



# Inflammation, Diabetes & COVID-19

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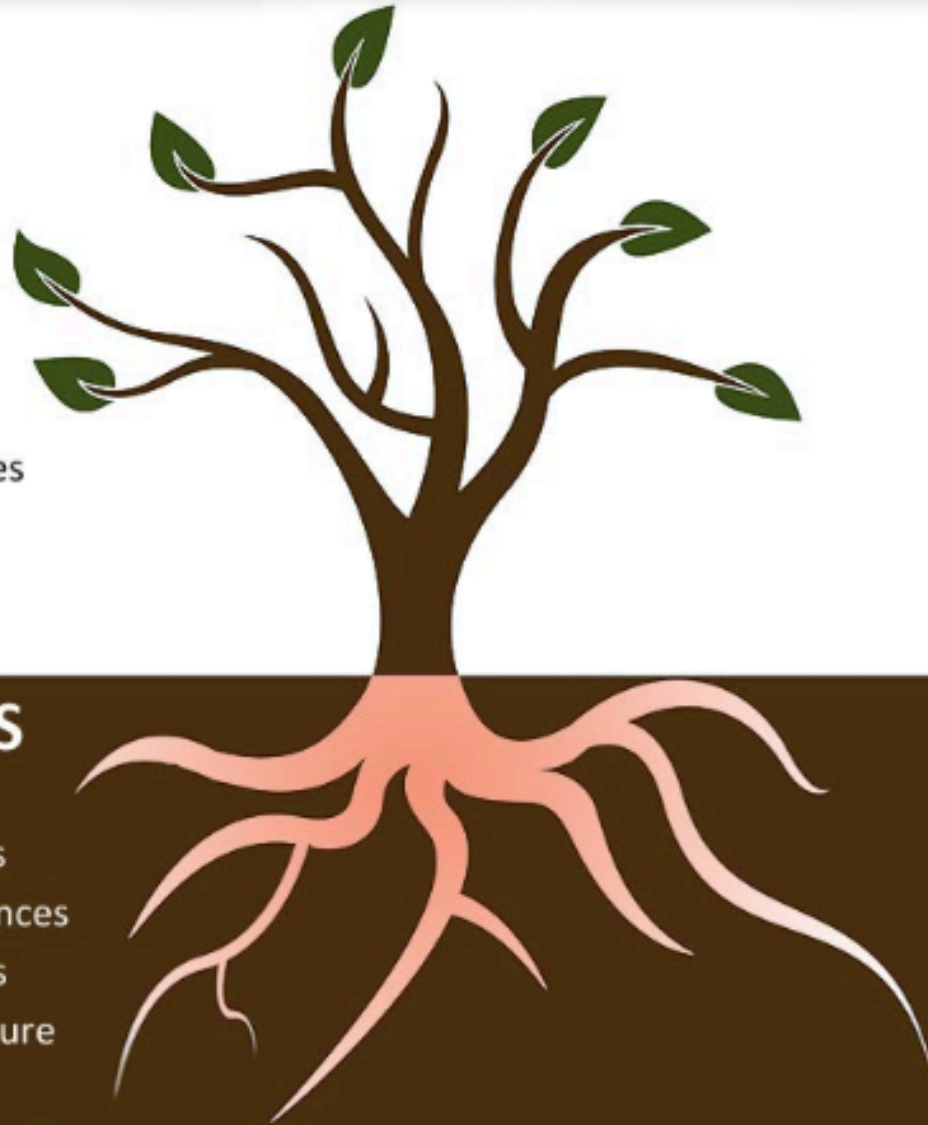
# Functional & Nutritional Medicine

## DISEASES

- Diabetes
- Cancer
- Heart Disease
- Obesity
- Autoimmune Diseases
- Fibromyalgia
- Arthritis

## ROOT CAUSES

- Immune Imbalances
- Structural Imbalances
- Inflammatory Imbalances
- Hormonal Imbalances
- Toxic Chemical Exposure
- Digestive Imbalances
- Mitochondrial Dysfunction



# Comorbidities

- “Comorbidities Associated with Mortality in 31,461 adults with COVID-19 in the United States”  
Harrison, et al. PLOS Medicine, September 10, 2020.
- Study of 18-90 year old; 31,461 records; from 24 US health organizations; 1/20 to 5/26/20
- #1: Chronic pulmonary disease 17.5%
- #2: Diabetes mellitus 15%

# Systemic Review

- “Comorbidities and the risk of severe or fatal outcomes associated with coronavirus disease 2019: A systemic review and meta-analysis”, Zhou, et al. International Journal of Infectious Disease, Vol 99, October 2020, p47-56.
- Most prevalent comorbidities were obesity (42%) and hypertension (40%) followed by diabetes (17%) and cardiovascular and respiratory diseases

# Inflammation

- “COVID-19: consider cytokine storm syndromes and immunosuppression”, Mehta, et al. The Lancet, Vol 395, Issue 10229, p1033-1034, March 28, 2020.
- Evidence may suggest some patients may have hyper inflammation with the virus.

