

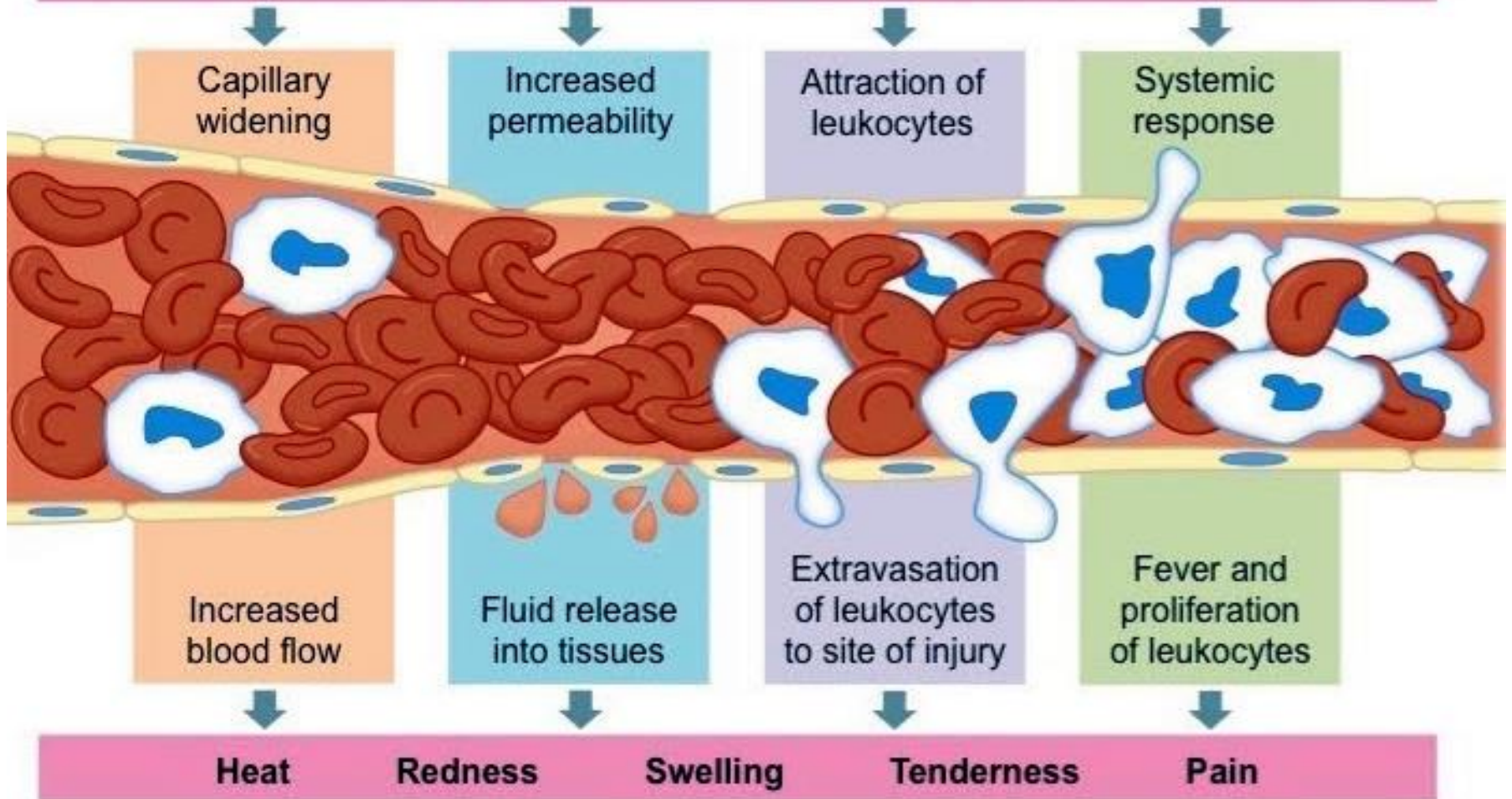
# INFLAMMATION

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# Inflammation

- ▶ 3 main processes occur in acute inflammation
  1. Increased blood flow to the area. Capillaries enlarge and become more permeable. Proteins and blood components move from serum into interstitial space creating edema.
  2. Granulocytes migrate out of capillaries into the area as macrophages and monocytes are attracted to the area. Outside of the capillaries, neutrophils and other granulocytes are guided to the injury site as they sense the presence of inflammatory cytokines.
  3. Damaged tissue becomes walled off from the rest of the body, and macrophages clear cell debris through phagocytosis.

