

## ***Framingham Heart Study and the Risk Factors that are Associated with Heart Disease***

### ***I. Introduction to the Framingham Heart Study (Started in 1948)***

- a. Step I:
  - i. 99.5% were free of disease
  - ii. Just observational
  - iii. Gift to the World (the FHS)
  - iv. Eventually this study identified the risk factors associated with CAD
- b. Step II:
  - i. Studies showed that increased cholesterol in the blood translated to increased heart attack rate.
  - ii. Hypothesis from above data: Could decreased blood cholesterol translate to fewer heart attacks?

### ***II. Women/Menopause and CAD***

- a. After menopause the risk for CAD is equal to men.

### ***III. Threshold for Cholesterol***

- a. Cholesterol at 225mg/dl or above, heart attacks were more prevalent (over the 26 years of the FHS)
- b. Bottom line: The higher the cholesterol; the higher the incidence of heart attack.
- c. During the 1950's—Cholesterol at 300 mg/dl— 5% of the population in the study had a heart attack over 30 years old (300 mg/dl used to be considered "OK" level).
- d. Today (as of 2005)—220's is the average cholesterol level of patients who experience heart attacks at the Metro West Medical Center (FUH).

### ***IV. Culture and Genetics Predict Heart Attack Risk***

- a. Work in the fields of China for 10-12 hours per day and live on rice, beans and tofu = 0 incidence of heart attack!!!!!!!!!!!!!!

### ***V. Unraveling the sub-fractions of cholesterol***

- a. The higher the LDL—the higher you need the HDL to protect yourself.
- b. The ratio of TOTAL/HDL used to be 4:1 ratio, Now it is favorable to have a ratio of 3:1 or lower.
- c. If you have an LDL of 180 or higher, you either:
  - i. Have a "Season Pass to McDonalds" (ie, junk food junkie) or possess familial hypercholesterolemia (hereditary).
  - ii. LDL of 100 and HDL of 25 or lower= ↑ risk of CAD

**VI. *Metabolic Syndrome (“Syndrome X”)***

- a. A group of health risks that ↑ the chances of developing CAD, Stroke and Diabetes. The criteria of this syndrome are listed below:
  - i. Insulin resistance
  - ii. ↑Triglycerides (as defined as 119 mg/dL or greater)
  - iii. ↓HDL (as defined as 40 mg/dl or less for men/50 or less for women)
  - iv. Hypertension (as defined as 130/80)
  - v. ↑Uric acid
  - vi. Glucose  $\geq$  100 mg
  - vii. Central adiposity ([Men 40” or greater] [Women 35” or greater])
  - viii. ↑Plasminogen (i.e., increased clotting problems)

**VII. *Hypertension as a Risk Factor for Developing CAD***

- a. 50 million people in the United States have hypertension.
- b. Hypothesis: Restricting sodium and reducing blood pressure:**
  - a. Subjects on the DASH diet (consisting of 1500 mg of sodium versus those subjects who consumed 2400 mg [the upper limit recommended by the National High Blood Pressure Education Program] witnessed a greater decrease in blood pressure.
  - b. *DASH* (dietary approaches to stop hypertension) diet consists of fresh fruits and vegetables, low fat dairy, fish, nuts, poultry and whole grains.
  - c. Systolic Blood Pressure out-predicted Diastolic Blood Pressure when measuring health risks.
  - d. 50% of heart attacks occur when systolic blood pressure range is 120-139 mm/Hg/ diastolic blood pressure range is 80-89 mm/Hg.
  - e. **NORMAL is 120/80.**
  - f. **Bottom Line: Decrease blood pressure = Decreased heart attack!**

**VIII. *Smoking and Lung Cancer***

- a. 1948—Women DIDN’T inhale thus posing less risk for lung cancer.
- b. 1950’s—Women learned to inhale whereby increasing the risk for developing lung cancer.
- c. Number 1 cancer cause of death in the US is lung cancer (2000).

**IX. *Diabetes***

- a. Fasting glucose: 126 mg  
Blood Sugar: 200 mg  
Pre-diabetic: 100-126 mg
- b. If you have diabetes you are treated as if you have CAD.
- c. Glycosylated Hemoglobin A<sub>1</sub>C should be below 6.0% and NOT 7% (which was the previous norm).

**X. *Homocysteine and carotid artery stenosis***

- a. Increased homocysteine levels = increased health risks (including carotid artery stenosis and Alzheimer disease).
- b. Increasing folic acid, B6, B12 can decrease homocysteine levels.

**XI. *LP (a)***

- a. Lp(a) lipoprotein is a member of the family of LDL cholesterol molecules, which form the fatty plaques that can block arteries.
- b. LP (a) levels are higher in women, but if they take estrogen, they did well.
- c. Niacin reduces LP (a) levels.
- d. Lower LDL = lower LP (a)

**XII. *Fitness***

- a. Increase exercise = decreased heart attack rate

**XIII. *Weight***

- a. Increased weight = ↑ BP, ↑ cholesterol, ↑ diabetes
- b. 1985—study on percentage of states that had high incidence of obesity but in 1994 most states had high incidence of obesity.
- c. Dr. Castelli's tongue and cheek remark, "Go on a diet and gain weight".

**XIV. *Lipids***

- a. Total Cholesterol/HDL (ratio of 4 or higher = greater risk for CAD)
- b. Lose weight = risk factors are diminished.
- c. Benecol (butter substitute) lowers LDL.
- d. Shrimp is high in cholesterol but very low in saturated fat which makes less of a risk than white meat chicken without the skin.

**XV. *Atkins and Heart Disease***

- a. Atkins diet doubled carotid artery plaque than those on heart study diet.
- b. Low fat diet = greatest fall in LDL rate.
- c. "Atkins study" (i.e., Conducted at Duke University by Eric Westman) was flawed, they gave the participants supplemental "omega-3 fish oils" which were responsible for lowering triglycerides NOT his diet.

**XVI. *Omega 3 (Fish oils and flaxseed)***

- a. DHA (one of the key ingredients in fish oils) protects you from

dementia. EPA (the other key ingredient in fish oils) converts to DHA with an enzyme.

b. Fish oils/flaxseed oil can decrease triglycerides.

***XVII. Statin Trials***

a. Decreased LDL= Decreased heart attack

***XVIII. Vitamin E***

a. d-Alpha Tocopherols= NO GOOD.

b. d-GAMMA = only good one he prefers (400 IU of this tocopherol is ok but NO MORE)

- Most vitamin E supplements are of the d-alpha, get the mixed!
- d-Gamma decreases prostate cancer (NOT d-alpha)

***XIX. Vitamin C***

a. Valentino Study—increased vitamin C (1000 mg/day) decreased incidence of carotid stenosis (plaque)

***XX. CRP (C reactive Protein)***

a. New Risk factor (indicates inflammation in the arteries).

b. Statin drugs can lower Cr-P levels.

c. When LDL is less than 100, Cr-P levels decrease.