Week 5

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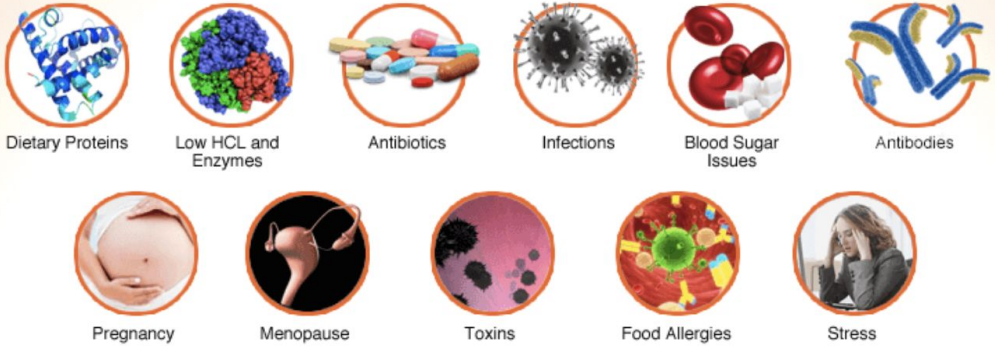
Elimination Food Plan

- Reflection on how it’s going
- Questions or concerns
- Q&A time

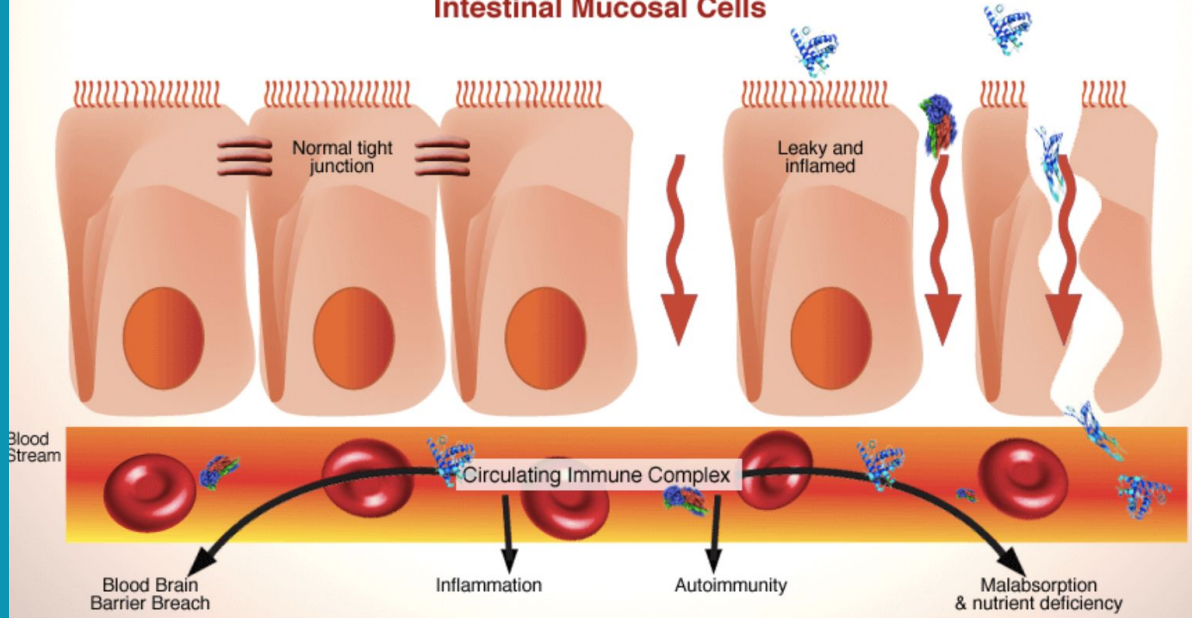
Repair

- We have *removed* offender's to the gut lining
- We have *replaced* things that may help digestion and decrease damage
- We have added in things that help *rebalance* - probiotics/prebiotics
- Now we add things in that we know are soothing and heal the gut lining
    - Helps heal the cells of the mucosal lining
- Today's focus is *repairing* the gut lining

Triggers Causing Intestinal Damage



Intestinal Mucosal Cells



6 Nutrients To Heal Leaky Gut Syndrome

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L-Glutamine

- Amino Acid broken down from protein
  - Out of 20 amino acids - the gut like L-glutamine the best (most energy)
  - Most abundant AA in the body - makes up 60% of our muscles
- Fuel to the intestinal lining to create a strong surface for digestion and absorption
- Most effective treatment to heal the gut lining
- It tightens the open junctions and triggers more mucus needed
- Also important for the immune system
  - Gut lining houses key immune molecules - immunoglobulins
  - Feeding this with L-glutamine - improves the immune system

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How L-Glutamine Improves Gut Health

Great Fuel Source for Intestinal Cells

Helps to Regulate Fluid Volume in Intestines

Improves Constipation and Diarrhea

Reduces Gut Inflammation

Improves sIgA levels for Gut Immunity

Favors the Development of a Healthy Microbiome

Improves Ammonia Elimination

Supports Liver Health

L-Glutamine

- Relieves pain associated with damage to the GI tract
- Equips epithelial cells with nutrients required to maintain the integrity of the GI tract → improves wound healing
- Beneficial for collagen synthesis
  - Broken into proline → essential for collagen production → wound healing, hair, nails
- Stabilizes the immune system - reduce sugar cravings
- Deficiency: altered T cell response
- Antioxidant
- One of the most valuable to help leaky gut

L-Glutamine in Food

- Nuts: Walnuts, almonds, pistachios
- Yogurt
- Milk - grass fed
- Ricotta cheese
- Beans: kidney beans, white eyed beans, chickpeas
- Animal sources: eggs, red meat, chicken, lamb, seafood
- Beets, cabbage, celery, leafy greens (spinach, kale), brussel sprouts

L-Glutamine Supplementation

- Whether adding as a supplement or through food:
  - It is important to add slowly and increase dose gradually
  - You need to allow time for your body to get used to the changes
- There can seem to be a sense of urgency to “fix the gut”
  - There can be dangers of introducing large amounts all at once
  - Take your time and be patient
  - Your gut will heal in due time
- Supplementation can be helpful as it is broken down into useable form
- Start with 2 grams a day increasing up to 5 g two times daily

L-Glutamine Supplement

- Apex ClearVite
- Apex Gastro-ULC
- Apex RepairVite
  - L-glutamine 2700mg
  - DGL, Aloe Vera, marshmallow extract, slippery elm, enzymes, chamomile and more
- GI Repair (Vital Nutrients)
  - Zinc carnosine, L-glutamine, Slippery Elm, MSM, Rutin, Aloe
- GI Restore
- Thorne Enteromend

Quercetin

- Healing effects better than any synthetic medication
- Supports a proper immune response by decreasing macrophages during situations of over-production as seen in AI conditions
    - Yet - unlike meds - does not block other inflammatory cells that may be needed
    - Stimulates apoptosis in cancer cells (cell death)
- Improves tight junction barriers lined by proteins
- Controls oxidative damage to tissues
- Prevents release histamine from cells associated with inflammation and systemic reactions
- Improves glutathione
- Combined with pineapple (bromelain) - synergistic for inflammation

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BioFlavonoids
are unique compounds that help give color and antioxidant protection to fruits and vegetables. Certain bioflavonids are well studied for their health benefits.
Quercetin and Rutin are 2 of these bioflavonoids and research shows when taken in clinical dosages they synergize to offer the following benefits
Down Regulate the Histamine Response
Support a Healthy Inflammatory Cycle
Improve Circulation and Tissue Oxygenation
Protect the Endothelial Lining of Blood Vessels
Reduce Allergy and Asthmatic Symptoms
Help to Reduce Pain and Improve Tissue Healing
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HEALTH

Quercetin in food

- Apples
- Capers
- Onions
- Berries
- Herbs like parsley and sage
- Green tea
- Consuming 400-1200 mg daily is recommended to help inflammation and gut healing

Curcumin

- From turmeric root
- Prevents chronic inflammation by controlling the inflammatory paths
  - Decreases tissue damage, histamine release, immune cell activation, GI issues
- Improve immune response in those with AI issues
- Heals leaky gut (same mechanism as quercetin)
- Regulates healthy amount macrophages but does not interfere with immune response to normal infections
- Scavenges free radicals and prevents GI damage
- 1000-2000 mg daily - limit inflammation and enhance immunity
- Add to meat marinades, homeade stew, sauces, coffee, smoothies

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Golden Milk

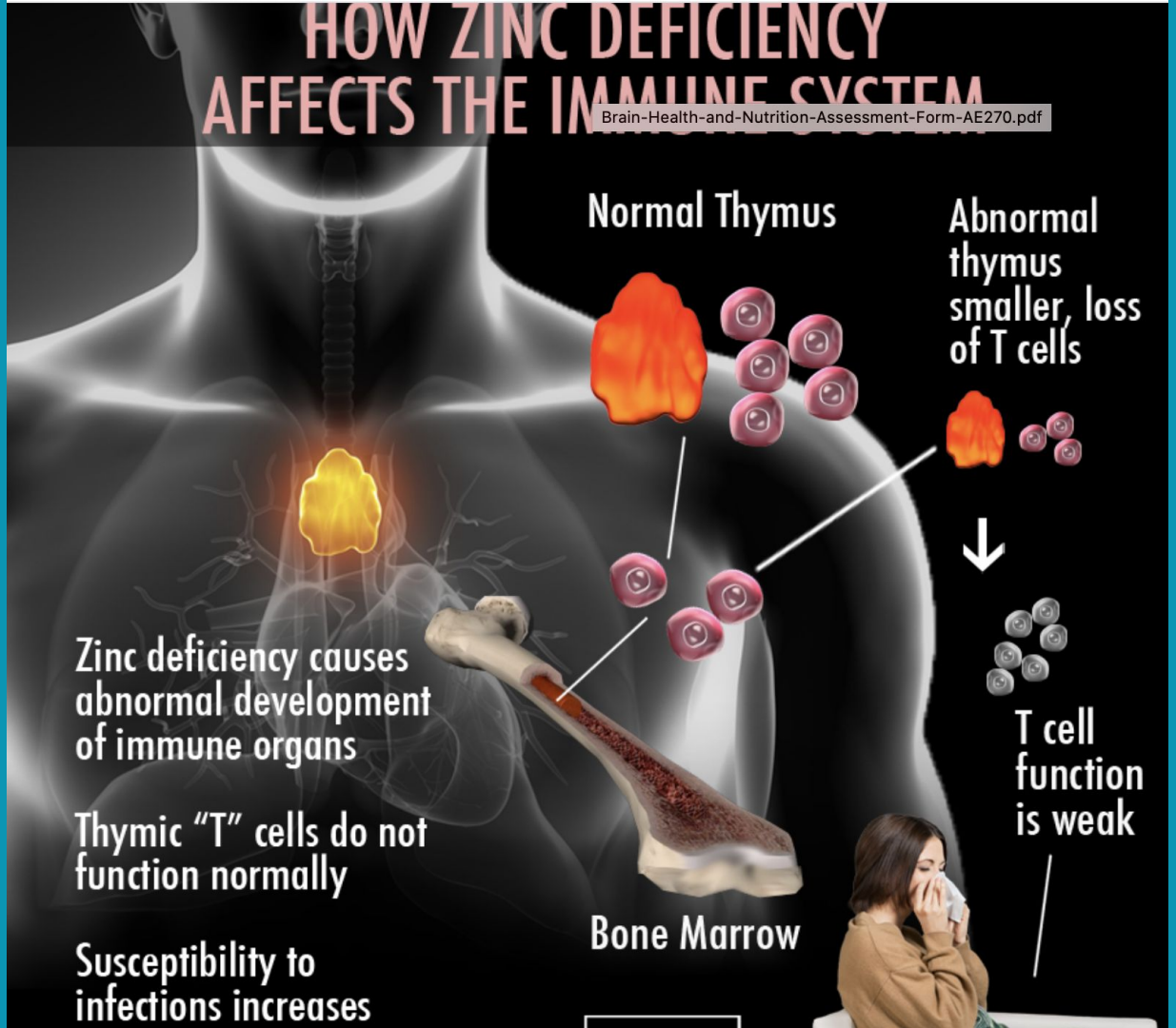
- 1 cup unsweetened almond milk
- 2 tsp honey
- ½ tsp almond butter (opt)
- ½ tsp vanilla
- ½ tsp cinnamon
- ¼ tsp turmeric
- ⅛ tsp ginger
- Black pepper, cardamom, cloves (opt)
- Combine in saucepan and warm

TURMERIC

- Prevents Alzheimer's Disease
- Improves Digestion
- Relieves Arthritis
- Prevents Liver Disease
- Controls Diabetes
- Prevents Cancer
- Immune Booster
- Weight Management
- Heals Wounds
- Reduces Cholesterol Level

Zinc

- Plays a major role in a variety of functions
  - Wound healing
  - Immune function
  - Moderating thyroid and insulin
  - Antioxidant properties
  - Essential nutrient in the gut barrier
- Can improve permeability and heal leaky gut
- IBD, ulcers have healed with Zinc carnosine


HOW ZINC DEFICIENCY
AFFECTS THE IM
Brain-Health-and-Nutrition-Assessment-Form-AE270.pdf
Normal Thymus
Abnormal thymus smaller, loss of T cells
Zinc deficiency causes abnormal development of immune organs
Thymic "T" cells do not function normally
Susceptibility to infections increases
Bone Marrow
T cell function is weak

Zinc containing foods

- Oysters and shellfish
- Beef
- Nuts and seeds
- Beans/legumes
- Whole grains
- Eggs
- Potatoes
- Dark chocolate
- Supplements: lozenge, pill, topical, nasal sprays

Ginger

- Comparable inflammation prevention as drugs like ibuprofen
- Digestive stimulant that promotes gastric flow and contains enzymes to help with digestion
- Used to treat pain associated with GI inflammation by decreasing contractions of the gut lining
    - Used to treat nausea, AM sickness and menstrual symptoms
- Powerful antimicrobial - both standard and drug resistant strains
- Powder and fresh ginger - combats bad bacteria in the gut

Lemon Ginger Tea Recipe

3 inch piece of ginger
2 cups of water
1/4 fresh lemon

Optional: 3-4 drops of lemon drop stevia

Step #1: Peel the ginger and slice thinly

Step #2: Pour into pot and boil the ginger for 10-15 minutes w/lid on.

