Effectively Fighting Inflammation Through an Evidence-Based Diet

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&

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Learning Objectives

- recall the components of an anti-inflammatory diet
- describe which inflammatory markers are utilized with chronic inflammation
- recognize the disease processes associated with chronic inflammation, with a focus on Obesity, Metabolic Syndrome, and Aging
- determine how dietary inflammatory indices are measured in pro-inflammatory and anti-inflammatory states
- explain how fiber influences inflammation and gut microbiota
- define the role of polyphenols in an anti-inflammatory diet
- identify the difference between omega-3 and omega-6 fatty acids and their role in inflammation
- illustrate how to prescribe an anti-inflammatory diet

Disclosures

I have no conflict of interest to disclose

What is an anti-inflammatory diet?

The Mediterranean diet, Okinawa diet (Ryukyu Islands region of Japan), and plant-based diets are anti-inflammatory diets. No universal definition.

- attributed to its polyphenol richness of many of its components
- incorporates the use of herbs, spices, and supplements (ginger, turmeric, garlic, cayenne, oregano)
- rich in fruits, vegetables
- whole grain carbohydrates with a low glycemic index
- healthy fats (salmon, flax seeds, chia seeds, walnuts)
- olive oil used at low temps when needing oil to prepare food
- consuming tea (green>>, black, white teas)
- moderate intake of alcohol (up to 1 drink/day for women and 2 drinks/day for men)--esp red wine
- eggs remain controversial

Ricker & Haas, 2017

Eating Habits

Eating Patterns and Habits

Beyond the dietary pattern of food selection, the manner in which food is consumed influences inflammation and nutrient value. Reinforced by complex social behaviors of Western society, Americans eat too much, too quickly, and on the run. Eating slowly, mindfully, and in smaller amounts can decrease the impact of inflammation on the body. Portion control and smaller meals decrease hyperglycemia and, in the long run, obesity—both of which reduce systemic inflammation.[9] Cortisol is a marker of stress in the body, and eating slowly, with a mindful approach, has been shown to decrease morning cortisol levels.[10] Changing the manner in which food is consumed may be equally as important as the food itself.

Conclusion

Influenced by the Mediterranean and Okinawan dietary patterns, an anti-inflammatory diet has emerged from a growing knowledge about the proinflammatory and anti-inflammatory effects of food. Although the components of an anti-inflammatory diet have been evaluated individually, adherence to the overall dietary plan may yield the greatest benefit, as shown in studies of the Mediterranean diet.[11] As such, an anti-inflammatory diet should not be prescribed according to its isolated components. Moreover, a truly integrative anti-inflammatory approach to nutrition will focus on eating mindfully and in caloric balance to help decrease obesity. The definition of an anti-inflammatory diet will likely continue to evolve with further advancements in nutrition research.

Statement of Authorship

Both authors contributed to the conception/design of the review; contributed to the acquisition, analysis, or interpretation of the data; drafted the manuscript, critically revised the manuscript;

Comparison of Diets

Table 1. Comparison of Diet Components.

Diet	Standard American Diet	Mediterranean Diet	Okinawan Diet	Anti-Inflammatory Diet
Vegetables and fruits	Fewer vegetables	High consumption of vegetables and fruits	High consumption of vegetables: orange, yellow root vegetables, leafy green vegetables	High consumption of vegetables: large diversity, including variety of colors to increase phytonutrients
Protein source	Red meat	Fish	High consumption of legumes (soy)	Plant sources of protein: legumes, soy, nuts, and seeds
	Dairy	Legumes	Small to moderate amounts of fish	More fatty fish and some lean animal protein
		Nuts	Less meat	
Carbohydrates	Refined carbohydrates; high-fructose corn syrup and added sugar	Whole grains	Small amounts of rice and noodles	Whole grains in small amounts, high fiber, reduced refined carbohydrates
	Fewer whole grains		Less sugar and fewer refined grains	
Dairy	High-fat dairy sources	Low-fat dairy, such as yogurt	Less dairy	
Fats	Solid added fats, such as butter and sour cream	Olive oil as source of added fat	Lower fat overall	Olive oil for added fat source
Other features	Soda and added-sugar beverages	Moderate red wine intake	Moderate alcohol intake, green tea intake; broth-based soups	Spices: turmeric, garlic, ginger, and other anti-inflammatory herbs and spices
Cultural	Eating on the run, overeating	Highly social and connected eating experiences	Low caloric diet; highly ritualistic culture	Mindful eating approach; quality over quantity