**Tissue injury caused by physical / chemical agent or pathogenic microorganism**



**Heat**

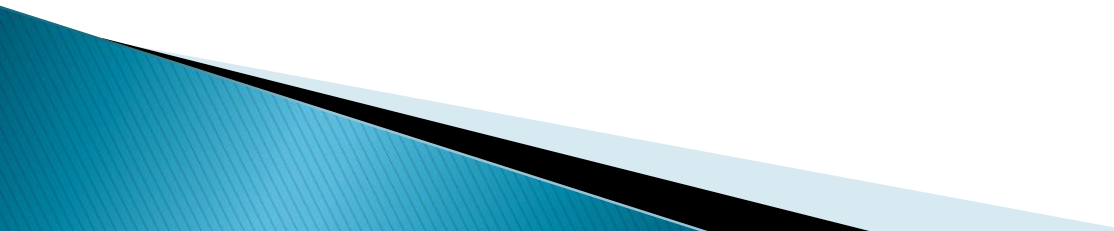
**Redness**

**Swelling**

**Tenderness**

**Pain**

# Inflammation Support

- ▶ During acute inflammation, the goal is to reduce swelling while supporting the body's efforts to rid itself of damaged tissue and decayed materials.
  - ▶ As healing proceeds, we shift focus to support repair and rebuilding of damaged tissue.
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# Inflammation Nutrition

- ▶ Proteolytic enzymes digest cellular debris, extracellular proteins, clotting and fibrous material. They are most effective in an acute condition but also useful in chronic conditions. They also increase effectiveness of other anti-inflammatory and other analgesic products when used together.





# Foundational support

- ▶ Nutritional deficiencies, especially those of Magnesium, Zinc, Vitamin B6, and other B vitamins, predispose one toward a pro-inflammatory state. Consider for foundational support:
- ▶ ProMulti Plus

# Check Adrenal Status

- ▶ Many injuries occur in hypoadrenal clients
- ▶ Shin splints, low back pain, SI sprain/strain, knee problems, foot/ankle problems – all signs of failing adrenal health
- ▶ Additionally, the adrenal hormone cortisol is an anti-inflammatory, endogenous hormone. When injured, cortisol levels will spike for anti-inflammatory purposes. In hypoadrenia, there will be a deficiency in cortisol.
- ▶ Consider: Cytozyme AD, ADB5 Plus, ADHS, L-Tyrosine



# Eicosanoids

- ▶ Eicosanoids are **signaling molecules** made by oxidation of twenty-carbon essential fatty acids, (EFAs).
- ▶ They exert complex **control** over many bodily systems, mainly in inflammation or immunity, and as messengers in the central nervous system
- ▶ The networks of controls that depend upon eicosanoids are among the most complex in the human body

- ▶ Eicosanoids derive from either omega-3 ( $\omega$ -3) or omega-6 ( $\omega$ -6) EFAs. The  $\omega$ -6 eicosanoids are generally considered pro-inflammatory, although they are not always;  $\omega$ -3s are much less so. The amounts and **balance of these fats** in a person's diet will affect the body's eicosanoid-controlled functions, with effects on cardiovascular disease, triglycerides, blood pressure, and arthritis. Anti-inflammatory drugs such as aspirin and other NSAIDs act by downregulating eicosanoid synthesis.

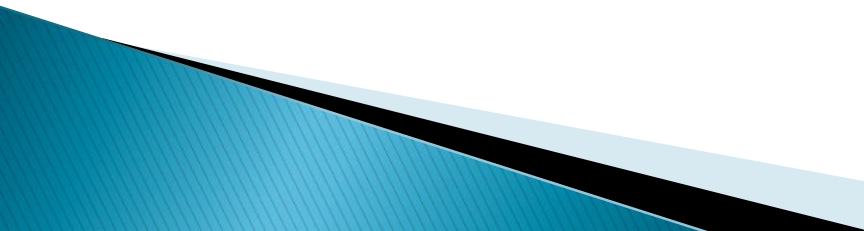
## EFA

Myth:

