

Inflammatory diseases and role of diet

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What is Inflammation?

- Inflammation is immune system's response to injury or infection
- Autoimmune disease are result of an unhealthy disordered immune system
- Inflammation results in pain, swelling, heat and redness of joints and tendons

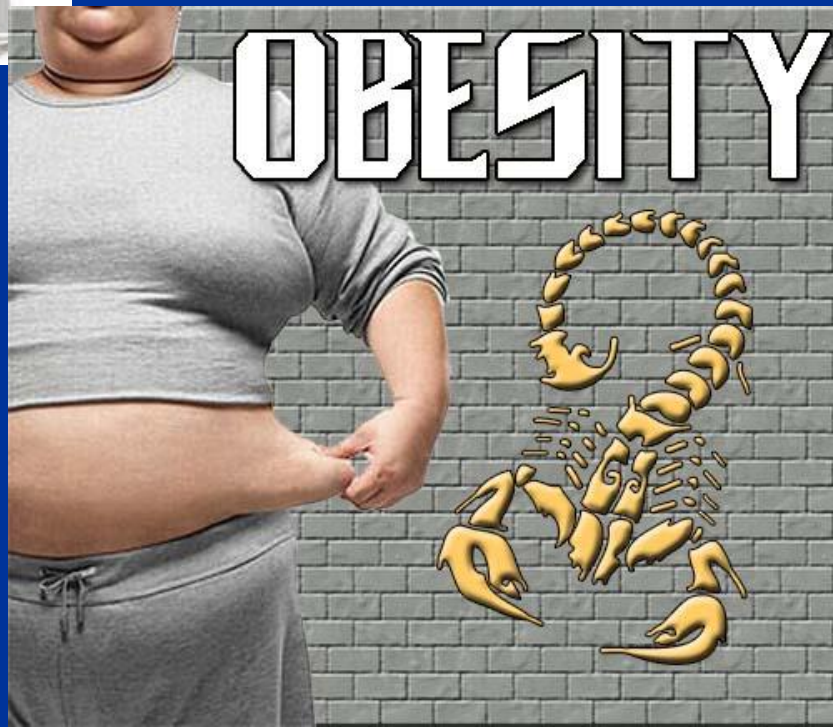
The Secret Killer



Role of inflammatory in arthritis

- Inflammation is a cascade of biological process which leads to production of harmful chemicals ; cytokines
- Cytokines detrimental to body are (IL)-1, IL-6, tumor necrosis factor (TNF)-alpha, gamma interferon (INF-gamma)
- Cells produce reactive oxygen species (ROS) harmful to cartilage and joint structures leading to destruction

Many faces of inflammation



Chronic Inflammatory Diseases

- More than 40 distinct autoimmune diseases
- 24 million Americans are affected (NIH Autoimmune Disease Coordinating Committee, June 2005)
- Examples: Asthma, Cohn's disease, Rheumatoid arthritis, SLE, Celiac disease
- Examples of chronic conditions with an inflammatory component include atherosclerosis, obesity, diabetes, cancer, and perhaps even Alzheimer's disease

Evolution of Nutrition

- Primitive humans; wild game or vegetarian
- Refining; loss of fiber and micronutrients
- Western diet had 75% decline in fiber, 5 fold increase in sugar and four fold increase in fats
- Our hunter-gatherer ancestors consumed equal amounts of omega-6s and omega-3s
- Today's diet has been estimated to contain 14-25 times as much omega-6 as omega-3 fat

Overfed and Undernourished

- “Snack” and “fast” food: high fat, high sugar
- Western diet leads to “Overfed and undernourished” state
- Increase weight, decreased essential nutrients
- 60% Americans: high waist/hip ratio (WHR) and BMI
- Alarming rates of diabetes, cancer, metabolic syndrome, heart and autoimmune diseases are linked to western diet

Western diet; Standard American Diet (SAD)



- High in *red and processed animal meats, saturated fats, trans fats, sweets*, desserts, fried food and refined grains and low in fiber
- Low in low-glycemic carbohydrates, fruits, vegetables, fish and legumes
- 12 yr relative risk of colon cancer 1.46, 8 yr heart disease risk 64%, 1.3 RR of all cause mortality

