Casual Friday Series

Unlocking the Symptom Profile of Hashimoto’s Thyroiditis

A Biogenetix Clinical Presentation

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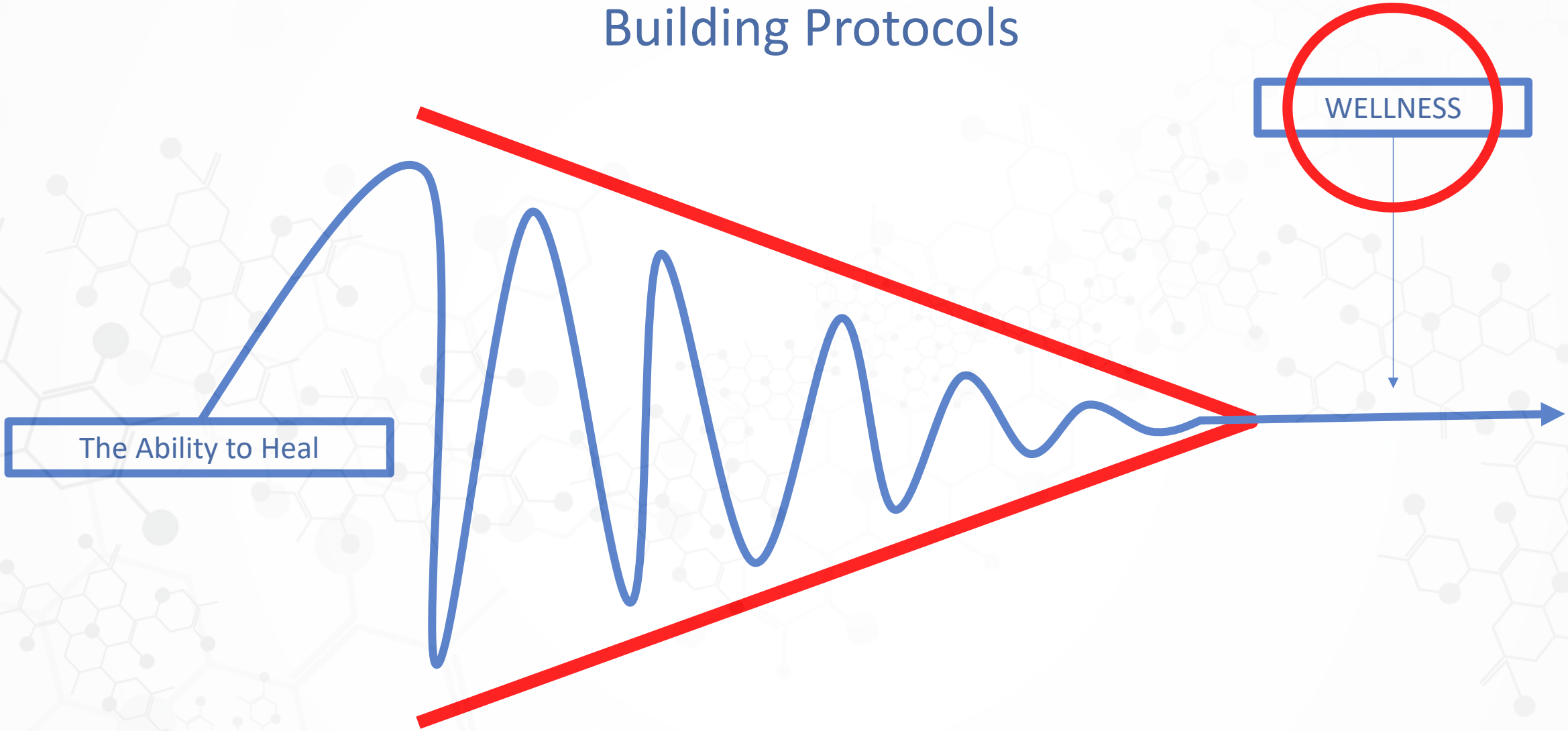
- *The information provided in this presentation is for your consideration only as a practicing health care provider. Ultimately you are responsible for exercising professional judgment in the care of your own patients.*

Building Protocols



The Hashimoto's Profile

- Fatigue and sluggishness
- Increased sensitivity to cold
- Increased sleepiness
- Dry skin
- Constipation
- Muscle weakness
- Muscle aches, tenderness and stiffness
- Joint pain and stiffness
- Irregular or excessive menstrual bleeding
- Depression
- Problems with memory or concentration
- Swelling of the thyroid (goiter)
- A puffy face
- Brittle nails
- Hair loss
- Enlargement of the tongue

https://www.mayoclinic.org/diseases-conditions/hashimotos-disease/symptoms-causes/syc-20351855

Review > Hormones (Athens). 2021 Dec;20(4):613-621. doi: 10.1007/s42000-021-00312-3. Epub 2021 Aug 24.

