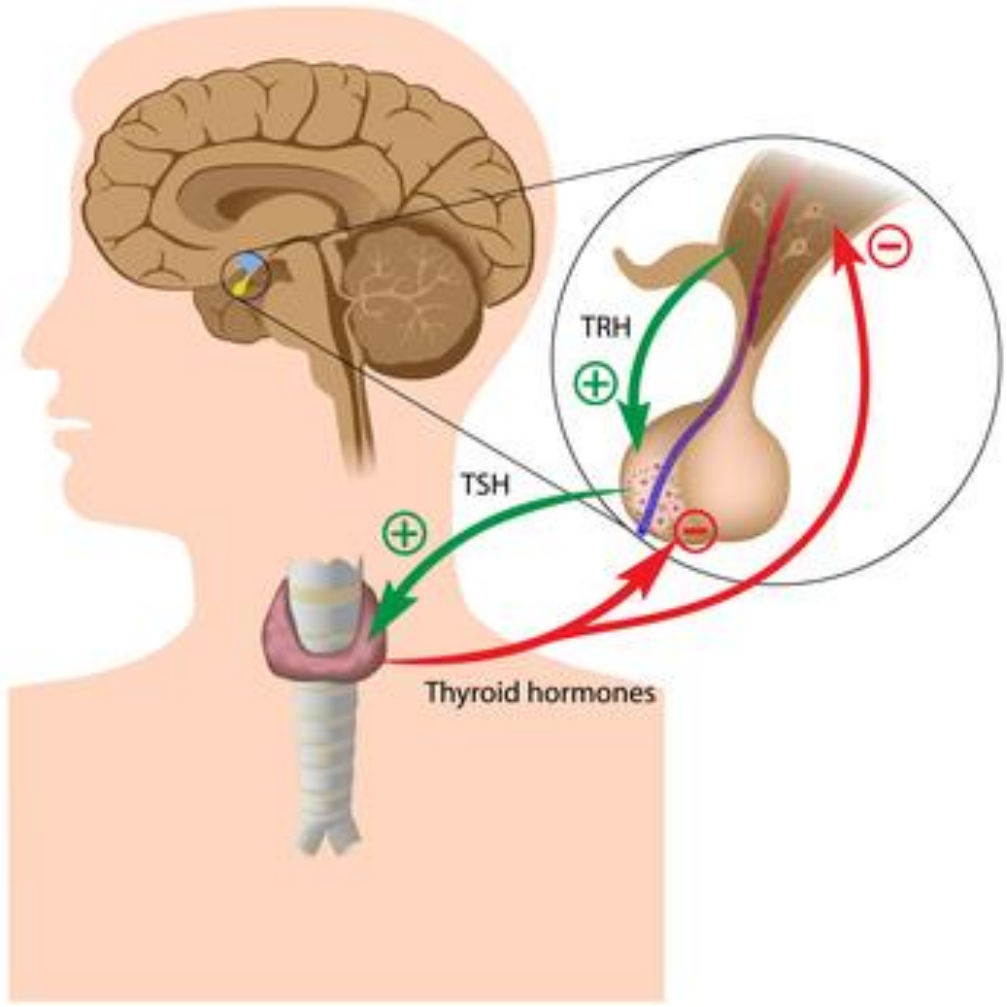
Gland is composed of hollow spheres, called colloid follicles.