Nutrition and Autoimmunity

- Inflammation and immune dysfunction starts in the intestinal track
- Presence of antibodies of intestinal bacteria like *Proteus mirabilis* have been linked to RA
- Lower antigen load, intake of vegetables, fruits and dietary vitamin C reduce risk, e.g. Norwegian and Mediterranean diets

High Glycemic Carbohydrates

- Negative impact on lipid and sugar metabolism
- Doubles reactive oxidative radicals production; increases peripheral vascular disease
- Depressed immunity and impairs white blood cell function
- Autoimmunity : Crohns disease, Rheumatoid arthritis

Impact of Unhealthy Fats

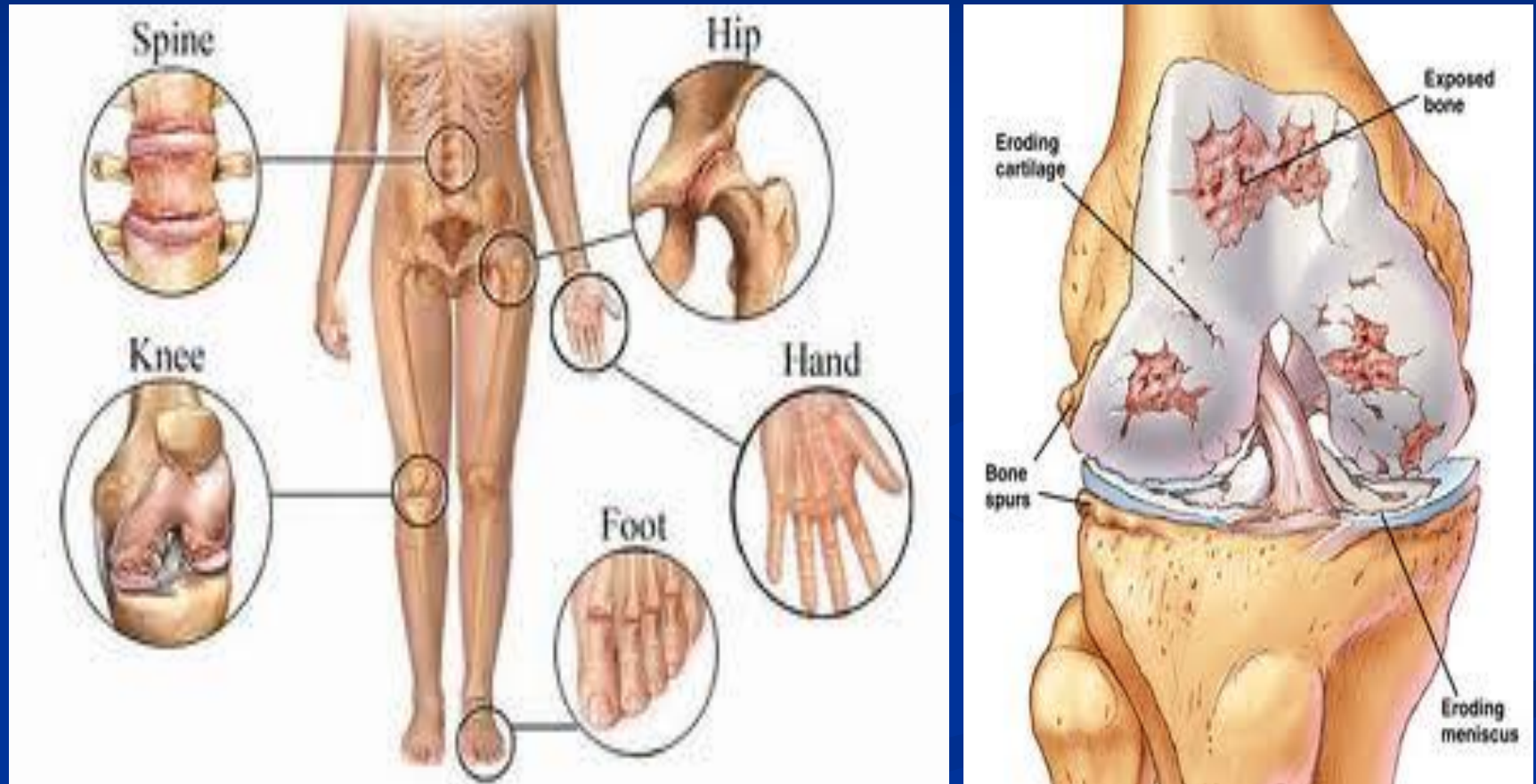
- Trans and saturated fats are associated with depressed immunity
- Doubles risk cataract
- Atherosclerosis
- Heart arrhythmias
- Cancers
- Decreases bone mineral density osteoporosis