Carbohydrates

Regular consumption of refined, high-glycemic carbohydrates results in chronic hyperglycemia which subsequently increases production of free radicals and proinflammatory cytokines

GLYCEMIC LOAD = quantity of carbohydrate ingested, multiplied by the rate at which that carbohydrate enters the bloodstream (ex. the glycemic index)

Ricker & Haas, 2017

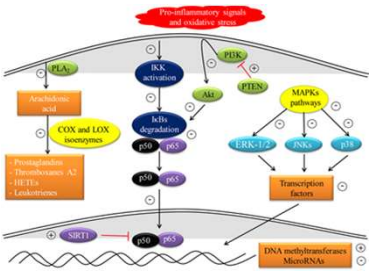
Polyphenols

Modulates several pro-inflammatory pathways:

- including COX-2, LOX, iNOS
- transcription factor: nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB)
- activating protein-1 (ap-1)
- activates antioxidant detoxifying enzymes protein kinase C, NF erythroid-2-related factor 2, mitogen-activated protein kinase (MAPK)

Arancibia-Riveros et al., 2022

Polyphenols



Khan et al., 2019

Polyphenols

- mainly absorbed in the intestine
- bioavailability depends on stomach pH, gastrointestinal motility, enzyme degradations, transporters, microbiota
- neutralizes free radicals
- antioxidant
- dampens the inflammatory response

Polyphenols

Found in Plants

- Fruits
- Vegetables
- Tea
- Coffee
- Dark chocolate
- Herbs and spices
- Whole grains
- Edible mushrooms and fungal fruiting bodies
- Red wine

Is there a chronic inflammatory marker?

- NONSPECIFIC markers: BMI, WBC, platelets, sed rate, CRP, interleukins (IL-6, IL-1β, IL-10, IL-4), TNF-alpha (-α), fibrinogen
- SPECIFIC markers: nothing yet however current research is underway. There is no standard biomarker for chronic inflammation

  →total urinary polyphenol excretion

  →DNA-methylation or DNAm proxies of CRP (epigenetic approach)

Acute vs Chronic Inflammation

Acute

- from an evolutionary standpoint–inherently protective: heals damaged tissue, eliminates destructive agents in a temporary, self-limiting manner
- capillary dilatation
- leukocyte infiltration causing redness, heat, pain, and swelling

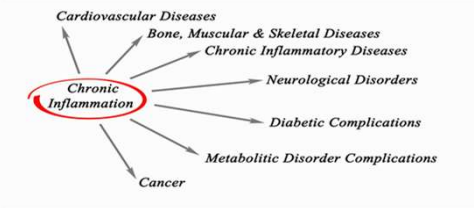
Chronic

- noxious stimuli persistently confronts the body and/or the inflammatory response fails to resolve
- causes silent damage throughout the body
- over time, chronic diseases becomes apparent

Ricker & Haas, 2017

Why?

Chronic Inflammation is associated with cancer, aging, and multiple disease processes



Disease Processes

- Aging ("Inflammaging")*
- Asthma
- Alzheimer's Disease
- Cancer
- Coronary Artery Disease
- Depression
- Fatty Liver
- Gut Microbiota
- Inflammatory Bowel Disease
- Metabolic Syndrome*
- Multiple Sclerosis
- Obesity*
- Pain Management
- Rheumatoid Arthritis
- Viral Respiratory Diseases (COVID-19)

Obesity

Adipose tissue is metabolically active in which its dysregulation causes a low-grade inflammatory state

The higher amount of visceral fat, leads to higher levels of inflammatory cytokines

Di Daniele et al., 2017

Caloric Intake

- excess caloric intake, particularly in sedentary individuals, results in increased adipose tissue which directly contributes to chronic inflammation
  - →adipose tissue releases proinflammatory cytokines, including TNF-α and IL-6
  - →as adipocytes enlarge, further inflammation ensues. Macrophages release inflammatory cytokines
  - →activates sympathetic nervous system

Ricker & Haas, 2017

Caloric Intake

- caloric restriction with adequate nutrition intake exhibits important anti-inflammatory effects
  - →adipocyte reduction through caloric restriction lowers proinflammatory adipokines and cytokines
  - →enhances corticosteroid production promoting anti-inflammatory effects on the body
  - →increases parasympathetic tone

