Anti-Inflammatory Diet and Foods

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Inflammation

• Latin, *inflammare* = to set on fire
• Biological response of tissues to harmful stimuli (pathogens, damaged cells and irritants)
• Characterized by:
  — Redness
  — Heat
  — Swelling
  — Pain
  — Loss of function

http://en.wikipedia.org/wiki/inflammation
intermittent increases in inflammation are critical for survival during physical injury and infection

systemic chronic inflammation → chronic disease
NonResolving Inflammation

Pain

Non-Resolution of INFLAMMATION

Atherosclerosis
Obesity
Cancer
Depression
COPD/Asthma
Autoimmune diseases

Nathan C and Ding A: Cell 140:871-882, 2010
Importance of Returning to Baseline
Specific foods are now known to exert strong effects on inflammatory pathways.

An anti-inflammatory diet plan:
- selecting foods that are anti-inflammatory in nature
- avoiding foods that are proinflammatory

A pattern of eating that:
- (1) focuses on eating whole, plant-based foods that are rich in healthy fats and phytonutrients
- (2) maintains a stable glycemic response

People with chronic spinal pain had significantly poorer diet quality compared to people without spinal pain (Healthy Eating Index).

Higher fruit and whole grain intake were associated with 20-25% lower likelihood of chronic spinal pain.

Added sugars and saturated fats were associated with 40-46% increased odds of chronic spinal pain.

The association with spinal pain was seen with added sugar as low as 8.8% of total dietary intake, approximately 5.5 tsp per 1000 kcal/d.
Fats (saturated, omega-6)

Sugars

Anti-oxidants
Anti-inflammatory
Phytonutrients
Omega-3 Fats

Oxidative stress

Smoking

INFLAMMATION
Antioxidant Power of Plant Foods

3/4 CUP OF COOKED KALE = 40 mg of vit. C + 10 IU of vit. E

3/4 CUP OF COOKED KALE NEUTRALIZED as many free radicals as did
599 mg of vit. C or 837 IU of vit. E

(1) Blueberries (6) Plums
(2) Kale (7) Broccoli
(3) Strawberries (8) Beets
(4) Spinach (9) Oranges
(5) Brussels sprouts (10) Red grapes

Wu X et al: JAFC, 52:4026-4037, 2004
# Inflammation Inhibitors in Culinary Herbs

<table>
<thead>
<tr>
<th>Herb</th>
<th>Inhibitor(s)</th>
<th>COX-2</th>
<th>5-LOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosemary (Rosmarinus officinalis)</td>
<td>Betulinic acid</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Ginger (Zingiber officinale)</td>
<td>Melatonin</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Gingerols</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Turmeric (Curcuma longa)</td>
<td>Curcuminoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Holy Basil (Ocimum sanctum)</td>
<td>Ursolic acid</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Oregano (Origanum vulgare)</td>
<td>Apigenin</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Green tea (Camellia sinensis)</td>
<td>Catechins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Barberry (Berberis vulgaris)</td>
<td>Berberine</td>
<td></td>
<td>+</td>
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</tbody>
</table>
C-Reactive Protein (CRP)

- Protein found in the blood
- Increased liver synthesis in response to inflammation
  — to IL-6 produced by macrophages and adipocytes
- Binds to lipids on the cell surface of microbes and dying cells to activate complement system and enhance phagocytosis
Anti-inflammatory effects of phytochemicals from fruits, vegetables, and food legumes: A review

Fengmei Zhu\textsuperscript{*}, Bin Du\textsuperscript{a,b}, and Baojun Xu\textsuperscript{b}

\textsuperscript{*}Hebei Normal University of Science and Technology, Qinhuangdao, Hebei, China; \textsuperscript{b}Food Science and Technology Program, Beijing Normal University—Hong Kong Baptist University United International College, Zhuhai, Guangdong, China

Greater frequency of fruit and vegetable intake was associated with significantly lower plasma CRP and homocysteine concentrations.

Lower concentrations of CRP were observed among people who consumed higher amounts of dietary fiber

Gao X et al., \textit{J Nutr} 134:913-918, 2004
Ajani UA et al., \textit{J Nutr}, 134:1181-85, 2004
Overall, 12.3% of adults met fruit recommendations, ranging from 8.4% in West Virginia to 16.1% in Connecticut (Ohio = 9.5%) and 10.0% met vegetable recommendations, ranging from 5.6% in Kentucky to 16.0% in Vermont (Ohio = 7.4%)
Forget five a day, eat 10 portions of fruit and veg to cut risk of early death

Scientists say even just 2.5 portions daily can lower chance of heart disease, stroke, cancer and premature death.

