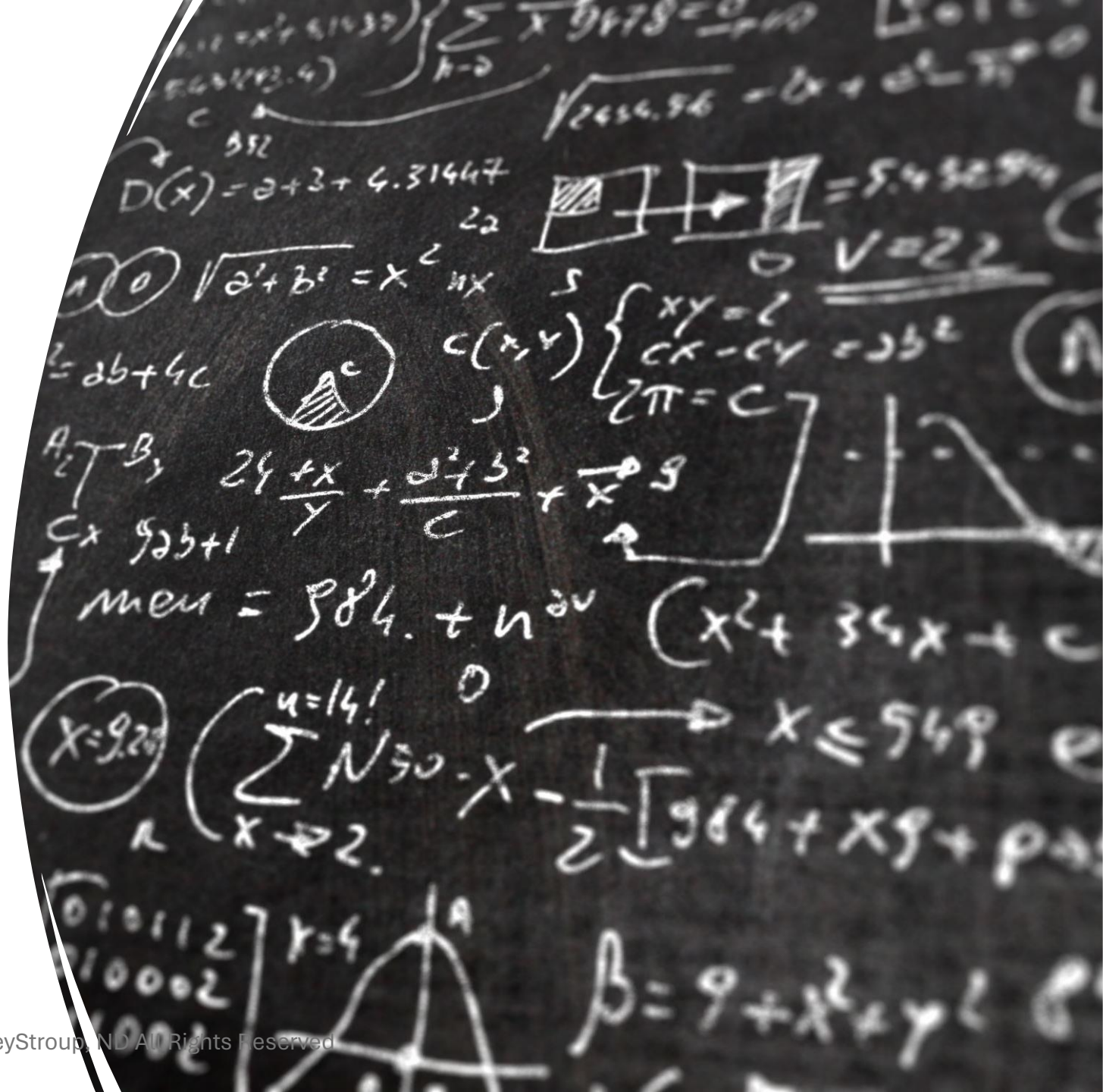
Beyond The Basics

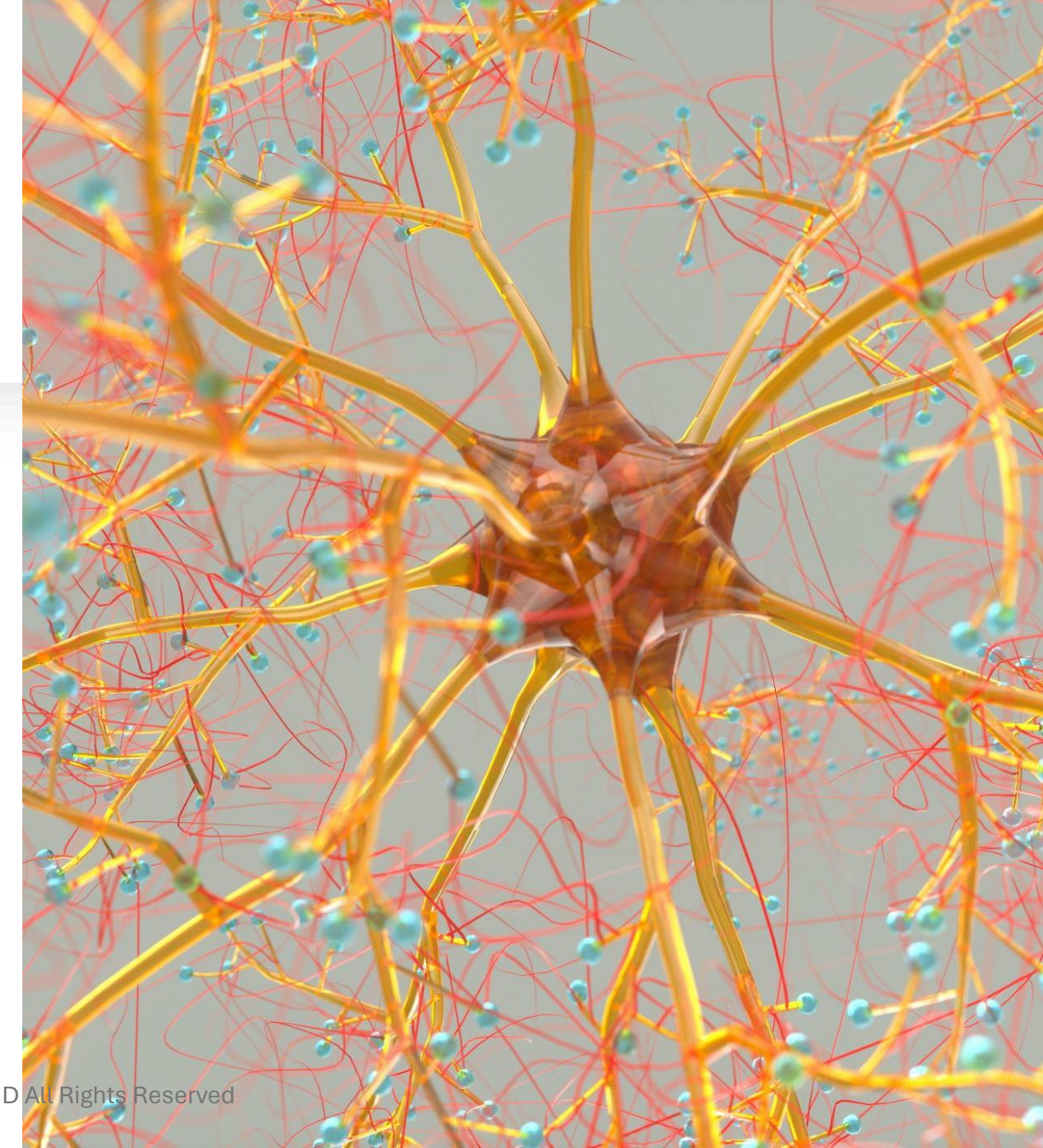
Advanced insights to functional bloodwork and specialty testing

Tracey Stroup, ND



Current state of health

- Chronic Inflammation
- Immune system dysregulation
- Cancer – Turbo
- Spectrum cases climbing
- MCAS – Mast Cell Activation Syndrome
- ”Chronic” infections
- Hormone issues – infertility and beyond
- Neurotransmitter issues – mass psychosis



You are only as young as your immune system

Getting Foundational

- Lifestyle – Nutrition, hydration, movement, sleep, elimination, emotional and spiritual wellness
- Ultimate Shake
- Pro Lean Greens

The “Kill it Mentality”

The Kill it or quiet it mentality

- Antibiotic
- Chemotherapy
- Steroids

Injury Healing Process

- Acute injury – Viral, bacterial, injury (trauma/jab) – requires an immune action
- Kill mentality & Repress mentality – antibiotics, NSAIDS, Steroids, Immune repression, chemotherapy
- Always leaves a scar when unsupported – UNHEALED TISSUE

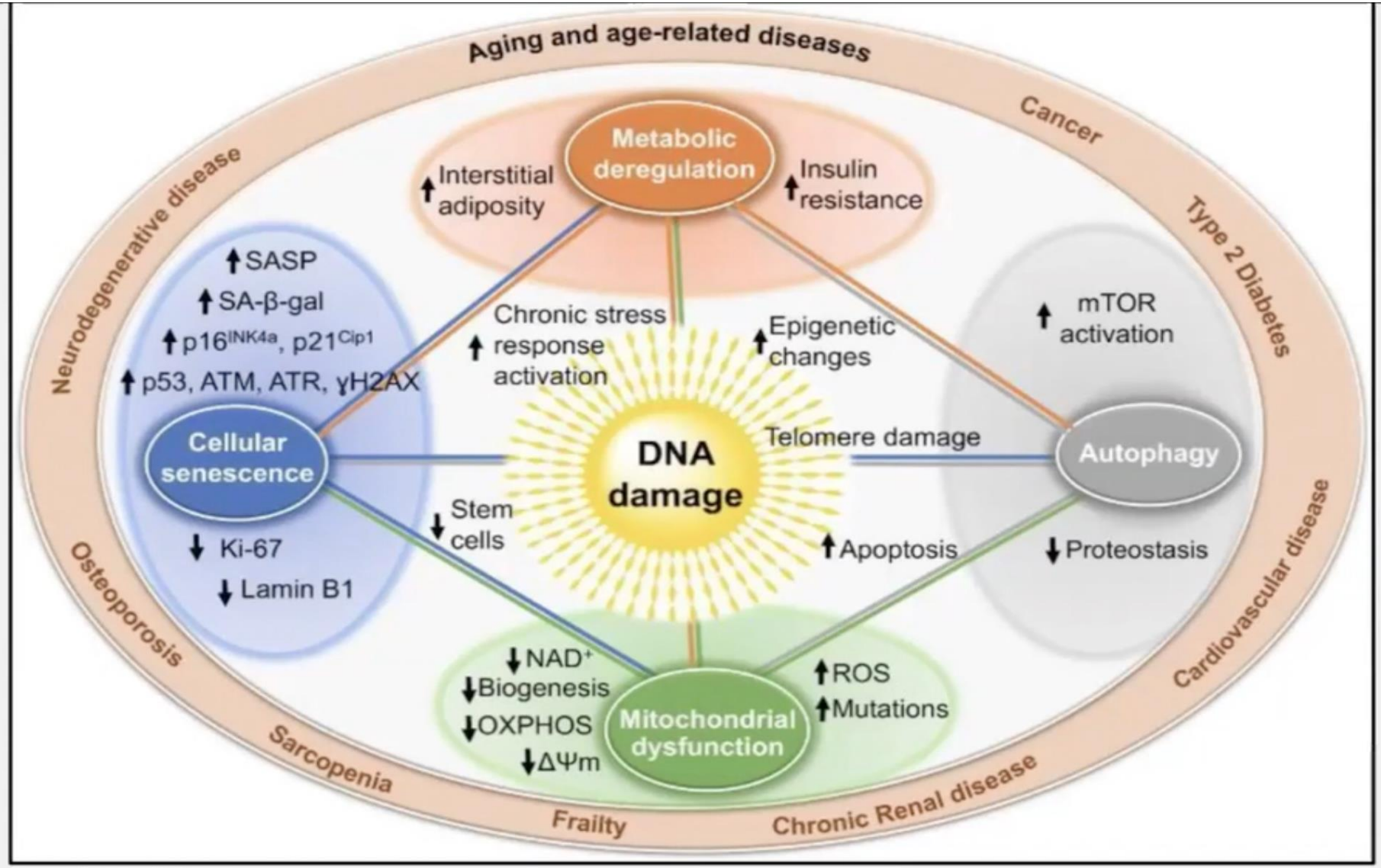
- PAMP/DAMP = CHRONIC UNDERLYING INFLAMMATION/IMMUNE DYSREGULATION
- THE IMMUNE SYSTEM RESPONDS CORRECTLY - MAY NOT RESOLVE CORRECTLY

Regenerative Healing

- Stops “treating” the chronic infection
- STARTS STRENGTHENING and TREATING THE IMMUNE SYSTEM

- What we are really seeing is:
  - Chronic inflammation
  - Immune system dysregulation
  - Lack of P53 activation - APOPTOSIS

What happens when full healing does not occur



Yousefzadeh, Matt et al. "DNA damage-how and why we age?." *eLife* vol. 10 e62852. 29 Jan. 2021, doi:10.7554/eLife.62852

Pathogen-Associated Molecular Patterns (PAMP)

- These are signals that indicate the presence of harmful invaders, such as bacteria, viruses, or other pathogens. Imagine these as red flags that tell the immune system, "Hey, there's a bad guy here, we need to defend ourselves!" When cells detect PAMPs, they trigger an immune response to fight off the invaders and protect the body from infection.
- Issue – The infection or invader is never handled or overcome completely
- Reason – No nutraceutical support, repression therapy, protocol not taken long enough, continuous exposure.
- Result – Complete healing does not occur

Damage-Associated Molecular Patterns (DAMP)

- These are signals that cells release when they're damaged or stressed, but not necessarily because of an infection. Think of DAMPs as distress signals that cells send out when they're injured or undergoing stress, saying, "Help! Something's wrong here, and we need assistance!" These can result from various sources, including physical injury, toxins, or even metabolic stress. When the immune system detects DAMPs, it responds by initiating repair processes to heal the damaged tissues and restore normal function.
- Issue - chronic or sustained release of DAMPs can lead to persistent inflammation, which is implicated in the development and progression of many chronic inflammatory diseases, autoimmunity, cancer, neurodegeneration, tissue fibrosis, cardiovascular disease, diabetes and disease of the bones.
- Reason – NOT ENOUGH fuel or TOO MUCH Toxicity
- Result – **Cellular Senescence or SICK CELLS** – Chronic Inflammation, Immune dysregulation, DIS-ease

Sterile Chronic Inflammation – No infection

Exposure to PAMPS

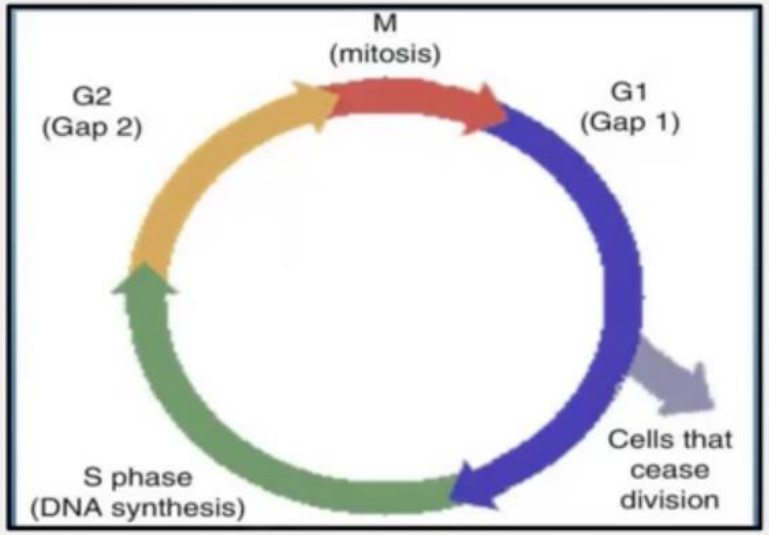
It is established that PAMPs mediate the production of cytokines by binding to PRRs such as Toll-like receptors (TLR) on immune cells. Galectins (Gal) are carbohydrate-binding proteins that when expressed play essential roles in the resolution of infectious and metabolic diseases. Are PAMPs inflammatory?
PAMP and DAMP-mediated signaling and induction of an innate immune response usually results in resolution of infection, but may also cause chronic inflammation or autoimmunity by altering various cell death and survival mechanisms.

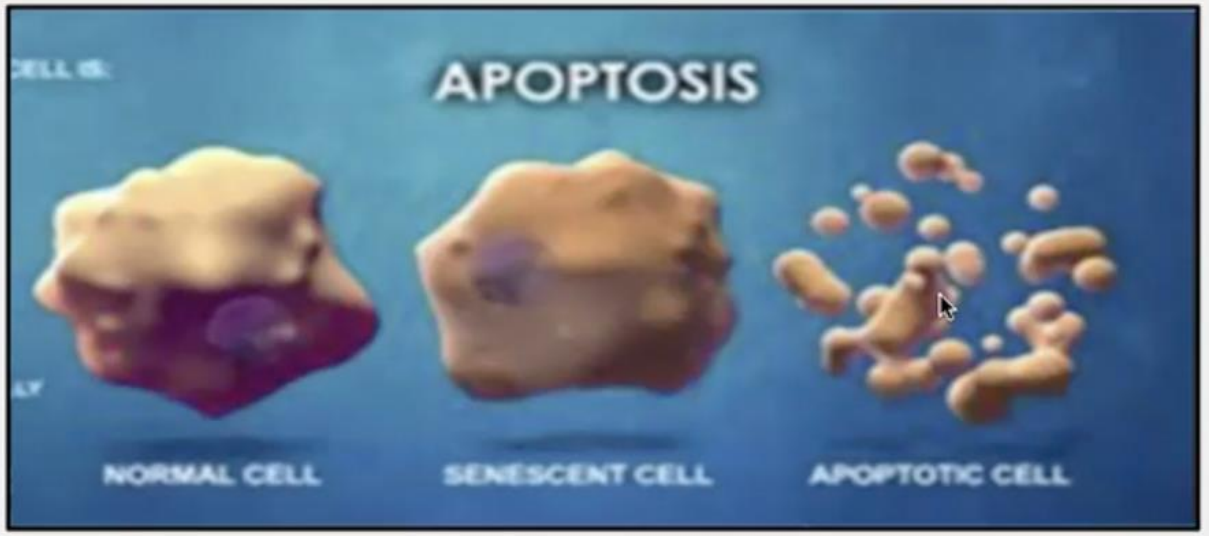
DAMPs endogenous

Cellular stress, damage, inflammation, and necrotic cell death cause release of endogenous damage-associated molecular pattern (DAMP) molecules or alarmins, which alert the host of danger by triggering immune responses and activating repair mechanisms through their interaction with pattern recognition receptors.
Damage-associated molecular patterns (DAMPs) are endogenous danger molecules that are released from damaged or dying cells and activate the innate immune system by interacting with pattern recognition receptors (PRRs). Although DAMPs contribute to the host's defense, they promote pathological inflammatory responses
DAMPs are molecules that have a physiological role inside the cell, but acquire additional functions when they are exposed to the extracellular environment: they alert the body about danger, stimulate an inflammatory response, and finally promote the regeneration process.

