Primary and Secondary Prevention of Cardiovascular Disease

Sources:

- Pearson, T, Primary Prevention, Chapter 22, in: Wong, Black, Gardin eds: Preventive Cardiology, Mc-Graw Hill 2000
- Brook RD, Greenland P, Secondary Prevention, Chapter 22, in: Wong, Black, Gardin eds: Preventive Cardiology, Mc-Graw Hill 2000
- American Heart Association web site scientific statements

Approaches to Primary and Secondary Prevention of CVD

- Primary prevention involves prevention of onset of disease in persons without symptoms.
- Primordial prevention involves the prevention of risk factors causative o the disease, thereby reducing the likelihood of development of the disease.
- Secondary prevention refers to the prevention of death or recurrence of disease in those who are already symptomatic

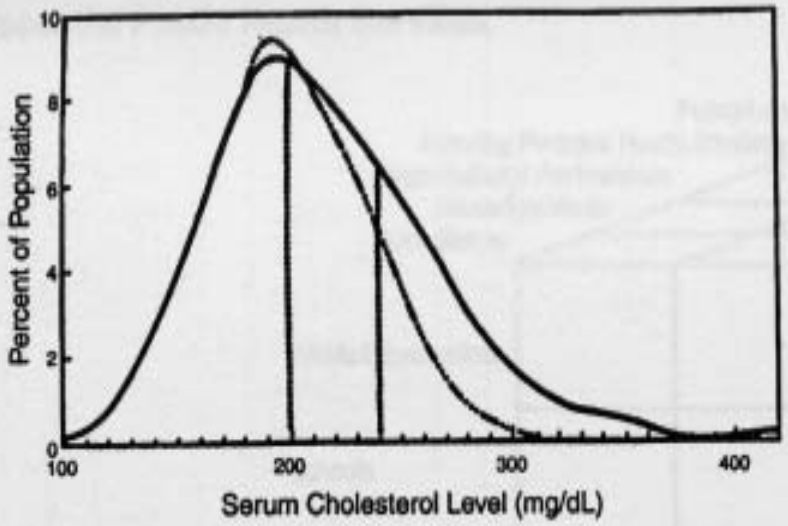
Risk Factor Concepts in Primary Prevention

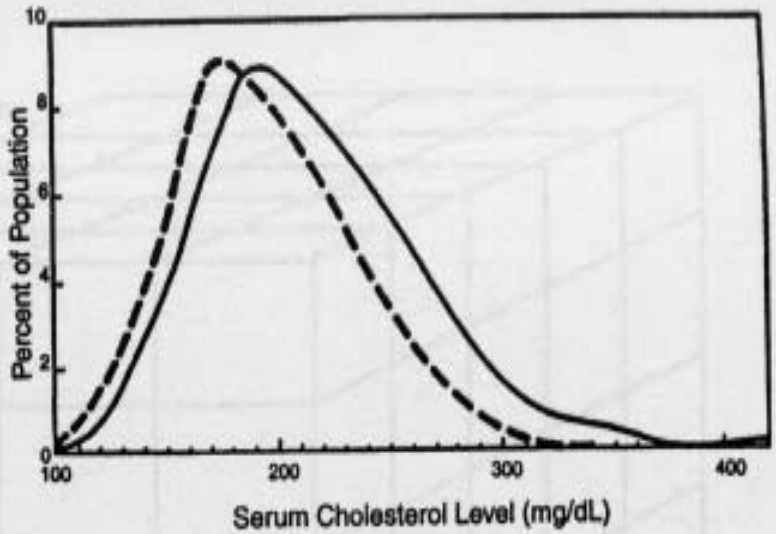
- **Nonmodifiable risk factors** include age, sexc, race, and family history of CVD, which can identify high-risk populations
- **Behavioral risk factors** include sedentary lifestyle, unhealthful diet, heavy alcohol or cigarette consumption.
- **Physiological risk factors** include hypertension, obesity, lipid problems, and diabetes, which may be a consequence of behavioral risk factors.

