

Functional Medicine- Osteopathy at its Best!

Aunna Herbst, DO, ND, CFMP

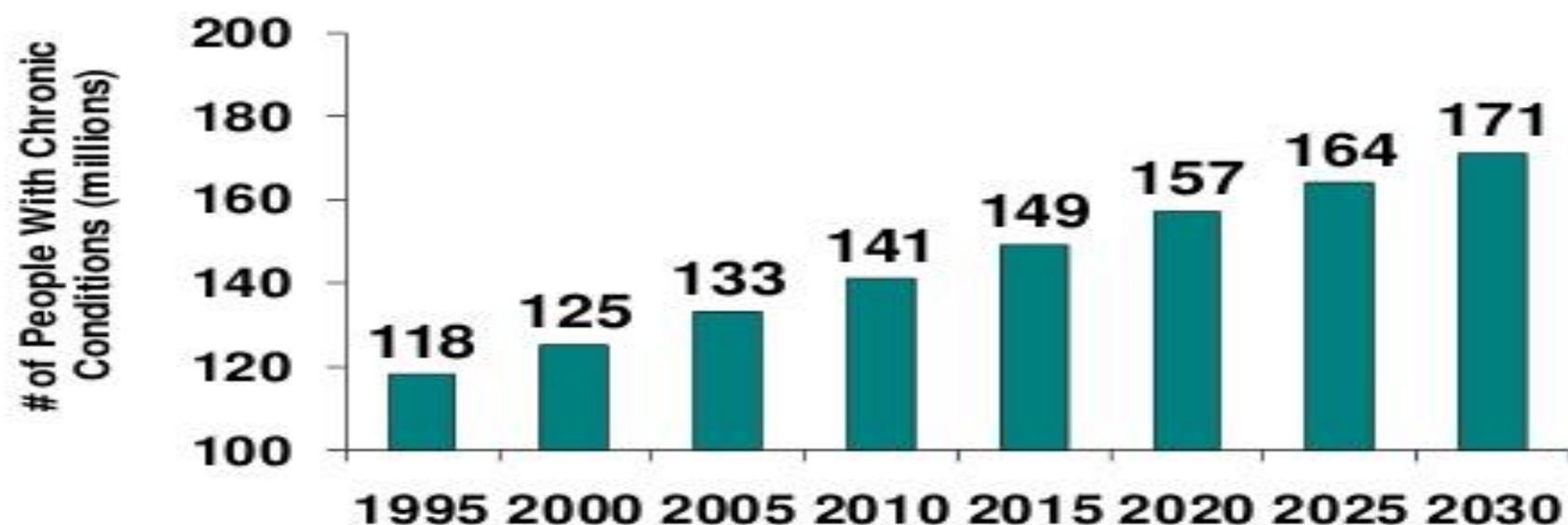
Cleveland Clinic Center for Functional Medicine

Objectives

- **Introduce Functional Medicine**
- **Introduce Center for Functional Med – Cleveland Clinic**
- **How OMT can and should play a role in our approach to chronic disease**
- **Case study**

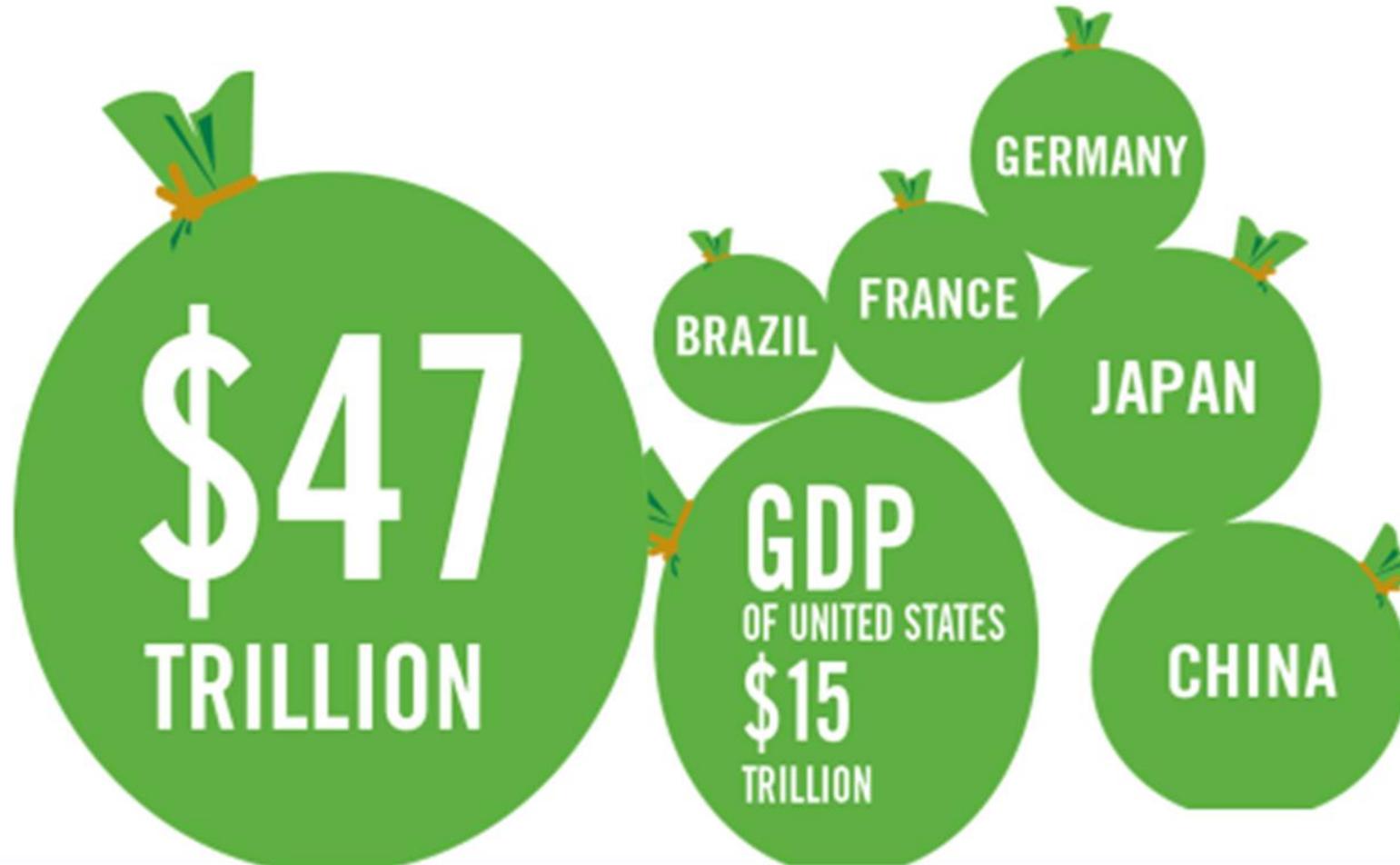


America's Health Care Crisis People with Chronic Conditions



Source: Wu, Shin-Yi and Green, Anthony. *Projection of Chronic Illness Prevalence and Cost Inflation*. RAND Corporation, October 2000.

Data: World Economic Forum 2011



- **Increase in incidence of obesity and diabetes and cardiovascular disease**
- **Childhood obesity = 1000% increase in type 2 diabetes in children**
- **Increase in neurodegenerative, mood disorders, allergic, autoimmune/ inflammatory disorders, digestive disorders (GERD) and cancer**
- **Decrease in life expectancy of 2-5 years**

The Problem???

Trying to use **20th** century ACUTE care
diagnosis and treatment model in a **21st** century
CHRONIC multi-systems disease epidemic

Genes to Society” —The Logic and Process of the New Curriculum for the Johns Hopkins University School of Medicine

Wiener, Charles M. MD; Thomas, Patricia A. MD; Goodspeed, Elizabeth MHS; Valle, David MD; Nichols, David G. MD

Academic Medicine: [March 2010 - Volume 85 - Issue 3 - pp 498-506](#)

Curriculum Renewal

In August 2009, the Johns Hopkins University School of Medicine implemented a new curriculum, “Genes to Society” (GTS), aimed at reframing the context of health and illness more broadly, to encourage students to explore the biologic properties of a patient's health within a larger, integrated system including social, cultural, psychological, and environmental variables. This approach presents the patient's phenotype as the sum of internal (genes, genotypic and societal) and external (environmental) factors, preferring to view illness, preferring to view the patient as a complex system that need to reformulate the relationship between the individual and the environment. This article describes the logic and process of the curriculum, commissioning a curriculum renewal committee, and the challenges of implementing GTS were leadership support, dialogue with faculty, broad engagement of the instructional community, avoidance of tunnel vision, and the use of pilot courses to test concepts and methods. GTS can be viewed as the foundation for the scientific and clinical career development of future physicians.

