Dr. Aggarwal reports nothing to disclose.

Notes:

- Some personal slides of Monica Aggarwal’s family have been omitted.
- Slides have been reformatted and color backgrounds changed to make this handout more readable.

**STATS**

- **AUTOIMMUNE DISEASES AFFECT APPROXIMATELY 5%–8% OF THE POPULATION OR 14–22 MILLION PERSONS**
- **78% OF AFFECTED ARE WOMEN**
WHAT IS INFLAMMATION?

TRADITIONAL THOUGHT

Genetic Predisposition → ILLNESS → INFLAMMATION

Second Hit ??

ANOTHER WAY TO LOOK AT IT

Gene Activation

Genetic Predisposition → INFLAMMATION → ILLNESS

LIFESTYLE FACTORS

IMBALANCE = INFLAMMATION

LIFESTYLES vs. RESOURCES

WHY DID I GET RA?

- GENES >> INFLAMMATION >> ILLNESS
- GENES ALWAYS THERE
- LIFESTYLE TRIGGERS INFLAMMATION AND ACTIVATES GENES EXPRESSION
- MY LIFESTYLE TRIGGERS:
  - LACK OF SLEEP
  - STRESS
  - DAIRY
**INFLAMMATION THROUGH DIET**

```
DIET  GUT FLORA  INFLAMMATION  ILLNESS
```

**MICROBIOTA/MICROBIOME**

The human microbiome project says the human body has 100 trillion microscopic life forms living in it.

**MICROBIOTA/MICROBIOME**

- All surfaces on body are exposed to outside are covered in bacteria.
- It is estimated that 90% of cells (approximated 100 trillion cells) found in our bodies are not human.
- Only 10% human and the remainder is microbial.
- Microbiome: Each of these bacteria in our body carries genetic material.
- Some people call this microbiome, our “second genome” or our second brain.
- Gut bugs can affect how you feel.

**MICROBIOTA AFFECTED BY CHANGES FROM BIRTH**

- Twenty minutes after birth, the microbiota of vaginally delivered infants resembles the microbiota of their mother’s vagina.
- While infants delivered via cesarean section harbor microbial communities typically found on human skin.
- Significant changes in gut noted:
  - Starting a diet of breast milk,
  - Development of fever at day 92,
  - Introduction of rice cereal at day 134,
  - Introduction of formula and table foods at day 161,
  - And antibiotic treatment and adult diet at day 371.

THE BUGS AND HOW THEY CHANGE WITH DIET

• DIET AFFECTS MICROBIOTA
• LONG-TERM AGRARIAN SOCIETIES HAVE HIGHER LEVELS OF SHORT CHAIN FATTY ACIDS AND GREATER PREVOTELLA/BACTEROIDES RATIO
• MULTIPLE DISEASE STATES ARE ASSOCIATED WITH DECREASED MICROBIOTA BIODIVERSITY = DYSBIOSIS

CHANGE IN DIET = CHANGE IN BUGS

• EARLY ANIMAL STUDIES ALSO SHOWED THAT CHANGE OF DIET AFFECTED MICROBIAL COMPOSITION. MICE STUDIES
  • HIGH FAT WESTERN DIET:
  • BY REDUCING FAT OR CARBS:
  • INCREASE FIBER:
    • THIS MAY BE RELATED TO ELEVATED LEVELS OF SHORT CHAIN FATTY ACIDS WHICH HAVE BEEN SHOWN TO DECREASE GUT INFLAMMATION, CANCER AND OBESITY.