Rheumatoid arthritis



- RA is a common autoimmune arthritis
- 1 in 100 persons, affects women more than males
- Cause is combination of genetic makeup and environmental cause or infection
- Main stay of treatment is allopathic medications
- Use of anti inflammatory diet and complementary therapy can be of immense help

Osteoarthritis



Osteoarthritis and Nutrition

- It is degenerative type of arthritis, most common form of arthritis
- Affects weight bearing joints; knees, hips also affects hands and spine
- Loss and damage of cartilage and joint structure
- Leads to loss of smooth gliding, pain and swelling, improves with rest
- Weight loss, conditioning exercises with anti inflammatory nutrition has great potential

Role of diet in arthritis

- Elimination
- Anti inflammatory approach
- Anti oxidants
- Probiotics
- Herbal supplements

Elimination diet for food triggers

- Arthritis linked to food sensitivities
- Dairy products, wheat, and nightshade vegetables (bell pepper, eggplant, tobacco, tomato, and white potato) may be culprits
- Eliminating and gradual re-introduction
- High intake of coffee is linked to increased risk of RA
- UltraInflamX® is an anti-inflammatory medical food

Anti-inflammatory approach

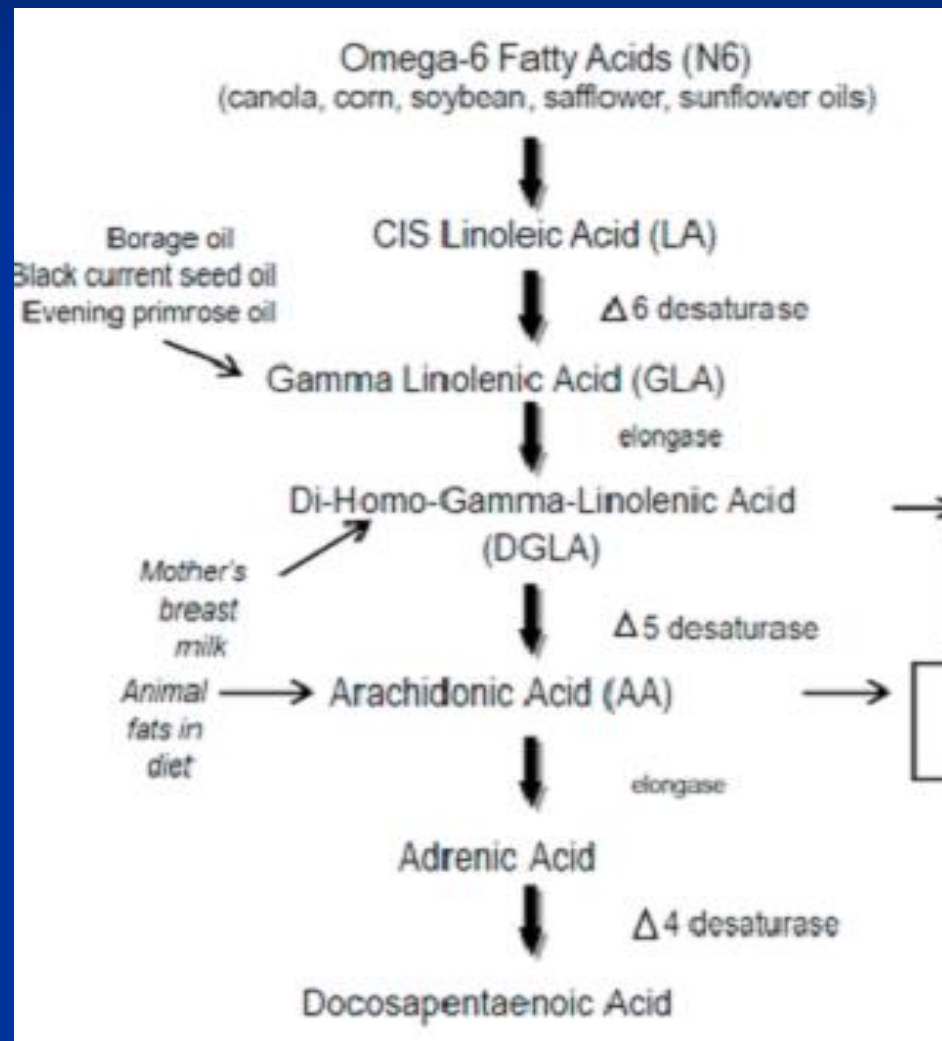
Diet and supplements

- Mediterranean diet; vegetables, whole grains, nuts
- Vitamin B6 and folic acid
- Omega-3 , EPA, DHA
- Anti oxidants
- Probiotics
- Herbal, Spices
- Bone supplements: Vitamin D, Calcium, Boron

