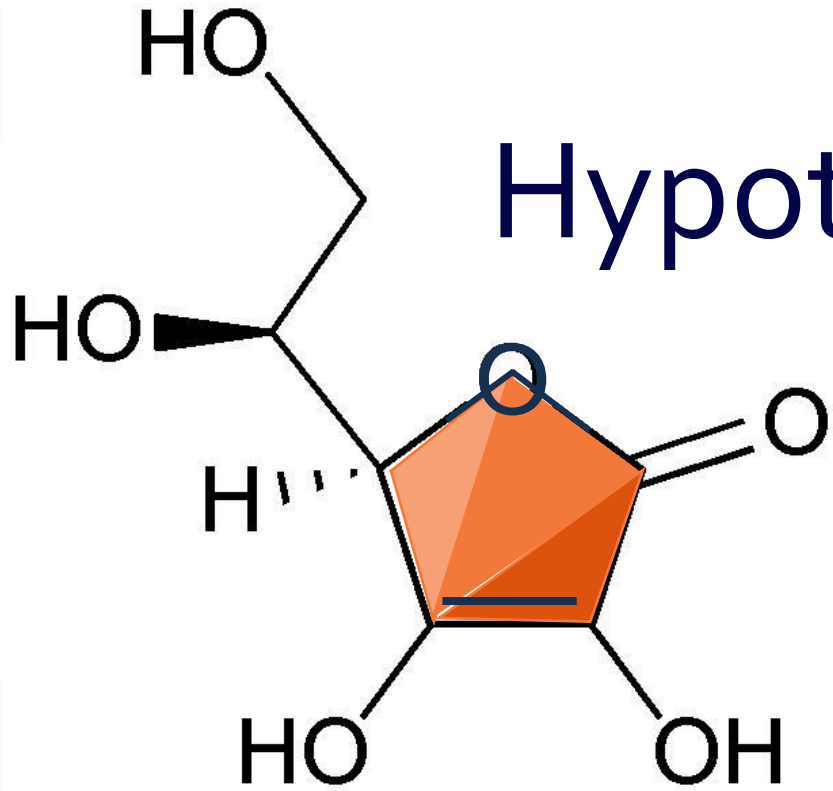


Riordan Clinic IVC Academy



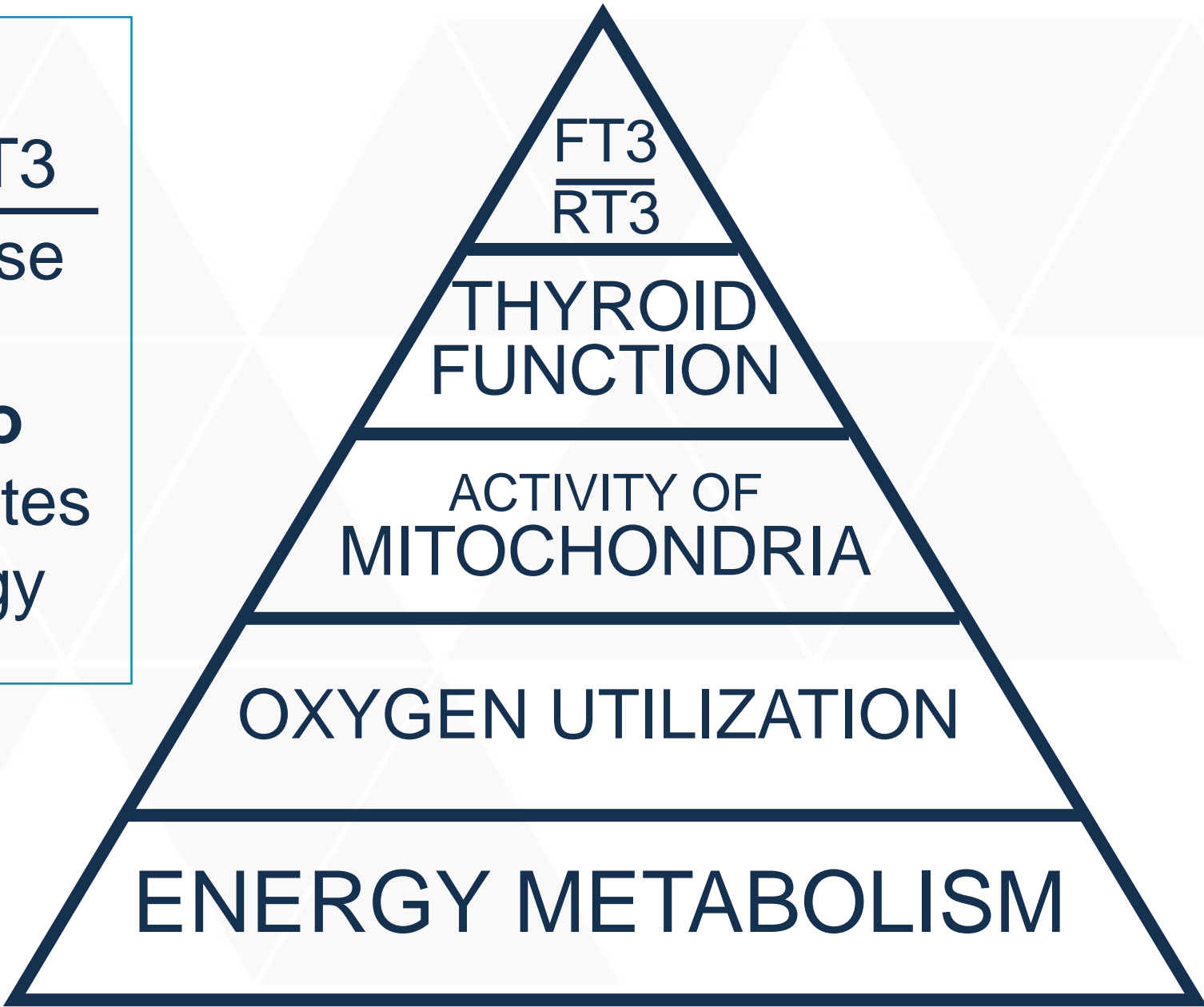
Hypothyroidism and EOMD



Five Key Concepts

1. Core Life Process: **ENERGY METABOLISM**
2. **ENERGY METABOLISM** is directly based upon **OXYGEN UTILIZATION**
3. **OXYGEN UTILIZATION** depends upon healthy **MITOCHONDRIAL ACTIVITY**
4. **MITOCHONDRIAL ACTIVITY** is regulated by **BALANCED THYROID FUNCTION**
5. **BALANCED THYROID FUNCTION** is controlled with an optimal **FT3/RT3 RATIO**

The
Free T3
Reverse
T3
Ratio
Regulates
Energy

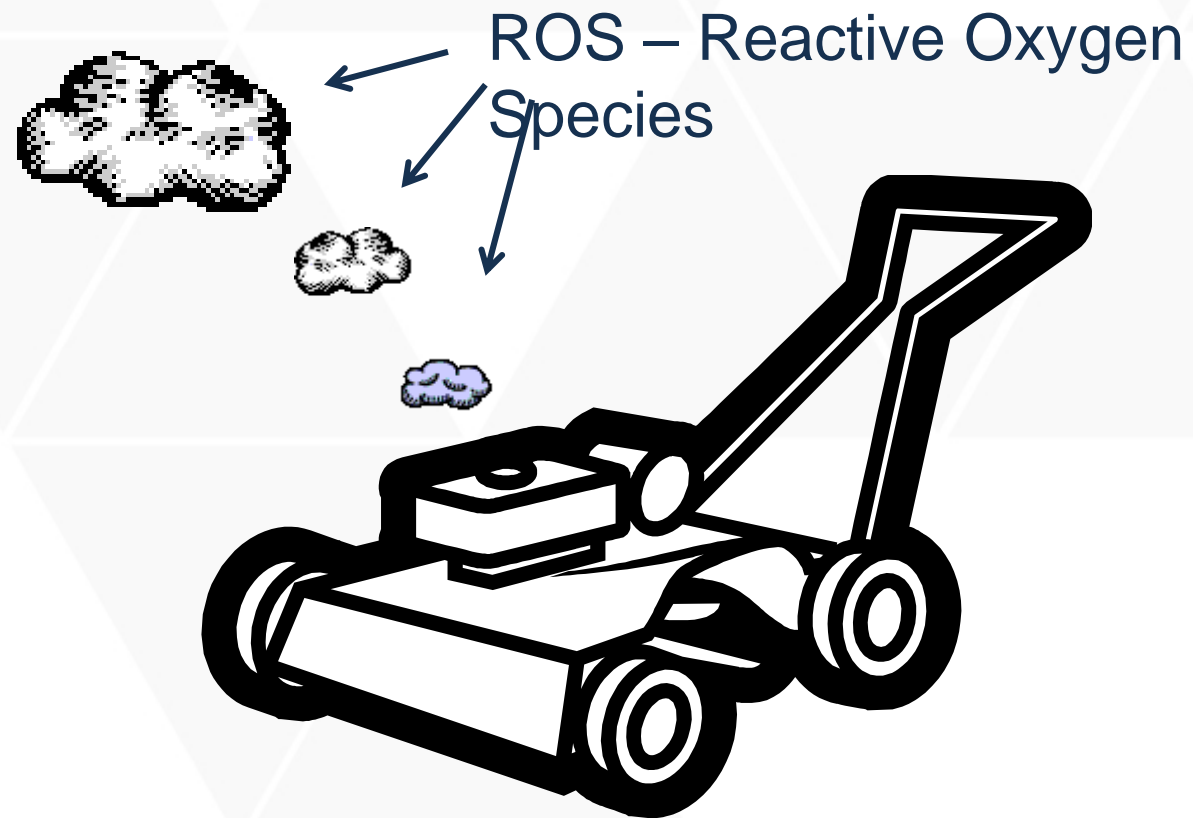


Poor Oxygen
Utilization Leads to
***Mitochondrial
Dysfunction***
in Cancer

Lecture #2

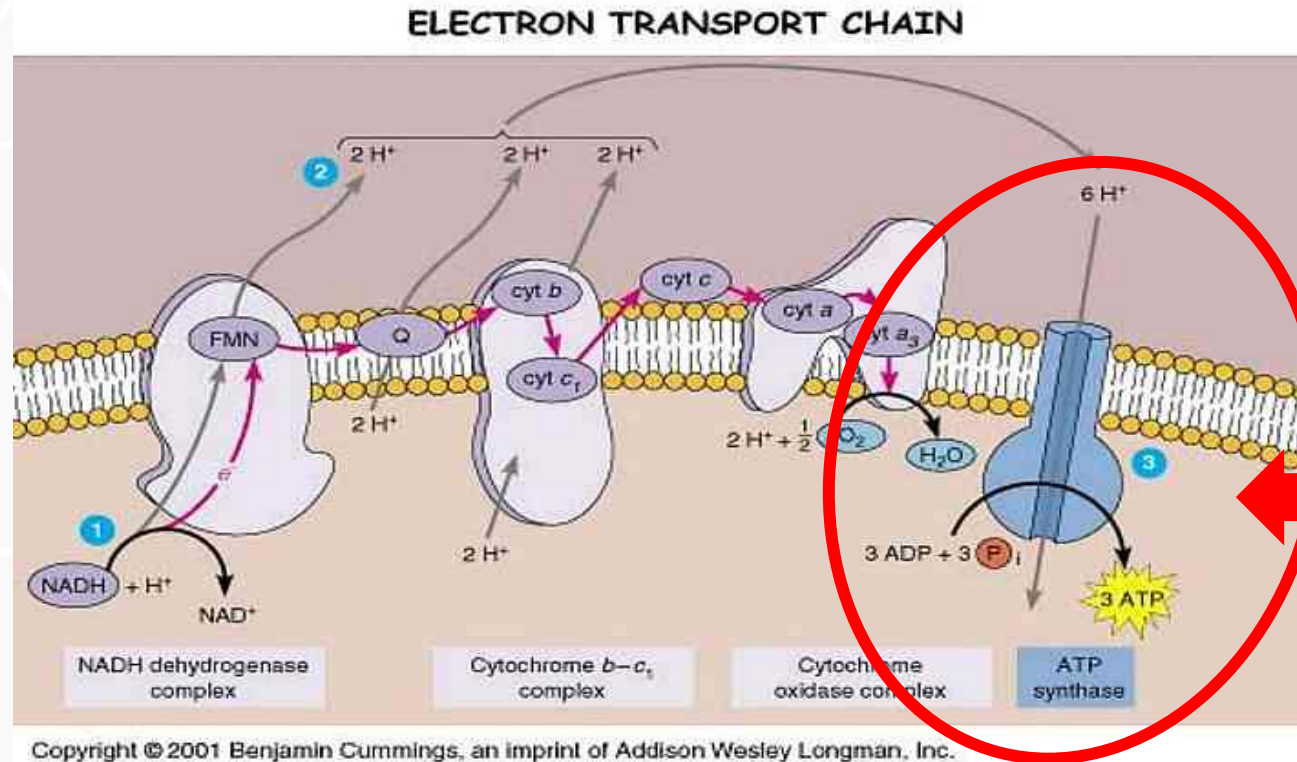
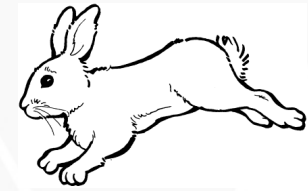
Mitochondrial
Re-regulation
Through the
Tight Control of
the
FT3/RT3 Ratio

Slow Metabolic Idle



Relieving the Proton Gradient

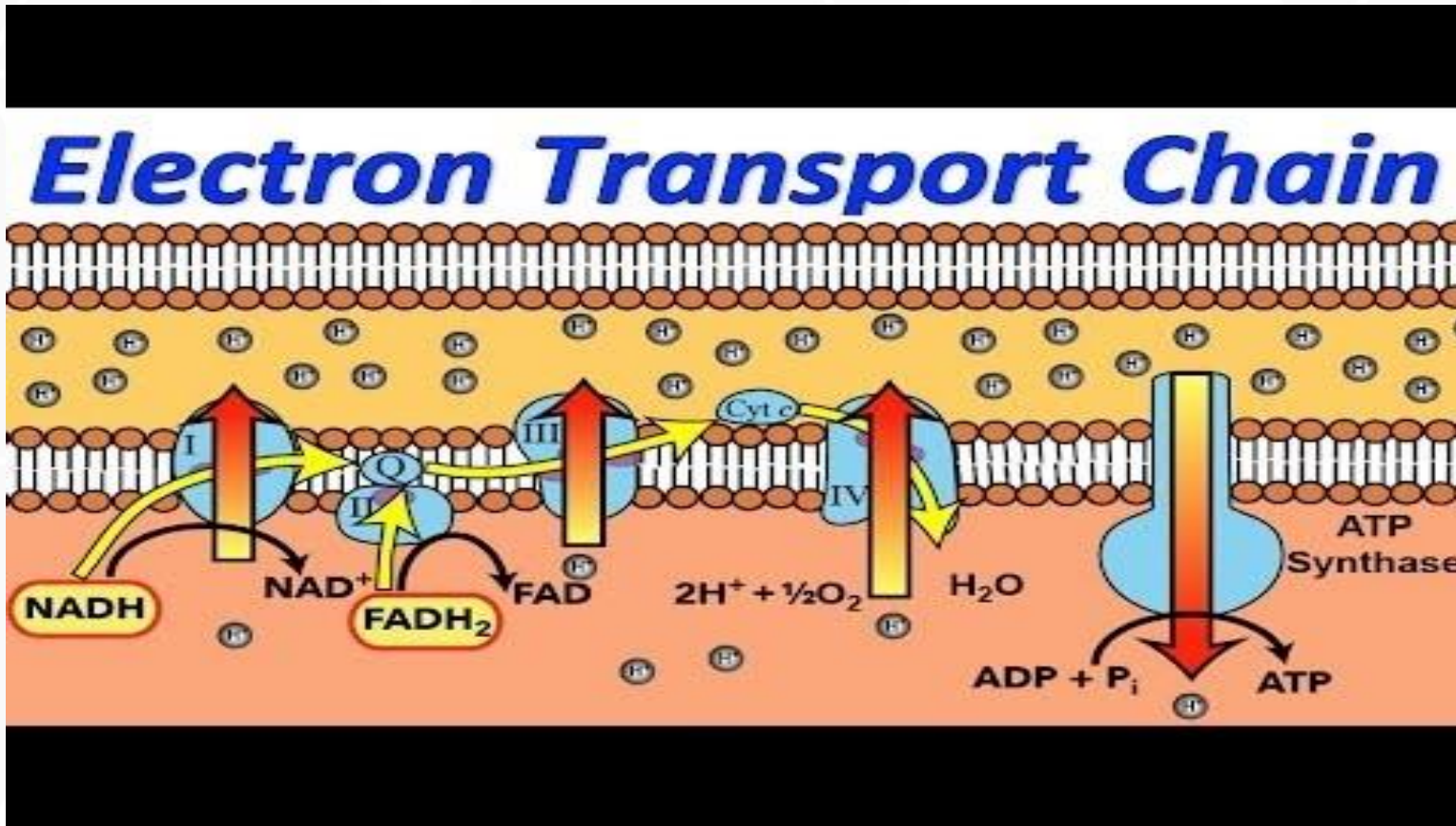
via the membrane enzyme complex 5 – ATP Synthase



Electrons from from **NADH** and **FADH₂** flow through the **electron transport chain**. Oxygen thus pumps protons out into the mitochondria membrane interspace where the proton gradient pushes them through **ATP synthase enzyme complex**.