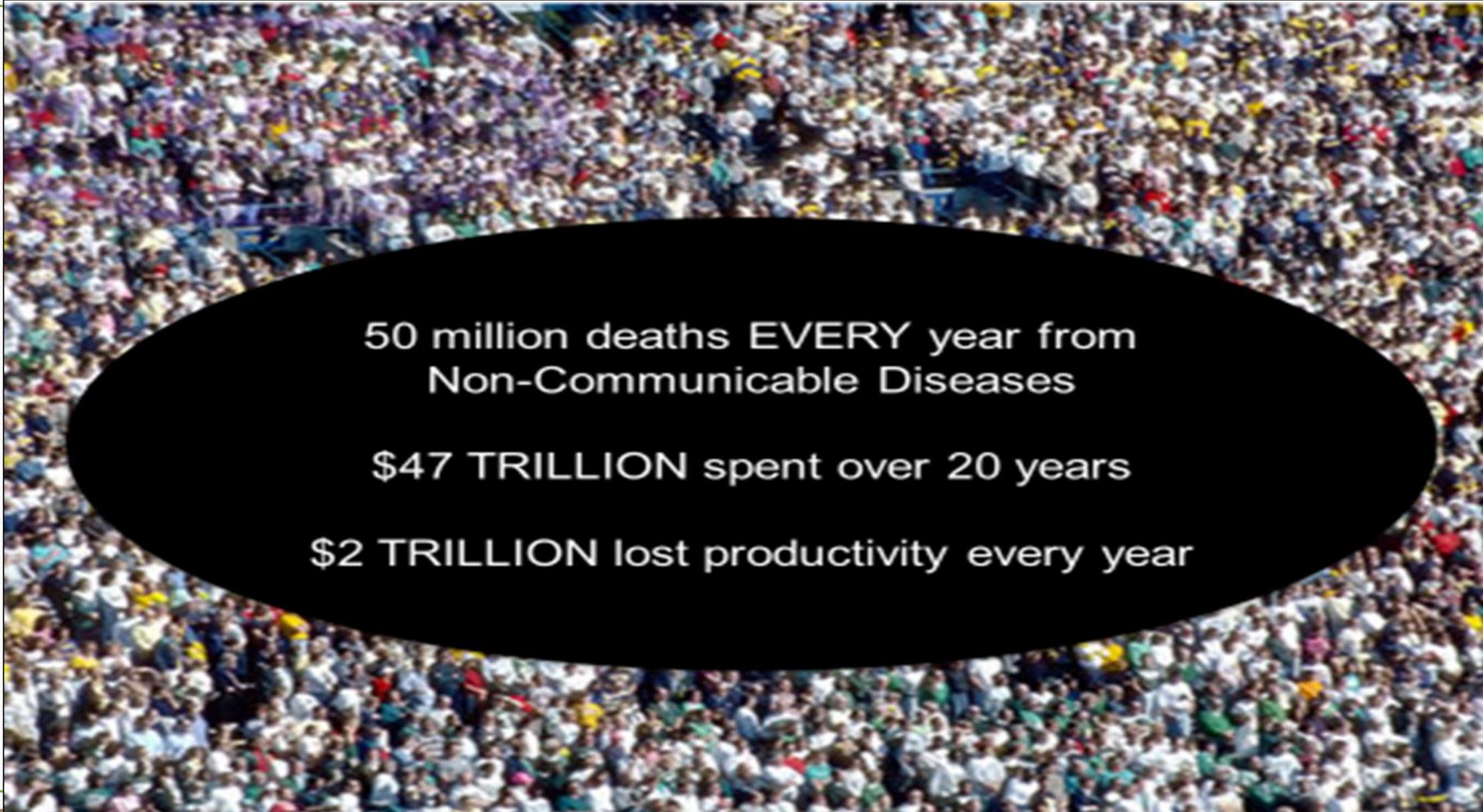
Future physicians will integrate individual evidence into a biologic system that extends from genes and the genome to the environment and society.

Functional Medicine

Functional medicine is a systems-based personalized healthcare approach that assesses and treats underlying causes of illness through individually tailored therapies to restore health and improve function.

Center for Functional Medicine Cleveland Clinic

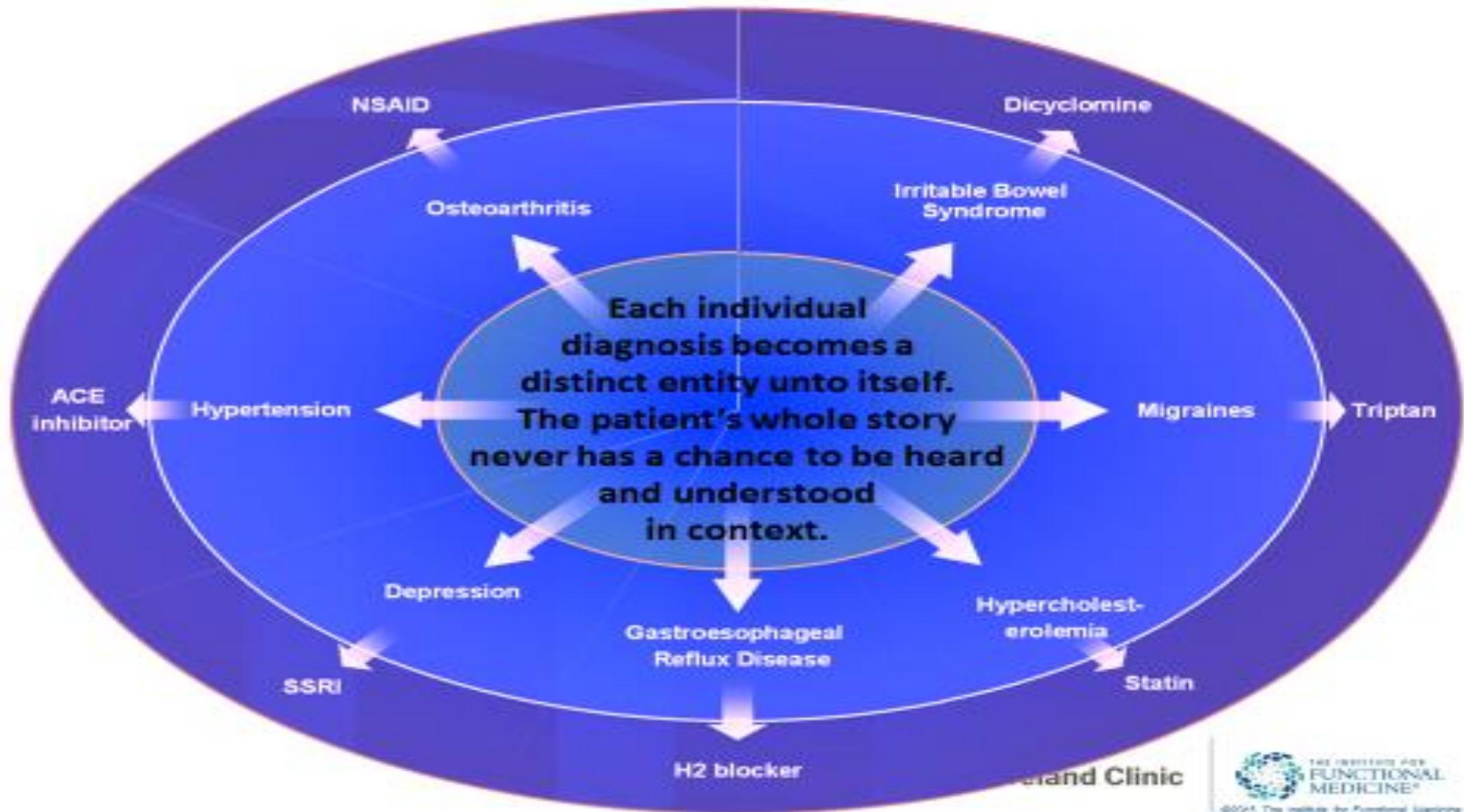
- **Patient care – systems based model**
- **Research**
- **Medical Education**
- **Community and Population Health**



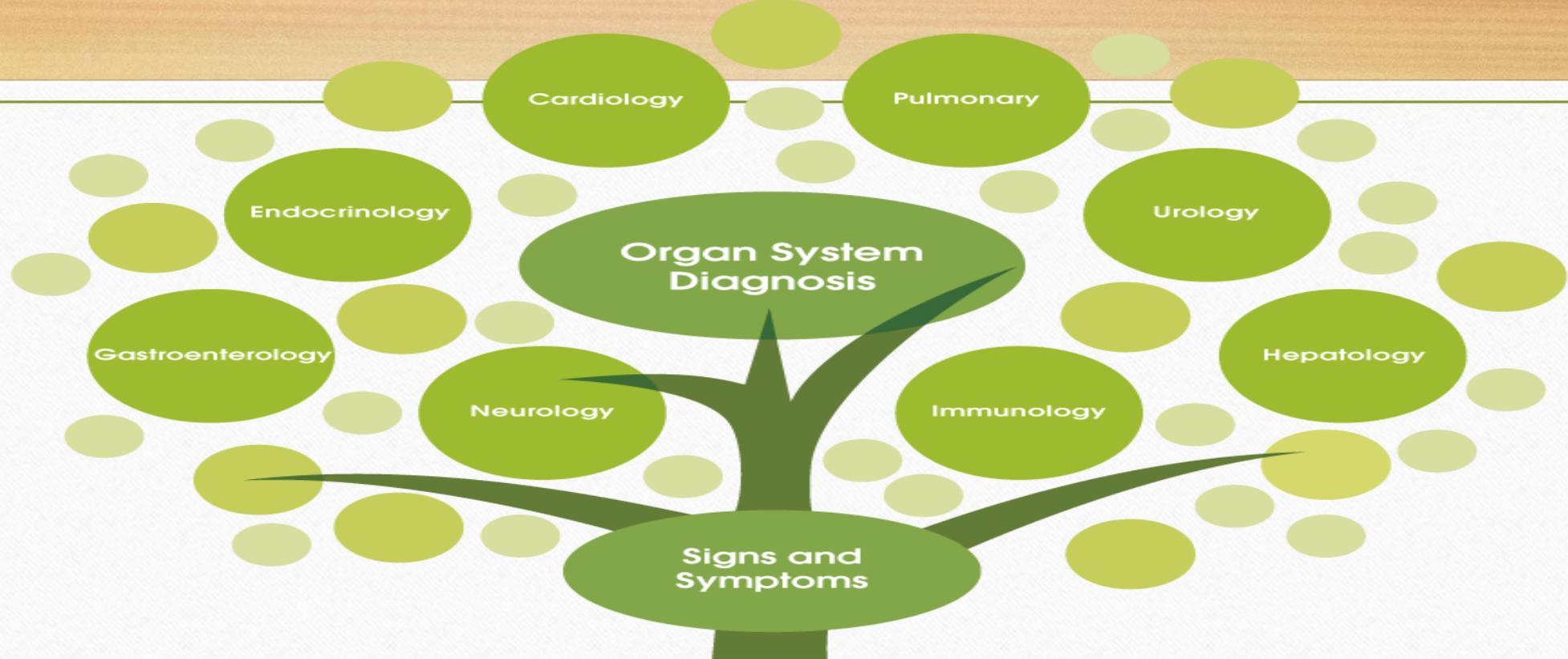
50 million deaths EVERY year from
Non-Communicable Diseases

\$47 TRILLION spent over 20 years

\$2 TRILLION lost productivity every year



land Clinic



The Fundamental Organizing Systems and Core Clinical Imbalances

Assimilation
 Digestion, Absorption, Microbiota/GI, Respiration
 Defense and Repair
 Immune system, Inflammatory processes, Infection and microbiota

Energy
 Energy regulation, Mitochondrial function
 Biotransformation and Elimination
 Toxicity, Detoxification
 Communication
 Endocrine, Neurotransmitters, Immune messengers, Cognition

Transport
 Cardiovascular, Lymphatic systems
 Structural Integrity
 From the subcellular membranes to the musculoskeletal system

Antecedents, Triggers, and Mediators

Mental, Emotional, Spiritual Influences



Genetic Predisposition



Experiences, Attitudes, Beliefs

Sleep & Relaxation

Exercise/
Movement

Nutrition/
Hydration

Stress/
Resilience

Relationships/
Networks

Trauma

Micro -
organisms

Environmental
Pollutants

Fx Med Focus



THE INSTITUTE FOR
FUNCTIONAL
MEDICINE®

FUNCTIONAL MEDICINE MATRIX

Retelling the Patient's Story

Antecedents
(Predisposing Factors—
Genetic/Environmental)

Triggering Events
(Activators)

Mediators/Perpetuators
(Contributors)

Physiology and Function: Organizing the Patient's Clinical Imbalances

Assimilation

(e.g., Digestion,
Absorption, Microbiota/GI
Respiration)

Defense & Repair

(e.g., Immune,
Inflammation,
Infection/Microbiota)

Structural Integrity

(e.g., from Subcellular
Membranes to
Musculoskeletal
Structure)

Mental

e.g., cognitive
function,
perceptual
patterns

Emotional

e.g., emotional
regulation, grief,
sadness, anger,
etc.