Obesity

The adult overweight and obesity rate for DuPage County is 56%

forward DuPage

https://forwarddupage.org/data/

Obesity - Study

"Association between Dietary Inflammatory Index, Dietary Patterns, Plant-Based Dietary Index and the Risk of Obesity" 05/2021

- ➔ Longitudinal cohort study in South Australia
- ➔ 787 participants
- ➔ Data collected initially in '99 - '03, then '04 - '06, then '08 - '10 using computer-assisted telephone interview, self-administered questionnaire, and clinic exam. Then in '15 a follow-up study using a self-completed online or postal survey was collected

Wang et al., 2021

Obesity - Study

BMI and a 12-month dietary intake assessment was used to compute:

- ➔ dietary inflammatory index (DII)
- ➔ plant-based dietary index (PDI)
- ➔ identify dietary patterns

Obesity - Study

A *lower* risk of obesity was associated with:

- anti-inflammatory diet (lower DII score)
- diet quality
- prudent dietary pattern
- overall plant-based diet
- healthy plant-based diet

A *higher* risk of obesity was associated with:

- pro-inflammatory diet (higher DII score)
- Western dietary pattern
- unhealthy plant-based diet

Obesity - Study

Supplementary Table 1. Food items components for the overall PDI, uPDI and hPDI.

Plant food groups	
Healthy	
Whole grains	Whole-grain bread, rye bread, crispbread, oatmeal, whole-grain breakfast cereal
Fruits	Apple, pear, orange, mandarin, kiwi, banana, plum, peach, apricot, strawberry, currant, blueberry, blackberry, grapes, mixed fruits
Vegetables	Carrot, tomato, lettuces, cabbage, cucumber, pepper, garlic, sauerkraut, spinach, cauliflower, broccoli, kohlrabi, asparagus, zucchini, mixed vegetables
Nuts	Nuts, seeds
Legumes	Beans, peas
Vegetable oils	Olive oil, sunflower oil, linseed oil, thistle oil
Tea and coffee	Tea, coffee, decaffeinated coffee
Less healthy	
Fruit juices	Orange juice, apple juice, currant juice, grape juice, cherry juice, pineapple juice, multivitamin juice
Refined grains	White bread, toast, rice, pasta, pancakes
Potatoes	Potatoes, potato products
Sugar-sweetened beverages	Lemonade, soft drinks
Sweets and desserts	Sugar, honey, jams and jellies, chocolates, candies, sweets without chocolate, syrup, sorbets, cake, cookies, biscuits
Animal food groups	
Animal fat	Butter, fish oil, other animal fat
Dairy	Milk, mixed milk drinks, cream, yogurt, curd, cheese, cream cheese, ice cream
Egg	Eggs
Fish or seafood	Fish, seafood
Meat	Beef, calf, pork, lamb, horse, goat, poultry, rabbit, game, processed meat
Miscellaneous animal-based foods	Casserole, mayonnaise or creamy salad dressing, pizza

Dietary Inflammatory Indices

Dietary Inflammatory Index (DII) - most commonly used

- utilizes CRP, interleukins (IL-6, IL-1β, IL-10, IL-4), TNF-α as markers
- originally developed in 2009, it was revised in 2014

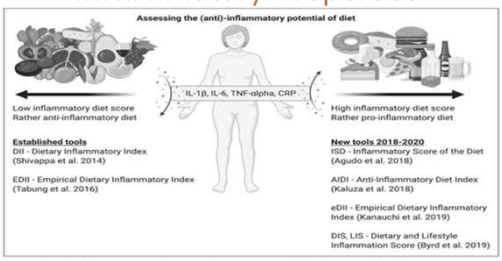
  →linked 45 parameters of diet w/ raw amount of food consumed

Dietary Inflammatory Indices

Since DII was developed, more indices have come about:

- includes dietary patterns (**EDII**)
- alcohol indices and specific criteria for fat consumption (**ISD**)
- consideration of lifestyle factors (**DIS, LIS**)
- non-US populations (**AIDI-northern European**)
- food assessment w/o labs (**eDII**)

Assessing Current Diets for Anti-Inflammatory Properties



Metabolic Syndrome

Criteria (3 or more of the following):

1. waist circumference > 40 in (men)/35 in (women)
2. BP >130/85 mmHg
3. fasting triglyceride >150 mg/dl
4. fasting HDL cholesterol <40 mg/dl (men)/50 mg/dl (women)
5. fasting blood glucose >100 mg/dl or T2DM dx