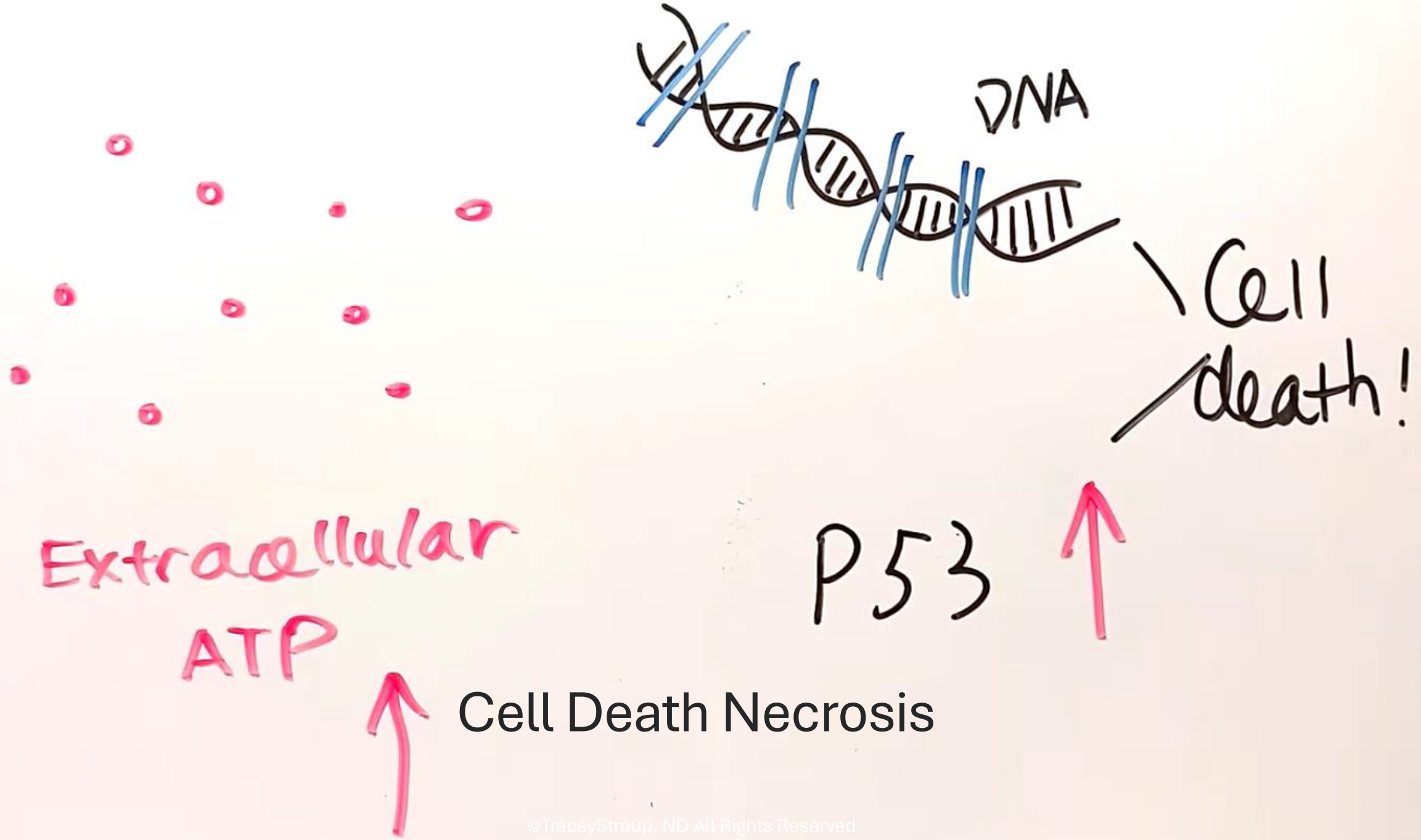
What is a Senescent Cell ?

- Cell cycle arrest phase G0
- *Can't divide but still viable*
- Apoptosis does *not* occur





Cellular Senescence as a Therapeutic Target for Age-Related Diseases: A Review



Cell Death Necrosis

4 Cycles of p53 Activation

P53 is a transcriber
Codes over 100 genes
for four mechanism

When P53 is activated, it becomes stable

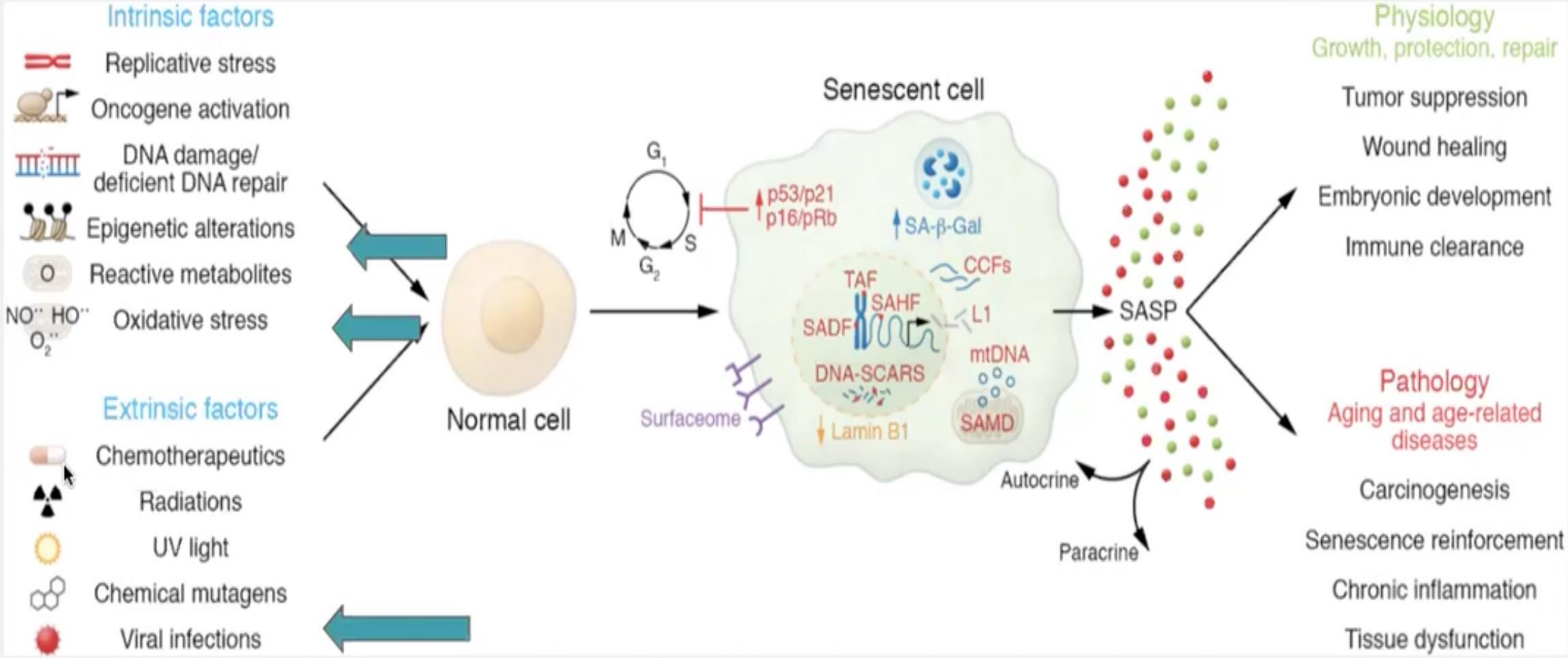
Enters the nucleus of the cell, binds promotors and turns on genes in 4 categories to help the cell respond to a stressful situation

- Cellular Arrest
- DNA repair
- Feedback Regulation
- Apoptosis - Cell Death

What encompasses a stressful situation

- Low Oxygen Levels
- DNA Damage
- Low Nutrient Levels
- Abnormal Cell Cycle

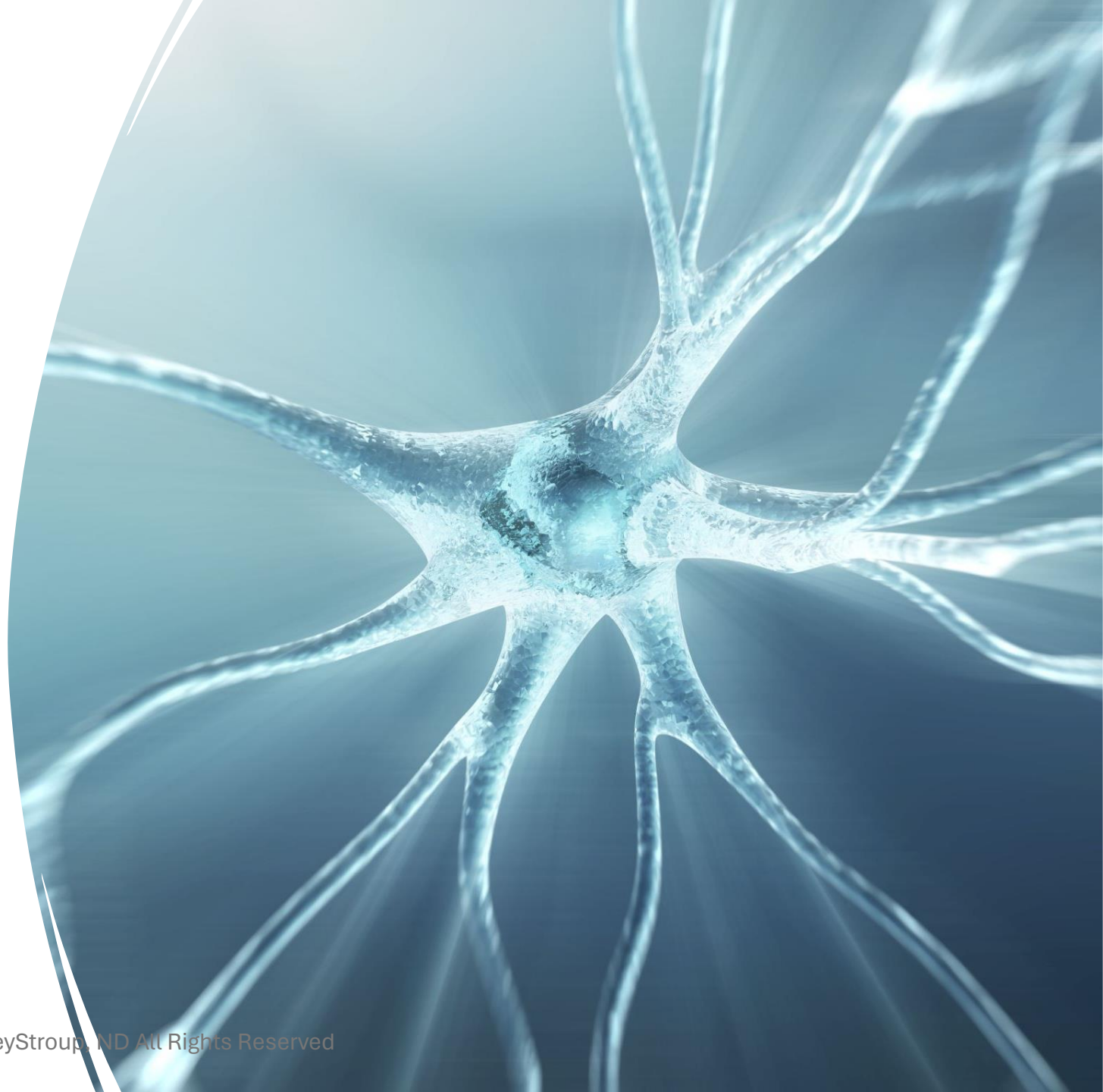
Cellular Senescence



THERE ARE NO FENCES IN THE BODY

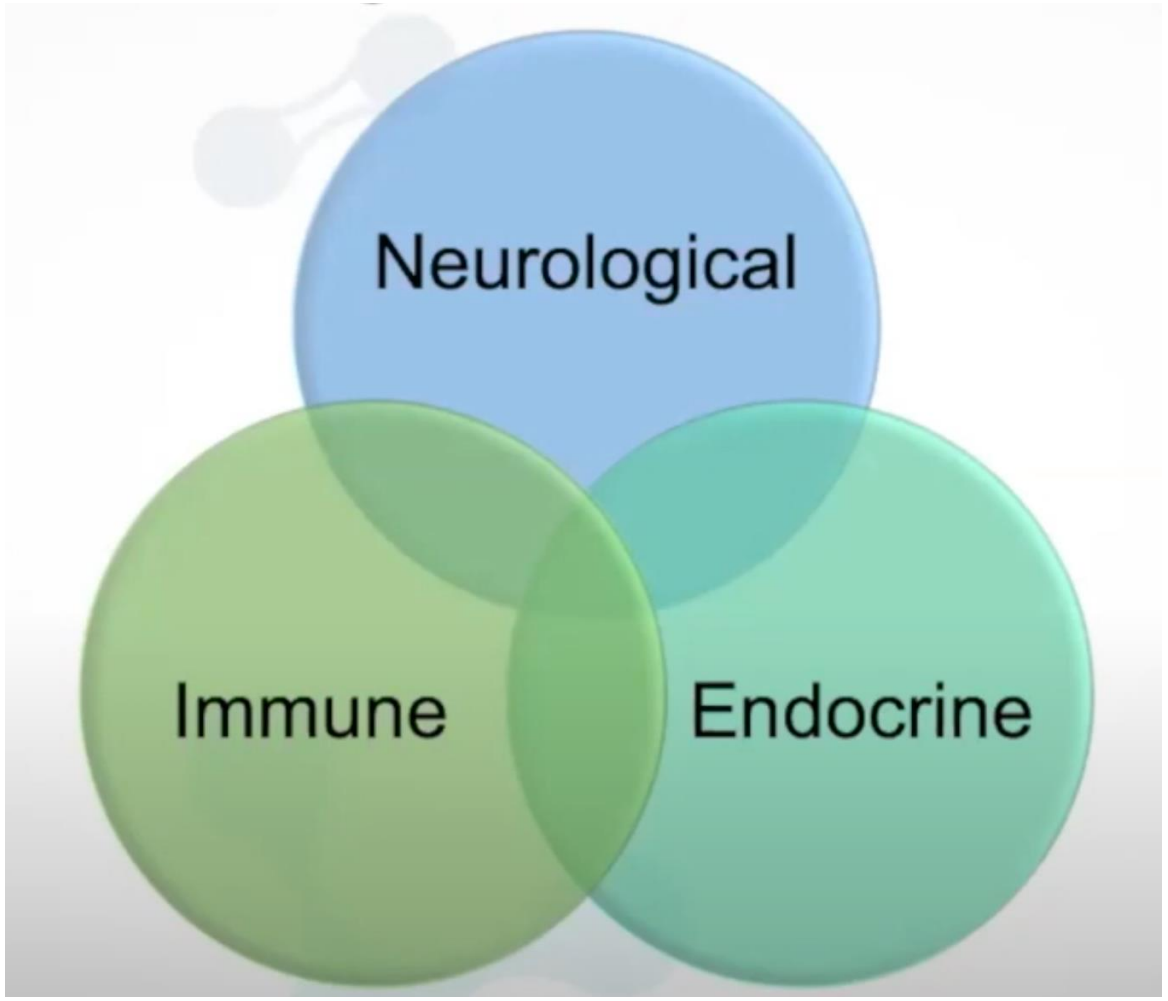
Immune system circulates

- Blood vessels
- Vasculature
- Lymphatics



Signaling in the body

- All types of signaling in the body – Ligands transmit signals between cells (extra and intra cellular communication)
- Ligands interact with proteins
  - Paracrine - other cells
  - Autocrine - same cell
  - Neurotransmitter
  - Endocrine



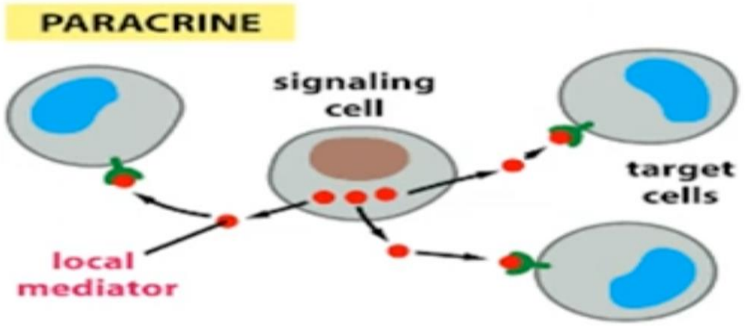
Paracrine Signaling

Types of Signaling

1. Paracrine signaling/ Short Range Signaling

They involve cells within a local neighborhood. These signaling events are mediated by regional chemical factors and mechanical forces.

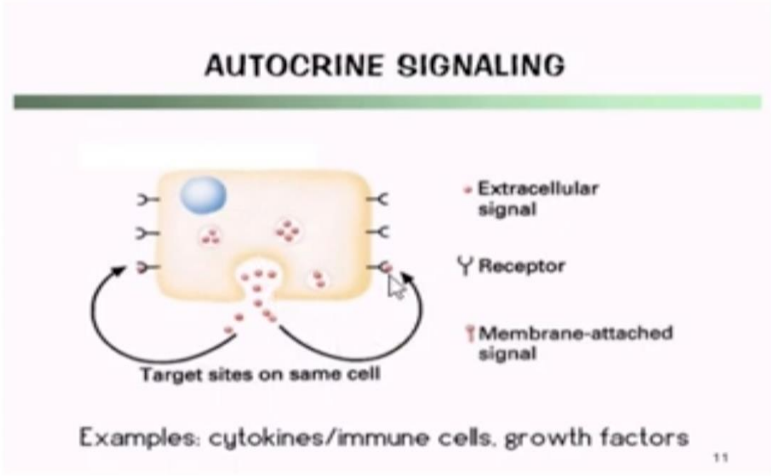
Examples include *Fibroblast growth factor* which stimulate proliferation and differentiation and *interferon* response during viral infections



