

## 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

## 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?

## 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

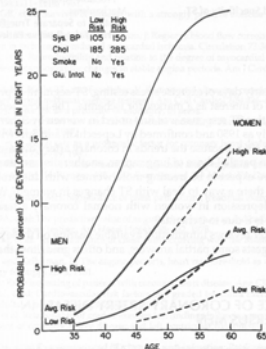


FIGURE 15-1. Probability of women developing CAD in 8 years according to age, sex, and risk. Men —·—·; Women — — — — (from the Framingham Heart Study, with permission.)

## Pre-test likelihood of CAD (%)

Age	Non-anginal Chest Pain		Typical Angina	
	Men	Women	Men	Women
30-39	5.2	0.8	69.7	25.8
40-49	14.1	2.8	87.3	55.2
50-59	21.5	8.4	92.0	79.4
60-69	28.1	18.6	94.3	90.6

Roberts 97, pg 148

## 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**

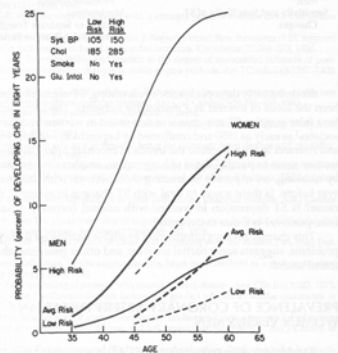
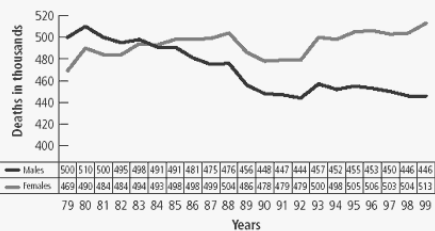


FIGURE 15-1. Probability of women developing CAD in 8 years according to age, sex, and risk. Men —, Women — (from the Framingham Heart Study, with permission.)

FIGURE 1  
Cardiovascular disease mortality trends for males and females  
United States: 1979–99



Source: CDC/NCHS and the American Heart Association

## 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**

## 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**

## 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



## *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**