BACTERIAL COMPOSITION IS AFFECTED BY WHAT YOU EAT

ALL BACTERIA PRODUCE SHORT CHAIN FATTY ACIDS (SCFA).
BUTYRATE SCFA IS ANTI-INFLAMMATORY AND ANTI-NEOPLASTIC
AGRARIAN SOCIETIES PRODUCE MORE BUTYRATE SCFA

THE GREAT DIET SWITCH

• PRIOR TO STARTING: THIS INSPECTION OF THE LARGE INTESTINE (THE COLON) SHOWED THAT NINE OF THE 20 AMERICANS HAD POLyps. NO POLyps WERE FOUND IN ANY OF THE 20 SOUTH AFRICANS.
• TWO-WEEK FOOD EXCHANGES

O’Keefe et al., Fat, Fiber and Cancer Risk in African Americans and Rural Africans, Nat Communications, 2015
**DIET AFFECTS GUT FLORA, EXAMPLE 1**

<table>
<thead>
<tr>
<th>12 Africans</th>
<th>12 African Americans</th>
</tr>
</thead>
<tbody>
<tr>
<td>More fiber, plant based, whole grains</td>
<td>Less fiber, animal based, refined foods 2-3 times more animal protein and fat than African cohort</td>
</tr>
<tr>
<td>More Bacteria, Prevotella predominance</td>
<td>Less Bacteria, Bacteroides predominance</td>
</tr>
<tr>
<td>More fermentation</td>
<td>Less fermentation</td>
</tr>
<tr>
<td>More Butyrate</td>
<td>Less Butyrate</td>
</tr>
<tr>
<td>Minimal colon cancer rates</td>
<td>High rates of colon cancer</td>
</tr>
</tbody>
</table>


**RESULTS**

- **MOVING TO AFRICAN DIET:**
  - Significant reductions in colon inflammation and other chemical signals that have been linked to colon cancer risk.
  - Microbiomes generated more butyrate, a byproduct of fiber metabolism that can help prevent cancer.

- **MOVING TO THE WESTERN DIET:**
  - Increase in inflammation
  - A decrease in butyrate generation, and other changes that could lead to colon cancer.

- **IN 2 WEEKS**

  O’Keefe et al., Fod. Fiber and Cancer Risk in African Americans and Rural Africans. *Net Communications* 2015

**EXAMPLE 2: INTESTINAL METABOLITE- TMAO**

Dietary choline and L-carnitine are metabolized into TMA in the gut and an enzyme in the liver converts it to TMAO (trimethylamine-N-oxide)

Effects of TMAO in the bloodstream:
  - Cholesterol metabolism
  - Vascular inflammation
  - Plaque formation in the arterial walls

Participants who had major adverse cardiovascular events also had higher baseline levels of TMAO, as compared with those who did not have cardiovascular events independent of traditional risk factors.


---

**ANIMAL MODELS WITH CARNITINE**

- **DIETARY CARNITINE ACCELERATES ATHEROSCLEROSIS BY 1.8 FOLD**
- **ANTIBIOTICS INHIBIT THIS EFFECT...GUT MICROBIOTA?!**

Koeth RA, Hazen S. Nature Medicine 2013

---

**DIFFERENT RESPONSES WITH DIFFERENT GUT BIOMES**

- **VEGAN=NO CAPACITY TO PRODUCE TMAO AFTER CHALLENGE**

Koeth RA, Hazen S. Nature Medicine 2013

---

**EXAMPLE 3: GUT METABOLITES**

- **ENDOTOXIN (POLYSACCHARIDE)**: RELEASED FROM BACTERIA WHEN THEY DIE
- **TRANSGRADE TO BLOODSTREAM**
- **ELEVATED LEVELS ARE ASSOCIATED WITH INFLAMMATION, INCREASED INTESTINAL PERMEABILITY**
- **ASSOCIATED WITH NAS, ATHEROSCLEROSIS (FORMATION OF CHYLOMICRONS), RHEUMATOID ARTHRITIS, OBESITY, TYPE II DM**
ENDOTOXIN

• INGESTION OF HIGH-FAT AND HIGH-CARBOHYDRATE WESTERN-STYLE MEALS FOUND TO PRODUCE POSTPRANDIAL "METABOLIC ENDOTOXEMIA". AN INCREASE IN CIRCULATING LPS LEVELS AND OTHER INFLAMMATORY CHANGES

