Preventative Cardiology: How to Approach the Asymptomatic Patient

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None
Objectives

- Cardiovascular Risk Estimators
- Risk Factor Modification
  - Lifestyle Changes
  - Blood Pressure Goals
  - Cholesterol Goals
  - Diabetes, Smoking, and Renal Disease
- Tests
- Medications for Prevention
- Conclusion
Risk Factor Concepts

- **Nonmodifiable risk factors** include age, sex, race, and FH of CVD.
- **Behavioral risk factors** include sedentary lifestyle, unhealthy diet, heavy alcohol/cigarette consumption.
- **Physiological risk factors** include HTN, HL, obesity, and diabetes.
Individual Risk Assessment

- History and Physical + Labs/Lipids
- Ask about Tobacco, Diet, and Physical Activity
- Obtain BP, Height, Weight, and Waist/Hip Circumference
- Calculate a 10-year CHD Risk Score
# Cardiovascular Risk Estimator

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Framingham</th>
<th>SCORE</th>
<th>PROCAM (Men)</th>
<th>Reynolds (Women)</th>
<th>Reynolds (Men)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, range (y)</td>
<td>30 to 74; M:49</td>
<td>19 to 80; M:46</td>
<td>35 to 65; M:47</td>
<td>&gt;45; M:52</td>
<td>&gt;50; M:63</td>
</tr>
<tr>
<td>Mean follow-up (y)</td>
<td>12</td>
<td>13</td>
<td>10</td>
<td>10.2</td>
<td>10.8</td>
</tr>
<tr>
<td>Risk factors considered</td>
<td>Age, sex, total cholesterol, HDL cholesterol, smoking, systolic blood pressure, antihypertensive Medications</td>
<td>Age, sex, total-HDL cholesterol ratio, smoking, systolic blood pressure</td>
<td>Age, LDL cholesterol, HDL cholesterol, smoking, systolic blood pressure, family history, diabetes, triglycerides</td>
<td>Age, HbA1C (with diabetes), smoking, systolic blood pressure, total cholesterol, HDL cholesterol, hsCRP, parental history of MI at &lt;60 y of age</td>
<td>Age, systolic blood pressure, total cholesterol, HDL cholesterol, smoking, hsCRP, parental history of MI at &lt;60 y of age</td>
</tr>
<tr>
<td>Endpoints</td>
<td>CHD (MI and CHD death)</td>
<td>Fatal CHD</td>
<td>Fatal/nonfatal MI or sudden cardiac death (CHD and CVD combined)</td>
<td>MI, ischemic stroke, coronary revascularization, cardiovascular death (CHD and CVD combined)</td>
<td>MI, stroke, coronary revascularization, cardiovascular death (CHD and CVD combined)</td>
</tr>
</tbody>
</table>
Pooled Risk Assessment

- 21k patients from FHS, FHS-Off, ARIC, CVHS (old), CARDIA (young)

**Issues and New Items**
- Data prior to widespread statin use (before late 1990’s)
- Adds race
- Adds lifetime risk in adults 20-59 years old
Is 10-Year Risk Enough?

PCE: 10-Yr and Lifetime ASCVD Risk in Nonsmoking, Nondiabetic Male with SBP 140 mmHg, TC 190, HDL-C 42, and TG 145 mg/dL*

*Average for MI in ♂<55
Average lifetime risk in men = 61%
ACC Pooled Risk Calculator

Search App Store: “ASCVD Risk”

ASCVD Risk Estimator*

<table>
<thead>
<tr>
<th>10-Year ASCVD Risk</th>
<th>Lifetime ASCVD Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.4% calculated risk</td>
<td>69% calculated risk</td>
</tr>
<tr>
<td>3.6% risk with optimal risk factors**</td>
<td>5% risk with optimal risk factors</td>
</tr>
</tbody>
</table>

Recommendation Based On Calculations...

Based on the data entered (assuming no clinical ASCVD and LDL-C 70-189 mg/dL):

- Gender: Male
- Age: 55
- Race: White/Other
- Total Cholesterol: 150
- HDL-Cholesterol: 55
- Systolic Blood Pressure: 150
- Hypertension Treatment: Yes
- Diabetes: Yes
- Smoker: Yes

Consider High-Intensity Statin

Moderate-intensity statin therapy should be initiated or continued for adults 40 to 75 years of age with diabetes mellitus. (1A)

High-intensity statin therapy is
Risk Factor
Modification
Start with the Basics
The Good, The Bad, and The Ugly
No Way This Will Be Repeated

International J Epidemiology 1979;8:99

Finnish Mental Hospital Study: ↓SFA/↑PUFA vs. Control Diet in 676 Patients w/o CHD using Cross-over Design (2 Hospitals)