Electron Transport Chain:

A two minute Musical Lecture



The Genesis of Mitochondrial Dysfunction

Complex Five converts ADP to **ATP**
but Root Causes deplete ADP

Intracellular oxidative stress buildup can shift cellular metabolism from

aerobic to anaerobic

Uncoupling Proteins

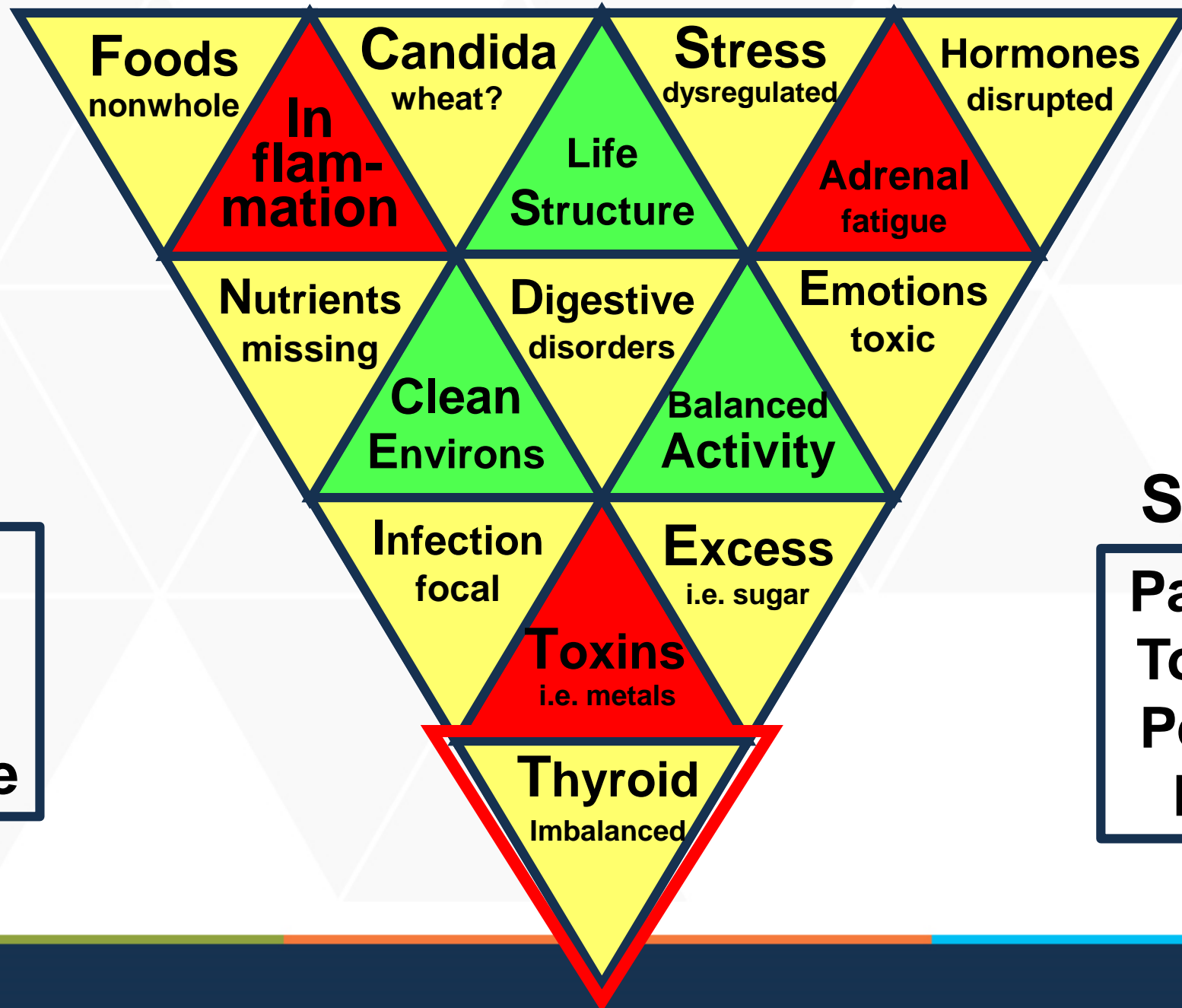
- Uncoupling proteins allow protons to re-enter the mitochondria without ADP
- The most active uncoupling protein is **UPC3**
- UCP3 is expressed almost exclusively in skeletal muscle and increases thermogenesis
- **Triiodothyronine (T3) up-regulates UPC3, and to some degree UPC1**

T3 Effects on Mitochondria

• T3 increases

- metabolic thermogenesis via UPC3
- induction of mitochondrial biogenesis via UPC1
- Result: increased oxygen utilization
- T3 regulation is a potential LINK to many of ROOT CAUSES of Chronic Illness and Cancer

Root Causes: Detect & Correct



Better Self Care

You begin
to see
yourself as
First Cause

S.O.A.P

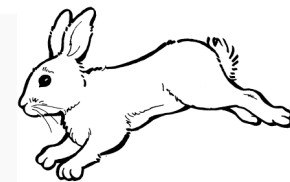
**Pathways
To Better
Personal
Health**

Dr. Broda Barnes...

did his PhD research at the University of Chicago, just a few years after Otto Warburg, in Germany, had demonstrated the role of a "respiratory defect" in cancer:

“ If hypothyroid people don't die young from infectious diseases, such as tuberculosis, they die a little later from cancer or heart disease.”

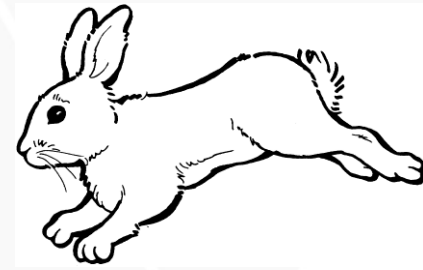
Thyroid Symptoms



- ✓ - Fatigue
- ✓ - Headaches
- Migraines
- ✓ - PMS
- ✓ - Irritability
- ✓ - Fluid retention
- ✓ - Anxiety
- Panic attacks
- ✓ - Hair loss
- ✓ - Depression
- ✓ - Decreased memory
- ✓ - Decreased concentration
- ✓ - Decreased sex drive
- ✓ - Unhealthy nails
- ✓ - Low motivation
- Constipation
- ✓ - Irritable bowel syndrome
- ✓ - Inappropriate weight gain
- ✓ - Dry skin
- ✓ - Dry hair
- ✓ - Insomnia
- ✓ - Falling asleep during the day
- ✓ - Arthritis and joint aches
- Allergies
- ✓ - Asthma
- ✓ - Muscle aches
- ✓ - Itchiness
- ✓ - Elevated cholesterol
- Ulcers
- ✓ - Increased nicotine, caffeine use

- ✓ - Abnormal throat sensations
- ✓ - Sweating abnormalities
- ✓ - Heat and/or cold intolerance
- Low self esteem
- ✓ - Irregular periods
- ✓ - Severe menstrual cramps
- ✓ - Low blood pressure
- ✓ - Frequent colds & sore throats
- Frequent urinary infections
- ✓ - Lightheadedness
- ✓ - Ringing in the ears
- ✓ - Slow wound healing
- ✓ - Easy bruising
- Acid indigestion
- ✓ - Flushing
- ✓ - Frequent yeast infections
- ✓ - Cold hands and feet
- Poor coordination
- ✓ - Slow development as a child
- ✓ - Infertility
- ✓ - Hypoglycemia
- Increased skin infections – acne
- ✓ - Abnormal swallowing
- Changes in skin pigmentation
- ✓ - Prematurely gray hair
- ✓ - Excessively tired after eating
- Carpal tunnel syndrome
- ✓ - Dry eyes – blurry vision
- ✓ - Hives
- Bad breath

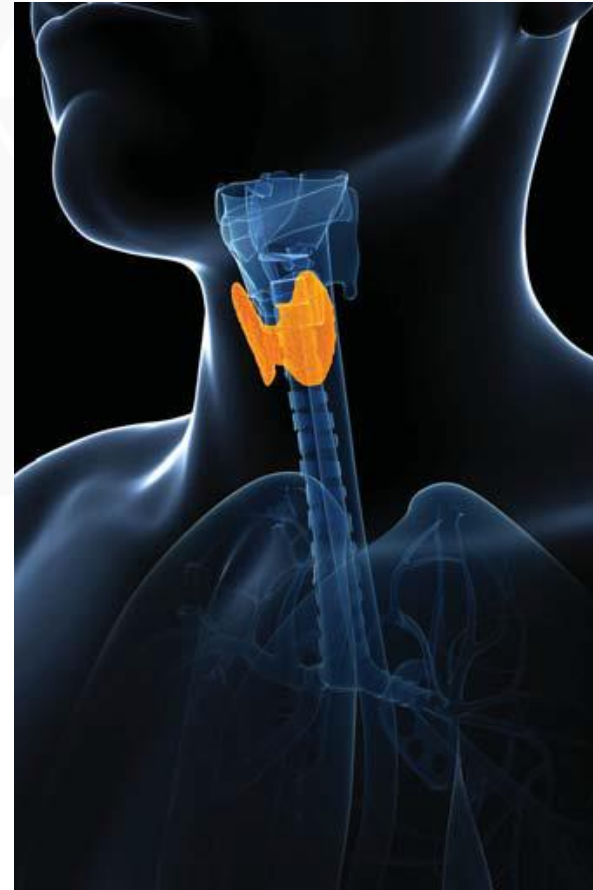
Mayo Clinic Publication



- Fatigue
- Increased cold sensitivity
- Constipation
- Dry skin
- Unexplained weight gain
- Puffy face
- Hoarseness
- Muscle weakness
- Elevated cholesterol
- Muscle achiness
- Pain, stiffness or swelling in your joints
- Heavier than normal or irregular menstrual periods
- Thinning hair
- Slowed heart rate
- Depression
- Impaired memory