• AFTER SUCCESSFUL ROUX-EN-Y GASTRIC BYPASS SURGERY, THE REDUCTIONS IN WEIGHT AND INSULIN RESISTANCE ARE ASSOCIATED WITH REDUCTIONS IN CIRCULATING LPS AND INFLAMMATION

• INCREASED FRUIT AND VEGETABLE EXTRACTS DECREASE LPS LEVELS

• HIGH FIBER MAY DECREASE LPS

Abiteboul, V., et al. 2017
Diet, Microbiome, and Metabolites. Obesity and Insulin Resistance, Diabetes, 2007

Spinelli, C. Comparison with conventional diets suggest dietary carbohydrates promote inflammatory mediators, and may be the primary dietary cause of high insulin and glucose, 2012

EXAMPLE 4 = C DIFF COLITIS

RECAP

• BUGS ALL OVER YOU. YOU ARE MADE OF LOADS OF BUGS

• CHANGE FROM BIRTH

• CHANGE FROM DIET, ANTIBIOTICS

• DIFFERENT FOODS AFFECT GUT BIOME AND DIFFERENT BIOMES ARE ASSOCIATED WITH DIFFERENT RISKS OF ILLNESSES

• BUT WHAT IS THE MECHANISM?

HOW THE GUT FUNCTIONS

Gut bugs = Microbiota

Good bugs, bad bugs

What you eat determines your bugs

Aggarwal, M, Rao J. Finding Balance
http://www.monicag.com
WHATS WRONG WITH OUR FOODS=THE STANDARD AMERICAN DIET (SAD)

SAD DIET

- THIS DIETARY PATTERN IS CHARACTERIZED BY A HIGH CONSUMPTION OF
  - RED MEAT
  - REFINED GRAINS
  - PROCESSED MEAT
  - HIGH-FAT DAIRY PRODUCTS
  - DESSERTS
  - HIGH-SUGAR DRINKS
  - EGGS

* ALMOST 75% OF PACKAGED FOODS IN THE U.S. NOW CONTAIN ADDED SUGARS, AND MUCH ALSO COMES FROM CONSUMPTION OF SUGAR-SWEETENED BEVERAGE (SSBS)

* ALCOHOL CONSUMPTION CONtributes TO HEPATITIS, LIVER RISK, AND HEPATOCARCINOMA

* ADDITIONAL FACTORS THAT MAY CONTRIBUTE TO THE DEVELOPMENT OF HEPATITIS C TELLUSION OF THE IMMUNE SYSTEM:
  - CONSUMPTION OF HIGH-SUGAR DRINKS
  - CONSUMPTION OF HIGH-SALT DRINKS

* STUDY OF 3,000 PEOPLE FOUND THOSE WHO CONSUMED HIGH-SUGAR DRINKS HAD A HIGHER RISK OF DEVELOPING HEPATITIS C

* NATIONAL INSTITUTE OF HEALTH RECOMMENDATIONS:
  - DRINK WATER INSTEAD OF SUGARY DRINKS
  - LIMIT THE CONSUMPTION OF SUGARY DRINKS

* DECREASED RISK OF DEVELOPING HEPATITIS C WITH REDUCTION IN SUGAR CONSUMPTION

* ADVICE FOR INDIVIDUALS WITH HEPATITIS C:
  - LIMIT THE CONSUMPTION OF SUGARY DRINKS
  - INCREASE THE CONSUMPTION OF WATER

* FUTURE RESEARCH:
  - FURTHER STUDIES TO EXPLORE THE EFFECTS OF SUGARY DRINKS ON HEPATITIS C

* CONCLUSION:
  - REDUCING SUGARY DRINK CONSUMPTION MAY REDUCE THE RISK OF DEVELOPING HEPATITIS C

* ACKNOWLEDGEMENTS:
  - THANKS TO THE NATIONAL INSTITUTE OF HEALTH FOR THEIR SUPPORT

* REFERENCES:
  - Sacks DB, et al. JAMA. 2015 August 5; vol. 314 no. 6 606-611

* SUGAR SHOCKERS
  - CONSUMPTION OF SUGARY DRINKS CAN LEAD TO INCREASED RISK OF HEART DISEASE
  - CONSUMPTION OF WATER CAN REDUCE THE RISK OF HEART DISEASE