# Reduced Immunity

**Fact:** High or uncontrolled blood sugar causes a dysfunction of the immune response.

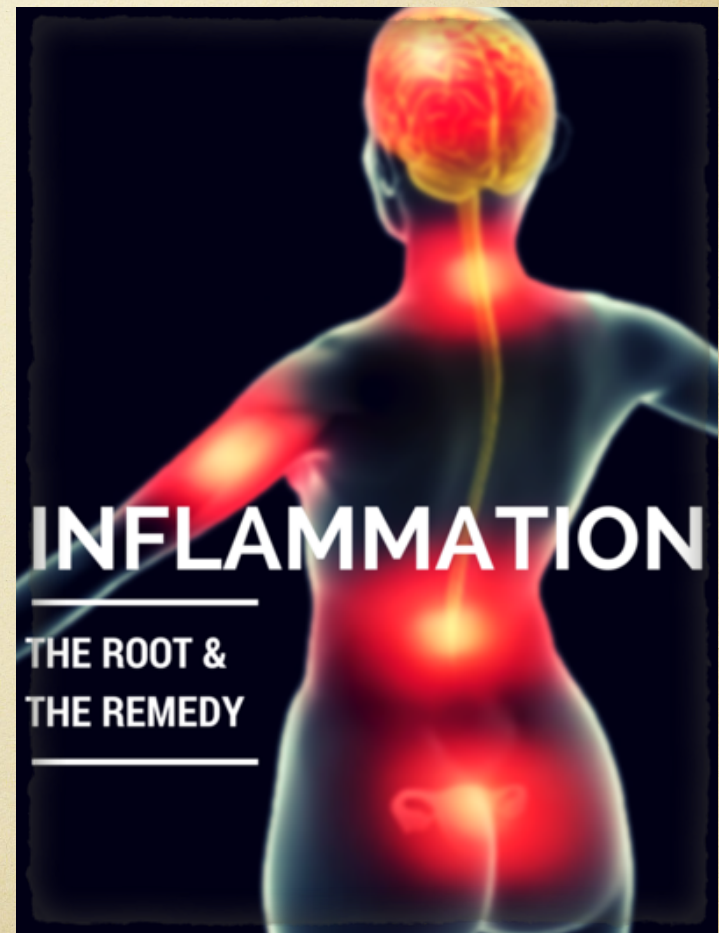
# Increased Inflammation

**Fact:** Insulin resistance increases body inflammation

# Inflammation

What causes increased inflammation in the body?