Subclinical thyroid dysfunction and major depressive disorder

Grigorios N Karakatsoulis [1] [2], Eva-Maria Tsapakis [3] [4], Calypso Mitkani [5], Konstantinos N Fountoulakis [6]

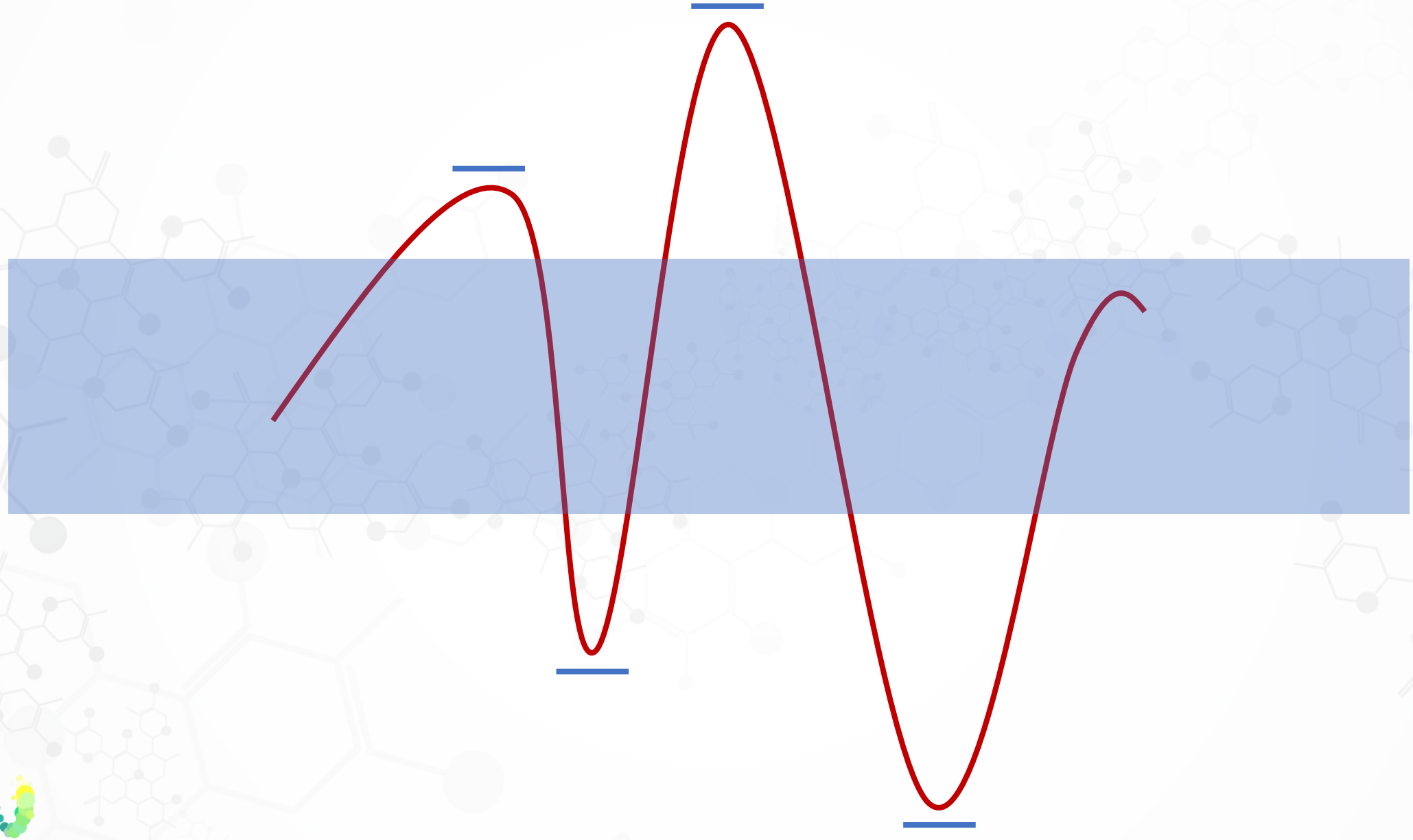
reflecting a possible effect of SCH in lowering the threshold for the emergence of MDD. The relationship between SCH and MDD is, however, not clear, with large and well-designed studies investigating possible links between reference-range thyroid hormone levels and MDD having as yet found no relation between the two.

Review > J Endocrinol Invest. 2021 Nov;44(11):2341-2347. doi: 10.1007/s40618-021-01600-w.
Epub 2021 Jun 15.

Role of thyroid hormone therapy in depressive disorders

M Bauer [1], P C Whybrow [2]

