World Heart Day
Insert Date

At University of Agriculture
In association with Nutrition Care Clinic Faisal Hospital, Faisalabad.
Dr. Ayesha Ramazn?
Consultant Nutritionist
Aging and cardiovascular disease

cardiovascular disease and nutrition metabolism
Structure of the heart

[Image: Diagram of the heart interior with labels for different structures such as brachiocephalic trunk, superior vena cava, left common carotid artery, left subclavian artery, aorta, left pulmonary arteries, pulmonary trunk, left pulmonary veins, left atrium, semilunar valves, atroventricular (tricuspid) valve, chordae tendineae, right ventricle, inferior vena cava, septum.]
Chambers:

- Heart is divided by **spectrum** into two halves.
- Halves are in turn divided into two chambers.
- Upper two chambers are called **atria**.
- Lower two chamber are called **ventricles**.
Blood circulation:
Diseases of heart

Heart consist of:

- Muscle that pumps blood
- Arteries that supply blood to the heart muscle
- Valves that ensure that the blood within the heart is pumped in the correct direction.
- Problems can arise in any of these areas.
- Like cardiovascular disease, heart disease is a term that’s somewhat loose and broad, and it’s often used that way.
Different types of heart disease:

- Coronary heart disease.
- Coronary artery disease.
- Ischemic heart disease.
- Cardiovascular disease.
- Hereditary heart disease.
- Hypertensive heart disease.
- Inflammatory heart disease.
- Valvular heart disease.
- Congenital heart disease.
- Heart failure.
Coronary heart disease:

- A disease of heart itself caused by accumulation of atheromatous plaques within the walls of arteries that supply the myocardium thus resulting in ischemia.
Ischemic heart disease:

- Another disease of the heart itself, characterized by reduced blood supply to organ.
Hypertensive heart disease:

- Heart disease caused by high blood pressure, especially localized high blood pressure.
Pericardial disease:

- These are diseases of sac that encase the heart (pericardium).
- Pericardium disorders include inflammation (pericarditis), fluid accumulation and stiffness (constrictive pericarditis).
- Pericarditis can occur after heart attack and lead to pericardial effusion or chest pain.
Heart failure:

- Often called congestive heart failure, is a condition in which heart can’t pump enough blood to the body’s organ and tissues.
- It doesn’t mean heart has failed and can’t pumps blood at all.
- With this less effective pumping vital organ don’t get enough blood, causing such sign and symptoms as shortness of breath.
- Cardiovascular conditions that have damaged or weakened the heart, such as coronary artery disease may result in heart failure or cardiomyopathy.
Congenital heart disease:

- This disease develop before birth (congenital).
- Congenital heart disease is broad term and include a wide range of diseases and conditions.
- These disease can effect the formation of heart muscles or its chambers or valves.
- They include such condition as narrowing of a section of the aorta (coarctation) or holes in the heart (atrial or ventricular septal defect).
- Some congenital heart defects may be apparent right at the time of birth, while others may not be defected until later in life.
Stroke:

- It is sudden loss of brain function.
- It occurs when blood flow to the brain is interrupted or when blood vessels in the brain rupture.
- These in turn cause the death of brain cells in the affected area.
- Stroke is often thought of as a neurological disorder because of many complications it causes.
Modifyable Risk Factors for Heart Disease

- Diabetes
- Hypertension or high blood pressure
- Dyslipidemia
- Inactivity
- Smoking
- Dietary factors
  - Amount and type of fats in the diet
  - Antioxidants
  - Fiber
  - Dietary patterns
Dietary Factors that Affect Blood Lipids
Saturated Fatty Acids

- Elevate blood cholesterol in all lipoprotein fractions (LDL and HDL) when substituted for CHO or other fatty acids
- Dose-response between SFA and LDL-C
  - For every 1% of energy intake increase in SFA, plasma cholesterol increases 2.7%
- Most hypercholesterolemic SFA are lauric (C12:0) myristic (C14:0) and palmitic (C16:0) (palmitic is 60% of SFA intake)
- Stearic (C18:0) is neutral
Saturated Fatty Acids

- The most hypercholesterolemic fats are palm kernel, coconut and palm oils, lard, and butter
- SFAs also associated with CAD progression: milk, cheese, butter, lamb, bakery goods, fast foods, snacks
- Average American intake is 11% of kcals
Polyunsaturated Fatty Acids

Omega 3 Fatty Acids

- Found in fish oils, fish oil capsules, and ocean fish (eicosa pentaenoic and docosahexaenoic acid)
- Do not affect TC; may ↑ LDL-C (5-10%) and decrease TG (25-30%) especially in patients with high TG
- Anticoagulant effect
- Decrease vasoconstriction
- Improve endothelial dysfunction
- Reduce inflammation
Omega-3 Fatty Acids: ALA

- Alpha-linolenic acid
- An essential fatty acid
- Shorter-chain found in various plant sources such as flax, canola, walnuts, and soy
- Benefits less clear; may protect against CVD by reducing inflammation
Omega-3 Fatty Acids

- Consumption of fish and fish oils rich in EPA, DHA will lower cholesterol, LDL, and TG and reduce sudden cardiac death
- One fatty fish meal/week resulted in 50% decrease in risk of cardiac arrest
- 1 g supplement of omega-3 daily reduced risk of CVD, nonfatal MI, nonfatal stroke
Cis-Monounsaturated Fat

- Naturally occurring monounsaturated fat
- Found in olive oil, canola oil, avocado, olives, pecans, peanuts, and other nuts
- Oleic acid is the most prevalent MFA in the US diet
Cis-Monounsaturated Fat