Energy

(e.g., Energy
Regulation,
Mitochondrial
Function)

Spiritual

e.g., meaning &
purpose,
relationship with
something greater

Biotransformation & Elimination

(e.g., Toxicity,
Detoxification)

Transport

(e.g., Cardiovascular, Lymphatic System)

Modifiable Personal Lifestyle Factors

Sleep & Relaxation

Exercise & Movement

Nutrition

Stress

Relationships

Name: _____

Date: _____

CC: _____

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MATRIX

- **Communication**
- **Assimilation**
- **Structural Integrity**
- **Defense Repair**
- **Biotransformation**
- **Energy**

Structural Integrity

- **Musculoskeletal Dysfunction**
 - Myofascial
 - Bones
 - Cartilage
 - Tendons/Ligaments
- **Subcellular Membrane**

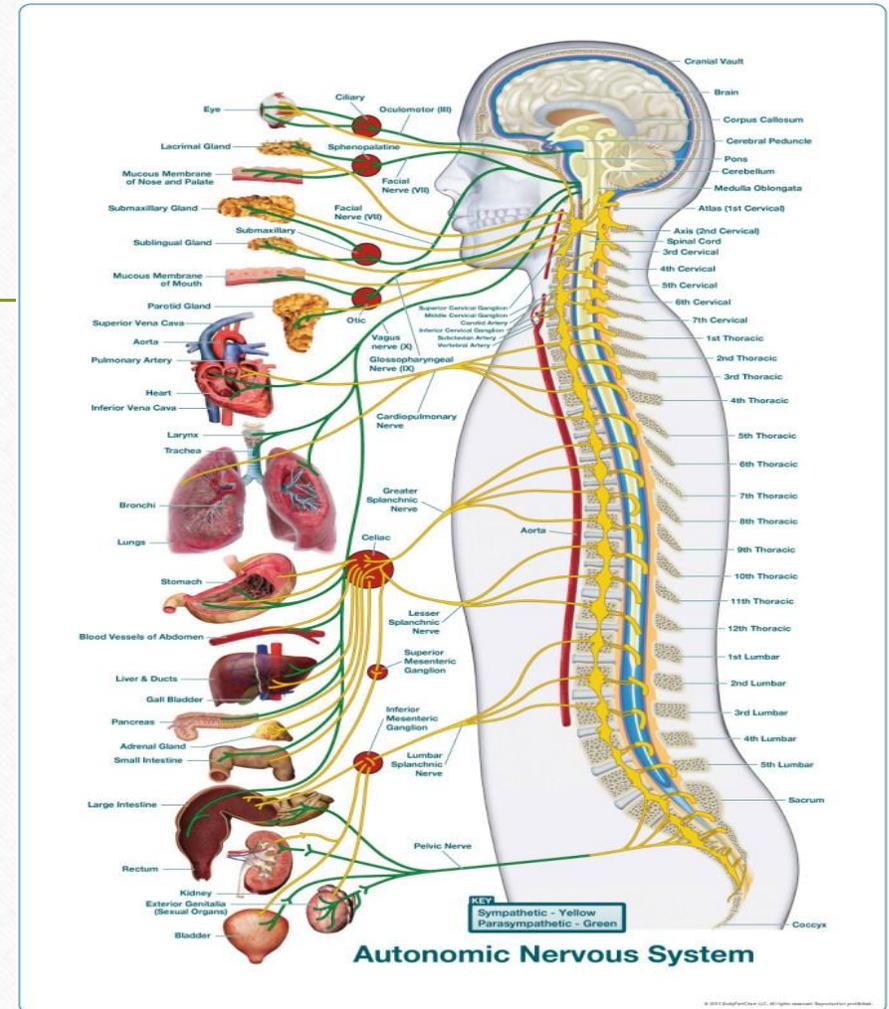


“We conclude that when the fluids of the body are stopped in the fascia, organs, and other parts of the system, stagnation, fermentation, heat and general confusion will follow....”

- AT Still 1828-1917

MYOFASCIAL PAIN

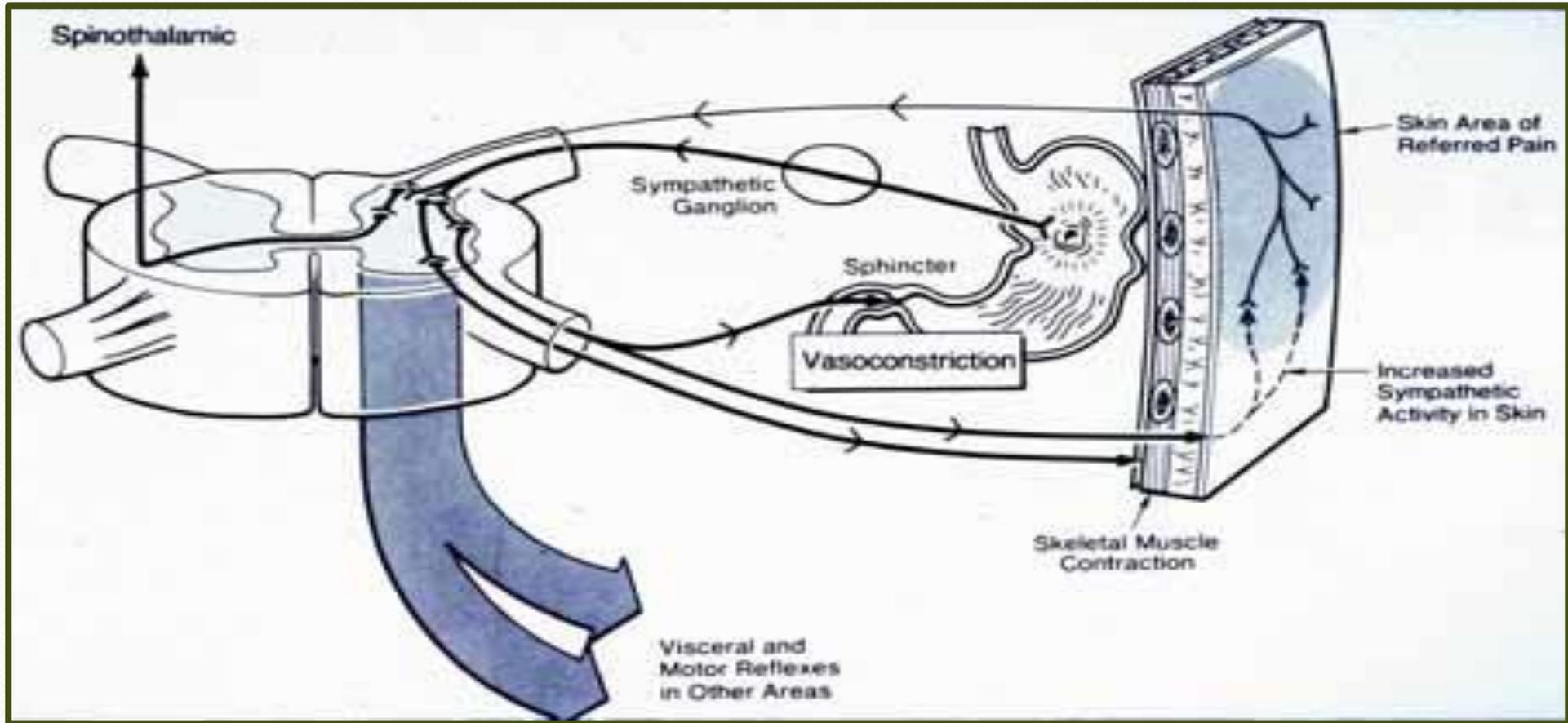
- Pathophysiology
- Nutrients play what role??
- Referred triggers (other illness/disease)



I cannot brain today.