Follicle cells produce thyroglobulin

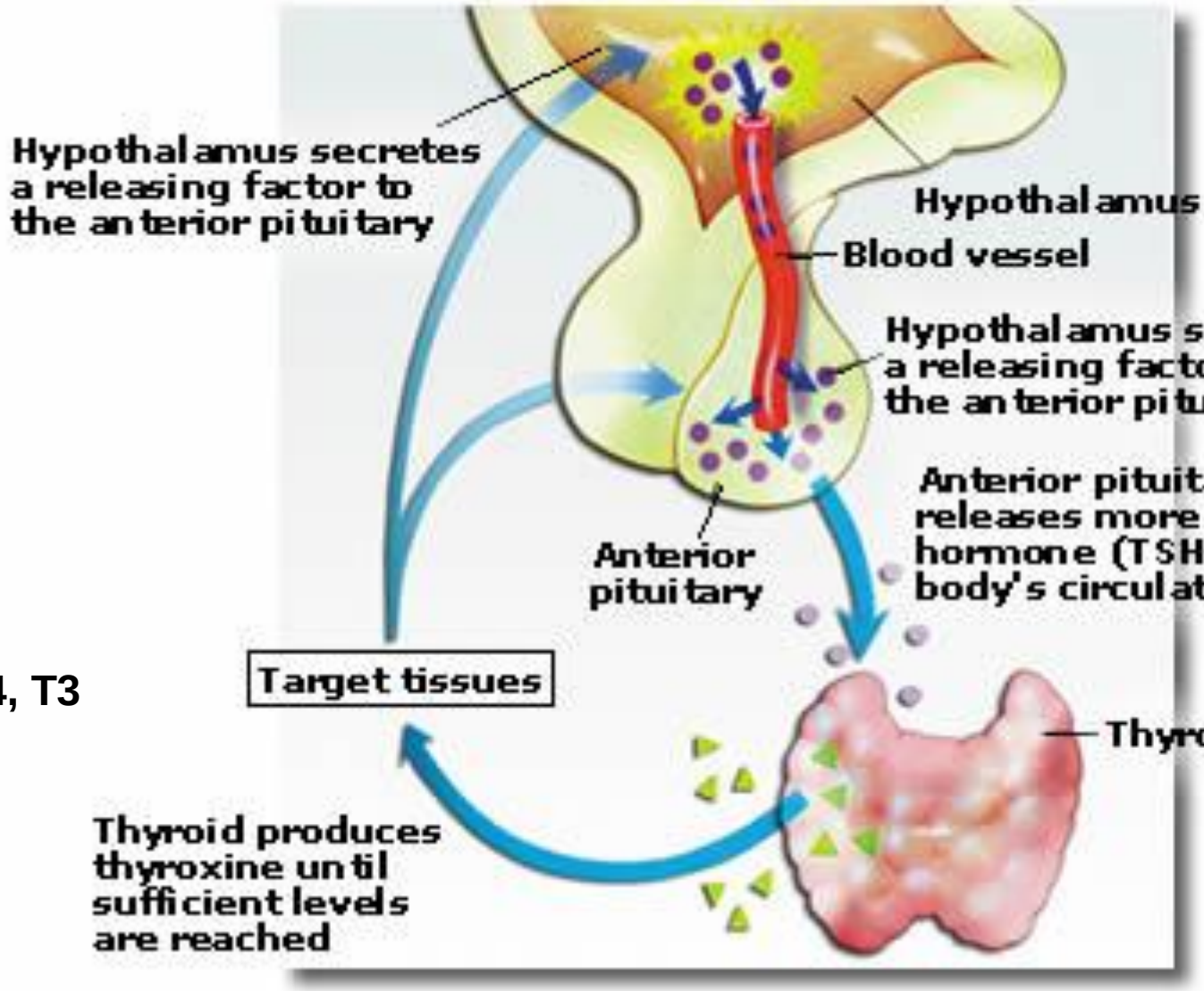


Colloid fills the follicle cavities

How Thyroid Hormone Gets Stimulated



Thyroid Control



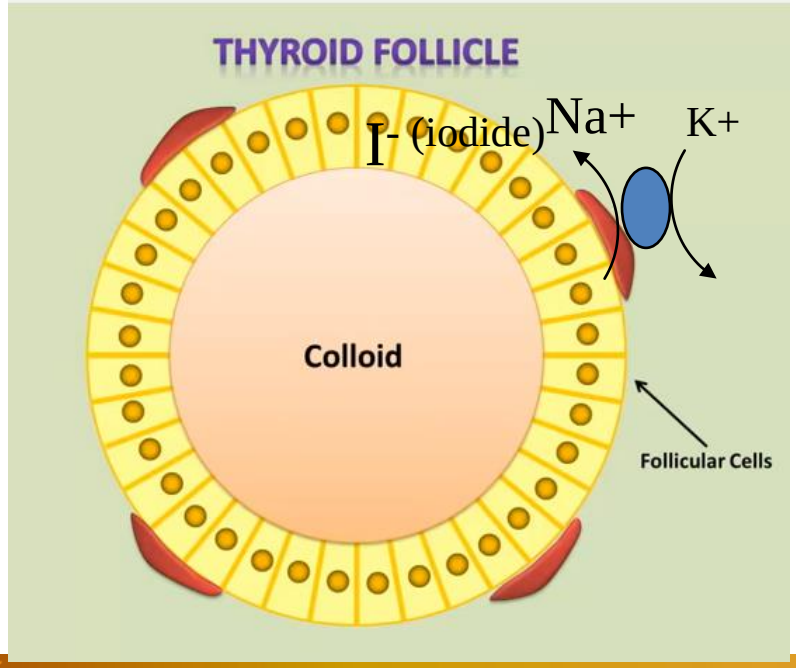
TRH

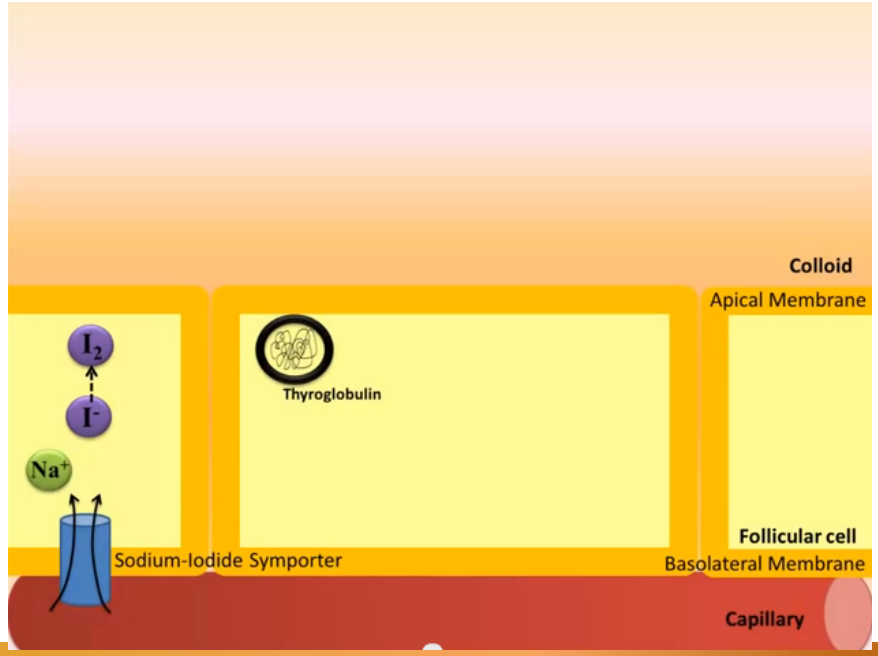
T4, T3

Action of TSH on the Thyroid

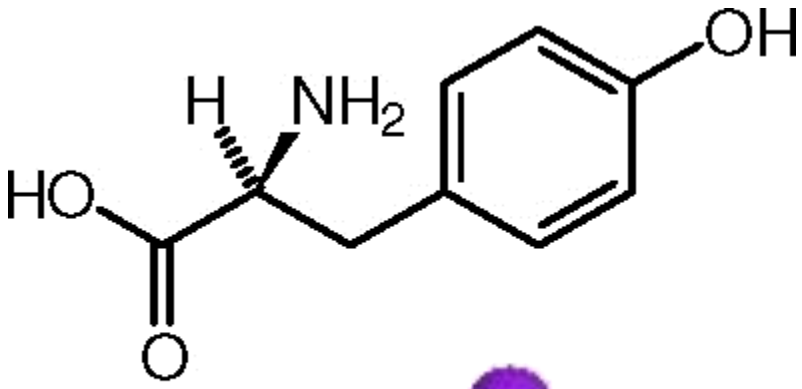
TSH acts on follicular cells of the thyroid.

