BRIGHAM AND WOMEN'S HOSPITAL

Sex and Gender in Cardiovascular Disease

Congressional Briefing

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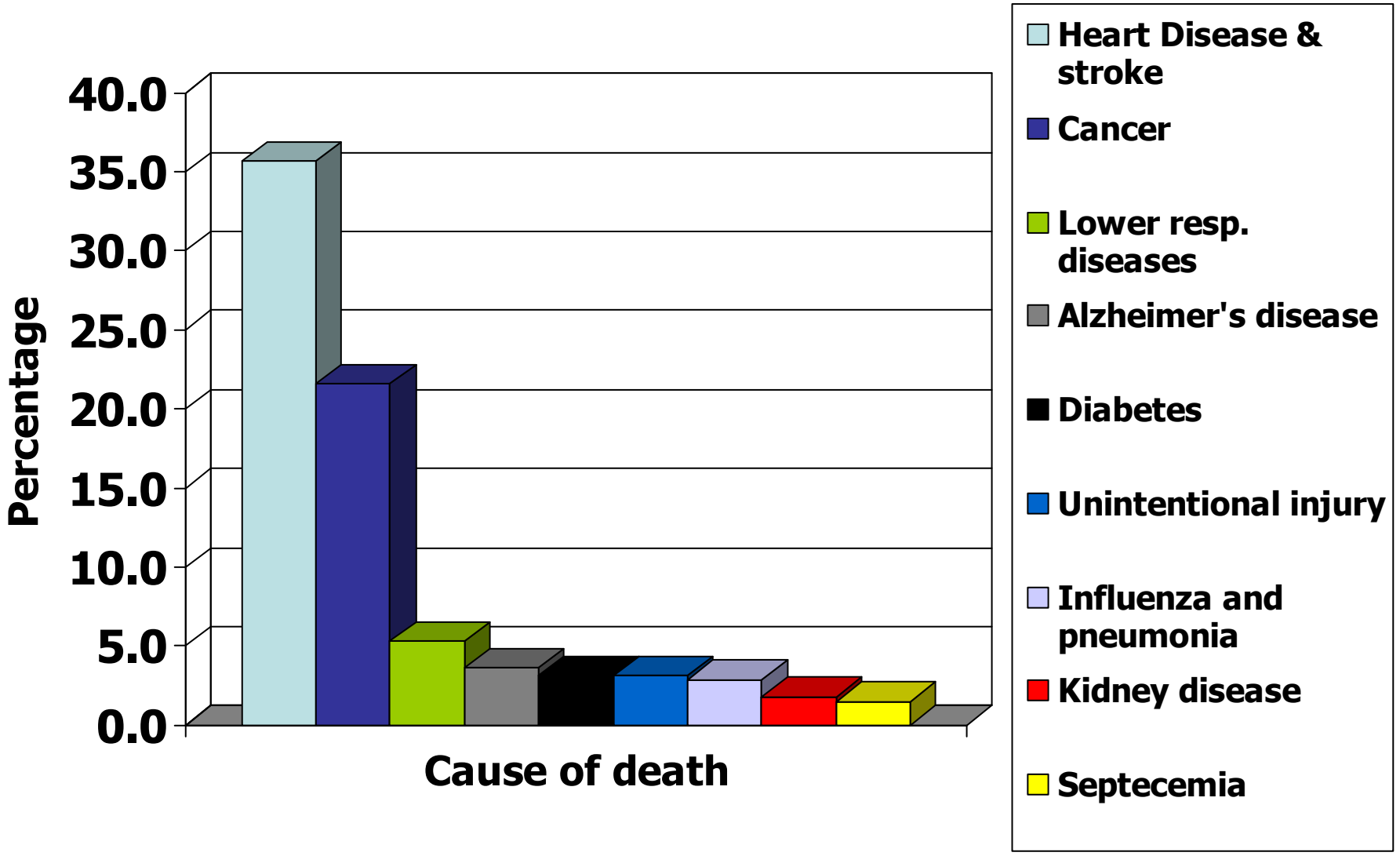
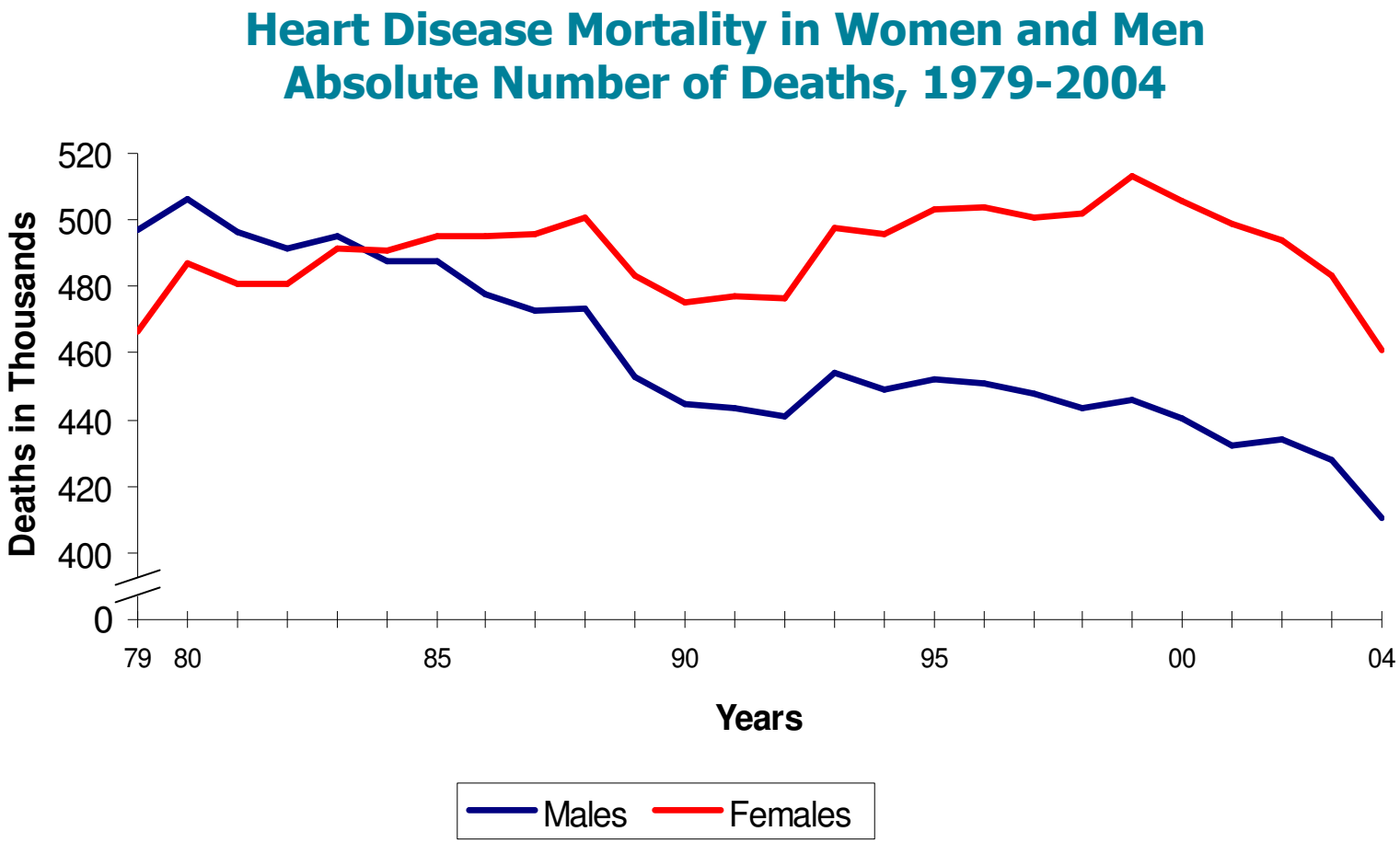
Leading causes of death among women