- When fat is replaced by CHO, it lowers HDL as well as LDL-C
- When sfa is replaced by mfa, lowers LDL-C without lowering HDL-C
- When substituted for carbohydrate, mfa reduces serum triglyceride levels
- Can recommend a higher fat diet if much of the fat comes from mfa
Cis-Monounsaturated Fat

- Mediterranean diet: high in fat, especially MFA (olive oil), fish, nuts, low in red meat associated with ↓ risk of CVD
- Emphasizes fruits, root vegetables, flax, canola
- High fat diets should be used with caution
Mediterranean vs Standard AHA Low Fat Diet

- Subjects: 202 post-MI patients
- 50 put on AHA lowfat diet (30% fat)
- 51 on Mediterranean (40% fat; fish 3-5 times/week, olive oil, avocado)
- Both limited to 7% SFA and 200 mg cholesterol/day
- Both groups received two individual diet counseling sessions in the first month and six group sessions over the next two years.
- 101 controls given advice in the hospital
- **Slides 26 and 27 can be omitted and at the end just summarize the recommendations**
Mediterranean vs Standard AHA Low Fat Diet

- After 4 years 83% of those on either therapeutic diet had survived without problems; cholesterol profile improved in both groups.
- People on either diet had one-third the risk of suffering another heart attack, a stroke, death or other heart problem as controls.
- Those on Mediterranean diet found it harder to stick to (↑ fish, olive oil).
- 53% of control patients survived without problems; cholesterol profile did not improve.
Trans-Monounsaturated Fats

- Produced in the hydrogenation process
- Commonly used in the food industry to harden unsaturated oils and soft margarines
- 50% of trans-fatty acids come from animal foods (beef, butter, milk fats)
- Major foods sources in US are stick margarine, shortening, commercial frying fats, high fat baked goods
The combined amount of saturated fat and trans fat in butter is higher than that in margarine.

Soft or liquid margarine is the preferred spread.

Average intake of trans fats is 7-8% of total fat intake.

Choose low fat desserts, dairy products, and meats will lower trans fatty acid intakes.
Total Fat Content of Diet

- High fat diets are associated with obesity, which increases the risk of CHD
- Low fat diets (<25% of kcals from fat) raise triglycerides and lower HDL; however these changes are not associated with ↑ risk
- Low fat diets lower LDL only when they are low in sfa
- AHA: total fat <30% of kcals
- ATP III: 25%-35% of kcals from fat
**Dietary Cholesterol**

- Dietary cholesterol raises total and LDL-cholesterol, but less than **sfa**.
- A 25 mg increase in dietary cholesterol raises serum cholesterol 1 mg/dl.
- At 500 mg intake, increments are even less; appears to be a threshold for response.
- TLC guidelines: <200 mg/day.
- AHA guidelines: <300 mg/day.
Fiber

- Soluble fibers (pectins, gums, mucilages, algal polysaccharides, some hemicelluloses) in legumes, oats, fruit and psyllium lower serum cholesterol and LDL-C
- Quantity needed varies by food (more legumes than pectins or gums)
Fiber

- Average decline in LDL-C is 14% for hypercholesterolemics and 10% for normocholesterolemics when soluble fiber is added to a low fat diet.
- Fiber may bind bile acids, which lowers serum cholesterol to replete the bile acid pool.
Fiber

- Insoluble fibers have no effect on lipid levels (celluloses and lignin)
- Of total fiber (25-30 grams) 6 to 10 grams should be from soluble fiber
- Can be achieved with 5 or more servings of fruits or vegetables a day and 6 or more servings of whole grains and high-fiber cereals
Coffee

- Mixed results in studies on effect of coffee on lipids
- Heavy intake of regular coffee (720 ml) causes minor increases in TC (9 mg/dl) LDL-C (6 mg/dl) and HDL-C (4 mg/dl)
- Boiled coffee (European) produces greater elevations than filtered coffee
Coffee

- Large population studies have failed to find associations between coffee consumption and CHD incidence or mortality.
- Coffee drinkers consume more saturated fat and cholesterol, smoked more cigarettes, and were less likely to exercise.
Antioxidants

- Antioxidants have been studied for possible role in preventing oxidation of LDL-C
- Epidemiological studies suggest vitamin E and carotenoids are inversely related to CVD, but randomized trials have not supported this
- Vitamin E: no primary or secondary prevention trials show positive effect
- B-carotene supplements appear to have no benefits
- Use food sources such as vegetables and fruits
Calcium

- Supplementation produces small decreases in LDL-C in hypercholesterolemic men
- May form insoluble soaps with fatty acids
Soy Protein

- Substituting soy protein lowers TC (9%) and LDL-C (13%) and TG (11%) with no effect on HDL-C
- Effect in addition to a Step 1 diet; occurs only in persons with hypercholesterolemia
- Dose response
- Daily intake of 25 g of soy will lower LDL-C by 4 to 8% in hypercholesterolemic persons
Therapeutic Lifestyle Changes in LDL-Lowering Therapy

- TLC Diet
  - Reduced intake of cholesterol-raising nutrients (same as previous Step II Diet)
    - Saturated fats <7% of total calories
    - Dietary cholesterol <200 mg per day
  - LDL-lowering therapeutic options
    - Plant stanols/sterols (2 g per day)
    - Viscous (soluble) fiber (10-25 g per day)
- Weight reduction
- Increased physical activity
Therapeutic Lifestyle Changes (TLC) REPEATO F40

- TLC Diet
  - Saturated fat <7% of calories, cholesterol <200 mg/dal
  - Consider increased viscous (soluble) fiber (10-25 g/day) and plant stanols/sterols (2g/day)

- Weight management
- Increased physical activity
Define the steps to prevent cardiovascular disease
Thanks