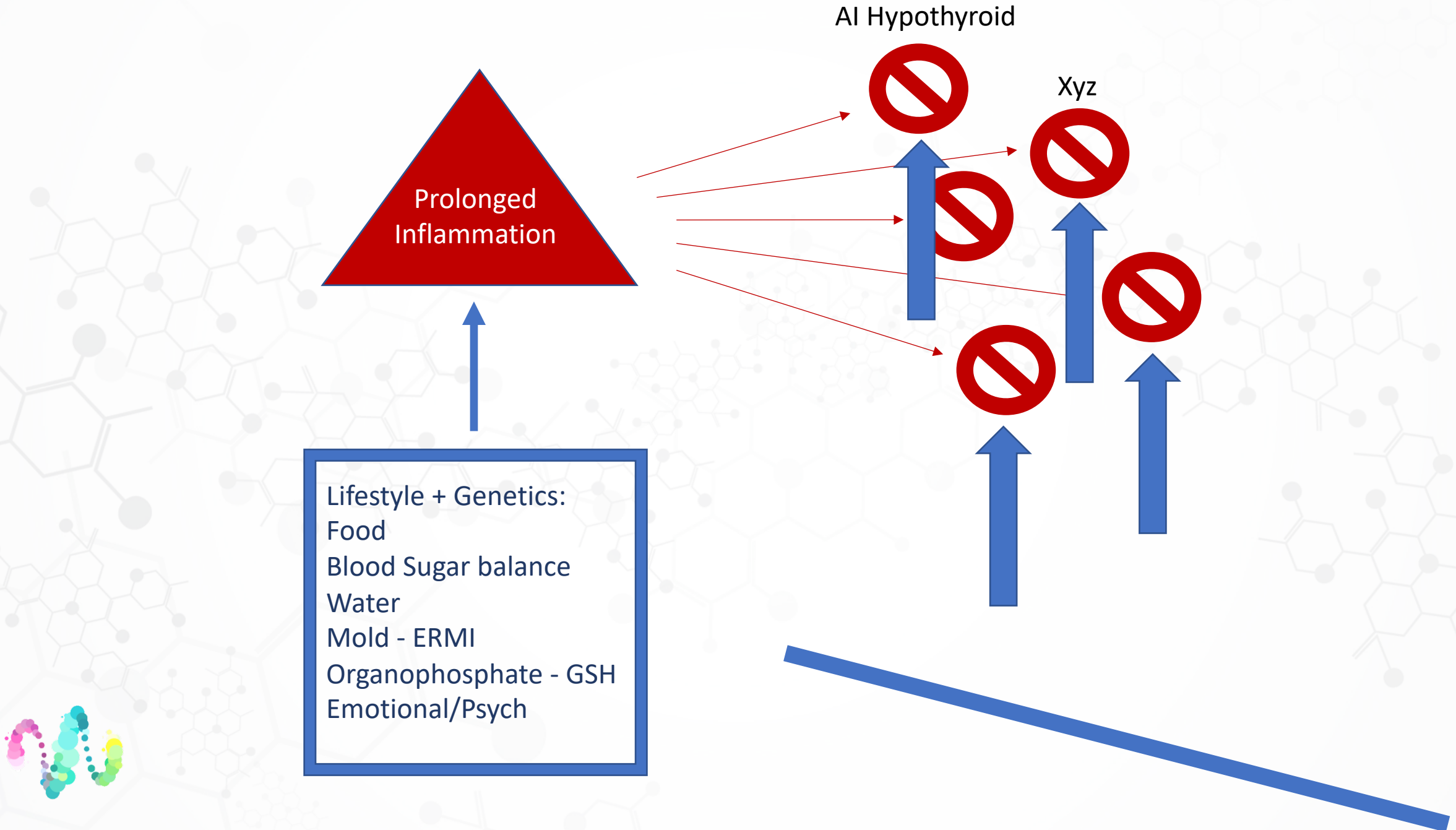
The successful modification of mood disorders with thyroid hormone underscores the association between endocrine and cerebral systems in these disorders. Thyroid hormones have a profound influence on behavior and appear to be capable of modulating the phenotypic expression of major mood disorders. In fact, there is evidence that triiodothyronine (LT3) may accelerate the antidepressant response to antidepressants, and studies suggest that LT3 also may augment the response to antidepressants in refractory depression. Add-on treatment with supraphysiologic doses of levothyroxine (LT4) has shown efficacy in open-label and in placebo-controlled studies, including in rapid cycling and prophylaxis-resistant bipolar disorder, and with acute refractory uni- or bipolar depression. Functional brain-imaging studies (PET) demonstrated that administration of supraphysiologic LT4 improves depressive symptoms in patients with bipolar depression by modulating cerebral activity in the anterior limbic network.