**If My Thyroid
Is "Normal,"
Why Do I Feel
so Bad?**

rhunninghake@riordanclinic.org



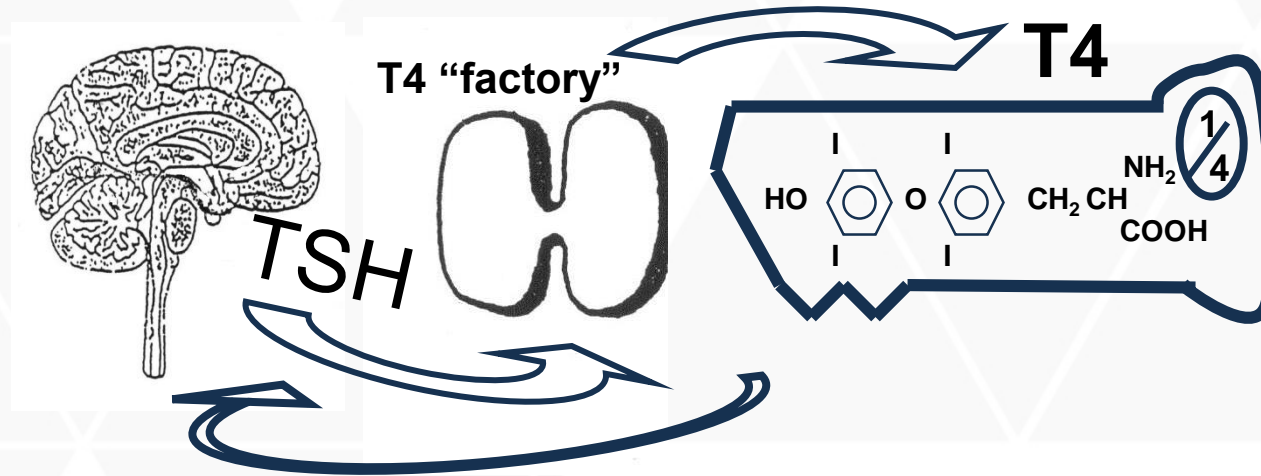
riordanclinic.org

> **Click "Learn"**

> **Click "Video Gallery"**

The Thyroid Glandular Regulation System

Glandular Regulation

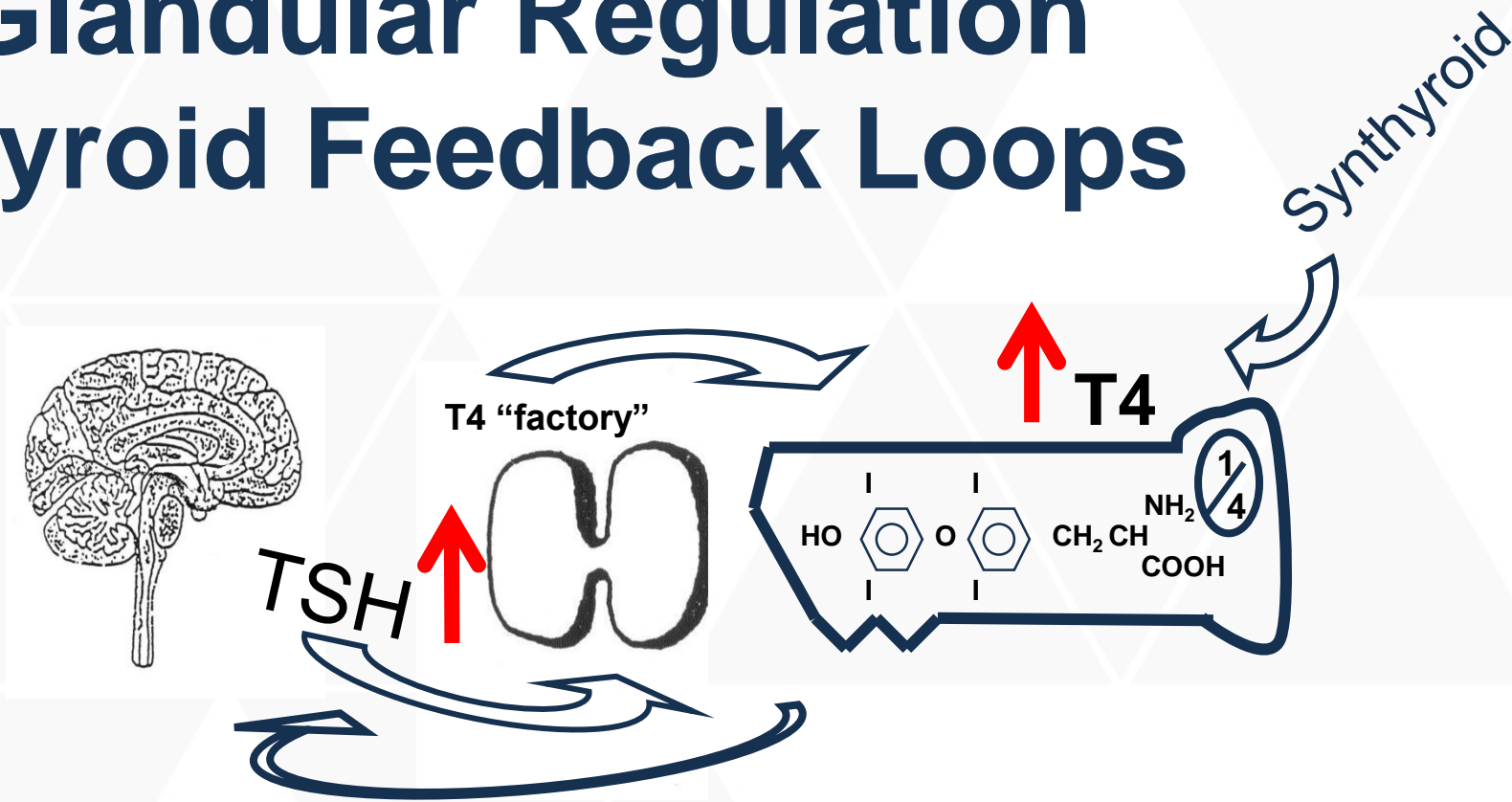


TSH = Thyroid Stimulating Hormone

Your TSH is in
the normal
range. Your
thyroid is OK.

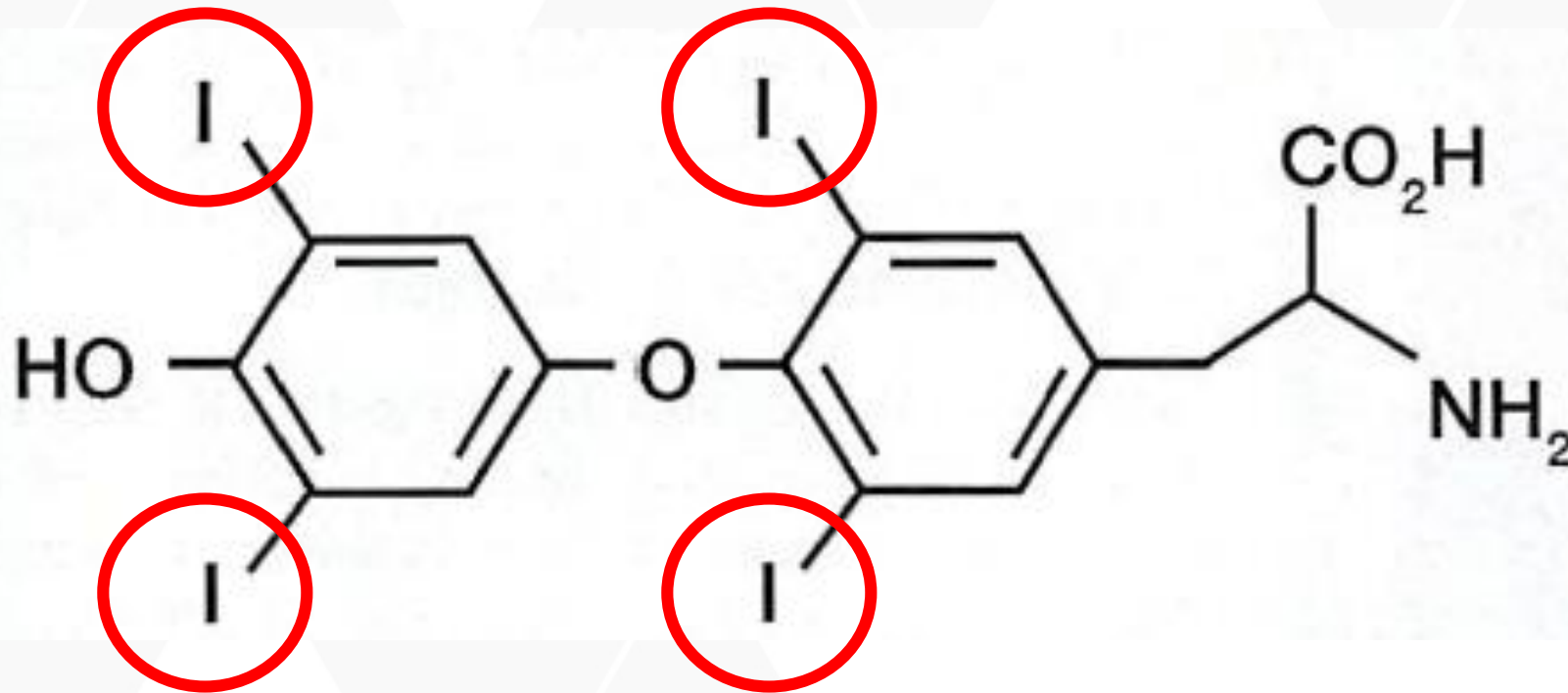


Glandular Regulation Thyroid Feedback Loops



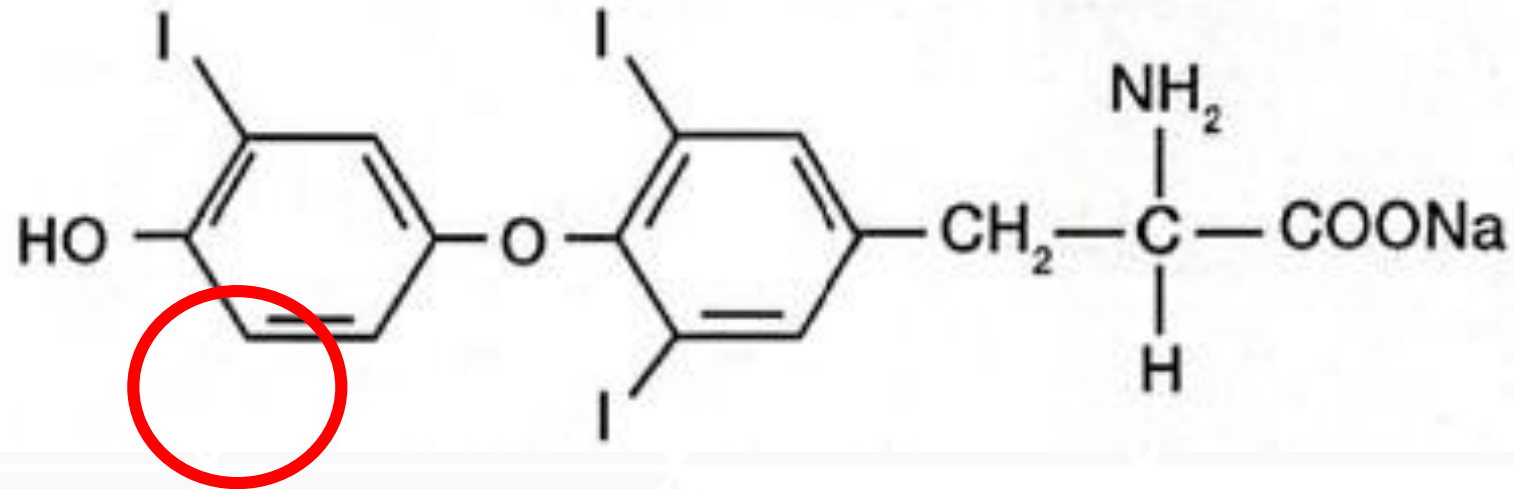
Typical Medical Understanding
of “Thyroid Care”

thyroxin - T4 - levothyroxine



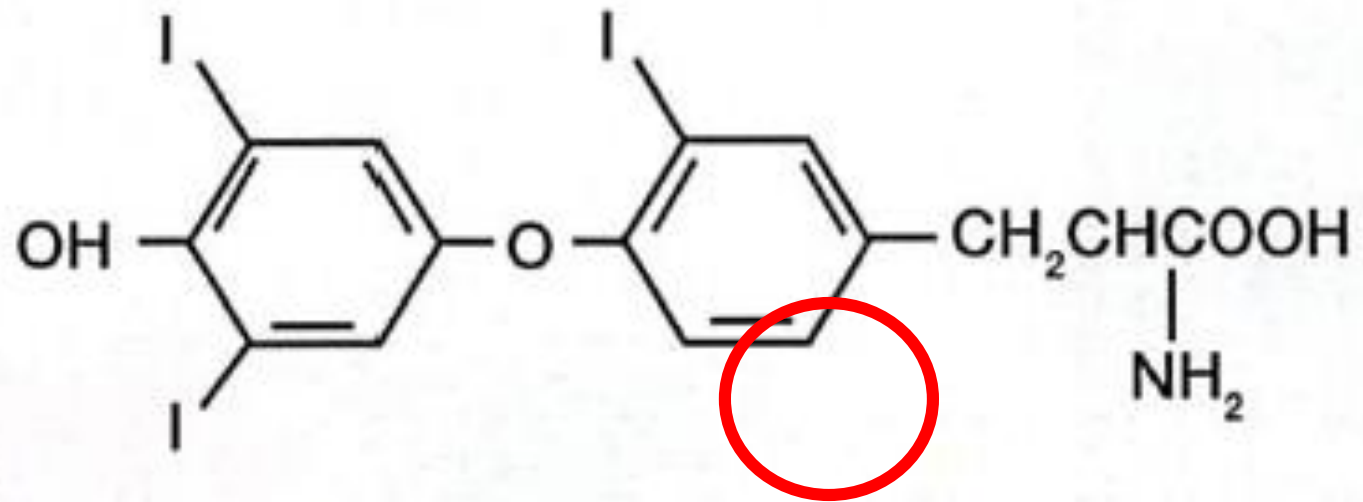
T4 = **Four** iodine atoms

T3 – liothyronine

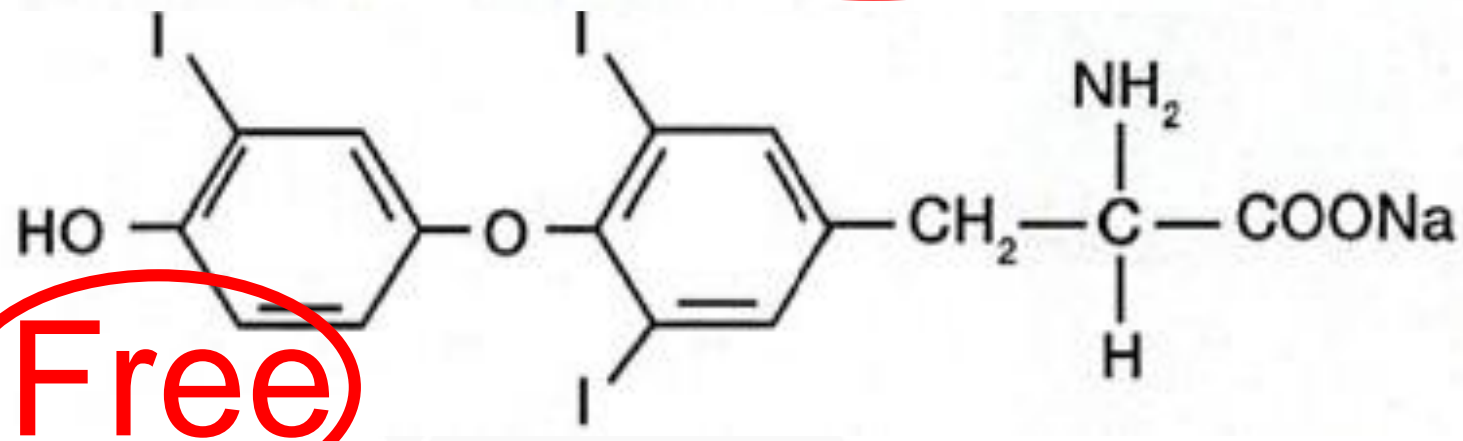
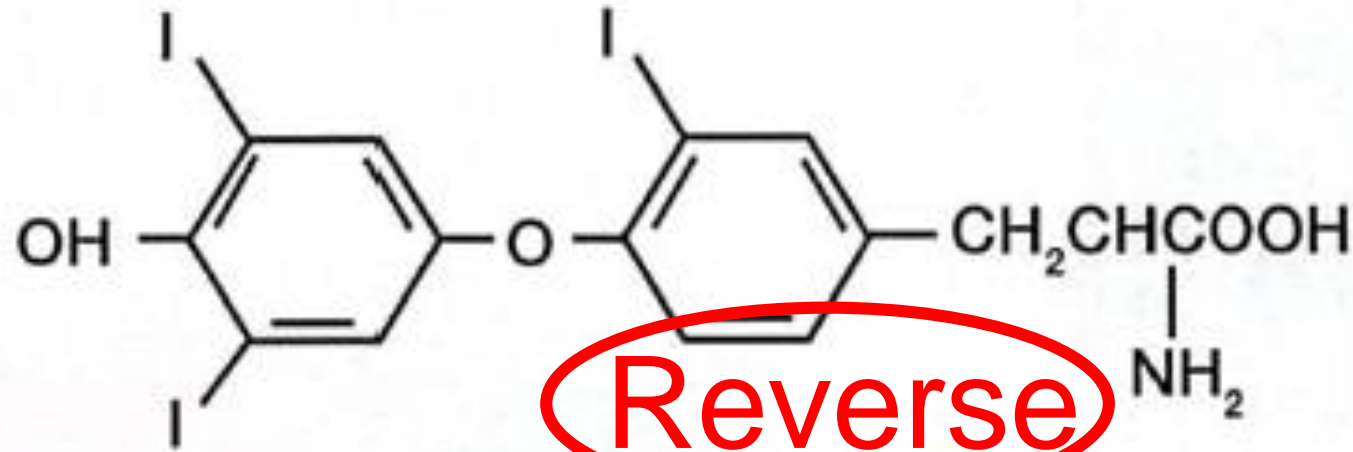