→ more than 25% of the US population

Metabolic Syndrome

Metabolic Syndrome - represents a cluster of several risk factors for atherosclerosis that is proinflammatory

- ➔ abdominal obesity, atherogenic dyslipidemia, glucose intolerance, and hypertension
- ➔ lab markers including CRP, TNF-α, and interleukins (IL-6, IL-18), correlate with propensity to develop ischemic events

Giugliano, 200
Di Daniele et al., 20

Metabolic Syndrome and the Gut

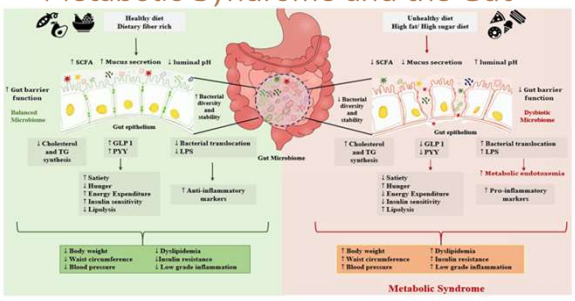
Diet influences and reshapes gut microbiota composition, diversity, and species richness in a time-dependent manner.

Human studies have depicted noticeable changes in gut microbiota **within 24 hr of shifting diet**

Poor Diet	Healthy diet
→reduces microbial diversity	→increases gut barrier function and mucus secretion
→a lowering of the metabolites that protect intestinal permeability	→decreases the luminal pH
→destruction of the mucus layer leading to inflammation and metabolic diseases	→reduces microbial translocation

Thomas et al., 2023

Metabolic Syndrome and the Gut



Thomas et al., 2023

Fiber

Dietary fiber decreases plasma cholesterol by binding to bile acids and dietary cholesterol in the intestinal lumen, resulting in reduced cholesterol absorption

Soluble* vs Insoluble fiber

- ➔ Soluble: oats, peas, beans, apples, citrus fruit, carrots, barley, psyllium
- ➔ Insoluble: whole wheat flour, wheat bran, nuts, cauliflower, green beans, potatoes

Thomas et al., 2013

Fiber

Follow the 5:1 carb to fiber rule

- for every 5 grams of carbohydrate you eat, aim to get at least 1 gram of dietary fiber

Picture:https://r.search.yahoo.com/_ylt=AwrEI1OHiUdk.6cu.6qtbtF;_ylu=c2ROAZQxLWF0dHJpYgRpdGxlcmlybA--/RV=2/RE=1694738251/RO=11/RU=https%3a%2f%2fwww.health.harvard.edu%2fblog%2fthe-trick-to-recognizing-a-goo

Fiber Influencing Inflammatory Markers

Population	Study design	Fiber	Indicator	Sample size
Adults (age ≥20 y)	NHANES, 1999–2000	Total	C-reactive protein	3920
Diabetic women (age ~60 y)	Nurses' Health Study	Cereal	C-reactive protein	902
			TNF-α receptor 2	
Adults (age 20–70 y)	SEASONS	Soluble	C-reactive protein	524
		Insoluble	C-reactive protein	
Postmenopausal women	Women's Health Initiative	Soluble	IL-6; TNF-α receptor 2	1938
		Insoluble	IL-6; TNF-α receptor 2	
Adults (age 50–71 y)	NIH-AARP study	Total	Infectious disease death	567,169
		Total	Respiratory disease death	
Breast cancer (female, age 18–64 y)	HEAL study	Total	C-reactive protein	1183
Cancer-free adults	EPIC cohort	Cereal	IL-1β IL-4; IL-5; IL-6; TNF-α	88
Adults (age 25–70 y)	EPIC cohort	Total	Inflammatory disease death	452,717

Kan, 2013

Aging

Associated with low-grade inflammation called ***Inflammaging***

Inflammaging is manifested by the release of a large number of inflammatory mediators that are produced to repair damage at tissue level

- pro-inflammatory cytokines: interleukins (IL-1, IL-2, IL-6, IL-8, IL-12, IL-13, IL-15, IL-18, IL-22, IL-23), TNF-α, IFN-γ
- anti-inflammatory cytokines: interleukins (IL-1Ra, IL-4, IL-10), TGF-β1
- mediators: lipoxin A4, heat shock proteins