Omega-6 fats are inflammatory, Omega-3's are anti-inflammatory

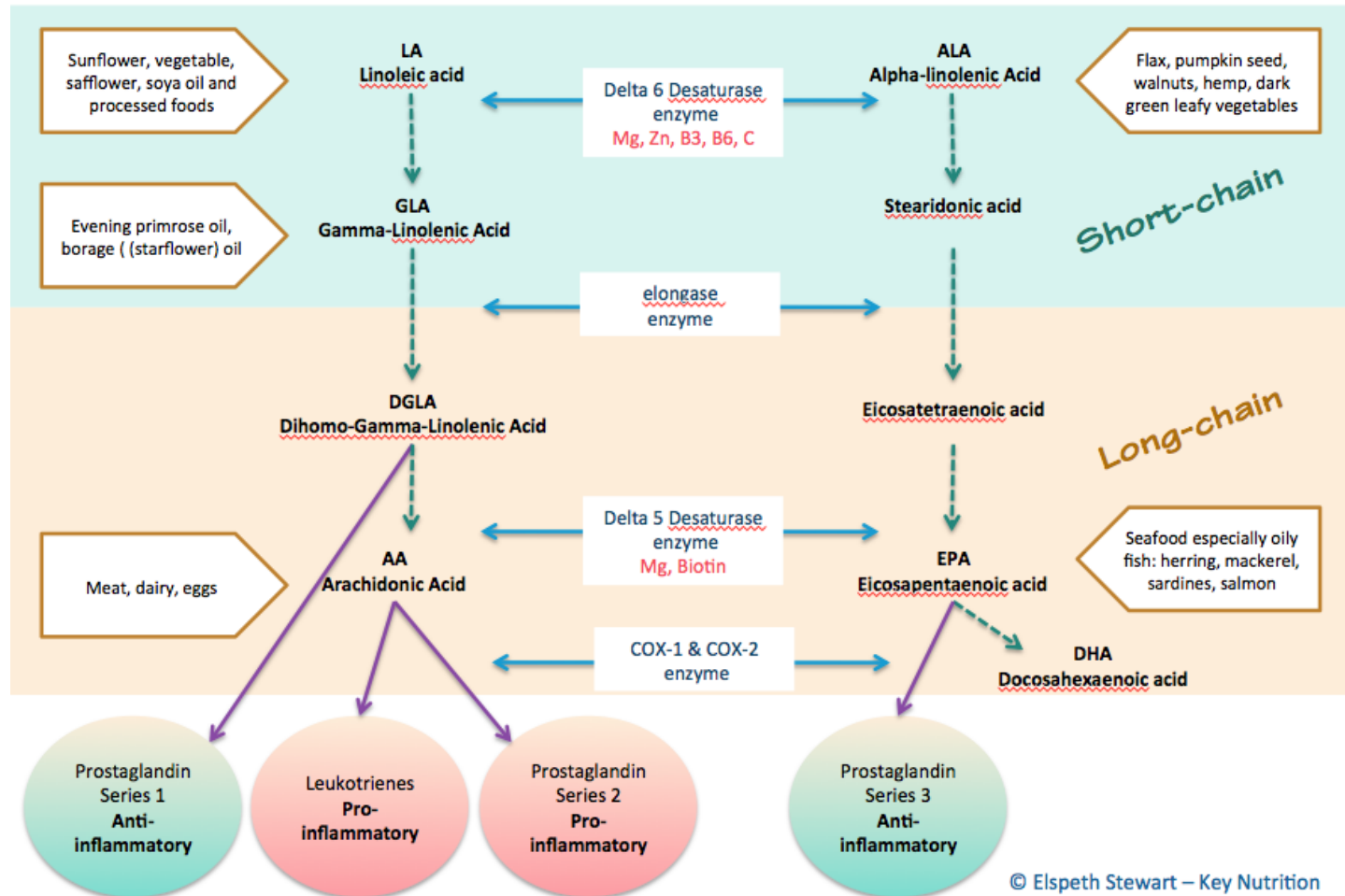
Omega-6 fat is “bad” because **the most abundant source of it in our diet is heated vegetable oil**, thus susceptible to oxidation, and contributes to oxidized lipids in our blood.

## Why are Omega-3 Fatty Acids so Important?

- Omega 3 Fatty Acids are one of the most important nutrients utilized by your body; critical for a wide variety of body functions. The cell membranes of almost every cell in the human are made up phospholipids.
  - The phospholipid structure of cell membranes are primarily comprised of Omega-3 fatty acids—mainly eicosapentaenoic acid (EPA) and docosahaexanoic (DHA). This makes Omega-3 fatty acids a critical nutrient for cell-to-cell communication and essential for health.
  - **The human brain is made up mostly of fatty acids and the connections between nerve cells are 80% fatty acids.**
  - DHA makes up over 90% of the n-3 PUFAs in the brain and 10%-20% of its total lipids. DHA is especially concentrated in the gray matter
  - Modern food production and the intrinsically unhealthy and stressful nature of life in the developed world make our diets woefully deficient in Omega-3 fatty acids. Omega-3 fatty acid deficiency can be a major cause of health problems.
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## Omega 6 pathway

## Omega 3 pathway



**EPA Omega-3 acts as a 'inhibitor' to the Omega-6, Arachidonic Acid (AA)**

We care about this because AA is a source of several cytokines.

