

Women and Heart Disease

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Presenter Disclosure Information

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Massachusetts General Hospital

No disclosures

Objectives

Discuss Burden of Heart Disease

Heart Disease / Risk Factors / Gender&Race

Risk Stratification

Prevention

- Hypertension
- Smoking
- Obesity
- Diabetes

Objectives

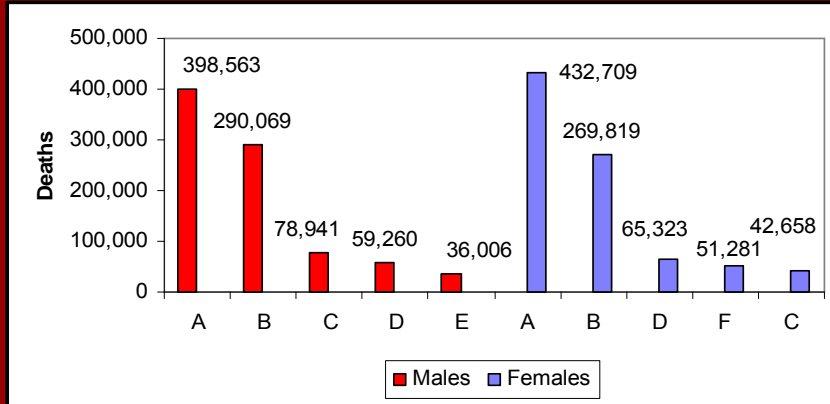
- Strategies to assess and stratify women into high, intermediate, lower, and optimal risk categories for cardiovascular disease
- Summarize lifestyle approaches to the prevention of cardiovascular disease in women
- Diabetic Cardiomyopathy

Why do women live longer
than men??

Why women live longer than
men

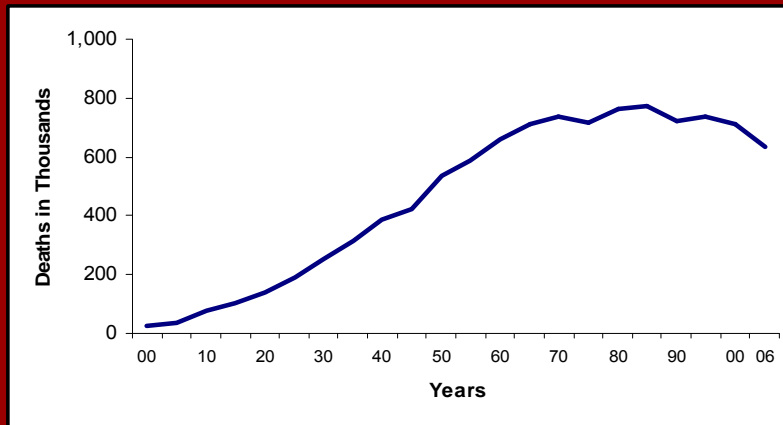


The Burden of Heart Disease

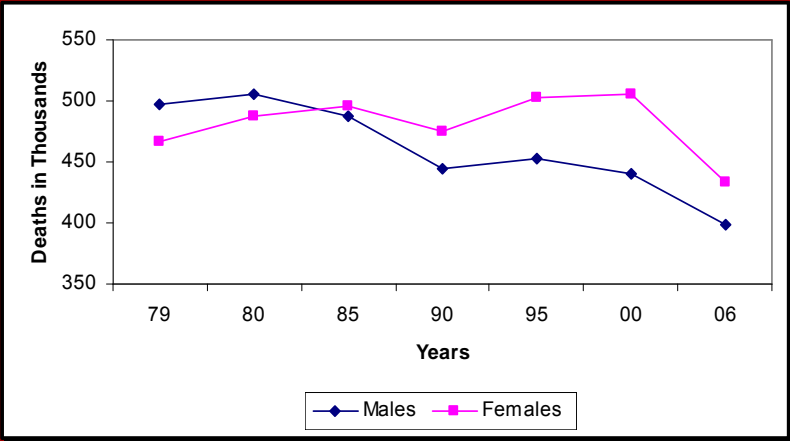


A CVD (I00-I99; Q20-Q28) D Chronic Lower Respiratory Diseases
B Cancer
C Accidents
E Diabetes Mellitus
F Alzheimer's Disease

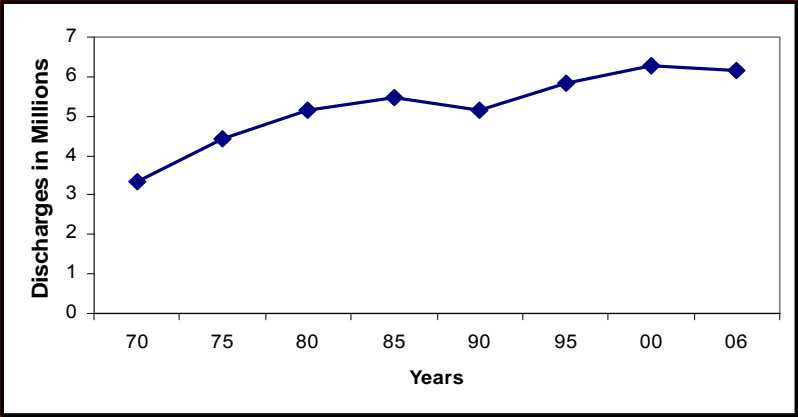
CVD and other major causes of death for all males and females (United States: 2006). Source: NCHS and NHLBI.



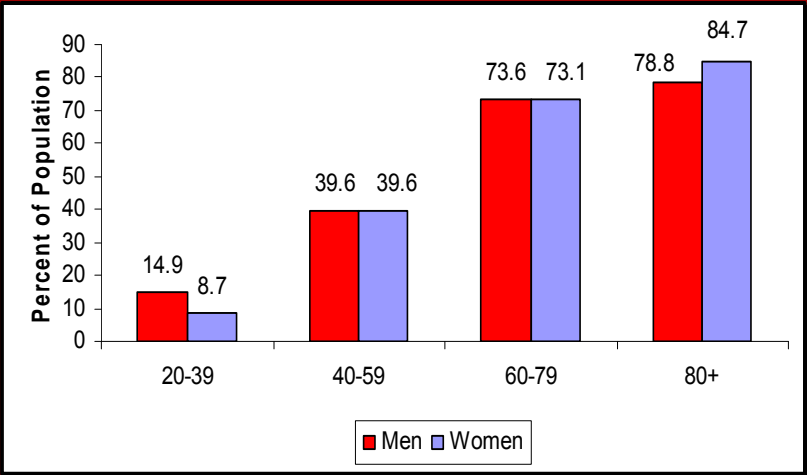
Deaths from diseases of the heart (United States: 1900–2006)
Note: See Glossary for an explanation of "Diseases of the Heart."
Source: NCHS.