* WATER COMMUNICATION CARD
  - WATER IS THE BEST DRINK FOR YOUR HEALTH
  - CONSUME WATER INSTEAD OF SUGARY DRINKS
Risk of Death from Any Cause per 20-Percentile Increase in Diet-Quality Scores.

CONCLUSIONS: 20-percentile increase in diet-quality scores was associated with a reduction of 8 to 17% in the risk of death from any cause.

WHAT SPECIFICALLY IS WRONG WITH THE DIET?
FIGURE 3. Multivariate relative risks (RRs) of coronary artery disease according to body mass index (BMI) and dietary glycemic load (GL): The GL is stratified by tertiles and the RRs are adjusted for the same covariates as those in Table 3. The 90% CIs for the 4 RRs are as follows: 1) RR (RR (95% CI): 1.00 (0.82-1.20), 1.18 (95% CI): 1.11 (1.02-1.20), 1.00 (95% CI): 0.92-1.09). 1.11 (95% CI): 1.02-1.20), 1.18 (95% CI): 1.09-1.27). 1.11 (95% CI): 1.02-1.20), 1.18 (95% CI): 1.09-1.27).


---

FIGURE 1. DOSE-RESPONSE RELATIONSHIP BETWEEN GL AND RISK OF CHD AND STROKE.

---

CHAI LATTE: BLACK TEA INFUSED WITH CINNAMON, CLOVE, AND OTHER WARMING SPICES IS COMBINED WITH STEAMED MILK AND TOPPED WITH FOAM FOR THE PERFECT BALANCE OF SWEET AND SPICY.

---

ACCORDING TO THE AMERICAN HEART ASSOCIATION (AHA), THE MAXIMUM AMOUNT OF ADDED SUGARS YOU SHOULD EAT IN A DAY ARE:

1 tsp=4 grams sugar

Daily Added Sugar Limit

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>No more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 teaspoons</td>
<td>36 grams</td>
<td>25 grams</td>
</tr>
<tr>
<td>150 calories</td>
<td></td>
<td>100 calories</td>
</tr>
</tbody>
</table>
CONCLUSIONS
Higher dietary intakes of major SFA's are associated with an increased risk of coronary heart disease. Owing to similar associations and high correlations among individual SFAs, dietary recommendations for the prevention of coronary heart disease should continue to focus on replacing total saturated fat with more healthy sources of energy.

TRIALS THAT SHOW MOVING AWAY FROM SATURATED FATS TO POLYUNSATURATED FATS
- WADSWORTH HOSPITAL (564, CVD MFS, CHOLESTEROL 3%, DOWM, MACE 20%)
- OSLO DIET-HEART STUDY (412 MEN, HISTORY OF MFS, CHOLESTEROL 15% DOWM, MACE 29%)
- BRITISH MEDICAL RESEARCH COUNCIL, 393 MEN, HISTORY OF MFS, 15% REDUCTION IN TIME TO EVENT

FINNISH DIET SURVEY

DEPENDS WHAT YOU REPLACE IT WITH

SATURATED FATS

SATURATED FATS
PROBLEM 3: TRANS FAT

- MOST DANGEROUS OF ALL THE FATS
- INCREASE LDL AND DECREASE HDL
- PRO-INFLAMMATORY AND IMPLICATED IN DIABETES, HYPERTENSION, STROKE, CARDIOVASCULAR DISEASE
- MAJOR DECLINE IN INTAKE BUT STILL 2% OF THE US CALORIC INTAKE

FULL BAN

- IF SAYS 0 TRANS FATS, REMEMBER BUSINESSES DO NOT HAVE TO MENTION 0.5 GRAMS OR LESS
- LOOK FOR ANYTHING HYDROGENATED, PARTIALLY HYDROGENATED
- BY JUNE 18, 2018, HUMAN FOOD MUST NO LONGER CONTAIN PARTIALLY HYDROGENATED OILS FOR USES THAT HAVE NOT BEEN OTHERWISE AUTHORIZED BY FDA.

Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality

Victor Li Zheng, PhD, Linda Lee, MD, MS; Shaowei C. Correa, PhD; John T. Vitting, MD, MS; Vangding Ng, MD, MS; Marjorie A. Lappe, PhD, MPH (Deceased); MD; Robert J. Calabrese, MD; Kathleen J. Tucker, PhD (Deceased); PhD; Anthony F. Nano, PhD; Dionisio L. Lopez-Jimenez, MD; Joel N. Norman, MD; Allen Ph.D

 Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality

- Each additional 300 mg of dietary cholesterol consumed per day was significantly associated with higher risk of incident CVD (adjusted HR, 1.17 [95%CI, 1.09-1.26] and all-cause mortality [adjusted HR, 1.10 [95%CI, 1.10-1.26]
- Each additional half an egg consumed per day was significantly associated with higher risk of incident CVD and all-cause mortality.
- The associations between egg consumption and incident CVD were no longer significant after adjusting for dietary cholesterol consumption.
### ANIMAL FATS/FATS

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat 22 g</td>
<td>33%</td>
</tr>
<tr>
<td>Saturated fat 9 g</td>
<td>45%</td>
</tr>
<tr>
<td>Polyunsaturated fat 1 g</td>
<td></td>
</tr>
<tr>
<td>Monounsaturated fat 10 g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol 89 mg</td>
<td>29%</td>
</tr>
<tr>
<td>Sodium 60 mg</td>
<td>2%</td>
</tr>
<tr>
<td>Potassium 316 mg</td>
<td>9%</td>
</tr>
<tr>
<td>Total Carbohydrate 0 g</td>
<td>0%</td>
</tr>
<tr>
<td>Dietary fiber 0 g</td>
<td>0%</td>
</tr>
<tr>
<td>Sugar 0 g</td>
<td>0%</td>
</tr>
<tr>
<td>Protein 28 g</td>
<td>56%</td>
</tr>
</tbody>
</table>

### Iron Intake

Iron intake is crucial for maintaining proper red blood cell production and preventing anemia. Adequate iron intake is particularly important for women of childbearing age and during pregnancy. Men and postmenopausal women also need to ensure adequate iron intake as a deficiency can lead to iron-deficiency anemia.

### Sodium Intake

Sodium intake is closely linked to cardiovascular health. Excessive sodium intake has been associated with high blood pressure and an increased risk of heart disease and stroke. It is recommended to limit sodium intake to 2,300 mg per day, or less if you have heart disease or high blood pressure.

### Atherosclerosis

Atherosclerosis is a condition where the arteries become hardened and narrowed due to the accumulation of plaque. This can lead to reduced blood flow to various parts of the body, potentially causing heart attacks, strokes, and other complications. Smoking, high cholesterol, high blood pressure, and diabetes are key risk factors.

### Carotene → TMAO

Research suggests that an increase in TMAO levels can be a biomarker for higher risk of cardiovascular disease. TMAO levels can be increased by a diet high in red meat and processed meat products, which are rich in saturated fats and cholesterol.

### Conclusions

Red meat consumption is associated with an increased risk of total, CVD, and cancer mortality. Substitution of other healthy protein sources for red meat is associated with a lower mortality risk.