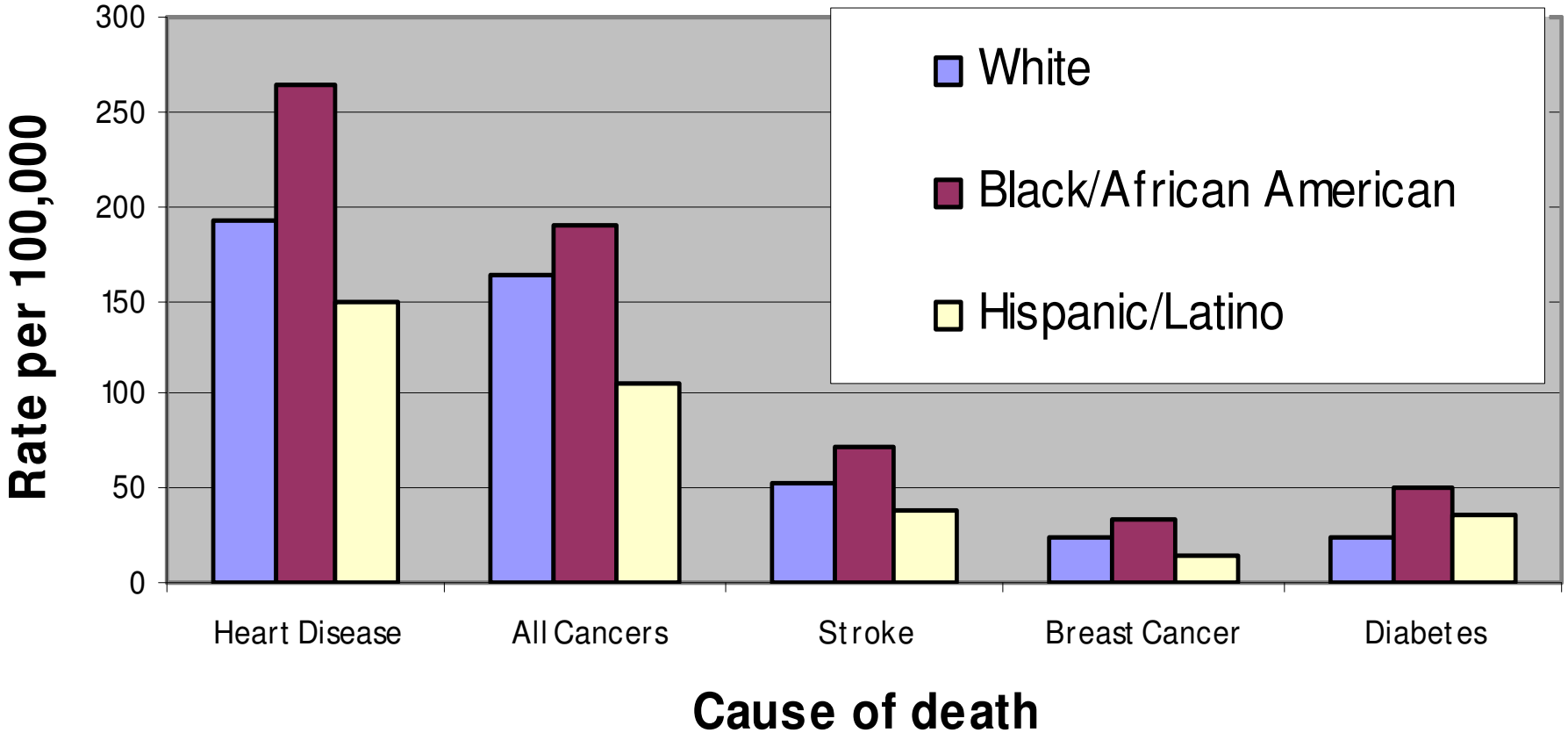
Source: CDC, Office of Women's Health, Leading Causes of Death, Females, US 2003