T3 = **Three** iodine atoms

Reverse T3

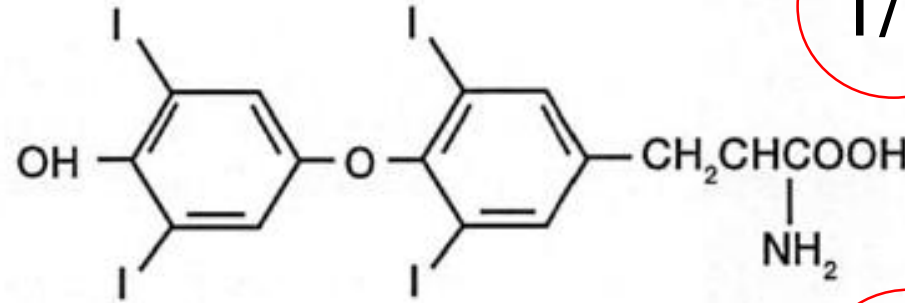


Reverse T3 vs. Free T3



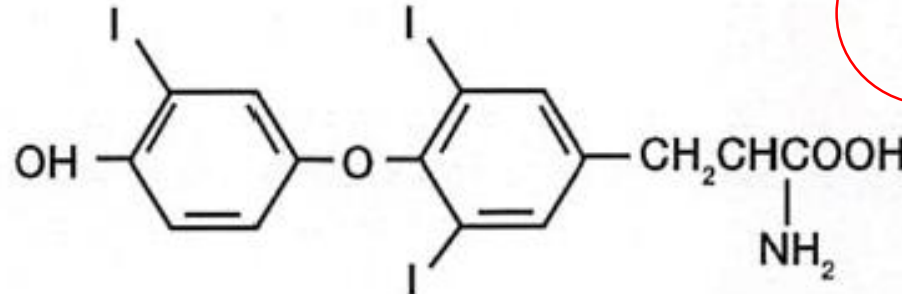
Cellular Receptor Activity:

T4 •



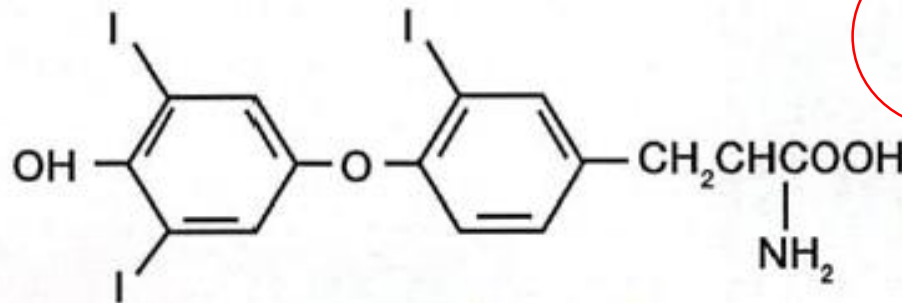
1/4

T3 •



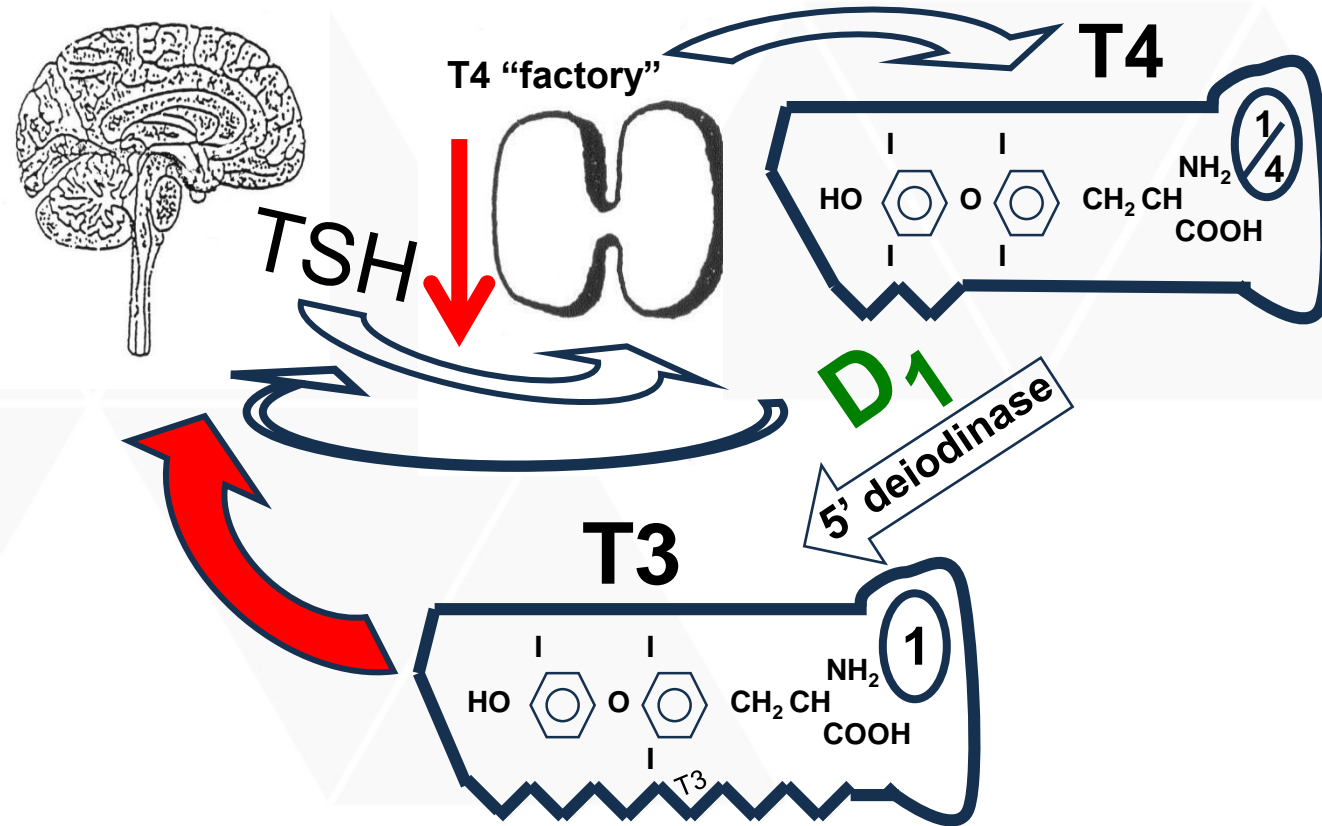
1

rT3 •

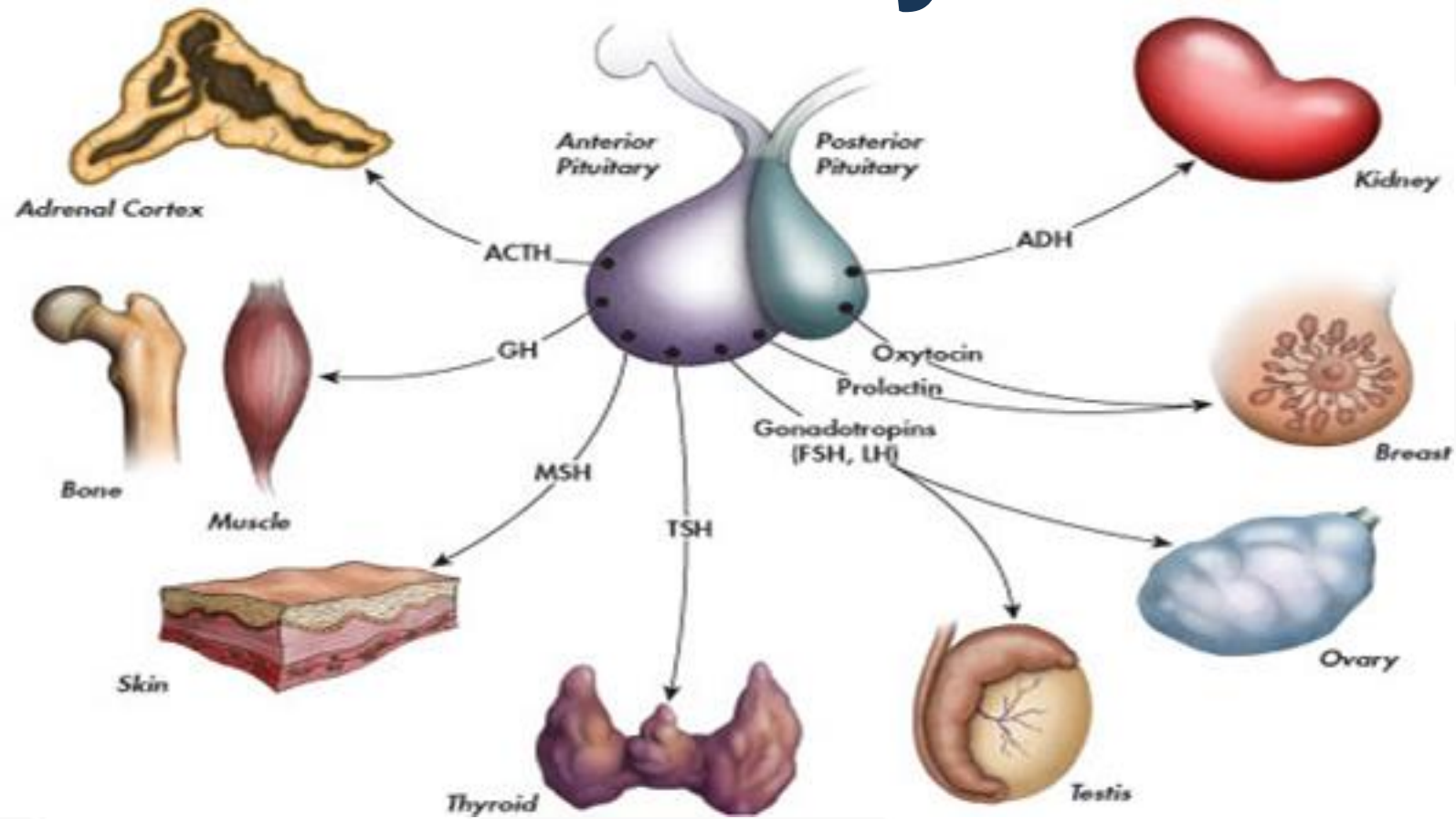


0

Does Thyroid Health = TSH Regulation?

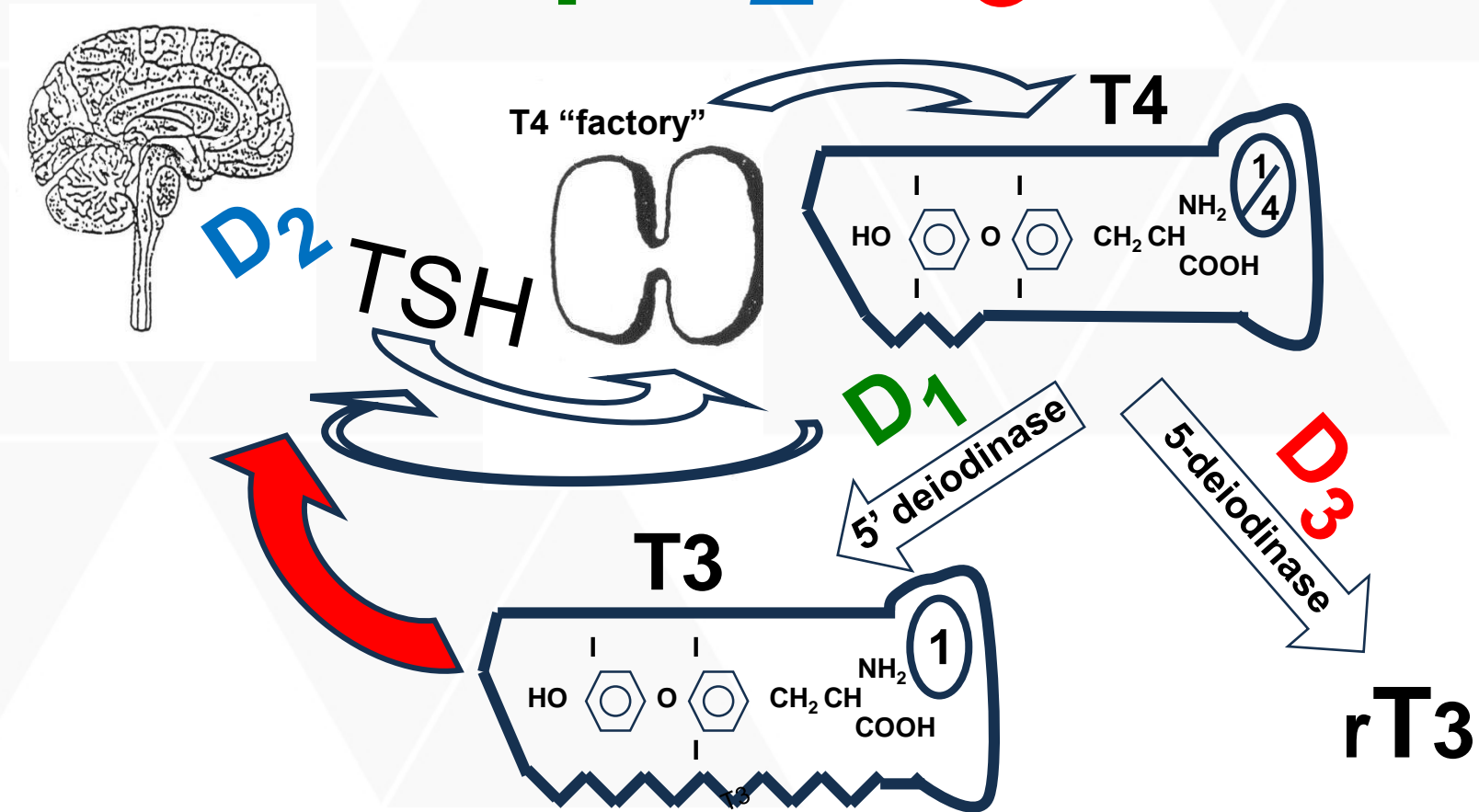


What Regulates the Pituitary?