EPA and AA compete for the same enzyme in your body – it's called **delta-5-desaturase**.

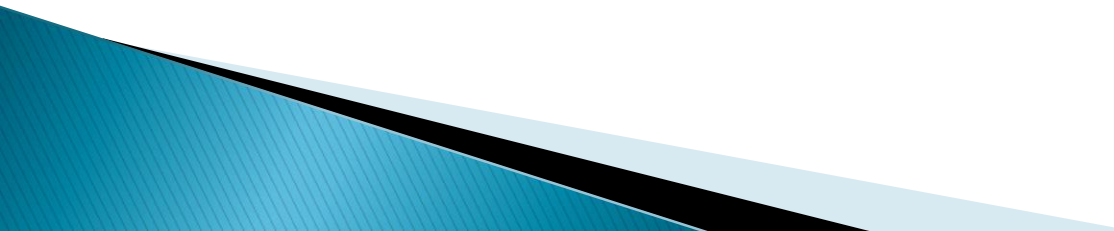
**The more EPA you have the less enzyme you have for producing AA. So more EPA means the more you inhibit or suppress the production of AA. And and that keeps your body in balance.**

It is like a musical chairs. If EPA gets the chair, AA loses.

**Wouldn't DHA work just as well?**

No. DHA does not inhibit AA. Why? Because DHA is a larger molecule and its structure simply won't allow it.

All this has to do with what's called the Eicosanoid pathway. And Omega-3 and Omega-6 can affect these same enzymes.





- ▶ There are four families of eicosanoids:
  - 1) Prostaglandins
  - 2) Prostacyclins
  - 3) Thromboxanes
  - 4) leukotrienes
- ▶ For each, there are two or three separate series, derived either from an  $\omega-3$  or  $\omega-6$  EFA. These series' different activities largely explain the health effects of  $\omega-3$  and  $\omega-6$  fats

- ▶ "Eicosanoid" is the collective term for oxygenated derivatives of three different 20-carbon essential fatty acids:
  - Eicosapentaenoic acid (EPA), an  $\omega$ -3 fatty acid with 5 double bonds;
  - Arachidonic acid (AA), an  $\omega$ -6 fatty acid, with 4 double bonds;
  - Dihomo- $\gamma$ -linolenic acid (DGLA), an  $\omega$ -6, with 3 double bonds.
  - Current usage limits the term to the leukotrienes (LT) and three types of prostanoids—prostaglandins (PG) prostacyclins (PGI), and thromboxanes (TX)

- ▶ Eicosanoids are not stored within cells, but are **synthesized as required**. They derive from the **fatty acids** that make up the cell membrane and nuclear membrane
- ▶ Eicosanoid biosynthesis begins when cell is activated by mechanical trauma, cytokines, growth factors or other stimuli.
- ▶ This triggers the release of a phospholipase at the cell membrane.
- ▶ The phospholipase travels to the nuclear membrane. There, the phospholipase catalyzes ester hydrolysis of **phospholipid** (by A2) or diacylglycerol (by phospholipase C). This frees a 20-carbon essential fatty acid.

Diacylglycerol or phospholipid

Phospho-  
lipase C    Phospho-  
lipase A<sub>2</sub>

Arachidonic acid

Lipoxygenase  
(FLAP, Alox5)

HPETE (hydroperoxy-  
eicosatetraenoic acid)

PGH<sub>2</sub> synthase  
(cox-1 or cox-2 and  
peroxidase)

H<sub>2</sub>O

LTB<sub>4</sub>

Leukotriene A<sub>4</sub>

PGD  
synthase

Prostaglandin H<sub>2</sub>(PGH<sub>2</sub>)