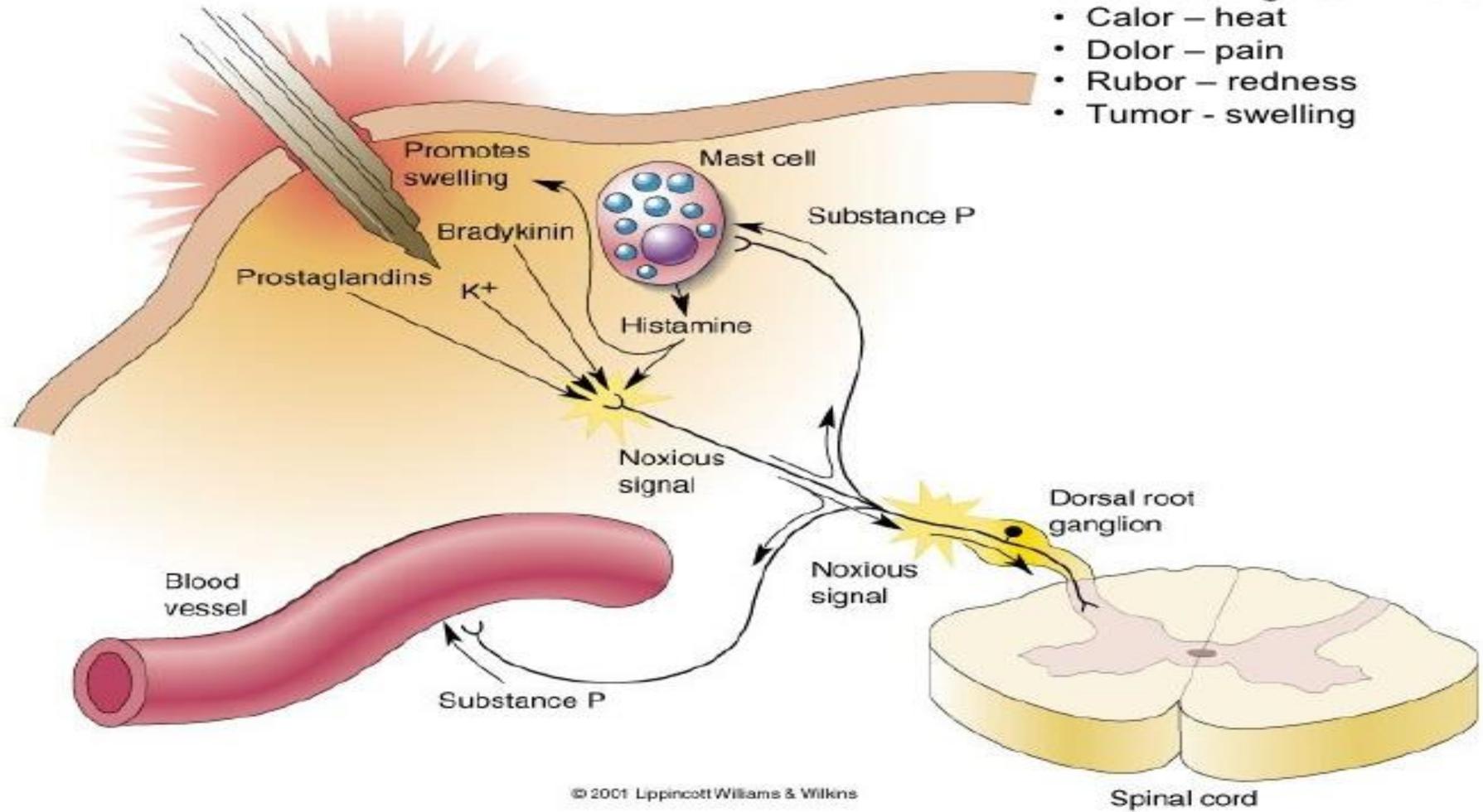


I has the dumb.



Sensitizing agents → ROS → cell damage → chronic symptom presentation → change in gene expression

Figure 12.24
Peripheral chemical mediators of pain and hyperalgesia.



Classical signs of infection:

- Calor – heat
- Dolor – pain
- Rubor – redness
- Tumor - swelling



Shah JP, Danoff JV, Desai MJ, et al. **Biochemicals associated with pain and inflammation are elevated in sites near to and remote from active myofascial trigger points.** *Arch Phys Med Rehabil* 2008; 89:16–23.

Significant rise in proinflammatory cytokines IL-8 and TNF α ¹⁵ but no significant changes in IL-4, IL-6, and IL-10 have been reported.

Wang H, Buchner M, Moser MT, Daniel V, et al. **Circulating cytokine levels correlated to pain in patients with fibromyalgia.** Clin J Pain. 2009;27

Rachlin ES. Myofascial Pain and Fibromyalgia Trigger Point Management. St Louis, Mosby- Yearbook: 1994. History and physical examination for regional myofascial pain syndrome; p. 169.

Medicine (Baltimore) 2016 Sep; 95(37): e4650.

Published online 2016 Sep 16. doi: PMCID: PMC5402557

Circulating biomarkers in acute myofascial pain

A case-control study

Liza Grosman-Rimon, PhD, et al.

[Indian J Anaesth](#). 2009 Oct; 53(5): 575–581.

PMCID: PMC2900090

Fibromyalgia and Myofascial Pain Syndrome-A Dilemma

[H C Chandola](#)¹ and [Arunangshu Chakraborty](#)²

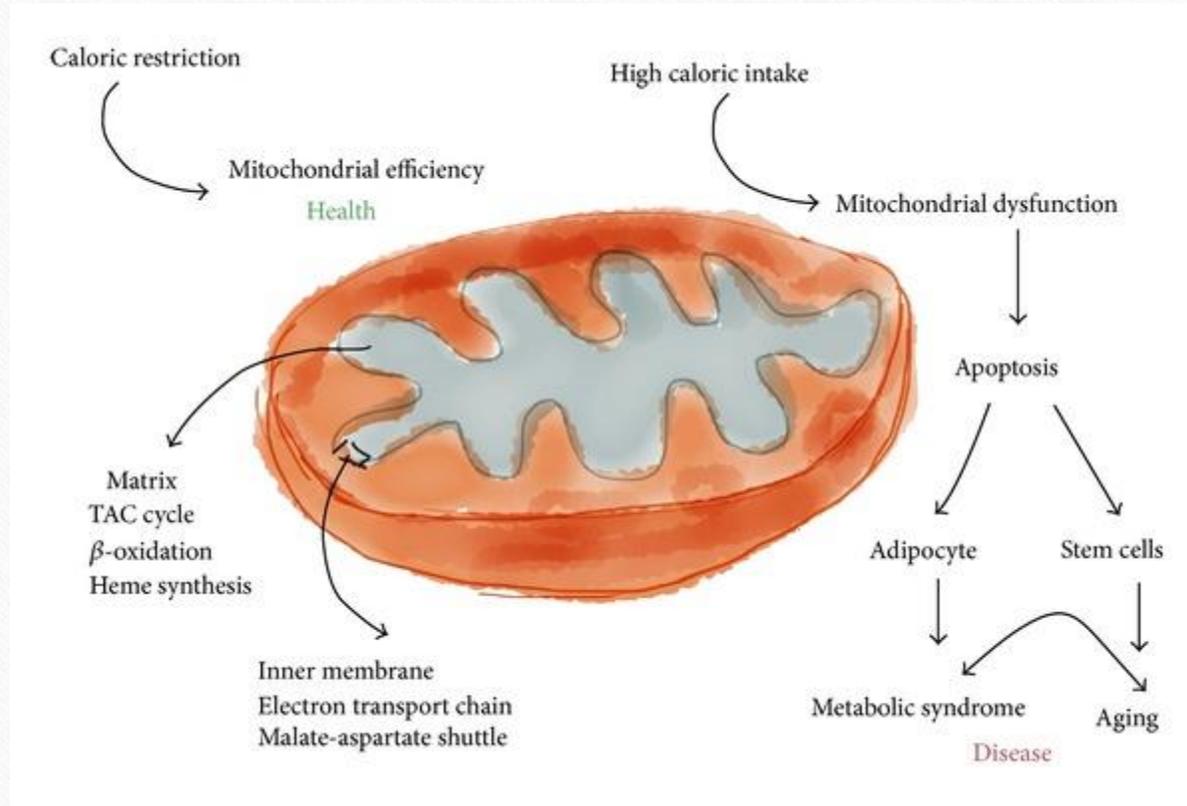
Chronic inflammation induces telomere dysfunction and accelerates aging in mice **Nature 2014**

Our results show that chronic inflammation aggravates telomere dysfunction and cell senescence, decreases regenerative potential in multiple tissues and accelerates ageing of mice. Anti-inflammatory or antioxidant treatment, specifically COX-2 inhibition, rescued telomere dysfunction, cell senescence and tissue regenerative potential, indicating that chronic inflammation may accelerate ageing at least partially in a cell-autonomous manner via COX-2-dependent hyper-production of ROS.

I see ... So, your medicine fell down
the sink by accident.
And it was just your
pain pills,
not your blood
pressure tablets.

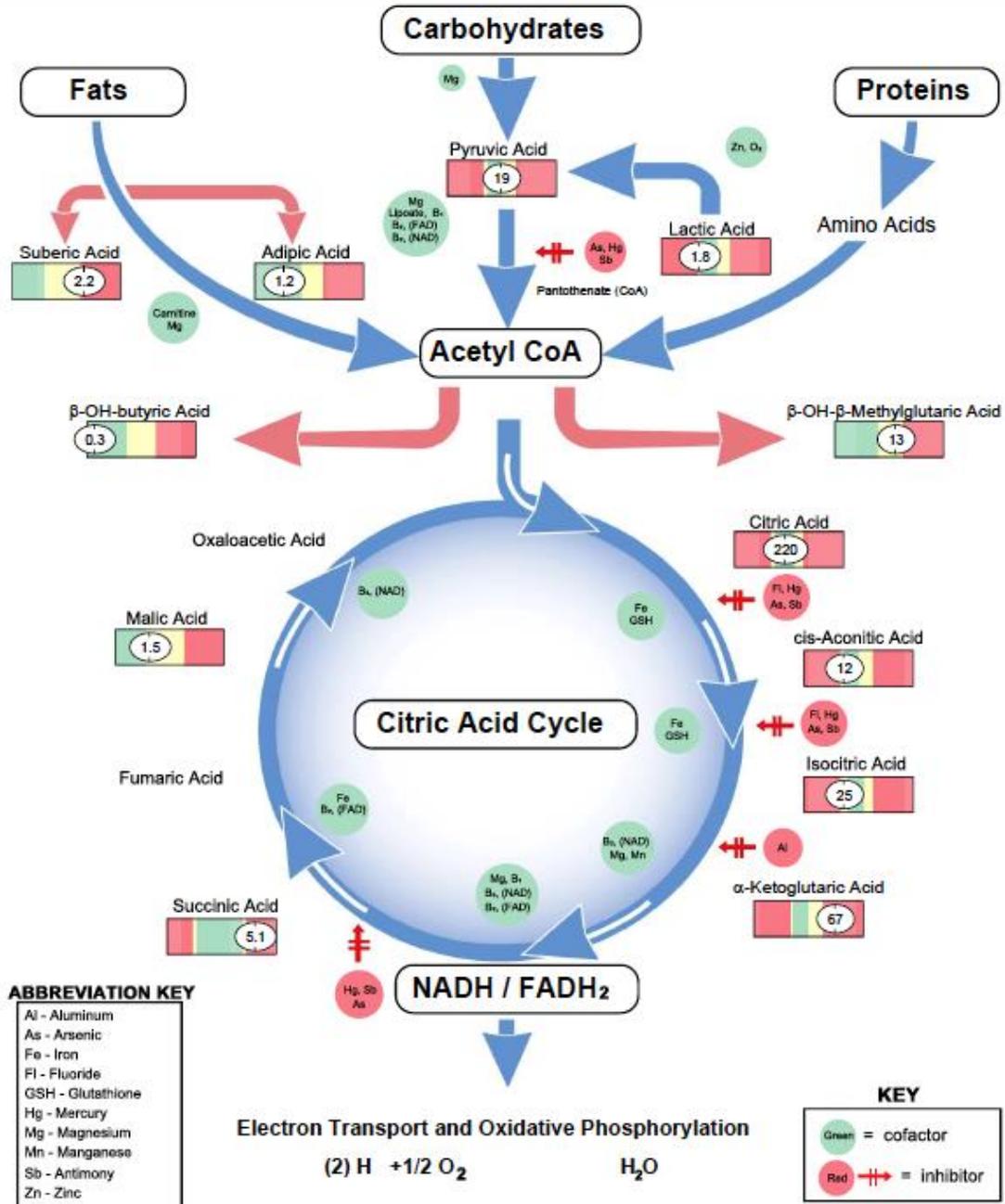


som^{ee}cards
user card



Editor in Chief Nutrition Evidence – Miguel Turibio-Mateas

Krebs Cycle At-A-Glance



Vitamins play key roles of the Citric Acid Cycle

Four of the B vitamins are essential in the citric acid cycle :