### Figure 1: Dose-response relationship between red meat intake and risk of all-cause mortality in the Health Professionals Follow-up Study (A) and the Nurses’ Health Study (B). The results were adjusted for age (continuous), body mass index (calculated as weight in kilograms divided by height in meters squared) category (23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or 35+); alcohol consumption (0, 0.1-4.9, 5.0-9.9, 10.0-14.9, or 15.0+ g/d in men; 0, 0.1-4.9, 5.0-14.9, or 15.0+ g/d in women); physical activity level (1, 2, 3, or 4); race (white or nonwhite); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and intake of total energy, whole grains, fruits, and vegetables, all in quintiles. Broken lines represent 95% CI.
IF NOT THAT, THEN WHAT SHOULD WE EAT?

TABLE 1
Mean BMI (in kg/m²) and the prevalence of diabetes and hypertension in different types of vegetarians compared with nonvegetarians in California Seventh-Day Adventists: preliminary analyses adjusted for age, sex, and race

<table>
<thead>
<tr>
<th>Diet group</th>
<th>BMI²</th>
<th>Diabetes¹</th>
<th>Hypertension¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonvegetarian</td>
<td>28.26 (28.22, 28.30)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Semi-vegetarian</td>
<td>27.00 (26.86, 27.04)</td>
<td>0.72 (0.65, 0.79)</td>
<td>0.77 (0.72, 0.82)</td>
</tr>
<tr>
<td>Pescovegetarian</td>
<td>25.73 (25.69, 25.77)</td>
<td>0.49 (0.44, 0.55)</td>
<td>0.62 (0.59, 0.66)</td>
</tr>
<tr>
<td>Lacto-ovo-vegetarian</td>
<td>25.48 (25.44, 25.52)</td>
<td>0.39 (0.36, 0.42)</td>
<td>0.45 (0.44, 0.47)</td>
</tr>
<tr>
<td>Vegan</td>
<td>23.13 (23.09, 23.16)</td>
<td>0.22 (0.18, 0.28)</td>
<td>0.25 (0.22, 0.28)</td>
</tr>
</tbody>
</table>

¹ n = 89,224.
**LIFESTYLE HEART TRIAL**

- 48 PATIENTS WITH MODERATE-SEVERE CAD WERE RANDOMIZED TO INTENSIVE LIFESTYLE CHANGES (10% FAT, WHOLE FOODS VEGETARIAN DIET, AEROBIC EXERCISE, STRESS MANAGEMENT TRAINING, SMOKING CESSION, GROUP PSYCHOSOCIAL SUPPORT) FOR 5 YEARS VERSUS CONTROL

- 35 COMPLETED THE STUDY

Ornish et al., JAMA 1998

**LIFESTYLE GROUP HAD 3% REDUCTION IN ABSOLUTE DIAMETER STENOSIS AND CONTROL GROUP HAD 12% PROGRESSION**
A pro-vegetarian food pattern and reduction in total mortality in the Prevención con Dieta Mediterránea (PREDIMED) study

Miguel A. Álvarez-Fandino, Jesus Molina-Castilla, Isidoro Curull, Armond J. Schmitz, Gabriela Rius, Fernando Aros, Enrique Gómez-García, Mikel Pk, Rosa M. Lamuela-Raventós, Miguel Rodriguez-Dilla, Jose Suarez, Lluis Sala-Morata, Xavier Vidal-Valadés, Enric Grau, and Monica Del Rio for the PREDIMED Group

ABSTRACT

Background: Vegetarian diets have been associated with reduced mortality. However, a pure vegetarian diet might not be necessary for the benefits to accrue, because a moderate consumption of plant-based foods may be associated with mortality reductions. Therefore, the aim of this study was to determine the association of plant-based food intake with all-cause mortality in a Mediterranean population.

Methods: A total of 7,447 participants (72% women, mean age 55 years) with a high cardiovascular risk were followed for 7.5 years. At baseline, participants were divided into quintiles based on their vegetable and fruit intake. In the analyses, hazard ratios and 95% confidence intervals (CIs) were estimated using Cox proportional hazards models. Deaths were censored at the time of visit to the trial or at the time of death in the participants not attending follow-up visits.