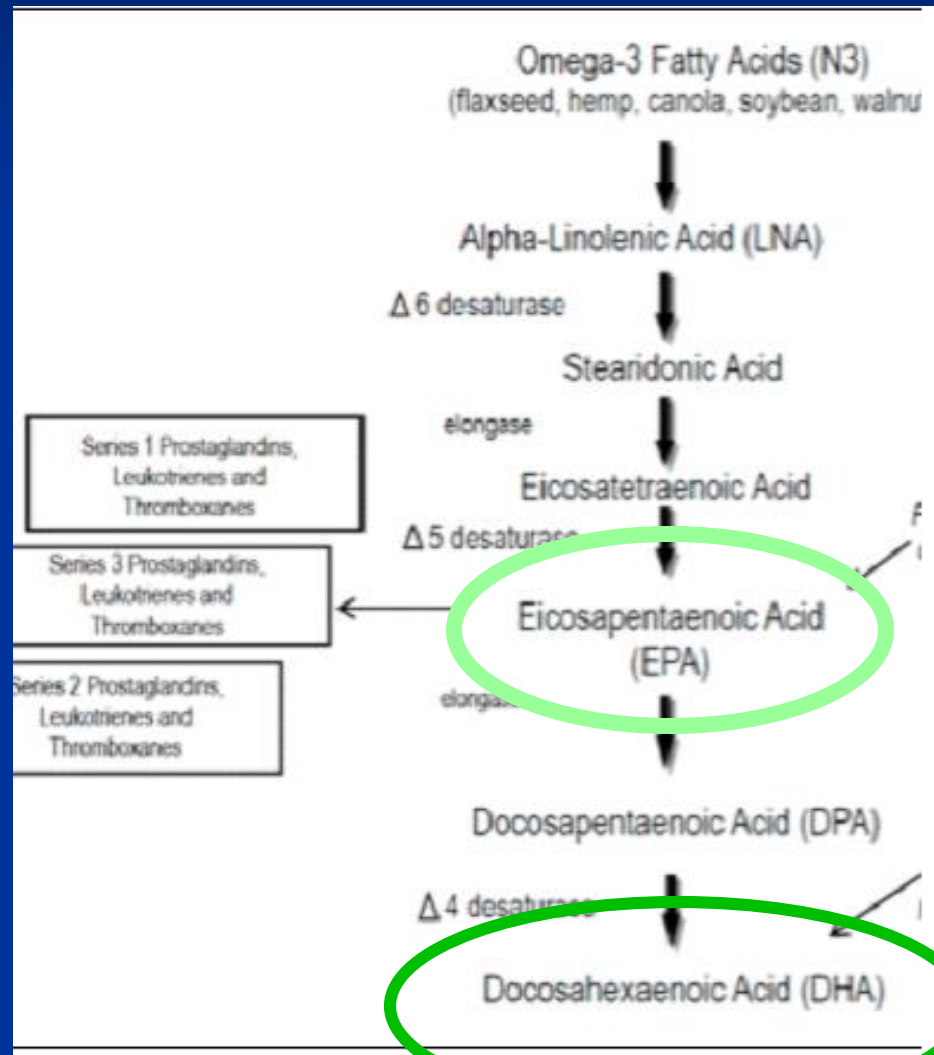
Essential fatty acids

- Humans are unable to synthesize the fatty acids linoleic acid and linolenic acid
- Must be obtained through the foods
- Both of these fats are polyunsaturated, meaning they will be liquid rather than solid at room temperature
- Linoleic acid belongs to the family of omega-6 fats and is readily available
- Linolenic acid belongs to Omega-3 fats

Sources of Omega 6



Sources of Omega 3



Polyunsaturated fatty acids

Omega 3 Fatty acids

- Remember EPA and DHA
- Produce *resolvin* which is anti inflammatory
- Clinical trials in RA, Lupus and Ankylosing spondylitis have proven benefit
- Improved patient reported pain, morning stiffness, number of painful and tender joints
- Average recommended dose , EPA 30mg/kg, DGA 50mg/kg or total 3.5g/day

Omega 6 versus Omega 3

- In general, omega-6 fats tend to
 - promote inflammation
 - constriction of the blood vessels
 - formation of blood cell clots
- Omega-3 fats are
 - anti-inflammatory
 - relax the blood vessels
 - protect against blood cells aggregating
 - prevents clots

Fat Guidelines

- Use coconut oil, canola, or olive oil (extra virgin is best) for cooking
- Make your own salad dressing with extra virgin olive oil, and red wine or balsamic vinegar
- Flax seeds and oil, sardines, ocean salmon, and walnuts
- Use a daily supplement of 1-4 grams of high EPA/DHA fish oils

Decrease pro inflammatory foods

- Trans fats, arachadonic acid and sugar may promote inflammation, so an anti-inflammatory diet is low in trans fats, arachadonic acid and sugar.
- Commercial meat and eggs are rich sources of arachidonic acid;
- Omega-3 eggs and pasture-fed beef have lower amounts of arachidonic acid.