Sarah Boseley Health editor
Wednesday 22 February 2017 18.01 EST

Aune D et al., Int J Epidemiol, 2017, 1–28
• 31 randomized control trials 4 weeks in duration, reporting 1 of the following: C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor (TNF)

• consumption of whole grain foods had a significant effect in reducing at least one inflammatory marker
natural soy products (TOFU, TEMPEH, EDAMAME, MISO) may reduce plasma levels of CRP in comparison to other source of isoflavones (soy extracts, supplements)
What About Microbiome?

Slide from Dr. Jonathan Eisen
UC Davis
Avoid Starving Your Microbial Friends

Pain regulation by gut microbiota: molecular mechanisms and therapeutic potential

Ran Guo\(^1,\dagger\), Li-Hua Chen\(^2,\dagger\), Chungen Xing\(^4,\ast\) and Tong Liu\(^3,5,\ast\)

• ...gut microbiota regulates pain in the peripheral and central nervous system, and targeting gut microbiota by diet may represent a new therapeutic strategy for the management of chronic pain

*British Journal of Anaesthesia, 123 (5): 637e654 (2019)*
Human Gut Microbiome Rapidly Responds to Dietary Changes

- 6 male and 4 female volunteers
- **Plant-based diet**: cereal for breakfast and precooked meals made of vegetables, rice and lentils for lunch and dinner with fresh and dried fruits were provided as snack
- **Animal-based diet**: eggs and bacon for breakfast, cooked pork and beef for lunch; cured meats and four cheeses for dinner; pork rinds, cheese and salami as snack

Diet Changes Microbiome

• The animal-based diet increased the abundance of bile-tolerant microorganisms and decreased the levels of those that metabolize dietary plant polysaccharides.

• Increases in the abundance and activity of *Bilophila wadsworthia* on the animal-based diet support a link between dietary fat, bile acids and the outgrowth of microorganisms capable of triggering inflammation.

A vegan diet resulted in a significant **32% lower** high-sensitivity C-reactive protein (β, 0.68, 95% confidence interval [0.49–0.94]; P=0.02) when compared with the American Heart Association diet.

Conclusions—In patients with coronary artery disease on guideline-directed medical therapy, a vegan diet may be considered to lower high-sensitivity C-reactive protein as a risk marker of adverse outcomes.
Chew Well

https://majorleagueeating.com/contests/914
Chew Well

2.5 pounds
17.5 seconds!

DIETARY SPECTRUM

THE AMERICAN COLLEGE OF LIFESTYLE MEDICINE DIETARY POSITION STATEMENT
ACLM recommends an eating plan based predominantly on a variety of minimally processed vegetables, fruits, whole grains, legumes, nuts and seeds.

WHAT AMERICA EATS

Increase whole plant foods, fruits, vegetables, whole grains, beans, legumes, nuts, seeds, water

Decrease sweets and snacks, fast food, fried foods, refined grains, refined sugar, meat, dairy, eggs, poultry, high sodium foods

*Food items are not to scale

- Increased risk for Obesity, T2Diabetes, Heart Disease, and some Cancers
- Poor nutrition is the leading cause of death globally.

TIPS FOR IMPROVED NUTRITION AND HEALTH
- Any movement toward WFPB eating is positive
- More movement toward a WFPB eating plan increases impact
- Tailored and sustainable approaches are recommended

WHAT AMERICA EATS

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Decrease sweets and snacks, fast food, fried foods, refined grains, refined sugar, meat, dairy, eggs, poultry, high sodium foods

*Food items are not to scale

- Decreased risk for Obesity, T2Diabetes, Heart Disease, and some Cancers
- Chronic disease treatment and potential reversal

What We Eat in America (WWEIA) Food Category analyses for the 2015 Dietary Guidelines Advisory Committee. Estimates based on day 1 dietary recalls from WWEIA, NHANES 2009-2010.
CONCLUSIONS AND RELEVANCE Based on the NHANES cycles from 1999 to 2018, the estimated proportion of energy intake from consumption of ultraprocessed foods has increased among youths in the US and has consistently comprised the majority of their total energy intake.
Safety of Plant-based Diets

“As more people eat high-fiber foods, the gas blasted into the atmosphere is increasing dramatically”.

Robert Park of Scotland’s Research Institute warning that human flatulence may be contributing to global warming

*Vegetarian Times, April 15, 1991*
Greenhouse gas emissions from the livestock sector are estimated to account for 14.5 per cent of the global total, more than direct emissions from the transportation sector.
How To Implement Healthy Lifestyle Self-Care Practices?

“The only way to keep your health is to eat what you don't want, drink what you don't like, and do what you'd rather not'.”

Mark Twain

Following the Equator: A Journey Around the World
Transition Towards Healthier Lifestyles

• Experimentation
• Evolution
• Evaluation

• CALL: 513-475- WLNS (9567)
• https://www.uchealth.com/integrative/
What and How to Eat?