Glutathione

Glutathione-  
S-transferase

PGD<sub>2</sub>

PGE  
synthase

PGE<sub>2</sub>

Prostacyclin synthase

Thromboxane synthase

Leukotriene C<sub>4</sub>

Glutamic acid

Leukotriene D<sub>4</sub>

PGF<sub>2</sub>

Leukotriene E<sub>4</sub>

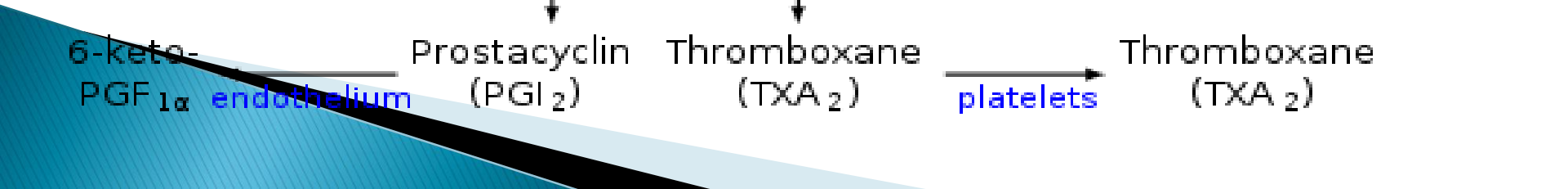
6-keto-  
PGF<sub>1α</sub> endothelium

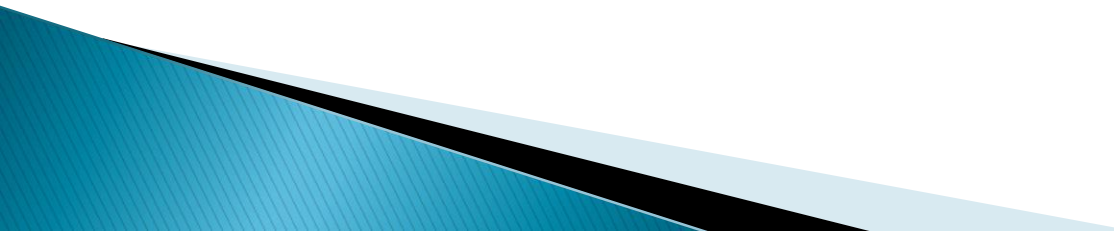
Prostacyclin  
(PGI<sub>2</sub>)

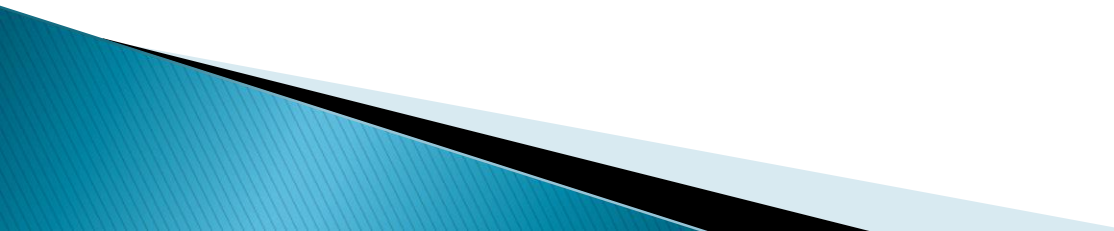
Thromboxane  
(TXA<sub>2</sub>)

platelets

Thromboxane  
(TXA<sub>2</sub>)

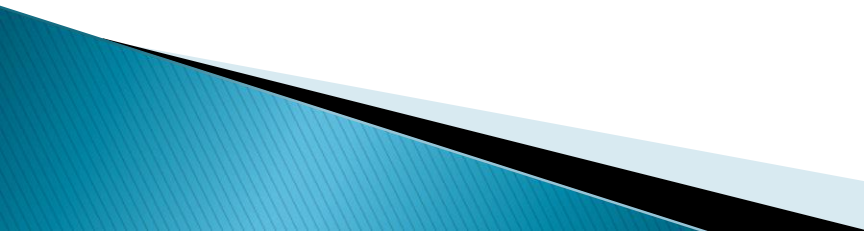


- ▶ Eicosanoid metabolism requires:
  - ▶ Ca
  - ▶ Mg
  - ▶ Zn
  - ▶ Thiamin B1
  - ▶ Niacin B3
  - ▶ Pyridoxine B6
  - ▶ Vitamin C
  - ▶ Vitamin E
- 

