Stress Testing in Women

- Prevalence of CAD in women vs. men
- Sensitivity and Specificity of stress testing in women
- Why???
- How to interpret results?

1928 Women’s Lobos

Prevalence of CAD in women

- Data is difficult due to inaccuracy of stress test results
- From mortality data women appear to lag behind men by 10 years
  - < 45 yrs, CAD is 5 times < men
  - ST depression is 4 times > men
- As women get older, ST depression decreases and CAD risk increases

ST Segment changes in women

- 1950 Scherlis et al. Noted increased ST depression in women
- Confirmed by several others
  - Is this true ischemia?
  - Is it true CAD?
  - What is the cause?

Pre-test likelihood of CAD (%)

<table>
<thead>
<tr>
<th>Age</th>
<th>Non-anginal Chest Pain</th>
<th>Typical Angina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>30-39</td>
<td>5.2</td>
<td>0.8</td>
</tr>
<tr>
<td>40-49</td>
<td>14.1</td>
<td>2.8</td>
</tr>
<tr>
<td>50-59</td>
<td>21.5</td>
<td>8.4</td>
</tr>
<tr>
<td>60-69</td>
<td>28.1</td>
<td>18.6</td>
</tr>
</tbody>
</table>

Yet death from CV disease is the most common cause of death in women

- Each year, more women than men die of cardiovascular disease
- It causes 1 out of 3 women’s deaths
- Twice as many deaths as all forms of cancer combined
**WHY????**

- Changes in risk with aging
  - < before menopause, > after
- Live longer
- Harder to detect
- Harder to diagnose

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**Age and CAD in women**

- First MI occurs 10 yrs later in women than men
- CAD increases with increasing age
  - 55-64 yrs, 36%
  - > 75 yrs, 55%
- By 2010, 81% of the population over 85 will be female

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**Risk Factors for Women**

- Smoking (21% of women smoke)
  - Smoking and BC pills 2-6 fold > risk of MI
- Diabetes (4x risk of CAD than diabetic men)
  - Why?? Glucose interferes with E binding to endothelium
- HTN (70% women > 65 have HTN)
- Lipids (HDL decreases with age in women)
- Menopause
- Obesity and inactivity

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**MI Symptoms**

- Women usually present with atypical symptoms
  - Nausea
  - Jaw pain
- 50% of MI are unrecognized in women
  - 33% in men
Symptoms

- **Classic Symptoms**
  - Chest pain
  - Shortness of breath
  - Sweating
  - Chest tightness
  - Pain spreading to arms and neck

- **More likely in women**
  - Indigestion
  - Dizziness, nausea
  - Lightheadedness, fatigue
  - Pain between shoulder blades
  - Sense of impending doom

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Diagnosis

- Women are harder to diagnose
- Most research was done in men
- Risk stratifications made for men
- Angina unrelated to CAD
  - 50% in women
  - 17% in men

Stress Testing

- 5-20 fold > false positives
- Why??????
- AHA recommends imaging rather than stress testing in symptomatic women

HRT and CAD

- Controversial topic
  - Prior studies suggest HRT provides a protective effect for CAD
  - HRT
    - lowers total and LDL cholesterol
    - Increases HDL

Women’s Health Initiative (2004)

- HRT with E trial was stopped
  - Increased the risk of MI and some cancers
  - No protective effect for CAD
- HRT with E and P stopped
  - No protective effect for CAD
  - Increased breast cancer

WHY Again????

- HRT levels these days are lower
  - Some beneficial effects may be over-taken by bad effects of HRT
- Bad effects?
  - > TG
  - Glucose metabolism
  - Coagulation and fibrinolysis
Conclusions

- Heart Disease is a major health problem for women
- Most people are unaware of the problem
- Not much research on CAD and women
- Diagnosis is often delayed and inaccurate
- HRT is not recommended to prevent CAD