• Chew Well!
• Stick with Whole, Predominantly Plant Foods
• Grains → Only 100% Whole
• Keep added sugars and syrups to a minimum
• Eat until You are no longer hungry, not until You are full
• Use Your Grandma’s plates
• Cook More, order less
• Transform your kitchen into the environment that promotes health
www.tkcollaborative.org/
Evidence-based field of medicine that blends the *art of food and cooking* with the *science of medicine*

• to help people achieve optimal self-care via accessing, preparing and eating, high-quality meals

• to help prevent and treat a spectrum of common chronic, non-communicable, lifestyle-related, diseases and restore well-being

Culinary Medicine

“Cooking is the key to changing our health and the environment”.

Michael Pollan

“Diet Is the Single Most Important Predictor of Health”

David L. Katz MD, MPH

SMOOTHIE RECIPE:
YIELDS: 1 EA

FRUITS/VEGGIES
1/2 cup - 1 1/2 cups

PROTEIN/FAT
2 Tbsp

ICE/ FROZEN FRUIT
1/2 cup - 1 cup

LIQUID
1/2 cup - 1 cup
<table>
<thead>
<tr>
<th><strong>FRUITS/VEGGIE IDEAS:</strong></th>
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<tbody>
<tr>
<td>Spinach</td>
</tr>
<tr>
<td>Kale</td>
</tr>
<tr>
<td>Cucumber</td>
</tr>
<tr>
<td>Berries, such as</td>
</tr>
<tr>
<td>strawberries,</td>
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<tr>
<td>raspberries,</td>
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<tr>
<td>blueberries</td>
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<tr>
<td>Pineapple</td>
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<tr>
<td>Bananas</td>
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<tr>
<td>Kiwi</td>
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<table>
<thead>
<tr>
<th><strong>FROZEN FRUIT IDEAS:</strong></th>
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<tbody>
<tr>
<td>Frozen Strawberries</td>
</tr>
<tr>
<td>Frozen Blueberries</td>
</tr>
<tr>
<td>Frozen Raspberries</td>
</tr>
<tr>
<td>Frozen Grapes</td>
</tr>
<tr>
<td>Frozen Bananas</td>
</tr>
<tr>
<td>Frozen Cherries, pitted</td>
</tr>
<tr>
<td>Frozen Mango</td>
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<table>
<thead>
<tr>
<th><strong>PROTEIN/FAT IDEAS:</strong></th>
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</thead>
<tbody>
<tr>
<td>Walnuts</td>
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<tr>
<td>Chia Seeds</td>
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<tr>
<td>Flax Seeds</td>
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<tr>
<td>Avocado</td>
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<tr>
<td>Nut or Seed Butter</td>
</tr>
<tr>
<td>Extra Virgin Olive Oil</td>
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<tr>
<th><strong>LIQUID IDEAS:</strong></th>
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<tbody>
<tr>
<td>Oat Milk</td>
</tr>
<tr>
<td>Almond Milk</td>
</tr>
<tr>
<td>Coconut Milk</td>
</tr>
<tr>
<td>Juice (avoid sugar added)</td>
</tr>
<tr>
<td>Beet Juice</td>
</tr>
<tr>
<td>Carrot Juice</td>
</tr>
<tr>
<td>Orange Juice</td>
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<tr>
<th><strong>ADD-INS:</strong></th>
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<tbody>
<tr>
<td>Turmeric, ground</td>
</tr>
<tr>
<td>Cinnamon, ground</td>
</tr>
<tr>
<td>Ginger, ground</td>
</tr>
<tr>
<td>Dates, dried, pitted</td>
</tr>
</tbody>
</table>
Smoothies are great, but what else?
In The Kitchen with Chef Jim and Dr. Mike

https://vimeo.com/showcase/inthekitchen
What if you could be your own, best, first doctor? | Melinda Ring | TEDxChicago – YouTube
https://www.youtube.com/watch?v=G5CpG5I3qy0
Whole Foods Plant-Based Eating Pattern

Documentaries:
- **Forks Over Knives** - YouTube
  https://www.youtube.com/watch?v=n1LUj3kxB9M
- **The Game Changers** - Full Documentary - YouTube
  https://www.youtube.com/watch?v=kRClkTu1JLg
- **Code Blue** – Dr. Saray Stancic (drstancic.com)
  https://drstancic.com/codeblue

Mediterranean Eating Pattern

Center for Science in the Public Interest at [www.cspinet.org](http://www.cspinet.org)

[www.pcrm.org](http://www.pcrm.org)
EATING RIGHT IS HIGHLY LOGICAL