Results: There were 754 deaths during the follow-up period (18.9% from cardiovascular causes, 5% from cancer, and 9% from other causes). Among participants with a vegetarian diet pattern, the hazard ratio (HR) was 0.82 (95% CI 0.68-0.99) compared with those with a non-vegetarian diet pattern. The HR was 0.79 (95% CI 0.65-0.96) for those with a low vegetable and fruit intake (quintile 1) compared with those with a high vegetable and fruit intake (quintile 5).

Conclusions: These results support the use of a Mediterranean diet with a moderate consumption of plant-based foods to reduce mortality. Further studies are needed to determine the underlying mechanisms of this association.

FIGURE 1. Absolute risk of death across baseline quintiles of the pro-vegetarian food pattern: the Prevención con Dieta Mediterránea trial, 2003–2010. Quintile score limits were as follows for quintiles 1–5: <33, 33–35, 36–37, 38–40, >40, respectively.
Flow Mediated Dilation

A multicenter randomized controlled trial of a plant-based nutrition program to reduce body weight and cardiovascular risk in the corporate setting: the GEICO study

A Low-Fat Vegan Diet Improves Glycemic Control and Cardiovascular Risk Factors in a Randomized Clinical Trial in Individuals With Type 2 Diabetes

- Body weight decreased 6.5 kg in the vegan group and 3.1 kg in the ADA group (p ≤0.001)
- LDL cholesterol fell 21.2% in vegans and 10.7% in the ADA group (p = 0.02).
- Urinary albumin reductions were greater in the vegan group (15.9 mg/24 h) than in the ADA group (10.0 mg/24 h) (p = 0.033)
- A1C fell 1.23 points in the vegan group compared with 0.38 points in the ADA group (p = 0.01)

Bernard ND. Diabetes Care 26:1777-1783, 2005

Esselstyn et al. J Fam Practice

Restoration of myocardial perfusion

Reversal of coronary artery disease

Reduction in CAD
ALL COMES BACK TO INFLAMMATION

Inflammatory markers only measured in intervention group.

1. Excessive abdominal fat
2. Elevated ALT
3. Increased triglycerides
4. Increased CRP
5. Low HDL
6. Blood pressure

Saota Y, Omaha D. Nutrition 20:885-886, 2004

ORIGINAL INVESTIGATIONS

Healthful and Unhealthful Plant-Based Diets and the Risk of Coronary Heart Disease in U.S. Adults

Arbica Setia, Sheets, N. Shephard, and S.D. Popkin, 

ABSTRACT

BACKGROUND Plant-based diets are recommended for coronary heart disease (CHD) prevention. However, plant foods are rarely dominant in the diet.

OBJECTIVES To study the associations between plant-based diet intake and CHD incidence.

METHODS A cohort study included 75,782 women in the Women's Health Study (1980 to 2013, mean follow-up 23.6 years).

RESULTS Plant-based diet scores were associated with lower CHD incidence. The risk of CHD was lowest among those consuming a healthful plant-based diet (HR: 0.67, 95% CI: 0.53-0.85, p=0.001) and highest among those consuming an unhealthy plant-based diet (HR: 1.37, 95% CI: 1.11-1.70, p=0.002).

CENTRAL ILLUSTRATION

Dose-Response Relationship of Plant-Based Diet Indices and Animal, Healthy Plant, and Less Healthy Plant Foods With CHD Incidence

A

B

HOW SHOULD WE ADVISE OUR PATIENTS?

FRUITS AND VEGETABLES?

- In 2005, approximately 32.6% of the U.S. adult population surveyed consumed fruit two or more times per day.
- 27.2% ate vegetables three or more times per day.
- Goal: 5-7-10 servings of fruits/vegetables per day.