Fats for life

Healthy choices

- Extra virgin olive oil
- Expeller-pressed organic canola oil
- Nuts, Walnut and hazelnut oils in salads
- Avocados
- Seeds - freshly ground flaxseed.
- Cold water fish
- Dark roasted sesame oil as a flavoring for soups and stir-fries
- Superior quality supplements



The good Omega 6

GLA

- Omega 6: LA and ARA driven chemicals are pro-inflammatory, role confirmed in RA
- LA: vegetable oils; corn, sunflower, safflower
- ARA: animal products, abundant in beef (grain fed), conventionally produced eggs
- **GLA** : has anti inflammatory properties, sources, Oils of evening primrose, borage and black currant
- Dose 1.5-3g/day

Protein Guidelines

- Have protein with each meal and snack if possible
- Limit red meat or eliminate it unless it is free-range, grass-fed beef or lamb
- Avoid charring/browning proteins/meats
- Use free-range eggs for protein but avoid browning the eggs
- Avoid lunch meats that have sodium nitrate or nitrites, consider nitrite free turkey

Protein Guidelines

- Use walnuts as snack, good protein and omega-3 fats source
- Use mixed nuts and seeds (pumpkin, sunflower)
- Consider nut butters ; almond, cashew, macadamia
- Soy products good sources of protein
- Organic milk products (milk, cheese, and yogurt)
- For milk substitutes, use soy, rice, almond, or oat milk

Add Color to your plate



- Flavonoids and carotenoids, antioxidant and anti-inflammatory activity
- Lightly cooked dark leafy greens (spinach, collard greens, kale, Swiss chard)
- Cruciferous vegetables (broccoli, cabbage, brussels sprouts, kale, cauliflower)
- Carrots, beets, onions, peas, squashes, sea vegetables and washed raw salad greens