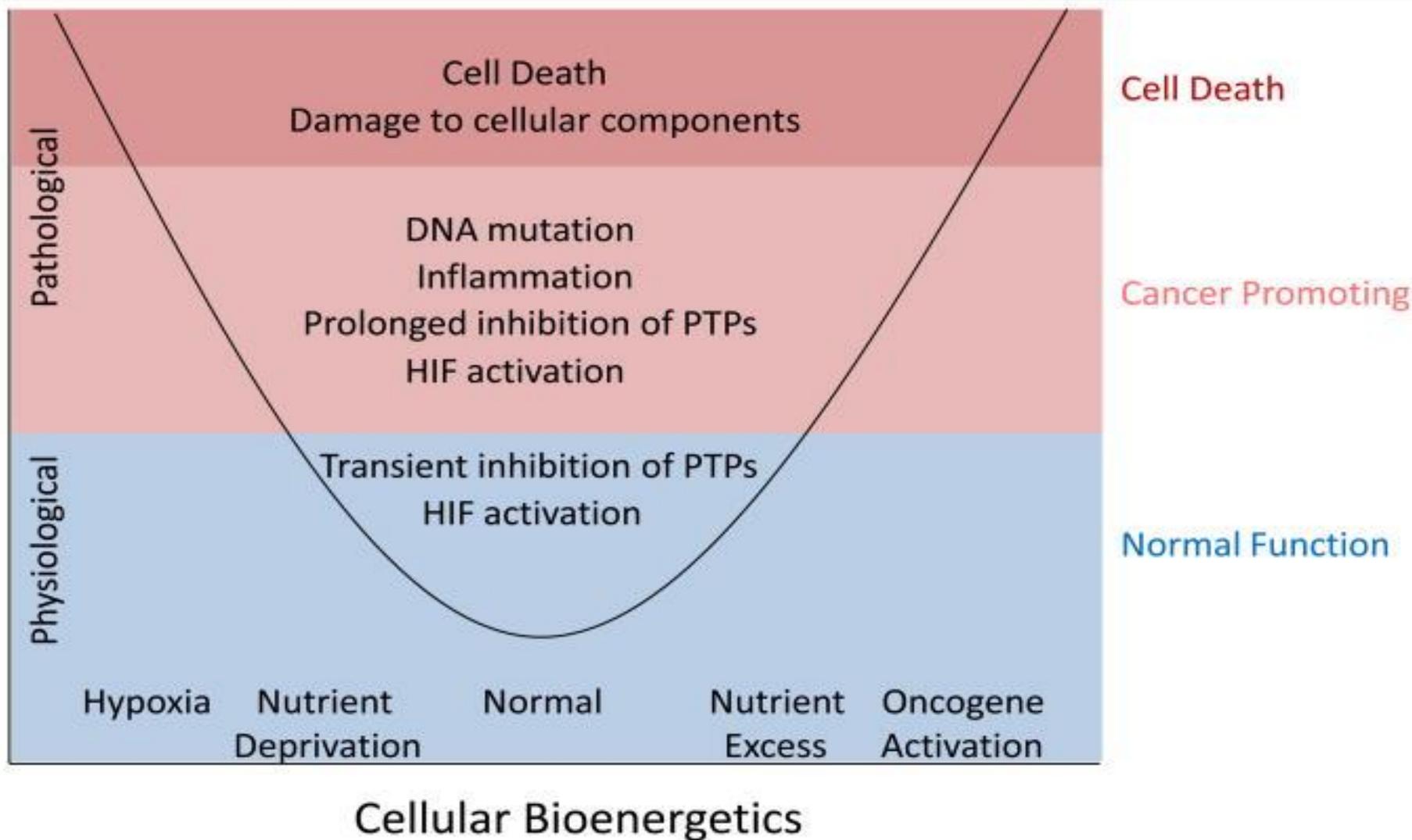
1. Riboflavin → FAD
2. Niacin → NAD
3. Thiamin → TPP
4. Pantothenic acid → CoA

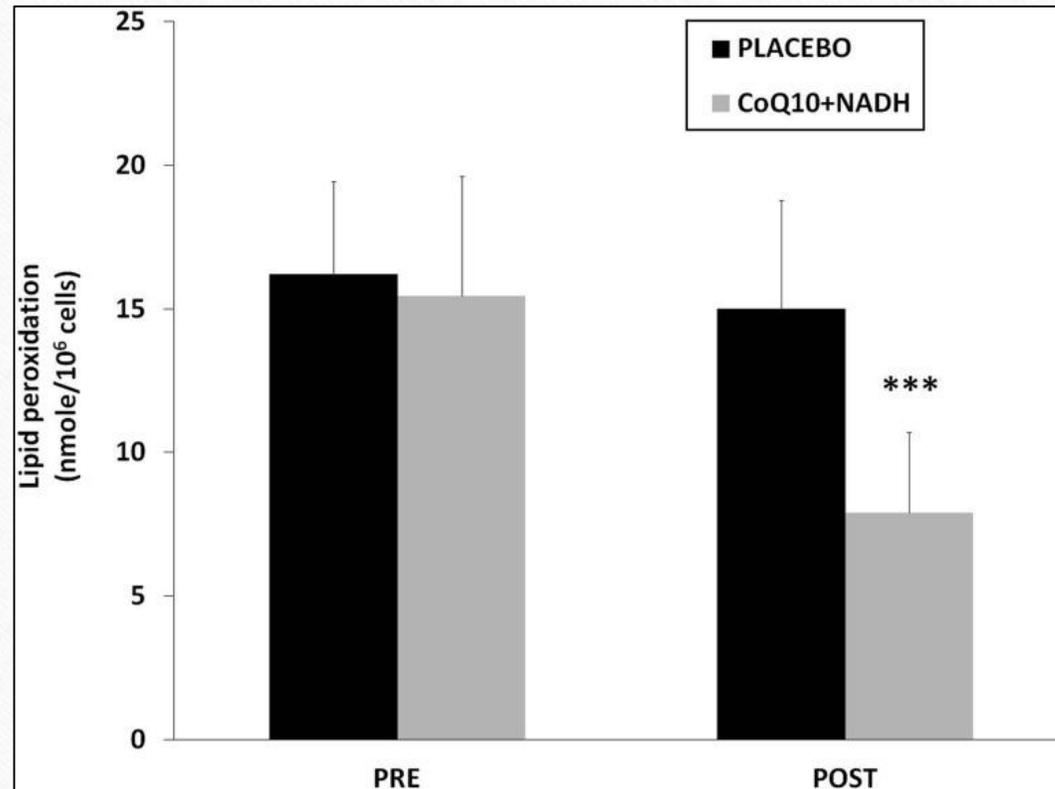
The B vitamins are essential in energy yielding metabolism by dehydrogenase enzyme :

- FAD → 2 mol ATP
- NAD → 3 mol ATP

COQ10

Cellular ROS production





Does Oral Coenzyme Q₁₀ Plus NADH Supplementation Improve Fatigue and Biochemical Parameters in Chronic Fatigue Syndrome?

Castro-Marrero Jesús, Cordero Mario D., Segundo María José, et al. *Antioxidants & Redox Signaling*. November 2014, 22(8): 679-685.

Published in Volume: 22 Issue 8: November 11, 2014

Figure 9. Lipid peroxidation markers pre- and post-intervention with oral NADH and CoQ10.

DIET

World J Gastroenterol. 2013 Oct 21; 19(39): 6540–6547.

Published online 2013 Oct 21. PMC3801366 Mohammed A Alzoghaibi

Concepts of oxidative stress and antioxidant defense in Crohn's disease

VIT A, C, E and B-carotene LOW →
higher ROS

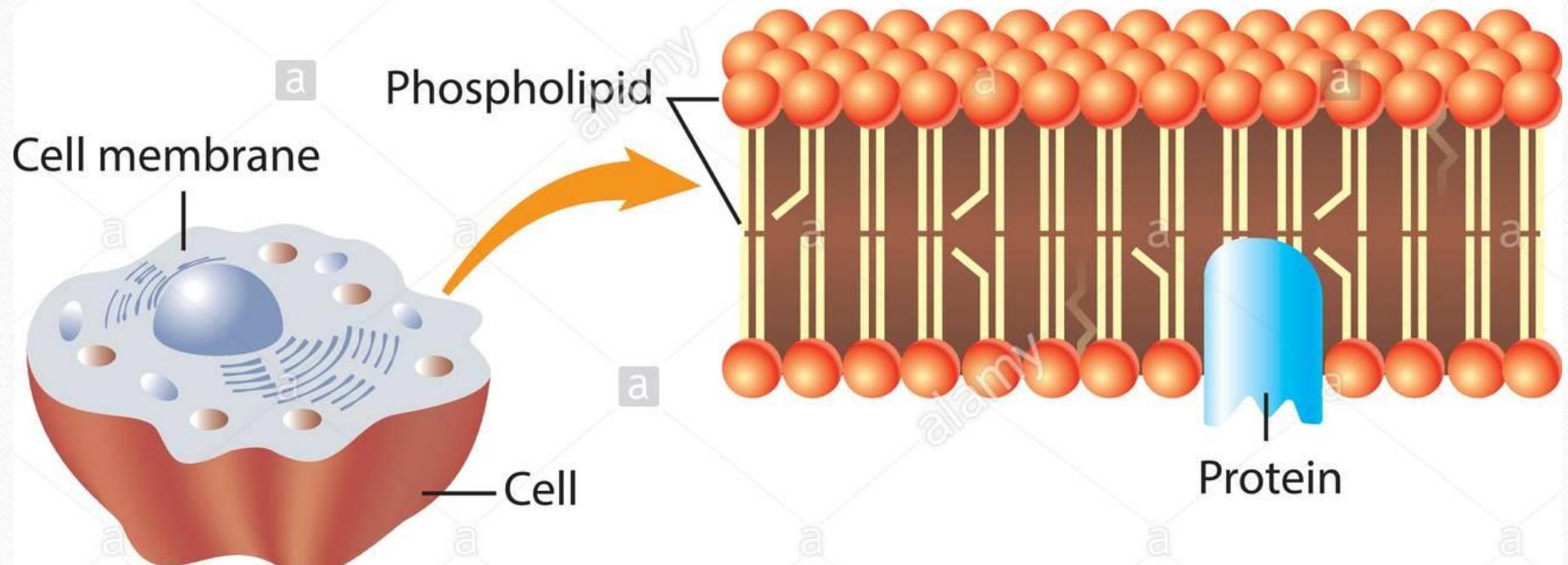
OMEGA 3/6

- Consensus from nutritional experts is that the omega-6 to omega-3 ratio should be no greater than 4:1, and ideally 1:1 for optimal health.
- If following the Standard American Diet (SAD), the ratio may be 25:1 or higher in favor of omega-6. This imbalance promotes inflammation, pain, and will compromise your ability to quickly recover from pain or injury.