- ▶ Anti-inflammatory medications like NSAIDs work by downregulating or blocking eicosanoid metabolism and prostaglandin synthesis
  - ▶ Steroids, alcohols, sugars, trans fats, heavy metals and toxins also interfere with eicosanoid metabolism and promote pro-inflammatory processes
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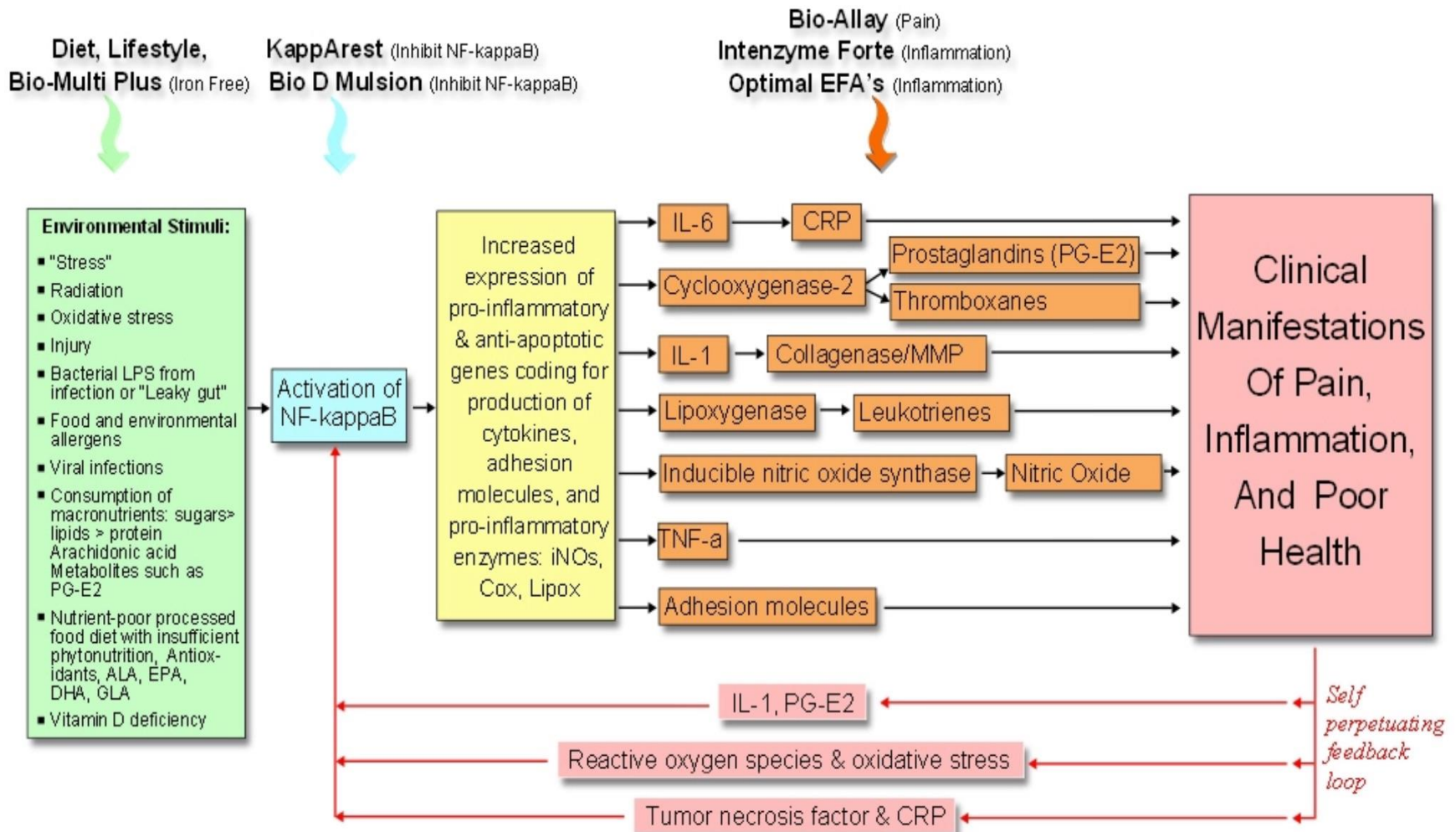


# Acute to Chronic Inflammation

- ▶ Acute interventions are most effective within 2 weeks of injury.
  - ▶ Chronic inflammation is self-perpetuating and may be due to:
    - An acute process that doesn't resolve
    - Non-localized or systemic processes
    - Microbial agents and Endotoxins
- 

- ▶ A key goal with nutritional therapy in chronic inflammation is to downregulate pro-inflammatory NF-kappaB
- ▶ Supportive foods / herbs / nutrients:
  - Lemon, curcumin, ginger, green tea extract, flavonoids, resveratrol
  - KappArest
  - ReserveraSirt-HP
  - Optimal EFAs
  - Bio D Mulsion Forte – body pain is a cardinal symptom of vitamin D deficiency

# The BioChemical Process Of Inflammation & Pain



## Traditional Treatment Options

The above was excerpted & adapted from *The Great Orthopedics* by Dr. Alex Vasquez

Acetaminophen (Tylenol, Aspirin Free Excedrin) • Nonsteroidal anti-inflammatory drugs (NSAIDs; aspirin, Motrin, and Aleve)  
Corticosteroids (Cortaid and Cortizone) • Opioids • Antidepressants • COX-2 inhibitors (Vioxx, Bextra, Celebrex, etc.)

