Naturopathic Approaches to Treatment of Ankylosing Spondylitis and Associated Disorders.

By

Dr. Alec Pekler
MS Environmental Health Toxicology, UCLA
Doctor of Naturopathic Medicine, Bastyr U.
www.DrHakunaMatata.com
Disclaimer

- None of the information in this presentation constitutes as a medical advice and/or treatment
- This information was solely compiled through the personal experience and training by the author
- If you have any medical issues please see a medical professional
Hippocrates

*Death sits in the bowels*

*and*

*bad digestion is the root of all evil.*

*400 B.C*
Outline:

- Naturopathic Medicine
- Immune dysregulation in AS
- Factors that contribute to immune dysregulation
- Inflammation
- Specific treatments for AS
- Questions
A little about me:

- B.S. Biology, American U.
- M.S. Toxicology, UCLA School of Public Health
- Doctor of Naturopathic Medicine, Bastyr University San Diego
- Father of 3 children
- Youngest – Avi - 11 years old with Down Syndrome, ASD, Hashimoto’s
  - Treated without medications for multiple illnesses
  - Healthier than most typical children now (took about 2-3 years of changed diet, vitamins, herbs and naturopathic modalities – water procedures)
  - Can read 5-20 words/min, very bright and energetic - [Avi’s Video Clip](#)
Avi sickness reduction (estimated)
Naturopathic Training

- 4 year program – based on MD curriculum, but treatments are natural and emphasis on prevention and nutrition.
  - 1st 2 years:
    - Biochemistry
    - Human Physiology
    - Histology
    - Anatomy
    - Macro- and Microbiology
    - Immunology
    - Human Pathology
    - Neuroscience
    - Pharmacology

Take 1st board exam - science

- Next 2 years:
  - Clinical Nutrition – food is medicine (nutrients, vitamins, herbs)
  - Botanical Medicine
  - Homeopathy
  - Acupuncture and Oriental Medicine
  - Lifestyle Counseling – big majority of curriculum because it is hard to change human behavior
  - Physical Medicine – chiropractic, craniosacral manipulations and massage
  - Hydrotherapy – special hot and water alternating techniques and sauna

Take 2nd board exam - clinical
Goal: Prevention

Prevention through:

- Stress management
- Sleep
- Exercise
- Nutrition
- Love
- Passions
- Detox
Cooking at school
Naturopathic Medicine

- 6 Principles:
  - *The Healing Power of Nature*
    Trust in the body’s inherent wisdom to heal itself.
  - *Identify and Treat the Causes*
    Look beyond the symptoms to the underlying cause.
  - *First Do No Harm*
    Utilize the most natural, least invasive and least toxic therapies.
  - *Doctor as Teacher*
    Educate patients in the steps to achieving and maintaining health.
  - *Treat the Whole Person*
    View the body as an integrated whole in all its physical and spiritual dimensions.
  - *Prevention*
    Focus on overall health, wellness and disease prevention.
How Does Illnesses develop? 
Naturopathic Prospective

- Person in healthy state
- Disturbing factors occur
  - Genetic abnormality (inborn factors) - Trisomy 21 = Down Syndrome, defective cholesterol receptor gene
  - Poor life style choices – High stress, no exercise/sleep, poor nutrition
  - Environmental factors – toxins, traffic, yelling boss
- Function is disturbed – Body cannot function properly
- Reaction - GI issues, cough, sneeze, can’t sleep, anxiety, depression.
- Discharge of the product of reaction – diarrhea, constipation, nose/throat/ears/skin inflammation, sleepiness, fatigue, yelling back at boss
- Resolution – if stop the disturbing factors return back to health, if do not chronic conditions develop.
Disease as Process

- Pro-inflammatory foods
- Toxins
- Lack of sleep
- Over/Under exercising
- Stress

Normal Health
Disturbing Factors
Disturbation of Function
Reaction (fever, inflammation, etc.)
Chronic Reaction
Degeneration (Zeff, Snider, Myers. 2006)
Naturopathic Hierarchy of Healing

1. Establish the conditions for health
   - Identify and remove disturbing factors – toxins, foods, stressors
   - Institute a more healthful regimen – sleep, exercise, nutrition, stress reduction

2. Stimulate the healing power of nature (vis medicatrix naturae): the self-healing processes = we are designed to heal without drugs, surgery, supplements and vitamins = fasting

3. Address weakened or damaged systems or organs
   - Strengthen the immune system –
   - Decrease toxicity
   - Normalize inflammatory function
   - Optimize metabolic function
   - Balance regulatory systems
   - Enhance regeneration
   - Harmonize with your life force

4. Modalities that we use: water/air/sun therapy, sauna, proper nutrition, vitamins, herbs, stress reduction, physical manipulations

4. Correct structural integrity – physical manipulations

5. Address pathology: Use specific natural substances, modalities, or interventions – use specific modalities that are specific for the pathology

6. Address pathology: Use specific pharmacologic or synthetic substances – if nothing else works (although if used long enough most people will heal with 1-5)

7. Suppress or surgically remove pathology – last resort
Whole body

We believe that the everything in the body is interconnected and we have to treat is as such:

TREAT THE WHOLE BODY, MIND AND SOUL
Food, gut and brain
Prevention

1) Sleep
2) Exercise
3) Enjoying life
4) Having friends
5) Having a job that you enjoy
6) Clear water and air
7) Stress management (meditation, yoga, prayer and 1-9) – your thoughts effect everything – read Dr. Pert’s book Molecules of Emotion
8) Reduce inflammation
9) Detox naturally – food, supplements and sauna
9) Nutrition (one way to reduce inflammation)
   - Plant based balanced food consumption (will go into detail)
   - Properly cooked food to:
     - Preserve nutrients and not to add more contaminants through proper cookware
Prevention through Nutrition

- Clinically
  - Impossible to heal a person if the person eats
    - Processed foods
    - Pro-inflammatory foods
    - Dairy
    - Gluten
    - Foods that the person has allergy or sensitivity to
    - Alcohol
    - Sugar
  - High Stress
  - Too much or too little exercise
  - Lack of restful sleep
What are possible causes of AS?