More Women Die from Heart Disease Then Men



Source: American Heart Association. Heart Disease and Stroke Statistics–2007 Update.

Mortality Rate For U.S. Women By Race/Ethnicity, 2002



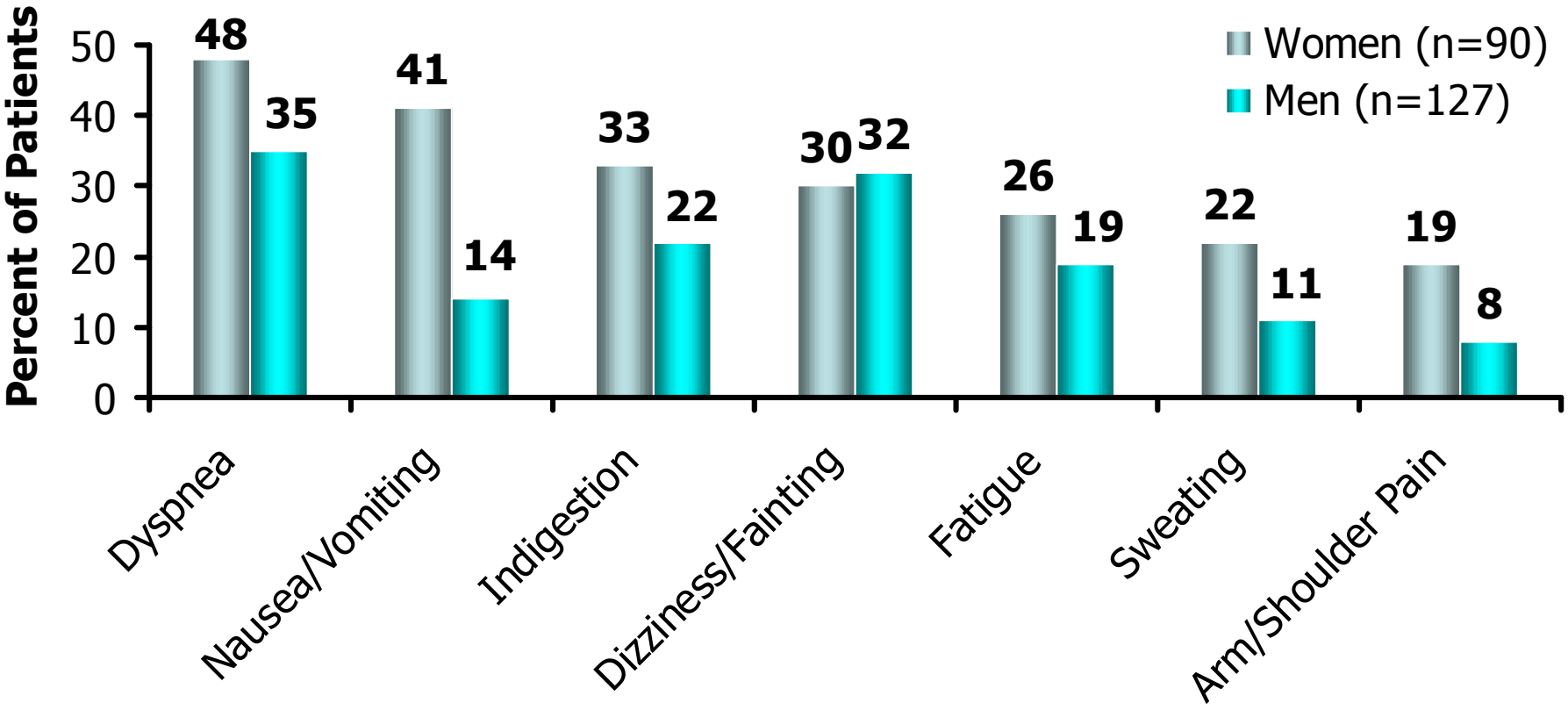
Source: CDC, NCHS, *Health, United States, 2004*