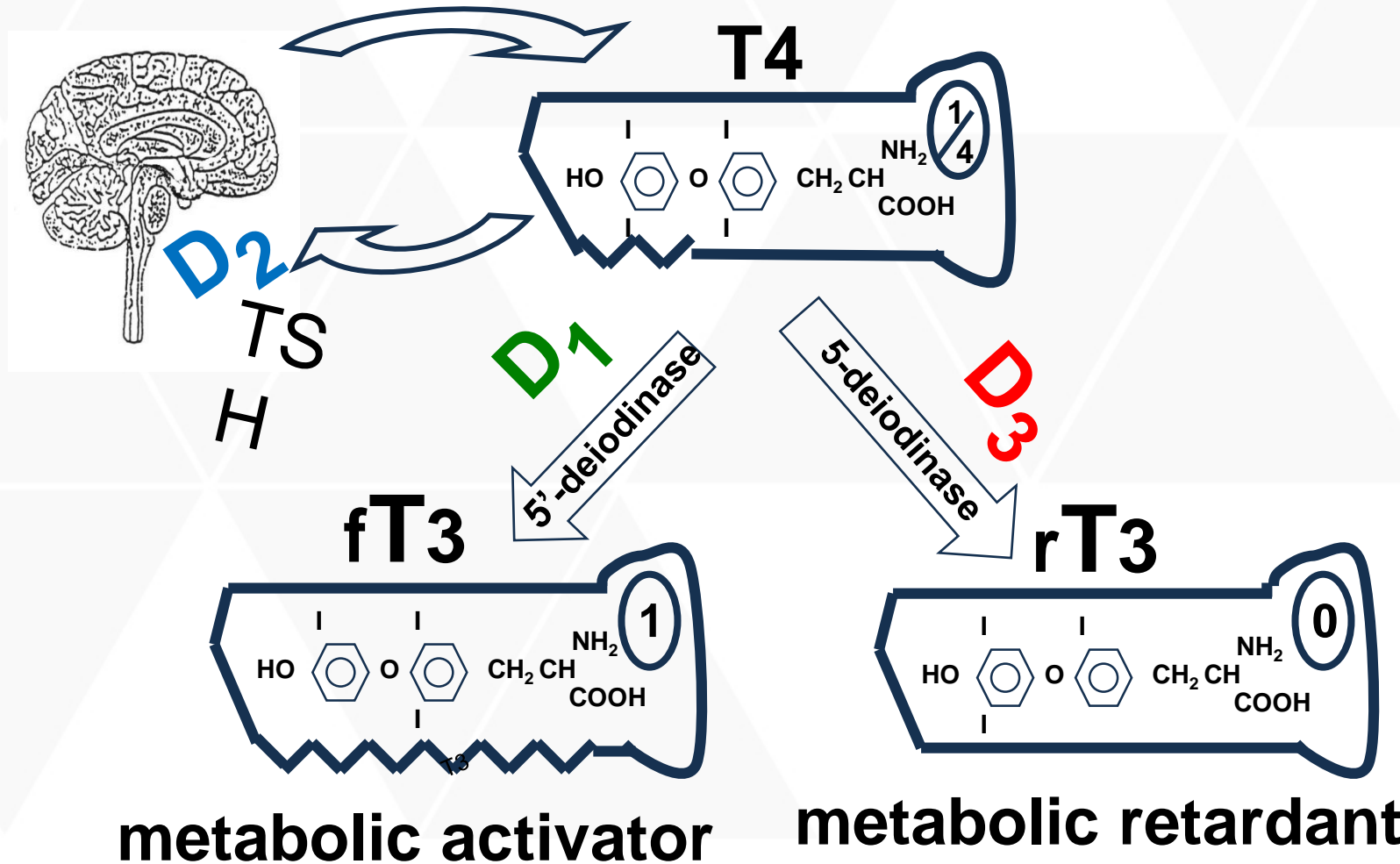
The Role of Deiodinases

D₁ **D₂** **D₃**

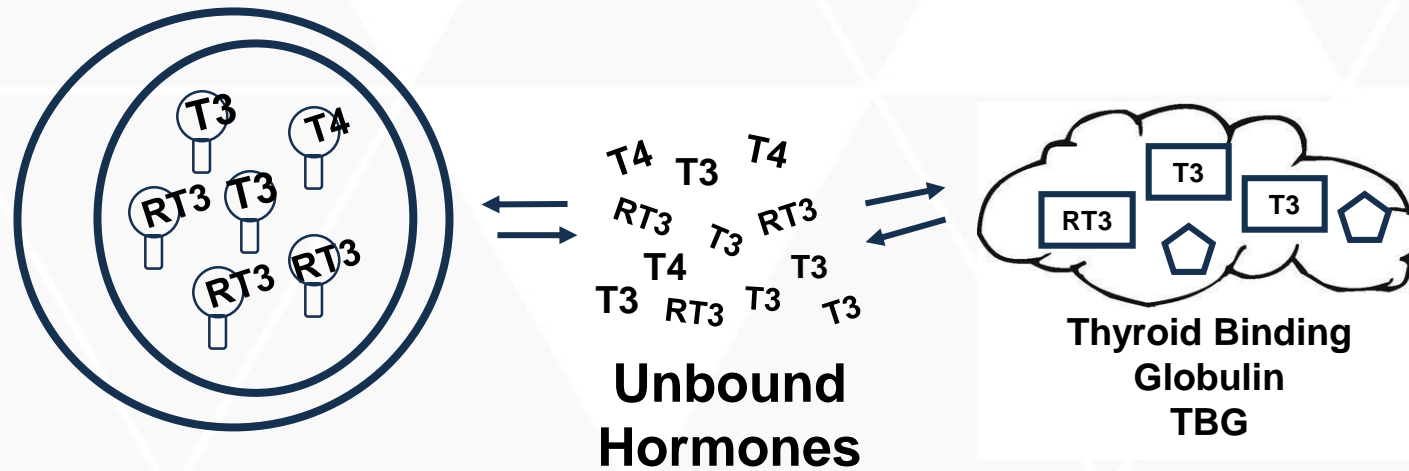


The Thyroid-Metabolic Regulation System

Cellular Regulation



Thyroid hormones are delivered to EVERY CELL IN THE BODY!



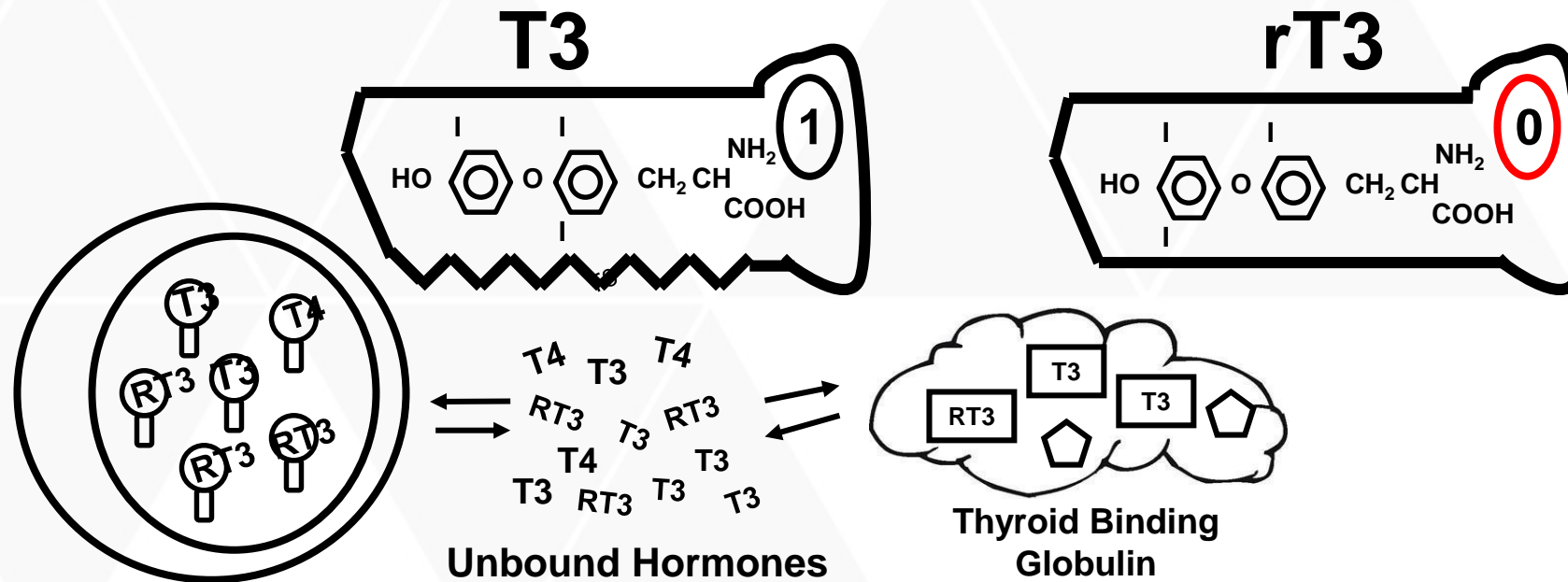
**Thyroid Receptors
on the Nucleus
are like Key Holes**

Cellular Uptake depends on
Transporter Activity and
Thyroid Hormone Structure
and TBG Activity

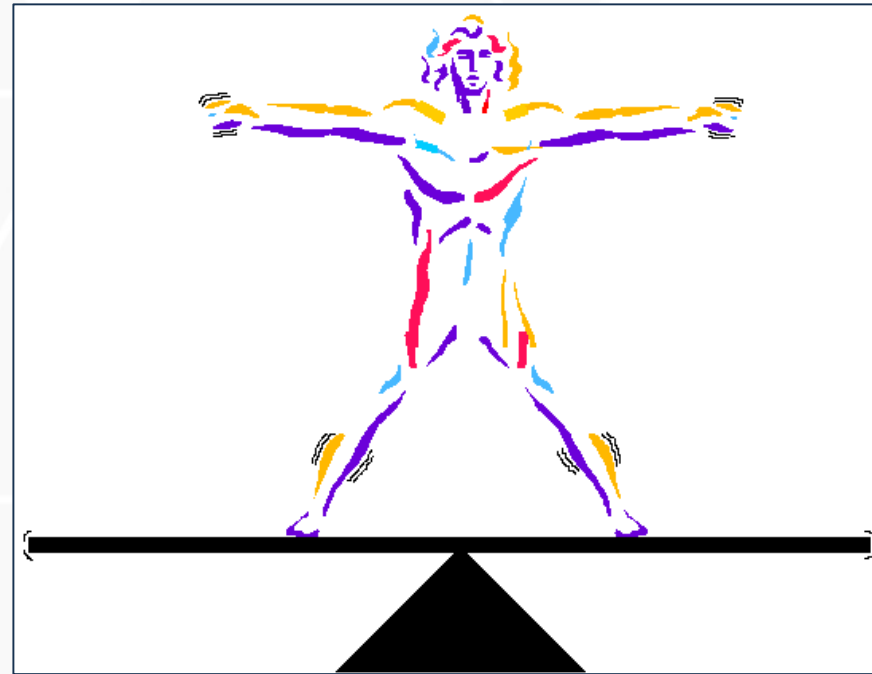
rT3 = ZERO

cellular receptor activity

rT3 is a “Competitive Inhibitor”



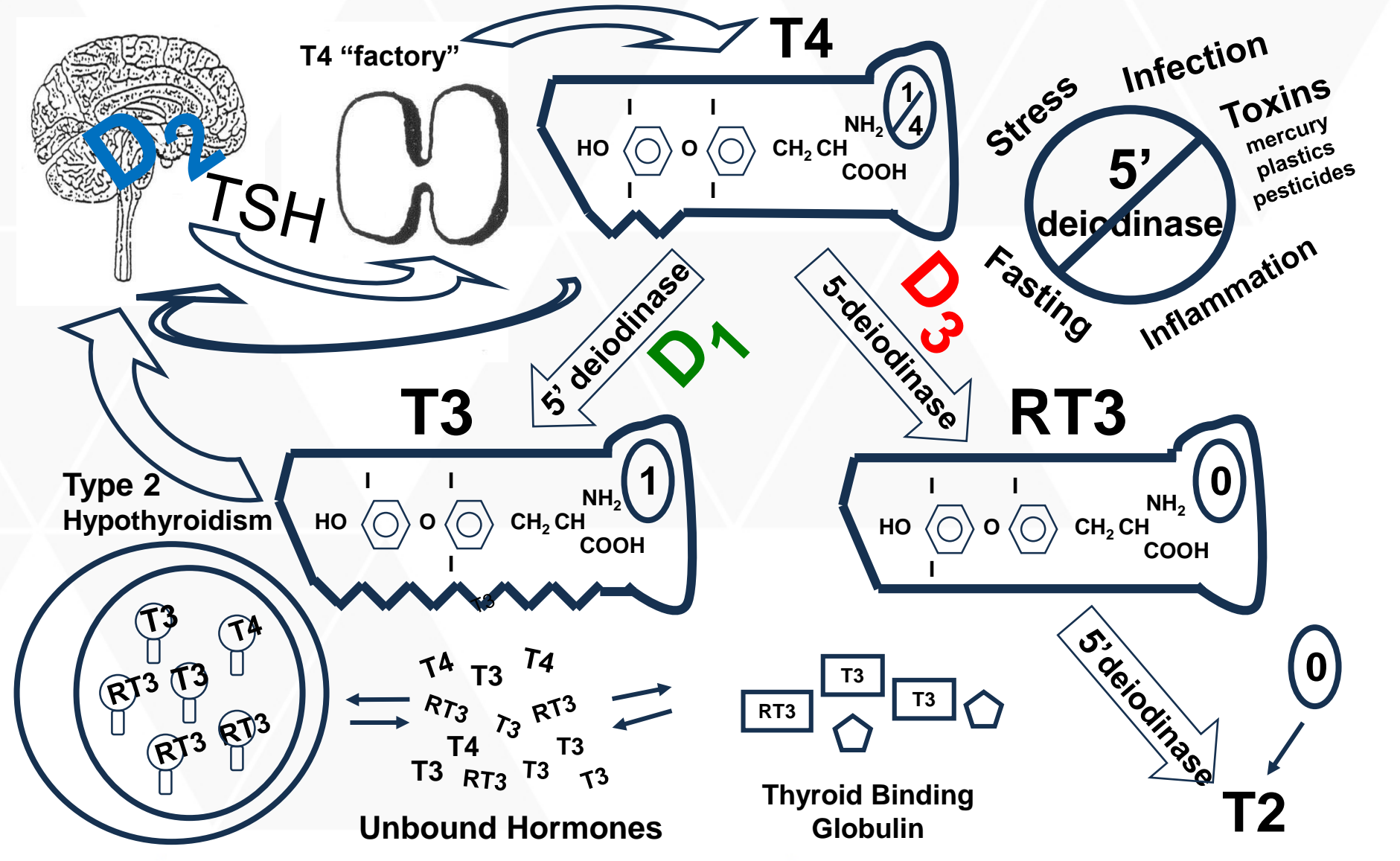
Thyroid Homeostasis



A Molecular Mechanism

The Thyroid-Metabolic Regulation System

Glandular Regulation ↔ Cellular Regulation

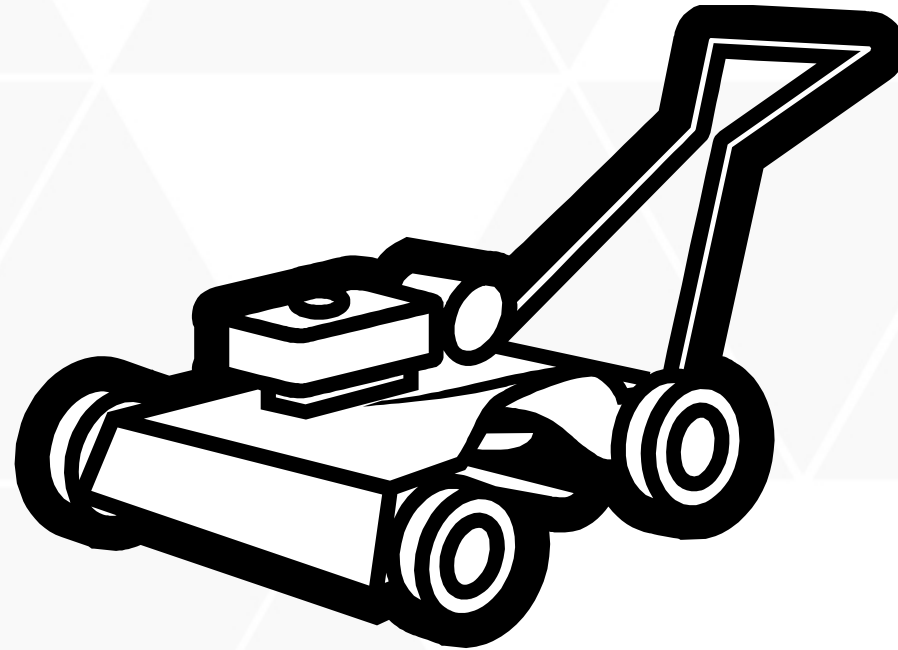


fT₃/rT₃ Ratio regulates Oxygen utilization



* For extensive references go to nahypothroidism.org

Low Ratio = Slow Metabolic Idle



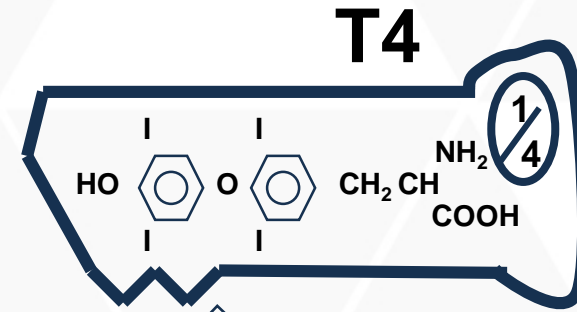
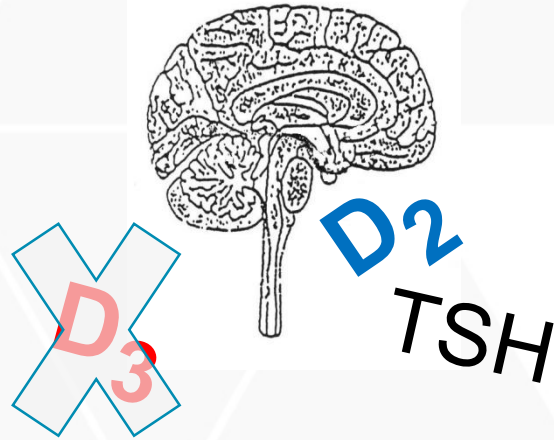
High Ratio = Fast Metabolic Idle