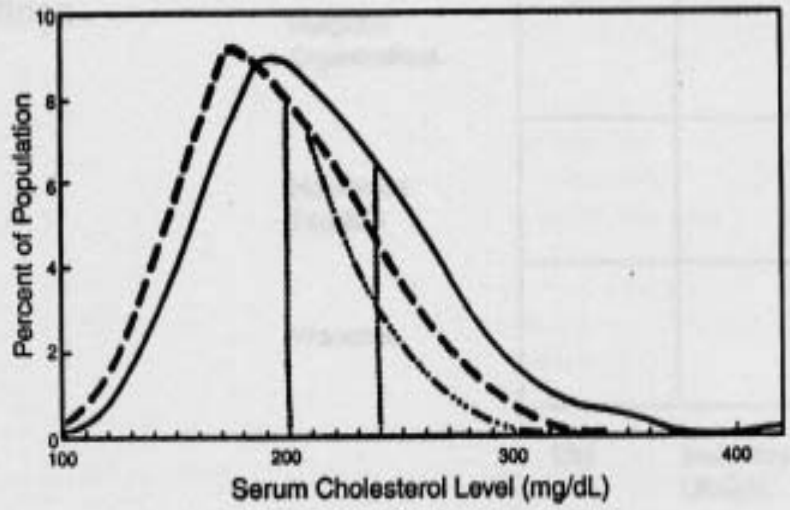
Population vs. High-Risk Approach

- Risk factors, such as cholesterol or blood pressure, have a wide bell-shaped distribution, often with a “tail” of high values.
- The “high-risk approach” involves identification and intensive treatment of those at the high end of the “tail”, often at greatest risk of CVD, reducing levels to “normal”.
- But most cases of CVD do not occur among the highest levels of a given risk factor, and in fact, occur among those in the “average” risk group.
- Significant reduction in the population burden of CVD can occur only from a “population approach” shifting the entire population distribution to lower levels.

Expected Shifts in Cholesterol Distribution from High-Risk, Population, and Combined Approaches







Population and Community-Wide CVD Risk Reduction Approaches

- Populations with high rates of CVD are those with Western lifestyles of high-fat diets, physical inactivity, and tobacco use.
- Targets of a population-wide approach must be these behaviors causative of the physiologic risk factors or directly causative of CVD.
- Requires public health services such as surveillance (e.g.,BFRSS), education (AHA, NCEP), organizational partnerships (Singapore Declaration), and legislation/policy (Anti-Tobacco policies)
- Activities in a variety of community settings: schools, worksites, churches, healthcare facilities, entire communities

Communitywide CVD Prevention Programs

- Stanford 3-Community Study (1972-75) showed mass media vs. no intervention in high-risk residents to result in 23% reduction in CHD risk score
- North Karelia (1972-) showed public education campaign to reduce smoking, fat consumption, blood pressure, and cholesterol
- Stanford 5-City Project (1980-86) showed reductions in smoking, cholesterol, BP, and CHD risk
- Minnesota Heart Health Program (1980-88) showed some increases in physical activity and in women reductions in smoking

Materials Developed for US Community Intervention Trials

- Mass media, brochures and direct mail
- Events and contests
- Screenings
- Group and direct education
- School programs and worksite interventions
- Physician and medical setting programs
- Grocery store and restaurant projects
- Church interventions
- Policies

Individual and High-Risk Approaches

- Primary Prevention Guidelines (1995) and Secondary Prevention Guidelines (Revised 2001) released by the American Heart Association provide advice regarding risk factor assessment, lifestyle modification, and pharmacologic interventions for specific risk factors
- Barriers exist in the community and healthcare setting that prevent efficient risk reduction
- Surveys of CVD prevention-related services show disappointing results regarding cholesterol-lowering therapy, smoking cessation, and other measures of risk reduction

Guide to Primary Prevention of Cardiovascular Diseases

Risk Intervention	Recommendations
Smoking: **Goal** **complete cessation**	Ask about smoking status as part of routine evaluation. Reinforce nonsmoking status. Strongly encourage patient and family to stop smoking. Provide counseling, nicotine replacement, and formal cessation programs as appropriate.
Blood pressure control: **Goal** **<140/90 mm Hg or <130/85 mm Hg if heart failure, renal insufficiency or diabetes**	Measure blood pressure in all adults at least every 2 years. Promote lifestyle modification: weight control, physical activity, moderation in alcohol intake, and moderate sodium restriction. If blood pressure ≥ 140/90 mm Hg after 3 months of lifestyle modification or if initial blood pressure >160/100 mm Hg or >130/85 mm Hg with heart failure, renal insufficiency or diabetes, add blood pressure medication. Individualize therapy to patient's age, race, need for drugs with specific benefits, etc.C:\My Documents\Guide to Primary Prevention of Cardiovascular Diseases.doc - T1

Individual Risk Assessment

- Careful assessment of medical history, physical examination, laboratory examinations
- Tobacco, diet, and physical activity history
- Blood pressure, height/weight, waist/hip or waist circumference, lipid profile
- Determination of global risk score (for assessing 10-year CHD risk probability)

Framingham Risk Algorithms

- Provides 10-year estimated risk of CHD (some focus only on hard endpoints, others include angina pectoris), Stroke, CHF, or Intermittent Claudication
- Applicable to specific ages and persons w/o CHD
- Different versions published:
  - Wilson 1998 includes LDL-C but ages limited to 30-74
  - NCEP III 2001 version has wider age range but does not include diabetes
  - D'Agastino 2001 version includes diabetes)
- Applicable to other ethnic groups as shown from validation studies in other population-based studies

Considerations for Secondary Prevention

- CVD event rates in those with pre-existing disease are 5-7 times greater than healthy individuals.
- Diabetics run a similar event rate as those with a previous myocardial infarction (Haffner)
- Risk factor modification is the cornerstone of secondary prevention efforts
- Categories of patients for secondary prevention efforts: 1) stable CHD, 2) unstable angina, 3) prior MI, 4) prior CABG, and 5) prior PTCA

Considerations for Secondary Prevention (cont.)