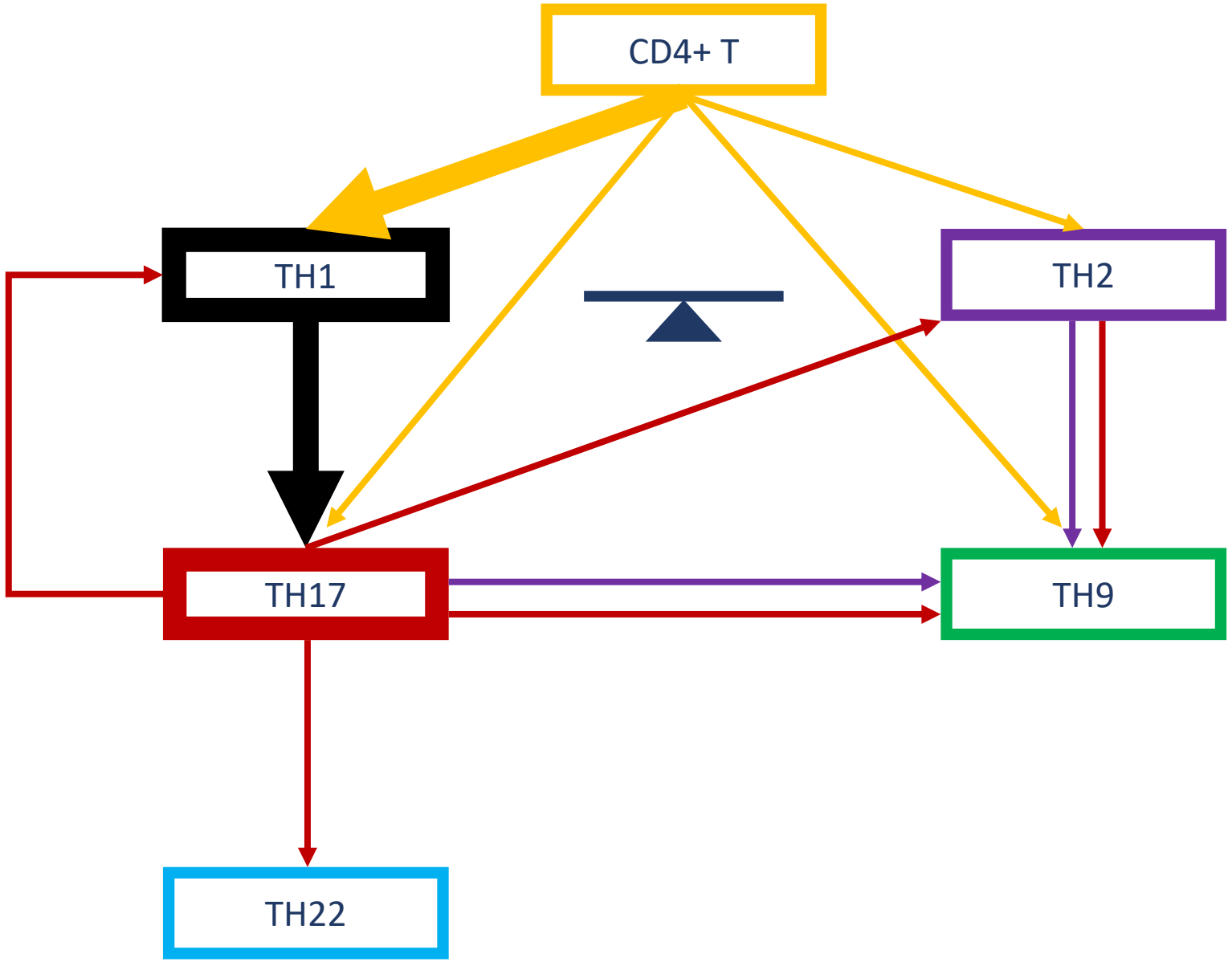


Biochem Biophys Res Commun. 1998 Apr 28;245(3):933-8. doi: 10.1006/bbrc.1998.8549.

Shifts in the TH1/TH2 balance during human pregnancy correlate with apoptotic changes

An important prerequisite for a successful pregnancy is that the maternal immune system does not reject the fetus. Down-regulation of the T helper 1 (TH1) associated cellular immune response could therefore be essential. With flow cytometric techniques, we show on a single cell level that both CD4+ and CD8+ T cells from peripheral blood produce less TH1 cytokines (i.e. IFN-gamma and IL-2) and more TH2 cytokines (i.e. IL-4) during normal human pregnancy and shortly after delivery than during non-pregnancy. The TH1/TH2 cytokine ratio in T cells of women during pregnancy and after delivery was significantly decreased. In contrast the TH1/TH2 ratio was elevated to near normal in women with recurrent spontaneous abortions, indicating a marked shift towards TH1 immunity. Fas antigen (CD95) on T cells was significantly elevated during pregnancy and in the post-delivery phase whereas the intracellular expression of anti-apoptotic protein Bcl-2 remained unchanged. Nevertheless Fas-mediated apoptosis in T cells was markedly reduced during normal human pregnancy. We hypothesize that TH1 cells undergo predominantly Fas-mediated apoptosis during pregnancy as has been shown in some TH2-prone diseases (e.g. SLE, HIV) where an elevated Fas expression on peripheral T cells is observed. This could explain the exacerbated occurrence of TH2-associated diseases in pregnancy.


AI Hypothyroid
Xyz
Prolonged Inflammation
Lifestyle + Genetics:
Food
Blood Sugar balance
Water
Mold - ERMI
Organophosphate - GSH
Emotional/Psych


CD4+ T
TH1
TH2
TH17
TH9
TH22
(Dermatologic)

Thyroglobulin Antibody

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
▲	**Thyroglobulin Antibody** [01]	**558.8**	**High**	**631.1**	05/12/2021	IU/mL	0.0-0.9

Thyroglobulin Antibody measured by Beckman Coulter Methodology

TSH

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
▼	**TSH** [01]	**0.013**	**Low**	**0.075**	07/28/2021	uIU/mL	0.450-4.500

Thyroxine (T4)

Test	Current Result and Flag	Previous Result and Date		Units	Reference Interval
Thyroxine (T4) [01]	8.4	6.1	07/28/2021	ug/dL	4.5-12.0

T3 Uptake

Test	Current Result and Flag	Previous Result and Date		Units	Reference Interval
T3 Uptake [01]	28	25	07/28/2021	%	24-39
Free Thyroxine Index	2.4	1.5	07/28/2021		1.2-4.9

Triiodothyronine (T3)

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
▲	**Triiodothyronine (T3)** [01]	**193**	**High**	92	07/28/2021	ng/dL	71-180