D₁ Factoids

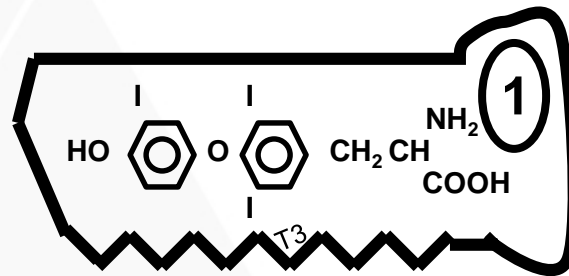
- D1 converts inactive T4 to active T3 throughout the body
- **BUT - D1 is not a significant determinant of pituitary T4 to T3 conversion**
 - Pituitary T4 to T3 conversion is controlled by D2 (1,7,10).

Peripheral Cells

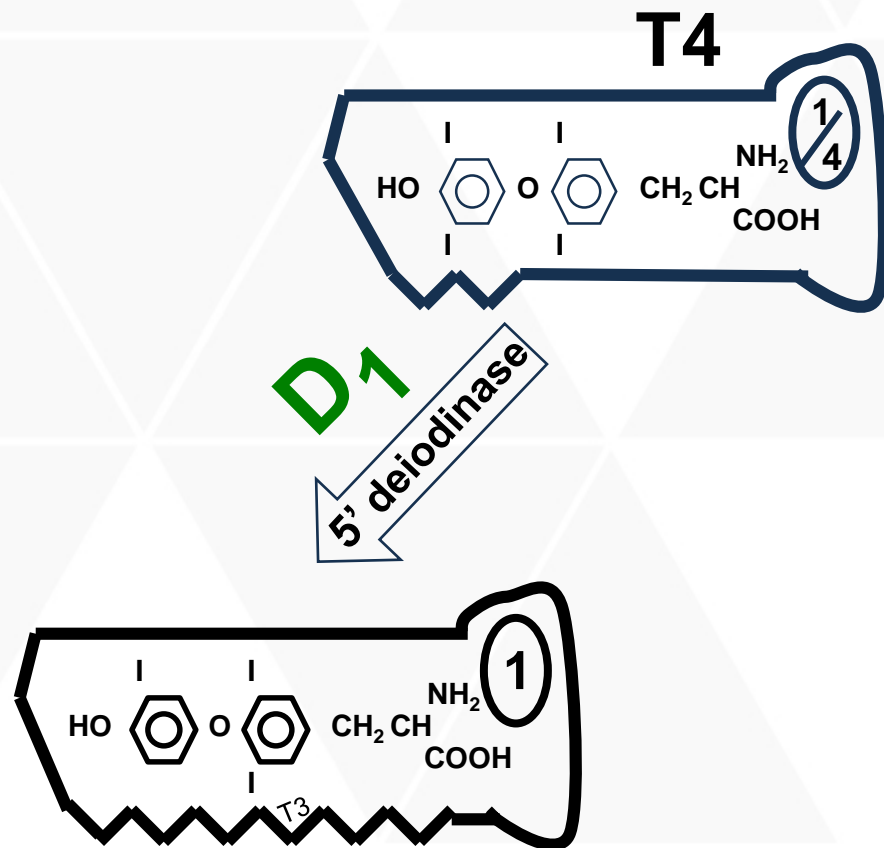
T4 ^{D₁} → T3



D₁
5' deiodinase



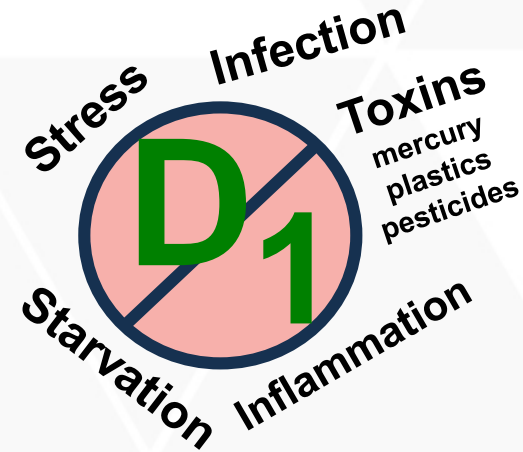
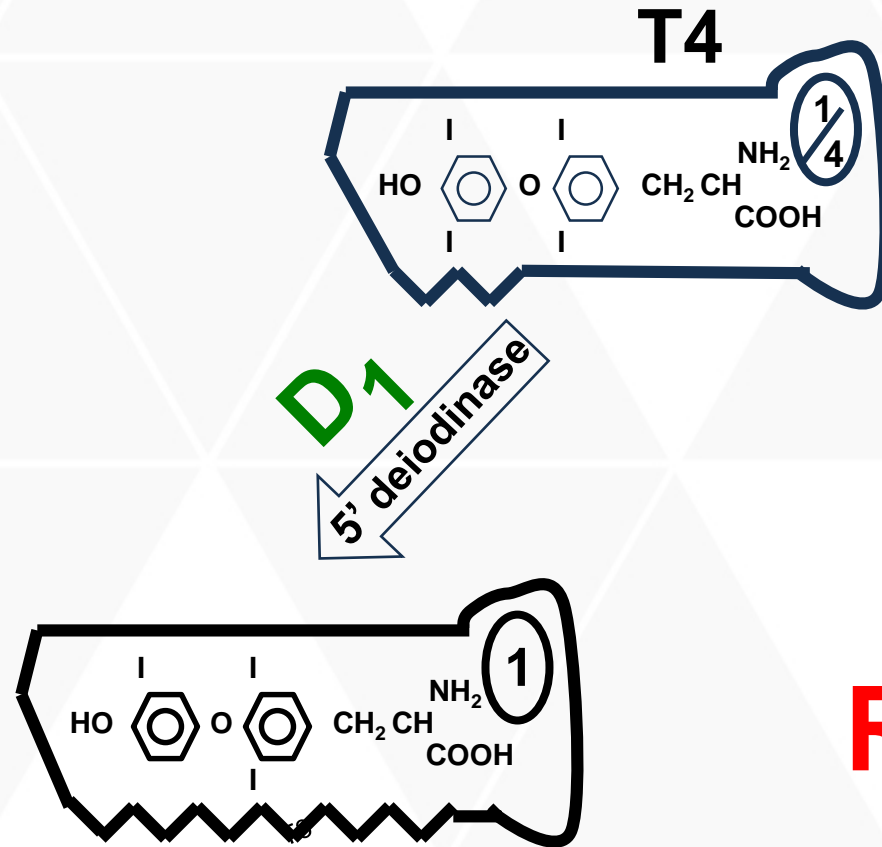
Epigenetic Environmental Factors REGULATE Enzyme Kinetics



D₁ but not D₂ is suppressed and down-regulated
(decreasing T4 to T3 conversion) in response to

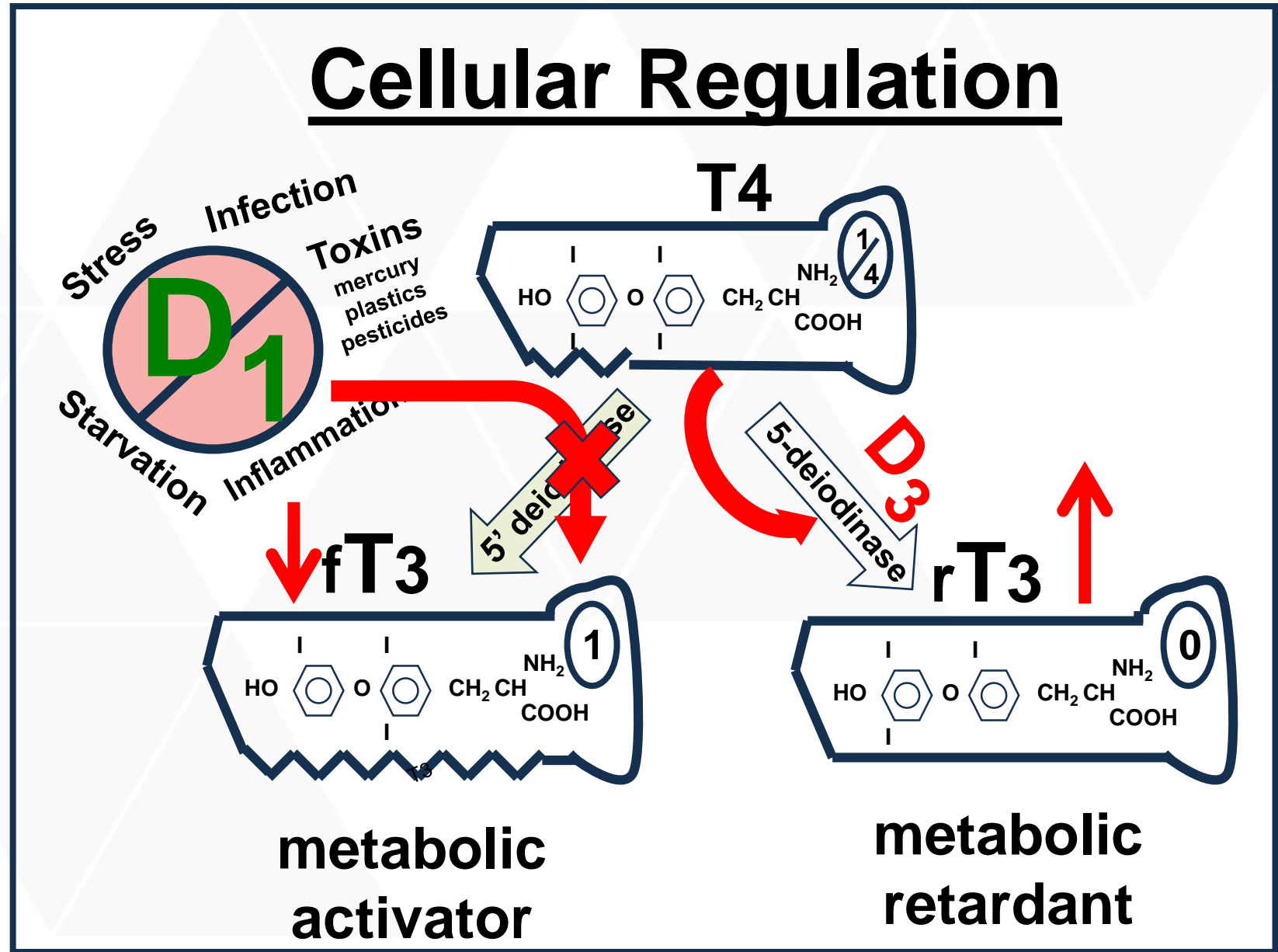
- physiologic and emotional stress
(11-22)
- depression
(23-45)
- dieting
(46-51)
- weight gain and leptin resistance
(47-91)
- insulin resistance, obesity and diabetes
(91-99)
- inflammation from autoimmune disease or systemic illness
(11,100,102-115)
- chronic fatigue syndrome and fibromyalgia
(121-125)
- chronic pain
(116-120)
- exposure to toxins and plastics
(126-134)