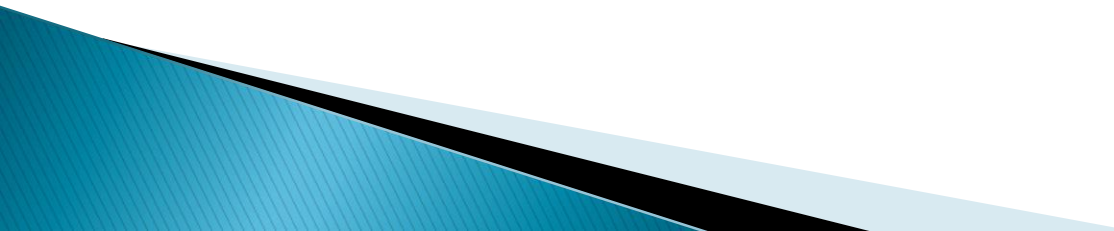
# Relevant Lab Values

- ▶ Systemic inflammation may result in:
  - Elevated C-reactive protein
  - Elevated erythrocyte sedimentation rate (ESR)
  - Elevated albumin
  - Also elevated IL-1 beta, IL-6, IL-18, TNF-alpha, and adhesion molecules

# Nutraceutical Analgesics

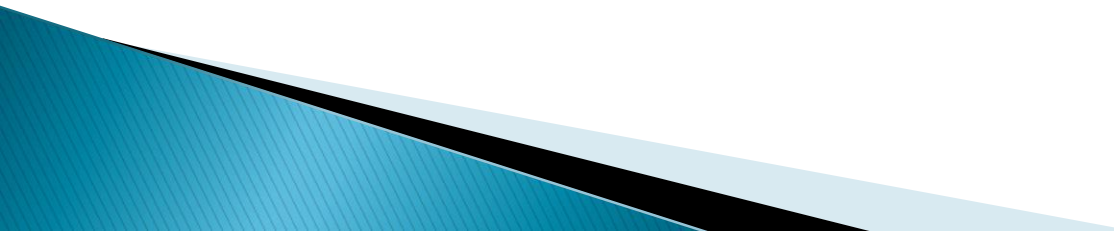
- ▶ Bio Allay – botanical anti-inflammatory
- ▶ KappArest – downregulates NF-kappaB
- ▶ Bio D Mulsion Forte
- ▶ ResveraSirt-HP – modulates pain mediators
- ▶ Bio-FCTS – bioflavonoids block arachidonic acid cascade and pro-inflammatory metabolites
- ▶ Inositol – used for nerve pain i.e. sciatica and neuralgias

# Rheumatoid Arthritis

- ▶ Eliminate sugars, excess starch, all artificial foods and potential allergens – no wheat, dairy, soy, caution with nightshades and corn
  - ▶ Promote healthy digestion and rule out chronic viral, yeast, parasitic conditions, heavy metals, environmental sensitivities
  - ▶ Focus on balancing adaptive immune response: TH1, TH2, T regs
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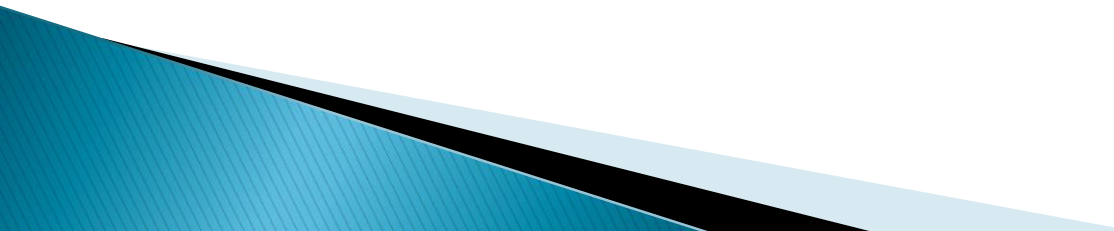
# Rheumatoid Arthritis