What are the causes of the immune dysregulation?
Possible Causes of AS

Editorial

Environmental Triggers and Autoimmunity

Aristo Vojdani, K. Michael Pollard, and Andrew W. Campbell

1 Immunosciences Laboratory, Inc., 822 S. Robertson Boulevard, Suite 312, Los Angeles, CA 90035, USA
2 Department of Molecular and Experimental Medicine, The Scripps Research Institute, 10550 North Torrey Pines Road, La Jolla, CA 92037, USA
3 The Wellness Center, 2344 Emerson Way, Land O Lakes, FL 34639, USA

Correspondence should be addressed to Aristo Vojdani; drari@msn.com

Received 9 October 2014; Accepted 9 October 2014; Published 24 December 2014

Copyright © 2014 Aristo Vojdani et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
Possible Causes of AS

Costello et al. Arthritis Research & Therapy 2013, 15:214
http://arthritis-research.com/content/15/3/214

REVIEW

Microbes, the gut and ankylosing spondylitis

Mary-Ellen Costello¹, Dirk Elewaut², Tony J Kenna¹ and Matthew A Brown*¹
Possible Causes of AS

Relationship between diet and ankylosing spondylitis: A systematic review

Tatiana V. Macfarlane1,2 ID, Hadeel M. Abbood1, Ejaz Pathan1, Katy Gordon3, Juliane Hinz1,4 ID, Gary J. Macfarlane1,5 ID
Possible Causes of AS

Rifaximin Alters Intestinal Microbiota and Prevents Progression of Ankylosing Spondylitis in Mice

Lianjun Yang¹, Bin Liu¹, Junchi Zheng¹, Jincheng Huang², Qinghao Zhao¹, Jinshi Liu¹, Zhihai Su¹, Min Wang¹, Zhifei Cui¹, Tingxuan Wang¹, Weicong Zhang¹, Qingchu Li¹ and Hai Lu²
Intestinal Microbiota Influences Non-intestinal Related Autoimmune Diseases

Maria C. Opazo¹,², Elizabeth M. Ortega-Rocha³, Irenice Coronado-Arrázola⁴, Laura C. Bonifaz⁵, Helene Boudin⁶, Michel Neunlist⁶, Susan M. Bueno⁴.
Possible Causes of AS

- Thyroid related Autoimmune diseases (GD, HT)
  - anti Saccharomyces cerevisiae antibodies (ASCA)
  - Yeast content
  - Presence of antibodies against Yersinia enterocolitica and to Helicobacter pylori
  - Bacteroides genus
  - Altered intestinal barrier
  - Intestinal permeability

- CNS related Autoimmune diseases (MS)
  - Bacteroides, Parabacteroides, Prevotella, and Lactobacillus genera
  - Akkermansia, Blautia, Ruminococcus and Bifidobacterium
  - Differentiation of T cells to CD25+/Foxp3+ Treg cells
  - Differentiation of T cells balanced towards to Th1 cells
  - Sutterella genus

Lipid 654 SCFAs

Gut Dysbiosis

- Diet
  - Infections
  - Antibiotics

Skin related Autoimmune diseases
  - Firmicutes
  - Actinobacteria
  - Staphylococcus
  - Akkermansia, Ruminococcus, and Pseudobutyivibrio
  - Gastrointestinal tract dysfunction

Type 1 diabetes
  - Intestinal permeability
  - Morphological alterations at the tight junction domains
  - microvilli
  - Zonulin
  - D. invissus, G. sanguinis and B. longum
  - Bacteroidaceae family
  - Bifidobacterium adolescentis and B. pseudacetagenulatum

CNS cognitive disorders
  - Lactobacillus and Bifidobacterium
  - Veillonellaceae family (FEP)
  - Lactobacillus (Autistic children)
  - Intestinal permeability
  - Proteobacteria and Actinobacteria
  - Bacteroidetes and Firmicutes (Depression)
  - or Lachnospiraceae (Depression)

Systemic Autoimmune diseases (SLE)
  - Firmicutes
  - Bacteroides phyla
  - Lymphocyte activation
  - T cell differentiation towards Th17
Microbial Imbalance

Dysbiosis and disease

- Dysbiosis: microbial imbalance or maladaptation on or inside the body (impaired microbiota)
- Microbial dysbiosis is found in many different diseases
- Proposed causes of dysbiosis of the microbiota:
Possible Causes of AS

Review

A Possible Role of Intestinal Microbiota in the Pathogenesis of Ankylosing Spondylitis

Lianjun Yang \textsuperscript{1,\dagger}, Liping Wang \textsuperscript{1,2,\dagger}, Xin Wang \textsuperscript{3}, Cory J. Xian \textsuperscript{1,2,*} and Hai Lu \textsuperscript{1,*}
Possible Causes of AS