Cardiovascular Disease in Women

- Heart disease claims the lives of more women than the next five causes of death *combined*
- Only 21% of US women believe that heart disease and stroke are their greatest health threats
  (26% white, 15% black, 7% Hispanic)
- Women are, on average, ten years older than men at the time of their first heart attack and are more likely to die
- 64% of women vs. 50% of men who died suddenly of CHD had no previous symptoms

Sources: American Heart Association. Heart Disease and Stroke Statistics–2007 Update.
Christian AH, et al. J Women's Health. 2007;16:68-81.

Frequency of Presenting Symptoms other than Chest Pain in Acute MI

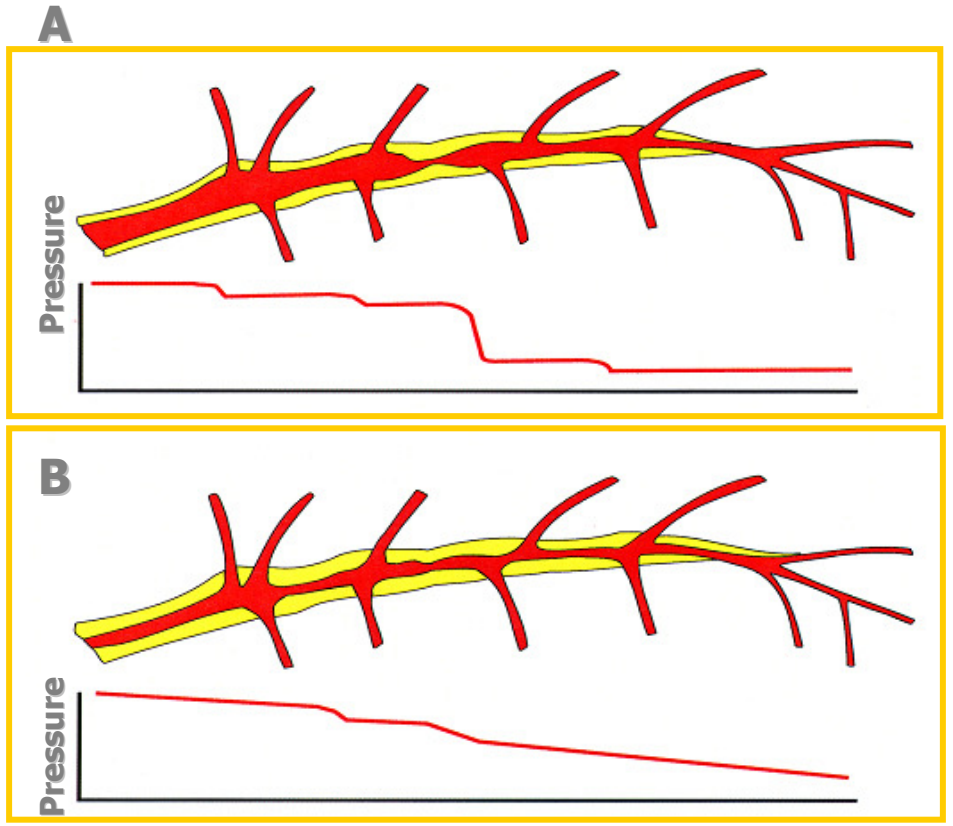


Source: Milner et. al *AM J Cardiol.* 1999; 84:396-399

Cardiovascular Disease can be Different in Women

Blockage in male coronary artery

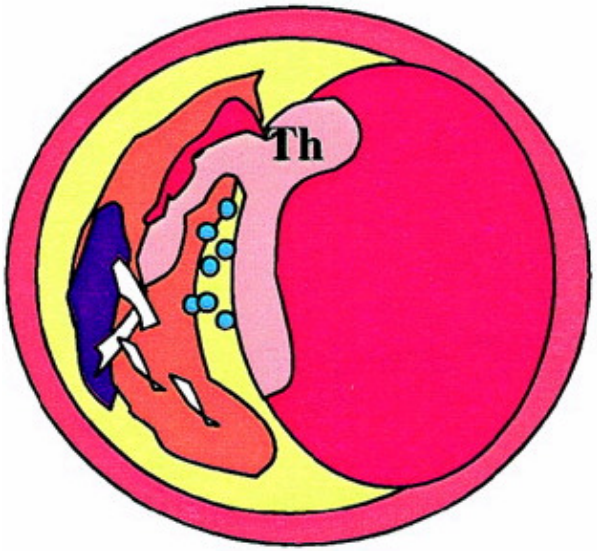
Blockage in female coronary artery



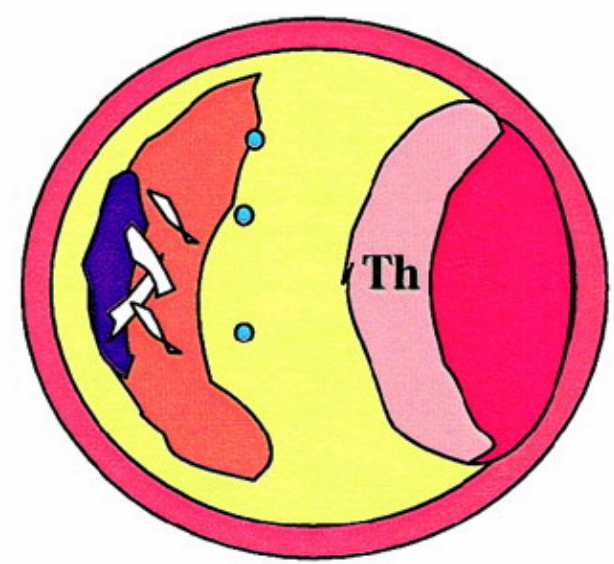
Gould. *Coronary Artery Stenosis and Reversing Atherosclerosis, 2nd ed.* 1999.

Sex Differences in Physiology in Myocardial Infarction

Plaque Rupture



Plaque Erosion



More commonly seen in women

Source: Virmani et al, ***Arterioscler Throm Vasc Biol***. 2000;20:1262-1275.

Secondary Prevention in Women: Lipids

- Sex-specific data from randomized trials consistently show benefit of treating women with known CHD with statins.

- CARE study shows that women benefit even more from statins in secondary prevention than men.

Sources: Walsh et al. *JAMA*. 2004;291:2243-2252. Lewis. J Am Coll Cardiol, 1998; 32 (1):140-146

Percentage of High Risk Women Achieving Optimal Lipid Values

	Baseline (%)	3 Years (%)
LDL-C <100 mg/dl	17	29
HDL-C >50 mg/dl	57	56
TG < 150 mg/dl	57	60
Combined LDL-C, HDL-C, and TG	7	12

