Heart Healthy

Adding Years to Your Life

Redwood Camp
Northern California Conference
July 2001

Allan Handysides, MB, ChB., FRCP, FRCSC

Coronary Heart Disease:

How about not needing these advances?

- Please let them work well - but on someone else!

What is Coronary Heart Disease?

- The number-one killer in the USA
- 1 in every 5 die of it
- 500,000 each year
- 6,300,000 are affected by it
- 1,100,000 have a heart attack because of it each year
- 5,600,000 are in heart failure
- 4,300,000 have a cardiac irregularity

Are you worried yet?

Time for Strategic Planning!

- Prevention
- Identification of risk factors
- Recognition of disease indicators
- Understanding goals of therapy
- Working closely with your doctor

Pathology

- Plaques - made up of blood fats, smooth muscle cells, collagen, proteins and calcium deposits
- The fats are, for a large part, cholesterol
- What is the sequence of events?

Atherosclerosis
1. Some kind of injury occurs (e.g., toxins in smoke, bacterial toxins)
2. White blood cells migrate to the area
3. These cells ingest oxidized LDL

- Since oxidized LDL is toxic to the blood vessel, lining more white cells are attracted.
- Smooth muscle cells stimulated by growth factors released by the damaged lining as well as the white cells migrate into the intima where they multiply.
- Collagen is secreted by the muscle cells and the white cells, so building up the plaque.

**Lipoproteins**

- Low density lipoproteins (LDL) can be oxidized by free radicals. This causes them to be incorporated into the intima by macrophages.
- High density lipoproteins (HDL) can remove cholesterol from the arterial wall and return it to the liver for disposal.
- Lipoproteins are the "truckers" of cholesterol.

**Symptoms of Coronary Heart Disease (CHD)**

- Angina - indicates usually a 75% narrowing of the vessels
- Pressure
- Tightness
- Burning
- Aching heaviness
- Choking sensation
- Rarely, the pain may be sharp

**Location**

- Above the waist
- Retrosternal
- Upper left arm (may be in the right side also)
- May go into the jaw (women)

**Gender Differences**

**Males:**

- When exercising
- Often a severe heaviness
- Gradually settles over a few minutes at rest

**Females:**

- May come on at rest
- May feel it in the jaw
- May be associated with breathlessness
- May be nauseated
- May complain of fatigue

**Angina**

- Not brought on by coughing
- Does not last for hours
- Does not last for a few seconds
- Is not reproduced by pressing on the chest or by moving the arms

**Common Triggers**
• Early morning exercise
• Cold
• Uphill or into the wind
• Shoveling
• Raking
• Anger
• Fear
• Sexual intercourse
• Bowel movements
• Pain is relieved by rest

Classification of Angina

(Canadian Cardiovascular Society)

• Class I - More than ordinary activity required to trigger angina
• Class II - Some limitation of ordinary activity
• Class III - Marked limitation of ordinary physical activity
• Class IV - Unable to perform any activity without discomfort

Angina

• Stable
• Predictable
• Each attack is similar
• Relief with nitroglycerine
• Unstable
• Condition between a heart attack and angina
• May reflect not so much increased demand for oxygen as an inadequate supply

Heart Attack (MI)

• Complete blockage of coronary artery
• Muscle death
• Sudden onset
• Half the deaths occur in the first hour
• Urgent need for medical attention

Signals and Actions

• Bear in mind that not all symptoms are present in all events
• Women may have different signs
• Chest pressure lasting a good few minutes
• Pain spreading to shoulders, neck, jaw or arms
• Chest discomfort plus lightheadedness, sweating, nausea, shortness of breath or fainting
• Remember women are more prone to milder chest pain, breathlessness, dizziness or lightheadedness, heart burn or nausea

What To Do?!

• Anyone with these symptoms for more than 10 minutes needs immediate help. Call 911.
• If it is clear that an ambulance will not be available for an extended period of time (20 or 30 minutes), another person should drive the patient to the nearest emergency room. Under no circumstances should the patient attempt to drive him or herself to the emergency room.
• If no contraindication, the person should chew an aspirin (tell emergency staff about the aspirin).
• Expect denial from the person experiencing these symptoms. Don't take no for an answer.
Arrhythmias

• Often associated with heart attack
• External cardiac massage
• CPR
• External defibrillation

Risk Factors for CHD

Factors that are not changeable:

• Age
• Gender
• Heredity
• Vascular disease
• Menopausal status in women

Factors that can be changed:

• Cigarette smoking
• Hypertension
• Abnormal blood lipid levels
• Diabetes
• Obesity
• Inactivity
• Stress
• Blood clotting factors
• Homocysteine

Smoking

• Cigarette smoking is a potent risk factor
• Direct effects on intima
• Lipid effects
• Vasoconstrictive effects
• Hypertensor
• Risk five (5) years after cessation returns to that of a non-smoker

Hypertension

• Enlarges the left ventricle, thereby increasing the oxygen requirements
• New category of high-normal (systolic = 130-139; diastolic = 85-89) (National Institutes of Health)
• One study of isolated systolic hypertension showed a 36% reduction in stroke and 27% reduction in heart attacks with antihypertensive therapy

Blood Lipids and Lipoproteins

• Increased total and LDL cholesterol increases the risk of CHD.
• The National Cholesterol Education Program recommends keeping the total cholesterol level below 200mg/D1.
• LDL levels should be kept below 130mg/D1 (if two or more risk factors are present); 130-159 = borderline high; 160mg/D1 = high.
• When known vascular disease is present, levels less than 100mg/D1 are aimed for
• HDL levels should be above 35mg/D1. A level above 60mg/D1 is considered protective.