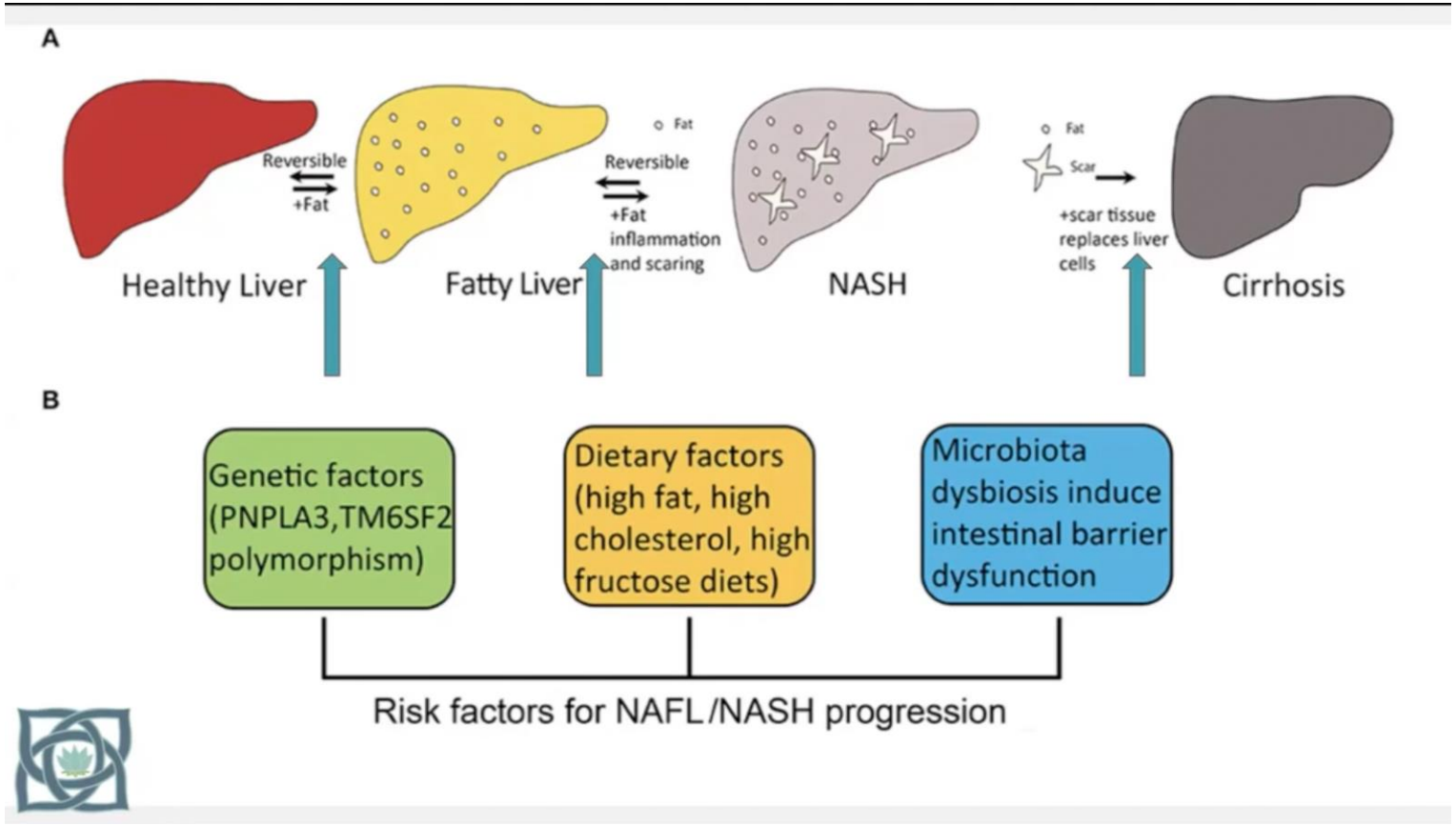
Autocrine Signaling

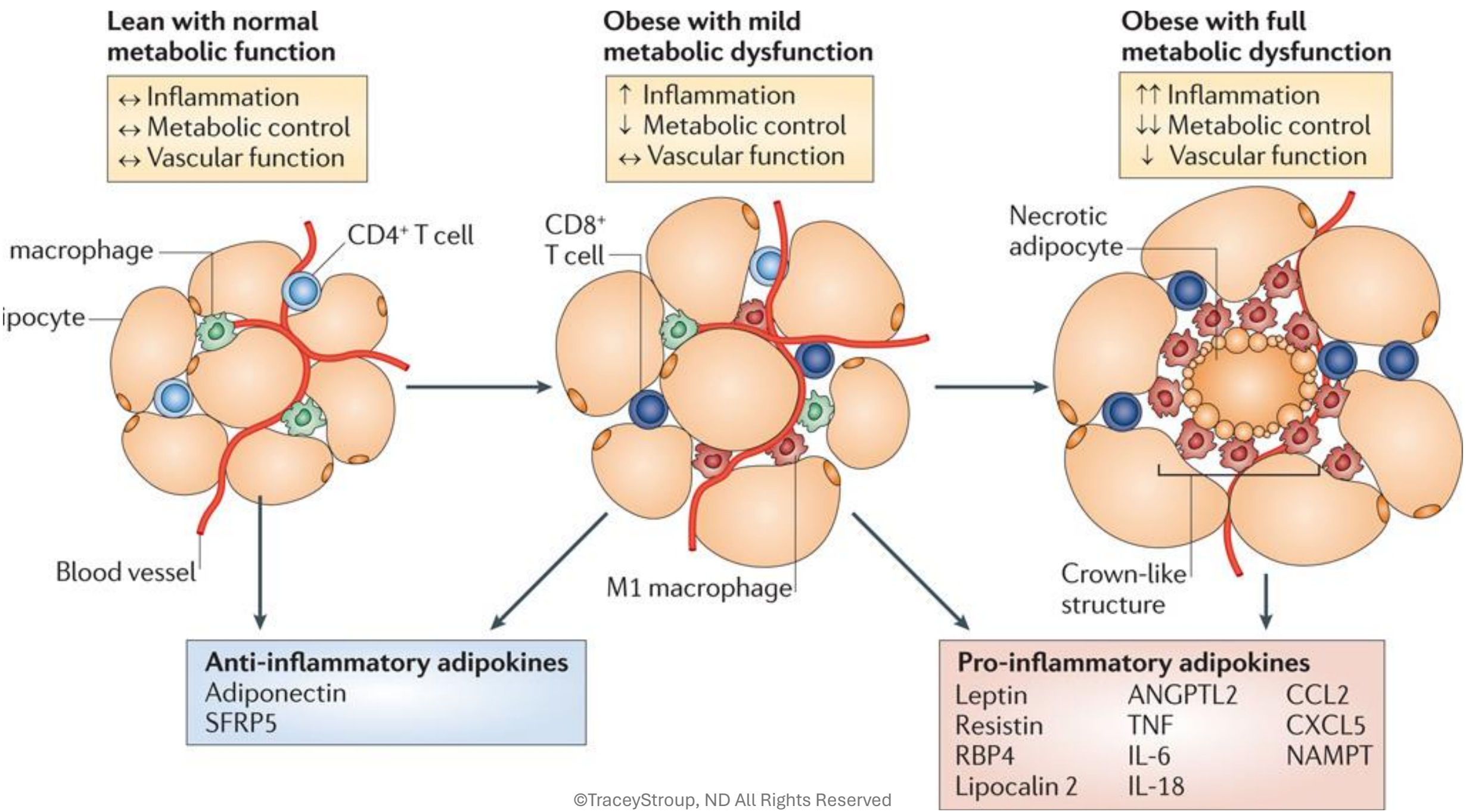
2. Autocrine Signaling

Autocrine signaling is a form of cell signaling in which a cell secretes a hormone or chemical messenger (the autocrine agent) that binds to autocrine receptors on that same cell, leading to changes in the cell. This is in contrast with paracrine or endocrine signaling.

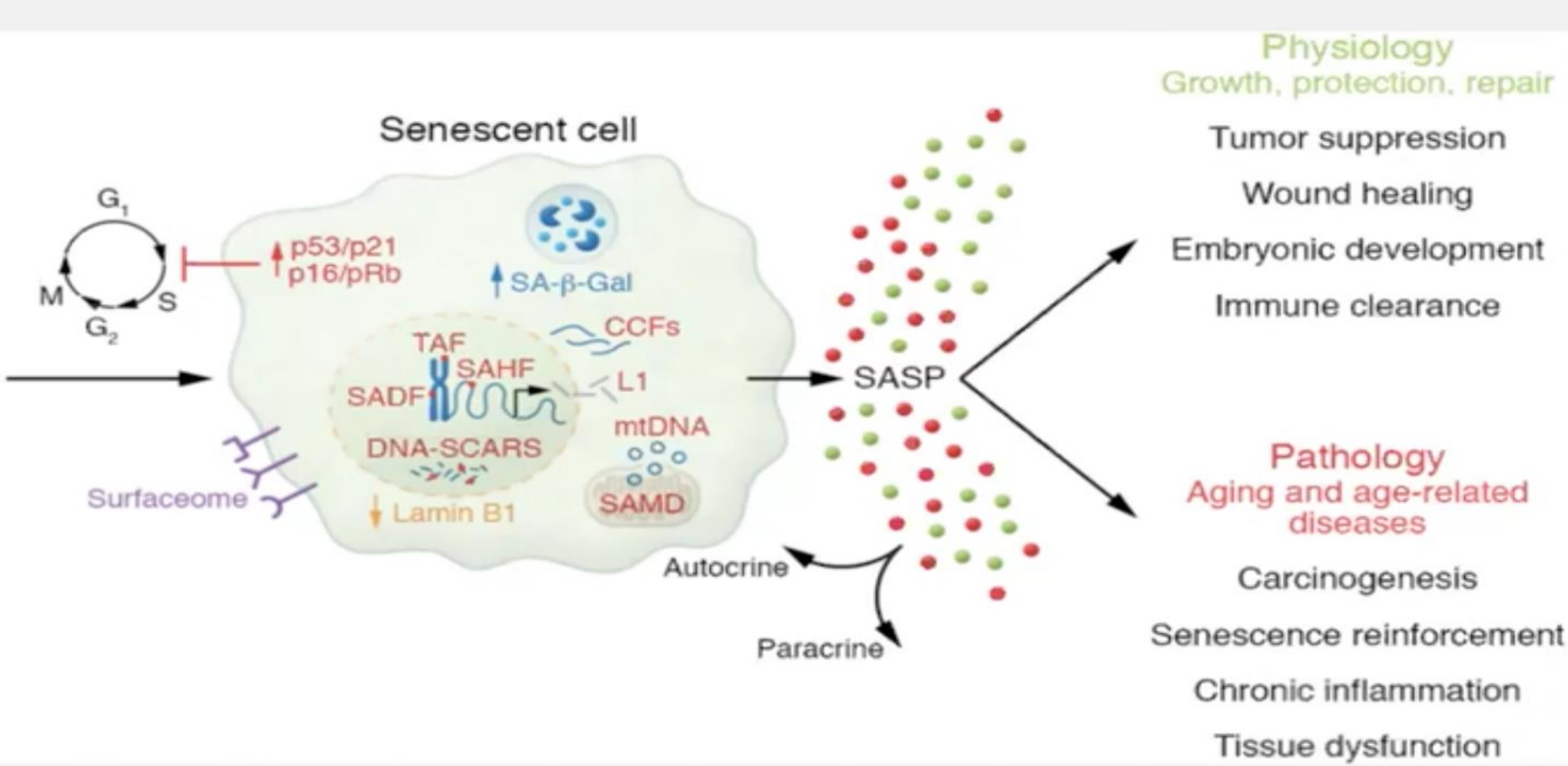


Fatty Liver





Paracrine & Autocrine - DAMP



Autocrine Example

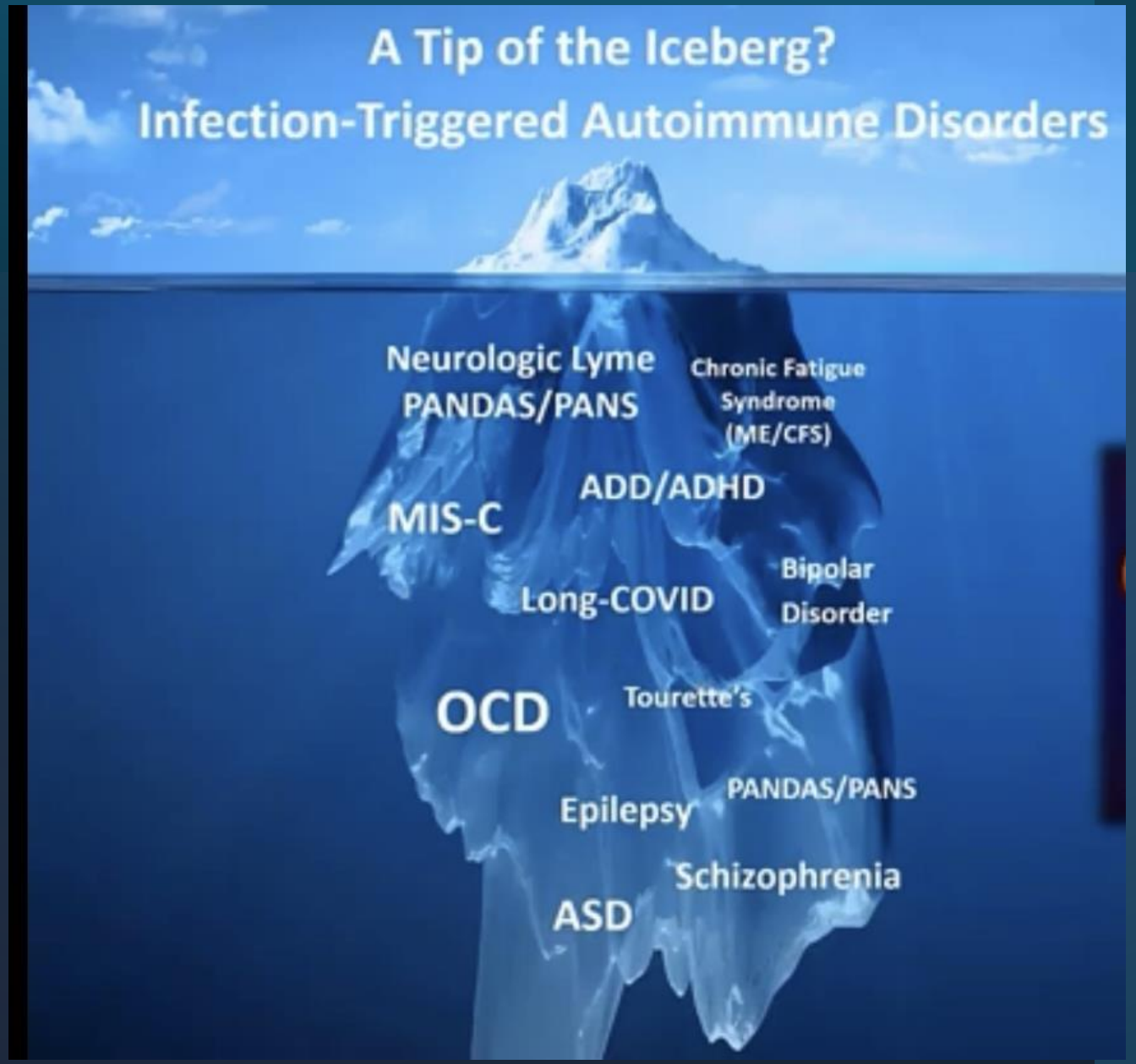
Examples

The cytokine Interleukin-1 in monocytes. When interleukin-1 is produced in response to external stimuli, it can bind to cell-surface receptors on that same cell.

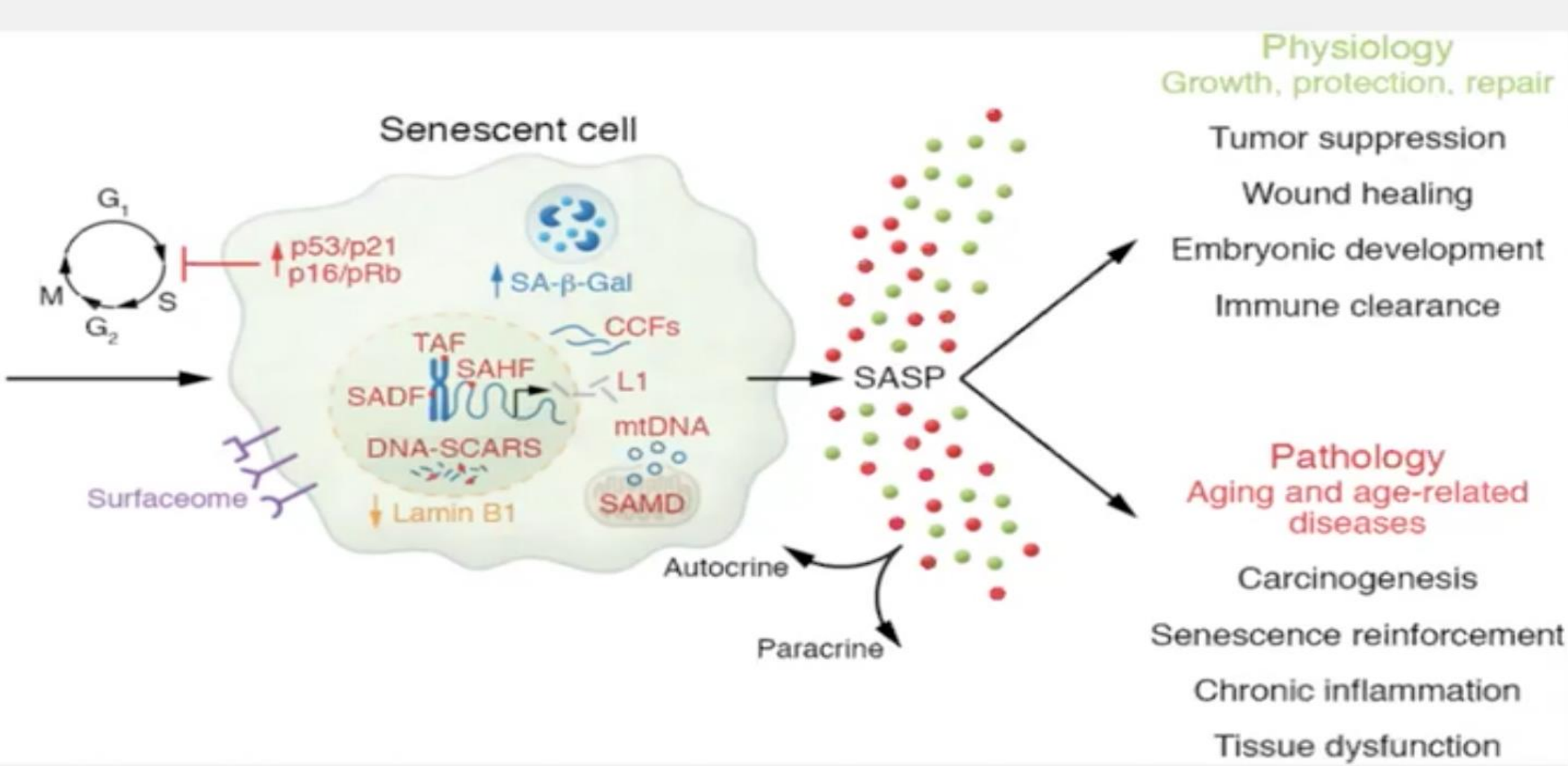
In activated T cell, the cell that releases IL-2 binds to its IL-2 receptors, causing self-stimulation and ultimately a monoclonal population of T cells is produced.

One approach used by tumors to upregulate growth and survival is through autocrine production of growth and survival factors.