Step #3: Turn off heat and remove lid and let cool down

Step #4: Once it is warm but drinkable, put in a mug and squeeze lemon and add lemon drop stevia if you want to make it sweet.

Note: *The larger the piece of ginger, the stronger the tea and the longer you will need to boil. Boiling for about 10-15 minutes will cause you to lose about 1/2 the water due to evaporation. So if you do a 6 inch piece of ginger root, you will need 3-4 cups of water and 30 mins or so to boil.*

DGL

- Helps your body repair your gut lining by replenishing the mucus for the gut lining.
  - Glue that holds the cells together tightly
- Has been used thousands of years for GI issues
  - Very soothing to the gut - like an antacid
- A study comparing to Zantac - it had better effect to soothe and prevent ulcer
- Can bind toxins and keep them from entering the circulation
- Helps fatigue
- DGL has removed the toxic part of licorice
  - However - still use caution if high BP
- All supplements should be temporary - while changing diet, lifestyle

Pea Protein

- Least likely to trigger digestive issues
- Vegan and great alternative to soy and dairy based ones
- Protein content comparable to animal protein, less inflammatory
- Lower in lectins
- Great for AI and food sensitivities
- Source energy, regulates sugars, suppress appetite
- Prebiotic - so helps with microbiome (esp bifidobacterium)
- Helps raise SCFA production - helps to feed microbiome and heal

Slippery Elm

- Increases the mucilage content in the GI tract
- Stimulates nerve endings to boost mucus secretion, which neutralized acidity in the gut and soothes ulcers
- Provides antioxidants to help relieve inflammation in the gut.
- Can help with bloating, pain, and stool frequency and consistency
- Can help with weight loss and lower LDL

Aloe Vera

- Soothing and protecting
- Helps your body replace the lost mucus associated with leaky gut and damage
- Support the immune system
- Increases water content in the intestines
- Aids in control of candida, bad bacteria, and inflammation.
- Provides nutrients like A,C,E
- Can help boost the number of beneficial bacteria in the gut

Marshmallow Root

- High mucilage content - covering the GI tract with a protective lining
- Eases inflammation in the gut
- Helps soothes ulcers
- Helps regulate BM’s
- Restores the integrity of the small junctions in the GI system

Other

- Fiber and prebiotic
- Rosemary
- EPA/DHA

Summary

- The GI tract needs time to heal
- We are working on the 5 R's to make changes to allow healing
- Once the GI system is healed - we can have a little more wiggle room
- But the goal - lasting changes
- 80/20 - 90/10
- Some changes permanent:
  - No artificial food colors or sweeteners
  - No HFCS
  - Very much limit certain foods - rare occasion

The Immune System

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Why immune system

- 80% immune system is in the gut
- The GI tract is the largest interface with the environment
  - Most options to trigger abnormal immune responses, blunt our system
- Immune system is important to have functioning well
  - Not overactive
  - Not underactive

What is healthy immunity?

- **D**etective and defensive
- **I**nternally regulated
- **R**estorative
- **T**olerant

Healthy immunity is....

- **D**etective and defensive:
  - Detects a threat and mounts a response.
  - Threats: microbes, foods, foreign chemicals.
- **I**nternally regulated:
  - Immune responses are tightly controlled
  - Regulated by genetics and enzyme reactions

Healthy Immunity is…

- **R**estorative: Repairs damage that ensues from the insult
- **T**olerant: actively unresponsive to:
  - Self-antigens (our own tissues)
  - Benign microbials (good bacteria)
  - Food and environmental allergens

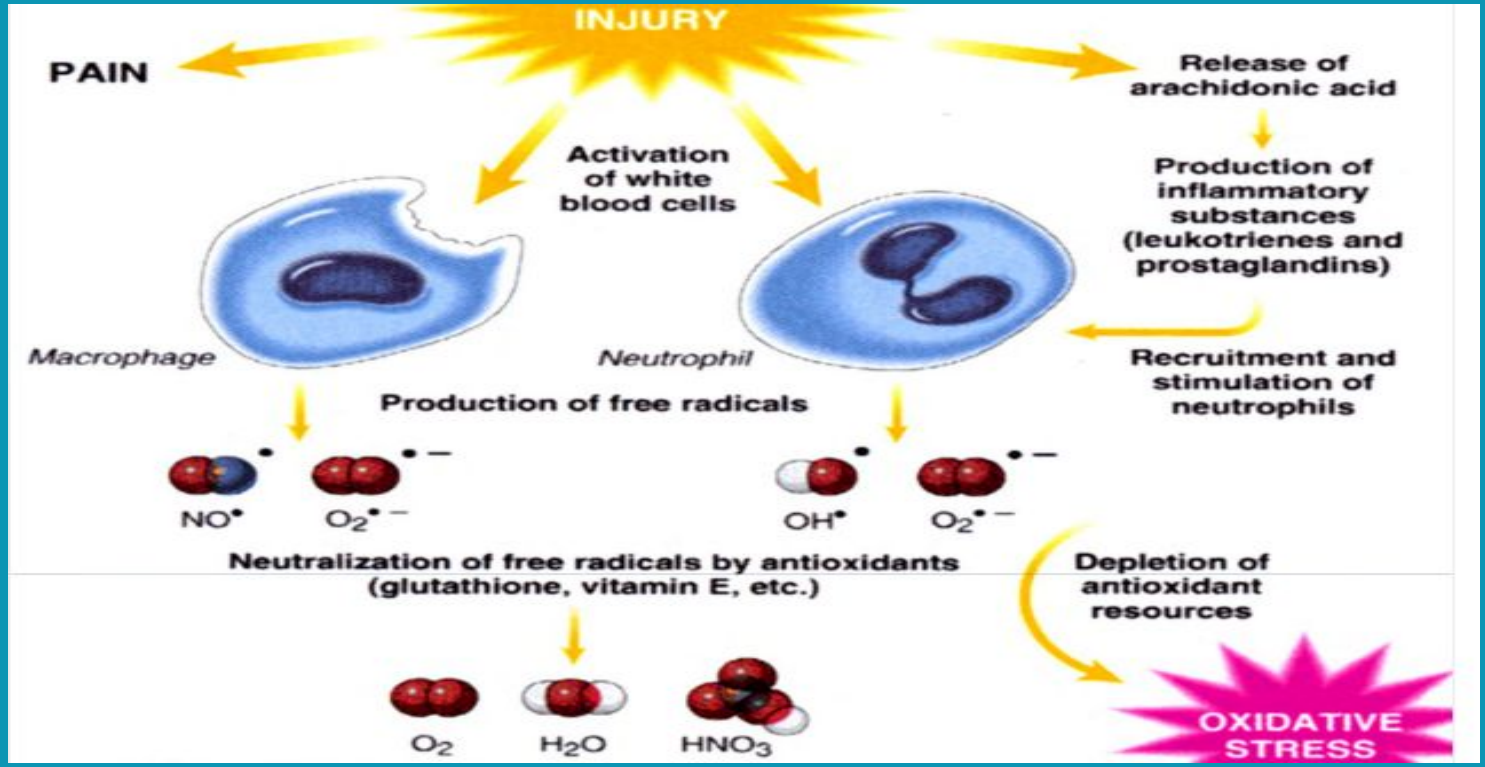
Pathogen Defense

- Innate: 0-96 hours
  - Non-specific, non-induced
    - Physical barriers (saliva, mucous)
    - Cilia
    - Acid pH
    - Enzymes

First lines of defense

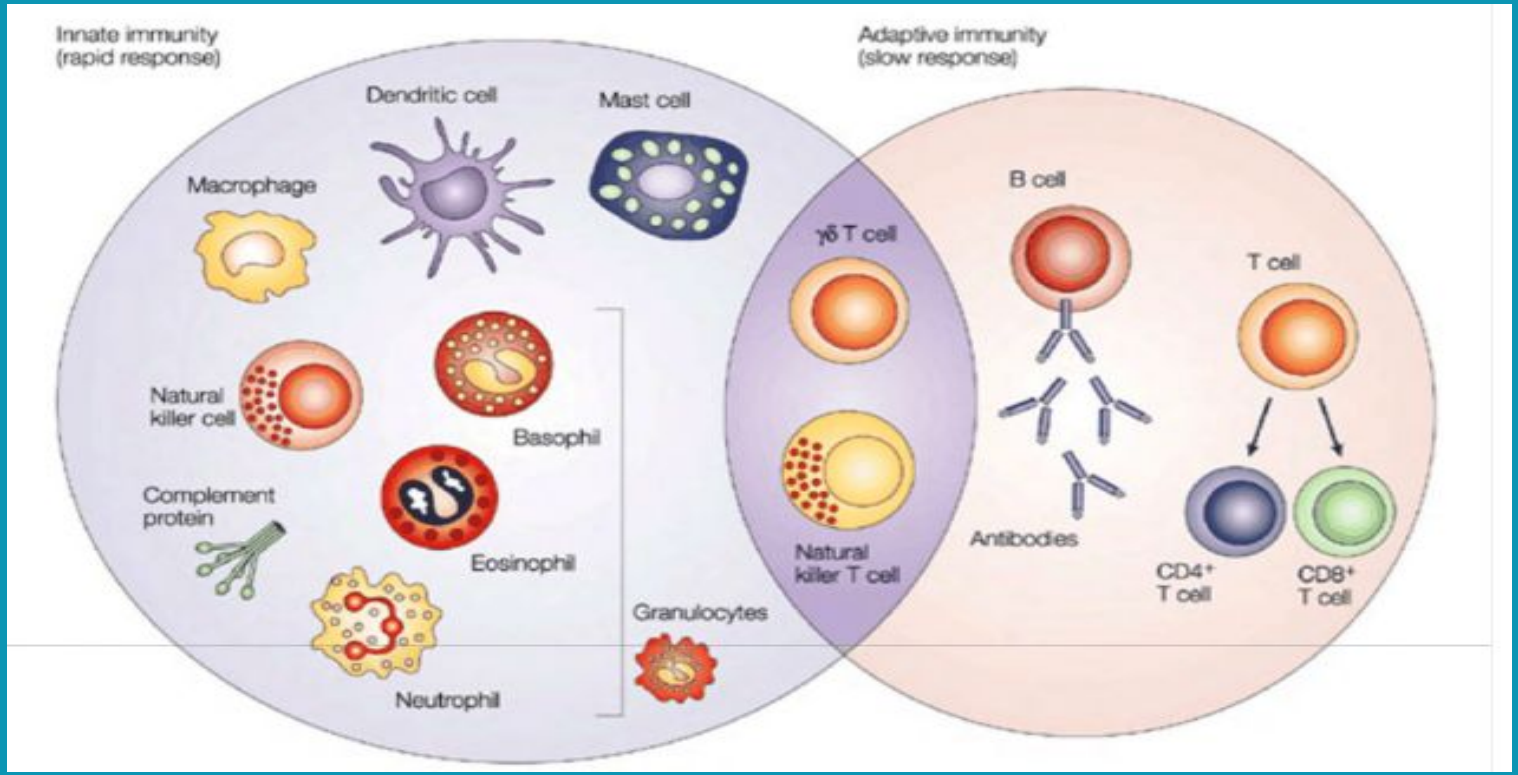
Phases of pathogen defense

- Innate: 0-96 hours
  - Specific cells - but broad reaction, induced
  - Different molecules and cells in the body start their defense
  - Cytokines, complement cells, etc...