68 yo female, Armour

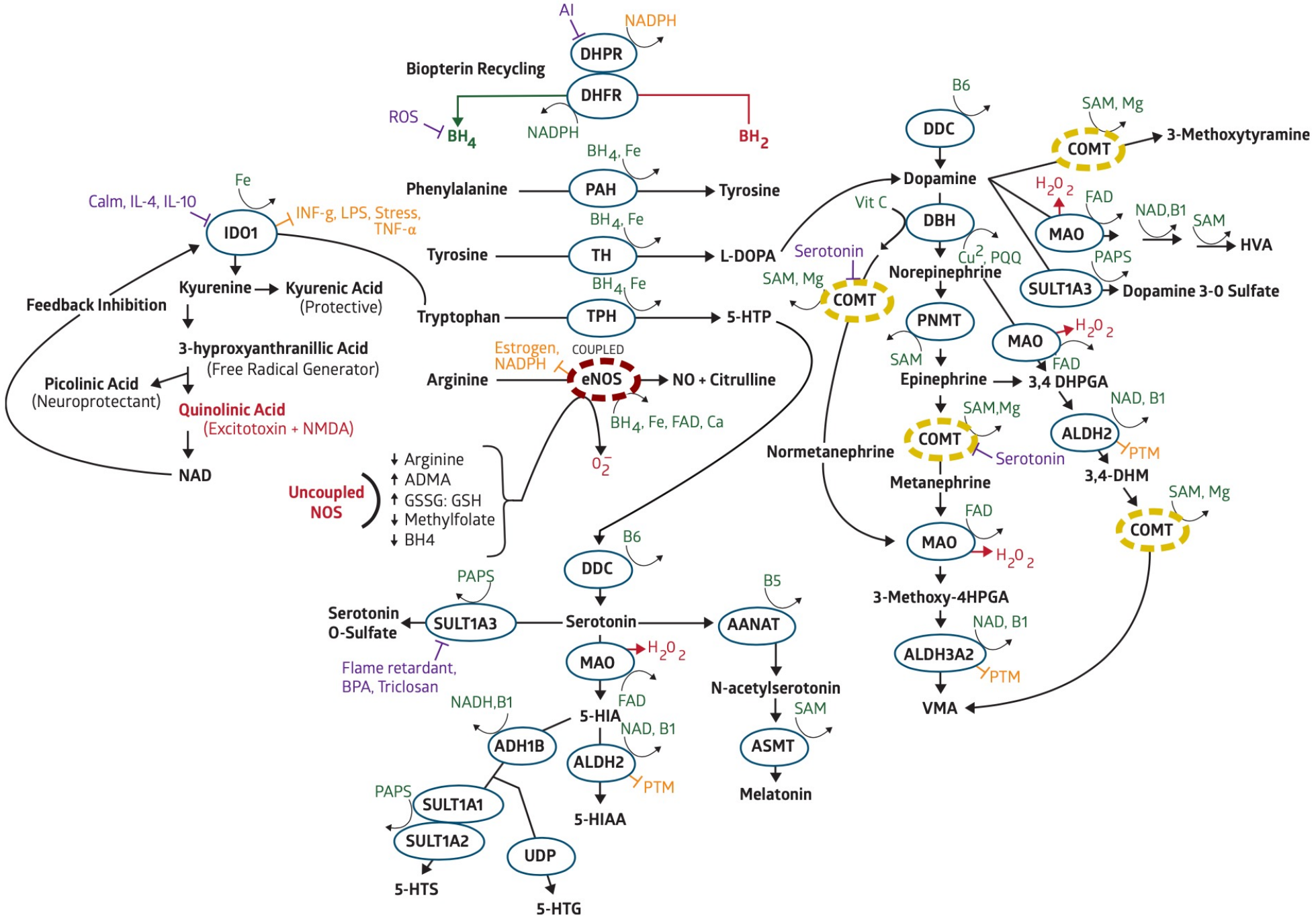
Thyroid Antibodies

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
	Thyroid Peroxidase (TPO) Ab [01]	9		10	09/02/2021	IU/mL	0-34
▲	**Thyroglobulin Antibody** [01]	**58.8**	**High**	**180.3**	09/02/2021	IU/mL	0.0-0.9
	Thyroglobulin Antibody measured by Beckman Coulter Methodology						

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
▲	**TSH** [01]	**7.440**	**High**	4.22	09/02/2021	uIU/mL	0.450-4.500
	Thyroxine (T4) [01]	6.5		6.5	09/02/2021	ug/dL	4.5-12.0
	T3 Uptake [01]	24		26	09/02/2021	%	24-39
	Free Thyroxine Index	1.6		1.7	09/02/2021		1.2-4.9

	Test	Current Result and Flag		Previous Result and Date		Units	Reference Interval
	Lipids [01]						
	Cholesterol, Total [01]	173		181	09/02/2021	mg/dL	100-199
▲	**Triglycerides** [01]	**186**	**High**	**319**	09/02/2021	mg/dL	0-149
	HDL Cholesterol [01]	68		43	09/02/2021	mg/dL	>39
	VLDL Cholesterol Cal	31		**52**	09/02/2021	mg/dL	5-40
	LDL Chol Calc (NIH)	74		86	09/02/2021	mg/dL	0-99
	T. Chol/HDL Ratio	2.5		4.2*	09/02/2021	ratio	0.0-5.0