- Framingham altorithms can be used for prediction of recurrent CHD events over next 2 years
- SBP, total cholesterol, and diabetes remain important predictors of reinfarction or CHD death over 10-years post-MI (Wong et al. 1989)
- Females often at poorer early prognosis, but can be shown to be at survival advantage post-MI after adjusting for risk factor differences: females are older, have more diabetes, hypercholesterolemia, and elevated BP levels post-MI (Wong et al.1989).

Secondary Prevention Strategies of Proven Benefit

- AHA Secondary Prevention Statement outlines recommended assessment, management, and risk factor goal levels.
- Proven strategies include:
  - cholesterol-lowering (4S, CARE, LIPID, HIT)
  - blood pressure reduction (HDFP, HOT)
  - antiplatelet rx (Antiplatelet Trialists Collab)
  - smoking (CASS)
  - dietary therapy and exercise (Lifestyle Heart Trial, Hdidelberg)

AHA/ACC Secondary Prevention for Patients With Coronary and Other Vascular Disease: 2001 Update

<table>
<tr><th>Goals</th><th colspan="3">Intervention Recommendations</th></tr>
<tr><td>Smoking:

<u>Goal</u>
complete cessation</td><td colspan="3">Assess tobacco use. Strongly encourage patient and family to stop smoking and to avoid secondhand smoke. Provide counseling, pharmacological therapy, including nicotine replacement and buproprion, and formal smoking cessation programs as appropriate.</td></tr>
<tr><td>BP control:

<u>Goal</u>
<140/90 mm Hg or
<130/85 mm Hg if heart failure or renal insufficiency
<130/80 mm Hg if diabetes</td><td colspan="3">Initiate lifestyle modification (weight control, physical activity, alcohol moderation, moderate sodium restriction, and emphasis on fruits, vegetables, and low-fat dairy products) in all patients with blood pressure ≥130 mm Hg systolic or 80 mm Hg diastolic.
Add blood pressure medication, individualized to other patient requirements and characteristics (ie, age, race, need for drugs with specific benefits) if blood pressure is not <140 mm Hg systolic or 90 mm Hg diastolic or if blood pressure is not <130 mm Hg systolic or 85 mm Hg diastolic for individuals with heart failure or renal insufficiency (<80 mm Hg diastolic for individuals with diabetes).</td></tr>
<tr><td>Lipid management:

<u>Primary goal</u>
LDL <100 mg/dL</td><td colspan="3">Start dietary therapy in all patients (<7% saturated fat and <200 mg/d cholesterol) and promote physical activity and weight management. Encourage increased consumption of omega-3 fatty acids. Assess fasting lipid profile in all patients, and within 24 hr of hospitalization for those with an acute event. If patients are hospitalized, consider adding drug
therapy on discharge. Add drug therapy according to the following guide:</td></tr>
<tr><td></td><td>LDL <100 mg/dL
(baseline or on-treatment)
Further LDL-lowering therapy not required
Consider fibrate or niacin (if low HDL or high TG)</td><td>LDL 100–129 mg/dL
(baseline or on-treatment)
Therapeutic options:
Intensify LDL-lowering therapy (statin or resin*)
Fibrate or niacin (if low HDL or high TG)
Consider combined drug therapy (statin+fibrate or niacin) (if low HDL or high TG)</td><td>LDL ≥130 mg/dL
(baseline or on-treatment)
Intensify LDL-lowering therapy (statin or resin*)
Add or increase drug therapy with lifestyle therapies</td></tr>
<tr><td>Lipid management:

<u>Secondary goal</u>
If TG ≥200 mg/dL, then non-HDL† should be <130 mg/dL</td><td colspan="3">If TG ≥150 mg/dL or HDL <40 mg/dL: Emphasize weight management and physical activity. Advise smoking cessation.
If TG 200–499 mg/dL: Consider fibrate or niacin after LDL-lowering therapy*
If TG ≥500 mg/dL: Consider fibrate or niacin before LDL-lowering therapy*</td></tr>
</table>

Secondary Prevention Strategies of Probable or Possible Benefit

- Probable Benefit:
  - Diabetes management (4S, HOT, ongoing NIH trial)
  - Low HDL-cholesterol, triglycerides (HIT)
- Doubtful Benefit:
  - Hormone replacement therapy - earlier observational studies and regression trials suggested benefit, but more recent studies (HERS, ERA) cast doubt on benefit
  - Antioxidants - earlier observational studies and clinical trials were promising, but large-scale trials (HOPE, PHS, CARET) casts doubt

AHA Get With The Guidelines

- Major AHA program to implement the secondary prevention guidelines for patients hospitalized with CHD
- Focuses on evidence-based guidelines
- National rollout began in New England and California
- Future expansion planned for stroke, CHF, and diabetes to address QA reporting requirements