INJURY
PAIN
Release of arachidonic acid
Activation of white blood cells
Production of inflammatory substances (leukotrienes and prostaglandins)
Macrophage
Neutrophil
Recruitment and stimulation of neutrophils
Production of free radicals
NO•
O2•−
OH•
O2•−
Neutralization of free radicals by antioxidants (glutathione, vitamin E, etc.)
Depletion of antioxidant resources
O2
H2O
HNO3
OXIDATIVE STRESS

Phases of Pathogen Defense

- Acquired – lymphocytes: 4-5 days
  - Cell-mediated
    - T-helper cells
    - Cytolytic T cells
  - Humoral (immunoglobins)
    - B cells

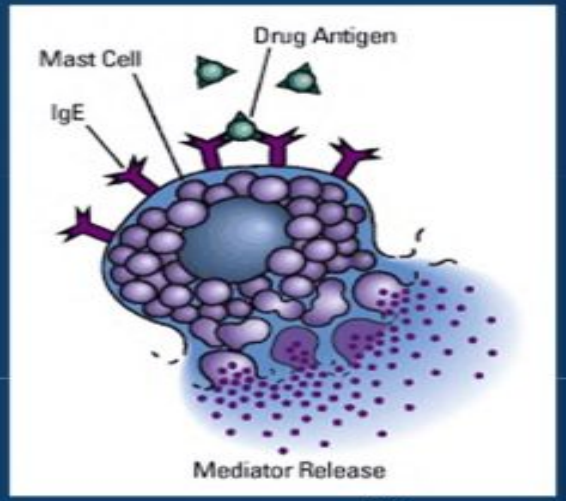

Innate immunity
(rapid response)
Adaptive immunity
(slow response)
Dendritic cell
Mast cell
Macrophage
γδ T cell
B cell
T cell
Natural
killer cell
Basophil
Complement
protein
Eosinophil
Antibodies
Natural
killer T cell
CD4+
T cell
CD8+
T cell
Granulocytes
Neutrophil

Mast Cells

Mast Cells

Degranulation: immune & non-immune mechanisms

- Direct injury *(mechanical & chemical stimuli)*
- IgE crosslinking
- Pattern recognition receptors
- Cytokines
- Complement



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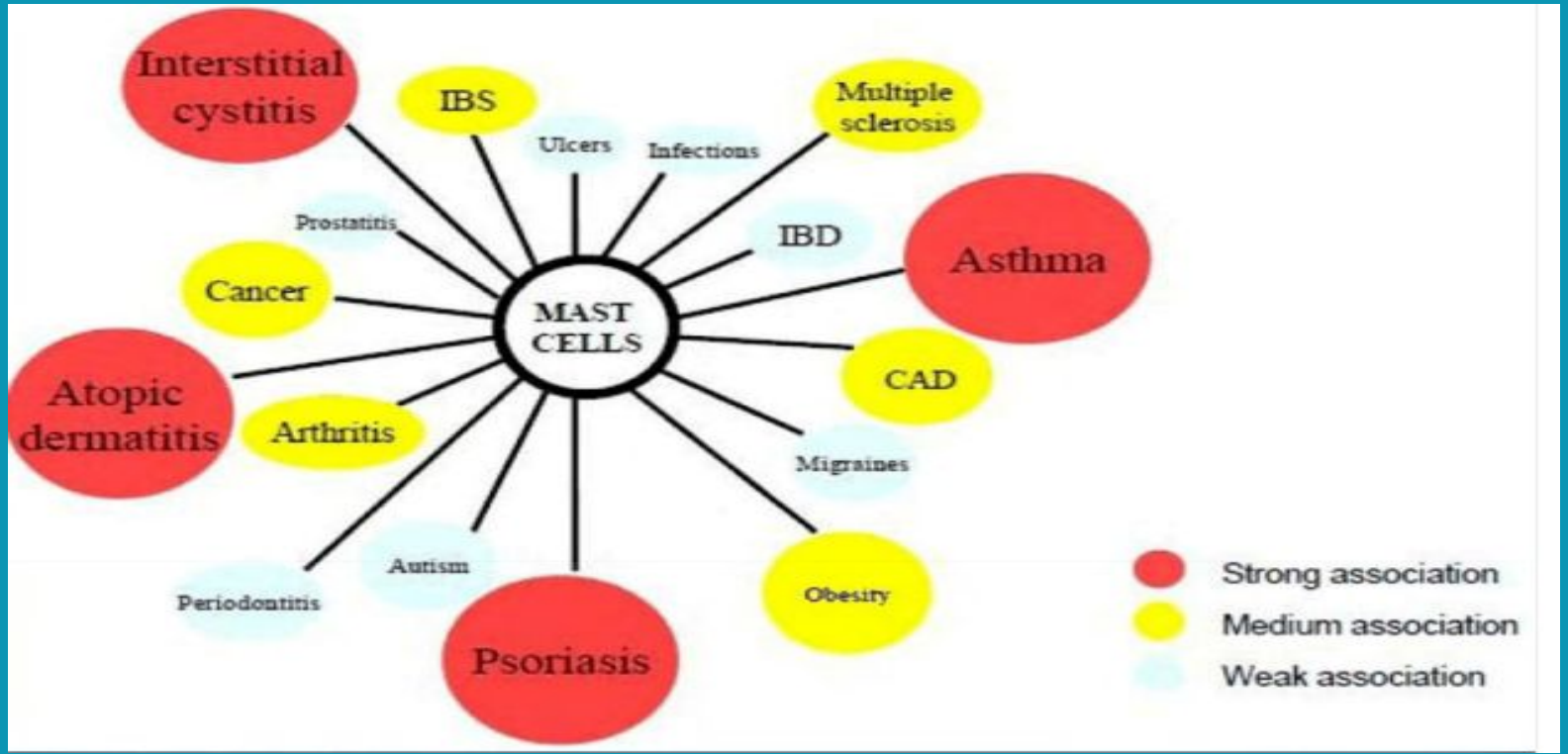
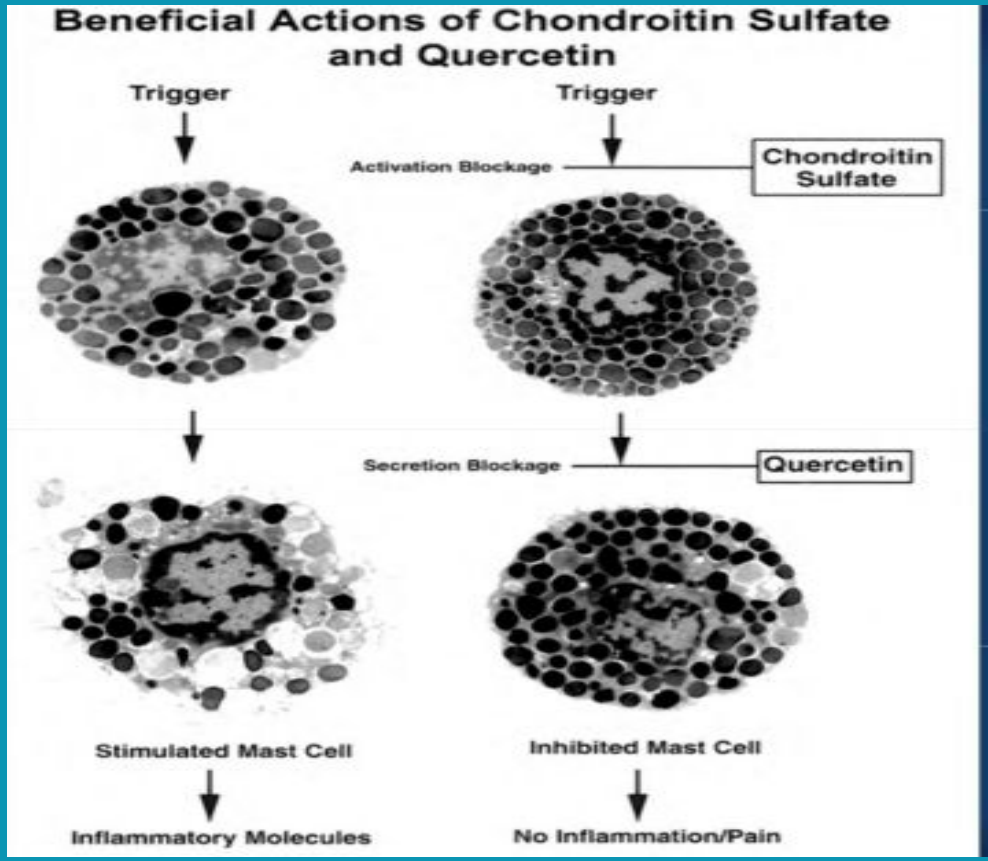
Mast Cells and Diseases

- Allergic and anaphylactic reactions
- Pathogen defense
- Wound healing
- Autoimmune disease
- Angiogenesis
- Obesity
- Mood disorders
- Atherosclerosis
- Interstitial cystitis


Interstitial cystitis
IBS
Ulcers
Infections
Multiple sclerosis
Prostatitis
IBD
Asthma
Cancer
MAST CELLS
Atopic dermatitis
Arthritis
CAD
Migraines
Autism
Obesity
Periodontitis
Psoriasis
Strong association
Medium association
Weak association



Theoharides
Ann Allergy
Asthma Immunol.
2004; 93 (Suppl
1): S24–S34.

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Mast Cells

- Mast cells release histamine
- Look into MCAS, histamine issues
- Many ways to treat
  - Low histamine foods
  - Quercetin, bromelein - Aller-C
  - Ketotifen

T helper cells and autoimmune

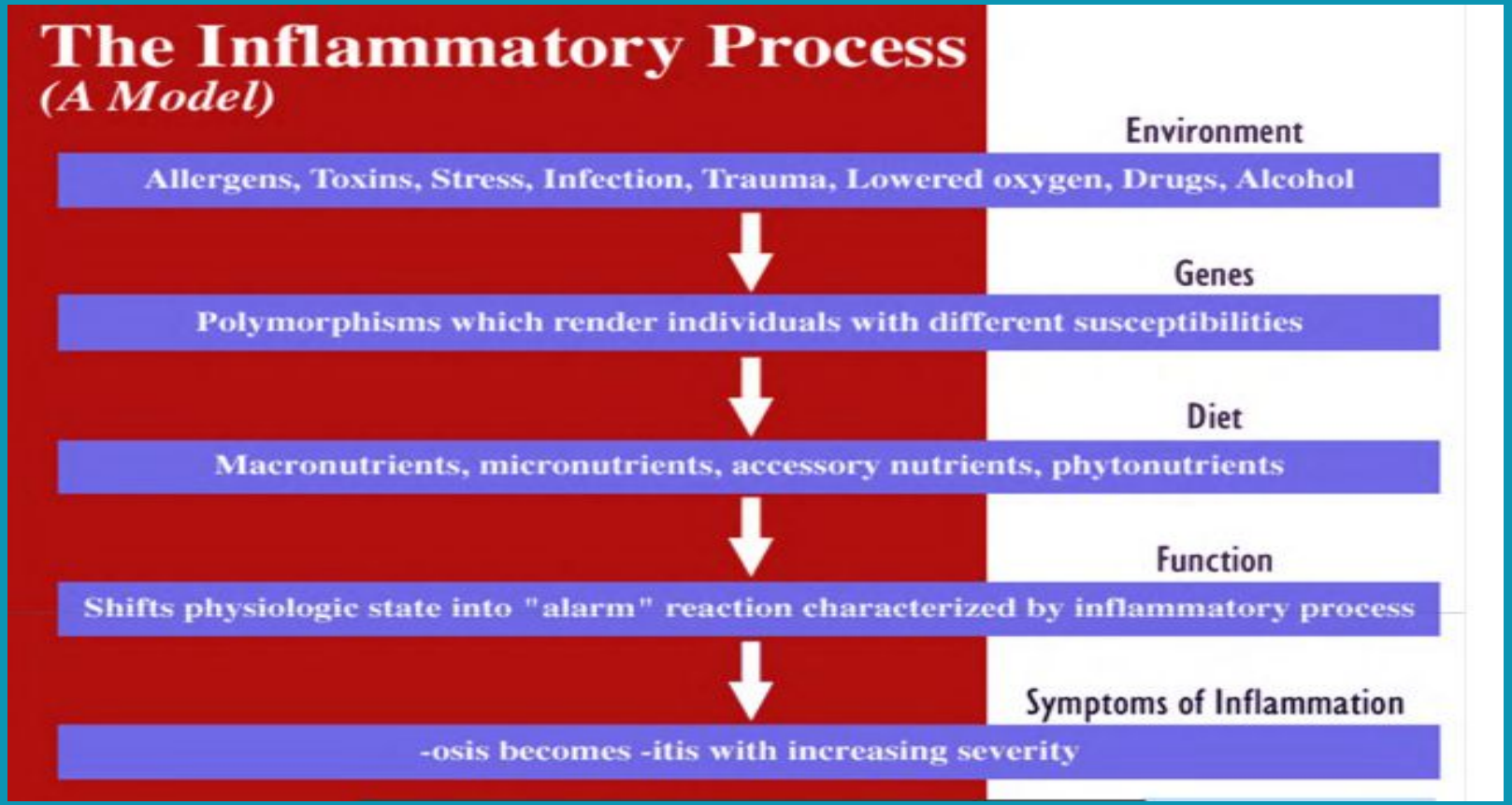
- TH1 diseases:
  - RA
  - MS
  - Thyroiditis
  - Lyme arthritis
  - Crohn’s disease
  - IDDM
- TH2 diseases:
  - Allergic disease, asthma, contact dermatitis
  - Scleroderma
  - Ulcerative colitis
  - SLE