Low glycemic carbohydrates

Beans and Legumes



- Rich in folic acid, magnesium, potassium and fiber
- They are a low-glycemic-load food
- 1-2 servings per day (one serving is equal to $\frac{1}{2}$ cup cooked beans or legumes)
- Beans like kidney, black, chickpeas, black-eyed peas and lentils
- Well-cooked either whole or like hummus

New Life Eating Plan (NLEP)

- Diet for OA sufferers
- Nutrient-dense; hypoallergenic; nightshade-free; yeast-free; high in alkalinity, fiber, essential fatty acids, and phytonutrients (e.g., berries, cherries, and green and yellow vegetables); and low in land-animal products.
- Elimination of possible food allergens, stabilization of insulin levels, and correction of leaky gut and imbalanced bacterial flora in the bowel

Antioxidants

- Inflammation leads to reactive oxygen radicals
- Oxidative damage to the joint and cartilage destruction
- Antioxidants defend against this process
- Increased anti oxidants consumption may prevent or relieve pain in RA and OA
- Vitamin E & C
- Selenium, Quecertain, Resveratrol

Top Anti oxidants

1 cup: Numbers refer to ORAC
(Oxygen Radical Absorbance Capacity) values

- Wild blueberry, 13427
- Blueberry, 9019
- Cranberry, 8983
- Artichoke hearts, 7904
- Blackberry, cultivated, 7701
- Raspberry, 6058
- Strawberry, 5938
- Sweet cherry, 4873

Fruit as a healthy snack



- Fruits are rich in flavonoids and carotenoids with both antioxidant and anti-inflammatory activity
- 3-4 servings per day
- Raspberries, blueberries, strawberries, pomegranates blackberries, cherries, all lower in glycemic load than most tropical fruits

Vitamin E



- Animal studies showed less arthritis with antioxidants
- Framingham study showed an association of reduced risk of OA and vitamin E intake
- Pain controlling effects
- Mixed tocopherols, gamma type is most potent
- Daily dose 600-800IU

Vitamin C



- Positive effects of vitamin C on health of immune system
- Reducing risk of Rheumatoid arthritis and OA
- A study of 640 patients showed three fold decrease in OA progression
- An Australian study found decrease incidence of OA
- A study stated high risk of RA with lowest intake

Resveratrol (grape extract)

- Present in various fruits especially skin of grapes
- Potent antioxidant properties protects cells
- Has anti inflammatory and prevents cartilage cell death
- Several animal studies are proven helpful and many human studies are underway

Selenium

- The mineral selenium chelates mercury in the body, and the chelated selenium-mercury complex is eliminated in the stool.
- Thus consumption of one or two Brazil nuts (a rich source of selenium) with a meal of fatty fish is advisable

Vitamin D

- Vitamin D has a vital role in regulation immune system and association with RA, SLE and OA
- Vitamin D receptors are present on the immune cells, synovial and cartilage cells
- Framingham data suggests 3x risk of progression of OA with lower intake
- Another study showed lower levels associated with cartilage loss, increased risk of hip OA

Vitamin D

- Iowa women health study found lower levels of vitamin D associated with higher risk of developing RA, more tender, swollen joints and HAQ scores
- Nurses health survey linked higher level of vitamin D with healthier lifestyles
- Dose: Vitamin D3- 2000-4000IU a day

Vitamin K

- Important bone regulator
- A recent study showed that low levels of vitamin K1 (phylloquinone) associated with an increased prevalence of OA hand and knee
- Framingham study found lower levels associated with x-ray findings of OA hands and knees
- Vitamin K2 is also helpful in osteoporosis

Dietary deficiency

Vitamin B6 and folic acid

- Lower levels of B6 and folate found in red blood cells of RA patients
- Low B6 is also associated with homocysteine levels which is associated with heart disease in RA
- Level of folic acid is low since disease modifying drug competitively inhibit its absorption
- Recommended dose B6 50mg, folic acid 1mg