Cancer is a metabolic issue



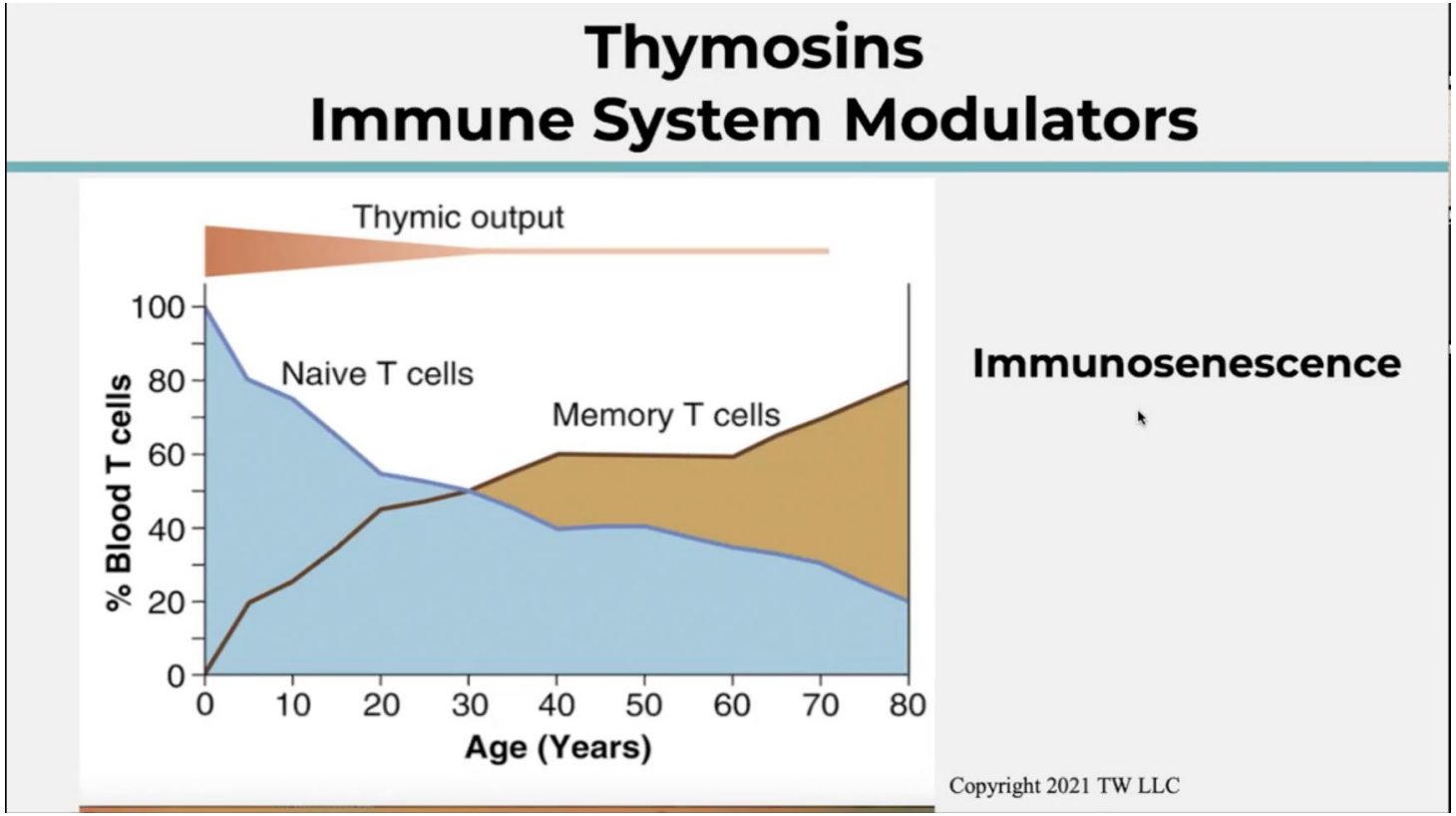
Paracrine & Autocrine - DAMP



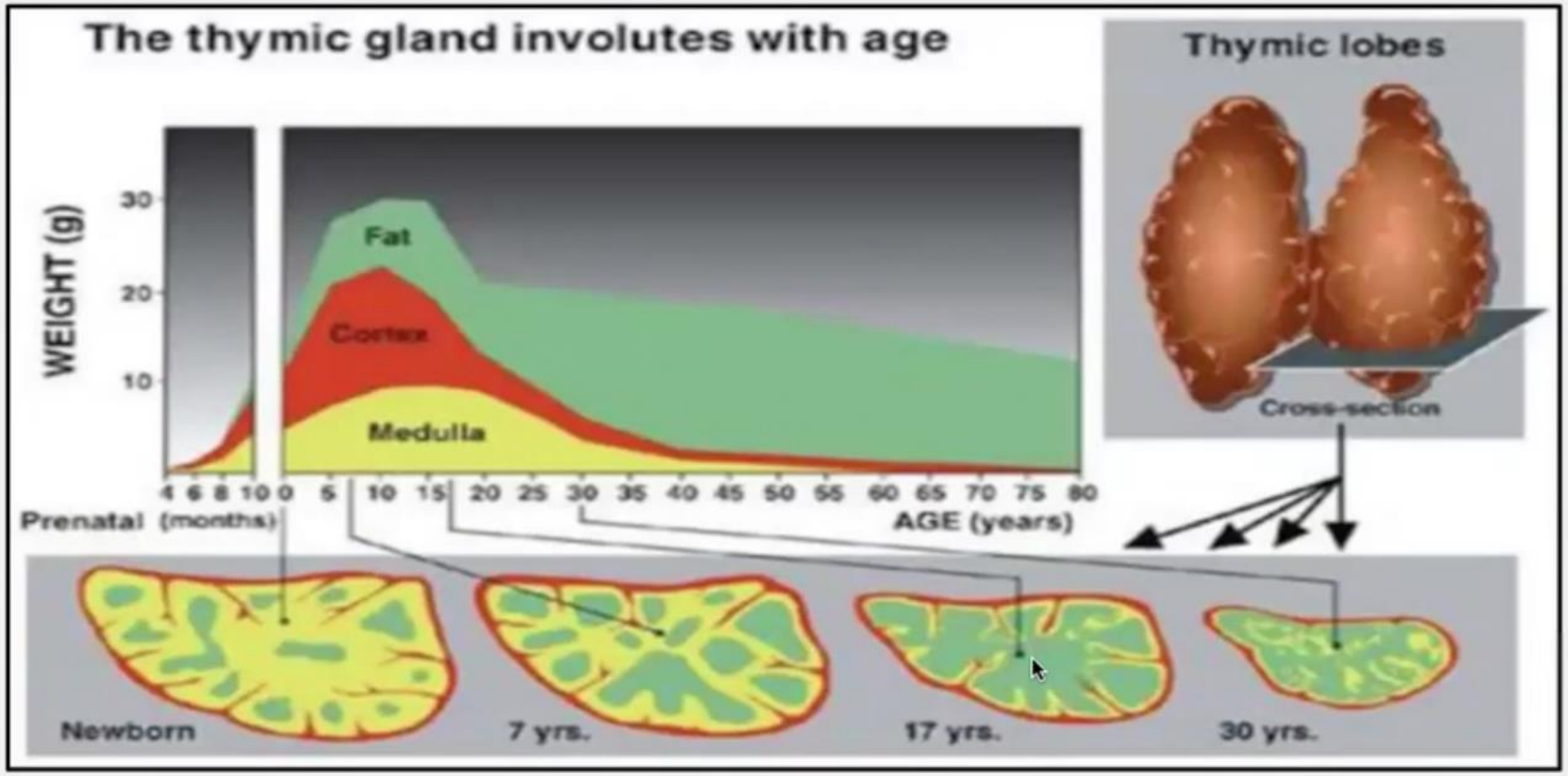
Let’s go beyond the bloodwork

High Monocytes/Low Lymphocytes

- Low grade sterile inflammation
- Naïve T cell production decreases over time
- Memory T Cells increase but are old



Thymic Involution



Chronic Ear Infections in Kids

When a baby is young, they have a lot of Naïve T cells…

However, reoccurring infections begin to create senescent cells…

Oxidative stress, inflammation, immune dysregulation

Most cases I have seen begin with underlying strep

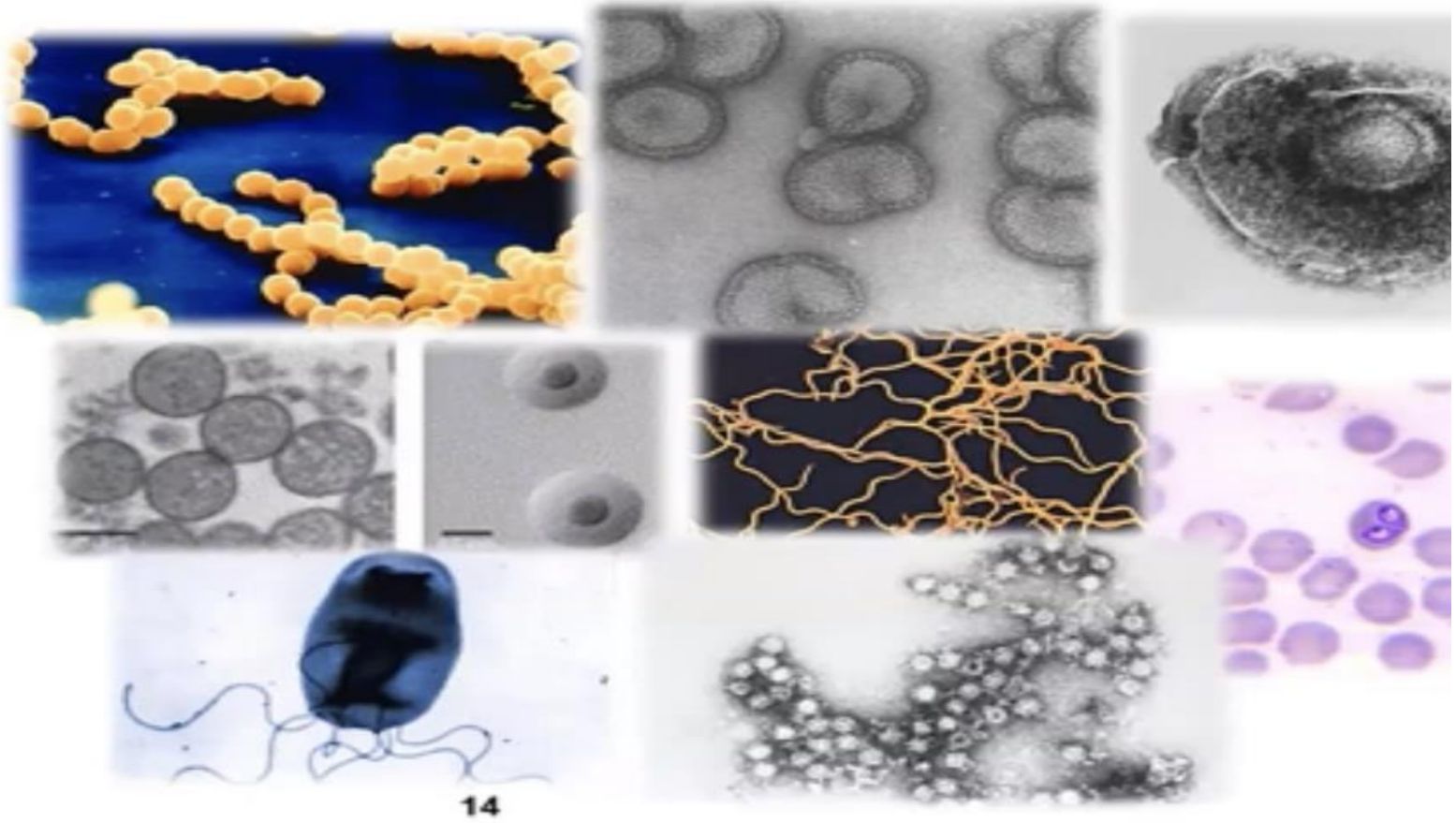
KILL MENTALITY

Antibiotics…antibiotics…antibiotics…

532	$5.00	Complete Blood Count (CBC) With Differential (005009)
513	$6.00	Antistreptolysin O (ASO) Antibodies (006031)
1054	$36.00	Anti-DNase B (Streptococcal) Antibodies (096289)

Certain Infections Are More Frequently Associated with Autoimmune Encephalopathies and Neuropsychiatric Symptoms

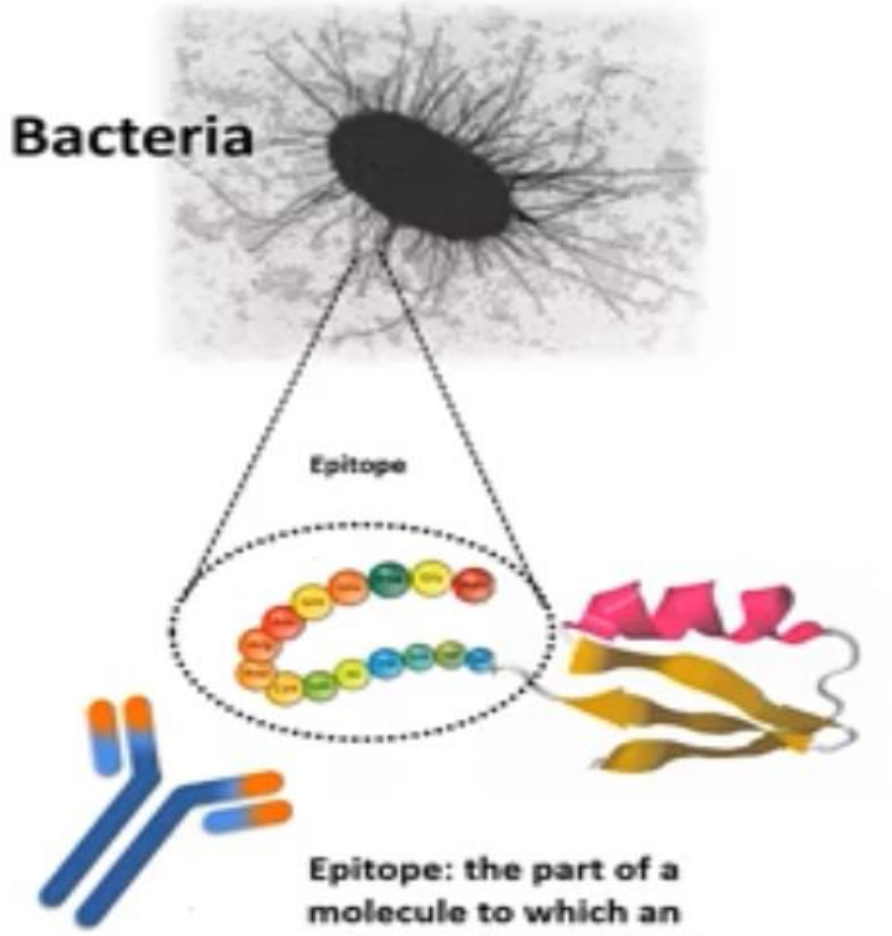
- Group A streptococci
- Influenza A
- Varicella (chickenpox)
- Mycoplasma
- Lyme disease
- Babesia
- Bartonella
- Coxsackie virus
- Others

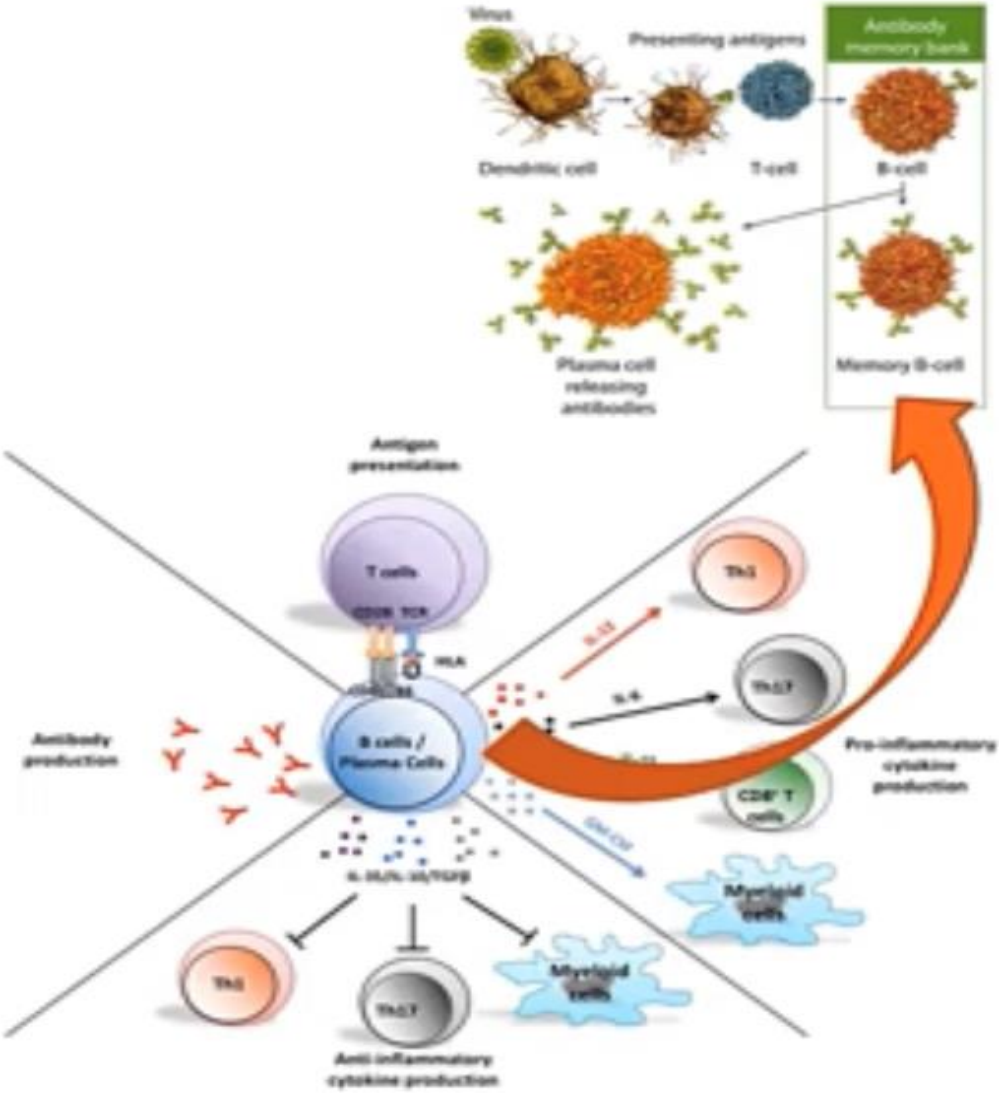


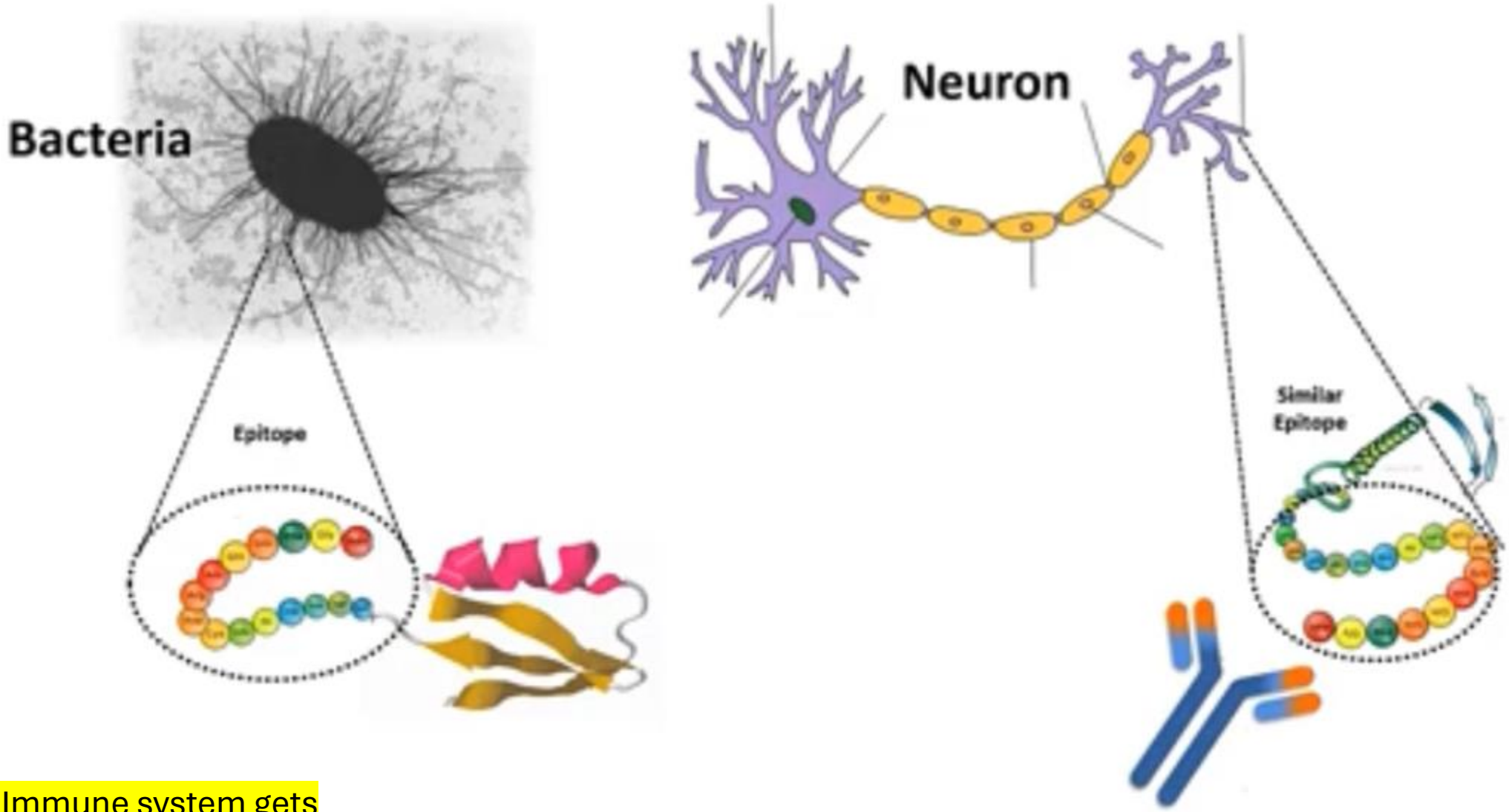
PAMP & DAMP

- Antibiotics unsupported
- Not enough “other” nutrition to overcome
- “Other” Toxicity in the way
- Environmental Influences – Childhood vaccine schedule

Antibodies Recognize "Epitopes" on Infectious Agents



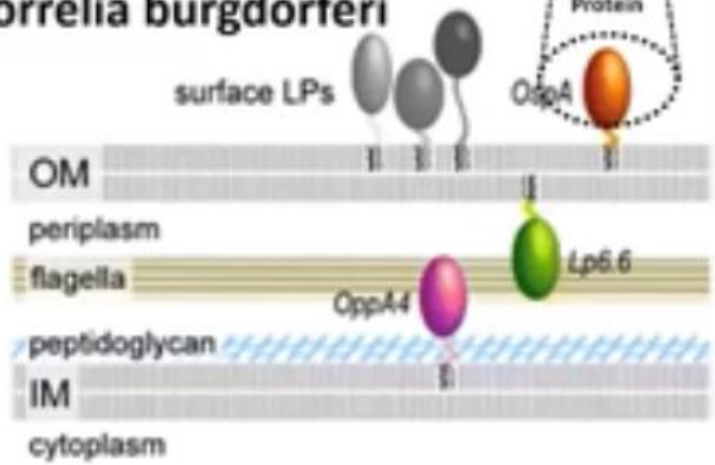




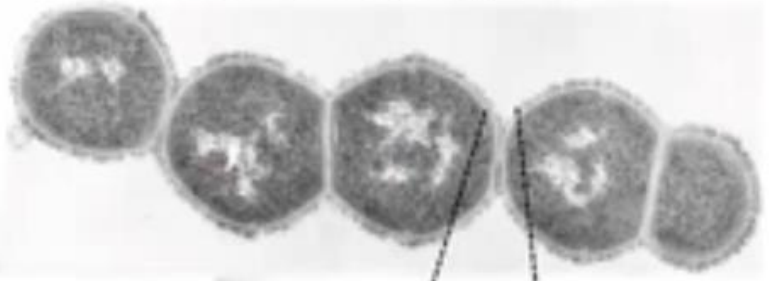
The Immune system gets Confused

Autoimmune response through "Molecular Mimicry"

Borrelia burgdorferi



Streptococcus pyogenes



Evidence of *Borrelia* Autoimmunity-Induced Component of Lyme Carditis and Arthritis

Elizabeth S. Roveche,[1] Steven E. Schutzer,[1]* Helen Fernandes,[1] Helen Bateman,[1] Brian A. McCarthy,[1] Steven P. Nickell,[2] and Madeleine W. Cunningham[3]

Departments of Pathology and Medicine, New Jersey Medical School, University of Medicine and Dentistry of New Jersey, Newark, New Jersey[1]; *Department of Molecular Genetics and Microbiology, University of New Mexico, Albuquerque, New Mexico*[2]; *and University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma*[3]