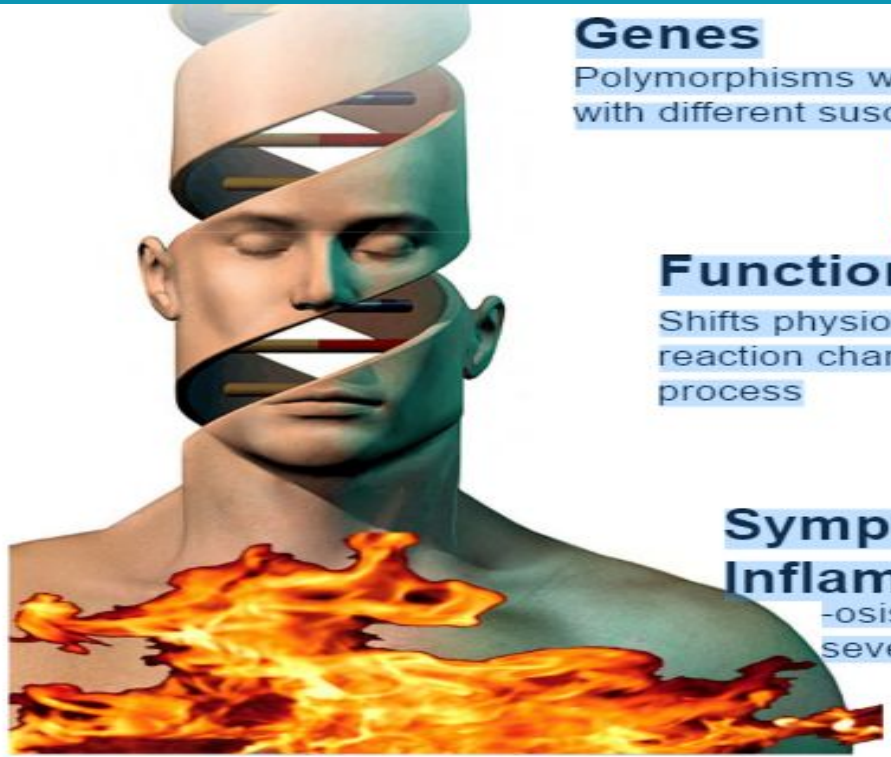
Interleukin 17 cytokines

- Initiates inflammation of tissues and organs
  - Autoimmune disease (MS, Crohn's, UC, SLE, RA, psoriasis, scleroderma, AS)
  - Production suppressed by Vit D, retinoic acid, statins, triptolide
  - Main drug for psoriasis – IL-17 inhibitor
- Tai Chi enhances CD4CD25 reg T cells

Inflammation

- The body's normal physiological defense and repair mechanism after an injury
- Injury can result from trauma, ischemia, infection, toxins, or unhealthy diet.
- All inflammatory triggers activate signals through molecular signals.
- Chronic inflammation signals a loss of tolerance.
- Local inflammation frequently results in a systemic inflammatory response.
- Similarly, a local loss of tolerance can lead to a systemic loss of tolerance.


The Inflammatory Process
(A Model)
Environment
Allergens, Toxins, Stress, Infection, Trauma, Lowered oxygen, Drugs, Alcohol
Genes
Polymorphisms which render individuals with different susceptibilities
Diet
Macronutrients, micronutrients, accessory nutrients, phytonutrients
Function
Shifts physiologic state into "alarm" reaction characterized by inflammatory process
Symptoms of Inflammation
-osis becomes -itis with increasing severity



Genes

Polymorphisms which render individuals with different susceptibilities

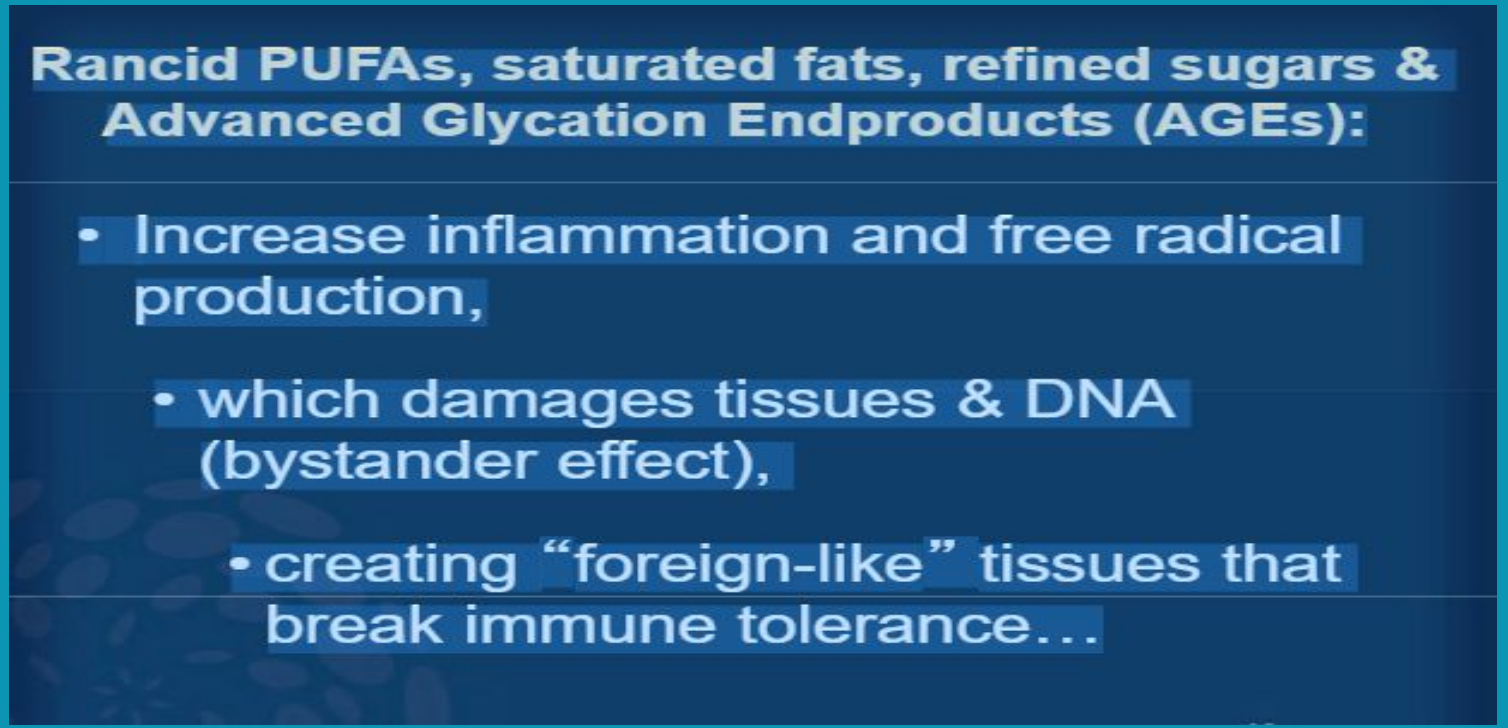
Function

Shifts physiologic state into “alarm” reaction characterized by inflammatory process

Symptoms of Inflammation

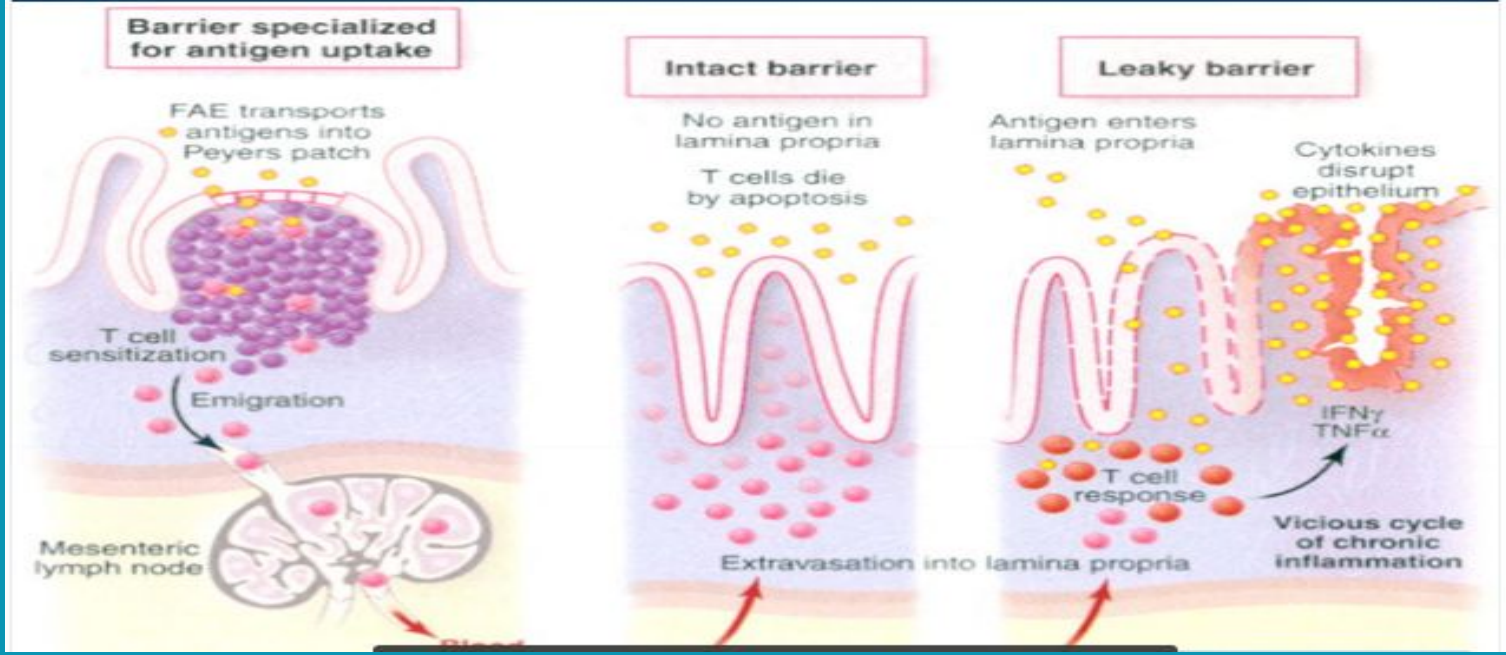
-osis becomes -itis with increasing severity