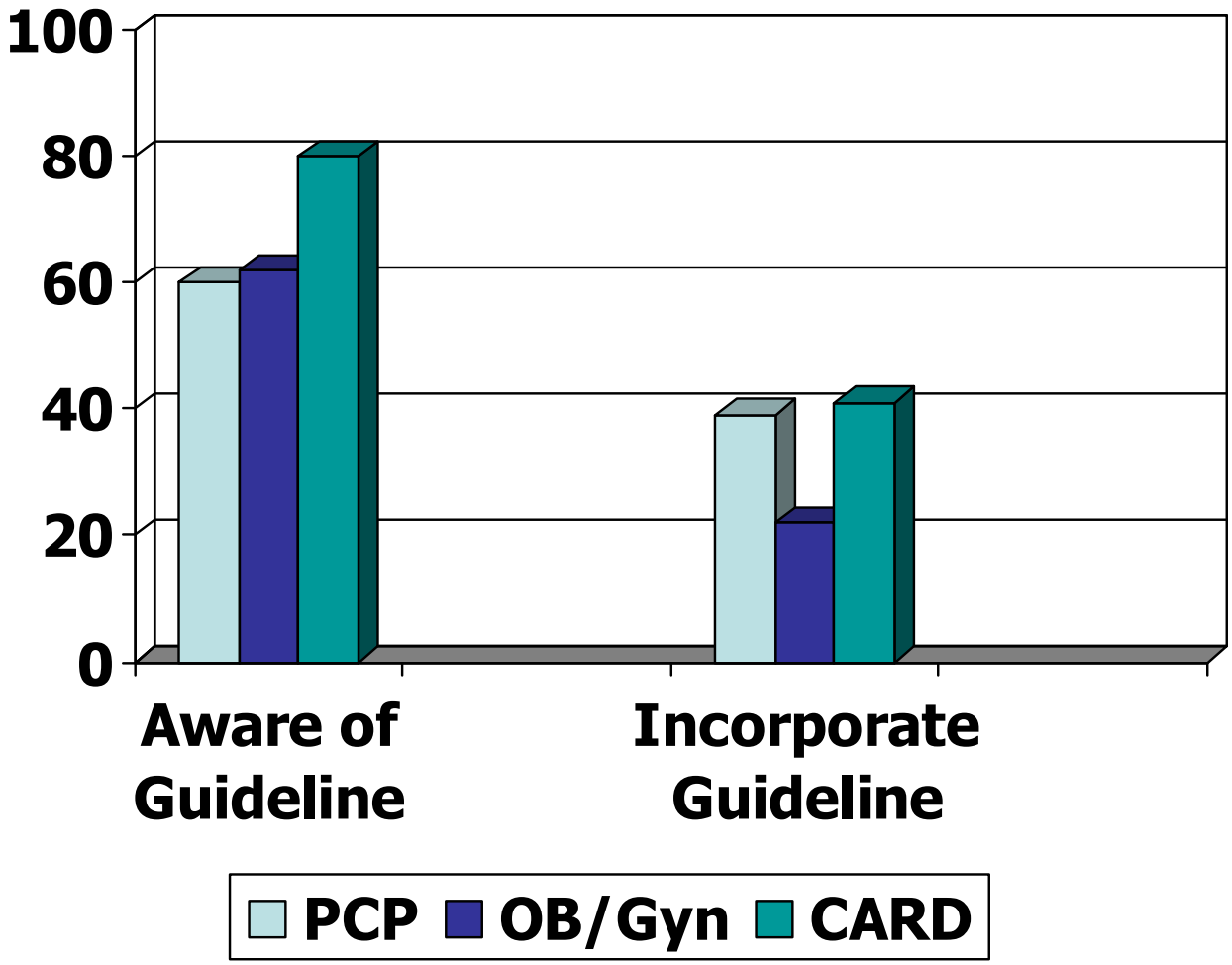
Source: Mosca et al. *Circulation.* 2005;111:488-493.

Secondary Prevention in Women: Lipids

- Sex-specific data from randomized trials consistently show benefit of treating women with known CHD with statins.
- CARE study shows that women benefit even more from statins in secondary prevention than men.
- In spite of these data, women are still under-treated

Sources: Walsh et al. *JAMA*. 2004;291:2243-2252. Lewis. J Am Coll Cardiol, 1998; 32:140-146

Physician Awareness of AHA Guidelines for Prevention of CVD in Women



Mosca L, et al. Circulation. 2005;111:499-510.

Sex and Gender Differences in CVD: Prevention and Treatment

- Current smoking cessation strategies are less effective in women and data point to a different biology of nicotine addiction in women.

- Women with diabetes have a greater risk of dying of CHD and of developing congestive heart failure compared with men.

- Glycoprotien IIb/IIIa inhibitors, a standard treatment in acute coronary syndromes, show higher bleeding rates and overdosing in women.

- Women with depression are more likely to experience a second heart attack.