- ▶ Or Autoimmunity in general...
  - ▶ Treat the gut barrier first along with a detox program
  - ▶ Then address the immune system directly and treat the joint for cartilage repair as the secondary issue
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# Autoimmune and Arthritis

- ▶ IPS – support for healing intestinal barrier. Use for leaky gut, allergies, autoimmune issues
  - RA and other autoimmune conditions generally have an intestinal component.
  - With leaky gut the immune system will be inundated with foreign materials, which become antigens and ignite immune response.
- ▶ Gastrazyme – used to heal gastric and intestinal mucosa as found commonly in rheumatoid and autoimmune conditions

# Autoimmune and Arthritis cont

- ▶ Gammanol Forte with FRAC – relieves muscle soreness, promotes gut healing and joint repair
  - ▶ Whey Protein Isolate – supports immune response, heals gut tissue, promotes glutathione
  - ▶ Immuno-gG – healing globulins for intestinal and immunological support
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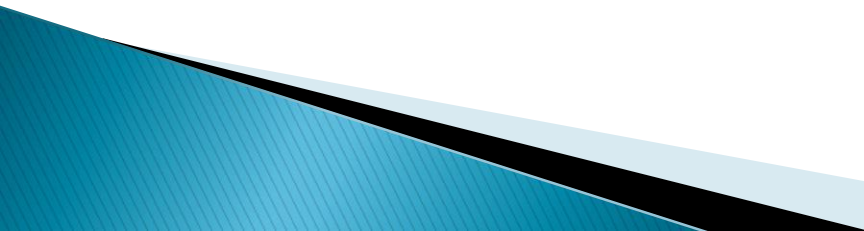
# Osteoarthritis

- ▶ “cooked food disease” – traced directly to dietary factors and lack of sufficient living foods
- ▶ Consider: Osteo BII, Osteo B Plus, EFAs, Trachea
- ▶ Often a need to support liver function:
  - Livotrit Plus, Beta TCP, phosphatidylcholine, B6 phosphate

# Bone and Heel Spurs

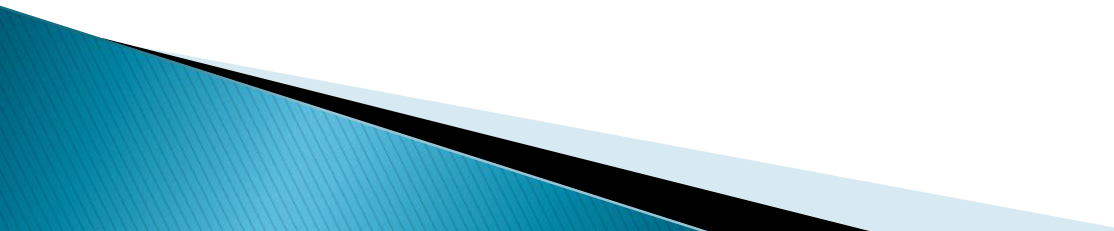
- ▶ Mineralization of tendon/ligament attachment along points of stress
- ▶ Bones remodel to stress and build solid structures along stress lines
- ▶ Predisposing factors:
  - Structural imbalance
  - Systemic pH imbalance (often too alkaline)
  - Connective tissue impaired with loss of function

# Bone Spur considerations:

- ▶ Optimal EFAs– required for healthy mineral distribution and mobilization
  - ▶ Bio D Mulsion Forte – for optimal mineral distribution
  - ▶ Liquid Iodine – calcium mobilizer
  - ▶ Bio K Forte – calcium mobilizer
  - ▶ HCl Plus – digestive aid, for acidification
  - ▶ Super Phosphozyme – to balance pH and minerals
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# Note on Phosphorus

- ▶ Phosphorus supplementation at sufficiently high doses will absorb mineral deposits in joints, bursa and spurs (as well as arterial plaque and kidney stones) pulling the minerals back into solution.
  - ▶ Dosed without regard to calcium and magnesium balance, it will result in deficiency and reports of skin irritations, sensitive/loose teeth, and joint instability.
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# Muscle Spasms / Cramps

- ▶ Happens when there are mineral imbalances: calcium, magnesium, potassium, sodium with fluid loss. Vitamin E is secondary.
  - Electrolyte Forte 1–2 scoops a day
  - Bio-CMP 3–6 daily
- ▶ Cramping with Restless Leg Syndrome
  - Electrolyte Forte
  - Bio-CMP
  - Bio-GGG-B
  - Ca/Mg-Zyme