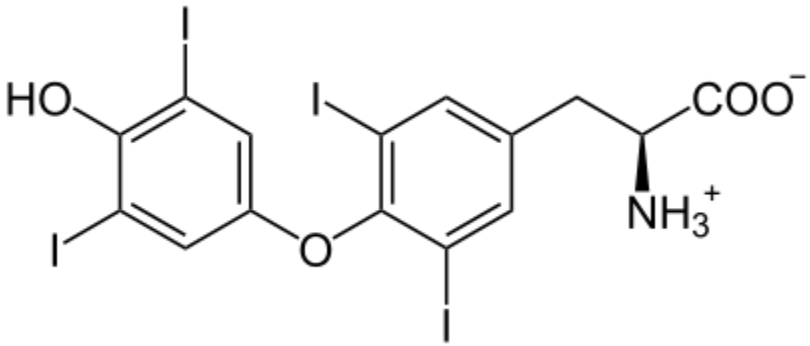
- ✓ Increases **iodide transport** into follicular cells by NIS - Sodium Iodide Symporter
- ✓ Oxidizes iodide to release iodine for iodination of tyrosine
- ✓ Increases production and iodination of **thyroglobulin**
- ✓ Brings the thyroglobulin back into the follicle cell



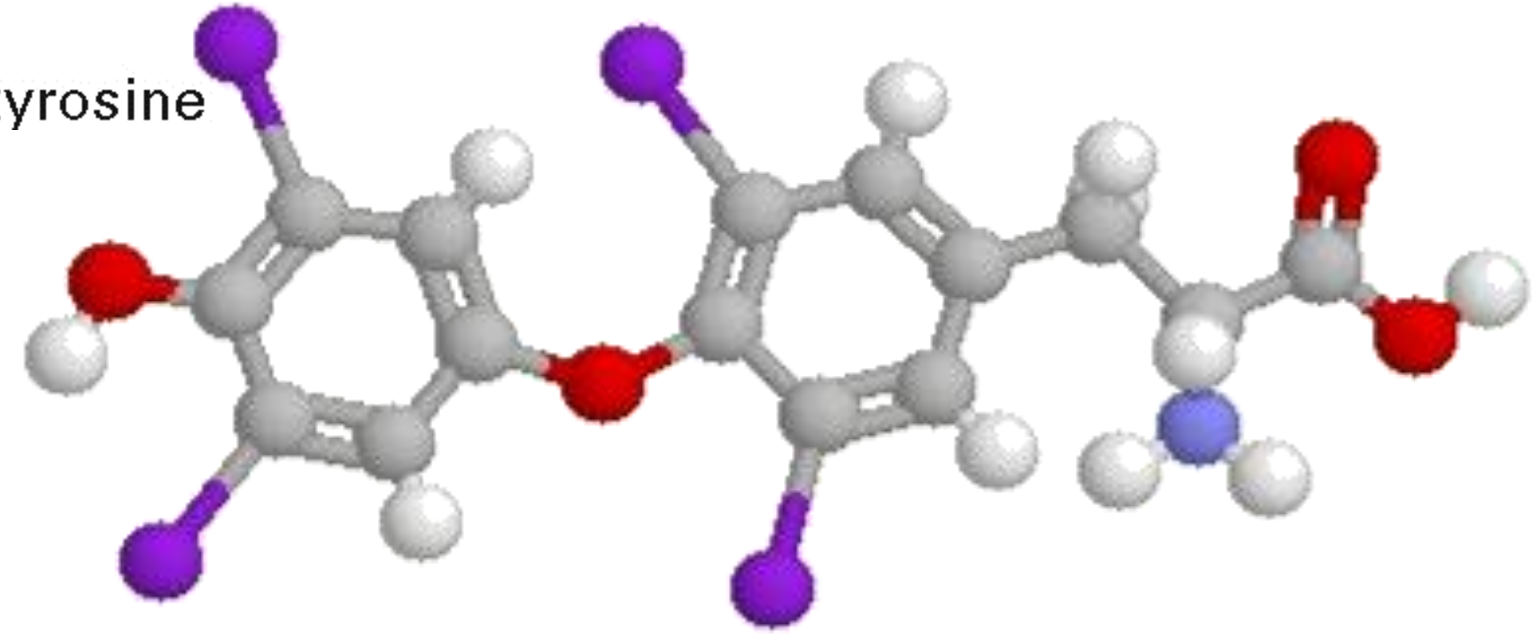


T4 - Thyroxine

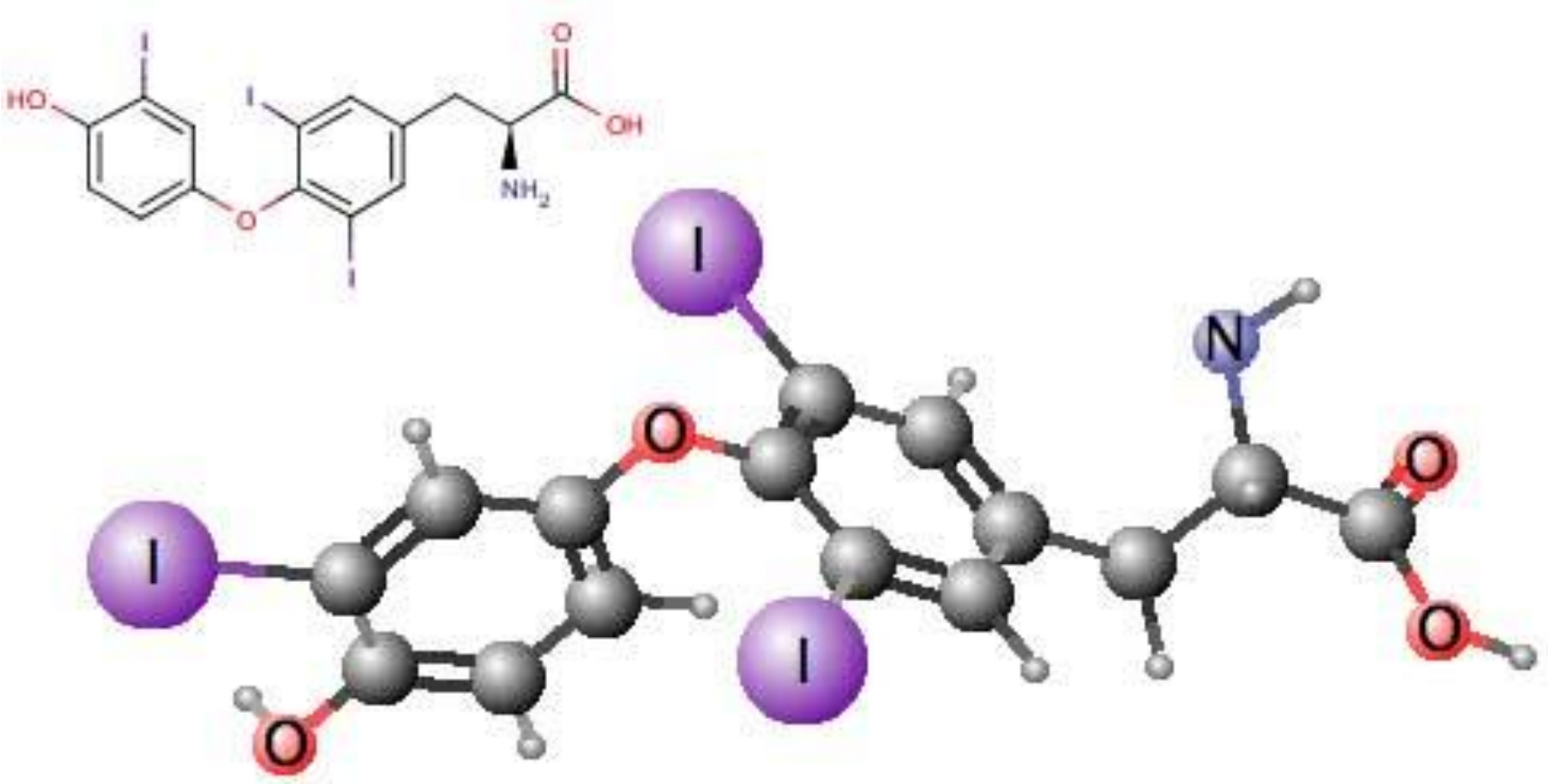




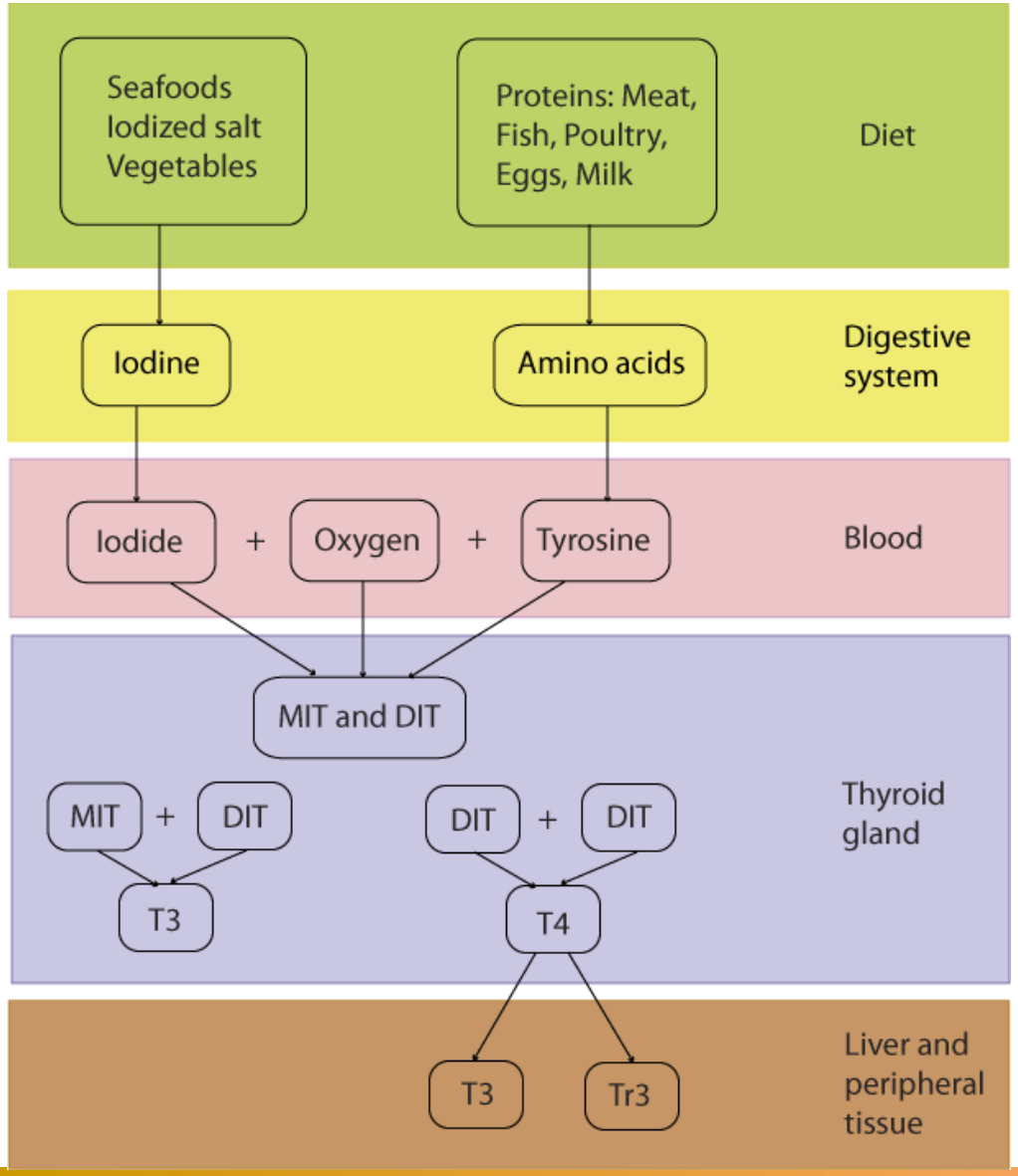
L-tyrosine



T3 - Triiodothyronine



Thyroid Hormone Synthesis