75 yo male, levothyroxine


AI
NADPH
DHPR
Biopterin Recycling
DHFR
ROS
BH4
NADPH
BH2
BH4, Fe
Phenylalanine
PAH
Tyrosine
Fe
Calm, IL-4, IL-10
IDO1
INF-g, LPS, Stress, TNF-α
BH4, Fe
Tyrosine
TH
L-DOPA
Feedback Inhibition
Kyurenine
Kyurenic Acid
(Protective)
BH4, Fe
Tryptophan
TPH
5-HTP
3-hyproxyanthranillic Acid
(Free Radical Generator)
Picolinic Acid
(Neuroprotectant)
Quinolinic Acid
(Excitotoxin + NMDA)
NAD
Estrogen, NADPH
COUPLED
Arginine
eNOS
NO + Citrulline
BH4, Fe, FAD, Ca
O2-
Uncoupled NOS
↓ Arginine
↑ ADMA
↑ GSSG: GSH
↓ Methylfolate
↓ BH4
B6
DDC
Dopamine
SAM, Mg
COMT
3-Methoxytyramine
Vit C
DBH
Serotonin
Cu2, PQQ
Norepinephrine
H2O2
FAD
MAO
NAD,B1
SAM
HVA
PAPS
SULT1A3
Dopamine 3-0 Sulfate
SAM, Mg
COMT
PNMT
SAM
Epinephrine
MAO
H2O2
FAD
3,4 DHPGA
NAD, B1
ALDH2
PTM
3,4-DHM
SAM,Mg
COMT
Normetanephrine
Serotonin
Metanephrine
SAM, Mg
COMT
FAD
MAO
H2O2
3-Methoxy-4HPGA
NAD, B1
ALDH3A2
PTM
VMA
B6
DDC
PAPS
SULT1A3
Serotonin O-Sulfate
Flame retardant, BPA, Triclosan
Serotonin
B5
AANAT
N-acetylserotonin
SAM
ASMT
Melatonin
MAO
H2O2
FAD
5-HIA
NADH,B1
ADH1B
NAD, B1
ALDH2
PTM
5-HIAA
PAPS
SULT1A1
SULT1A2
5-HTS
UDP
5-HTG