Dietary Habits of Cardiovascular Professionals

FRUITS AND VEGETABLES: DASH DIET

Hazard ratio (95% CI) of all cause mortality vs. fruit and vegetable consumption (servings/day)
There is no time for junk.
Nutrition Education From Medical School to Fellowship

<table>
<thead>
<tr>
<th>During Fellowship Training</th>
<th>FIT</th>
<th>MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I recall receiving a high level of nutrition education that gave me excellent skills for counseling patients.</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>I recall receiving a solid nutrition education during my fellowship training that adequately prepared me for counseling patients.</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>I recall receiving minimal nutrition education during my fellowship training that did not adequately prepare me for counseling patients.</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>I do not recall receiving any nutrition education during my fellowship training.</td>
<td>56%</td>
<td>57%</td>
</tr>
</tbody>
</table>

**WHAT WE ARE DOING AT UNIVERSITY OF FLORIDA**

**Medical Education**

**Changing the Hospital Paradigm**

**Changing the Clinic Paradigm**

**RESEARCH**

- **MEDICAL STUDENTS**
  - One-week nutrition intensive in first year medical school nutrition intensive
  - Hands-on exposure through general cardiology and prevention clinics

- **RESIDENTS**
  - Deliver nutrition-focused noon conferences
  - Hands-on exposure through prevention clinic
  - Mentor residents on lifestyle-related research projects
  - Division of Cardiology Medical Educator, influencing medical curriculum

- **FELLOWS/FACULTY**
  - Established CME certified prevention conference
  - Medical Grand rounds

**PREVENTION CLINIC**

Build a prevention clinic and empower parents to take control of their health using lifestyle and diet tools

**INTEGRATIVE AND PREVENTATIVE MODEL**

- Prevention Clinic with one-hour long visits.
- A Yoga Room
- Meditation

**RESULTS:**

- Improved Quality of life
- Decrease in Anthropomorphic measurements
- Reduction in medications
- Reduction in serum lipid profiles

Extensive nutrition education.
HOSPITAL PARADIGM

- DISCHARGE EDUCATION PACKET
- NURSING INVOLVEMENT IN EDUCATION
- REQUIRED DIETICIAN VISIT PRE DISCHARGE
- REQUIRED DOCUMENTARIES TO BE WATCHED ON TELEVISION
- PLANT BASED MENU

PLANT-BASED MENU

This meal plan is based on high fiber, fruits, vegetables, beans, and whole grains. Eating these foods puts you on track to reversing the risk of chronic diseases. Techniques to cook healthy foods are listed below.

Breakfast
- Whole grain cereal with fruit and low-fat milk
- Omelet with spinach and tomato

Lunch
- Grilled chicken salad with mixed greens
- Lentil soup

Dinner
- Brown rice with vegetable stir-fry
- Baked salmon with sweet potato

RESEARCH

Successful Implementation of Healthful Nutrition Initiatives into Hospitals


Contemporary Clinical Risk Communications in Cardiology

A Clinician’s Guide for Treating Cardiovascular Nutrition Controversies Part 1
MY HOPES FOR THE FUTURE=
THIS IS WHERE WE NEED HELP

- More education of physicians.
- Culinary workshop at UF for physicians and allied professionals.
- More clinics cropping up around the country that focus on wellness:
  - Be stay on the right side of the line.
- Write more papers
- CHF and lifestyle paper
- Research.
  - Need to make the links more clear between food, microbiome, inflammation and illness.
  - Can diet suppress gene expression?
  - Couple of research protocols and grants pending.

THIS IS AN EXCITING TIME

- Have hope that change is possible.
- There is a very real connection between the food we eat and what happens in our gut and how that triggers inflammation and eventually chronic illness.
- Be empowered and know that you can do this and you can be part of the change.

IMBALANCE=INFLAMMATION

So you have two choices. We could perform triple bypass surgery, where we take a vein out of your thigh, and open up your chest so we can sew the vein onto your coronary artery. This costs more than $100,000 and will keep you laid up for at least two months.

Or we could put you on a vegan diet.

A vegan diet? Goo, Doc, that sounds pretty extreme.

CONTACT INFORMATION

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