Colloid
Apical Membrane
I_2
I^-
Na^+
Thyroglobulin
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
Capillary
Colloid
Apical Membrane
I_2
I^-
Na^+
Thyroglobulin
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
Capillary
Thyroglobulin
Colloid
Apical Membrane
I_2
I^-
Na^+
Thyroglobulin
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
Capillary
Thyroglobulin
T_1
T_2
T_2
T_2
Thyroxine
T_4
Triiodothyronine
T_3
Colloid
Apical Membrane
I_2
I^-
Na^+
Thyroglobulin
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
Capillary
Colloid
Apical Membrane
I_2
I^-
Na^+
Follicular cell
Sodium-Iodide Symporter
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Apical Membrane
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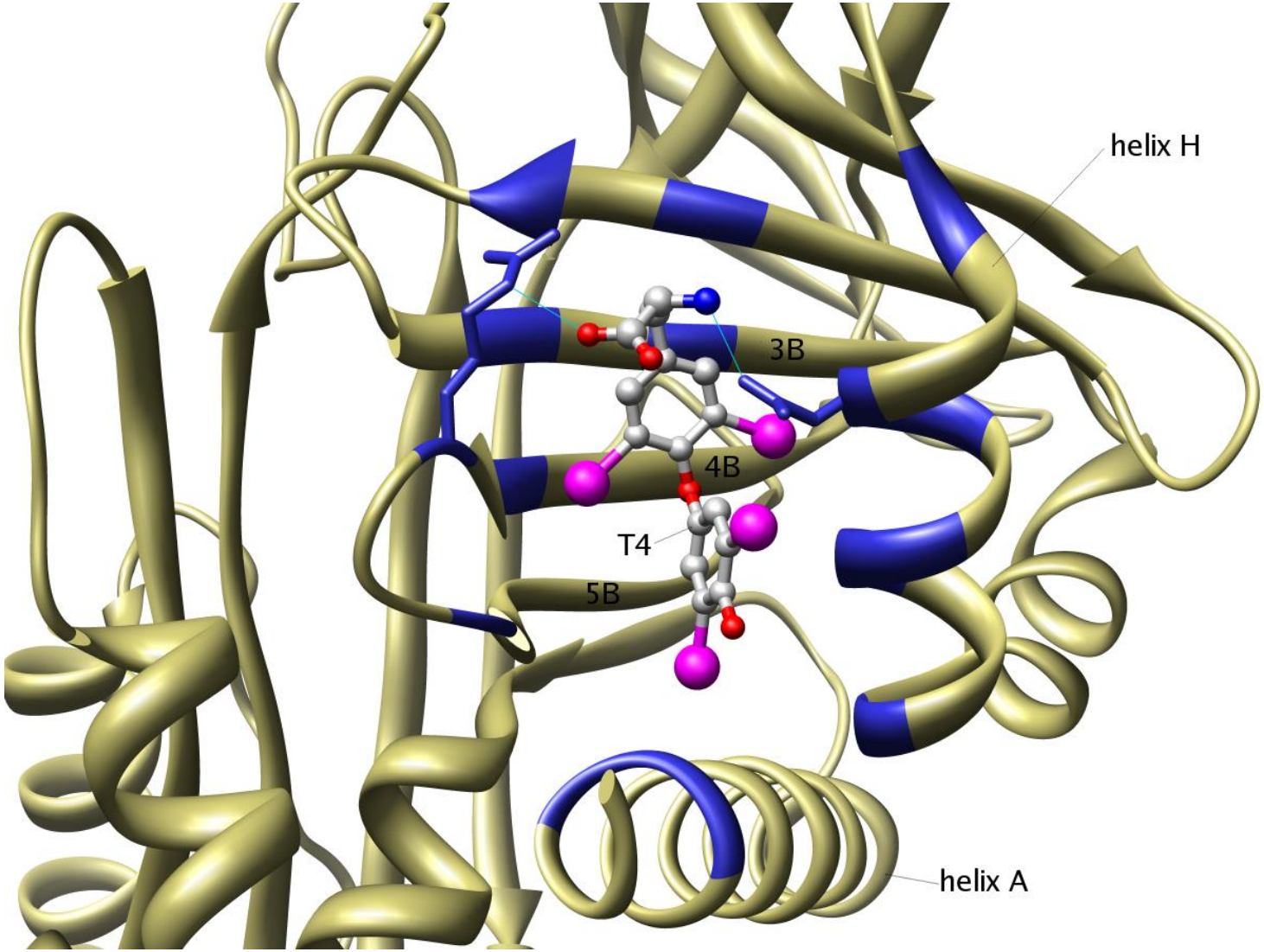
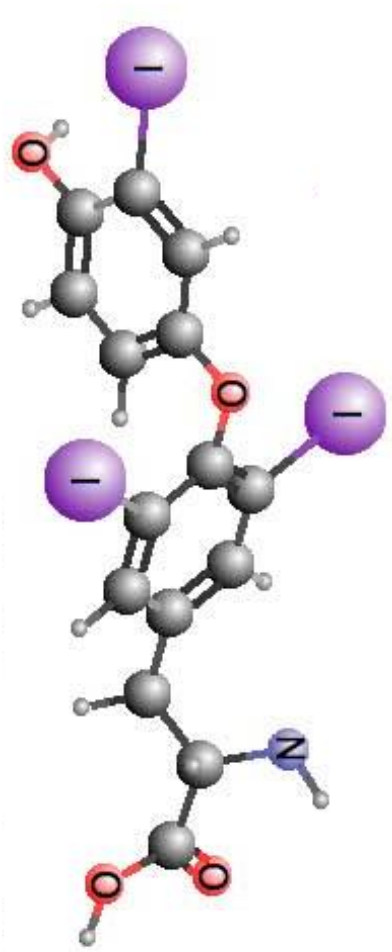
Na^+
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
Capillary
Colloid
Apical Membrane
I_2
I^-
Na^+
Follicular cell
Sodium-Iodide Symporter
Basolateral Membrane
T_4
TBG
Thyroxine Binding Globulin
Capillary