Blood Lipids and Lipoproteins

• Triglycerides above 200mg/D1 are considered abnormal, but whether it is the
accompanying low HDL that causes the increased risk is not clear because lowering triglycerides does not appear to lower risk.

- LDL has two particles (large and small). Their proportions in a given person can be important, because people with elevated small high density fractions carry increased risk. These are said to have Pattern B. They have a three-fold high risk than Pattern A patients. Men are more likely to have Pattern B. Small LDL is also linked to lower HDL levels.
- High levels of Lp(a) are another risk factor for CHD. Lp(a) is a lipoprotein similar to LDL, but it has on its surface a protein similar to plasminogen. Plasminogen plays a role in mopping up clots, and it is suggested this lipoprotein may interfere with the conversion mechanisms required for this protective function. A second role is of being incorporated into the atheromatous plaque.

**Diabetes**

- Apart from the associated risks relating to lipoprotein disturbances seen with diabetes, diabetics have a yet-to-be-identified mechanism that greatly increases their risk of CHD. Even folks with carbohydrate intolerance (insulin resistance) are at increased risk. The exact mechanisms remain to be conclusively demonstrated. Diabetics, therefore, should be even more careful about smoking, hypertension and cholesterol levels.

**Obesity**

- Weight in pounds times 704 divided by the square of the height in inches equals the Body Mass Index (BMI). Overweight is now defined as a BMI of 25-29.9; obesity as a BMI of 30 or above.
- Waist measurement with the tape passing over the top of the hips is a good indicator of risk. Over 40” in men = abdominal obesity; over 35” in women = abdominal obesity.
- A pear shape is less of a risk than an apple shape.

**Physical Inactivity**

- At least 28 studies show that physical activity helps prevent the first heart attack.
- The American Heart Association cites inactivity as a risk factor for CHD.
- However, the relationship does not prove lack of exercise directly raises the risk as there may be other differences between active and sedentary persons that have not been identified.
- Exercise in rehabilitation programs significantly reduces risk factors for recurrent events.
- While we cannot state lack of exercise causes increased risk, exercise lowers risk.

**Stress**

- Relationships exist between stress and aspects of CHD, but stress is not generally accepted as a risk factor for CHD, as it is difficult to quantify stress in a given individual.
- The outpouring of catecholamines (adrenaline-like compounds) could well cause vasospasm and decrease coronary blood flow with bad effects, but the CHD would have been in existence already.

**Blood Clotting Factors**

- A consistent factor in the coagulation cascade has not been identified as a causative factor for CHD, though persons with elevated fibrinogen, factor VII, or hyperactive platelets are generally associated with a higher heart attack risk.

**Homocysteine**

- High levels of this amino acid in the blood are associated with increased risk of CHD and stroke. High levels may damage the intima, but recent research suggests low levels of vitamin B6, found where homocysteine levels are raised, may be the culprit.
Diagnosis of CHD

- History
- Electrocardiogram
- Exercise stress test
- Thallium stress test
- Dobutamine echocardiogram
- Coronary angiography (gold standard)
- Electrophysiology studies

Blood Markers of a Heart Attack

- Creatine kinase MB
- Troponin C and T

Lifestyle Measures and Prevent and Treat CHD

- Smoking
- Dietary fat - the American Heart Association recommends 25-30% of daily calories should come from fat (average American diet = 40% calories from fat).
- Levels less than 15% are not recommended, as they can lower the HDL without lowering the LDL any more than a standard low-fat diet, and they are associated with a rise in triglycerides of up to 70%.
- Concerns of malnutrition and the needs of the elderly, the very young and people with Type 1 diabetes make these people at increased risk with these very low-fat diets.
- Among the fats, the mono-unsaturated fats should be chosen where possible to provide 10-15% of the daily calories. These lower LDL, reduce its oxidation and protect or raise the HDL levels. Olive and canola oils, almonds and avocados are top suppliers of MUFAs.
- Polyunstruates (safflower, sunflower and corn oils) also lower LDL, but one has to keep the total fats below 30%.
- Saturated fats (naturally in animal fats) are best reduced to less than 7% of the daily fat intake.
- Trans-fatty acids raise the ratio of LDL to HDL, and may be worse than SFAs.
- Sodium and potassium.
- Dietary fiber and soy products.
- Antioxidants - fruits, colored vegetables.
- Physical activity.
- Weight control.
- Alcohol.
- Stress reduction.
- Homocysteine (folic acid) but no proof it reduces risk of CHD.

Benefits of Lowering Cholesterol

- Oslo trial using diet lowered cholesterol level by 10% and recorded a 47% decrease in deaths over five (5) years.
- Medications to lower total cholesterol are well-documented to reduce risks of CHD.
- Margarines that lower cholesterol ("Benecol" and "Take Control), BMJ suggest a 25% reduction in risk of heart attack after 2 years (contain ester derivatives of stanols and sterols, natural substances from plants that resemble cholesterol).

Other Measures

- Antihypertensives/ACE inhibitors
- Calcium channel blockers
- Aspirin
- Estrogen replacement therapy (not effective when known coronary artery disease "HERS" study)
- Nitrates
• Beta blockers