Epigenetic Environmental Factors REGULATE Enzyme Kinetics

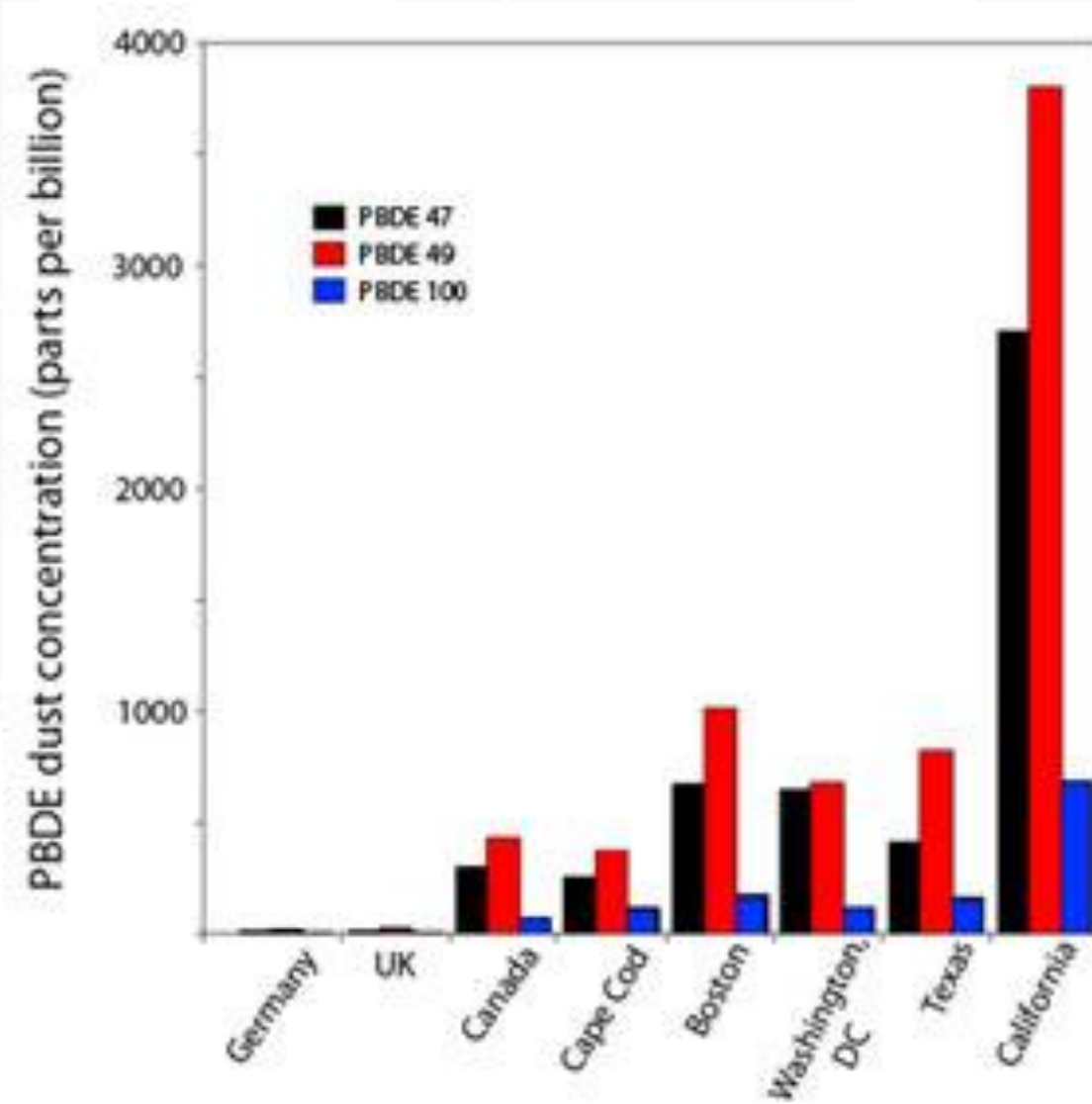


**EPIGENETIC
Root Causes?**

The Thyroid-Metabolic Regulation System

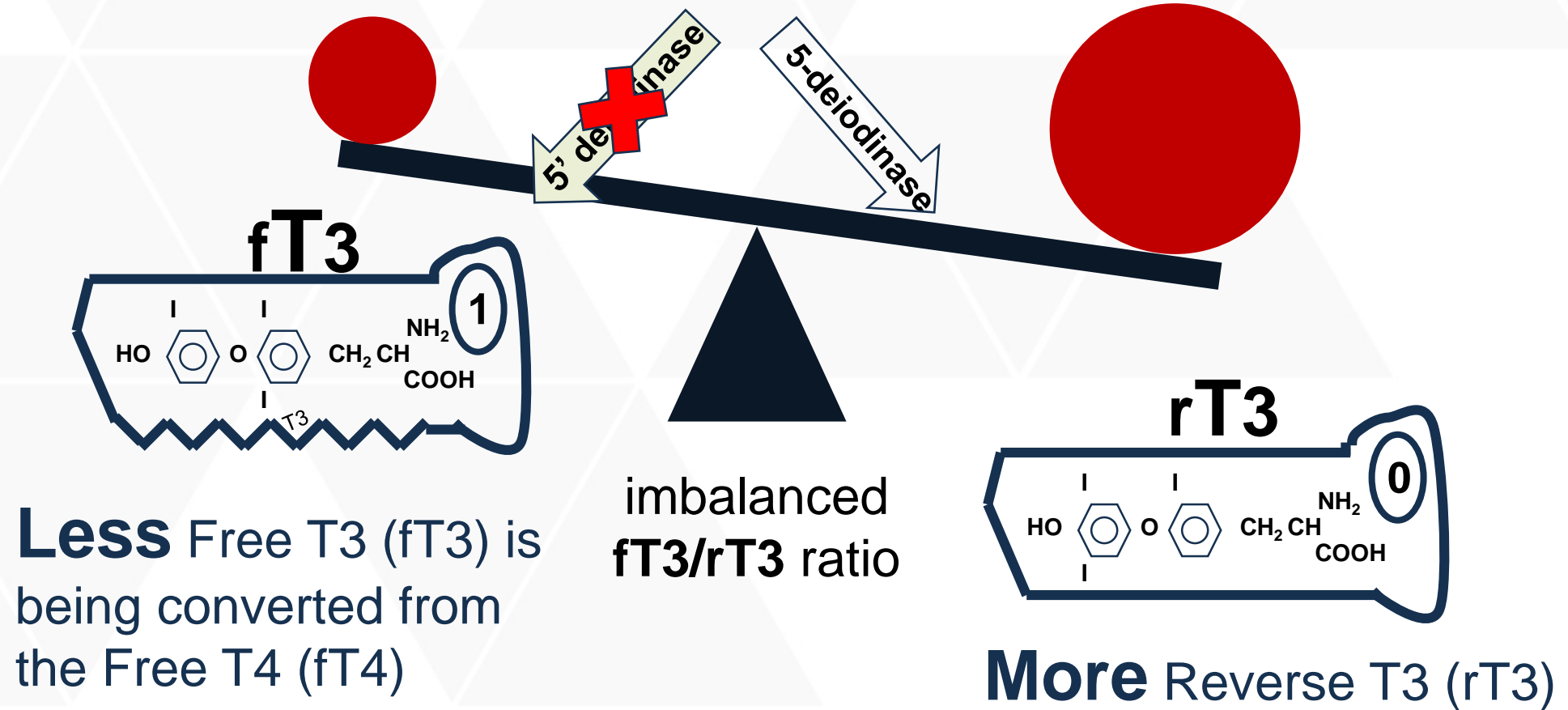


PBDE Fire Retard in Dust



Environment Stressors

SHIFT Balance to **MORE** rT3:

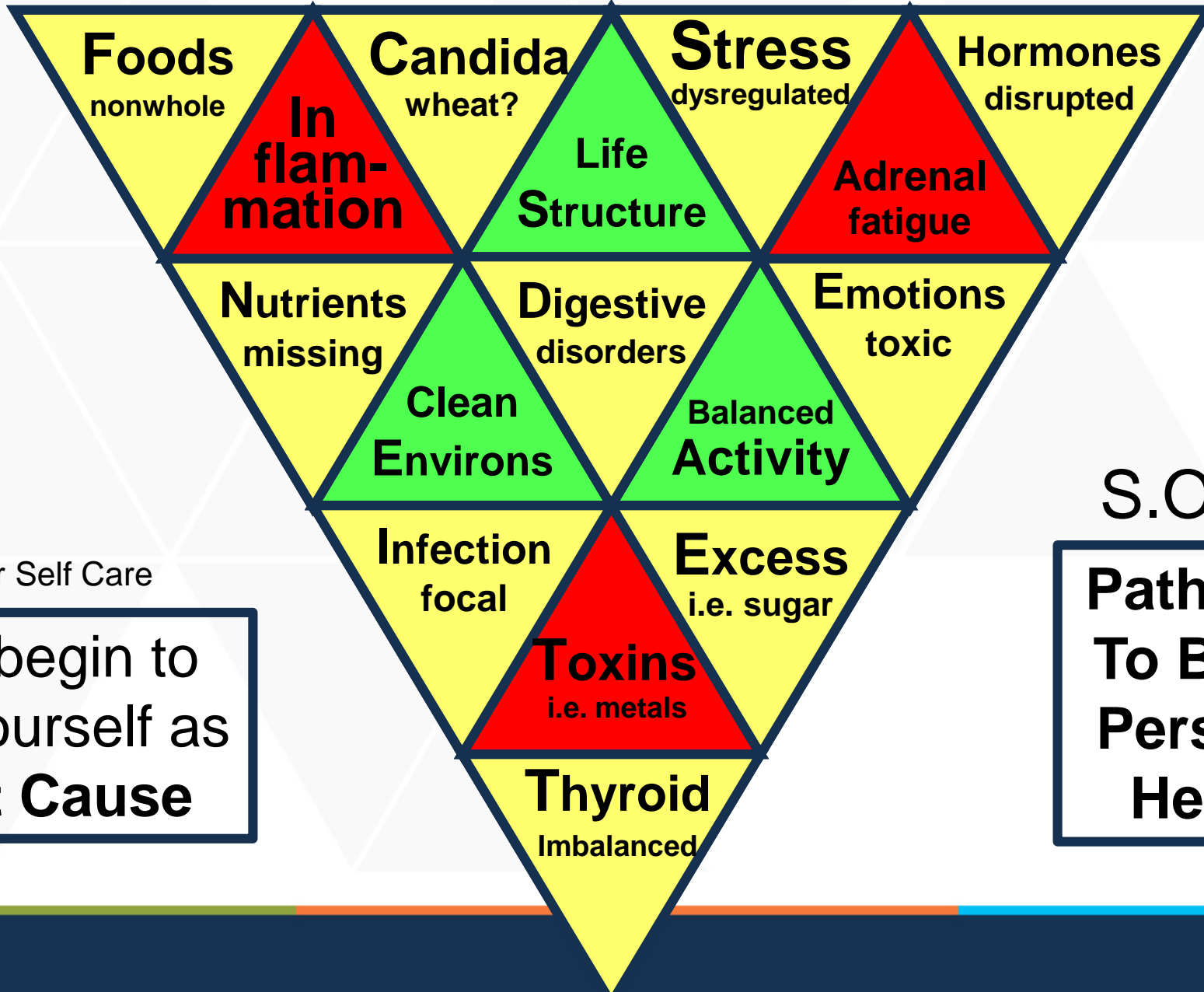


fT3/rT3 Dysregulators

Epigenetic Factors that SLOW Metabolism

High cortisol	Low nutrients:	Inflamed NF kappa-B	Severe illness	Toxins Metals
Infection, Injuries	Vitamin D Iodine	High hsCRP	Frost bite Hemorrhage	Bisphenol-A Phthalates
Insulin resistance	B12 B6	Free radicals	Chronic hepatitis	Pb, Hg, etc. Obesity
Diabetes High Hba1c	Zinc Chromium	Chronic pain	Alcoholism Drug abuse	Bromides Fluorides
Aging Surgery	Iron Selenium	ICU syndrome	Hormonal disorders	Leptin resistance

fT3/rT3 Dysregulators = Root Causes of Cancer and Chronic Illness



Better Self Care

You begin to see yourself as First Cause

S.O.A.P

Pathways To Better Personal Health

D₁ Activity Lower in Females

- **D1 activity lower in females (143,144)**
- Women more prone to tissue hypothyroidism
 - with resultant depression
 - fatigue
 - fibromyalgia
 - chronic fatigue syndrome
 - obesity
- Despite having normal TSH levels!
- Breast tissue 2nd highest iodine usage

D₂ Activity Determines Pituitary T3 Levels (1,7,10)

- **D₂** is 1000 times more efficient at converting T4 to T3 than D1 in the body (1,10,46,145,146)
- **D₂** is much less sensitive to suppression by toxins and medications (147)
- In Pituitary 80-90% of T4 is → T3 (4,148,149)
- 30-50% of T4 is → T3 in peripheral tissue (149,150)

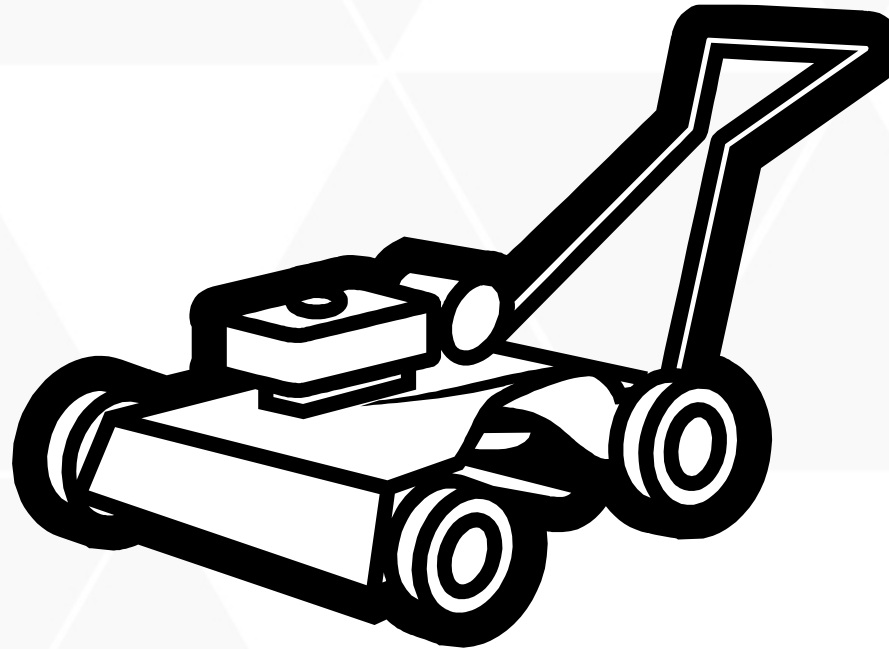
D₂ has an opposite response from **D1** to...

- Physiologic and emotional stress, depression, both dieting and weight gain, PMS, diabetes, leptin resistance, chronic fatigue syndrome, fibromyalgia, inflammation, autoimmune disease, and systemic illness
- **D₂** is up-regulated in response to such conditions
 - increasing intra-pituitary T4 to T3 conversion
 - the rest of body suffers from diminished levels of T3
 - **This causes the TSH to remain normal despite the fact that there is significant cellular hypothyroidism present in the rest of the body.**

Free T3/Reverse T3 Ratio

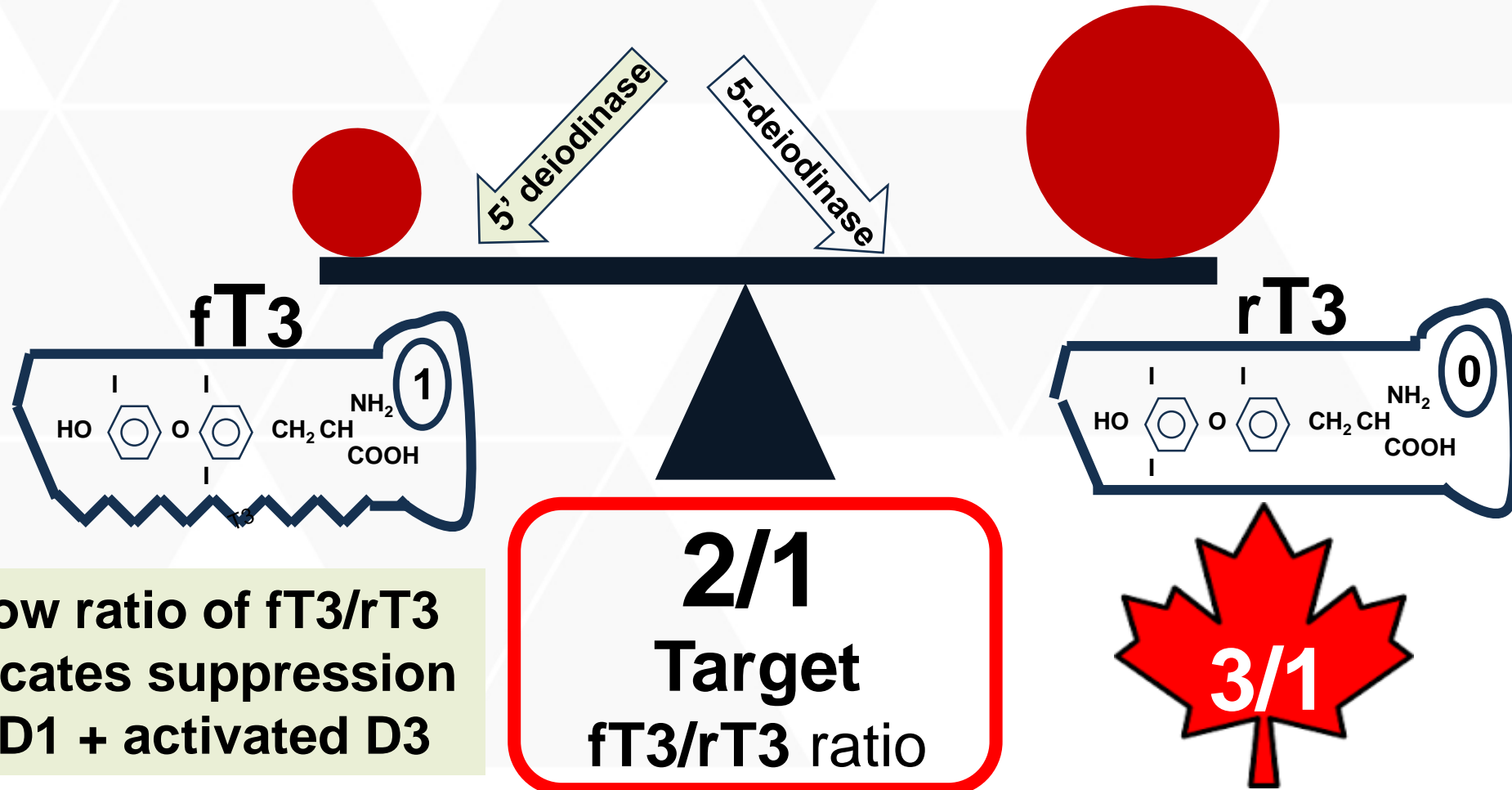


Pituitary D_2
Does NOT
Change !