Wawrzyniak-Gramacka et al., 2021

Aging - Study

"The Association of Anti-Inflammatory Diet Ingredients and Lifestyle Exercise with Inflammaging" 10/2021

60 elderly individuals (> 65 yo) were put in two groups based on CRP levels:

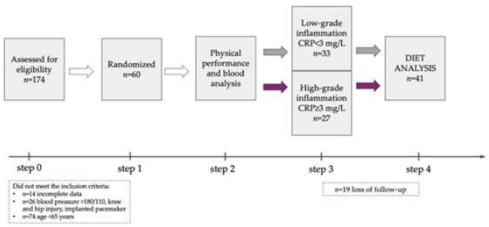
➔ low grade inflammation (CRP <3 mg/L)
➔ high grade inflammation (CRP >3 mg/L)

Wawrzyniak-Gramacka et al., 2021

Aging - Study

- 24-hr dietary recall was utilized for diet analysis
- Physical performance based on 6-min walk test
- Body comp analysis utilizing bioelectrical impedance method
- Labs collected including CRP, interleukins, TNF-α, and cell-free DNA (cfDNA)

Aging - Study

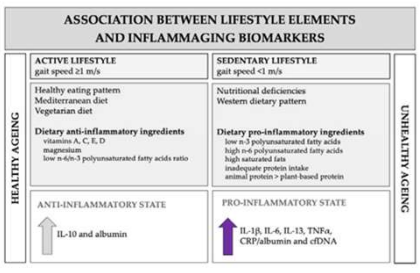


Aging - Study

Results:

- Circulating interleukins IL-1β, IL-6, IL-13, TNFα and cfDNA demonstrated high concentrations in the elderly with a low 6-min walk test, confirming an impairment of physical performance by persistent systemic inflammation
- The low grade inflammation group demonstrated a lower ω-6:ω-3 ratio and higher vitamin D intake than the high grade inflammation group
- The low grade inflammation group demonstrated a significantly higher gait speed

Aging - Study



Aging - Study

5. Conclusions Go to: ▸

This study generally supports the notion that anti-inflammatory diet ingredients and physical activity sustained throughout life are critical for optimal inflammatory response in the elderly. Moreover, it shows that the analysis of inflammatory profile, including novel inflammatory markers such as CRP/albumin and cfDNA, with nutritional status and physical performance may be useful in defining healthy or unhealthy ageing (Figure 5). However, future studies are needed to determine the effectiveness of, and conditions for, various nutritional and physical intervention regimens to improve the function of the ageing immune system.

Omegas

Polyunsaturated Fatty Acids (PUFAs)

- ω-3 and ω-6 fatty acids
  - ➔ A ω-6:ω-3 ratio >10:1 is believed to be pro-inflammatory ☹
  - ➔ When the ratio is <5:1 it has an anti-inflammatory effect

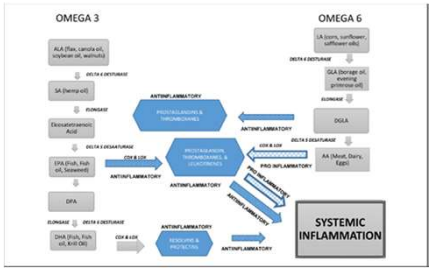
Ricker & Haas, 2017

Omegas

Omega 6's (ω-6)
-walnuts
-pine nuts
-sunflower seeds
-sunflower oil
-grapeseed oil
-corn oil
-walnut oil
-cottonseed oil
-soybean oil
-mayonnaise
-almonds
-tofu
-vegetable shortening
-fortified foods

Omega 3's (ω-3)
-fish/seafood (salmon, mackerel, tuna, herring, sardines, anchovies)
-nuts (walnuts)
-seeds (flaxseeds, chia seeds)
-edamame
-seaweed
-algae
-plant oils (flaxseed oil, soybean oil, canola oil)
-fortified foods

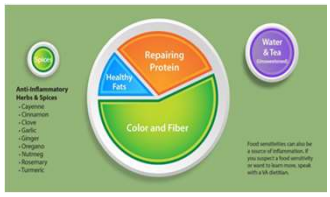
Omegas



Ricker & Haas, 2017

Anti-Inflammatory Meals

What does an anti-inflammatory diet look like at the plate level?