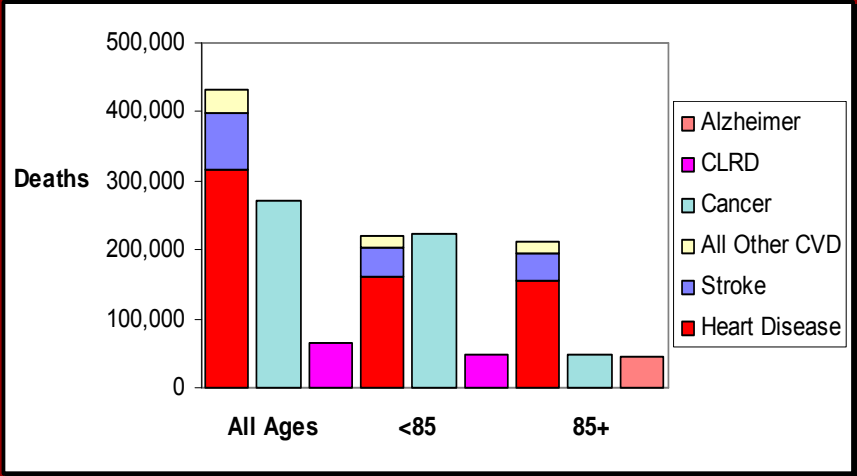
CVD disease mortality trends for males and females
(United States: 1979-2006).
Source: NCHS and NHLBI.



Hospital discharges for cardiovascular diseases.
(United States: 1970-2006). Note: Hospital discharges include
people discharged alive, dead and status unknown.
Source: NCHS and NHLBI.



Prevalence of CVD in adults age 20 and older by age and sex (NHANES 2003-2006). Source: NCHS and NHLBI. These data include coronary heart disease, heart failure, stroke and hypertension.



CVD and other major causes of death: females (United States: 2006). Source: NCHS and NHLBI.

□ The Facts

- Heart Disease is the number one killer of men and women
- Coronary Artery Disease is the number one heart disease diagnosis
- More people are living with heart disease
- A gender disparity exists with regard to mortality
- A racial disparity exists
- Heart disease begins young and therefore opportunity for prevention exists

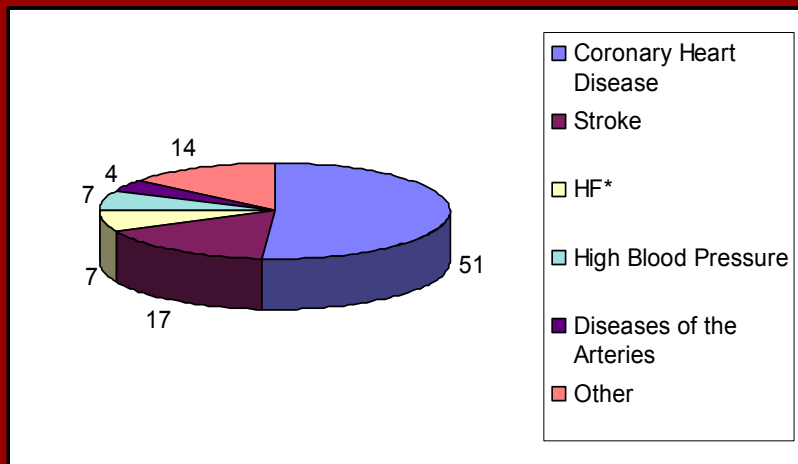
Why women live longer than men



Heart Disease Risk Factors

What is Heart Disease

- Coronary Artery Disease
- Stroke
- Heart Failure

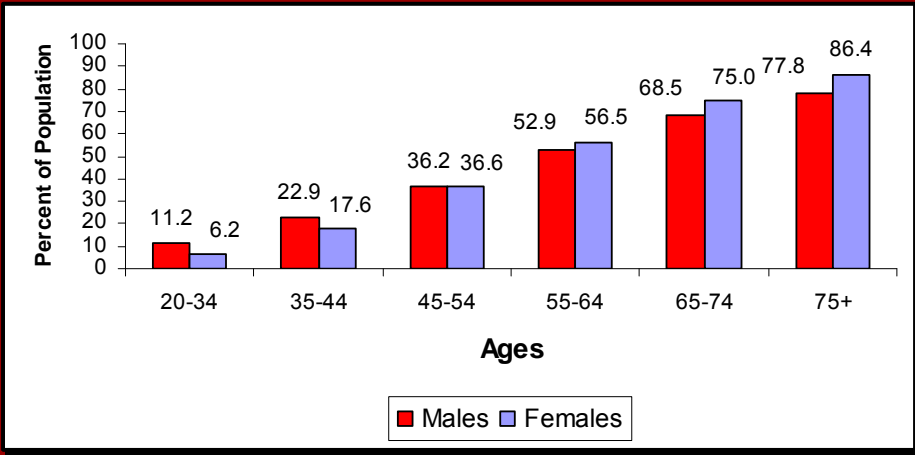


Percentage breakdown of deaths from cardiovascular diseases

(United States: 2006) * - Not a true underlying cause.

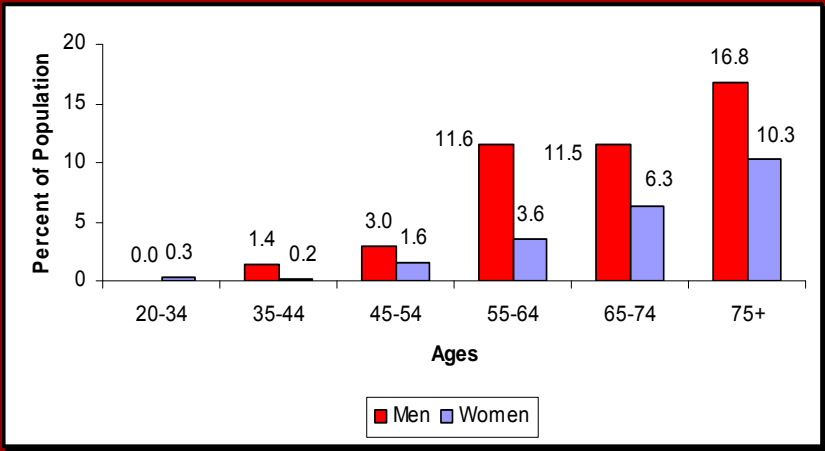
Source: NCHS.