Gut/immune/inflammation

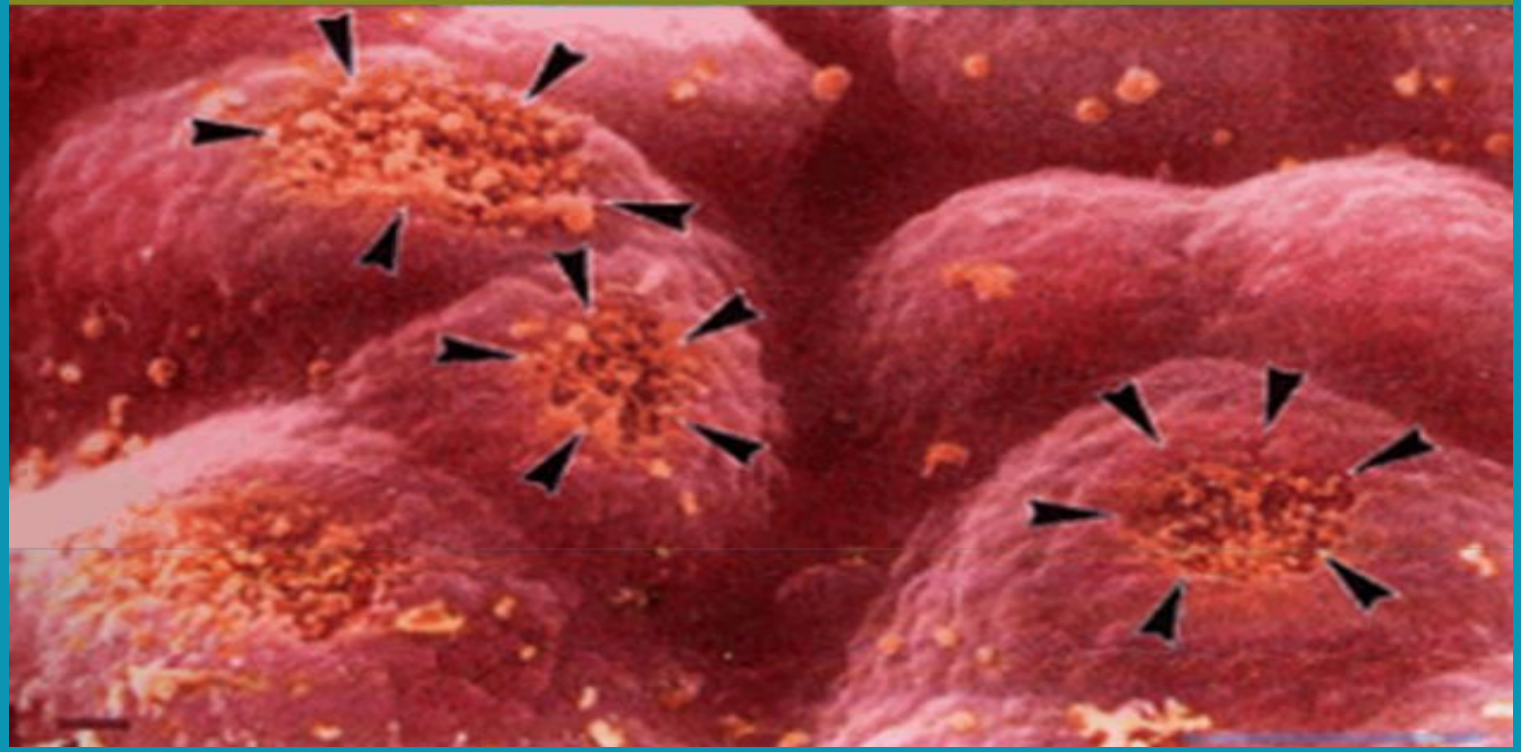



Activators for RAGEs
(Receptors for Advanced Glycation Endproducts)
IFM

Leaky Barriers: A Common Antecedent for Chronic Inflammatory Disease



Damaged Intestinal Microvilli



Inflammatory triggers for innate immune response

- Pathogens – especially LPS
  - LPS comes from SAD→ inflammatory response-->insulin resistance→ DMII, NAFLD, CV
- Trauma (mechanical, chemical, thermal, electromagnetic); intracellular
- Lectins and other food components
- Advanced glycation end products (AGEs)
- Free radicals
- Toxins

Increase in intranuclear nuclear factor kB and decrease in inhibitor kB in mononuclear cells after a mixed meal: evidence for a proinflammatory effect

- It is of interest that **these processes get triggered within 1 h of a meal and remain active for >3** and that **CRP also increases** after such a meal.
- The duration of this proinflammatory effect is relevant because **the time for another meal is usually 4-5 h after a meal, with the potential for further NF-KB activation, ROS load, and potential proinflammatory changes.**

IFM

AJCN, 2004, Vol 79: 682-690

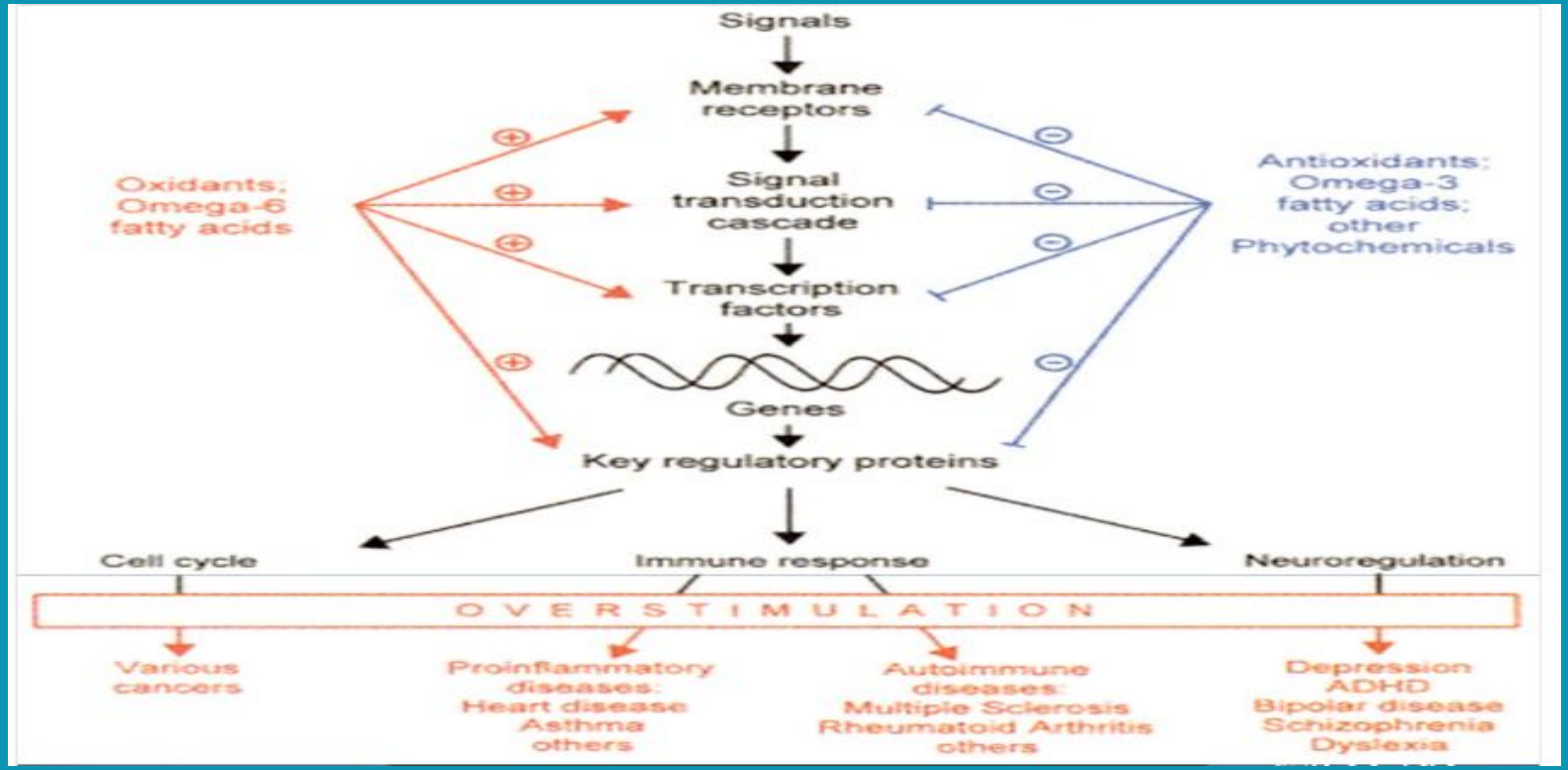
Caveat:

The *trigger* is not the same as the disease.

Disease is a pattern of immune *response*.

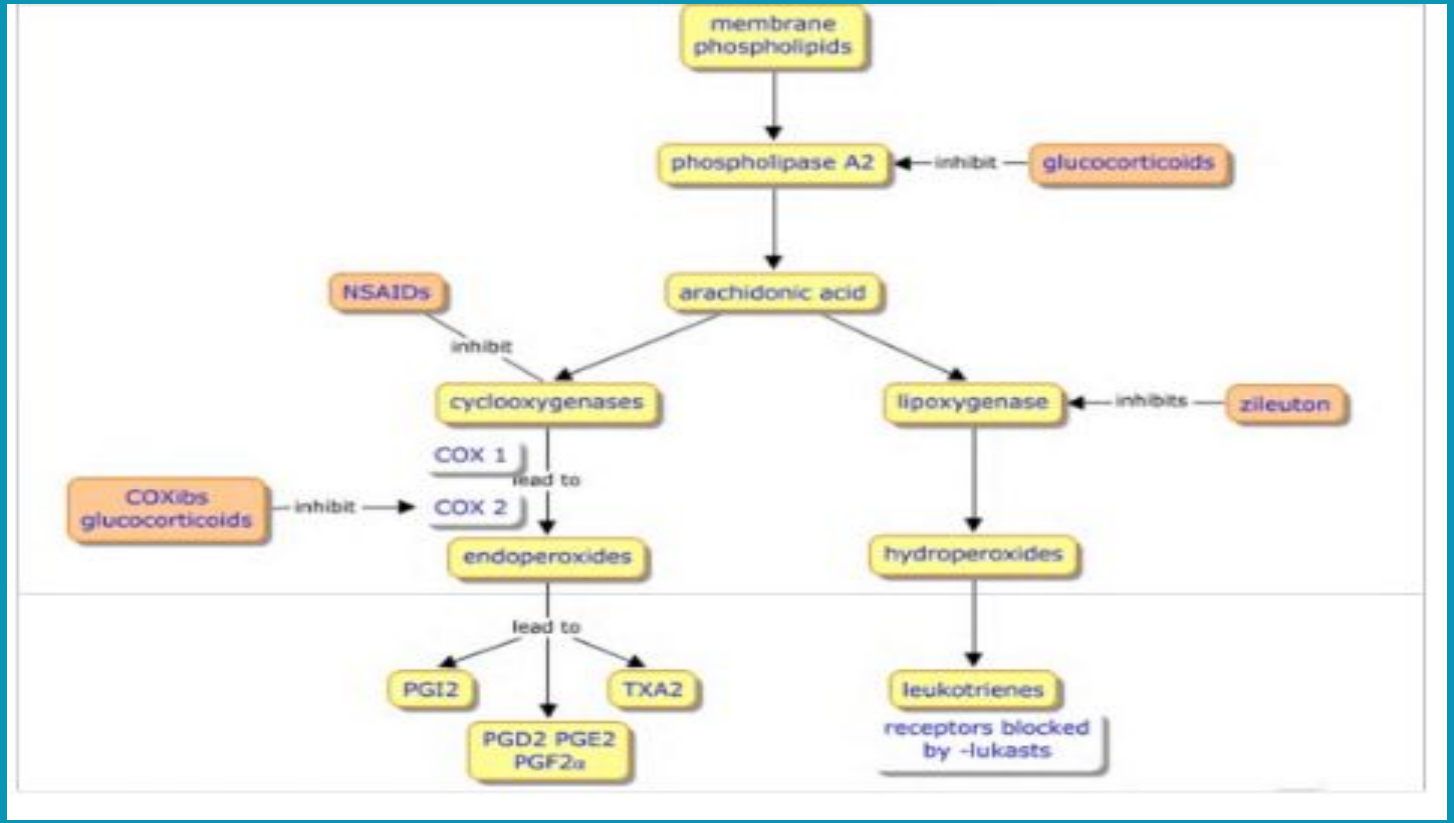
Boundaries, Immune Dysfunction, & Disease