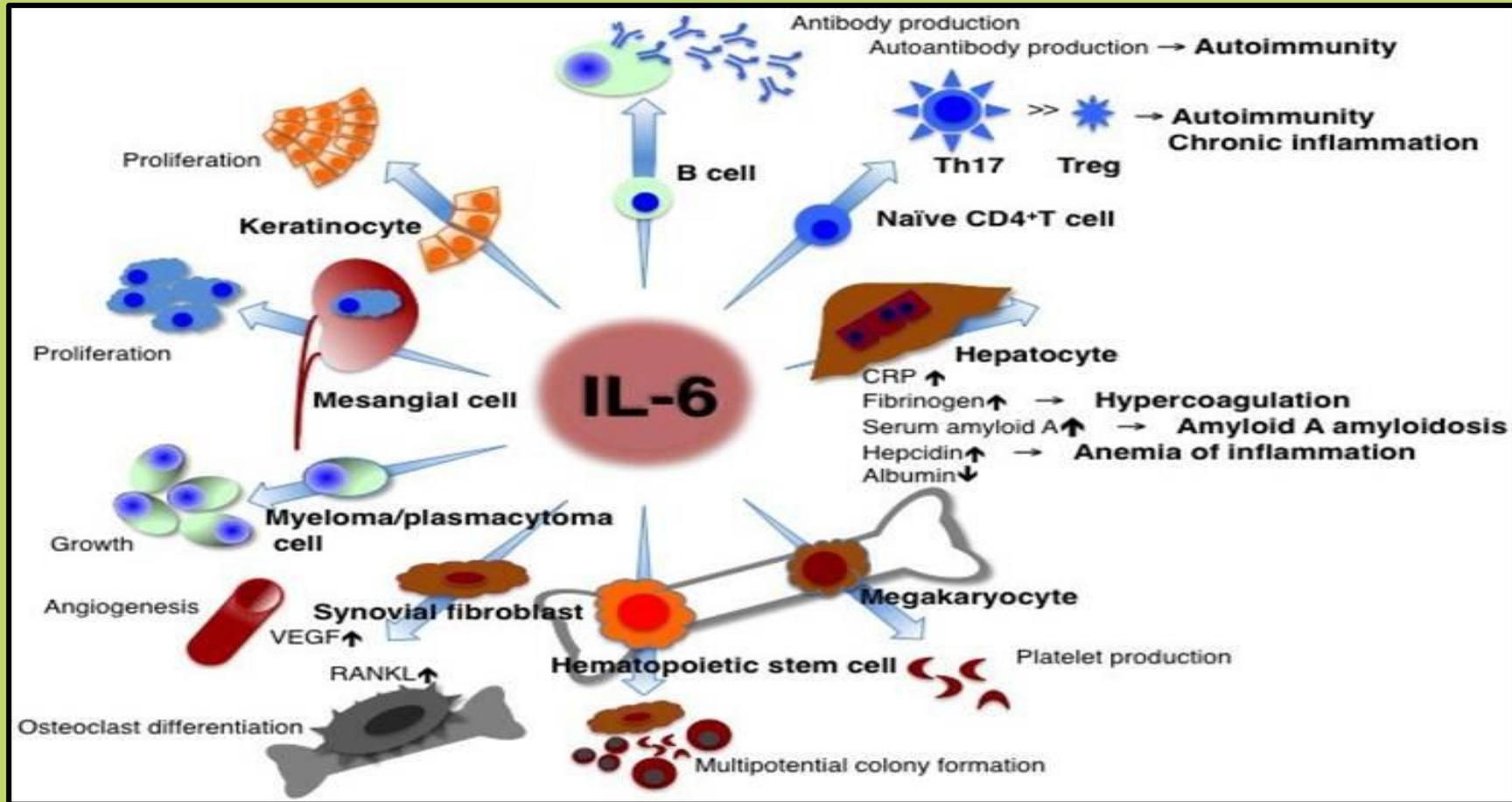
Omega-3 phospholipid



Cell membrane lipid bilayer



Vitamin D also inhibits synthesis of IL-6 by monocytes, which is the primary stimulant of CRP production in the liver



Irritable Bowel Syndrome/Abdominal Pain

- 25 y/o female
- IBS c/d, Abd pain LUQ, Fibromyalgia
- Labs from outside: CBC, CMP, TSH – neg
- GI: Linzess tried, colonoscopy/EGD negative
- Neuro consult: fibromyalgia Dxd, tender pt 16/18, tried Lyrica and Gabapentin

Initial Visit

PE: ttp18/18 pts, white spots in nails, tongue scalloped, beefy red, ttp LUQ, patellar hyperreflexia b/l, no organomegaly, no rash, no skin color

MSQ 119 PROMIS 10.4%

Labs Ordered: GI microscopic culture and Eval, Nutritional status evaluated

Treated one MTp on LUQ and rib 9-11 with myofascial release

→IMPROVED IN OFFICE

GLASBERGEN

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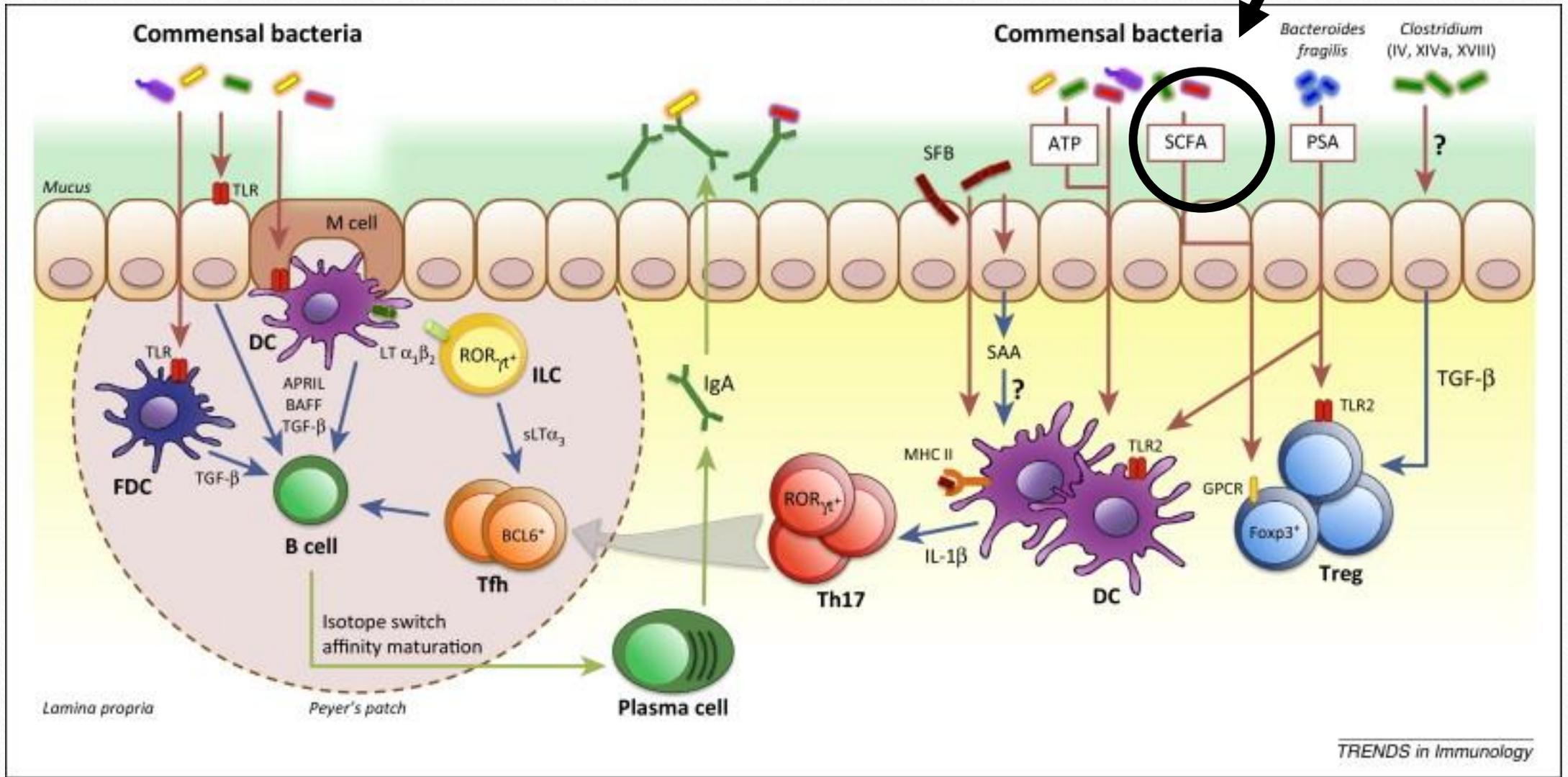
“To prevent a heart attack, take one aspirin every day. Take it out for a run, then take it to the gym, then take it for a bike ride...”