Prevalence of Cardiovascular Disease



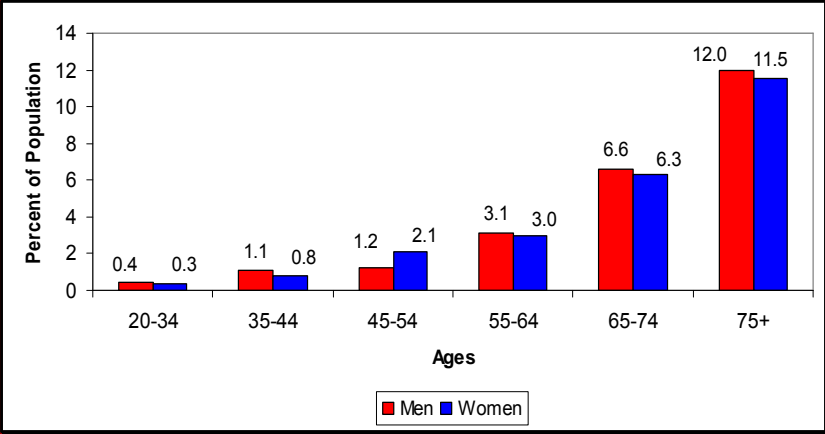
NHANES: 2003

Prevalence of Coronary Heart Disease



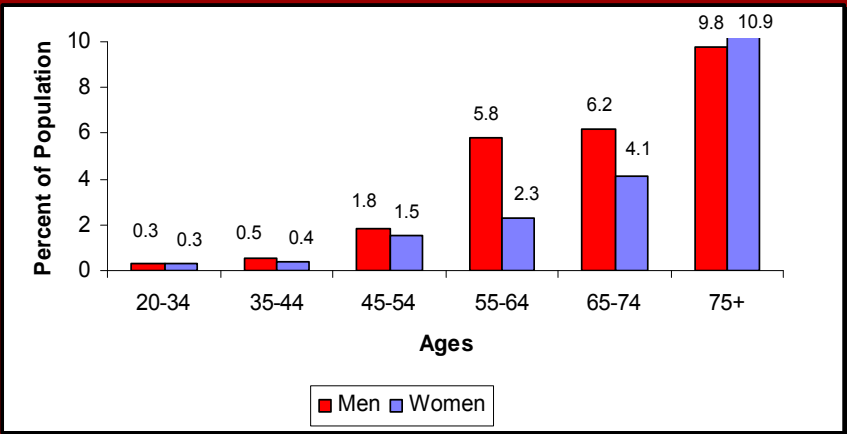
CDC/NCHS and NHLBI

Prevalence of Stroke



CDC / NCHS

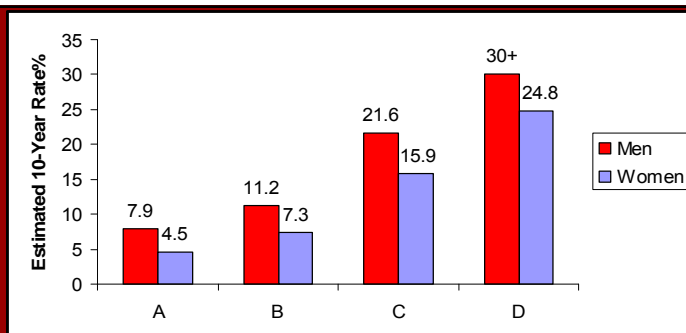
1999 - 2002 Prevalence of Heart Failure



CDC/NCHS and NHLBI NHANES

Risk Factors

- **Non-Modifiable**
 - Age (> 65 not as important)
 - Ethnic background
 - Family history (< 60)
 - Gender (at birth)
- **Modifiable**
 - Smoking
 - Hypertension
 - Unhealthy lipids
 - Diabetes
 - Sedentary lifestyle
 - Overweight / Obesity
 - Depression



	A	B	C	D
Age	50-54	50-54	50-54	50-54
HDL Cholesterol, mg/d	45-49	45-49	35-34	35-34
Total Cholesterol (mg/dL)	160-199	200-239	200-239	200-239
Systolic BP mm/Hg, no treat.	120-129	130-139	130-139	130-139
Smoker	No	No	No	Yes
Diabetes	No	No	Yes	Yes

mm Hg = millimeters of mercury. mg/dL = milligrams per deciliter of blood

Estimated 10-Year CVD risk in 50 to 54-year-old adults according to levels of various risk factors (Framingham Heart Study).

Source: D'Agostino et al., Circulation. 2008;117:743-753.

Risk Factors

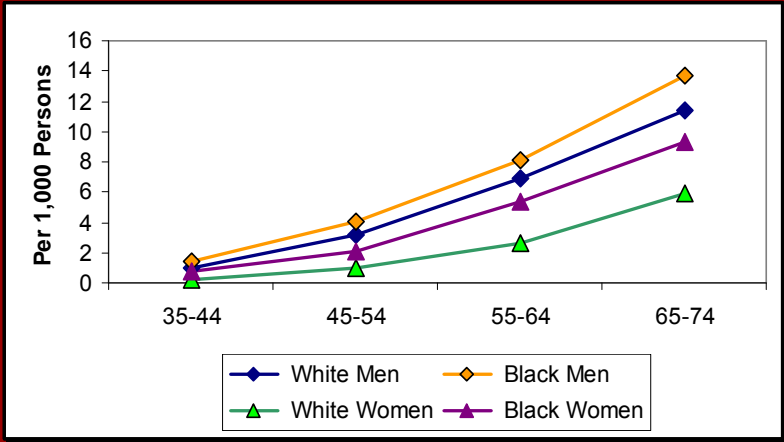
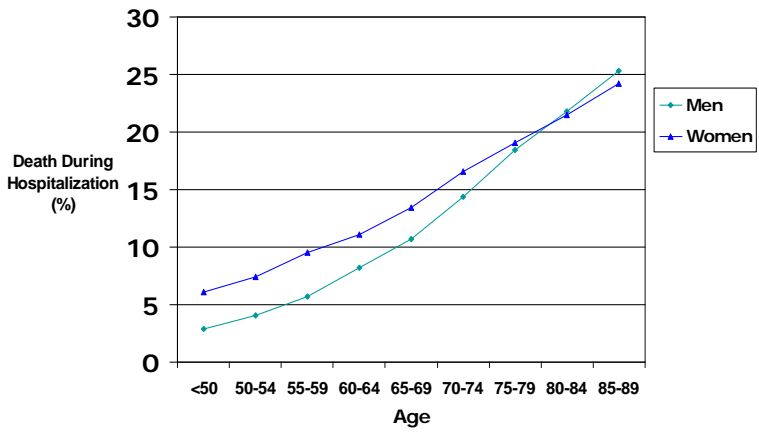
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 - **Gender (at birth)**
- **Modifiable**
 - **Smoking**
 - **Hypertension**
 - **Unhealthy lipids**
 - **Diabetes**
 - **Sedentary lifestyle**
 - **Overweight / Obesity**
 - **Depression**