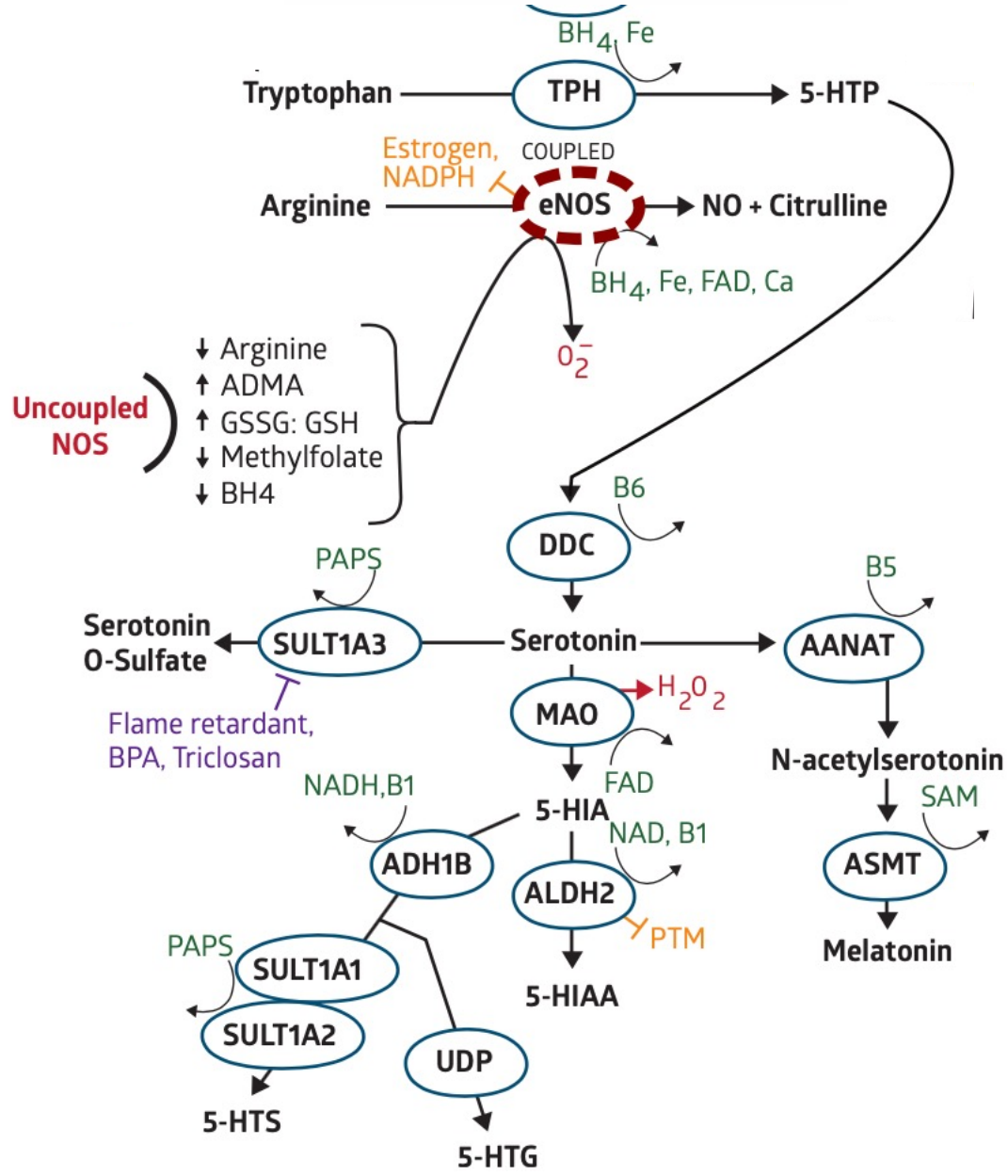
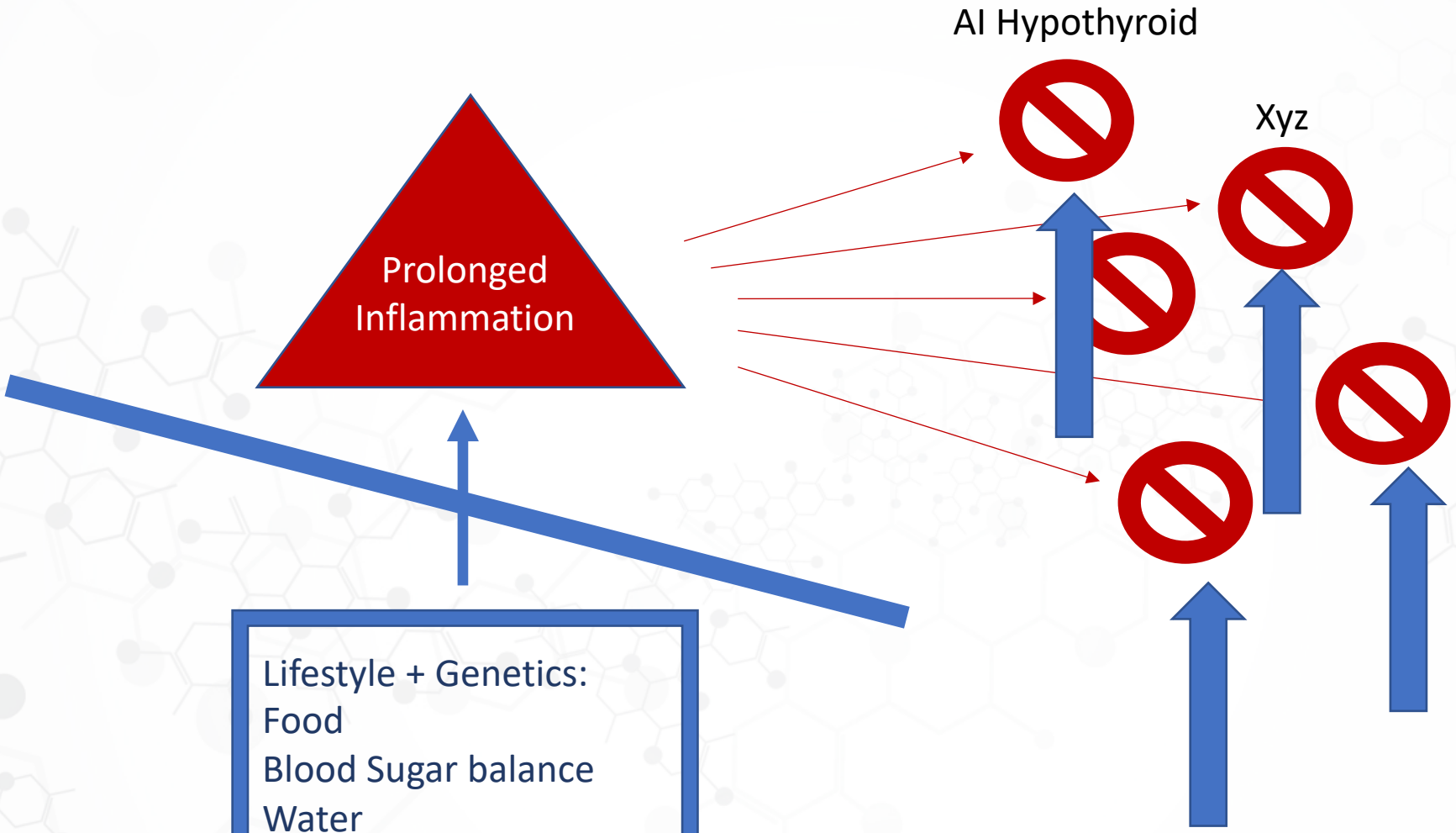

BH4, Fe
Tryptophan
TPH
5-HTP
Estrogen, NADPH
COUPLED
Arginine
eNOS
NO + Citrulline
BH4, Fe, FAD, Ca
O2−
Uncoupled NOS
↓ Arginine
↑ ADMA
↑ GSSG: GSH
↓ Methylfolate
↓ BH4
B6
DDC
PAPS
B5
Serotonin O-Sulfate
SULT1A3
Serotonin
AANAT
H2O2
MAO
Flame retardant, BPA, Triclosan
FAD
N-acetylserotonin
NADH,B1
5-HIA
SAM
NAD, B1
ADH1B
ALDH2
ASMT
PTM
PAPS
SULT1A1
5-HIAA
Melatonin
SULT1A2
UDP
5-HTS
5-HTG