Fig. 1 Schematic diagram displaying the nexus between ‘Western diet’, gut microbiota, T cells, and autoimmunity.
Possible Causes of AS

Soleimanifar et al. Advances in Rheumatology

(2019) 59:9

Advances in Rheumatology

Effect of food intake and ambient air pollution exposure on ankylosing spondylitis disease activity

Narjes Soleimanifar¹,²,³, Mohammad Hossein Nicknam¹,³, Katayoon Bidad⁴, Ahmad Reza Jamshidi⁵, Mahdi Mahmoudi⁵, Shayan Mostafaei⁶, Zahra Hosseini-khah² and Behrouz Nikbin¹,²,³*
Possible Causes of AS

International Journal of Environmental Health Research, 2015

Relationship of environmental exposures and ankylosing spondylitis and spinal mobility: US NHAENS, 2009–2010

Ivy Shiue*

Built Environment, Heriot-Watt University, Edinburgh, UK
(Received 3 December 2013; final version received 27 May 2014)

It was aimed to study the relationships of different sets of urinary environmental chemical concentrations and ankylosing spondylitis in a national and population-based setting. Data were extracted from United States National Health and Nutrition Examination Surveys, 2009–2010. Information on demographics was obtained by household interview and ankylosing spondylitis clinical measures and urines were taken at examination. People with abnormal occiput-to-wall distance were found to have higher urinary cadmium (OR 2.17, 95% CI 1.34–3.52, p = 0.004), antimony (OR 1.74, 95% CI 1.15–2.62, p = 0.012), tungsten (OR 1.91, 95% CI 1.39–2.64, p = 0.001), uranium (OR 1.49, 95% CI 1.03–2.15, p = 0.036), and trimethylarsine oxide (OR 5.01, 95% CI 2.34–10.71, p < 0.001) concentrations. Moreover, people who resided in older households tended to have abnormal ankylosing spondylitis clinical measures, compared to those who resided in households that were built in...
Possible Causes of AS

What is it?

Cadmium is a silver-white metal that is found in the earth's crust. It is extracted during the production of metals such as copper, lead, and zinc.

Cadmium is found in some foods and is emitted by using fossil fuels such as coal and oil, smoking cigarettes, and burning waste. It is used in batteries, craft glazes, and metal coatings.

Where is Cadmium found?

- Consumer products - cigarettes, batteries, craft glazes, jewelry, and metal coatings
- Food - some shellfish, kidney beans, gran cereal, and vegetables
- Air - cigarette smoke, second-hand smoke, and emissions from fossil fuels

How can I be exposed to Cadmium?

Cadmium commonly enters the body through:

- Ingestion (swallowing)
  - Swallowing food that contains cadmium.
Cadmium levels in wine, beer and other alcoholic beverages: possible sources of contamination.

Mena C¹, Cabrera C, Lorenzo ML, López MC.

Abstract
An accurate and precise method is described for the direct determination of Cd in wine, beer and other alcoholic beverages by electrothermal atomization-atomic absorption spectrometry (ETA-AAS). The graphite furnace program was optimized and samples were pretreated with nitric acid and pentoxide vanadium in a digestion block at 120 degrees C for 90 min. The results obtained were validated against microwave acid sample digestion. The analytical detection limit was 0.5 pg. The proposed method was applied to determine Cd in 134 samples of 10 different alcoholic beverages. The mean values ranged from 0.10 to 15.38 microg/l in wine, from not detectable to 0.80 microg/l in beer, and from not detectable to 11.52 microg/l in other alcoholic beverages such as cider, brandy, rum, whisky, gin, anisette, liquor and spirits. The wide variability of the results obtained emphasizes the multiplicity of factors that can influence the presence of Cd in these products. Because alcoholic beverages are widely consumed, they contribute a large fraction of cadmium intake, and therefore, strict control of this element is advisable.
Review

The accumulation and toxicity of methylated arsenicals in endothelial cells: important roles of thiol compounds

Seisihiro Hirano, a,b,⁎, Yayoi Kobayashi, a Xing Cui, a Sanoe Kanno, a Toru Hayakawa, c,d and Amjad Shraim e,d

a Environmental Health Sciences Division, National Institute for Environmental Studies, 16-2 Ōtsuka, Tsukuba, Ibaraki 305-8566, Japan
b Research Center for Environmental Risk, National Institute for Environmental Studies, 16-2 Ōtsuka, Tsukuba, Ibaraki 305-8566, Japan
c Faculty of Pharmaceutical Sciences, Chiba University, Inohana, Inage, Chiba 263-8522, Japan
d National Research Centre for Environmental Toxicology, The University of Queensland, Coopers Plains, Brisbane, Queensland 4108, Australia