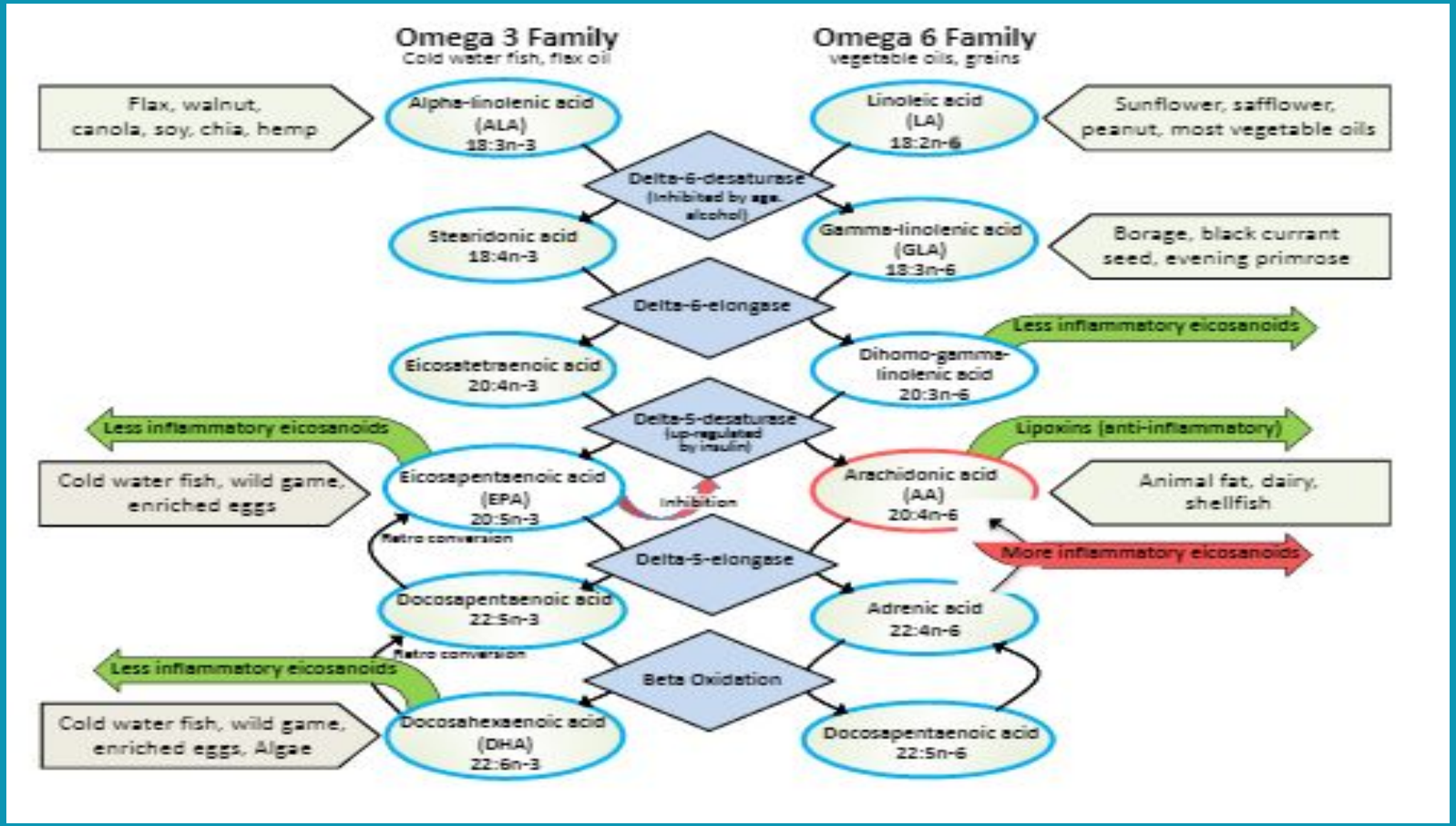
	Immune Response	
Boundary	*Excess*	*Deficiency*
Internal (self)	**Autoimmunity Cardiovascular Neurodegeneration**	**Cancer**
External (non-self)	**Allergy, Atopy, Hypersensitivity**	**Infection**

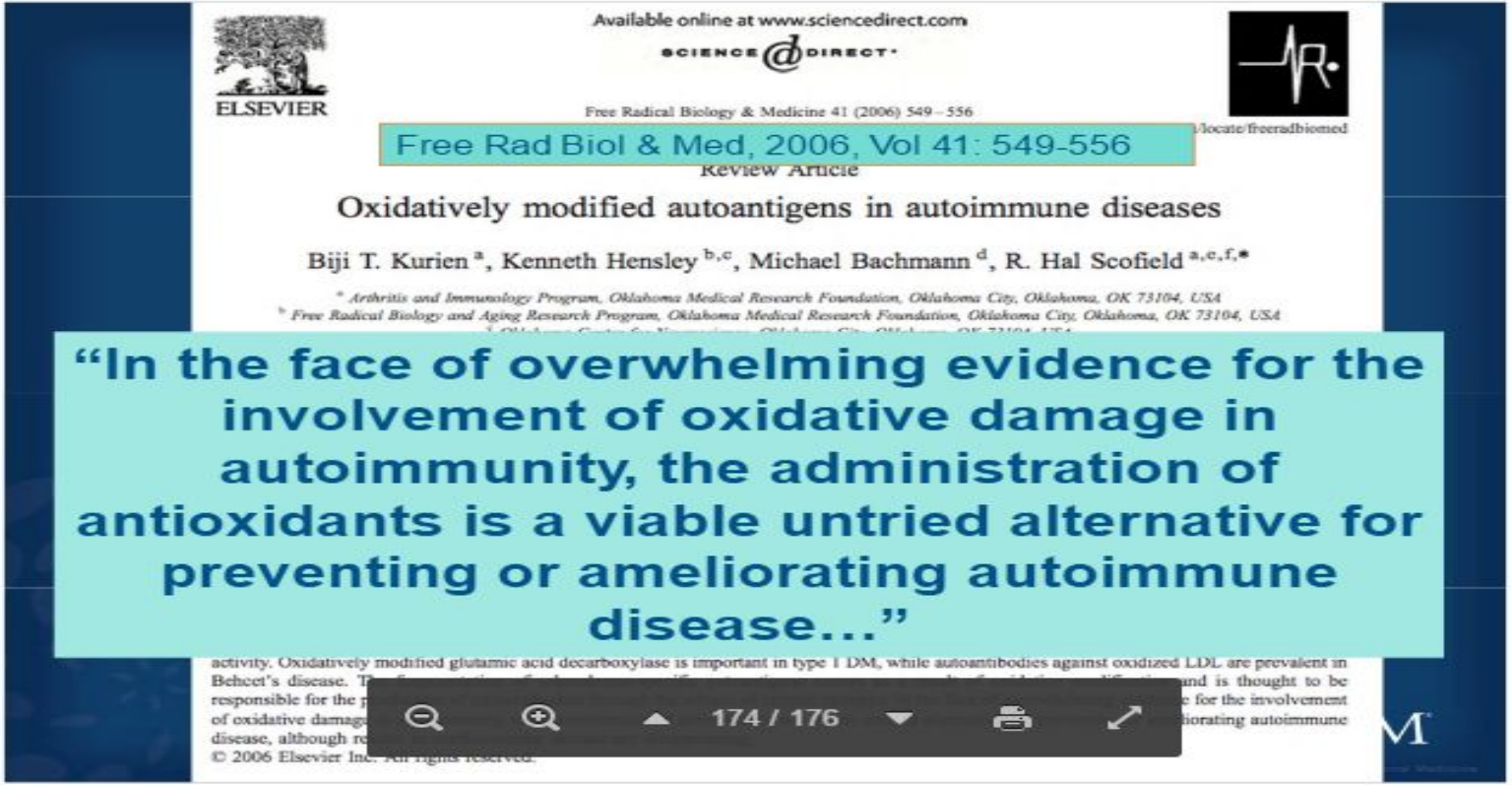

Signals
Membrane receptors
Signal transduction cascade
Transcription factors
Genes
Key regulatory proteins
Oxidants; Omega-6 fatty acids
Antioxidants; Omega-3 fatty acids; other Phytochemicals
Cell cycle
Immune response
Neuroregulation
OVERSTIMULATION
Various cancers
Proinflammatory diseases: Heart disease Asthma others
Autoimmune diseases: Multiple Sclerosis Rheumatoid Arthritis others
Depression ADHD Bipolar disease Schizophrenia Dyslexia

The pharmacological approach to immune regulation…

IFM


membrane phospholipids
phospholipase A2
inhibit
glucocorticoids
NSAIDs
arachidonic acid
inhibit
cyclooxygenases
lipoxygenase
inhibits
zileuton
COX 1
lead to
COXibs glucocorticoids
inhibit
COX 2
endoperoxides
hydroperoxides
lead to
PGI2
TXA2
PGD2 PGE2 PGF2α
leukotrienes
receptors blocked by -lukasts

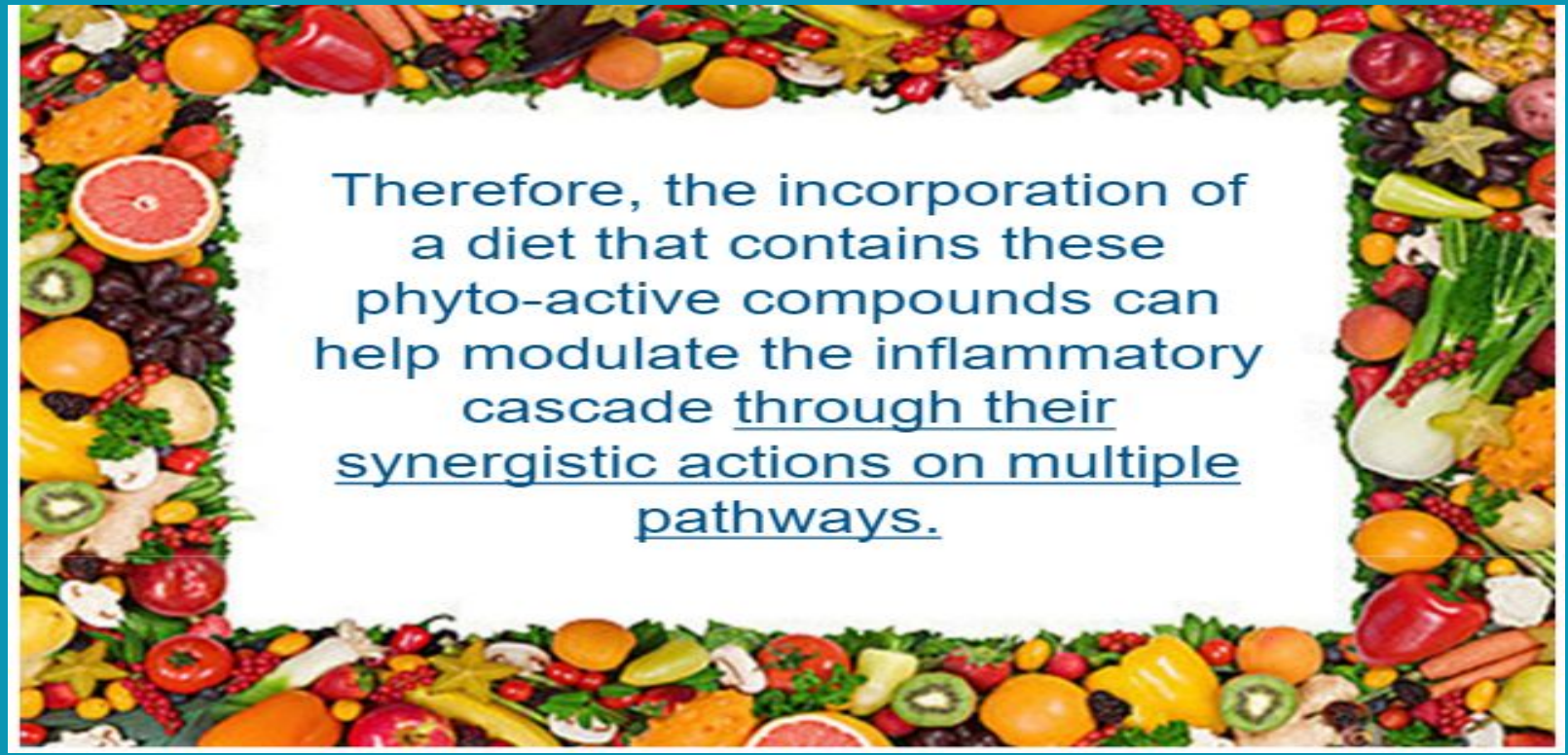

Omega 3 Family
Cold water fish, flax oil
Omega 6 Family
vegetable oils, grains
Flax, walnut, canola, soy, chia, hemp
Alpha-linolenic acid (ALA) 18:3n-3
Linoleic acid (LA) 18:2n-6
Sunflower, safflower, peanut, most vegetable oils
Delta-6-desaturase (inhibited by age, alcohol)
Stearidonic acid 18:4n-3
Gamma-linolenic acid (GLA) 18:3n-6
Borage, black currant seed, evening primrose
Delta-6-elongase
Less inflammatory eicosanoids
Eicosatetraenoic acid 20:4n-3
Dihomo-gamma-linolenic acid 20:3n-6
Delta-5-desaturase (up-regulated by insulin)
Less inflammatory eicosanoids
Lipoxins (anti-inflammatory)
Cold water fish, wild game, enriched eggs
Eicosapentaenoic acid (EPA) 20:5n-3
Inhibition
Arachidonic acid (AA) 20:4n-6
Animal fat, dairy, shellfish
Retro conversion
Delta-5-elongase
More inflammatory eicosanoids
Docosapentaenoic acid 22:5n-3
Adrenic acid 22:4n-6
Retro conversion
Less inflammatory eicosanoids
Beta Oxidation
Cold water fish, wild game, enriched eggs, Algae
Docosahexaenoic acid (DHA) 22:6n-3
Docosapentaenoic acid 22:5n-6


Available online at www.sciencedirect.com
SCIENCE DIRECT
ELSEVIER
Free Radical Biology & Medicine 41 (2006) 549–556
Free Rad Biol & Med, 2006, Vol 41: 549-556
Review Article
Oxidatively modified autoantigens in autoimmune diseases
Biji T. Kurien [a], Kenneth Hensley [b,c], Michael Bachmann [d], R. Hal Scofield [a,e,f,*]
[a] Arthritis and Immunology Program, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma, OK 73104, USA
[b] Free Radical Biology and Aging Research Program, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma, OK 73104, USA
"In the face of overwhelming evidence for the involvement of oxidative damage in autoimmunity, the administration of antioxidants is a viable untried alternative for preventing or ameliorating autoimmune disease..."
174 / 176

Key concepts

- Inflammatory disease may seem unpredictable, but there are identifiable patterns.
- The same inflammatory trigger can lead to vastly different responses depending on the initial circumstances.
- The same intervention can lead to a range of responses.
- The essential question is, what factors perpetuate the pathology in a given individual.