- TC 268→226 mg/dL (↓16%)
- PUFA Diet
- Control Diet

<table>
<thead>
<tr>
<th>Events / 1000 Person Years</th>
<th>MI+CHD Death 1959-65</th>
<th>Death 1959-65</th>
<th>MI+CHD Death 1965-71</th>
<th>Death 1965-71</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P=0.03</td>
<td>P=0.11</td>
<td>P=0.02</td>
<td>P=0.25</td>
</tr>
</tbody>
</table>
The Poor Veterans

LA VAMC Domiciliary Study: ↑PUFA/↓SFA vs. Usual Diet (Cafeteria Style) in 846 Men with/without CHD over 8 Years

Dayton S et al, Lancet 1968:1060

TC 234→203 mg/dL (↓13%)

Events

<table>
<thead>
<tr>
<th></th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal CVD</td>
<td></td>
</tr>
<tr>
<td>Nonfatal CVD</td>
<td></td>
</tr>
<tr>
<td>Total CVD</td>
<td></td>
</tr>
</tbody>
</table>

P <0.05

PUFA Diet

Control Diet
Who Likes French Food?

Lyon Diet Heart (Mediterranean Diet) Study

de Longeiri et al, Circulation 1999;99:779

- 46 month RCT trial in 605 CHD subjects
- more whole grains
- more fruits, beans, and vegetables
- more fish
- less meat
- skim milk products
- canola oil margarine

<table>
<thead>
<tr>
<th>% Change</th>
<th>14 vs. 44</th>
<th>14 vs. 24</th>
<th>Cardiac Death + Nonfatal MI</th>
<th>All-cause Mortality</th>
<th>LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>&lt;0.001</td>
<td>&lt;0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kcal</td>
<td>2140 → 1928</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-Fat</td>
<td>33% → 31%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFA</td>
<td>12% → 8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oleic</td>
<td>10% → 13%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALA</td>
<td>0.3% → 0.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A Coke A Day Keeps...

Yang Q et al, JAMA Intern Med 2/3/14

CV Mortality vs. Dietary Added Sugar in 11,733 Healthy Subjects in NHANES III

U.S. Mean = 15% (18 oz regular soda)

HR CVD Mortality

<10% Cal from Added Sugar
10-25% Cal from Added Sugar
>25% Cal from Added Sugar

↑ 175%
Buy Your Coke in Mexico?

Whole Grain vs. High Fructose Corn Syrup Pathways

- **Whole Grain**
  - Image of wheat ears

- **High Fructose Corn Syrup**
  - Image of a Coca-Cola can
  - Image of corn kernels

- **Glucose**
  - Image of a brain
  - Green arrow from Glucose to Brain
  - Green arrow from Glucose to Central Obesity

- **Fructose**
  - Green arrow from Fructose to Liver
  - Purple arrow from Fructose to Insulin

- **Insulin**
  - Green arrow from Insulin to Liver

- **Leptin**
  - Green arrow from Leptin to Liver

- **Central Obesity**
  - Image of adipose tissue

- **2/3**
  - Green arrow from Glucose to Central Obesity

- **1/3 (TG)**
  - Green arrow from Fructose to Hepatic Triglycerides
  - Purple arrow from Fructose to Insulin

- **HTN**
  - Image of a blood pressure monitor

- **Endo Dysf’n**
  - Image of endothelial dysfunction

42-55% probability of fructose consumption
Physical Inactivity

“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
The Lipid Dilemma

Characteristics of Young (♂<55, ♀<65) MI Patients without prior CHD or CHD Equivalent and ATP-III Recommendations

Akosah KO et al, J Am Coll Cardiol 2003;41:1475

<table>
<thead>
<tr>
<th>Lipid</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>190</td>
</tr>
<tr>
<td>LDL-C</td>
<td>126</td>
</tr>
<tr>
<td>HDL-C (M)</td>
<td>42</td>
</tr>
<tr>
<td>HDL-C (F)</td>
<td>45</td>
</tr>
<tr>
<td>TG</td>
<td>145</td>
</tr>
<tr>
<td>Lipid Tx Recomm</td>
<td>25%</td>
</tr>
</tbody>
</table>
Do You Believe in Statins?