Received 1 July 2003; accepted 8 October 2003

Abstract

Excess intake of arsenic is known to cause vascular diseases as well as skin lesions and cancer in humans. Recent reports suggest that trivalent methylated arsenicals, which are intermediate metabolites in the methylation process of inorganic arsenic, are responsible for the toxicity and carcinogenicity of environmental arsenic. We investigated acute toxicity and accumulation of monomethylarsonic acid (MMAIII), dimethylarsinic acid (DMAII), trimethylarsine oxide (TMAO), and monomethylarsinous acid diglutathione (MMAIII(GS)2) in rat heart microvascular endothelial (RHMVE) cells. MMAIII (LC₅₀ = 36.6 nM) and DMAII (LC₅₀ = 2.54 nM) were less toxic than inorganic arsenicals (LD₅₀ values for inorganic arsenic (iAsIII), and inorganic arsenite (iAsV) were reported to be 26 and 228 μM, respectively, in RHMVE cells). TMAO was essentially not toxic. However, MMAIII(GS)2 was highly toxic (LC₅₀ = 4.1 μM). The order of cellular arsenic accumulation of these four organic arsenic compounds was MMAIII(GS)2 > MMAIII > DMAII > TMAO MMAIII(GS)2 was efficiently taken up by the cells and cellular arsenic content increased with the concentration of MMAIII(GS)2 in culture medium. N-acetyl-L-cysteine (NAC) reduced cellular arsenic content in DMAII-exposed cells and also decreased the cytotoxicity of DMAII, whereas it changed neither cellular arsenic content nor the viability in MMAIII-exposed cells. MMAIII(GS)2, levels of intracellular GSH (1.93 ± 0.4) were decreased by NAC in DMAII-exposed, but MMAIII-exposed cells. Buthionine sulfoximine (BSO), a cellular glutathione (GSH) depleting agent, enhanced the cytotoxicity of MMAIII. However, BSO reduced, rather than enhanced, the cytotoxicity of DMAII. These results suggest that intracellular GSH modulated the toxic effects of arsenic in opposite ways for MMAIII and DMAII. Even though intracellular GSH decreased the cytotoxicity of MMAIII, extracellularly added GSH enhanced the cytotoxicity of MMAIII. The use of high-performance liquid chromatography (HPLC)-inductively coupled plasma mass spectrometric analyses suggested that a small amount of MMAIII was converted to MMAIII(GS)2 in the presence of GSH. These results support that MMAIII(GS)2 is highly toxic compared to other arsenic compounds because of faster accumulation of this species in cells in addition to enhanced intracellular concentration of reduced thiol compounds.
Possible Causes of AS

Stress as a trigger of autoimmune disease

Ljudmila Stojanovich*, Dragomir Marisavljevich

“Bezanijska Kosa” University Medical Center, Belgrade University, Serbia
Possible Causes of AS

DOI 10.1007/s10067-005-0131-z

ORIGINAL ARTICLE

Jane Zochling · Martin H. J. Bohl-Bühler · Xenofon Baraliakos · Ernst Feldtkeller · Jürgen Braun

Infection and work stress are potential triggers of ankylosing spondylitis
What do all of these possible causes boil down to?
Inflammation

- Caused by:
  - 1) Not sleeping – increase stress hormones = inflammation
  - 2) Sedentary life style (not exercising) – increases hypoxia (not enough oxygen) increases acidity = inflammation
  - Tumor cells grow much better in acidic environment!!! Show me a person who does not have cancer?
  - 3) Toxins (from water, air, food) – directly damage cells
  - 4) Stress – increase stress hormones = inflammation
  - 5) Thinking negatively = also promotes inflammation
  - 6) Pro-inflammatory diet:
    - Processed foods (more than too much) What is process foods?
    - Improperly cooked food – it becomes oxidized = major factor
    - Too much sugar – increases inflam. directly and impairs immune system
    - Too much caffeine
    - Too much alcohol
    - No plant based foods (vegetables/fruit)
    - Too much meat and milk (not enough fish and legumes (beans))
    - Too many toxins in food, water, air
    - Overeating – increases inflam. because body cannot keep up with processing of this material
Mechanism of Inflammation

Current Diet
Increases:
Pro-Inflam.
Chemicals:
ROS
H₂O₂
Hi Acid
Hi Cell
Damage Everywhere

Viruses, bacteria, toxins, processed foods, sugar
Lack of sleep and exercise, stress, too much TV

Current Diet
Increases:
Pro-Inflam.
Chemicals:
ROS
H₂O₂
Hi Acid
Hi Cell
Damage Everywhere
Inflammation = Rusting
“Salt Sugar Fat: How the Food Giants Hooked Us”

- How we are tricked into eating them and why they are so bad for us
- Book by Michael Ross and another book “The pleasure Trap” by Dr. Goldhamer: fasts people for up to 90 days with great results in Santa Rosa, CA – has a big clinic
- Shows that food companies make the food super fat, super salty and super sugary and make it addictive = we are designed genetically to enjoy pleasure. These molecules go into the brain and make you crave it more.
- It takes at least 2 weeks to stop craving all of theses foods once you get rid of them.
What do infants/children consume?

- Breast milk (only about 30% of infants in the US breastfed to 12 months).
- Formula – high in High Fructose Corn Syrup (up to 1990’s).
- First baby foods – cereals (high sugar content and Cadmium).
What else do infants receive with their cereal?

Lead and cadmium contamination in a large sample of United States infant formulas and baby foods.

Gardener H1, Bowen J2, Callan SP3.

Author information
1 Department of Neurology, University of Miami, Miami, FL, USA. Electronic address: hgardener@med.miami.edu.
2 The Clean Label Project, Denver, CO, USA. Electronic address: jbowen@cleanlabelproject.org.
3 Ellipse Analytics, Denver, CO, USA. Electronic address: scallan@ellipseanalytics.com.