Nutrition/Health Coach

- Started on basic “clean eating plan” – eliminated added sugar, processed foods/drinks
- Deep breathing 10 mins daily
- Meditative walking as tolerated and 10 mins stretching as tolerated
- Sleep to continue with reg routine bedtime 10p-6a
- Journal for stress outlet

Follow up visit

- MfTp per pt request
- **Comprehensive Stool Cx:**
pancreatic elastase 177, Commensal bacteria overgrowth 18/22, **low SCFA**, fecal sIgA elevated, low growth bifidobacter sp. by PCR cx
- **Nutritional eval (serum and urine):**
low B1, B12, folate, Zinc and several amino acids including glutamine, methionine and araginine (high need)
MSQ 94 PROMIS 28% PH



Zinc Def

[PLoS One](#). 2016; 11(10): e0164302.

Published online 2016 Oct 18. PMID: PMC5068745

Selenium and Zinc Status in Chronic Myofascial Pain: Serum and Erythrocyte Concentrations and Food Intake

[João Araújo Barros-Neto](#),^{1,*} [Adelmir Souza-Machado](#),² [Durval Campos Kraychete](#),³
[Rosângela Passos de Jesus](#),⁴ [Matheus Lopes Cortes](#),⁵ [Michele dos Santos Lima](#)

J Back Musculoskeletal Rehabil. 2010;23(4):187-91.

The relationship between serum trace elements, vitamin B12, folic acid and clinical parameters in patients with myofascial pain syndrome.

Okmumus M, Ceceli E, Tuncay F, Palulu N, et al.

Natl J Maxillofac Surg. 2014 Jul-Dec; 5(2): 109–116.
doi: 10.4103/0975-5950.154810
PMCID: PMC4405950
Trends in management of myofacial pain
Uma Shanker Pal, Lakshya Kumar,¹

BMC Oral Health. 2016; 16: 60.

Published online 2016 May 27. doi: 10.1186/s12903-016-0215-y

PMCID: PMC4884371

Oral manifestations in vitamin B₁₂ deficiency patients with or without history of gastrectomy

Jihoon Kim

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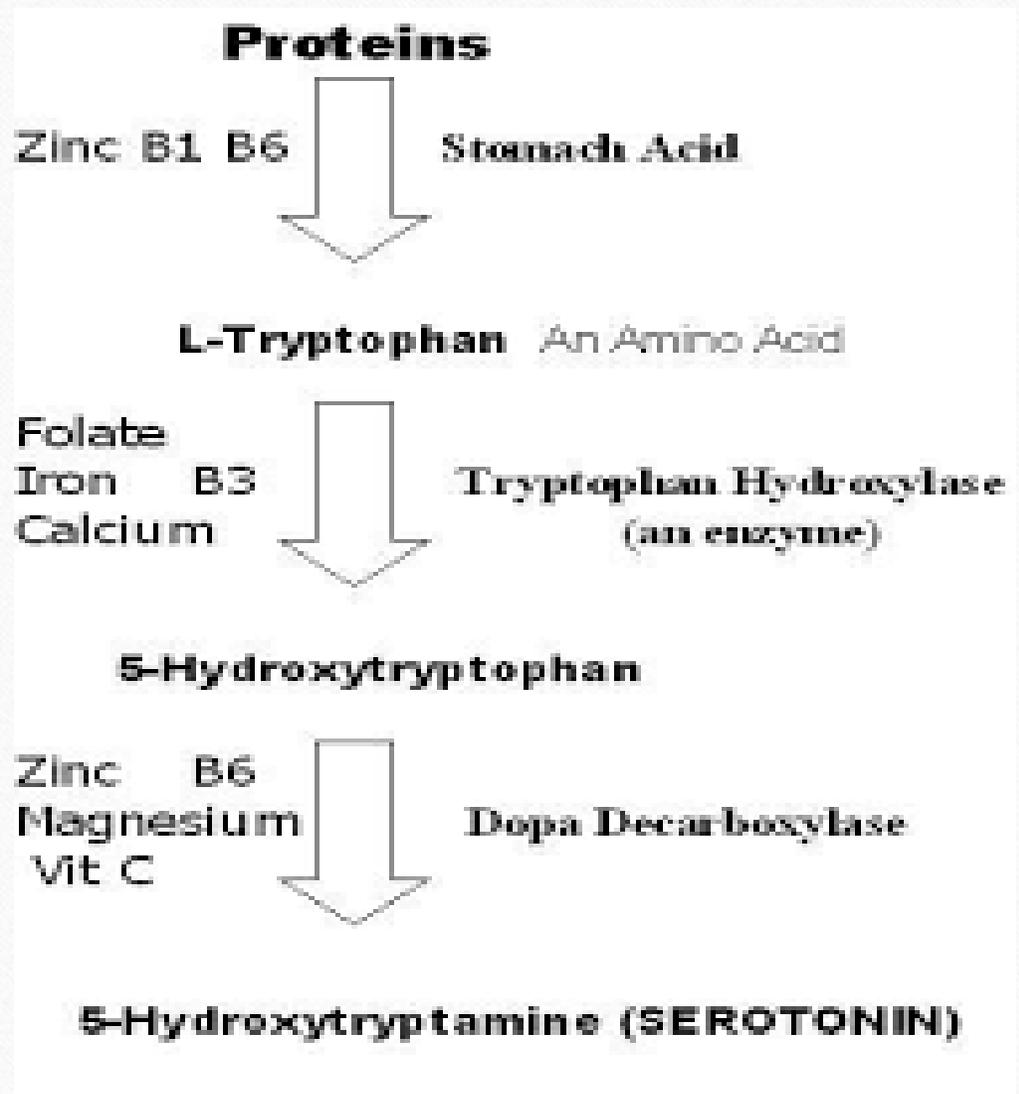
Amino Acid Deficiencies

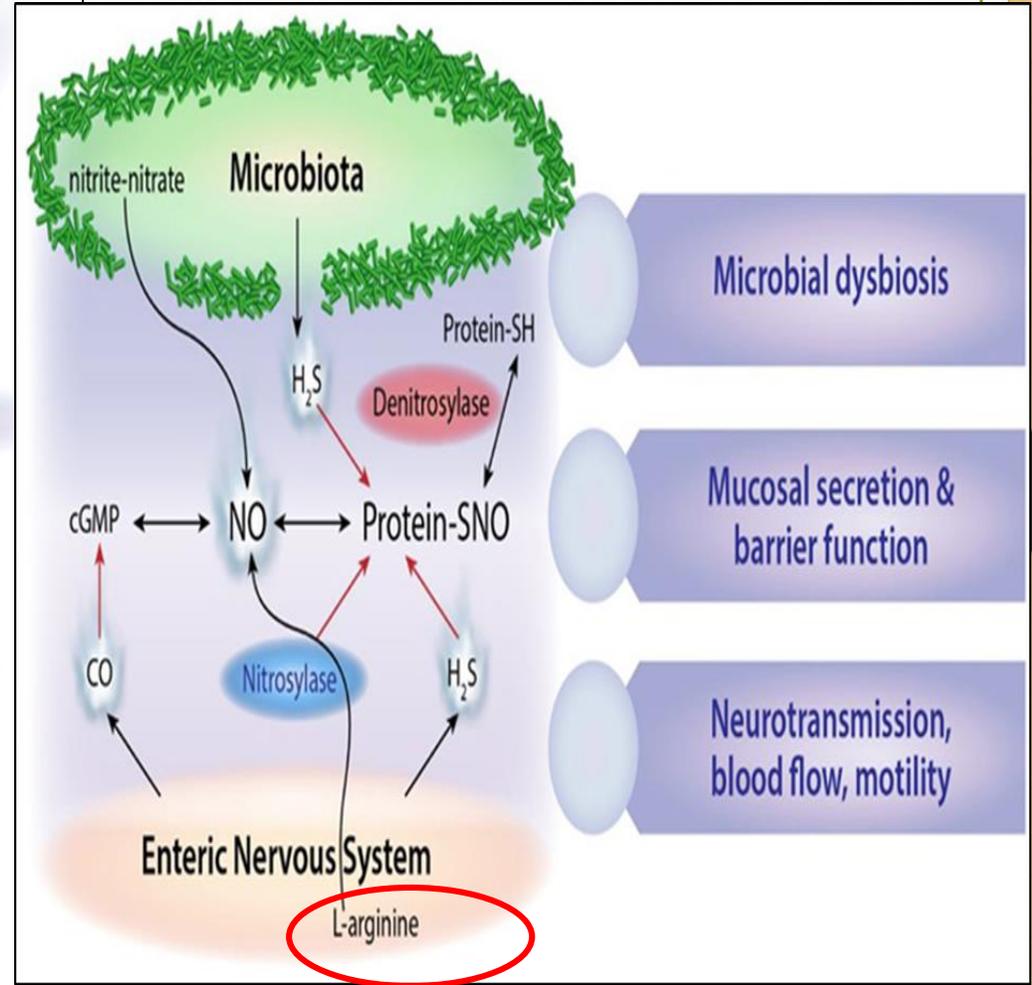
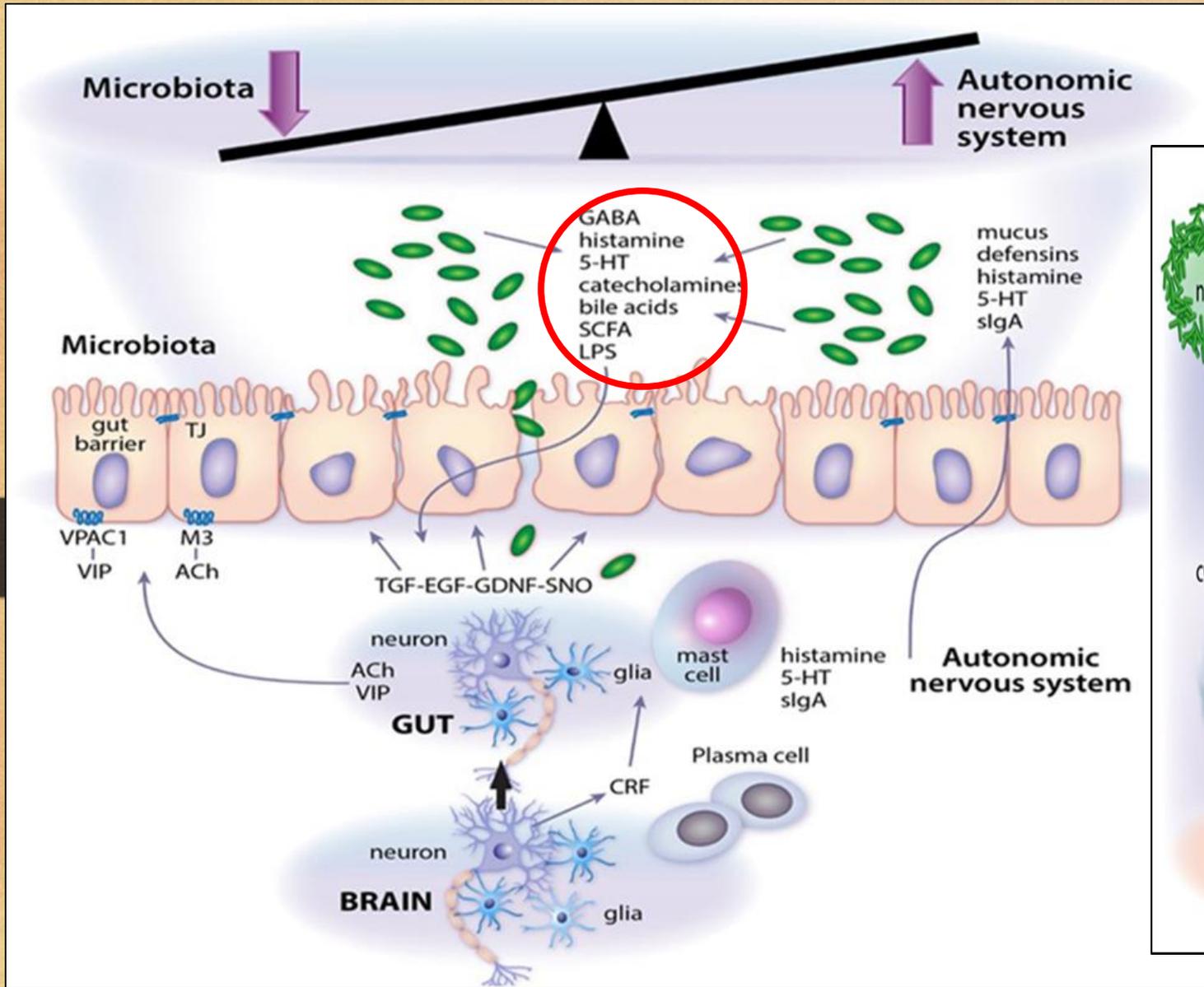
Arginine