Why women live longer than Men

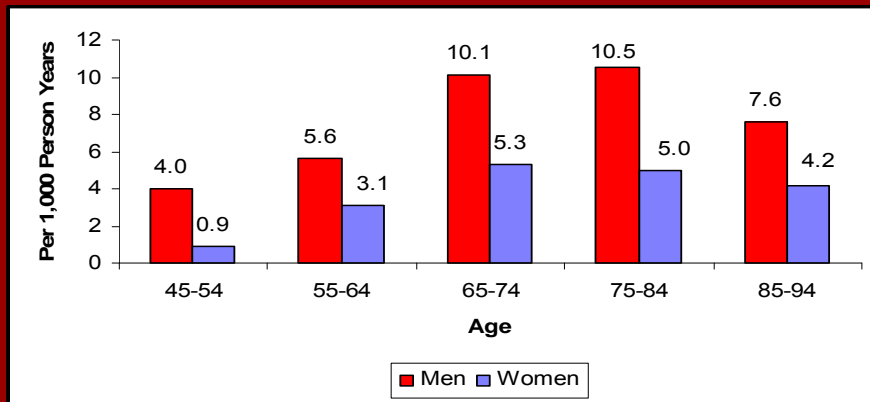


Modifiable Risk
Factors
/Gender/Race
Disparity

Acute MI Mortality by Age and Sex



Annual rate of first heart attack by age, sex and race.
(ARIC Surveillance:1987-2004). Source: NHLBI.



Incidence of Angina Pectoris* by Age and Sex.

(FHS: 1980-2002/2003). Source: NHLBI. * AP uncomplicated based on physicians interview of patient. Note: Rate for women age 45-54 considered unreliable.

Anginal Presentation

- | | |
|---|--|
| <ul style="list-style-type: none"> • Men <ul style="list-style-type: none"> – Mid-chest - 60% – Neck/Jaw/Throat-50% – Dizziness 30 % – Arm / shoulder pain-25% – Shortness of breath - 20% – Nausea/vomiting – Unusual fatigue – Sweating – Arm/shoulder/hand | <ul style="list-style-type: none"> • Women <ul style="list-style-type: none"> – Shortness of breath - 50% – Nausea / vomiting - 35% – Mid-chest pain - 30% – Abdominal / mid-back – Neck / Jaw /Throat- 25% – Dizziness - 20% – Unusual fatigue – Sweating – Arm / shoulder pain – Impending doom |
|---|--|

Gender Disparity of Care

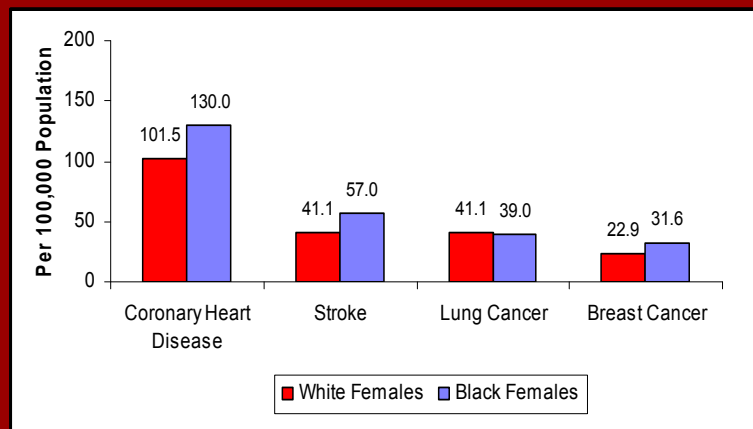
- 43% women vs 38 % men die of CVD annually (~ 500,000 vs 440,000).
- 38% women vs 25% men will die within 1 year of their first heart attack.
- 35% of women vs 18% of men who have a heart attack will have another one in 6 years.
- 335,000 people a year die of CHD from sudden death.
 - About half of all deaths from CHD — more than 930 Americans each day.

Gender Disparity of Care

- 46% of women vs 22% of men heart attack survivors will be disabled w/in 1 year.
- Women are 2x more likely to die after cardiac bypass.
- Women are less likely to receive Beta Blockers, Ace Inhibitors, ASA, Statins after a heart attack.
- Women are less likely to be admitted from the ER for cardiac problems.
- Women are less likely to undergo testing for CVD, including Stress tests, EKGs and blood work.

Gender Disparity of Care

- Though more women than men die of heart disease each year, women receive:
 - 33% fewer angioplasties and stents
 - 28% implanted defibrillators
 - 36% fewer open heart operations
 - Fewer heart transplants



Age-adjusted death rates for CHD, stroke, lung and breast for white and black females (United States: 2006).
Source: NCHS.

Racial and Ethnic Groups

- Cardiovascular disease is the leading cause of death for African Americans, Latinos, Asian Americans, Pacific Islanders, and American Indians
- African American women are at the highest risk for death from heart disease among all racial, ethnic, and gender groups

Source: American Heart Association 2004

Why women live longer than men...