Abstract
Data is limited on lead and cadmium contamination in baby food, a population uniquely susceptible to the toxic effects of heavy metals. The goal of this study was to examine lead and cadmium concentrations in a large convenience sample of US baby foods. We identified the number of baby food product samples that exceeded US FDA and California Proposition 65 limits for daily lead consumption across a range of servings/calories, and the number of samples that exceeded World Health Organization and California Proposition 65 limits for daily cadmium consumption across a range of servings/calories. In total, 564 baby foods were tested across infant and toddler formula, cereals, meals, juices/drinks, jars, pouches, snacks, and electrolyte water. ICP-MS analysis of lead and cadmium was completed using a modified version of EPA method 6020A. Samples were analyzed using kinetic energy distribution mode. Lead was detected in 37% of samples (median = non-detect, 75% = 5.6, maximum = 183.6 µg/kg), and cadmium in 57% (25% = non-detect, median = 2.8, 75% = 9.5, maximum = 103.90 µg/kg). Of 91 infant formula samples, none exceeded FDA lead consumption guidelines in 31 oz, but 22% exceeded the Proposition 65 lead guidelines, 23% exceeded the Proposition 65 cadmium guidelines, and 14% exceeded the WHO tolerable cadmium intake levels for a four-month-old baby. In the solid baby food samples, 1% exceeded FDA lead guidelines in two servings (26% exceeded CA Proposition 65 limits), 3% in 300 cal (34% exceeded CA Proposition 65 limits). For cadmium, 6% exceeded Proposition 65 guidelines in two servings, 8% in 300 cal. There was no association between whether the product was certified organic and its heavy metal concentration. Products containing rice were higher in both lead and cadmium concentrations. Further research is needed to understand the long-term health effects of this chronic daily low level heavy metal exposure in babies.
One of the biggest offenders

Sugar

- Sugar intake depresses immune system
  - Acutely – get colds (sick after holidays?)


**Role of sugars in human neutrophilic phagocytosis.**
Sanchez A, Reeser JL, Lau HS, Yahiku PY, Willard RE, McMillan PJ, Cho SY, Magie AR, Register UD.
Sugar and Immunity

ABSTRACT This study was designed to test a) whether carbohydrates other than glucose decreased the phagocytic capacity of neutrophils in normal human subjects, b) the duration of this effect, and c) the effect of fasting on neutrophilic phagocytosis. Venous blood was drawn from the arm after an overnight fast and at 0.5, 1, 2, 3, or 5 hr postprandial and this was incubated with a suspension of Staphylococcus epidermidis. The phagocytic index (mean number of bacteria viewed within each neutrophil) was determined by microscopic examination of slides prepared with Wright’s stain. Oral 100-g portions of carbohydrate from glucose, fructose, sucrose, honey, or orange juice all significantly decreased the capacity of neutrophils to engulf bacteria as measured by the slide technique. Starch ingestion did not have this effect. The decrease in phagocytic index was rapid following the ingestion of simple carbohydrates. The greatest effects occurred between 1 and 2 hr postprandial, but the values were still significantly below the fasting control values 5 hr after feeding (P < 0.001). The decreased phagocytic index was not significantly associated with the number of neutrophils. These data suggest that the function and not the number of phagocytes was altered by ingestion of sugars. This implicates glucose and other simple carbohydrates in the control of phagocytosis and shows that the effects last for at least 5 hr. On the other hand, a fast of 36 or 60 hr significantly increased (P < 0.001) the phagocytic index. Am J Clin Nutr 26: 1180–1184, 1973.

Very few Studies?!? Why?
Sugar and Immunity

- 10 subjects – normal blood sugar levels
- 8 subjects – abnormal sugar levels
- 7 subjects – water (controls)
- 100 g of Carbohydrates (>overnight fast)
  - Honey
  - Orange Juice
  - Glucose
  - Fructose
  - Starch
  - Sucrose
- 6 different days
Sugar and Immunity

● Phagocytic Index:
  ● # of bacteria (*Staphylococcus epidermidis*) in first 50 neutrophils
  ● Counted under the microscope

● Blood drawn:
  ● Overnight fasting (0 hr)
  ● 0.5, 1, 2, 3, 5 hrs
Sugar and Immunity

Non-diabetic Subjects

Neutrophilic phagocytosis and plasma glucose of human subjects fed different carbohydrates after an overnight fast