"Sequence similarity between the *B. burgdorferi* protein ***OspA*** and the *S. pyogenes* ***M5 protein***"

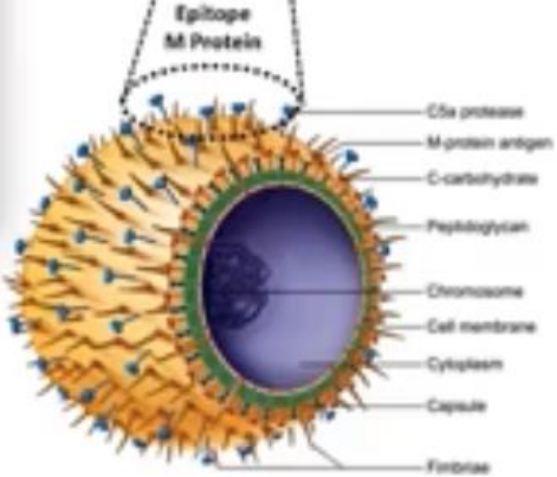
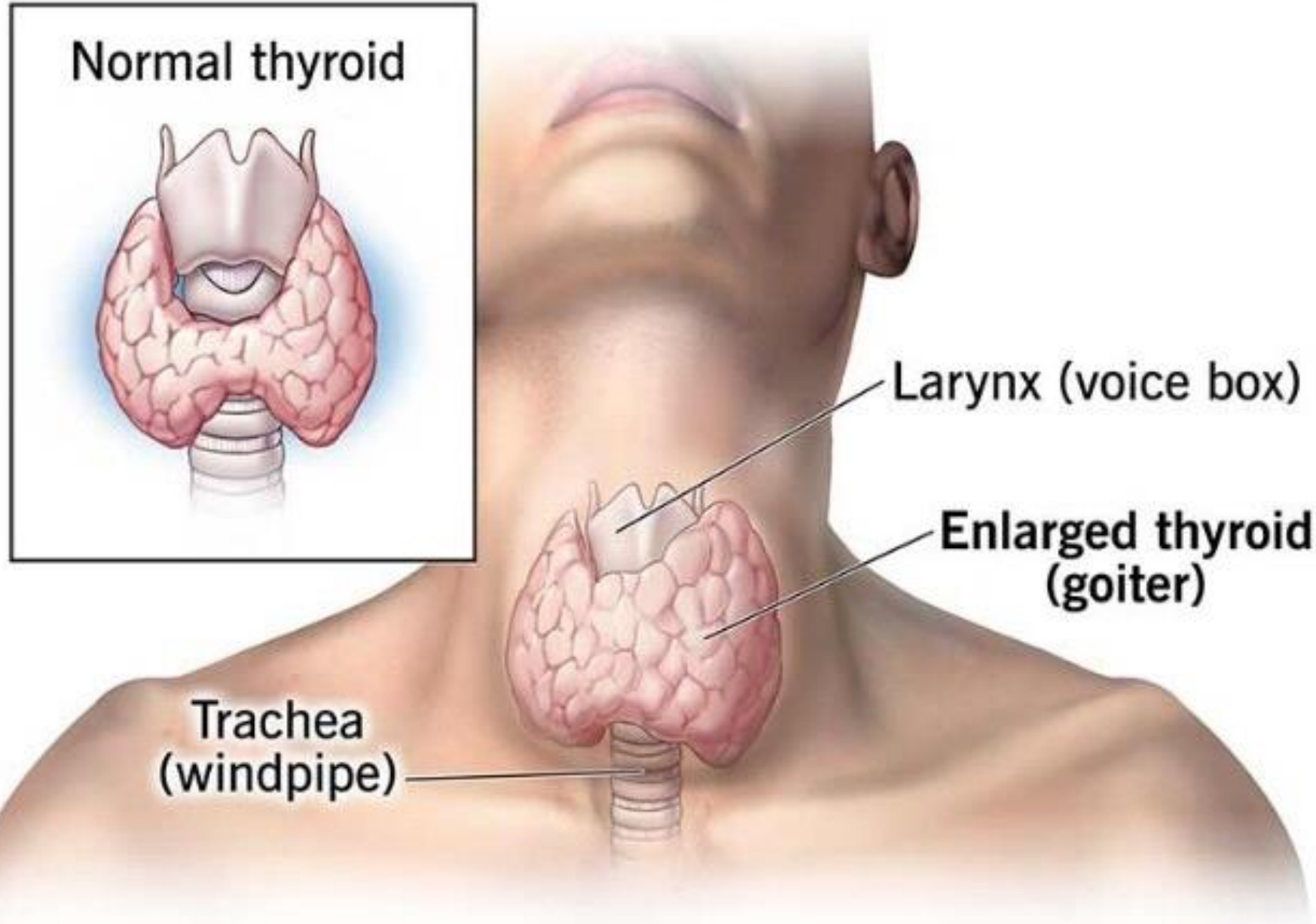
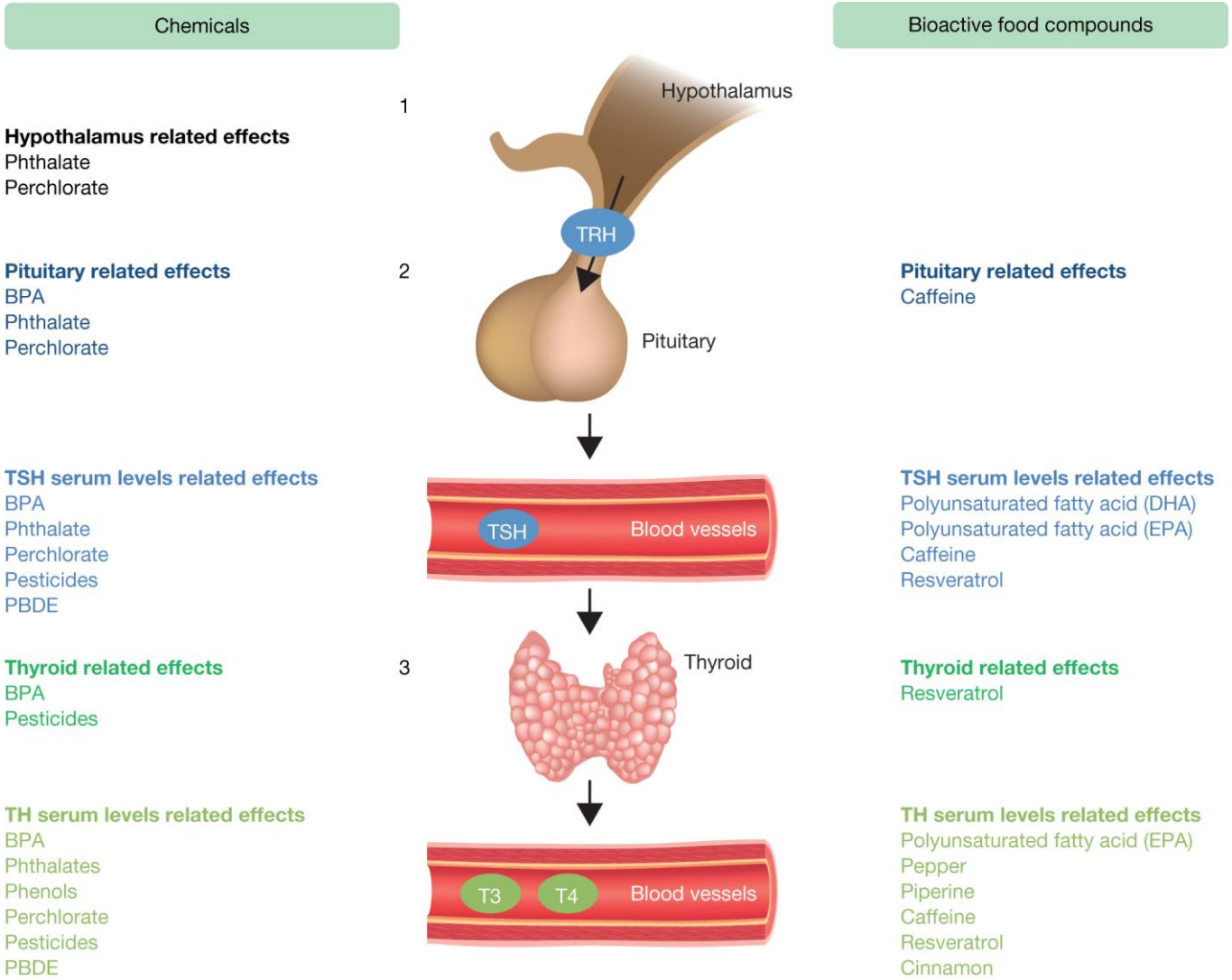


Image from Talaro & Talaro (2002)

"The IgM anti-B. burgdorferi … cross-reacted with S. pyogenes M and myosin, both of which share sequence homology with B. burgdorferi OspA, ***suggesting a role for molecular mimicry in the generation of these Ab reactivities***





Simple scheme of the hypothalamus–pituitary–thyroid axis. The hypothalamus produces thyrotropin-releasing hormone (TRH), which stimulates the pituitary to release thyrotropin (thyroid-stimulating hormone, TSH). TSH is released in circulation and stimulates the thyroid gland to produce thyroid hormones (THs) (Ortiga-Carvalho et al. 2014). The thyroid produces the main THs, thyroxine (T4) and triiodothyronine (T3). TSH stimulates all the steps of TH biosynthesis and release, as well as the expression and activity of several proteins: the solute carrier family 5A (also known as sodium-iodide symporter (NIS)), pendrin (PDS), dual oxidase type 2 (DUOX), thyroid peroxidase (TPO), thyroglobulin (Agic et al. 2007) and deiodinases type 1 (D1, DIO1), 2 (D2, DIO2) and 3 (D3, DIO3). In physiologic balance, T4 and T3 (3) regulate their own concentrations in the blood by negative feedback acting at the hypothalamic (1) and pituitary (2) levels (Ortiga-Carvalho et al. 2016). BPA, bisphenol A; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; PBDE, polybrominated diphenyl ether.

Viruses lay latent until something tips the immune system

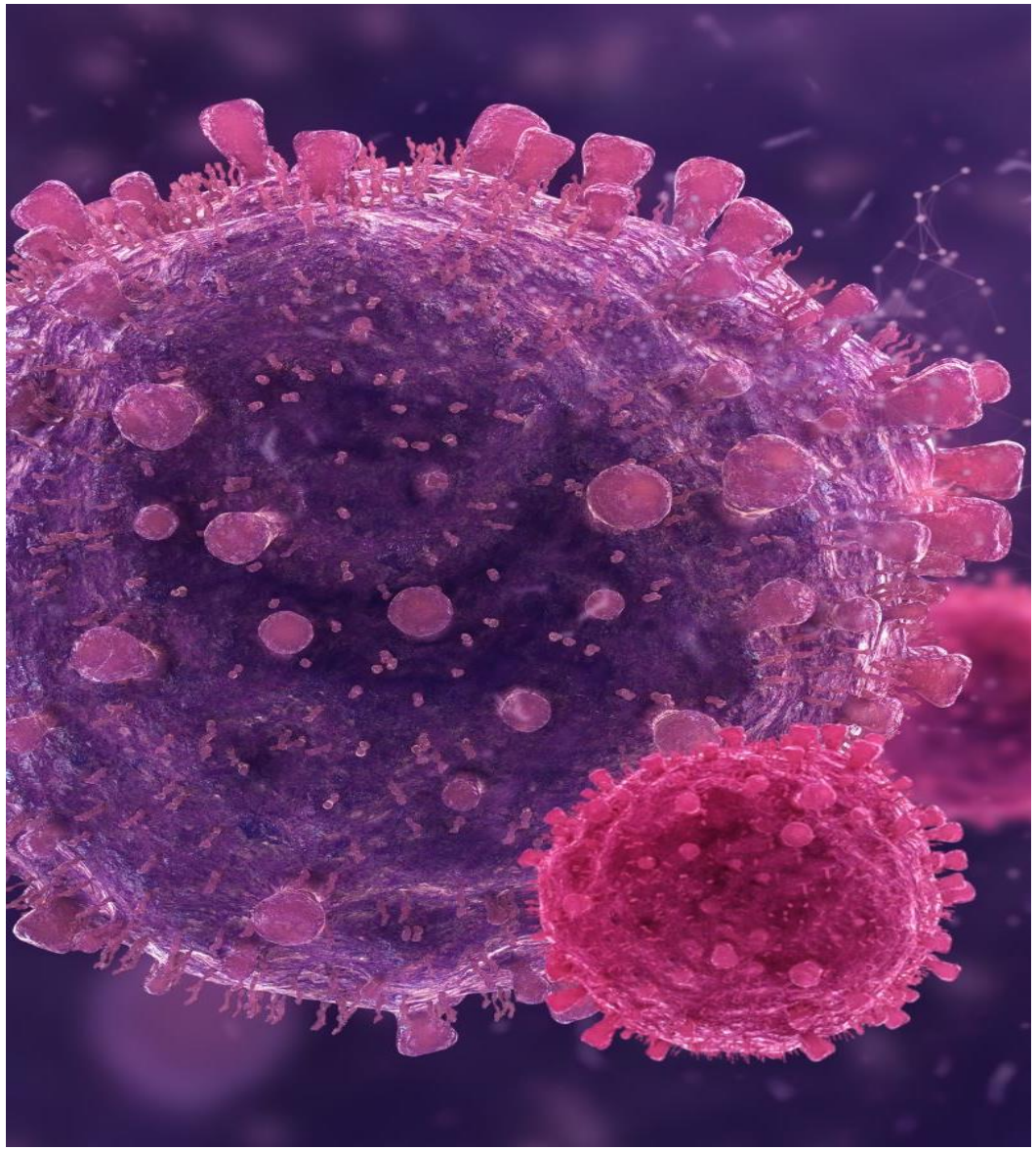
Hashimoto's is a great example of a latent virus destroying a function over time. Epstein-Barr (EBV) is a virus that causes mononucleosis (also known as "mono" or "glandular fever" in the UK).

A 2015 Polish study found the Epstein-Barr virus in the thyroid cells of 80 percent of people with Hashimoto's and 62.5 percent of people with Graves'.

Specific immune cells known as CD8+T cells are needed to fight off the Epstein-Barr virus. However, some individuals may have a low baseline level of these types of immune cells.CD8+T cells decrease with age, are lower in women, and are also decreased when vitamin D intake is low.

When levels of these fighter cells are insufficient, the Epstein-Barr virus may take up residence in the thyroid and essentially hijack it to help the virus hide and multiply. Add poor Lifestyle, SAD diet, deficiencies and toxicity. It's the perfect storm.

Begin PAMP & DAMP!

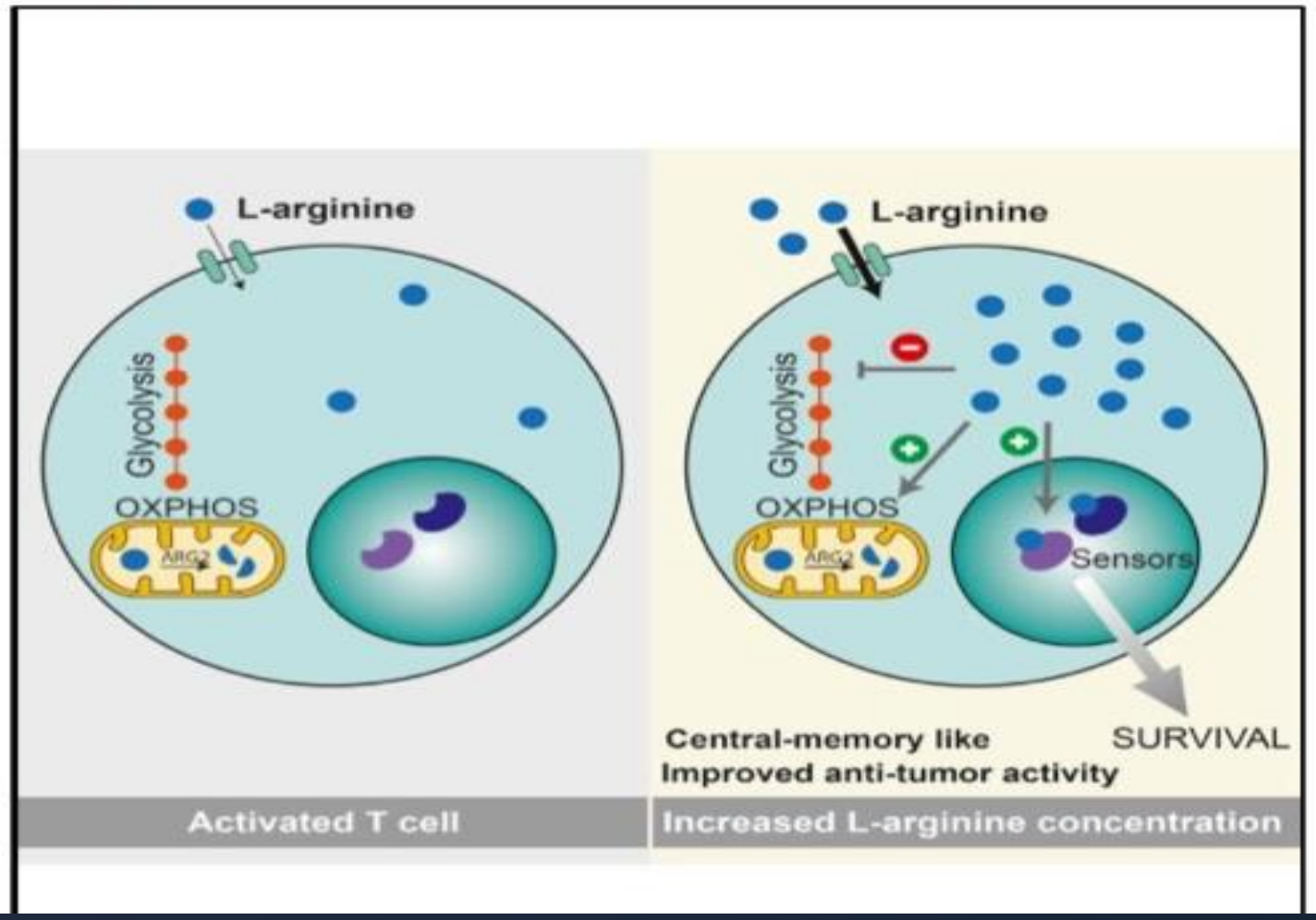


Probiotics can enhance the antitumor immune response of $CD8^+$T cells. It can play a synergistic antitumor role. On the one hand, its mechanism is through regulating intestinal flora, and on the other hand, through regulating the antitumor immune function of $CD8^+$T cells.

Cell

L-Arginine Modulates T Cell Metabolism and Enhances Survival and Anti-tumor Activity

Graphical Abstract



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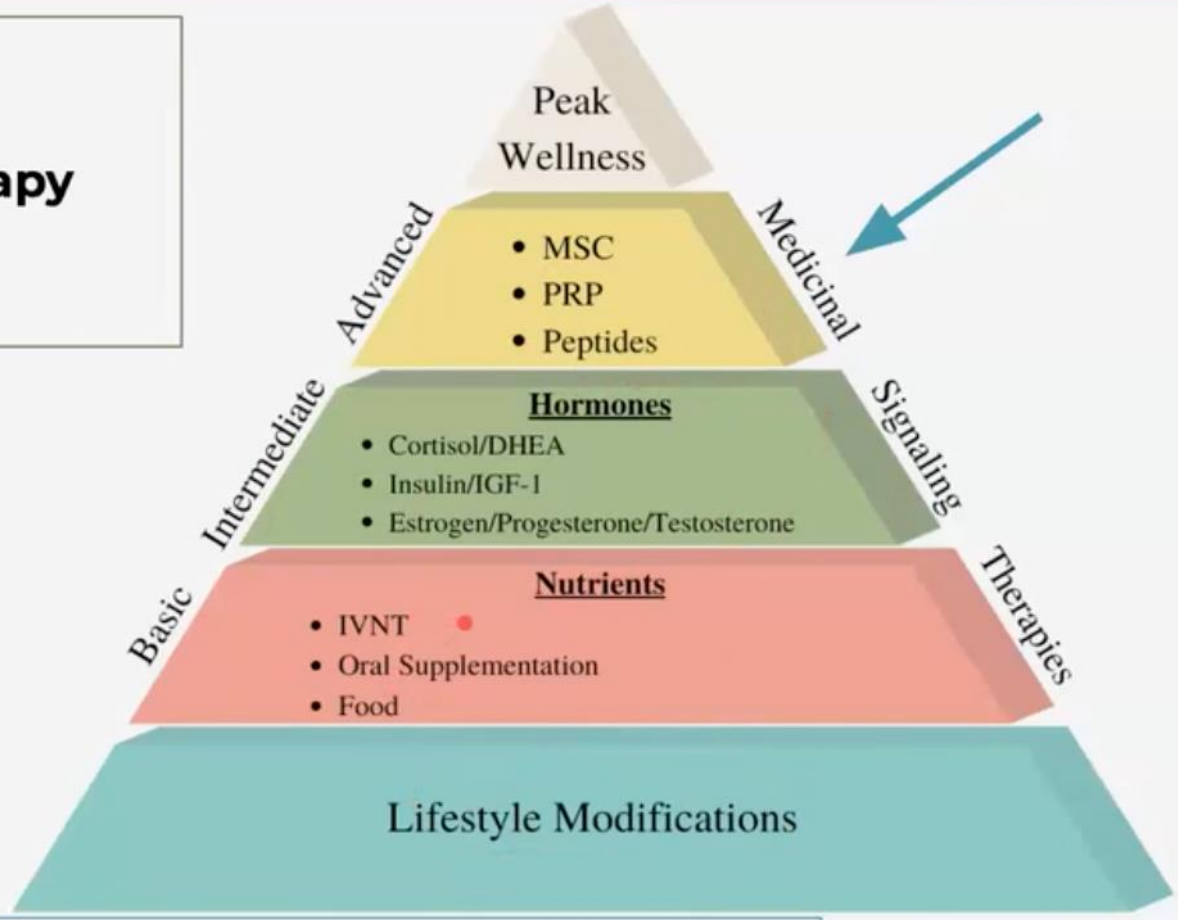
In Brief

Metabolomic and proteomic profiling unveil intracellular L-arginine as a cruc regulator of metabolic fitness, survival capacity, and anti-tumor activity of central memory T cells.