Probiotics

- Probiotics are live microorganisms, also known as “friendly bacteria,”
- Help maintain the natural balance of organisms (microflora) in the human gut
- Vital for a healthy immune system, protect against disease-causing microorganisms,
- The most well-known probiotics are *Lactobacillus acidophilus*, occurring naturally in yogurt, and *Bifidobacterium*

Natural supplements

Glucosamine

- Synthesized from chitin in shellfish exoskeletons
- Hypothesized to rebuild damaged cartilage by stimulating the synthesis and inhibiting the degradation of glycosaminoglycans and proteoglycans
- Glucosamine sulfate is absorbed and distributed to the joint tissues
- It has anti-inflammatory and anabolic properties
- 1500 mg, best to dose glucosamine once a day

Natural supplements

Chondroitin

- Chondroitin contributes to the resilience and elasticity of cartilage
- It is a building block for the formation of the joint matrix structure
- Bovine or shark cartilage. Animal studies suggest functions as an anti-inflammatory agent
- Trials showed variable results, combination seem to work better, delayed progression
- 120omg/day, good safety data

Natural supplements

MSM

- Being popularly market for arthritis, found in may foods we eat, effectiveness needs confirmation
- Clinical data is still inconclusive for effectiveness, but combination of glucosamine and Chondroitin is more effective than used alone
- Dose is 1500mg, up to 3-4 times/day
- No toxicity issues reported

Natural supplements

SAMe

- SAMe has scientific evidence to support its effectiveness in double blind clinical trials
- Has anti inflammatory properties, compared to Naproxen, Piroxicam and Celebrex
- Typical dose is 200-400mg 3-4x/day
- Works slowly and has been also found to have beneficial effects for depression and fibromyalgia

Spice up your taste buds



HEALTHY HERBS & SPICES

Why: Use these herbs and spices generously to season foods. Turmeric and ginger are powerful, natural anti-inflammatory agents

Healthy choices: Turmeric, curry powder (which contains turmeric), ginger and garlic (dried and fresh), chili peppers, basil, cinnamon, rosemary, thyme

Herbal or Botanical approach

- Avocado/Soybean Unsaponifiables
- Ashwagandha
- Boswellia
- Bormelain
- Curcumin
- Cats claw
- Devil's claw
- Evening Primrose Oil
- Ginger
- Garlic
- Rose hip
- Thunder God Vine
- Willow

Ginger



- Anti inflammatory herb can help with pain, swelling and stiffness in OA
- Study of 261 people, 63% experienced relief of knee pain (50% sugar pill)
- May have efficacy in RA by inhibiting inflammatory chemicals (prostaglandins)
- Dosage powdered root 500-1000mg/day or as tea
- Avoid if have history of gall bladder stones

Turmeric (Curcumin)



- Clinical trial has shown efficacy similar to Nsaids
- Powdered root, 500mg-1000mg, 2-3x/day
- Avoid if risk of bleeding, GI intolerance and impaired fertility

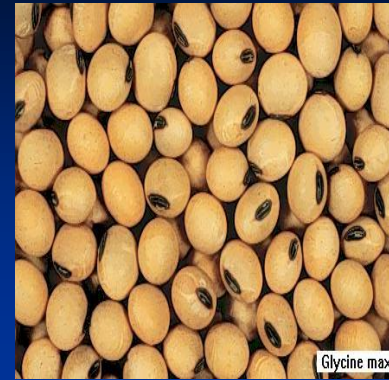
Boswellia



- Inhibits the synthesis of pro inflammatory chemicals
- It is suggested to have efficacy in OA
- A study of 30 patients with knee OA found improvements in pain and walking distance

Avocado soybean oil

extract



- Recent studies have showed that ASU has promising beneficial role in OA hips and knees
- It has effects on type 2 collagen synthesis
- 4 major clinical studies suggested benefit with 6 months of use
- No major adverse effects noted
- Dose: 300m/day for 3-6 months

Devil's claw



- Anti inflammatory herb used in OA
- Seems to work similarly like prescription Celebrex
- Works as COX inhibitor
- Avoid in patients wit ulcers and heart diseases

Thank You

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- [https://Twitter.com/irheum](https://twitter.com/irheum)
- www.Linkedin.com/in/ftahirmd
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