JUPITER Trial: Rosuvastatin 20 mg in 17,802 Healthy Subjects (>50 M, >60 F) with LDL-C <130 mg/dL and CRP >2 mg/L

## 2013 ACC/AHA Guidelines for Treating Hypercholesterolemia (Summary)

### Patient categories

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>With diagnosed cardiovascular disease and over 21 years old</td>
<td>75 or younger: Daily dose lowers LDL, or bad cholesterol, by 50% or higher</td>
</tr>
<tr>
<td></td>
<td>Older than 75: Moderate-intensity statin; Daily dose lowers LDL between 30% and 50%</td>
</tr>
<tr>
<td>With an LDL cholesterol level of 190 mg/dl</td>
<td>High-intensity statin</td>
</tr>
<tr>
<td>With a 7.5% or more risk of heart attack in the next 10 years*</td>
<td>High-intensity statin</td>
</tr>
<tr>
<td>With type 1 or 2 diabetes between 40 and 75 years old</td>
<td>Moderate-intensity statin</td>
</tr>
<tr>
<td>With a 7.5% or more risk of heart attack in the next 10 years* and between 40 and 75 years old</td>
<td>Moderate-to-high intensity statin</td>
</tr>
</tbody>
</table>

*Risk determined by a new calculation that accounts for age, cholesterol, blood pressure, smoking status and other risks experienced by men, women and minority groups.

Sources: American Heart Association; American College of Cardiology

The Wall Street Journal
### Individual Cardiovascular Endpoints and CVD/MI/Stroke

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>HR</th>
<th>Simva*</th>
<th>EZ/Simva*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause death</td>
<td>0.99</td>
<td>15.3</td>
<td>15.4</td>
<td>0.782</td>
</tr>
<tr>
<td>CVD</td>
<td>1.00</td>
<td>6.8</td>
<td>6.9</td>
<td>0.997</td>
</tr>
<tr>
<td>CHD</td>
<td>0.96</td>
<td>5.8</td>
<td>5.7</td>
<td>0.499</td>
</tr>
<tr>
<td>MI</td>
<td>0.87</td>
<td>14.8</td>
<td>13.1</td>
<td>0.002</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.86</td>
<td>4.8</td>
<td>4.2</td>
<td>0.052</td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>0.79</td>
<td>4.1</td>
<td>3.4</td>
<td>0.008</td>
</tr>
<tr>
<td>Cor revasc ≥ 30d</td>
<td>0.95</td>
<td>23.4</td>
<td>21.8</td>
<td>0.107</td>
</tr>
<tr>
<td>UA</td>
<td>1.06</td>
<td>1.9</td>
<td>2.1</td>
<td>0.618</td>
</tr>
<tr>
<td>CVD/MI/stroke</td>
<td>0.90</td>
<td>22.2</td>
<td>20.4</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*7-year event rates (%)

**Ezetimibe/Simva Better**

**Simva Better**

IMPROVE-IT slide set with permission
Hypertension

>140-150/90
<table>
<thead>
<tr>
<th>Modification</th>
<th>Recommendation</th>
<th>Approximate SBP Reduction Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight reduction</td>
<td>Maintain normal body weight (BMI=18.5-25)</td>
<td>5-20 mmHg/10 kg weight lost</td>
</tr>
<tr>
<td>DASH eating plan</td>
<td>Diet rich in fruits, vegetables, low fat dairy and reduced in fat</td>
<td>8-14 mmHg</td>
</tr>
<tr>
<td>Restrict sodium intake</td>
<td>&lt;2.4 grams of sodium per day</td>
<td>2-8 mmHg</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Regular aerobic exercise for at least 30 minutes most days of the week</td>
<td>4-10 mmHg</td>
</tr>
<tr>
<td>Moderate alcohol</td>
<td>&lt;2 drinks/day for men and &lt;1 drink/day for women</td>
<td>2-4 mmHg</td>
</tr>
</tbody>
</table>

BMI=Body mass index, SBP=Systolic blood pressure
Chobanian AV et al. *JAMA* 2003;289:2560-2572
I Can’t Keep Up!

2014 Hypertension Guideline Management Algorithm

Adult aged ≥18 years with hypertension
Implement lifestyle interventions (continue throughout management).
Set blood pressure goal and initiate blood pressure lowering-medication based on age, diabetes, and chronic kidney disease (CKD).

General population (no diabetes or CKD)
- Age ≥60 years
  - Blood pressure goal SBP <150 mm Hg DBP <90 mm Hg
    - Initiate thiazide-type diuretic or ACEI or ARB or CCB, alone or in combination.¹
- Age <60 years
  - Blood pressure goal SBP <140 mm Hg DBP <90 mm Hg
    - Initiate thiazide-type diuretic or CCB, alone or in combination.