CV Disease Prevention

Cardiovascular Disease Prevention in Women: Current Guidelines

- A five-step approach
 - Assess and stratify women into high, intermediate, lower and optimal risk categories
 - Lifestyle approaches recommended for all women
 - Other cardiovascular disease interventions: treatment of HTN, DM, lipid abnormalities
 - Highest priority is for interventions in high risk patients
 - Avoid initiating therapies that have been shown to lack benefit, or where risks outweigh benefits

Source: Adapted from Mosca 2004

Risk Stratification:

- CHD equivalent
 - Diabetes mellitus
 - Established atherosclerotic disease
 - Includes many patients with chronic kidney disease, especially ESRD
- Major Risk Factors:
 - Age ≥ 55 years
 - Smoking
 - Hypertension, whether or not treated with medication
 - HDL cholesterol $< 40\text{mg/dL}$
(HDL cholesterol $\geq 60\text{mg/dL}$ is a negative risk factor)
 - Family history of premature CVD

Source: Mosca 2004, ATP III 2002

Risk Stratification

- Diabetes
 - Automatically places a patient in a “High Risk” category
- Family History
 - Defined as CVD in a female first degree relative < 65 years old, or a first degree male relative < 55 years old

Source: Mosca 2004

Risk Stratification

- Calculate 10 year risk for all patients with two or more risk factors that do not already meet criteria for CHD equivalent
- Use electronic calculator for most precise estimate:
www.nhlbi.nih.gov/guidelines/cholesterol/index.htm

Source: Mosca 2004

CHD Risk Equivalents

- High Risk > 20% 10-yr risk for CHD events
 - Established coronary artery disease
 - Carotid artery stenosis
 - Peripheral arterial disease
 - Abdominal aortic aneurysm
 - Diabetes
 - Includes many patients with chronic renal disease, especially ESRD

Source: Mosca 2004

Risk Stratification

- Intermediate Risk 10-20% 10-yr risk for CHD events
 - May include women with metabolic syndrome, especially women over the age of 60 or with individual factors that are markedly elevated or severe
 - Often includes women with multiple risk factors, a single markedly elevated risk factor, or a 1st degree relative with premature CVD
- Use electronic calculator for most precise estimate:
www.nhlbi.nih.gov/guidelines/cholesterol/index.htm

Source: Mosca 2004

Definition of Metabolic Syndrome in Women

- Abdominal obesity - waist circumference \geq 35 in.
- High triglycerides \geq 150mg/dL
- Low HDL cholesterol $<$ 50mg/dL
- Elevated BP \geq 130/85mm Hg
- Fasting glucose \geq 100mg/dL

Source: AHA/NHLBI 2005

Risk Stratification

- Lower Risk $<$ 10% 10-yr risk for CHD events
 - May include women with one or more risk factors
 - May include women with defined metabolic syndrome, if no individual factor is severe or markedly elevated
 - May include women with no risk factors, but non-optimal lifestyle factors, such as lack of regular exercise or a high fat diet
- Optimal Risk $<$ 10% 10-yr risk for CHD events
 - Optimal levels of risk factors
 - Heart healthy lifestyle

Source: Mosca 2004

Why women live longer than men



Take Action

Lifestyle Interventions

- Smoking
- Physical Activity
- Heart healthy diet
- Weight reduction/maintenance
- Psychosocial factors
- Omega 3 fatty acids
- Folic acid
- Cardiac rehabilitation

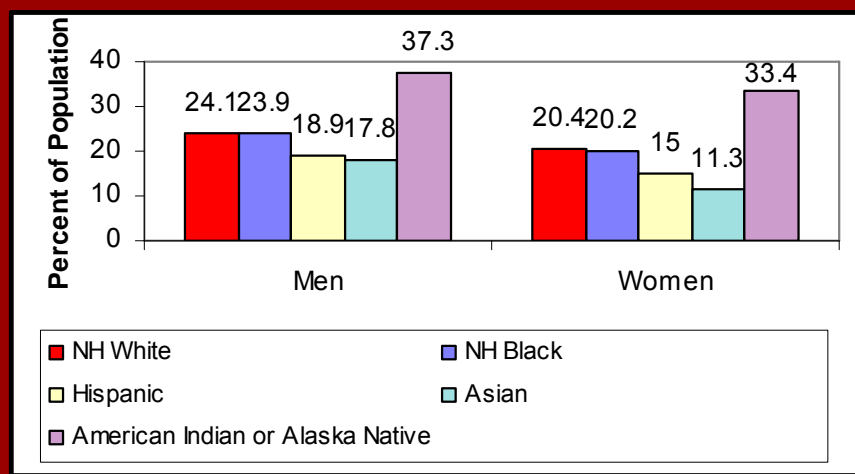
Source: Mosca 2004

Smoking

- All women should be consistently encouraged to stop smoking and avoid environmental tobacco
 - The same treatments benefit both women and men
 - Women face different barriers to quitting
 - Concomitant depression
 - Concerns about weight gain

Source: Fiore 2000

Smoking



MMWR, Vol. 54, (44); Nov. 11, 2005, CDC/NCHS

Smoking - Intervention

- **37% of Caucasian women stated they received any MD counseling to quit smoking.**
- **50% of Caucasian men stated they received any MD counseling to quit smoking.**
- **All women and minorities of both genders received less MD counseling to quit smoking.**
- **Women and minorities received less medication to help quit smoking**

Silagy C., *et al.*. *BMJ* 1992;305:871-874

Smoking

- **When a woman quits smoking by the age of 39, she will add 3 years to her life.**
- **When a man quits smoking by the age of 39, he will add 5 years to his life.**
- **Smoking - greater negative affect on HDL in women than in men.**
- **Smoking - greater influence in developing heart disease in women than in men.**

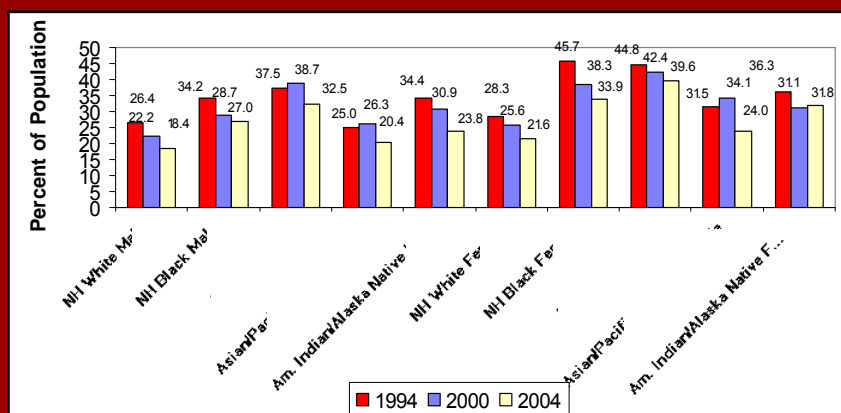
Njolstad I., *et al.* *Circ.* 1996; 93:450-456.