<table>
<thead>
<tr>
<th>Treatment and parameter measured</th>
<th>Fasting&lt;sup&gt;a&lt;/sup&gt; (10-13)&lt;sup&gt;b&lt;/sup&gt;</th>
<th>30 min (5-10)</th>
<th>1 hr (10-13)</th>
<th>2 hr (9-11)</th>
<th>3 hr (9-11)</th>
<th>5 hr (6-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose Phagocytic index&lt;sup&gt;c&lt;/sup&gt;</td>
<td>16.2 ± 0.9&lt;sup&gt;d,e&lt;/sup&gt;</td>
<td>13.8 ± 1.3</td>
<td>11.7 ± 0.8</td>
<td>9.6 ± 0.6</td>
<td>12.9 ± 0.6</td>
<td>13.5 ± 0.7</td>
</tr>
<tr>
<td>Glucose Plasma glucose, mg/dl</td>
<td>86 ± 2&lt;sup&gt;d&lt;/sup&gt;</td>
<td>117 ± 9</td>
<td>97 ± 7</td>
<td>88 ± 7</td>
<td>67 ± 4</td>
<td>77 ± 2</td>
</tr>
<tr>
<td>Fructose Phagocytic index</td>
<td>15.5 ± 1.0</td>
<td>13.3 ± 2.0</td>
<td>8.5 ± 0.9</td>
<td>9.7 ± 1.2</td>
<td>11.0 ± 0.9</td>
<td>12.8 ± 1.1</td>
</tr>
<tr>
<td>Fructose Plasma glucose, mg/dl</td>
<td>89 ± 3</td>
<td>96 ± 5</td>
<td>96 ± 2</td>
<td>89 ± 3</td>
<td>87 ± 2</td>
<td>81 ± 3</td>
</tr>
<tr>
<td>Sucrose Phagocytic index</td>
<td>15.2 ± 1.0</td>
<td>12.1 ± 1.7</td>
<td>8.6 ± 0.9</td>
<td>9.3 ± 0.7</td>
<td>12.5 ± 1.1</td>
<td>15.0 ± 1.3</td>
</tr>
<tr>
<td>Sucrose Plasma glucose, mg/dl</td>
<td>90 ± 2</td>
<td>110 ± 7</td>
<td>88 ± 5</td>
<td>82 ± 2</td>
<td>79 ± 3</td>
<td>80 ± 3</td>
</tr>
<tr>
<td>Honey Phagocytic index</td>
<td>15.9 ± 0.9</td>
<td>15.9 ± 1.7</td>
<td>9.7 ± 0.9</td>
<td>9.7 ± 0.9</td>
<td>12.4 ± 1.1</td>
<td>12.7 ± 1.0</td>
</tr>
<tr>
<td>Honey Plasma glucose, mg/dl</td>
<td>89 ± 1</td>
<td>115 ± 15</td>
<td>89 ± 5</td>
<td>75 ± 3</td>
<td>81 ± 4</td>
<td>87 ± 2</td>
</tr>
<tr>
<td>Orange juice Phagocytic index</td>
<td>16.6 ± 1.2</td>
<td>12.6 ± 1.0</td>
<td>10.1 ± 1.3</td>
<td>9.6 ± 0.8</td>
<td>13.2 ± 1.4</td>
<td>11.7 ± 0.8</td>
</tr>
<tr>
<td>Orange juice Plasma glucose, mg/dl</td>
<td>89 ± 2</td>
<td>114 ± 9</td>
<td>93 ± 4</td>
<td>86 ± 4</td>
<td>86 ± 2</td>
<td>81 ± 2</td>
</tr>
<tr>
<td>Starch Phagocytic index</td>
<td>15.7 ± 0.8</td>
<td>17.1 ± 1.3</td>
<td>14.4 ± 0.9</td>
<td>14.1 ± 1.1</td>
<td>14.6 ± 1.3</td>
<td>13.6 ± 0.7</td>
</tr>
<tr>
<td>Starch Plasma glucose, mg/dl</td>
<td>88 ± 2</td>
<td>98 ± 7</td>
<td>96 ± 4</td>
<td>83 ± 3</td>
<td>83 ± 3</td>
<td>85 ± 2</td>
</tr>
</tbody>
</table>

<sup>a</sup> After an overnight fast of approximately 12 hr.  
<sup>b</sup> Numbers in parentheses indicate subjects per group for the various time intervals and different carbohydrates.  
<sup>c</sup> Mean number of bacteria (Staphylococcus epidermidis) viewed within each neutrophil.  
<sup>d</sup> Mean ± standard error.  
<sup>e</sup> Statistical analyses are given in the text. The significant reduction in phagocytic index (P < 0.001) was statistically indistinguishable after feeding each of the various simple carbohydrates and the phagocytic index with the sugars was significantly less (P < 0.001) than with starch.
FIG. 1. Comparison of the effects of sugars and starch on the phagocytic index after an overnight fast in normal human subjects ingesting 100 g carbohydrate. The values for starch ± standard error (solid line) and for the sugars ± standard error of their means (broken line) are derived from Table 2. The sugars include glucose, fructose, sucrose, honey, and orange juice.
Sugar and Immunity

Diabetic Patients

<table>
<thead>
<tr>
<th>Time interval</th>
<th>Plasma glucose</th>
<th>Phagocytic index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>102 ± 5 (^a)</td>
<td>12.4 ± 0.7 (^a)</td>
</tr>
<tr>
<td>30 min</td>
<td>187 ± 17</td>
<td>9.1 ± 0.9</td>
</tr>
<tr>
<td>1 hr</td>
<td>231 ± 26</td>
<td>7.2 ± 0.8</td>
</tr>
<tr>
<td>2 hr</td>
<td>185 ± 30</td>
<td>5.3 ± 0.7</td>
</tr>
<tr>
<td>3 hr</td>
<td>126 ± 23</td>
<td>9.7 ± 1.1</td>
</tr>
</tbody>
</table>

\(^a\) Mean ± standard error of the mean.
Can you imagine what 1 can of soda does? 3 cans? After 20 years?
Ginger Ale = when sick?