Thyroid Binding Globulin

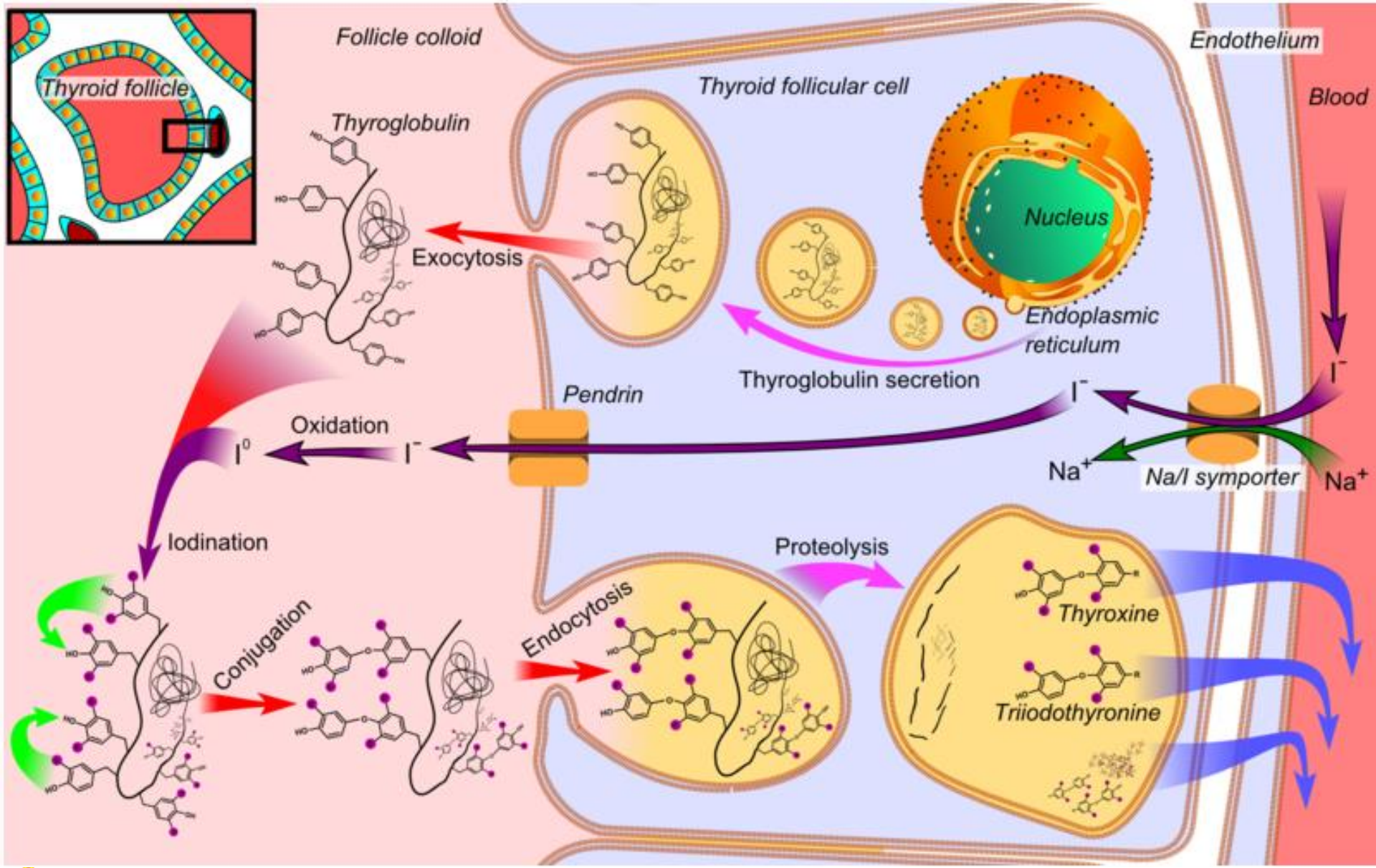


The Making of Triiodothyronine (T3)

- ✓T4 is converted to T3 by 5′ Deiodinase
- ✓Inhibited by stress, acute and chronic illness, fasting, cortisol (steroids)
- ✓T4 is also converted to inactive Reverse T3 (RT3) by 5 deiodinase
- ✓80% of T3 is produced in body tissues: liver, kidney, gut

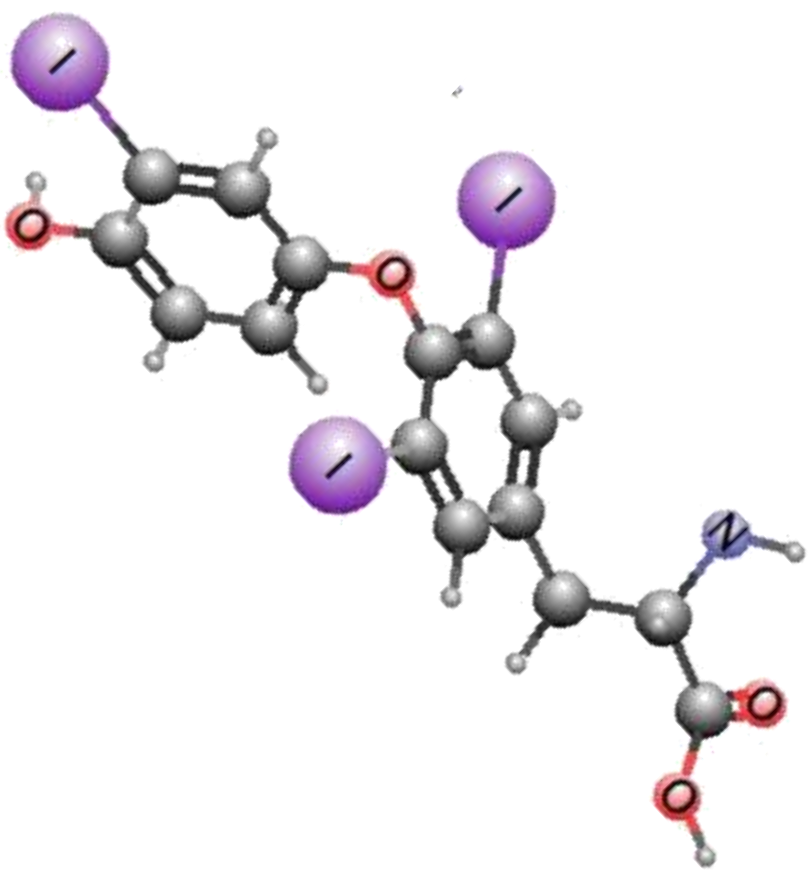


Thyroglobulin



How T3 Increases Metabolic Rate

- ✓ Pumps sodium and potassium across cell membranes to maintain resting membrane potential
- ✓ Acts on mitochondria to increase ATP synthesis
- ✓ Increases the synthesis of Na^+/K^+ pumps, markedly increasing ATP consumption.
- ✓ The resulting increased metabolic rate increases thermogenesis (heat production).