Physical Activity

- Consistently encourage women to accumulate a minimum of 30 minutes of moderate intensity physical activity on most, or preferably all, days of the week

Source: Mosca 2004

1994 - 2004 Leisure-Time Physical Inactivity

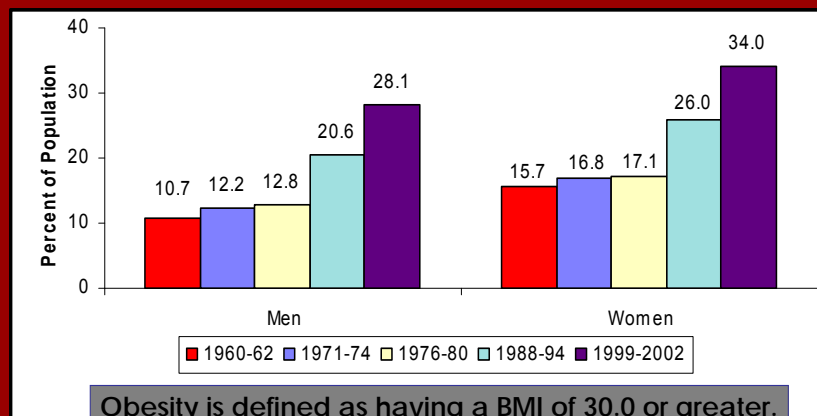


MMWR, Vol. 54, No. 39, Oct. 7, 2005, CDC. BRFSS: 1994, 2000, 2004

Physical Inactivity

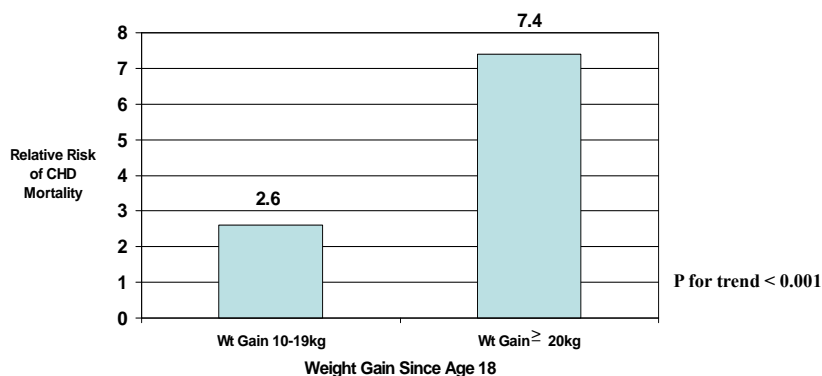
- **38 % of heart disease deaths in women are associated with physical inactivity.**
- **35% for men.**
- **1989 estimate that physical inactivity cost the nation \$5.7 billion due to hospitalizations and other related health care costs.**

1960 - 2002 Obesity



NHES, 1960-62; NHANES, 1971-74, 1976-80, 1988-94 and 1999-2002

Body Weight and CHD Mortality Among Women



Source: Adapted from Manson 1995

Weight Maintenance/Reduction Goals

- BMI between 18.5 and 24.9
- Waist circumference < 35 inches
- Weight loss goals
 - 10% of body weight over six months or 1-2 pounds weight loss/week
 - Reduce calories by 500-1,000 per day

Source: Mosca 2004, ATP III 2002

Obesity Facts

- **Obesity is an independent predictor of coronary atherosclerosis.**
- **Overweight (24 BMI) women had a 50% increase in risk of nonfatal or fatal coronary heart disease,**
- **Overweight (26-28) men had a 72% increased risk.**

Manson JE., et al. *N Engl J Med.* 1995;333:677-685.

Obesity Facts

- **Risk of death from heart disease was 43% higher for “low risk” obese people.**
- **In “moderate-risk” group, the risk of death from heart disease was 2.1 times higher for obese people.**
- **Risk of hospitalization for “low risk” obese people were 4.2 times greater than “normal weight” low risk people.**

Deepak Bhatt, M.D. *JAMA*, Jan. 11, 2006.

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Deepak Bhatt, M.D. JAMA, Jan. 11, 2006

Depression and CHD: Results from the Women’s Health Initiative Study

- Depression is an independent predictor of CHD death among women with no history of CHD

Source: Wassertheil-Smoller 2004

1998 - 2002

Prevalence of Depression

- **Annually**
 - 12% women are diagnosed with depression
 - 7% men are diagnosed with depression
 - 6.5% (6.7 million) women have major depression (1998)
 - 3.3% (3.2 million) men have major depression (1998)

Depression

Depressed women:

- 73% more likely to develop heart disease than non-depressed women.
- 50% increase in death after a heart attack.
- 2x more likely to have metabolic syndrome.

Depressed men:

- 71% more likely to develop heart disease than non-depressed men.
- 240% increase in death from heart disease.
- No any increase in metabolic syndrome.

AHA June 2005

Women and Depression

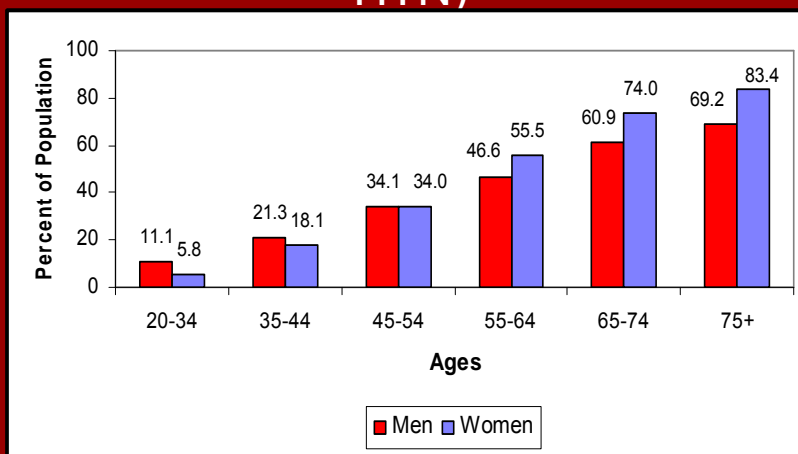
- **50% more likely to have high blood pressure.**
- **60% more likely to have a history of stroke or angina.**
- **Women with risk factors for CAD, such as smoking, obesity, sedentary, HTN, and diabetes, had a 20%-50% higher risk of having depression**

Major Risk Factor Interventions

- **Blood Pressure**
 - Target BP < 120/80 mmHg
 - Pharmacotherapy if BP \geq 140/90, or \geq 130/80 in diabetics or patients with renal disease
- **Lipids**
 - Follow NCEP/ATP III guidelines
- **Diabetes**
 - Target HbA1C < 7%

Source: Mosca 2004

1999 - 2002 High Blood Pressure (Hypertension - HTN)



CDC/NCHS and NHLBI. NHANES 2002

Classification of Hypertension: JNC 7 Guidelines

Classification	Systolic (mmHg)	Diastolic (mmHg)
Normal	<120	and <80
Prehypertension	120–139	or 80–89
Stage 1 Hypertension	140–159	or 90–99
Stage 2 Hypertension	≥160	or ≥100

JNC=The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure.