- 3 g of sugar/30 g of Ale = 25 g of sugar/240 ml of ale
**Juice**

### Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: 248 g</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount Per Serving</strong></td>
</tr>
<tr>
<td><strong>Calories: 112</strong></td>
</tr>
<tr>
<td>Calories from Fat: 2%</td>
</tr>
<tr>
<td><strong>Total Fat: 0g</strong></td>
</tr>
<tr>
<td>Saturated Fat: 0g</td>
</tr>
<tr>
<td><strong>Trans Fat: 0g</strong></td>
</tr>
<tr>
<td>Cholesterol: 0mg</td>
</tr>
<tr>
<td>Sodium: 2mg</td>
</tr>
<tr>
<td><strong>Total Carbohydrate: 20g</strong></td>
</tr>
<tr>
<td>Dietary Fiber: 0g</td>
</tr>
<tr>
<td>Sugars: 21g</td>
</tr>
<tr>
<td><strong>Protein: 2g</strong></td>
</tr>
</tbody>
</table>

**Vitamin A:** 10%  
**Vitamin C:** 207%  
**Calcium:** 3%  
**Iron:** 3%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.*

---

*NutritionData.com*

**Download Printable Label Image**

---

**Nutritional Target Map**

- **More Filling:** 
- **Nutrients:**
- **Fullness Factor:** 3.6
- **ND Rating:** 3.1

**Caloric Ratio Pyramid**

- **Carbs:** 31%
- **Protein:** 4%
- **Fats:** 5%

**Estimated Glycemic Load:**

*The good: This food is very low in Saturated Fat, Cholesterol and Sodium. It is also a good source of Thiamin, Folate and Potassium, and a very good source of Vitamin C.*

*The bad: A large portion of the calories in this food come from sugars.*

**Weight loss:**

- **Optimum health:**
- **Weight gain:**

**Typical target total is 100/day or less**
Granola
Granola + Juice

- Granola = 29 g of sugar
- Juice = 21 g of sugar

Total = 50 g of sugar
Sugar Substitute

- Health effects
  - Carcinogenic
  - Insulin resistance promotion
  - Cardiovascular risk
  - Cell death – osmotic trap
  - Neurotoxins
General Nutritional Guidelines

Current US Guideline

Much better pyramid

Do you see a difference?
Modern
Dr. Murray

The Optimal Health Food Pyramid

- **Completely Avoid:**
  - High-glycemic starchy or sugary foods, hydrogenated oils, deep fried foods

- **Dairy Products**
  - Low-fat
  - 1-2 servings

- **Fruit**
  - 2-3 servings

- **Whole grains**
  - Low-glycemic choices only
  - 3-5 servings

- **Legumes**
  - 2-3 servings
  - (Lean chicken or turkey; fish and seafood; eggs)

- **Good oils**
  - 4 servings
  - Fresh nuts, seeds; vegetable oils (e.g., flax, olive, macadamia, canola)

- **Vegetables**
  - 5-7 servings

- **Optional:**
  - May substitute with calcium supplement

Exercise
- Daily
- Aerobics
- Strength
- Stretching

Pure water
- 8-12 glasses a day
Current Representation

What is missing? Why?
Current Representation

Where is a good fat?
Going to the Pharmacy Market?
Highest anti-oxidants foods

- Sulphur Containing Foods:
  - Arugula
  - Bok Choy
  - Broccoli
  - Brussel Sprouts
  - Cabbage
  - Cauliflower
  - Collard Greens
  - Kale
  - Mustard greens
  - Radish
  - Turnip
  - Watercress
Toxins

- Where do we find them?
  - Air /Water/Food – pesticides and all chemicals from manufacturing and gasoline
  - Cosmetics/Personal hygiene products (soap/shampoo/deodorant)
  - Bug repellent
  - Canned food
  - Plastics
  - Cleaners
  - **COOKWARE - if cooking with fresh foods - this is where we get most of the toxins !!!**

- What do they do?
  - Endocrine disruptors – screw up your hormones
  - Metals – autoimmune dzs/neuro, compete with other minerals = detox not efficient
  - Directly toxic – destroy cells – brain!
  - Immune dysregulators
How to deal with toxins?

- Remove them from home
- Sauna - sweating
- Hyperbaric Oxygen
- Gentle Cleanses
- Fiber and bowel movement – 3 times per day
- Probiotics
- Chelation therapies
- Filters – air/water
- Organic food
- Fresh Air
Natural anti-inflammatory/oxidants compounds in foods

- Curcumin form Turmeric
  - Curry = spice = add it to as many dishes as you can and as much as you can so it tastes good
- Quercetin
  - Orange = white parts, garlic and onion
- Vit C, E, A and Bioflavanoids
  - Yellow veggies and veggies and fruits in general
- Glutathione precursors
  - Garlic and onion
- Omega-3 Fatty acids – fresh water fish, flaxseeds, green leafy veggies
- Bioflavanoids + antioxidants in:
  - Blueberry (organic to reduce exposure to pesticides)
  - Cocoa/Chocolate (no sugar and a little per day)
  - Ginger
  - Grape seeds – resveritol (super good for you)
  - Green tea – 1-3 cups/day
  - Rosemary – put into fish and soups
  - Spinach
  - Artichoke
  - Coffee (please not 10 ccups)
  - Brassica
- Lots of others – eating a diverse diet is the key!!!

ALL OF THESE HELP WITH REDUCTION OF CHRONIC DESEASES IF USED IN COMBINATION WITH SLEEP, EXERCISE, STRESS REDUCTION
Anti-oxidants

Neurohormentic phytochemicals include compounds from a range of botanical sources and chemical classes:

- Resveratrol – red grapes and wine, peanuts, soy
- Isothiocyanate sulforaphanes – broccoli and other cruciferous vegetables
- Curcumin – turmeric
- Catechins – green tea
- Allicin – garlic
- Hypericin – St. John’s wort
Produce from FM

What do you notice?
What do you notice?