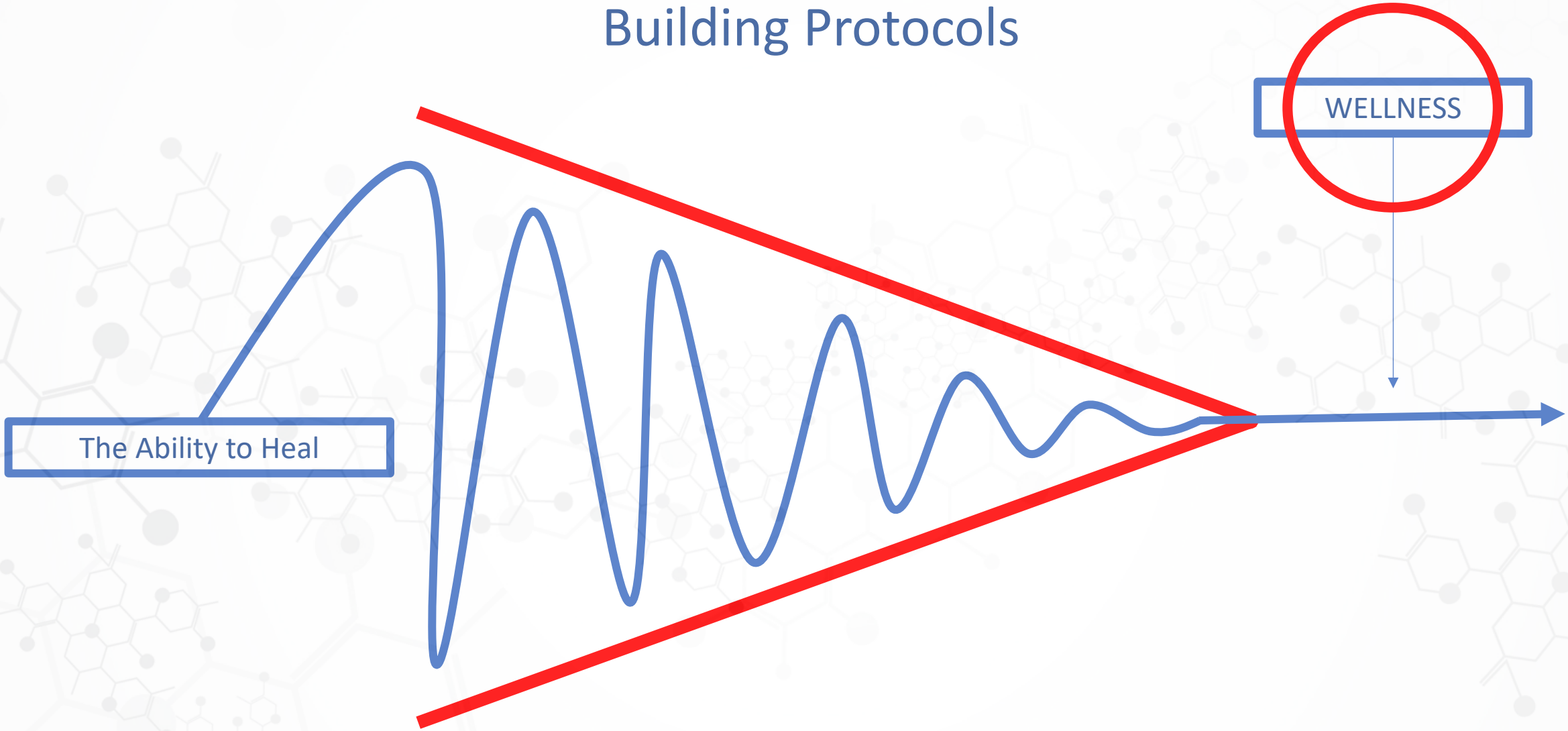
Table I. Drugs and Agents Associated with Thyroid Dysfunction

Medication or agent	Effects on Serum Thyroid Function Tests
Glucocorticoids	- Can transiently suppress TSH without hyperthyroidism
Dopamine and Dobutamine	- Can transiently suppress TSH without hyperthyroidism
Amiodarone	- Can induce either hypothyroidism or hyperthyroidism - May observe a transient TSH increase in the first days and weeks following amiodarone introduction - LT4 requirements in treated hypothyroid patients are increased
Lithium	- Can induce hypothyroidism but also less commonly, transient hyperthyroidism (similar to silent thyroiditis)
Interferon	- Can induce hypothyrodism (permanent or transient) but also less commonly, hyperthyroidism (similar to Graves' disease and silent thyroiditis)
Tyrosine kinase inhibitors (sunitimib, sorafenib, imatinib)	- Can induce hypothyroidism (permanent or transient)
Alemtuzumab	- Hyperthyroidism (Graves' disease)
Iodine-containing medications and agents	- Can unmask latent hyperthyroidism in iodine deficient individuals - Can induce hypothyroidism in euthyroid patients with underlying thyroid disease
Drugs which reduce LT4 absorption (cholestyramine, calcium, sucralfate, sevelamer)	- Increases LT4 requirements in treated hypothyroid patients
Drugs which increase hepatic metabolism of thyroid hormones (phenobarbital, carbamazepine, phenytoin, rifampicine)	- Increases LT4 requirements in treated hypothyroid patients
Drugs which increase TBG levels (estrogen)	- Increases LT4 requirements in treated hypothyroid patients

https://www.endocrinologyadvisor.com/wp-content/uploads/sites/9/2019/01/ch6012.table1_.pdf


AI Hypothyroid
Xyz
Prolonged Inflammation
Lifestyle + Genetics:
Food
Blood Sugar balance
Water
Mold - ERMI
Organophosphate - GSH
Emotional/Psych

Building Protocols



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