Cardiovascular Disease: an Overview

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The Good News

We are living longer!

Heart & stroke death rates are falling!
Changing demographics

Figure 2-6.
Population Age 65 and Over: 1900 to 2000
(Millions)

Source: U.S. Census Bureau, decennial census of population, 1900 to 2000.
So Why Worry about Cardiovascular Disease?

- Cardiovascular disease is the number one killer
  - About 42% of all deaths
  - Nationwide: 921,819 annually
  - NH: 3468
  - VT: 1751
- Cardiovascular disease continues to strike young and middle-aged individuals
- We are losing ground on several important risk factors
Obesity in the USA

- **Men**
- **Women**

<table>
<thead>
<tr>
<th>Year</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-62</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>1971-74</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>1976-80</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>1988-94</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>2001-04</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>
Prevalence of Diabetes 1980-2004

2010 Goal: 25%

Source: Wonder.cdc.gov
FIGURE 1. Annual adult per capita cigarette consumption and major smoking and health events — United States, 1900–1998

Smoking in Youth

2005 Youth Risk Behavior Survey (YRBS)
A Potential Decline in Life Expectancy in the United States in the 21st Century

S. Jay Olshansky, Ph.D., Douglas J. Passaro, M.D., Ronald C. Hershon, M.D., Jennifer Layden, M.P.H., Bruce A. Carnes, Ph.D., Jacob Brody, M.D., Leonard Hayflick, Ph.D., Robert N. Butler, M.D., David B. Allison, Ph.D., and David S. Ludwig, M.D., Ph.D.
Women are not immune to heart disease!

![Bar chart showing death rates per 100,000 population for CVD, Resp. Cancer, Colon Cancer, and Breast Cancer for Men and Women.](chart.png)
Potential for Falling Longevity?

Life Extending Technology

Public Health Measures

Health adverse behavior
Evolution of Cardiovascular Disease

We must tackle heart disease at all points!
What is Cardiovascular Disease?

“Cardiovascular disease” refers to diseases involving the heart and blood vessels

Heart
- Angina
- Heart Attack
- Heart Failure
- Arrhythmias

Brain
- Stroke
- TIA

Peripheral Vasculature
- Claudication
- Ulceration
- Amputation
The heart, brain and extremities share a disease process

- Coronary Disease: 30%
- Cerebral Disease: 25%
- Peripheral Vascular Disease: 19%
- Intersection of Cerebral and Coronary Disease: 7%
- Intersection of Coronary and Peripheral Vascular Disease: 12%
- Intersection of Cerebral and Peripheral Vascular Disease: 3%
- Unique to Cerebral Disease: 4%
- Unique to Coronary Disease: 3%
- Unique to Peripheral Vascular Disease: 19%
The Common Thread?

- Circulatory system (arteries, veins, etc.)
- Susceptibility to atherosclerosis
Atherosclerosis

AKA “Arteriosclerosis”, “hardening of the arteries”

- Complex, self-sustaining inflammatory process
- Thickens arterial wall
- Occurs slowly over decades
Atherosclerosis Progression

- No Symptoms
- Mild Symptoms
- Severe Symptoms

Time (years to decades)

Ischemic Heart Disease
Cerebrovascular Disease
Peripheral Vascular Disease
What causes atherosclerosis?

- Smoking
- High Blood Pressure
- High Cholesterol
- Diabetes
- Hereditary Factors
- Sedentary Lifestyle
- Obesity
- Other Factors

The Big 5
Normal Coronary Arteries

Right Coronary Artery

Left Coronary Artery
Diseased Coronary Artery
Peripheral Vascular Disease
Stroke – “Brain Attack”
## Symptoms of Cardiovascular Disease

<table>
<thead>
<tr>
<th>Heart Disease</th>
<th>Stroke or TIA</th>
<th>Peripheral Vascular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest Discomfort</td>
<td>Sudden numbness or weakness.</td>
<td>Pain in calves, thighs or buttocks</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>Sudden confusion, trouble speaking or understanding</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Sudden visual loss</td>
<td>Non-healing ulcers</td>
</tr>
<tr>
<td>Palpitations</td>
<td>Sudden trouble walking, instability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sudden severe headache with no known cause</td>
<td></td>
</tr>
</tbody>
</table>
Suspected Stroke or Heart Attack?