Sex and Gender Differences in CVD: Prevention and Treatment

Provision of care:

- Women are more likely to experience delays in primary angioplasty

- Women are less likely to be referred to cardiac rehabilitation and when enrolled are more likely to drop out

Impact of burden of disease:

- Women spend more of their discretionary income on medical care and have higher rates of poverty at both younger and older ages

Inclusion of Women and Minorities in Research

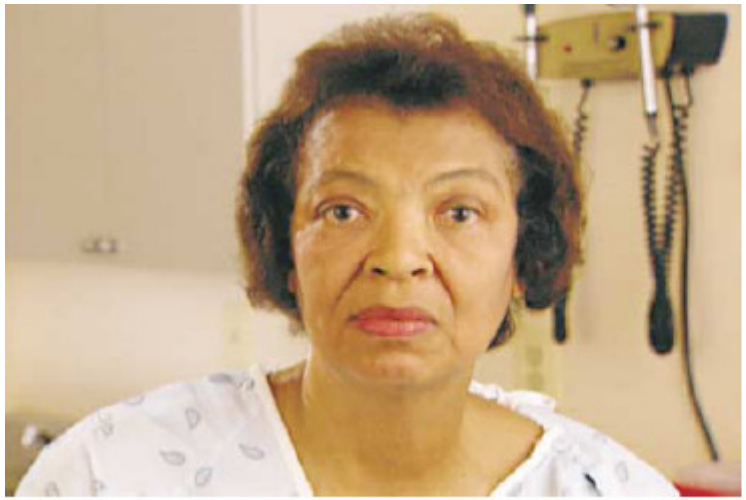
- NIH Revitalization Act of 1993, PL 103-43 established guidelines for inclusion of women and minorities in clinical research

- There is no mandate to report sex-specific data. Few cardiovascular studies report sex-specific results.
  - In a study of 645 cardiovascular trials published in lead medical journals in 2004, only 24% reported sex-specific results

- Overall, sex differences in CVD are inadequately understood, which limits ability to optimize care

Source: Blauwet et al. Mayo Clin Proc. Feb 2007; 82 (2); 166-170.

Racial and Ethnic Disparities



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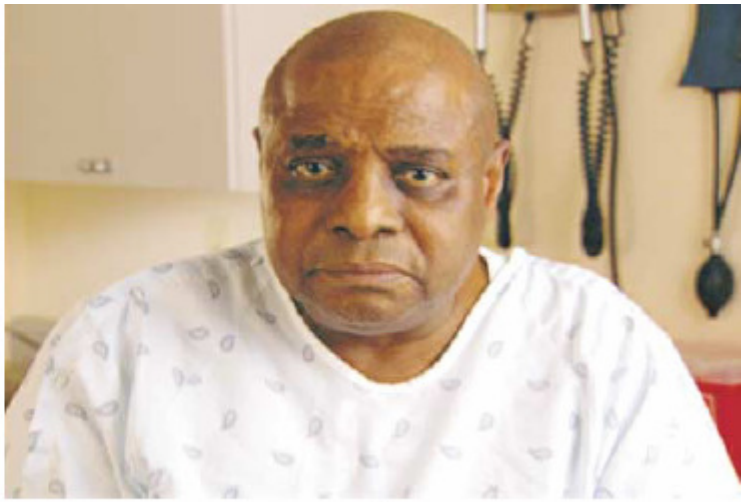

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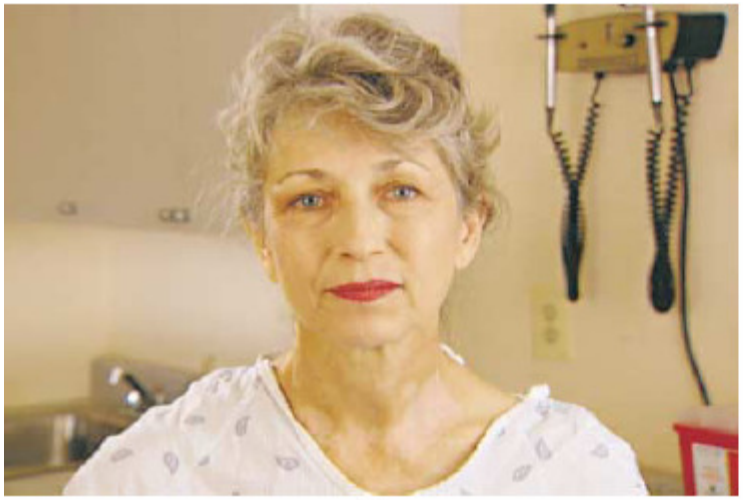

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Schulman Kevin A, et al. NEJM. 1999;340-624.