All Colors!
Eating the whole foods

- Ex: apple + cinnamon = combining to ↑ health
- Skin = insoluble fiber + vitamins + anti-oxidant
- The white part = sugar + vitamins + fiber
- Seed = Omega 3+6, high antioxidant and anti-cancer (new article came out Aug 2013)
- Eating together = skin slows down digestion and lets all other nutrients to slowly absorbed in GI, fiber detoxifies and lowers cholesterol
- What about juice?
Whole Apple vs Juice

**TABLE 1 Polyphenolic concentration of whole apples (freeze dried) and apple juice**

<table>
<thead>
<tr>
<th>Polyphenolic compound</th>
<th>Whole apple (67 cultivars; n = 5 each), mg/kg dry weight (5)</th>
<th>Fresh juice (combined dessert and cider apples), mg/L(^1)</th>
<th>Commercial juice (combined clear and cloudy juices), mg/L(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxycinnamic acids</td>
<td>50–3000</td>
<td>57–593</td>
<td>69–259</td>
</tr>
<tr>
<td>5-Caffeoylquinic acid (chlorogenic acid)</td>
<td>15–2960</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-Coumaroylquinic acid</td>
<td>4–260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flavan-3-ols/procyanidins</td>
<td>4622–25,480</td>
<td>50–393</td>
<td>14–124</td>
</tr>
<tr>
<td>Procyanidins B2</td>
<td>69–2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procyanidins C1</td>
<td>58–970</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(+) Epicatechin</td>
<td>69–2760</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(+) Epicatechin</td>
<td>10–720</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligomeric procyanidins</td>
<td>1374–19,850</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
<tr>
<td>Flavonols</td>
<td>80–1660</td>
<td>0.4–27</td>
<td>4–14</td>
</tr>
<tr>
<td>Dihydrochalcones</td>
<td>49–434</td>
<td>10–171</td>
<td>9–87</td>
</tr>
<tr>
<td>Anthocyanins (red peel)</td>
<td>10–551</td>
<td>n.d.</td>
<td>n.d.</td>
</tr>
<tr>
<td><strong>Total polyphenols</strong></td>
<td><strong>5230–27,240</strong></td>
<td><strong>154–970</strong></td>
<td><strong>110–459</strong></td>
</tr>
</tbody>
</table>
Seeds – anti-oxidant powerhouse
Here is our typical food at home

What do you notice?
Budgeting for food

- Plan to spend: $8 per person per day on:
  - 95% organic fruits and vegetables
  - No hormone or antibiotics meats
  - Clean fish
  - Nuts and seeds
  - Legumes
  - Clean water
Specific AS treatments

- Sauna/Hydrotherapy
- Detoxification
- Gut health
- Nutritional changes
- High dose:
  - Vitamin A, D, C, E, Zn, Mg, Se
  - Omega 3/6 balance
  - Curcumin
  - Boswellia
  - Immune modulating herbs
    - Cat’s claw
    - Davil’s claw
  - Proteolytic Enzymes
  - Glucosamine Sulfate
  - Probiotic
- Sleep
- Stress Reduction
- Gentle Exercise
- Hyperbaric Oxygen Therapy
- Injection/Prolotherapy Therapy
- Avoiding Food Allergens
- Correct Hormone Imbalances
- Low dose Naltrexone
- Acupuncture
- Craniosacral Therapy
Further Resources:

- Environmental Working Group – [www.ewg.org](http://www.ewg.org)
- Price foundation [www.westonprice.org](http://www.westonprice.org)
- Price-Pottenger Nutrition Foundation – [www.ppnf.org](http://www.ppnf.org)
- Clean fish to consume – [www.seafoodwatch.org](http://www.seafoodwatch.org)
- Book: Nourishing Traditions by S. Fallon
- Book: Nourishing Meals by A. Segersten and T. Malterre
- Book: The Encyclopedia of Healing Foods by M. Murray
- Book: Greens Glorious Greens by J. Albi and C. Walthers
- Book: The Healing Power of Herbs by M. Murray
- Book: 8 Weeks to Women’s Wellness by M. Marchese
References:

- Pizzorno JE., Total Wellness: improve your health by understanding and cooperating with your body’s natural healing systems. Prima Health 1998.
- Pizzorno JE. Total Wellness course. Bastyr University San Diego, Summer 2013
- Rieg D., Gut Health course. Bastyr University San Diego, Summer 2013
- Pert CB., Molecules of Emotion Scribner 1997
- Serikov I., Gut Microbiota in Health and Disease Physiol Rev 90: 589-904 2010
- Moss M., Salt Sugar Fat Random Hou-se 2003
- Murray M., Healing Foods Atria 2005-
- Kalyanaraman B. Teaching the basics of redox biology to medical and graduate students: Oxidants, antioxidants and disease mechanisms. Redox Biol. 2013 Feb 8;1(1):244-257.
- Dr. Pottenger Food Guidelines Spring 2008 vi Health and Healing Wisdom Journal
- Improving the bioavailability of nutrients in plant foods at the household level.
- Gibson RS, Perlas L, Hotz C

- Dietary strategies for improving post-prandial glucose, lipids, inflammation, and cardiovascular health.