Regenology Pyramid

Key

MST = Medicinal Signaling Therapy
IVNT = Intravenous Nutritional Therapy
MSC = Medicinal Signaling Cells
PRP = Platelet Rich Plasma



Dr. Kathleen O'Neil-Smith.and Dr. Angeli Maun, *Fine Tune Your Immune System*. 1st ed., vol. 2, 2021.

Inflammation and Immune Modulation Protocols

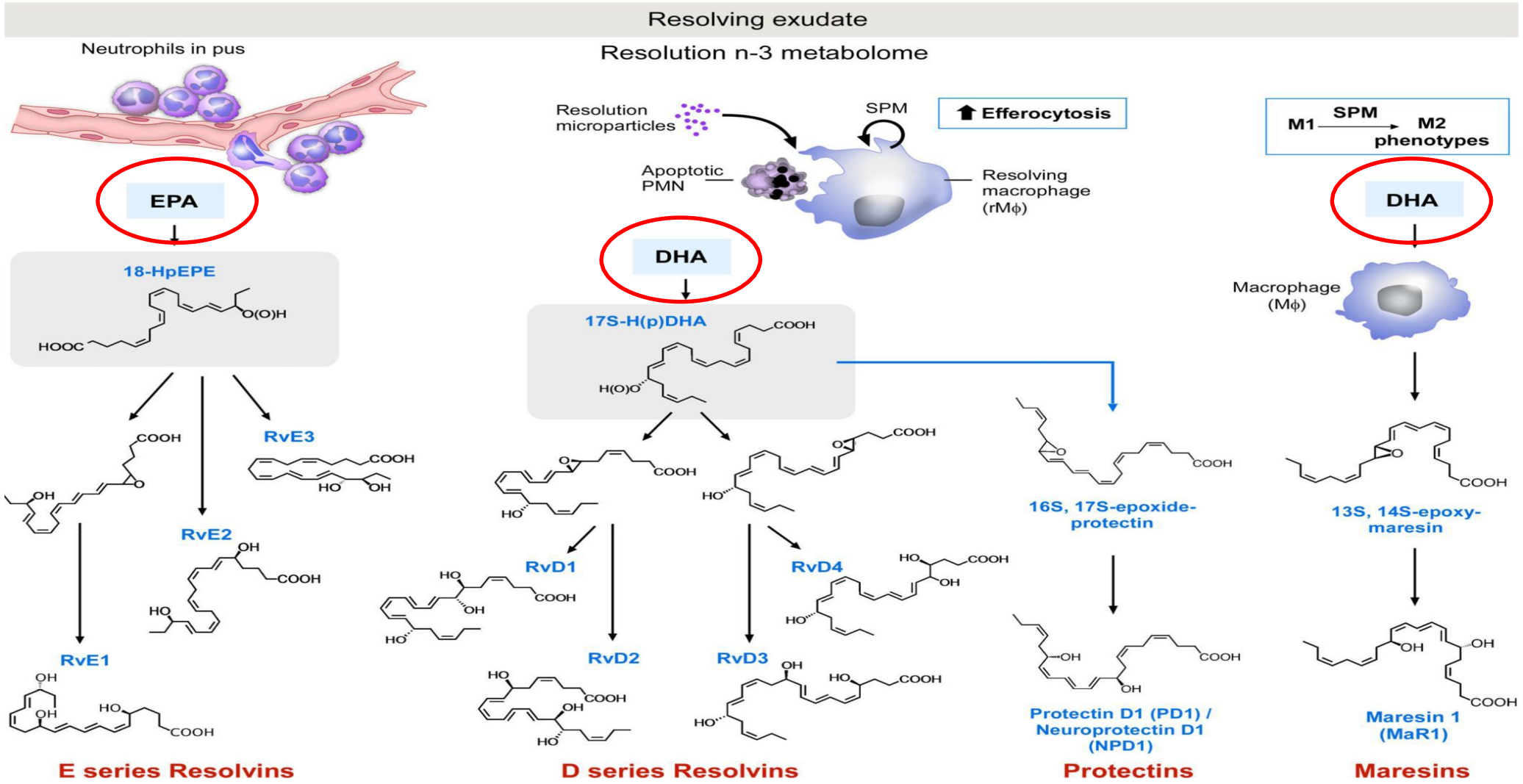
- SPM
- CBD
- Xflame
- InFlam
- Turmeric Plus

They are called ‘resolving mediators’ because of their role in facilitating natural resolution of the inflammatory response.

Examples of SPMs include resolvins, lipoxins, protectins, and maresins.

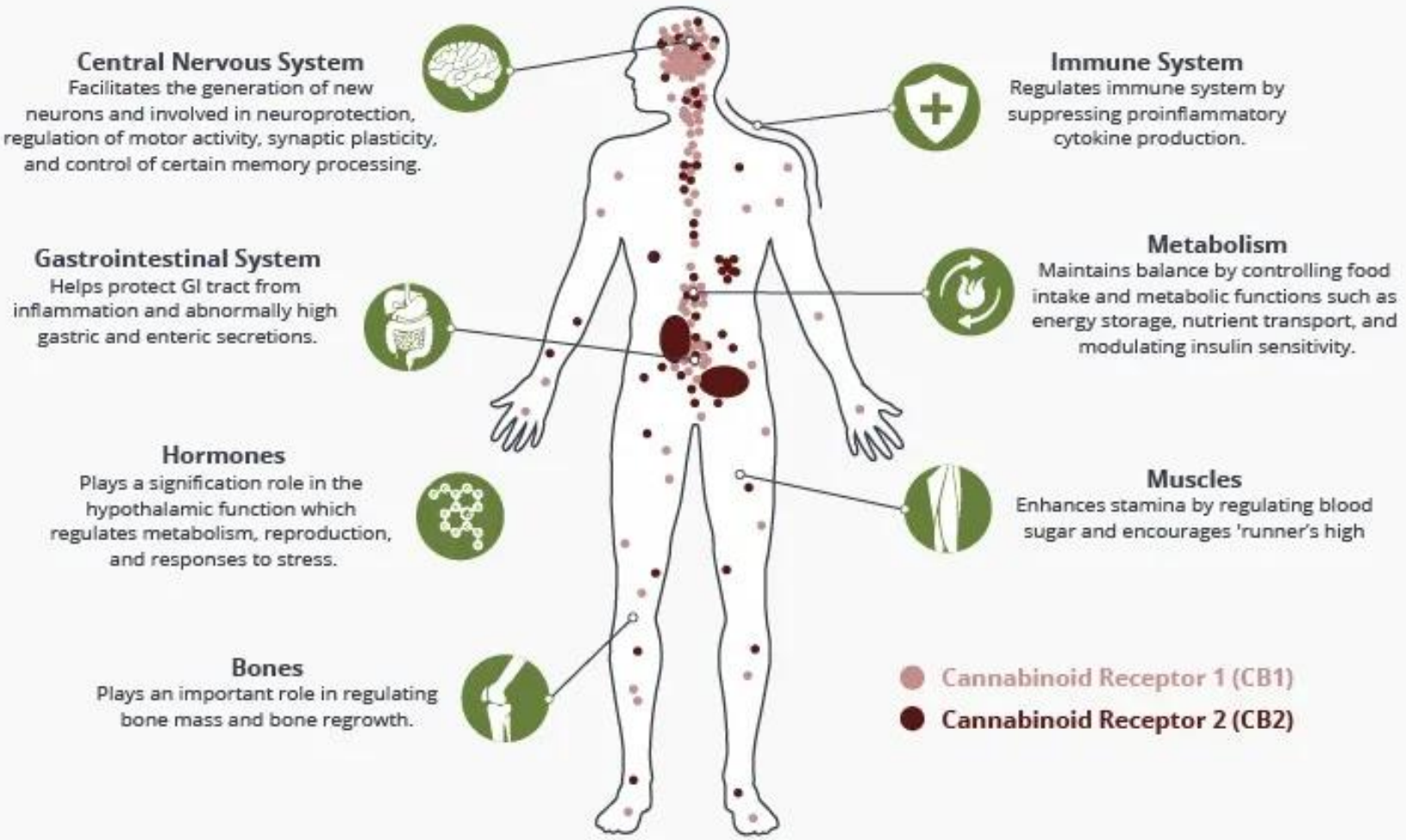
Resolution of Inflammation

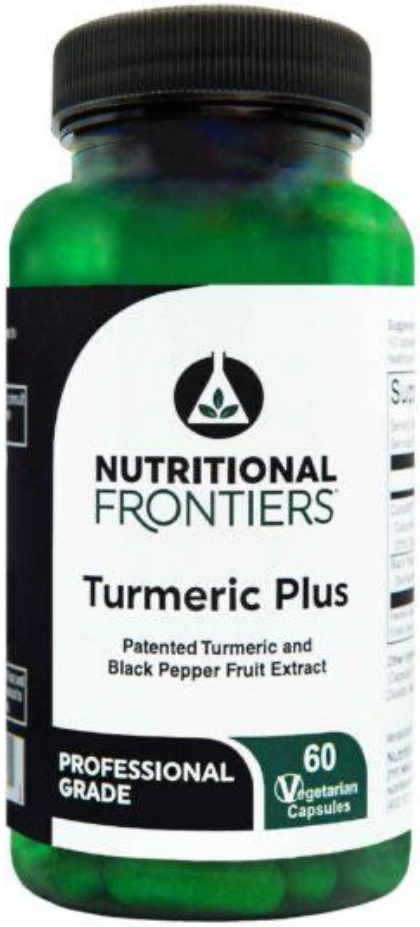
Metabolic Pathways in Resolution



C. N. Serhan, *Nature* **2014**, *510*, 92–101.

THE BODY'S
ENDOCANNABINOID SYSTEM





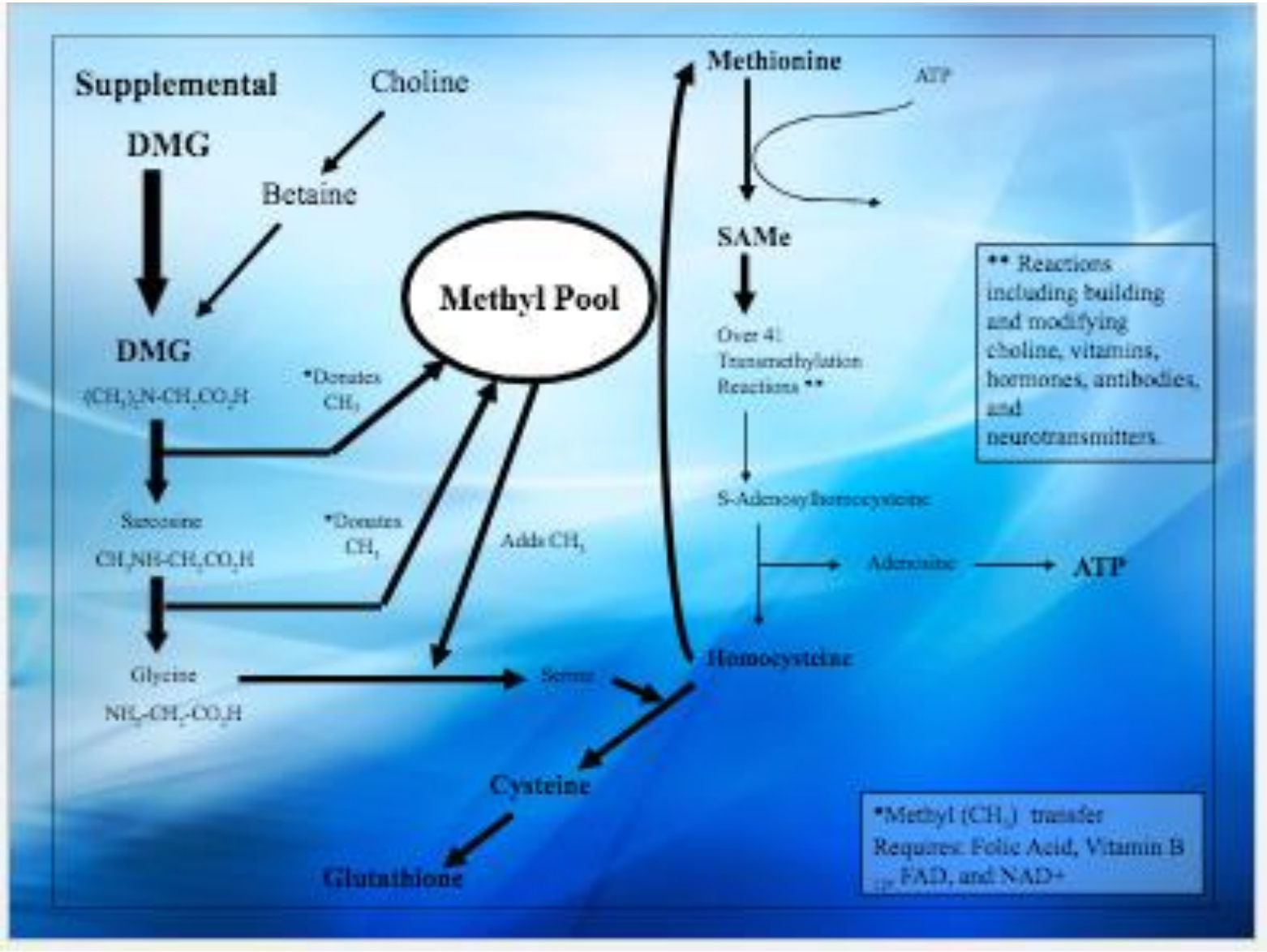
Turmeric

Curcumin can also modulate the expression of genes involved in inflammation. It inhibits the activation of transcription factors such as nuclear factor-kappa B (NF-κB), which regulates the expression of pro-inflammatory genes. By suppressing NF-κB activation, curcumin reduces the production of inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α), interleukin-1 beta (IL-1β), and interleukin-6 (IL-6), which are key mediators of inflammation

Peptides

P53 Modulation and APOPTOSIS

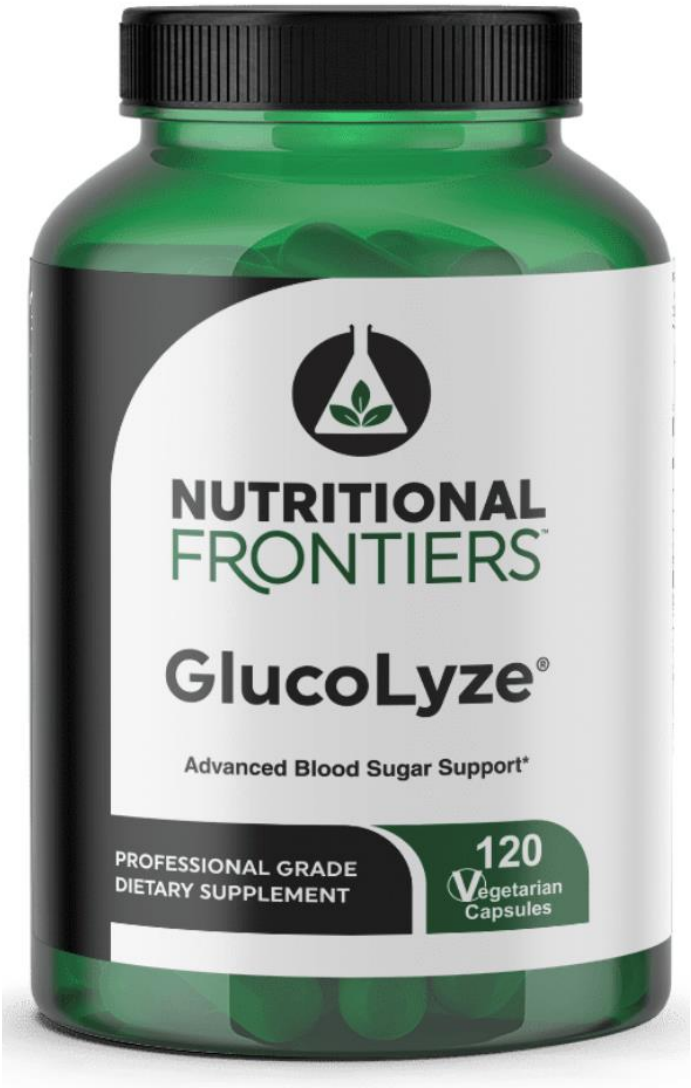
EnerDMG
Resveratrol
EGCG – Pro Oranges
Nutraglutide
Quercetin
Peptides



You must balance blood sugar for OPTIMAL P53 Activation

- P53 can influence the expression of genes encoding glucose transporters (e.g., GLUT1) and enzymes involved in glycolysis (the breakdown of glucose), such as hexokinase and phosphofructokinase. By modulating the expression of these genes, P53 can affect the uptake and utilization of glucose by cells

- Dysregulation of P53 function is commonly observed in cancer and metabolic disorders, including diabetes and obesity. Altered glucose metabolism and insulin signaling pathways can impact P53 activity and expression, while aberrant P53 function may contribute to metabolic abnormalities and insulin resistance.



Cancer is a metabolic issue

Peptides to learn about

Thymosin Alpha 1

Thymosin Beta 4

BPC

BPC + PEA

KPV

Peptides

Specific Protocol to Educate and Eliminate

ImmuneBoost
Probiotics (Super)
Immunomax
Peptides
Nosodes - Specific

Gut Health

- GI COMPLETE – sooths and cools digestive tract – enhances integrity of the lining of GI tract
- PROBIOITICS – Microbiota balance and proper signaling and defense against inflammatory pathogens
- IGG – Modulation of immune response, neutralizes pathogens, supports gut barrier function, potential to manage food sensitivities.

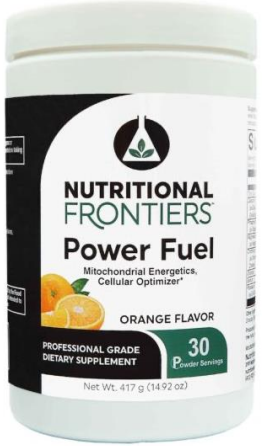
Poor gut health is connected to chronic inflammation,

Neurological issues, metabolic syndrome and more

One offs to Consider

- PowerFuel
- CircuCore
- BCAAs

Proper AA metabolism



ATP Production

Vascular Integrity

Rebuild what has been damaged

Nutritional Frontiers Solutions

Testing Beyond The Baseline

CBC with Diff

CMP

Lipid

Serum Iron

Thyroid Women

PSA and/or Testosterone Men

Inflammation Blood Panel

The most frequently used inflammatory markers include acute-phase proteins, essentially CRP, serum amyloid A, fibrinogen and procalcitonin, and cytokines, predominantly TNFα, interleukins 1β, 6, 8, 10 and 12 and their receptors and IFNγ.