- Fatty acid imbalance
- High Insulin
- Obesity



# Essential Fatty Acid Pathways

## OMEGA-6 Family

**LINOLEIC ACID (LA)**  
Eg. Soybean, Sunflower, Corn,  
Canola + Rice Barn Oil

*Your Body Converts LA to:*

**GAMMA-LINOLENIC ACID (GLA)**  
Eg. Evening Primrose Oil +  
Borage Oils

*EPA Inhibits this Conversion*

**ARACHIDONIC ACID (AA)**  
Eg. Meat

PRO-INFLAMMATORY  
PRODUCTS

## OMEGA-3 Family

**ALPHA-LINOLENIC ACID (ALA)**  
Eg. Flaxseed, Hemp + Chia Seed Oil

*Your Body Converts ALA to:*

**EICOSAPENTANONIC ACID (EPA)**  
Eg. Fish Oil

*Your body converts EPA to:*

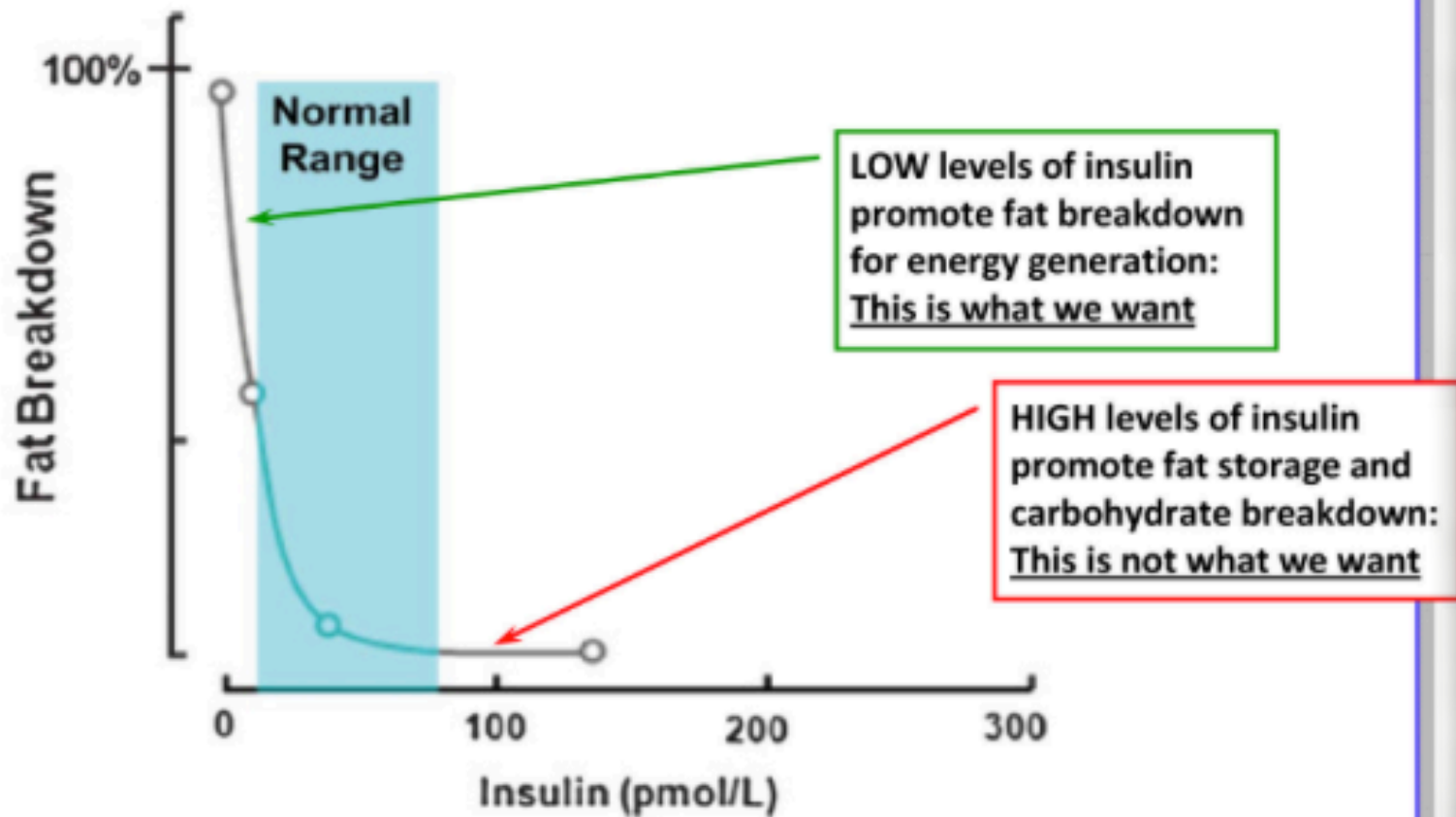
**DOCOSAHEXAEONIC ACID (DHA)**  
Eg. Fish Or Algae Oil

ANTI-INFLAMMATORY  
PRODUCTS





# Insulin Resistance



# Inflammatory cytokines

- Cytokines implicated in progression of several viral infections (covid-19)
- COVID-19: consider cytokine storm syndromes and immunosuppression, Mehta, P. et al. The Lancet, Vol 395, Issue 10229, P1033-1034, March 28, 2020.



# Cytokine inhibitors

- Curcumin (500-1000mg)
  - Found in tumeric (200mg per tsp)
- Bergamot (500-1000mg of extract)
  - Type of citrus fruit
- Flavonoids like resveratrol (100-200mg) grape and
  - Luteolin (10-20mg) perilla seed



# Potential viral enzyme influencers (studies currently underway)

Kaempferol - spinach, cabbage, dill

Quercetin - dill, fennel leaf, onion, oregano, chili pepper

Luteolin - olive, star fruit

Curcumin - tumeric

Naringenin - citrus fruits

Oleuropein - olive

EGCG - green tea



## Viola diffusa

Hesperidin

Chrysin

Riboflavin (B2)

Vitamin C

Glutathione

Andrographis

**Viola diffusa - leaves  
and flower buds  
cooked or tea**





# Hesperidin

*Citrus fruits - more concentrated in the rind*



# Chrysin



**propolis**



**Passiflora sp,**



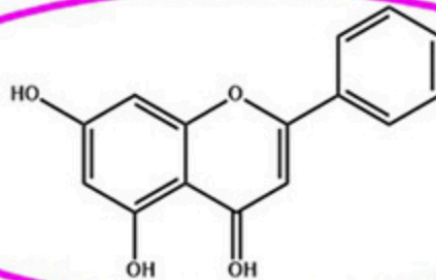
**Radix scutellariae**



**Pleurotus ostreatus**

**Sources**

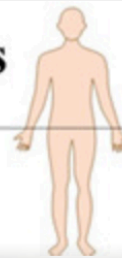
**Sources**



**Health Claims**

Anti-obesity  
Antiallergic  
Hepatoprotective  
Reproductive health  
Neuroprotective effect  
Miscellaneous properties

Anticancer  
Antidiabetic effect  
Oxidative stress  
Cardiovascular health  
Anti-inflammatory role



# Andrographis

*"Indian echinacea"*

*Andrographis Leaf Extract  
400mg*

*Supports lung health and  
immunity*





# Quercetin

*Onion, peppers, green tea, apple,  
other fruits & vegetables*



# Recommendations

- Improving glucose & HbA1c control
- Losing excess weight and insulin levels
- Consume foods and supplements high in anti-inflammatory nutrients
- Support immunity with plant foods, D3, C, Zinc

Thank You & Be Healthy!



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