Predictors of Referral for Cardiac Catheterization

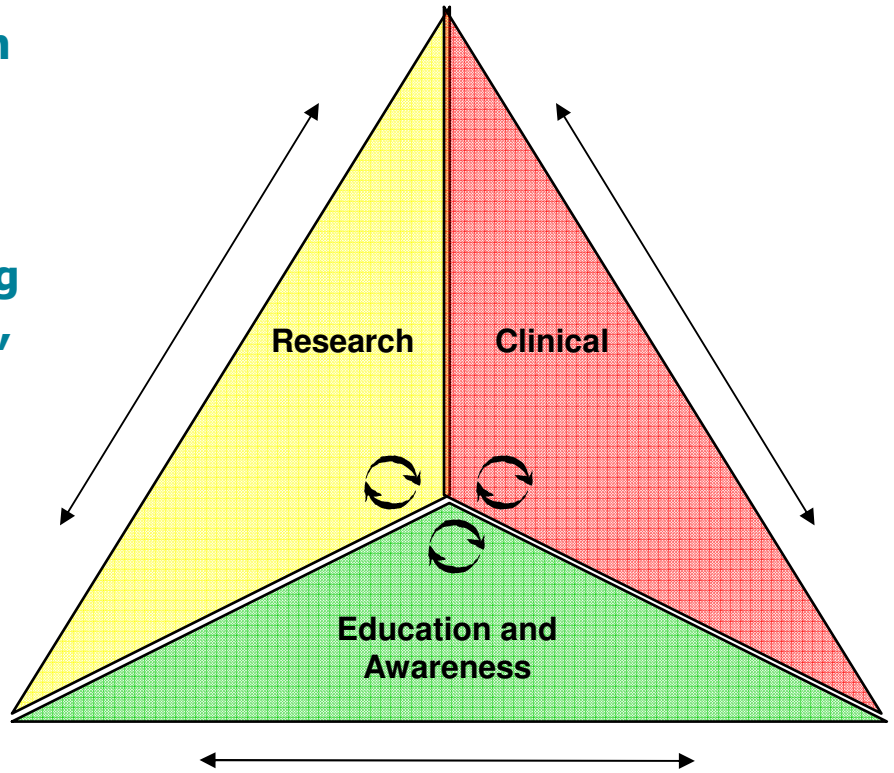
Factors	Odds Ratio for Catheterization	P Value
Race and Sex as Separate Factors		
Male	1.0	
Female	0.6 (0.4-0.9)	0.02
White	1.0	
Black	0.6 (0.4-0.9)	0.02
Interaction of Race and Sex		
White Male	1.0	
Black Male	1.0 (0.5-2.1)	0.99
White Female	1.0 (0.5-2.1)	>0.99
Black Female	0.4 (0.2-0.7)	0.004

Schulman Kevin A, et al. NEJM. 1999;340-624.

Creating Change

Expand inclusion of women in research and clinical trials

Expand reporting of results by sex, race, and by sex/race



Effectively translate research into clinical care

Use sex-specific data to consider safety of interventions

Sex-stratified quality measures

Improve education and awareness of women, investigators, physicians, and other health care providers

Opportunities for Impact

The changing healthcare environment

- Current focus on reforming the healthcare system needs to focus on women as a key group with specialized strategies.

- The Massachusetts experience provides opportunities for expanding women's access to health coverage, including the chance to enhance primary and secondary prevention.

Opportunities for Impact

Expand knowledge and support of prevention programs

- 82% heart disease deaths among women are preventable through controlling risk factors and maintaining a healthy lifestyle

- By controlling these risk factors, women can also reduce their risk of many other chronic illnesses including diabetes, hypertension, chronic obstructive pulmonary disease and cancer

Source: Stampfer et al. NEJM, 2000, Jul 6;343(1):16022

Contact Information

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AHA 2007 Guidelines for Preventing CVD in Women

Emphasizes lifetime risk/Includes family hx

- HTN: wt control, increase fresh fruits and vegetables and low-fat dairy
- Smoking: counseling and nicotine replacement
- Physical Activity: 60-90 mins/day to lose or sustain wt loss
- Diet: Saturated fats < 7% percent of cals omega-3 fatty acid intake-oily fish 2x/wk

Mosca L, et al. 2007; 115.

AHA 2007 Guidelines for Preventing CVD in Women

- LDL cholesterol: < 70 mg/dl in very high-risk women with heart disease
- AHA does not recommend:
  - HRT and SERMs
  - Antioxidant supplements (vitamins E, C, beta-carotene)
  - Folic acid to prevent CVD
- Low-dose ASA considered in women ≥ 65 yrs if benefits outweigh risks
- Upper dose of ASA for high-risk women is 325 mg

Mosca L, et al. 2007; 115.

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Mosca L, et al. National Study of Physician Awareness and Adherence to Cardiovascular Disease Prevention Guidelines. *Circulation*. 2005;111:499-510.

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Stampfer et al. Primary Prevention of Coronary Heart Disease in Women through Diet and Lifestyle. *NEJM*, 2000, Jul 6;343(1):16022

Virmani et al. Lessons From Sudden Coronary Death : A Comprehensive Morphological Classification Scheme for Atherosclerotic Lesions. *Arterioscler Throm Vasc Biol*. 2000;20:1262-1275.

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