Methionine

Glycine

L-tryptophan





World J Gastroenterology. 2016 Feb 21; 22(7): 2219–2241.

Gut microbiota role in irritable bowel syndrome: New therapeutic strategies. Elenora Distrutti, Lorenzo Munaldi, et al.

It is now recognized that a significant portion of the metabolites circulating in mammalian blood derives from the intestinal microbial community[21-25] and the presence or absence of the gut microbiota influences the metabolic profile in regions distant from the gut such as the brain[26]. Moreover, it releases factors that target specific neuronal systems involved in the gut-brain axis, generating neurotransmitters and neuromodulators as dopamine, noradrenaline, acetylcholine and gamma-aminobutyric acid (GABA)[27-31]. **Direct contact of certain probiotics (i.e., *Lactobacillus acidophilus*) with epithelial cells induce the expression of opioid and cannabinoid receptors in the gut and contribute to the modulation and restoration of the normal perception of visceral pain**

1. Cryan JF, Dinan TG. Mind-altering microorganisms: the impact of the gut microbiota on brain and behaviour. *Nat Rev Neurosci.* 2012;13:701–712.
2. Lyte M. Probiotics function mechanistically as delivery vehicles for neuroactive compounds: Microbial endocrinology in the design and use of probiotics. *Bioessays.* 2011;33:574–581.
3. Forsythe P, Kunze WA. Voices from within: gut microbes and the CNS. *Cell Mol Life Sci.* 2013;70:55–69.
4. Asano Y, Hiramoto T, Nishino R, Aiba Y, Kimura T, Yoshihara K, Koga Y, Sudo N. Critical role of gut microbiota in the production of biologically active, free catecholamines in the gut lumen of mice. *Am J Physiol Gastrointest Liver Physiol.* 2012;303:G1288–G1295.
5. Barrett E, Ross RP, O'Toole PW, Fitzgerald GF, Stanton C. γ -Aminobutyric acid production by culturable bacteria from the human intestine. *J Appl Microbiol.* 2012;113:411–417

LOW SCFA

- Glutamine – promotes intestinal cell proliferation, →NFkB
- Probiotics
 - modulate the activity of many cells NKs, DCs, macrophages, epithelial cells and granulocytes, and Th1, Th2, Th17, Treg, Tc and B cells
 - Biotransformation, vitamin synthesis, peristalsis
- Prebiotics

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“I’ve always been a high achiever, always striving for bigger, faster, greater...and now suddenly I’m expected to settle for *lower* blood pressure and *less* cholesterol?!”

P
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Vegetables

Artichokes
Radishes
Carrots
Cucumbers
Asparagus
Bell Peppers
Onions
Leeks
Jicama
Beets
Yams
Garlic
Daikon Radishes
Dandelion Greens
Chicory Root
Sweet Potatoes
Cabbage

Fruits

Tomatoes
Apples
Berries
Bananas
Mango

Other Sources

Honey
Dark Chocolate
Coconut Flour
Flax Seeds
Hemp Seeds
Pumpkin Seeds
Chia Seeds
Legumes
Quinoa
Wild Rice
Ginger Root

Nutrients. 2013 Jun; 5(6): 1869–1912.

Published online 2013 May 29.

doi: [10.3390/nu5061869](https://doi.org/10.3390/nu5061869)

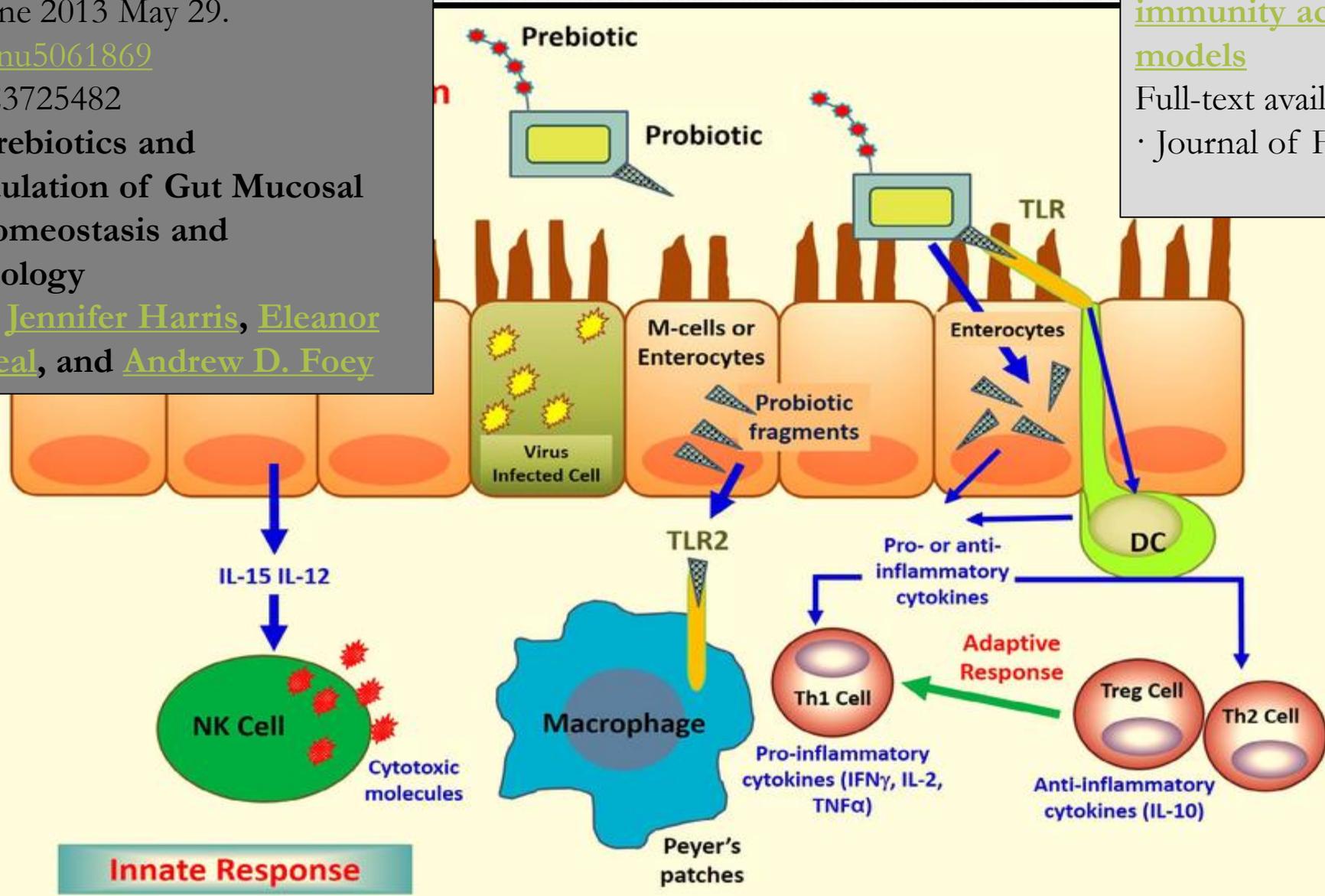
PMCID: PMC3725482

Probiotics, Prebiotics and Immunomodulation of Gut Mucosal Defences: Homeostasis and Immunopathology

[Holly Hardy](#), [Jennifer Harris](#), [Eleanor Lyon](#), [Jane Beal](#), and [Andrew D. Foey](#)

Probiotics in valorization of innate immunity across various animal models

Full-text available · Article · Mar 2015
· *Journal of Functional Foods*



Visit #3 (6 mths)

MSQ 22 (119) PROMIS: PH 87% (7.2%)

Gi effects retest ordered, Nutra Eval reordered

BM- daily (dairy constipates me)

Belching and reflux improved “a lot with Creon”

Muscle pain overall better – off the daily aleve

No more LUQ pain

And BTW...Psych is weaning me off the mood stablizer

“If a mechanic is particular to inspect every part and principle belonging to a steam engine for a purpose of getting good results, can you as an engineer omit any bone in the body and claim to be a trustworthy engineer? Can you say that any part has no importance physiologically, in this, the greatest engine of human life?”– AT Still