Chobanian AV et al. *Hypertension*. 2003;42:1206–1252.

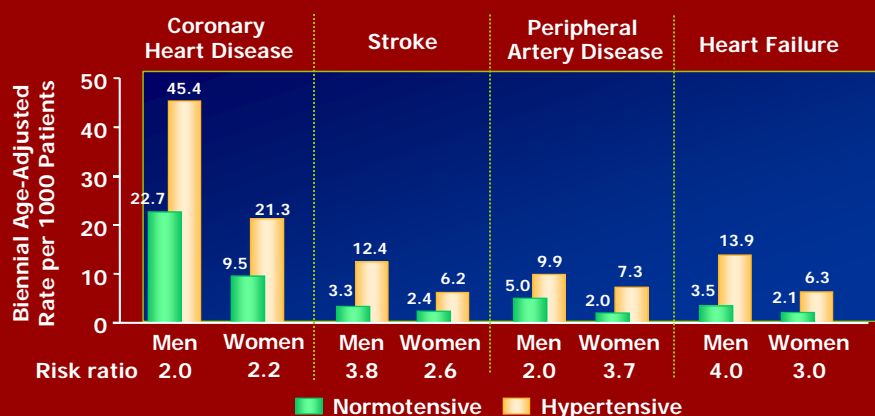
Hypertension Is a Major Risk Factor for MI and Heart Failure

- BP >140/90 mmHg associated with:
 - 69% of first myocardial infarctions
 - 91% of cases of heart failure
- Increases risk of heart failure by a factor of 2–3

BP=blood pressure; MI=myocardial infarction.

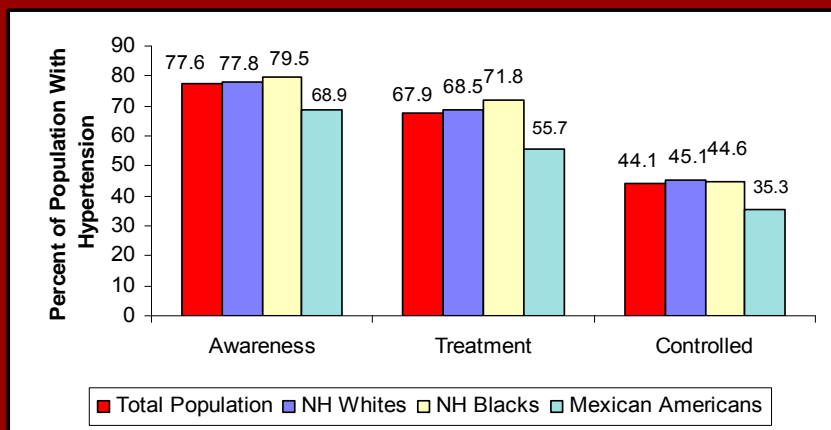
Adapted from Thom T et al. *Circulation*. 2006;113:e85–e151.

Hypertensive Women Are at Increased Risk for Cardiovascular Disease



The relationship between BP and risk of CVD events is continuous, consistent, and independent of other risk factors

Adapted from Kannel WB. *JAMA*. 1996;275:1571–1576.
Chobanian AV et al. *JAMA*. 2003;289:2560–2572.



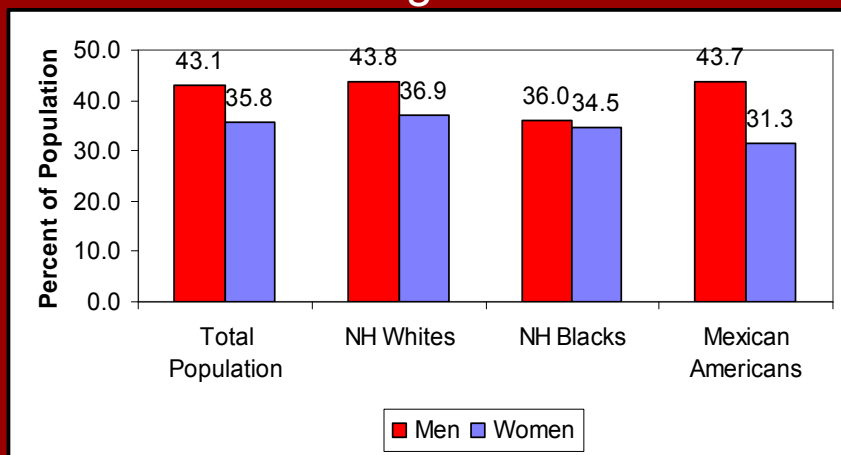
Extent of awareness, treatment and control of high blood pressure by race/ethnicity (NHANES : 2003-2006).
Source: NCHS and NHLBI.

Lipids

- Optimal levels of lipids and lipoproteins in women are as follows (these should be encouraged in all women with lifestyle approaches):
 - LDL < 100mg/dL
 - HDL > 50m/dL
 - Triglycerides < 150mg/d