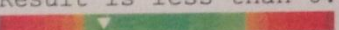


= Slower Metabolic Idle


Goal of Therapy → RESTORE Metabolic Homeostasis (Balance)



■ Needs Improvement
 ■ Within Acceptable Range (+ 2 Standard Deviations)
 ■ Beyond the Expected Range
 * Below Detectable Limits

		Result	Expected Range	Units
THYROID TESTING				
Reverse T3 <small>[3]</small>	 H	39.7	9.2 - 24.1	ng/dL
Free T3	 V	2.72	1.71 - 3.71	pg/mL
TSH	 L	0.1	0.4 - 2.8	uIU/mL
	Result is less than 0.1 uIU/mL			
Free T4	 V	0.83	0.71 - 1.85	ng/dL

SPECIAL ASSAYS

CRP-hs	 H	14.2	0.0 - 1.9	mg/L
C-Reactive Protein (CRP) Risk Factors				
<ul style="list-style-type: none"> < 0.7 mg/L Lowest Risk 0.7 - 1.1 mg/L Low Risk 1.2 - 1.9 mg/L Moderate Risk 2.0 - 3.8 mg/L High Risk > 3.8 mg/L Highest Risk 				

Vitamin K
[19] See Report


[3] Performed by LabCorp., 1447 York Ct., Burlington, NC 27215
[19] Performed by Genova Diagnostics, 3425 Corporate Way Duluth, GA 30096

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[Maybe our new diagnostic chelation would help us determine if

Inflammation is still causing you to run a high Reverse T3. Do you have root cause

■ Needs Improvement
 ■ Within Acceptable Range (+ 2 Standard Deviations)
 ■ Beyond the Expected Range
 * Below Detectable Limits

		Result	Expected Range	Units
THYROID TESTING				
Reverse T3 <small>[3]</small>		22.5	9.2 - 24.1	ng/dL

SPECIAL ASSAYS

CRP-hs	 H	7.7	0.0 - 1.9	mg/L
C-Reactive Protein (CRP) Risk Factors < 0.7 mg/L Lowest Risk 0.7 - 1.1 mg/L Low Risk 1.2 - 1.9 mg/L Moderate Risk 2.0 - 3.8 mg/L High Risk > 3.8 mg/L Highest Risk				

[3] Performed by LabCorp., 1447 York Ct., Burlington, NC 27215

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10/29/2013

$$\frac{fT3 \times 10}{rT3} = \frac{27.2}{39.7} = \frac{0.68}{1}$$

1/08/2014

$$\frac{fT3 \times 10}{rT3} = \frac{29.2}{22.5} = \frac{1.3}{1}$$



Test - Units	Pure North	Riordan
TSH - mU/L	0.45 – 3	0.40 - 2.8
Free T3 - /1.5	2.7 - 5.7 pmol/L	1.71- 3.71 pg/ml
Reverse T3 - ng/dL	11 – 34	9.2-24.1
FT3 x 10/RT3	3/1 Target	2/1 Target
<u>10/29/2013</u>	0.7 x 1.5 = 1.05	27.2/39.7 = 0.7
<u>1/08/2014</u>	1.3 x 1.5 = 1.95	29.2/22.5 = 1.3

T3 Ratio Numbers at Riordan Clinic

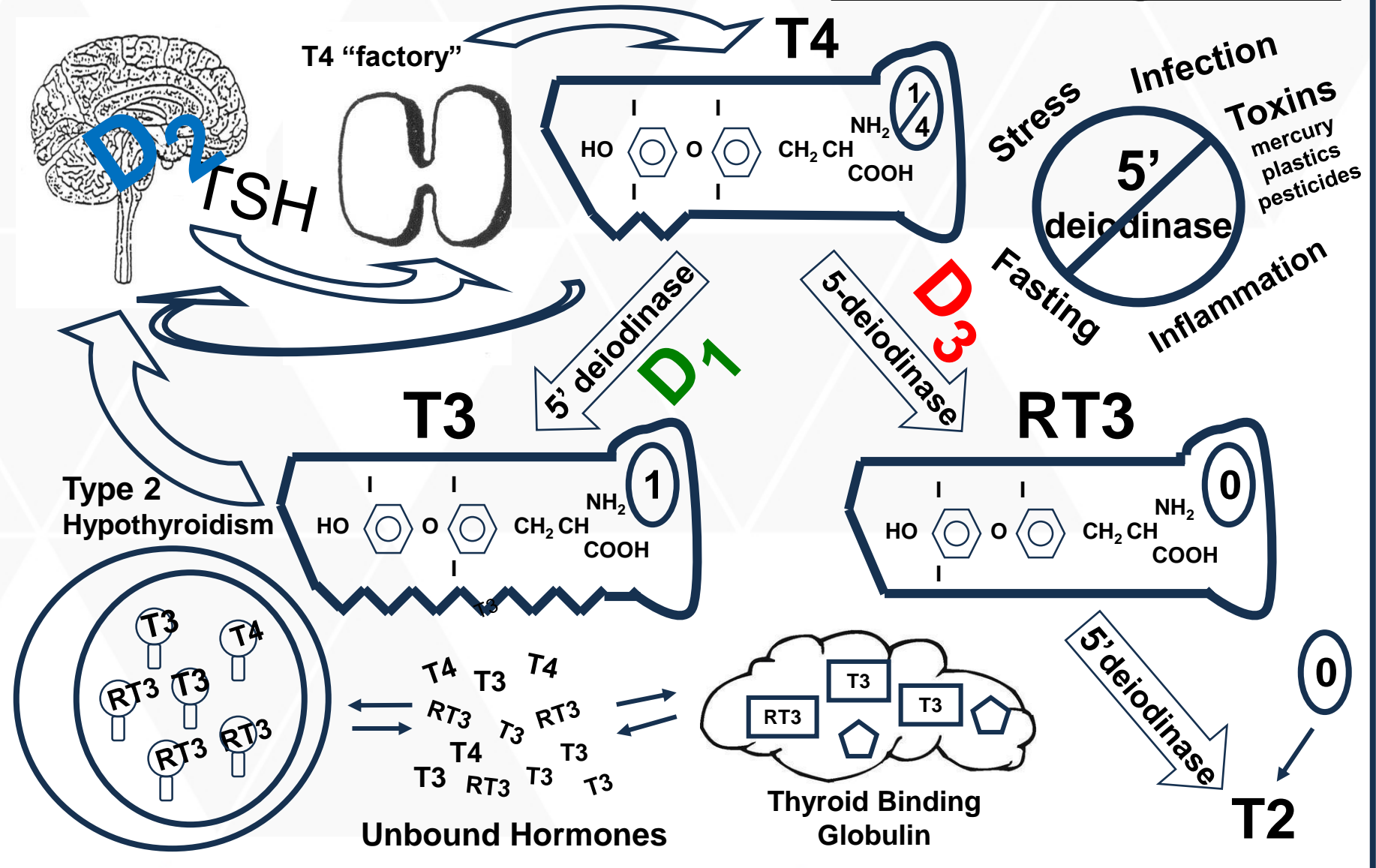
Approaching 1500 tests!

Cellular Hypothyroidism

- Reverse T3 (metabolic retardant) is a marker for **cellular hypothyroidism** (TSH & fT4 are normal)
- Cellular or tissue hypothyroidism:
 - **Higher levels of Reverse T3**
 - **Lower Free T3/Reverse T3 ratio**
 - **Target: 3/1 Canadian - 2/1 USA**

The Thyroid-Metabolic Regulation System

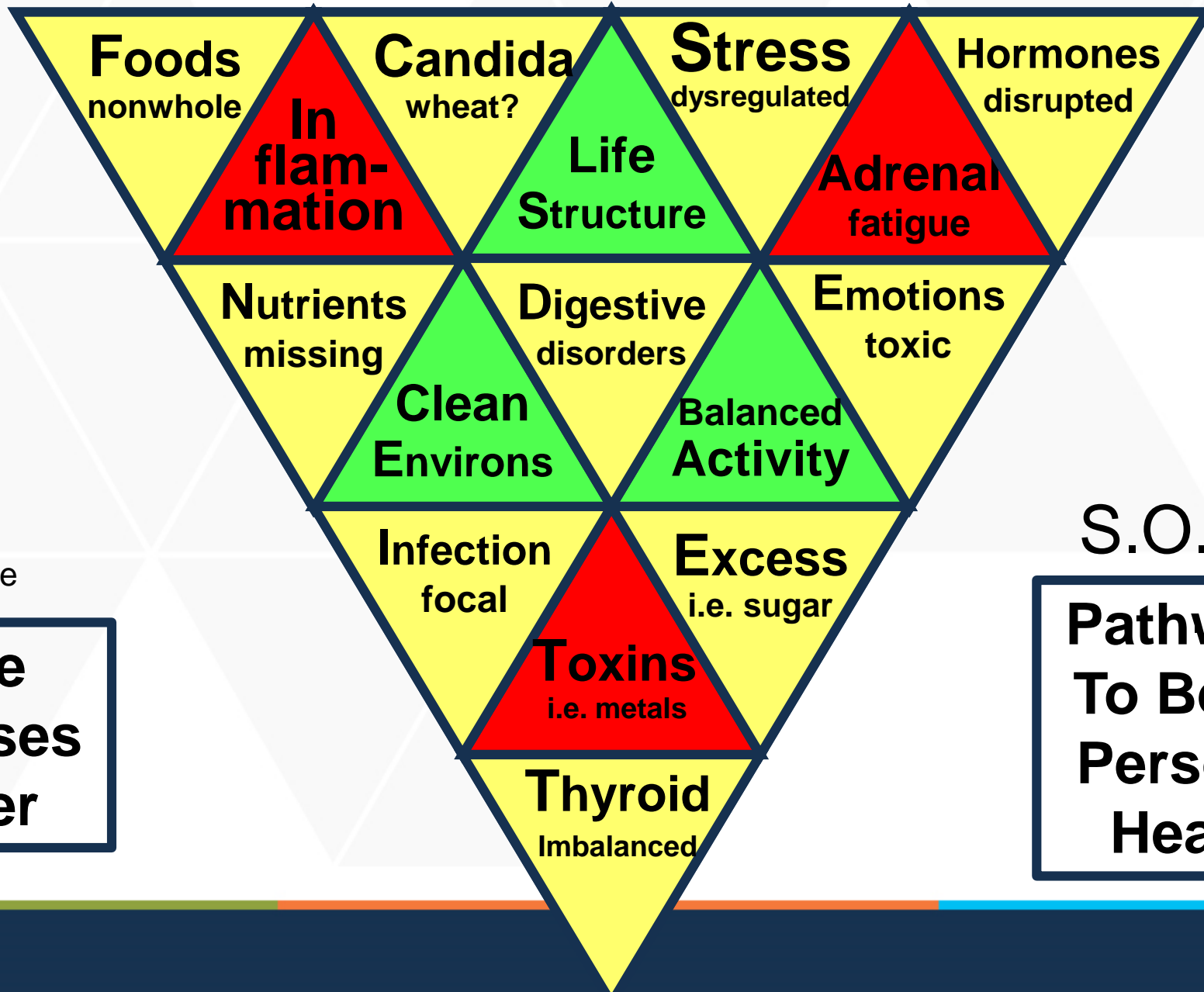
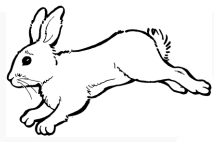
Glandular Regulation ↔ Cellular Regulation



Use Supplemental T3 + Treat the Underlying Dysregulators

- Improving the fT3/rT3 ratio will improve metabolic function and reduce the symptoms of thyroid dysregulation
- Addressing and correcting THYROID DYSREGULATORS will stabilize the metabolic improvements of an improved fT3/rT3 ratio
- **Supplemental T3 improves metabolism**
- **Correct ROOT CAUSES (example – iodine) to eliminate the need for supplemental T3**

Always treat the ROOT CAUSES + the Cancer disease



Better Self Care

**Treat the
Root Causes
of Cancer**

S.O.A.P

**Pathways
To Better
Personal
Health**

Metabolism Generates Energy

- Energy is a necessary for health restoration
- Improve the fT3/rT3 ratio!
- Help your patient with more energy!
- Add small doses of T3 (2.5-5.0 mcg)
- ½ - 1 grain desiccated thyroid
= 2.5-5.0 mcg of Liothyronine (Cytomel)
- Do this in conjunction with

Nutrient replacement and **IVC Push**

nahypothyroidism.org



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Empowering **Patients with Knowledge**

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NAH on The Mighty

New Published Studies by Kent Holtorf, M.D. Download and read them now:

Thyroid Hormone Transport into Cellular Tissue

Peripheral Thyroid Hormone Conversion and Its Impact on TSH and Metabolic Activity

Introducing the IVC Push

- A 7-minute IVC using 7.5 grams of ascorbate
- Now we will view the IVC Push video:

“How to correctly perform an IVC Push”



**10
Keys
To Balance**

**Root
Causes
6**

**Food
GI**

Allergen

**Ortho
Nutrient**

**Energy
Thyroid**

**Non-whole
Food**

Stress

**Non-
disrupted
Hormone**

**IVC
First!**

**Neuro-
transmitters
Adrenals**

Toxins

Infection

Genetics

**Life
Structure**

**Clean
Environs**

**Rhythm
Movement**

**Love
Purpose**

**Maintain a
healthy
FT3/RT3
Ratio!**

Better Self Care
IVC First!