- $9.00 C-Reactive Protein (CRP), Quantitative (006627)
- $7.00 Ferritin (004598)
- $50.00 Fibrinogen Antigen (117052)
- $50.00 Interleukin-06 (IL-6), Serum (140916)
- $35.00 Tumor Necrosis Factor-a (140673)
- $50.00 Interleukin-08 (IL-8), Serum (140918)
- $50.00 Interleukin-10 (IL-10), Serum (140920)
- $7.00 Sedimentation Rate, Modified Westergren (ESR) (005215)

EBV (always test Strep too!)

532	$5.00	Complete Blood Count (CBC) With Differential (005009)
513	$6.00	Antistreptolysin O (ASO) Antibodies (006031)
1105	$16.00	Epstein-Barr Virus (EBV) Antibodies to Viral Capsid Antigen (VCA), IgM (096735)
5128	$34.00	EBV-VCA and EA, IgG Antibody Profile (096255)
1054	$36.00	Anti-DNase B (Streptococcal) Antibodies (096289)

MCAS Panel

Serum Tryptase: Tryptase is a marker of mast cell activation and is released into the bloodstream during mast cell degranulation. Measuring serum tryptase levels can help assess the extent of mast cell activation. However, it's important to note that tryptase levels may be normal or only transiently elevated in some individuals with MCAS, so a normal result does not necessarily rule out the diagnosis.

Histamine: Histamine is one of the primary mediators released by activated mast cells. Measuring histamine levels in the blood or urine may provide additional evidence of mast cell activation. However, histamine levels can fluctuate rapidly and may not always correlate with symptoms.

Prostaglandin D2 (PGD2): PGD2 is another mediator released by mast cells during activation. Elevated levels of PGD2 in the blood or urine may indicate mast cell activation and contribute to the diagnosis of MCAS.

N-Methylhistamine (NMH) and 11β-Prostaglandin F2α (PGF2α)**: These are metabolites of histamine and PGD2, respectively, and their levels in urine can provide indirect evidence of mast cell activation.

Complete Blood Count (CBC): A CBC may reveal abnormalities such as eosinophilia (elevated eosinophil count), which can be associated with allergic or inflammatory conditions, including MCAS.

Inflammatory Markers: Tests such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) may be elevated in individuals with inflammatory conditions, although they are not specific to MCAS.

Specific IgE and IgG Testing: Allergy testing, including specific IgE and IgG testing for common allergens or triggers, may be helpful in identifying potential triggers for mast cell activation in some individuals.

Specialty Tests – Food Sensitivity

Gut Barrier Panel		
	IgG1-4+C3d	IgA1-2
Candida	Negative	Negative
Zonulin	Negative	Negative
Occludin	Negative	Negative
LPS	Positive	Negative

KBMO or Blood

Gut barrier panel

Serum – EBV – Current "Medical" Interpretation

VCA-IgM	VCA-IgG	EA-D, IgG	EBNA, IgG	Possible Interpretation
Negative	Negative	Negative	Negative	No infection, symptoms due to another cause, susceptible to EBV infection
Positive	Positive	Negative	Negative	Early, primary infection
Negative or positive	Positive	Positive	Negative	Active infection, though EA-D IgG may persist for life in about 20% of people
Negative	Positive	Negative	Positive	Past infection
Negative	Positive	Positive	Positive	May indicate reactivation of virus

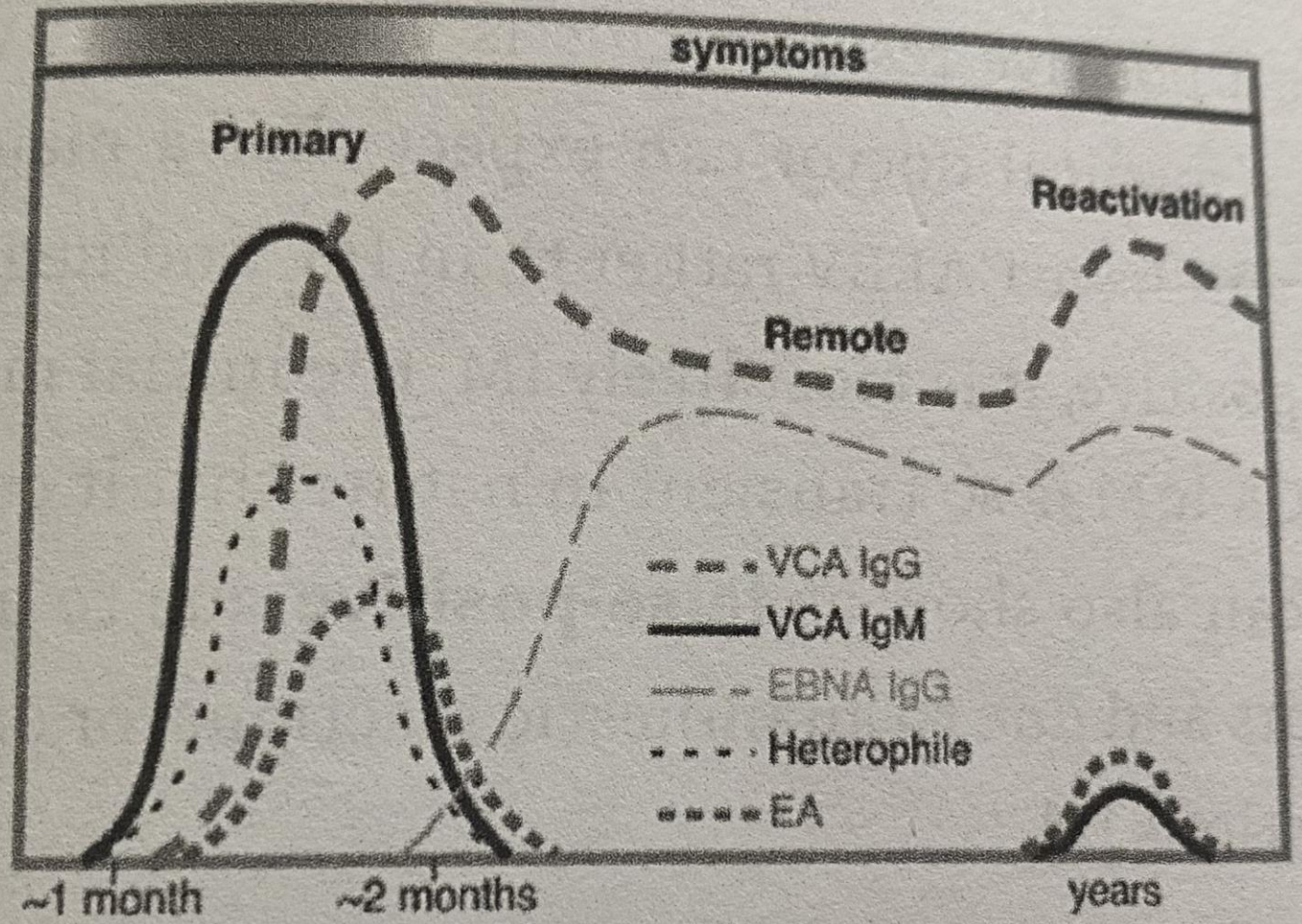


Figure 20. Shifts in EBV antibodies over time.
Source: Newfoundland and Labrador Public Health Library

Serum – EBV – the way you should look at it

- Each antibody has a different pattern of response time
- Some people are symptomatic with only on type of antibody flaring

Serum - Mold

Components:

M001-IgG Penicillium chrysogen
M005-IgG Candida albican
M009-IgG Fusarium proliferatum
M207-IgG Aspergillus niger
M003-IgG Aspergillus fumigatus
M007-IgG Botrytis cinerea
M011-IgG Rhizopus nigricans
M002-IgG Cladosporium herbarum
M006-IgG Alternaria alternata
M008-IgG Setomelanomma rostart
M012-IgG Aureobasidi pullulans
M004-IgG Mucor racemosus
M010-IgG Stemphylium herbarum
M014-IgG Epicoccum purpur

Mold testing generally refers to environmental testing (for the presence of mold in a home or building), while mycotoxin testing refers to tests that look at the presence or effects of mycotoxins in the body.

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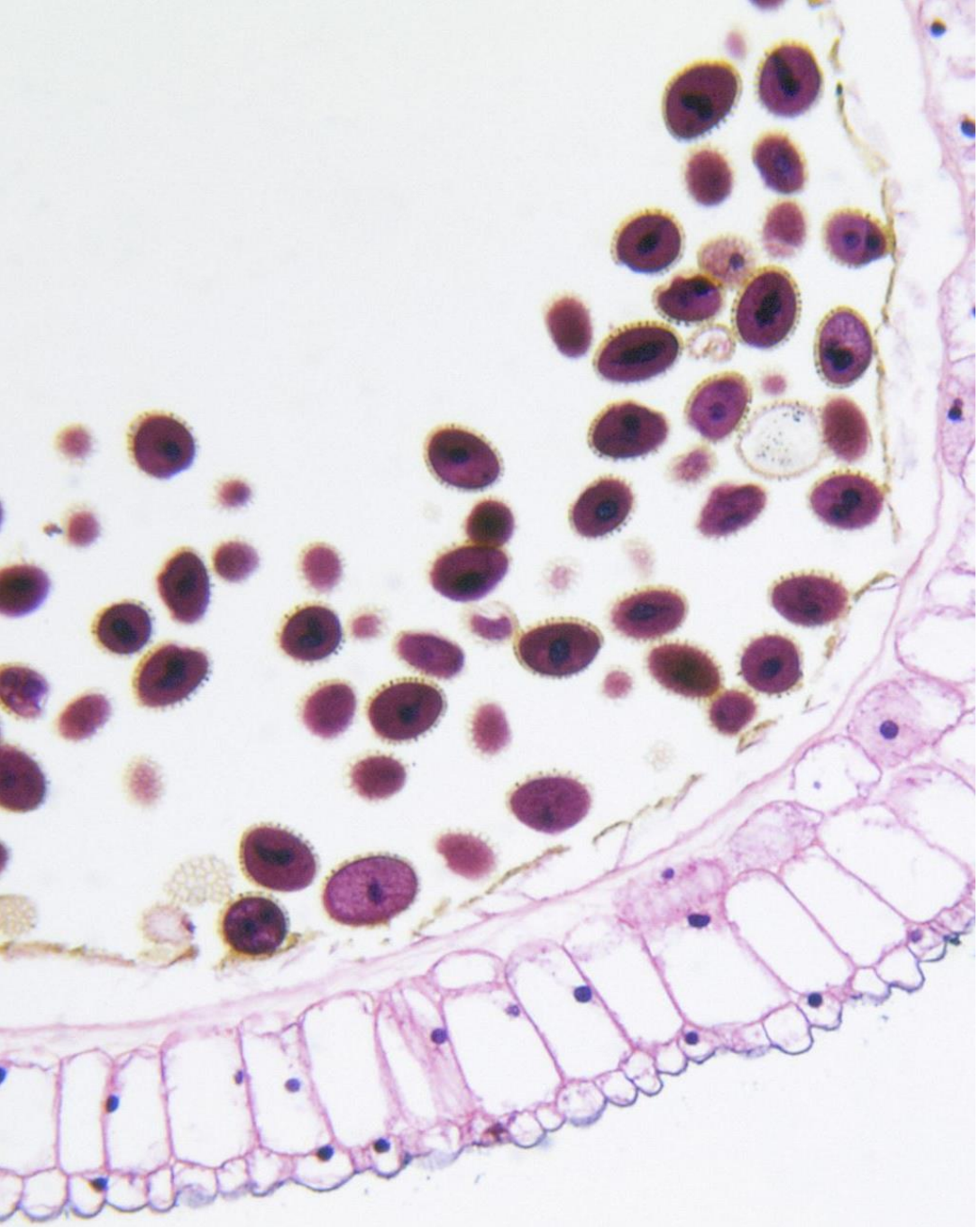
Specialty Tests - Mycotoxins

- Mycotoxins are certain toxins that are naturally produced by mold and other kinds of fungi. Humans may be exposed to mycotoxins through the air in mold-affected buildings or homes and through certain kinds of foods.
- Mycotoxin exposure can lead to illness, the symptoms and severity of which vary significantly from person to person

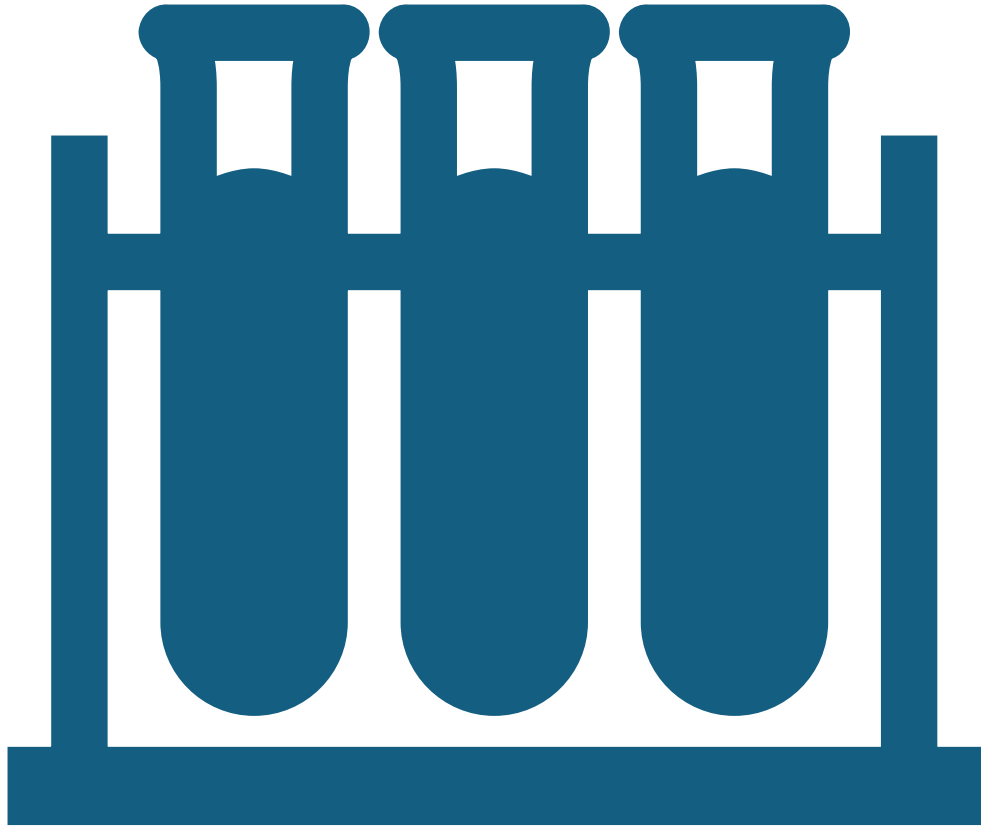


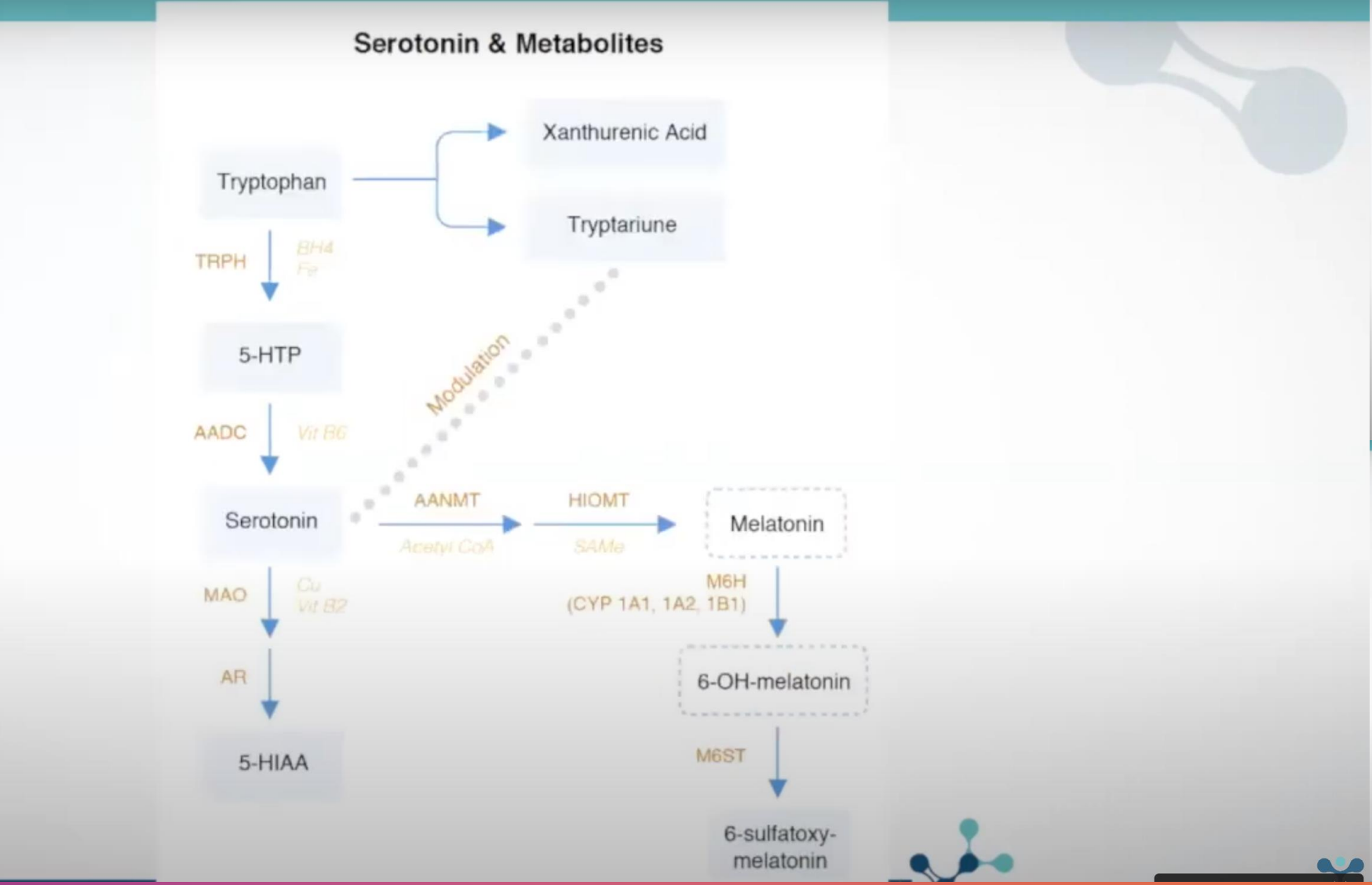
GI Map

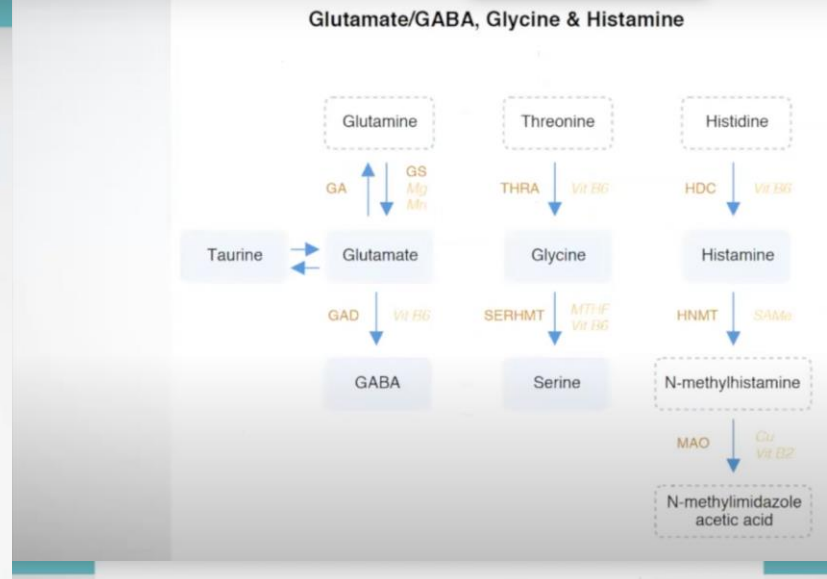
- The GI-MAP® includes pathogens (bacterial, parasitic and viral) commonly known to cause gastroenteritis

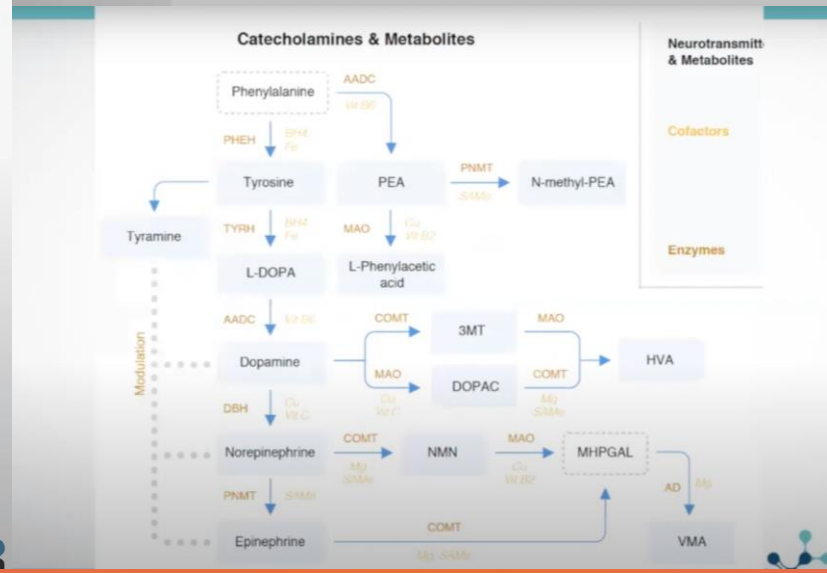
Specialty Test - Micronutrient

- Spectra Cell
- May need to partner with a clinic to do this test









Specialty Test - Neurotransmitter

ZRT Labs

Serum – Vit D, Omega, Fasting Glucose, A1C

Vitamin D, 25-Hydroxy

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
▼ **Vitamin D, 25-Hydroxy** [01]	**27.0 Low**		ng/mL	30.0-100.0

Vitamin D deficiency has been defined by the Institute of Medicine and an Endocrine Society practice guideline as a level of serum 25-OH vitamin D less than 20 ng/mL (1,2). The Endocrine Society went on to further define vitamin D insufficiency as a level between 21 and 29 ng/mL (2).