- The respiratory and GI mucosa are the single biggest triggers for chronic inflammation.
- Botanical and nutritional therapies can act as biological response modifiers that dampen the inflammatory cascade without contributing to additional pathology.


Therefore, the incorporation of a diet that contains these phyto-active compounds can help modulate the inflammatory cascade through their synergistic actions on multiple pathways.

Rainbow a Day

- 9-13 servings
- All colors daily


Natural ways to boost your immunity

What affects the Immune System

- Gut health
- Sleep
- Stress reduction
- Exercise – not enough or too much
- Food
- Optimism – gratefulness
- Laughing
- Social connections
  - hugging

Damages immune system

- Exposure to toxins
- Too many antibiotics (decreases cytokines)
- OTC meds
- Alcohol
- Pessimism, social isolation, anger
- Sugar!!
- Opposite of the previous slide
- Stress – physical, chemical, mental

THINGS YOU DO THAT HARM YOUR IMMUNE SYSTEM

Top10 Home Remedies

BINGE DRINKING

SMOKING & EXPOSURE TO SECONDHAND SMOKE

SCRIMPING ON SLEEP

PHYSICAL INACTIVITY

CARRYING NEGATIVE EMOTIONS

AVOIDING SUNLIGHT

IGNORING PERSONAL HYGIENE

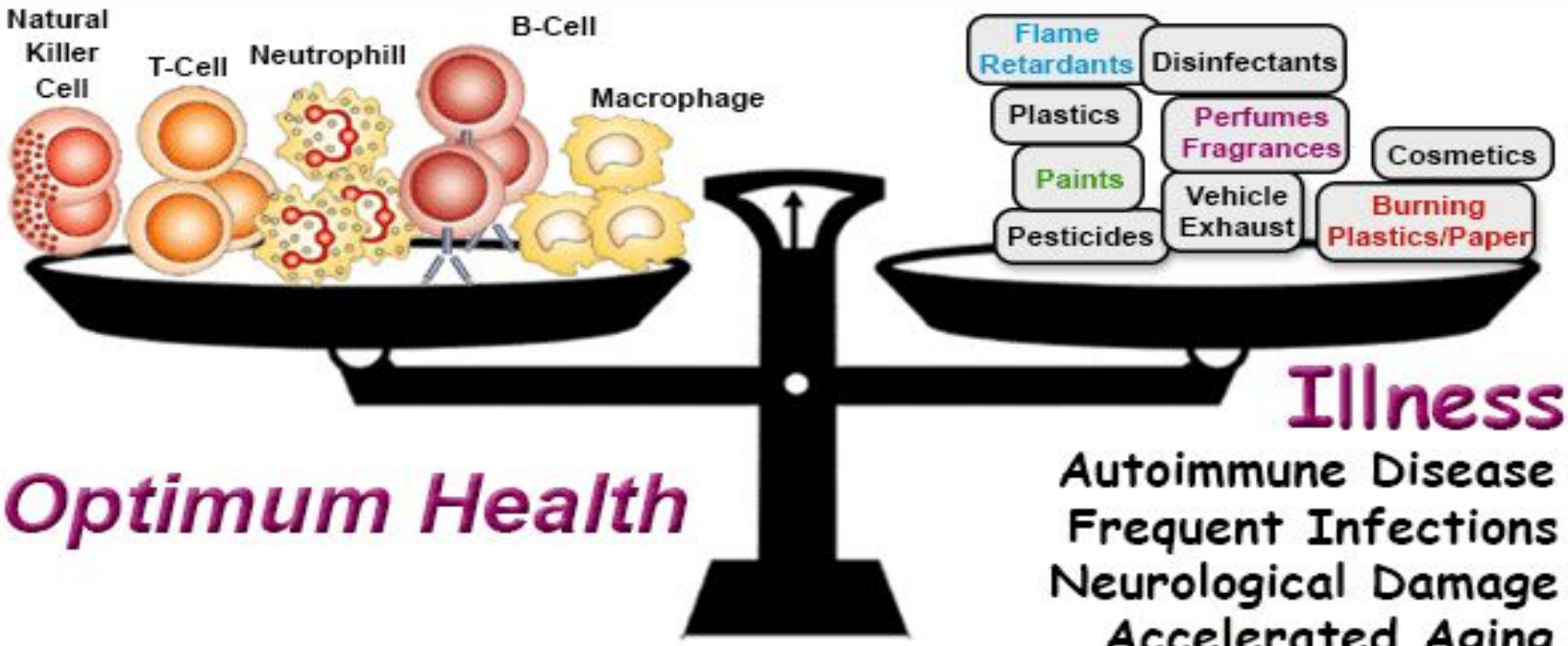
USING TOXIC MAKEUP & HYGIENE PRODUCTS

NEGLECTING THE IMPORTANCE OF WATER

MISUSE OF ANTIBIOTICS

To explore more, visit www.Top10HomeRemedies.com

Research: How Common Chemicals can Weaken the Immune System



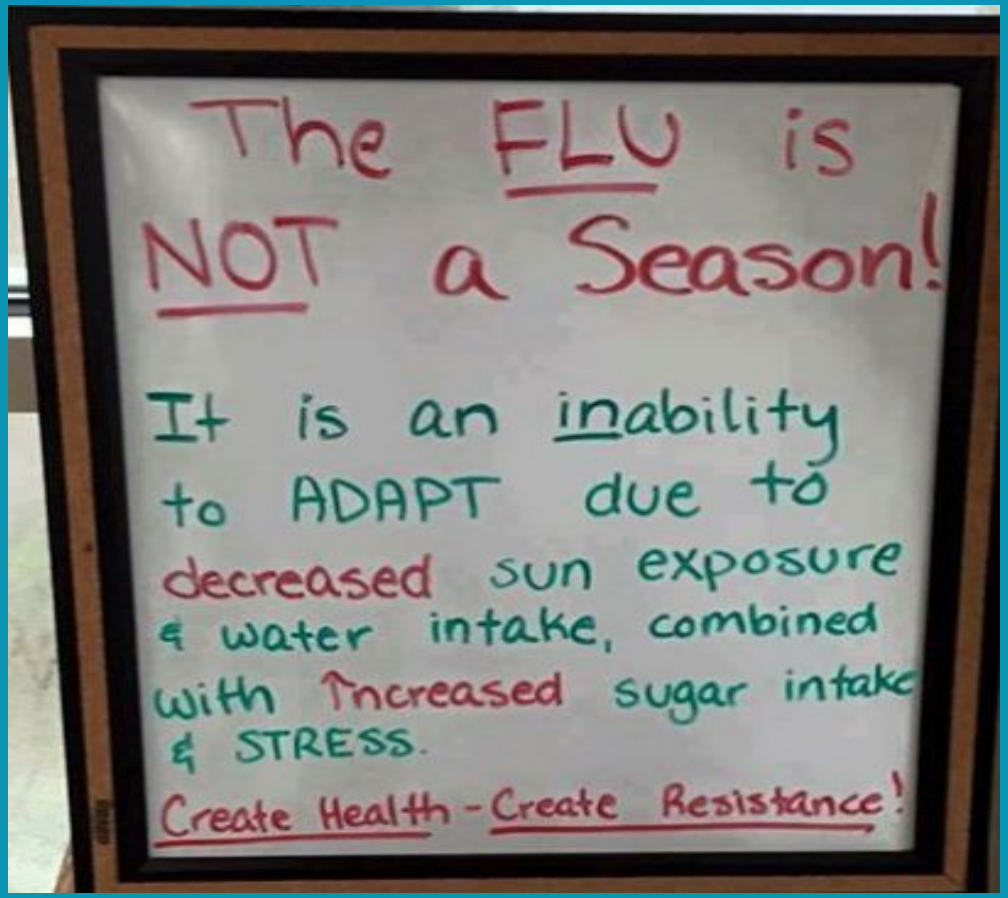
Immune analogy

Illness

- Seasonal patterns
- Underlying conditions – allergies, genetics, diseases
- Our gut!!!
  - 80% immune system is in the gut!
  - We need to pay attention to our gut!
- Vitamin D deficiency
- Immune system deficiencies (due to lifestyle)

Fever

- Fever helps to heat up the body in an effort to kill a virus/bacteria
- Fever leads to increased production of WBC, antibodies and interferon – all which help fight infection
- Fever shuttles iron to the liver (less for bugs to eat)
- Therefore, fever serves a purpose
- In general for children, higher fevers are usually viral
  - They get fevers because their immune systems respond and are robust
- So…to medicate or not to medicate a fever


The FLU is
NOT a Season!
It is an inability
to ADAPT due to
decreased sun exposure
& water intake, combined
with ↑ncreased sugar intake
& STRESS.
Create Health - Create Resistance!

How to Avoid the Flu/Viruses

- Diet (low to no sugar, cut grains, increase raw foods)
- Sleep
- Address stress
- Exercise
- Omega-3 fatty acids
- Wash hands with simple chemical free soap
- Natural boosters: Oil of oregano, garlic
- Vitamin D, Vitamin C, echinacea, zinc, immuneplex
- Avoid hospitals, Use vinegar

Best foods

- Whole real food
- Herbs and spices
- The rainbow a day
- Bone broth
- Bee propolis
- Mushrooms

Prevention

- Vit C – 1-3 gram/day
- Vit D. Levels between 40-80.
  - 2000-5000IU daily
- Melatonin 5-20 mg
- NAC 900 mg twice daily
- Glutathione
- Zinc 30-60 mg daily
- Fish oil
- Magnesium

AGE's

Food Processing

- Lipid glycation - when sugar is cooked with proteins or fats
- Glycation - browning that happens with cooking
  - But this is done in processed foods
  - Tasty
- Advanced glycation end products (AGE'S)
  - Contribute to formation acrylamide - a potential carcinogen
- Glycation → inflammation
- AGE's added to foods as flavor and color enhancers
- AGE's→ Alzheimer's, CV disease, cancer, neuropathy, age hearing loss
- Roasted nuts - increases allergens

AGE’s

- Induce mast cell activation and inflammation
  - Causes increase in AGE formation
  - Activates more mast cells
  - Exposure of intestinal cells to glycation products → IL 6, IL 8
- Food emulsifiers (creamier - oil and water mixes)
  - Dramatic increase in gut markers of inflammation
  - Carageenan, xanthan gum, lechitin → gut inflammation and metabolic syndrome
  - Affect gut bacteria

Food additives

- The study authors advise that though emulsifiers are listed on food labels, the additives have varying names, and the best way to avoid eating them is to not eat processed food.
- Food additives are also believed to trigger ADHD-like behaviour in children lacking the histamine-degrading HNMT enzyme.