Call 911

Time = saved heart muscle
Time = saved brain function
Other Causes of Heart Disease

• Heart failure
• Heart rhythm disturbances (arrhythmias)
• Congenital heart disease
• Heart Valve Disease
• Heart infections
Heart Failure
Heart Failure

- Virus
- Toxins
- Hypertension
- Post Partum
- Ischemia
- Valve Disease

Heart Muscle Injury

Heart Failure
Heart Failure: Symptoms

- Shortness of breath
- Fatigue
- Edema (swelling)

(Dr Kono will review heart failure in detail)
Arrhythmias
A wave of electrical discharge proceeds mechanical contraction of the heart.
Arrhythmia Symptoms

• Palpitations (a feeling of thumping, fluttering, skipping or racing of the heart)
• Lightheadedness/loss of consciousness
• Chest pain or tightness
• Shortness of breath
• Fatigue
• Anxiety

(Dr Sangha will review arrhythmias in detail)
Heart Valve Disease
Valve Disease

Valves are intended to allow blood flow in only one direction from one heart chamber to another

- **Normal Function:**
  - Allow blood to flow freely one direction and none backwards

- **Dysfunction:**
  - Become narrow and impede forward flow (stenosis)
  - Become incompetent and allow backward flow (regurgitation)
Valve Disease

- Shortness of breath
- Fatigue
- Chest Pain
- Susceptibility to infection
- Death

Congenital Abnormality
Infection
Age Related Degeneration
Rheumatic Fever

Valve Dysfunction
Treatment of Valve Disease

- Medications
- Surgery
- Percutaneous repair
Open Heart Surgery
Percutaneous Valvuloplasty

Mitral Valvuloplasty

Aortic Valvuloplasty

Valvuloplasty
A procedure to improve blood flow through a narrow valve. A catheter is threaded to the valve through a hole temporarily created in the septal wall and inflated.
Percutaneous Aortic Valve Replacement
Percutaneous Aortic Valve Replacement
What can you do to stay healthy?
Know your Enemies!

- Inactivity
- Obesity
- Smoking
- Elevated cholesterol
- Diabetes
- Hypertension
Calculate Your Risk

Framingham Risk Calculator

**Coronary Disease Risk Prediction Score Sheet for Men Based on Total Cholesterol Level**

**Coronary Disease Risk Prediction Score Sheet for Women Based on Total Cholesterol Level**
Make the right choices

- Use the stairs; take a daily walk!
- Stay away from all fast food restaurants!
- Eat smaller portions
- Read food labels
- Choose foods made from whole grains
- Stay away from restaurants that allow smoking
Learn about Trans Fatty Acids

- Low level presence in meat and milk of ruminant animals
- High levels in “partially hydrogenated vegetable oils”
- Lot of bad consequences:
  - Raise LDL & lower HDL
  - Increase risk of heart disease by 30%
Trans Fatty Acids

AHA Recommendations:

- Saturated fats < 7% of total caloric intake
- Trans fats to < 1% of total caloric intake
- Cholesterol to < 300 mg per day
- Total fat to 25-35% of total caloric intake

FDA mandated trans fat food labeling after January 1, 2006
Some Unlikely Friends?
Dark Chocolate

• Raises HDL
• Improves insulin sensitivity
• Lowers blood pressure
• Improves blood vessel reactivity

Rx: Recommended Dose – 100 gm per day

Dark Chocolate ≠ Milk Chocolate
Alcohol

- Elevation of HDL
- Antithrombotic effects
- Promote formation of nitric oxide (NO)
- Reduced coronary heart disease

Rx: Recommended Dose – 1-2 drinks per day
Olive Oil

- Increase in HDL
- Reductions
  - Total Cholesterol
  - Total to HDL Ratio
  - Triglycerides
- Reduction in oxidative stress markers
Green Tea

- Decrease in total and cardiovascular mortality
- Decrease in myocardial infarction
- Decrease in stroke
- Reduced mortality after MI
- Increases coronary flow reserve
- Improved endothelial function
Where are we heading?