Source: Mosca 2004

LDL Cholesterol of 130 mg/dL or Higher



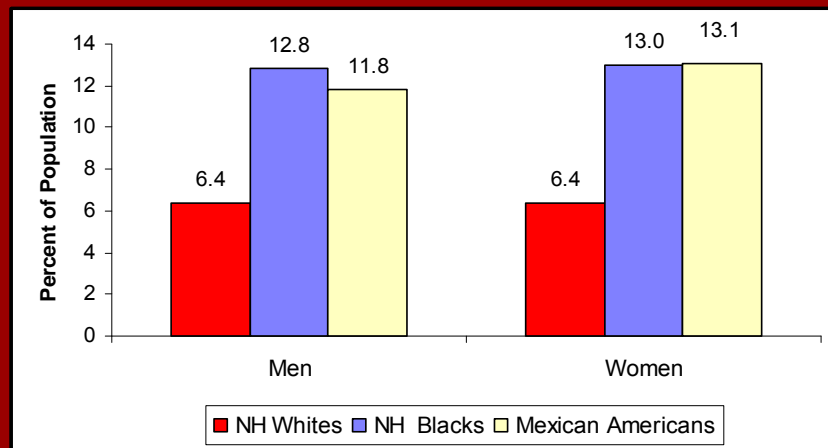
CDC/NCHS and NHLBI. NHANES 2002

Lipid Therapy

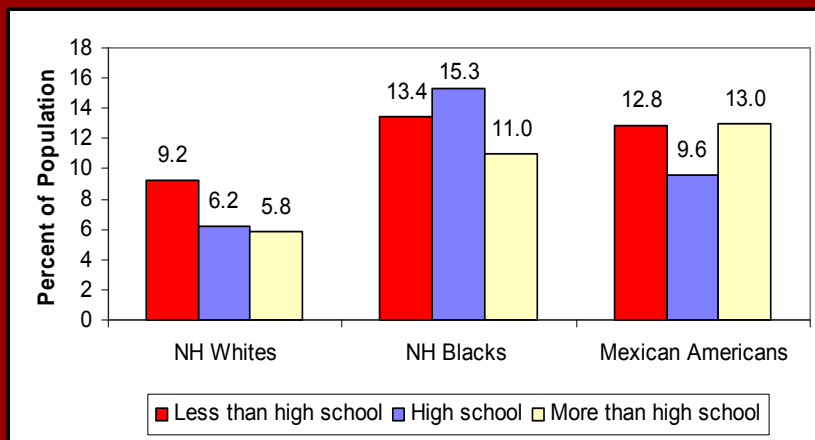
- **Women are less likely to be told they have unhealthy lipids.**
- **Women are less likely to receive lipid lowering medication.**
- **Lower HDL in men is more atherogenic than in women.**
- **Women are less likely to continue with their medication if cost is an issue.**

Berra, Kathy, MSN, ANP. Journal of Cardiovascular Nursing. 14(2):59-78, January 2000.

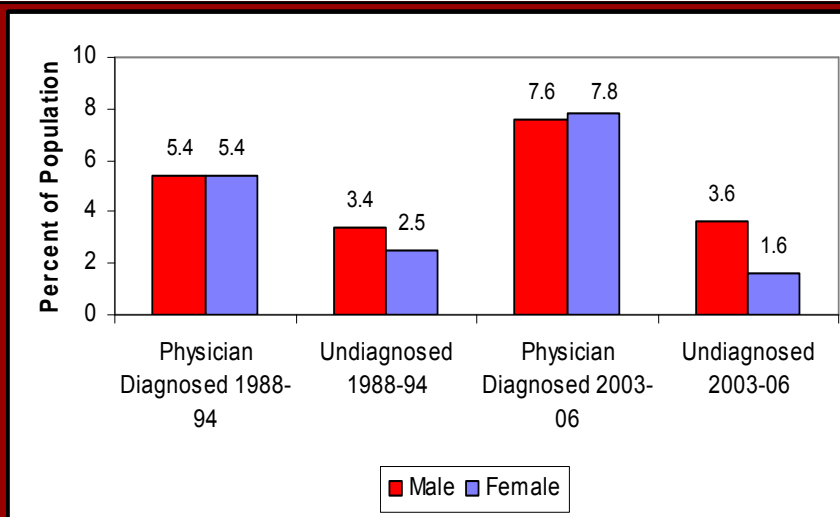
Diabetes



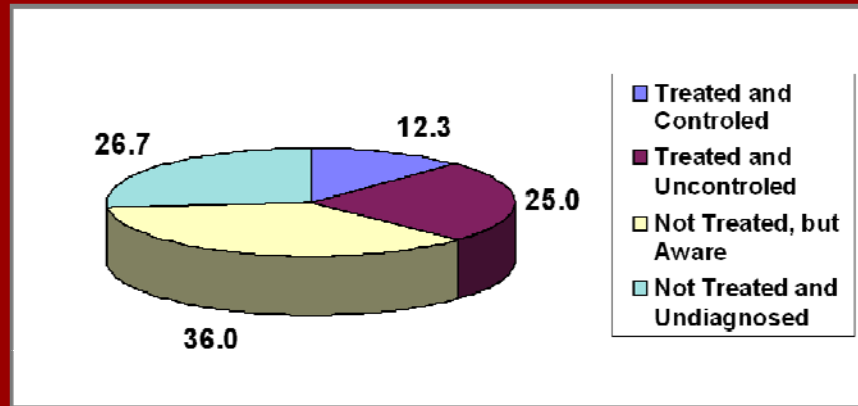
Prevalence of physician-diagnosed diabetes in Adults age 20 and older by race/ethnicity and sex (NHANES: 2003-2006). Source: NCHS and NHLBI. NH – non-Hispanic.



Prevalence of Physician Diagnosed Type 2 diabetes in Adults age 20+ by Race/Ethnicity, and Years of Education (NHANES: 2003-2006). Source: NCHS and NHLBI. NH – non-Hispanic.



Trends in diabetes prevalence in adults age 20+ by Sex (NHANES: 1988-94 and 2003-2006). Undiagnosed 03-06 for females considered unreliable. Source: NCHS and NHLBI. NH – non-Hispanic.



Diabetes Awareness, Treatment and Control
(NHANES: 2003-2006). Source: NHLBI.

Diabetes Facts

- **75% to 80% diabetics will die from CVD.**
- **Diabetic women are 5-7 times more likely to die of CVD than diabetic men.**
- **Diabetic women have a 3x higher risk of dying from a heart attack than non-diabetic women.**

Diabetic Cardiomyopathy

- Diabetics are at increased risk for development of cardiomyopathy despite adjusting for risk factors such as HTN and CAD
- Early detection should prompt intense glycemic control
- Epidemic of obesity + sedentary lifestyle has projected 300million people with diabetes in 2025

Diabetic Cardiomyopathy

- Increased LV wall mass
- Increased LV pressure
- Impaired diastolic function
- Interstitial fibrosis
- Myocyte hypertrophy
- Increase contractile protein glycosylation

Pathogenesis Diabetic Cardiomyopathy

- Hyperglycemia
- Hyperinsulinemia
- Free Fatty Acid Metabolism
- Insulin Resistance
- Microcirculatory changes

Case

- Ms C
- 55 yo hospital employee present SOB
- EF 25%
- ECG- NSR 90 PRWP
- 110/60 WT 240 HT 66in
- Exam
- Cors Normal
- HAIC 11

Why women live longer than men...



Conclusions

- Gender differences exist in diagnosis, treatment, and prognosis of CHD
- Knowledge of gender differences is essential for appropriate therapy
- Evidence-based guidelines provide a new framework for prevention and treatment of cardiovascular disease in women

Conclusion

- Diabetes places a female in the high risk group for 10 yr CV event rate
- Diabetic women have higher mortality post revascularization
- Diabetes is under recognized and undertreated in women
- A unique entity “ Diabetic Cardiomyopathy” is recently recognized