1. IOM (Institute of Medicine). 2010. Dietary reference intakes for calcium and D. Washington DC: The National Academies Press.
2. Holick MF, Binkley NC, Bischoff-Ferrari HA, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. JCEM. 2011 Jul; 96(7):1911-30.

Magnesium

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Magnesium [01]	1.9		mg/dL	1.6-2.3

Serum – Vit D, Omega, Fasting Glucose, A1C

▼	**Arachidonic Acid/EPA Ratio** [02]	**2.0**	**Low**	20.4	06/29/2020		3.7-40.7
▼	**Omega-6/Omega-3 Ratio** [02]	**2.6**	**Low**	11.1	06/29/2020		3.7-14.4
	Omega-3 total [02]	11.2		3.4	06/29/2020	% by wt	
▲	**EPA** [02]	**4.1**	**High**	0.5	06/29/2020	% by wt	0.2-2.3
	DPA [02]	1.8		0.9	06/29/2020	% by wt	0.8-1.8
▲	**DHA** [02]	**5.3**	**High**	2.0	06/29/2020	% by wt	1.4-5.1
	Omega-6 total [02]	29.4		37.6	06/29/2020	% by wt	
	Cleveland HeartLab measures a number of omega-6 fatty acids with AA and LA being the two most abundant forms reported.						
▼	**Arachidonic Acid** [02]	**8.1**	**Low**	10.2	06/29/2020	% by wt	8.6-15.6
	Linoleic Acid [02]	19.4		24.4	06/29/2020	% by wt	18.6-29.5

Serum – Vit D, Omega, Fasting Glucose, A1C

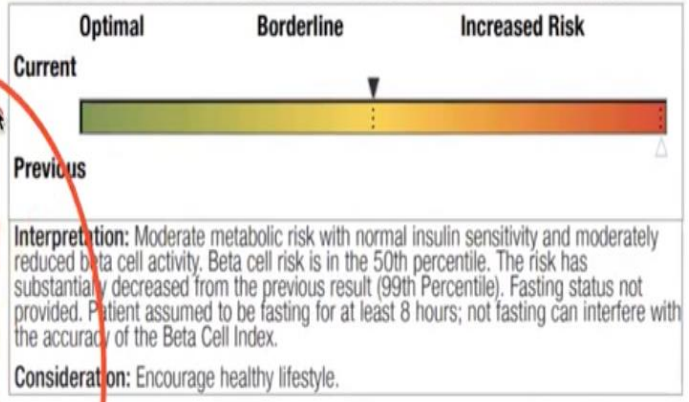
22 y/o F Insulin Labs: Normalized

Metabolic Tests

HbA1c	5.1				
	<5.7	5.7-6.4	>6.4 %		
Glucose[2]	76			10	75
	70-99	100-125	<70 or >125 mg/dL		
Insulin[3]	1			10,11	29
	<10	10-15	>15 µU/mL		
Adiponectin[1]	14.1				21.0
	>13	9-13	<9 µg/mL		
HOMA-IR	0.2			13	5.4
	<2	2-3	>3		
HOMA-S	532.9			10	18.6
	>50.0	33.3-50.0	<33.3		
HOMA-B		28		10	870
			%		

Interpretation: Based on the HbA1c value, the estimated Average Glucose (eAG) is 100 mg/dL which includes the non-fasting state.

Boston Heart Beta Cell Function and Risk Index



Interpretation: Moderate metabolic risk with normal insulin sensitivity and moderately reduced beta cell activity. Beta cell risk is in the 50th percentile. The risk has substantially decreased from the previous result (99th Percentile). Fasting status not provided. Patient assumed to be fasting for at least 8 hours; not fasting can interfere with the accuracy of the Beta Cell Index.

Consideration: Encourage healthy lifestyle.

The Tick-Borne Panel

Serum – Lyme and Co–Infections

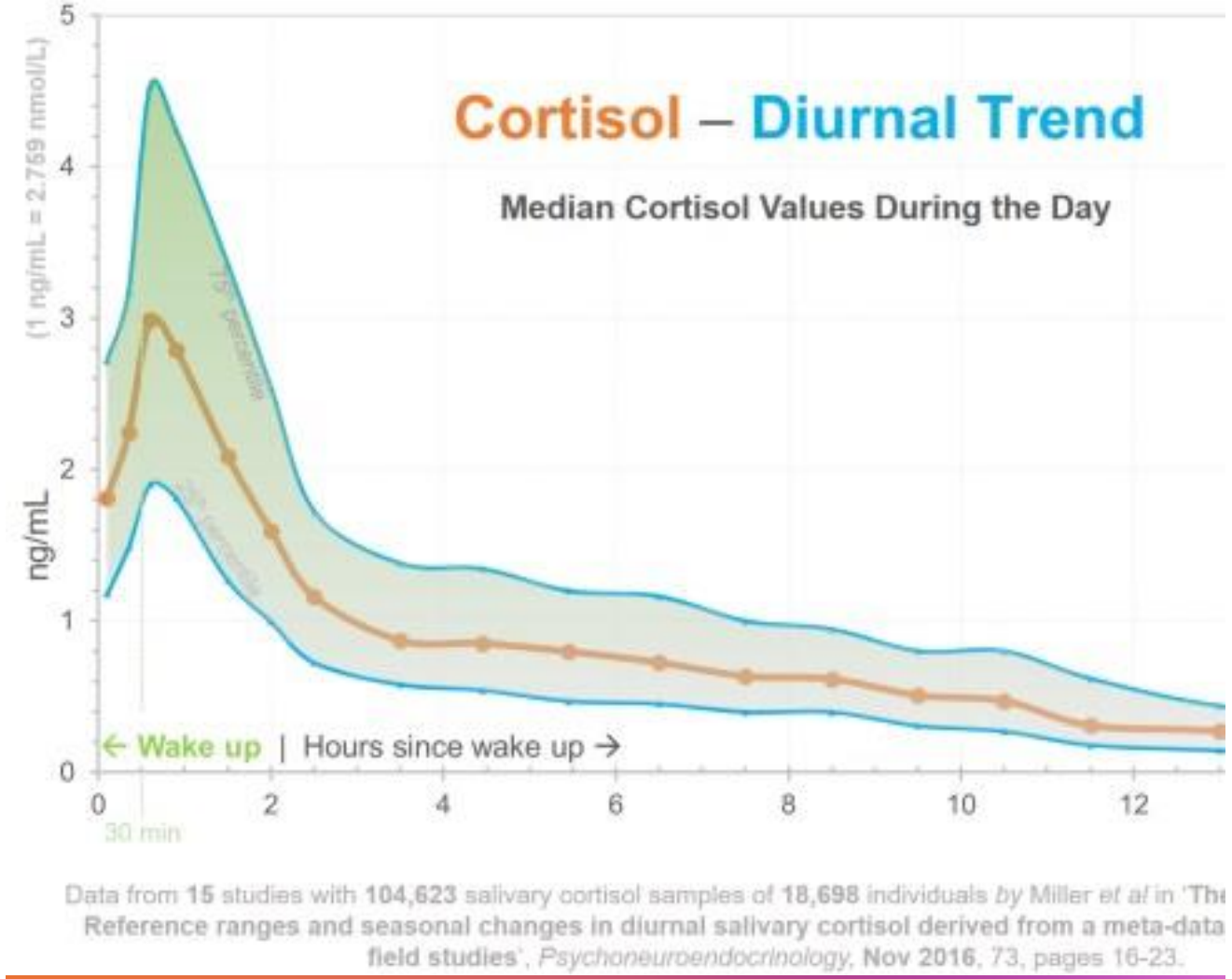
Interpretation of the Western blot—More is not necessarily better.

		IgG	IgG	IgM	IgM
Band kDa	Band importance	Ma et al. 2 of 6	CDC 5 of 10	Ma et al 2 of 5	CDC 2 of 3
18	Thought to be specific				
22	Thought to be specific				
23-25	OSP-C highly specific				
28	Not specific				
30	Thought to be specific				
31	OSP-A highly specific				
34	OSP-B highly specific				
37	Thought to be specific				
39	Thought to be specific				
41	Non-specific flagella				
45	Non-specific				
58	Non-specific				
66	Non-specific				
73	Non-specific				
88	Thought to be specific				
93	Thought to be specific				

Engstrom found 2 of 5 bands to be highly sensitive and specific for Lyme disease (Engstrom 1995), while 46 of 66 symptomatic pediatric patients with a history of bulls eye rash and tick bite were negative by CDC criteria (Fawcett 1995 Rheumatology Symposia Abstract #1254.) The CDC criteria are intended only for surveillance purposes, not diagnosis. Many physicians interpret the Western blot based on the number and specificity of the patient's bands. See also (Ma et al. 1989).

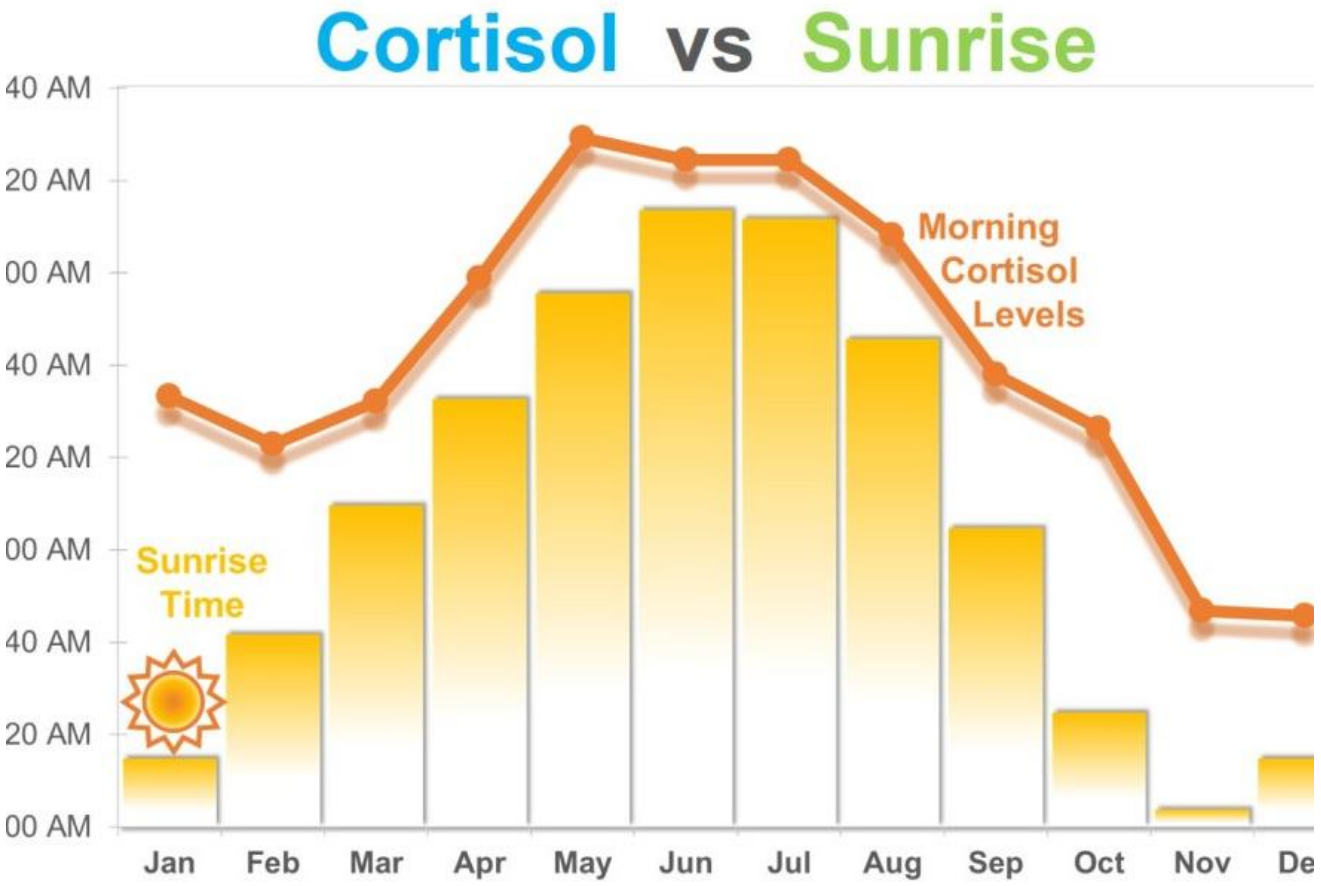
Specialty Tests – Diurnal Cortisol

- Saliva is easiest – Collected at 4 points through the day
- Can do an am/pm
  - Miss the CAR
  - The **change in cortisol concentration** that occurs in the first hour after waking from sleep.
  - 50-100% rise 30 min after waking



Factors affecting Cortisol:

- The early morning cortisol is affected by several factors:
- The exact ***time of collection*** after waking up—levels are flat for first 15 minutes but then quickly change in next 30 to 60 minutes.
- Darkness or dim ***light*** or full exposure to sunlight after waking up—the peak levels are higher with more light.
- ***Season*** of the year—which again correlates to the amount of light; late sunrise time (in winter) gives higher levels in morning according to an Australian study.
- Increases with age; Women have a higher surge than men on average with CAR



Data from an Australian study of **27,569** serum samples collected over **13 years** *by* Hadlow *et al* in '**The effects of season, daylight saving and time of sunrise on serum cortisol in a large population**', *Chronobiology International*, **2014** vol. 31(2): pages 243–251

Specialty Tests – Hormone

Blood or Dutch

dutchtest
BY PRECISION ANALYTICAL INC.

Accession # 00287454
Female Sample Report
123 A Street
Sometown, CA 90266

PRECISION ANALYTICAL INC.
SIMPLY · BETTER · TESTING

Last Menstrual Period:
2017-12-26

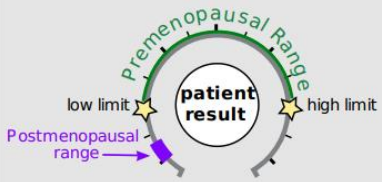
Ordering Physician:
Precision Analytical

DOB: 1976-01-01
Age: 42
Gender: Female

Collection Times:
2018-01-24 08:00AM
2018-01-24 10:00AM
2018-01-24 05:00PM
2018-01-24 11:00PM

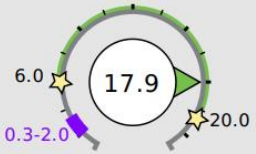
Hormone Testing Summary

Key (how to read the results):



Sex Hormones See Pages 2 and 3 for a thorough breakdown of sex hormone metabolites

Estradiol(E2)



Progesterone
(Serum Equivalent, ng/mL)

Progesterone Serum Equivalent is a calculated value based on urine pregnanediol.

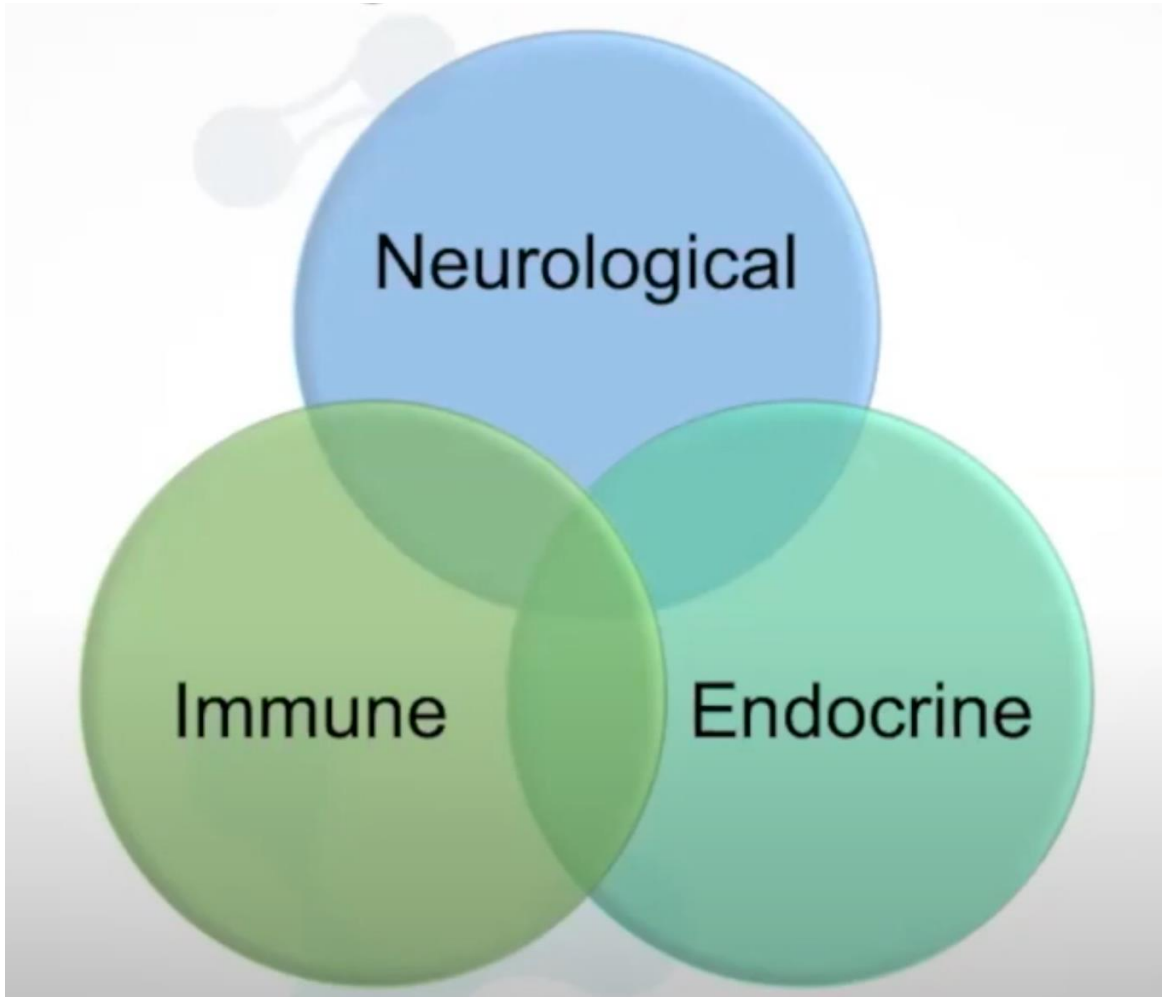
Testosterone

Continuous Glucose Monitor

Practitioner:
https://join.theiahealth.ai/partners?referrer=traceystroupnd

Signaling in the body

- All types of signaling in the body – Ligands transmit signals between cells (extra and intra cellular communication)
- Ligands interact with proteins
  - Paracrine - other cells
  - Autocrine - same cell
  - Neurotransmitter
  - Endocrine



You are only as young as your immune system

Questions

LAB RESOURCE:
Evexia Diagnostics:
https://www.evexiadiagnostics.com/

www.traceystroupnd.com