Anti-Inflammatory Meals - Polyphenols & Fiber

Color and Fiber

Vegetables	Whole Grains	Spices
• Alliums/Onions	• Amaranth	• Allspice
• Cruciferous veggies	• Barley	• Black pepper
• Dark leafy greens	• Brown rice	• Cinnamon
• Fermented veggies	• Buckwheat	• Clove
• Mushrooms	• Bulgur	• Cumin
• Peppers	• Millet	• Curry
• Root vegetables	• Oats	• Garlic
• Seaweed	• Quinoa	• Ginger
• Summer squash	• Sorghum	• Mustard
Fruits	• Wheat berries	• Nutmeg
• Apples	• Wild rice	• Paprika
• Bananas	**Legumes**	• Saffron
• Berries	• Black beans	• Turmeric
• Citrus	• Black eyed Peas	**Herbs**
• Cherries	• Garbanzo beans	• Basil
• Grapes	• Lentils	• Chives
• Mangoes	• Navy beans	• Cilantro
• Melons	• Pinto beans	• Dill
• Papayas	• Peas	• Mint
• Pineapples	**Starchy Vegetables**	• Oregano
• Peaches/plums	• Corn	• Parsley
• Pomegranates	• Peas	• Rosemary
• Watermelon	• Potatoes	• Sage
	• Sweet potatoes	• Thyme
	• Winter squash	

Fiber

Recommended intake
- Men < 50: 38 grams
- Women < 50 : 25 grams

Fiber intake of the U.S population
- < 1 in 10 U.S. adults meet recommendations

4 Most Common Barriers
- Confusion around fiber content
- Dissatisfaction with taste
- Digestive distress
- Intake less than perceived

Quagliani & Felt-Gunderson, 2016

Fiber - Closing the Intake Gap

Enforce label reading

U.S. Food and Drug Administration

Encourage portion control

Utilize tracking apps when appropriate

Noom, Lose It!, MyFitnessPal

Recommend experimentation with cooking

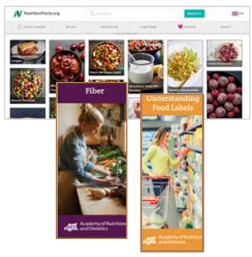
Using Visuals and Other Guides

Posters and Bulletin Boards
- Waiting rooms, hallways, exam rooms

Hand-outs

Online Resources
- Clinic website, social-media
- AmericanHeartAssociation.org
- Nutritionfacts.org, eatright.org

Community Resources
- Culinary demonstrations
- Hands on cooking experiences
- Community Pantry



Anti-Inflammatory Meals – Omega 3s

Healthy Fats	Healing Proteins
Nuts • Almonds • Brazil nuts • Cashews • Hazelnuts/Filberts • Macadamia nuts • Pecans • Pine nuts • Walnuts **Seeds** • Chia • Flax (ground) • Hemp • Pumpkin • Sunflower **Unrefined Oils** • Avocado oil • Coconut oil • Extra virgin olive oil • Flax oil (no heat) • Hemp oil (no heat) • Walnut oil **Other Healthy Fats** • Avocadoes • Olives	**Anti-Inflammatory Proteins** • Cold water fatty fish o Halibut o Herring o Mackerel o Rainbow trout o Salmon o Sardines o Tuna • Beans/legumes • Nuts/nut butters • Seeds/seed butters o Whole soy o Edamame o Tofu o Tempeh o Natto **Neutral Proteins** • Chicken • Eggs • Turkey • Seafood • Wild game • Fermented dairy o Kefir (unsweet) o Yogurt (unsweet)

Anti-Inflammatory Meals - Omega 3s

*Essential fatty acids

Cold-water fatty fish

Nuts and seeds

Plant oils

Fortified foods

Omega-3 dietary supplements

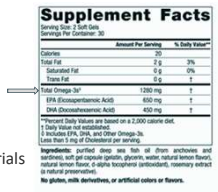
Dietary Supplementation of Omega 3s

How much is enough?

- Recommendations inconsistent
- National Institute of Health
  - 1.1-1.6 grams/day
- American Heart Association
  - 3 grams/day

Recommended DHA:EPA ratio

- 2021 regression analysis with 92 clinical trials
  - Ratio of 1:3 modulates CRP
- 2017 study on liver damaged mice
  - ratio of 1:2 mitigated inflammatory risk factors



Supplement Facts

Serving Size: 2 Soft Gels
Servings Per Container: 30

Amount Per Serving	% Daily Value**
Calories 20	
Total Fat 2 g	3%
Saturated Fat 0 g	0%
Trans Fat 0 g	†
Total Omega-3s* 1280 mg	†
EPA (Eicosapentaenoic Acid) 650 mg	†
DHA (Docosahexaenoic Acid) 450 mg	†

**Percent Daily Values are based on a 2,000 calorie diet.
† Daily Value not established.
§ Includes EPA, DHA, and Other Omega-3s.
Less than 5 mg of Cholesterol per serving.