AGEs

- AGEs form at all temperatures
- The higher the heat the greater the formation of AGEs
- Heating and drying are used as a means of preserving, transporting, and extending the shelf-life of food.
    - And creating tasty addicting foods.
    - This is one secret of the food industry

AGE’s

- Why do we consume something so toxic?
- It brings the attributes we associate with our favorite meals
  - The smells and tastes we enjoy
  - The grilled burger
  - Pizza, fried chicken
  - Bacon, chips, cookies
- This is what attracts our attention, awakens our senses, and encourages us to eat more - even when we are full.

AGE’s

- Bad news is….
- More than any other single dietary component, AGEs are now found to be linked to more diseases and health problems, including diabetes, heart and kidney disease, dementia, stroke, arthritis, osteoporosis, skin aging, poor wound healing, and periodontal disease.

Why are AGEs so toxic?

- 1. Ages are oxidants.
  - They corrode our body the same way rust damages metal in a machine if it's allowed to build up.
  - Oxidation depletes our natural reserves of anti-oxidants, which are the "good guys". Anti-oxidants are the substances that can neutralize the corrosive effects of AGEs, but only up to a point.
- 2. The body reacts to these the way it fights an infection -- inflammation
  - If we continue exposure - it builds up → chronic inflammation
  - Speeds up aging of the mind and body

AGEs Toxicity

- 3. Animal fats are easily oxidized by AGEs
  - AGE-lipid compounds tend to stick to our arteries more easily
  - Causes inflammation, obesity, insulin resistance.
- 4. AGEs also can cause proteins to stick together.
  - With years, AGE-proteins become rigid.
  - This is one reason why joints, muscles and tendons become stiff and inflexible over time.
  - This is why blood vessels become thick and inelastic, a condition we call “hardening of the arteries”, which leads to high blood pressure and heart disease.

Key points about glycation

- High fat meals have the highest AGE content
  - Processed meats, fats, chips, etc..
- Broil and frying generate more glycation than roasting
  - Boiling is best
- Cook at low temperature may help
- Soda and soy sauce have high AGEs
- Watch how hot your tea and coffee water is
- Avoid processed foods, inflammatory foods

AGEs

- Food AGEs absorbed - our protective anti-oxidant systems neutralize the effects.
  - This is limited in capacity
    - Genetics
    - Foods we eat
    - Lifestyle factors
- Like money in the bank - in savings
  - Our bodies natural defenses will be depleted if we spend them too fast
  - They will be depleted long before “disease”
  - Even with intake of anti-oxidants - it may not be enough protection
- It is also additive and synergistic
  - Young people have high accumulated AGEs - high DM rates

Good news

- Can normalize AGEs in blood, inflammation and high CRP
- Eating lower AGEs
- Fill plates with fruits and vegetables
- Marinate meats (vinegar, wine, citrus) - acidity inhibits formation AGEs
- Cook low and slow
- Steam, stew, poach and braise meats instead of grilling, roasting, broiling or frying.
    - Poaching or steaming chicken cuts AGEs by 75 percent compared to roasting or broiling.
- Avoid grilling (or add AO with it)
- Cook from scratch at home

AGEs and food

- Processed cheese has more AGEs
- **Get more flavonoids.**
  - These are naturally occurring compounds that appear to activate enzymes that deactivate AGEs, inhibit AGE-related oxidation and trap the molecules that can increase AGE formation.
  - *Good sources:* Apples, chili peppers, berries, broccoli, kale and green or black tea. Spices and herbs that have similar effects include turmeric, cinnamon, parsley, rosemary and sage.
- Go easy on sweets - especially processed
  - Fats and proteins with sugar increase risk
  - Fructose - soft drinks - processed - 10x rate glycation
    - Dark colored are particularly bad - color is from caramelizing
    - Diet has just as many AGEs as sugar counterparts

AGE counts

- **Very Low** (100 kU/serv or less)—Bread • Eggs (poached, scrambled, boiled) • Fruits (fresh) • Grains (boiled, steamed) • Milk • Soy milk • Vegetables (fresh, steamed) • Yogurt
- **Low** (101–500 kU/serv)—Avocado • Fruits (dried, roasted, grilled) • Legumes (cooked, canned) • Olive oil • Olives • Pasta • Soy veggie burgers • Vegetables (roasted, grilled)
- **Medium** (501–1,000 kU/serv)—Cheese (reduced-fat) • Chicken (poached, steamed, stewed, braised) • Chocolate (dark) • Fish (poached, steamed) • Sunflower and pumpkin seeds (raw) • Tofu (raw) • Tuna or salmon (canned)

AGE counts

- Very Low: Eggs (poached, scrambled, boiled), Fresh Fruits, Grains (boiled or steamed), milk, vegetables (fresh or steamed), yogurt
  - 100KU/serving or less
- Low: Avocado, Fruits (dried, roasted, grilled), Legumes (cooked, canned), Olive oil, olives, pasta, vegetables (roasted, grilled)
  - 101-500KU/serving
- Medium: Cheese, Chicken (poached, steamed, stewed, braised), Dark chocolate, fish (poached, steamed), sunflower and pumpkin seeds, tuna or salmon
  - 501-1,000kU

AGE Counts

- High: Beef or pork (stewed, braised), butter, cheese (full fat and processed varieties, Fish (grilled, broiled, baked), French fries, Nuts (raw), Sweets (donuts, pies, cakes, pastries..)
  - 1,001-3000
- Very High: Chicken (skinless, broiled, grilled, roasted), Fish (breaded and fried), Pork chops (pan-fried), Cheeseburger (fast food), Grilled cheese, Turkey (roasted)
  - 3001-5000
- Highest: Bacon (fried), Beef (roasted, grilled, broiled, well-done), Chicken with skin (broiled, grilled, roasted), Chicken (fried, fast food nuggets), Fish sandwich, hot dog, sausage, pizza 5000 or more

AGEs

- Anything > 16,000 per day - high AGE category
- Fat and meat products contain the most AGEs
- Carbohydrates (natural) are relatively low
- Higher cooking temperatures increase AGEs
- Longer cooking time increases AGEs
- The presence of liquid in cooking reduces AGEs
- Processed foods have more AGEs than natural or homeade foods
- Processed foods in general have more AGEs than unprocessed foods: for example, infant formula milk contains a 100 times more AGEs than human or cow milk

Supplements that may help AGE’s

- Quercetin
  - Prevent glycation formation in the body
- Curcumin
  - May prevent intestinal damage from processed foods
- Glutamine
- Prebiotics

FAT AGEs (AGEs/serving)

- Almonds roasted 1995
- Avocado 473
- Cashews roasted 2942
- Peanut butter 2255

Frankfurter, boiled 7 min	74,850	90	6,736
Frankfurter, broiled 5 min	112,697	90	10,143
Hamburger, fried 6 min	26,391	90	2,375
Hamburger, fast food	54,176	90	4,876
Meatball, boiled in sauce 1 h	28,519	90	2,567
Meat loaf, crust off, roasted 45 min	18,619	90	1,676
Roast beef	60,708	90	5,464

Shoulder cut, boiled 1 h	22,305	90	2,007
Shoulder cut, broiled 15 min	59,636	90	5,367
Bacon, microwave 3 min	90,228	13	1,173
Deli ham, smoked	23,491	90	2,114
Pork chop, pan fried 7 min	47,526	90	4,277
Beef and pork links, pan fried	54,255	45	2,441
Sausage, pork links, microwave 1 min	59,438	90	5,349

Chicken breast, skinless cubes, pan fried 15 min	61,221	90	5,510
Steamed 10 min and broiled 12 min	56,348	90	5,071

Pan fried 10 min and boiled 12 min	63,398	90	5,706
Chicken breast, skinless cutlet, raw	7,686	90	692
Boiled 1 h	11,236	90	1,011
Broiled 15 min	58,281	90	5,245
Fried 8 min	73,896	90	6,651

Salmon, breaded, broiled 10 min	14,973	90	1,348
Salmon, raw	5,573	90	502
Salmon, smoked	5,718	90	515
Trout, raw	7,830	90	705
Trout, roasted 25 min	21,383	90	1,924

American, processed	86,775	30	2,603
American, processed, low fat	40,395	30	1,425
Brie	55,979	30	1,679
Cottage cheese 1% fat	14,532	120	1,744
Feta	84,235	30	2,527
Mozzarella, part skim	16,777	30	503
Parmesan, grated	169,020	15	2,535
Swiss, processed	44,701	30	1,341

Egg yolk, boiled 10 min	12,134	15	182
Boiled 12 min	18,616	15 279	
Egg white, boiled 10 min	442	30	13
Boiled 12 min	573	30	17
Egg, fried with margarine	27,494	45	1,237

Corn, canned	195	100	20
Sweet potato, roasted, 1 h	723	100	72
White potato, boiled, 25 min	174	100	17
White potato, french fries, homemade	6,939	100	694
White potato, french fries, fast food	15,219	100	1,522

Chips, corn, Doritos	5,049	30	151
Lay's Potato Chips	28,818	30	865
Chips Ahoy Chocolate Chip Cookies	16,837	30	505
Oatmeal raisin cookie	13,707	30	411
Cracker, Goldfish, cheddar	21,760	30	653
Chocolate Chunk Granola Bar	5,068	30	152
Peanut Butter Chocolate Chunk Granola Bar	31,761	30	953
Popcorn with butter, air popped	1,340	30	40

Apple	127	100	13
Apple, baked	445	100	45
Banana	87	100	9
Cantaloupe	201	100	20
Raisin	201	30	36

Vegetables	**AGEs (U/g)**	**Serving (g)**	**AGEs/serving (kU)**
Broccoli, carrots, celery, grilled	2,260	100	226
Carrots, canned	103	100	10
Green beans, canned	179	100	18
Onion, raw	358	100	36
Tomato, raw	234	100	23

Italian pasta salad, homemade	9,346	100	935
Macaroni and cheese, baked	40,698	100	4,070
Pizza, thin crust	68,248	100	6,825
Sandwich, toasted cheese	43,327	100	4,333

Breakfast

- Often a meal with the most AGE’s
  - Cereal, bars, baked goods, etc…
- IF
- Overnight Oats (chia, flax, berries and more)
- Smoothies
  - Leafy greens, avocado, ginger, collagen, protein powder, veggie mash-up, probiotics, etc..
  - Get creative
  - Rotate

Purple Passion Smoothie

- Uses: Beverage, Breakfast, Snack, Candida Control & SIBO, Elimination Diet, Paleo, Standard, Thyroid Connection
- Ingredients
- 3/4 cup coconut milk (almond milk, if you tolerate) nuts 2 cups
- purple kale 2 cups
- 1 frozen banana
- 1 cup frozen blueberries
- 1 Tbsp avocado
- 1/4 tsp probiotic powder
- Instructions 1. Blend all ingredients in a high-speed blender

Healthy Whole Veggie Juice

- Beverage, Breakfast, Snack, Candida Control & SIBO, Elimination Diet, Paleo, Standard, Thyroid Ingredients
- 2 cucumbers
- 1 green apple
- 1 lemon
- 1 inch ginger root
- 2 stalks kale
- herbs of your choice (basil, mint, parsley, cilantro, or fennel)
- 2 Tbsp Great Lakes Collagen Hydrolysate (optional)
- 1/4 tsp probiotic powder
- Instructions 1. Blend all ingredients in a high-speed

Dr. Myers' Favorite Gut-Healing Smoothie

Breakfast, Snack, Candida Control & SIBO, Elimination Diet, Paleo, Standard, Thyroid

Ingredients

3/4 cup unsweetened coconut milk

3 stalks red kale

3 stalks dinosaur kale

1/2 cup frozen berry mix (raspberries, strawberries, blueberries)

1/4 tsp probiotic powder

2 Tbsp Great Lakes Collagen Hydrolysate (optional)

Protein powder

Instructions 1. Blend all ingredients in a high-speed blender

Optimize Nutrition

- Common sense and science (free of bias) tell us the answer – despite confusing media, etc…
- If we want healthy bodies, we must put the right raw materials into our bodies: real, whole, local, fresh, unadulterated, unprocessed, and chemical, hormone, and antibiotic-free food.
- There is NO role in our diets for foreign molecules such as trans fats and high-fructose corn syrup, which interfere with our biology at every level

Optimize Nutrition

- If you want junk out, put junk in.
- If you want a whole, healthy body, put in whole real food
- *Food can heal or harm. You make that choice every day by what you put on your fork.*
- “Eat food. Not too much. Mostly plants.”

Tack Rule

- Rule #1: If you are sitting on a tack, taking aspirin will not make it go away.
- Rule #2: If you are sitting on 2 tacks, removing 1 does not necessarily mean you will get 50% improvement.
    - And taking more medications will still not make it go away.