Diabetes or CKD present
- All ages Diabetes present No CKD
  - Blood pressure goal SBP <140 mm Hg DBP <90 mm Hg
    - Initiate thiazide-type diuretic or CCB, alone or in combination.
- All ages CKD present with or without diabetes
  - Blood pressure goal SBP <140 mm Hg DBP <90 mm Hg
    - Initiate ACEI or ARB, alone or in combination with other drug class.²

Select a drug treatment titration strategy
A. Maximize first medication before adding second or
B. Add second medication before reaching maximum dose of first medication or
C. Start with 2 medication classes separately or as fixed-dose combination.
Diabetes

Sometimes all the warning signs are right in front of you.
Smoking
Smoking

“I’m prescribing a patch to help you quit smoking. Wear it over your mouth.”
Tests in the Asymptomatic Patient
A resting electrocardiogram (ECG) is reasonable for cardiovascular risk assessment in asymptomatic adults with hypertension or diabetes.

A resting ECG may be considered for cardiovascular risk assessment in asymptomatic adults without hypertension or diabetes.
Echocardiography to detect left ventricular hypertrophy may be considered for cardiovascular risk assessment in asymptomatic adults with hypertension.

Echocardiography is not recommended for cardiovascular risk assessment of CHD in asymptomatic adults without hypertension.
Measurement of ankle-brachial index is reasonable for cardiovascular risk assessment in asymptomatic adults at intermediate risk.
An exercise ECG may be considered for cardiovascular risk assessment in intermediate-risk asymptomatic adults (including sedentary adults considering starting a vigorous exercise program), particularly when attention is paid to non-ECG markers such as exercise capacity.
Stress Testing

“You’ll probably find this considerably more strenuous than other treadmill tests you’ve taken.”
Stress echocardiography is not indicated for cardiovascular risk assessment in low- or intermediate-risk asymptomatic adults.
Stress MPI may be considered for advanced cardiovascular risk assessment in asymptomatic adults with diabetes or asymptomatic adults with a strong family history of CHD or when previous risk assessment testing suggests high risk of CHD, such as a coronary artery calcium (CAC) score of 400 or greater.

Stress MPI is not indicated for cardiovascular risk assessment in low- or intermediate-risk asymptomatic adults.
Measurement of CAC is reasonable for cardiovascular risk assessment in asymptomatic adults at intermediate risk (10% to 20% 10-year risk).

Measurement of CAC may be reasonable for cardiovascular risk assessment persons at low to intermediate risk (6% to 10% 10-year risk).

Persons at low risk (<6% 10-year risk) should not undergo CAC measurement for cardiovascular risk assessment.
Coronary computed tomography angiography is not recommended for cardiovascular risk assessment in asymptomatic adults.
In men 50 years of age or older or women 60 years of age or older with LDL cholesterol less than 130 mg/dL; not on lipid-lowering, hormone replacement, or immunosuppressant therapy; without clinical CHD, diabetes, chronic kidney disease, severe inflammatory conditions, or contraindications to statins, measurement of CRP can be useful in the selection of patients for statin therapy.
In asymptomatic intermediate-risk men 50 years of age or younger or women 60 years of age or younger, measurement of CRP may be reasonable for cardiovascular risk assessment.

In asymptomatic high-risk adults, measurement of CRP is not recommended for cardiovascular risk assessment.

In low-risk men younger than 50 years of age or women 60 years of age or younger, measurement of CRP is not recommended for cardiovascular risk assessment.
Lipoprotein A2

Lipoprotein-associated phospholipase A2 (Lp-PLA2) might be reasonable for cardiovascular risk assessment in intermediate-risk asymptomatic adults.
In asymptomatic adults with diabetes, 40 years of age and older, measurement of CAC is reasonable for cardiovascular risk assessment.

Measurement of hemoglobin A1C may be considered for cardiovascular risk assessment in asymptomatic adults with diabetes.

Stress MPI may be considered for advanced cardiovascular risk assessment in asymptomatic adults with diabetes or when previous risk assessment testing suggests high risk of CHD, such as a CAC score of 400 or greater.
Other Tests

"Off hand, I'd say you're suffering from an arrow through your head, but just to play it safe, I'm ordering a bunch of tests."
Medications for Prevention

- Aspirin
  - 20% relative risk reduction in MI
  - 50% risk of non-fatal major bleeding
  - 6-8% reduction in mortality

- BB/ACEi/CCB/HCTZ

- Statins

- Red Wine/Moderate Alcohol

- Polypill? Liquid Drano?
Conclusions

- Know How to Calculate Patient Risk
- Make Sure the Patient Understands and Modifies his/her Risk Factors
- Exercise, Low Fat Diet, and Weight Loss Make the Patient Less Sweet
- Stop Smoking
- Know which Tests for Asymptomatic Patients can be Helpful
- Aspirin is Still King...for Now
Until We Change Our Culture…