Ingredients: purified deep sea fish oil (from anchovies and sardines), soft gel capsule (gelatin, glycerin, water, natural lemon flavor), natural lemon flavor, d-alpha tocopherol (antioxidant), rosemary extract (a natural preservative).
No gluten, milk derivatives, or artificial colors or flavors.

Anti-Inflammatory Diet - Caloric Restriction

Calorie Calculator

- For patients and providers

Calorie Trackers

- Can enhance awareness
- MyFitnessPal, Noom, Lose It!

Anti-Inflammatory Diet - Caloric Restriction

KEY components of sustainable caloric restriction

- Satiety supporting meals
  - Fat, Protein, Fiber
- Nutrient dense food intake
- Consistent nutrient intake
- Alternative stress relief/pleasure stimulating activities

Anti-Inflammatory Meals - A Daily Breakdown

- 2,000 calories
- 30 grams fiber
- 3 grams Omega-3s
- 1000 mg polyphenols
- # of servings
  - Whole grains-2
  - Vegetables-3.5
  - Fruit-1.5
  - Nuts-2
  - Meat/Seafood-2

Breakfast: 1 cup cooked oatmeal (166 cal) 1/2 cup raspberries (32 cal) 1 tbsp ground flaxseed (37 cal) 1 cup almond milk (60 cal) 1 tbsp maple syrup (52 cal) *Total: 347 cal*	**Lunch:** 3 oz grilled tuna (144 cal) 1 cup mixed greens (10 cal) 1/2 cup chickpeas (134 cal) 1/4 cup red bell pepper (12 cal) 1/4 cup red onion (16 cal) 1 tbsp olive oil (120 cal) 1 tbsp lemon juice (3 cal) *Total: 439 cal*	**Dinner:** 4 oz baked turkey (160 cal) 1 cup steamed green beans (44 cal) 1/2 cup cooked quinoa (111 cal) 1/4 cup sunflower seeds (200 cal) 1 tbsp balsamic vinegar (14 cal) 1 tbsp olive oil (120 cal) *Total: 649 cal*	**Snack 1:** 1 medium banana (105 cal) 1 tbsp peanut butter (94 cal) *Total: 199 cal*	**Snack 2:** 1 oz dark chocolate (170 cal) 1/4 cup cashews (196 cal) *Total: 366 cal*

Effective Dietary Counseling

Tailor the **modality**

Include **clients' preferences, wishes, and expectations** during goal-setting

Show ***empathy***

Connect to ***motivation***

Use integrated ***support tools***

Provide ***recurring feedback***

Demonstration of ***self-efficacy***

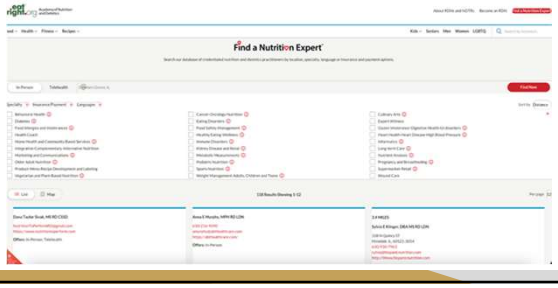
Barkmeijer et al., 2022

Referral Resources

Academy of Nutrition and Dietetics - eatright.org

- Find a Nutrition Expert
  - 1:1 and Group Counseling
  - Grocery Shop Tours
  - Pantry Makeovers
  - Culinary / Meal Prep Workshops

Resources for Providers and Patients



Evolution of Inflammation in Medicine

Evolving Process

- inflammatory markers
- how we conduct research (difficulty assessing, compliance issues)
- new ways to assess diets

➔ *Disease Specific Guidelines*

Anti-Inflammatory Diet

- The healthy properties cannot be limited to any single nutrient, food or food component, rather an entire meal pattern or lifestyle.
- This diet represents a behavioral model, a "way of life", that can ensure longer life expectancy and improve quality of life itself.

Di Daniele et al., 2017

Questions?

Anti-Inflammatory Meal Plan Handout

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