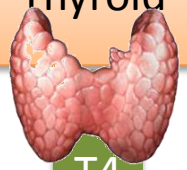
Hypothalamus

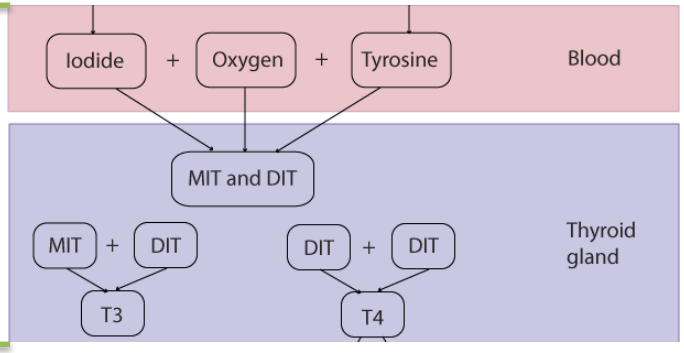
CRH

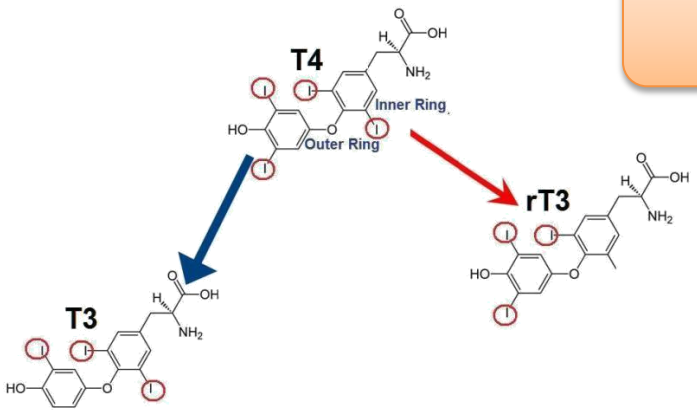
Pituitary

TSH

Thyroid







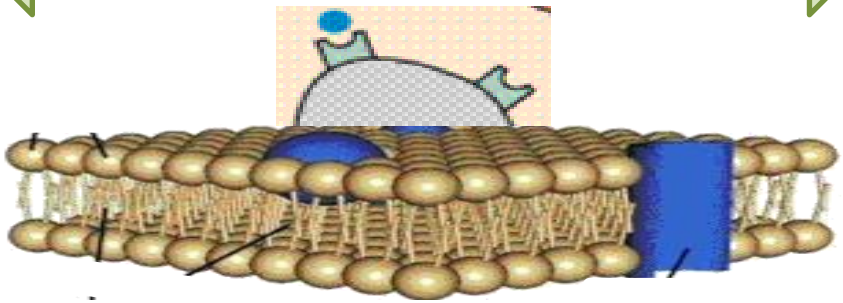
T4

5' Deiodinase

5 Deiodinase

T3

rT3



T4 to T3 Conversion Enhancers

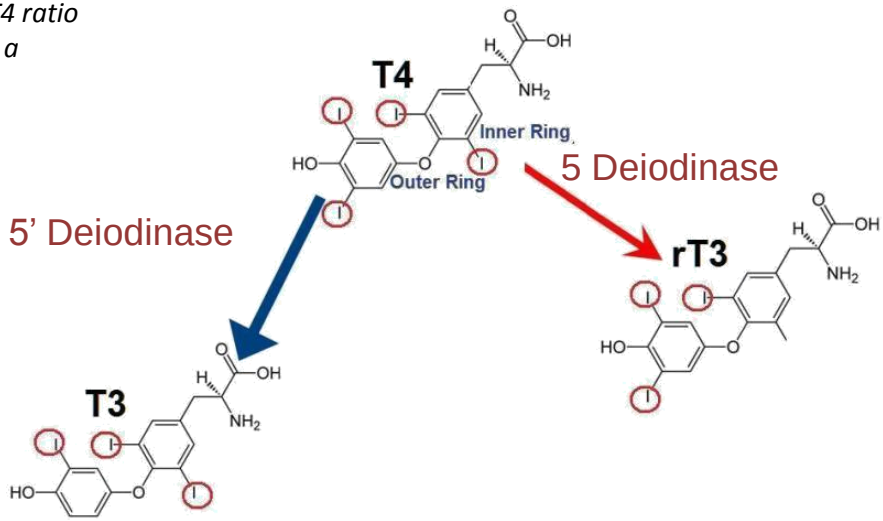
- ✓ Selenium

  A double-blind, placebo controlled trial of selenium normalized the T3 /T4 ratio in selenium-treated subjects (Clin Sci (Colch) 1995;89:637-42). However, a German study documented that inorganic, non-cysteine bound selenium dropped serum T3 fifty percent (Z Ernahrungswiss 1995;34:277-283)

- ✓ Zinc
- ✓ Vitamin D
- ✓ Iron
- ✓ Iodine
- ✓ Vitamins B6 and B12
- ✓ Copper
- ✓ Ashwagandha

  Krause's Food & the Nutrition Care Process, By L. Kathleen Mahan, Janice L Raymond, Sylvia Escott-Stump

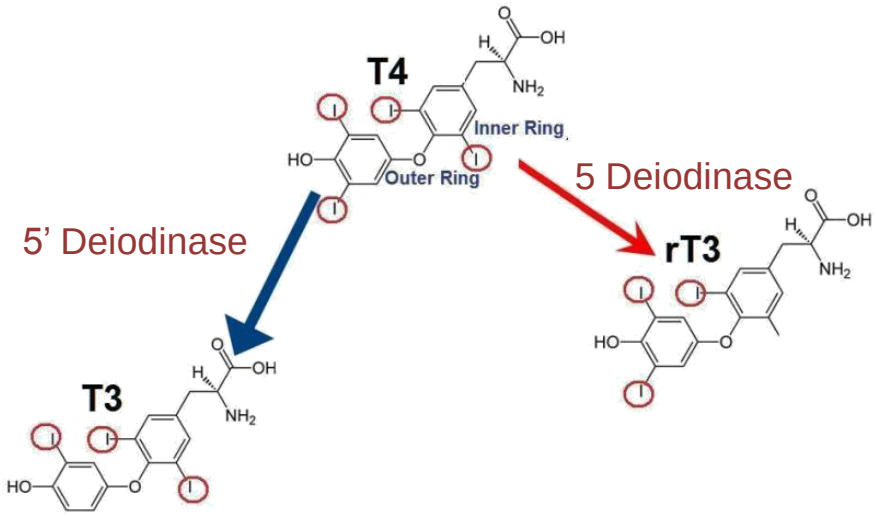
- ✓ Blood Sugar Balance
- ✓ Low stress



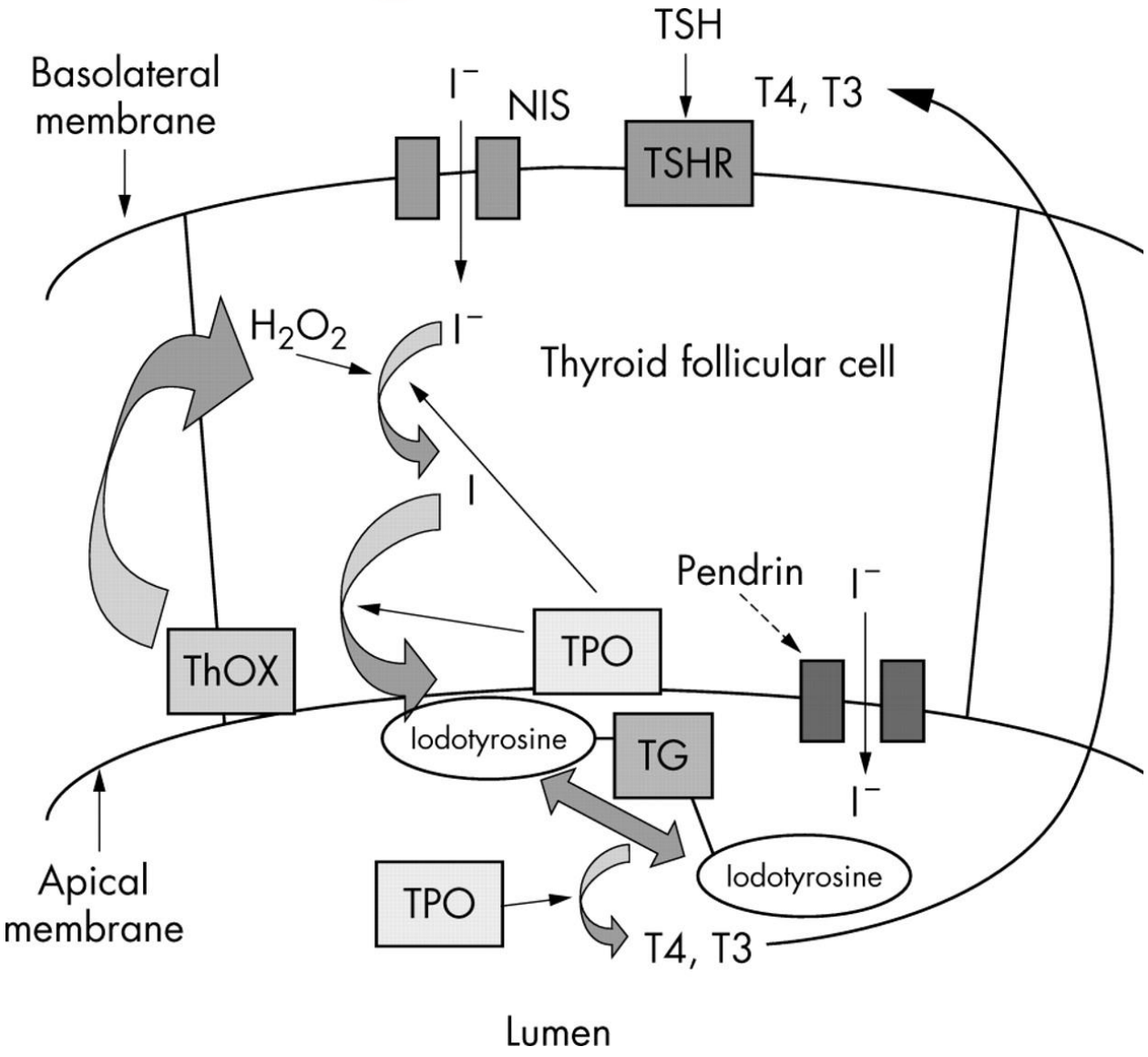
Beta blockers, antiarrhythmic, antianginal, and corticosteroid drugs are 5'-deiodinase inhibitors J Clin Endocrinol Metab 1975;41:911; Thyroid 1991;1:273-77; Acta Endocrinol (Copenh) 1983;103:254-258; J Clin Invest 1975;55:218; Clin Invest 1976;58:25)

Inducers of Reverse T3 aka rT3

- ✓ Illness
- ✓ Immune challenges
- ✓ Stress
- ✓ Inflammation (IL-6)
- ✓ Blood sugar imbalances
- ✓ Fasting or famine
- ✓ Toxins
- ✓ Impaired liver function
- ✓ Impaired kidney function
- ✓ Heavy metals, especially mercury and lead



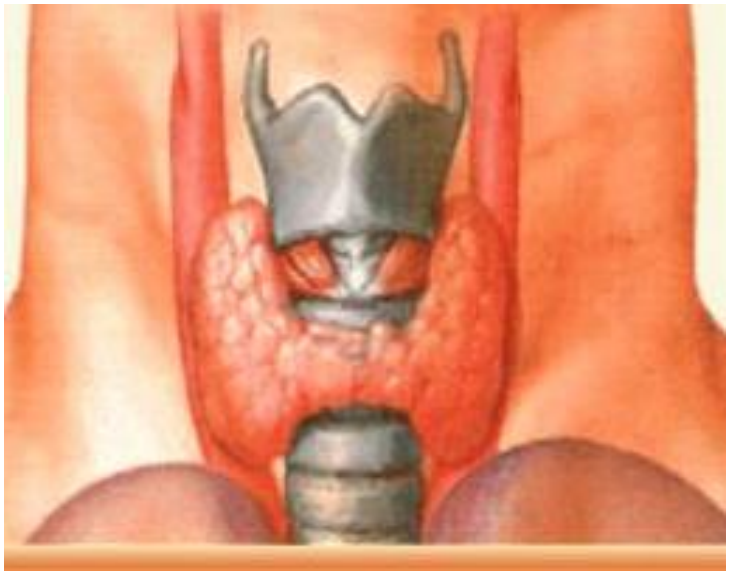
Thyroid Peroxidase



- Stimulated by TSH
- Inhibited by drugs such as propylthiouracil and methimazole.
- In laboratory rats with insufficient iodine intake, genistein (soy) inhibits TPO.

Types of Thyroid Dysfunction

- ✓ Hypothyroidism
- ✓ Hyperthyroidism
- ✓ Autoimmune Thyroid Conditions
  - ➢ Graves' Disease
  - ➢ Hashimoto's Thyroiditis
- ✓ Subclinical Thyroid Conditions
  - ➢ Binding Protein Problems
  - ➢ Conversion Problems
  - ➢ Thyroid Receptor Resistance
  - ➢ Wilson's Temperature Syndrome
- ✓ Cancer



The Zen to Wellness – Healing the Adrenals Through the Asian Self-Care Practices of Acupressure, Pranayama, Meditation, Tai Chi / Chi Gong and Tonic Herbs

Dr. David Weinthal, DOM, LAc