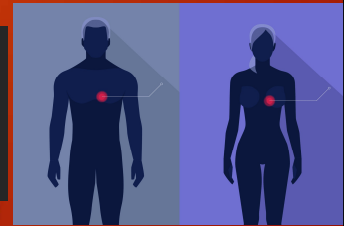


# Battle of the Sexes: Cardiovascular Disease in Women



Joshua McKay, MD, FACC  
Interventional Cardiologist  
Austin Heart



## Disclosures

- Paid participant Medtronic Peripheral Atherectomy Summit

## Learning Objectives

- Recognize the differences in cardiovascular disease between men and women.
- Identify specific acute coronary syndromes that more commonly affect women.
- Review practice strategies to help close the gap in cardiovascular disease.

## Outline

- Epidemiology
- Risk factors for cardiovascular disease (CVD)
- Disease Presentation
- Specific Acute Coronary Syndromes
- Areas for Improvement

## Head to Head

Men

Women

Higher prevalence of cardiovascular disease



## Head to Head

Men


Women

Higher incidence of myocardial infarction




Austin Heart  
Setting the Standard in Cardiac & Vascular Care

## Head to Head

Men	Women
More likely to die within 1 year of myocardial infarction	

Austin Heart  
Setting the Standard in Cardiac & Vascular Care

## Head to Head

Men	Women
More likely to die, develop heart failure, or suffer stroke within 5 years after myocardial infarction.	

## Head to Head

Men

Women

Higher rates of non-obstructive coronary disease at time of myocardial infarction



## Head to Head

Men

Women

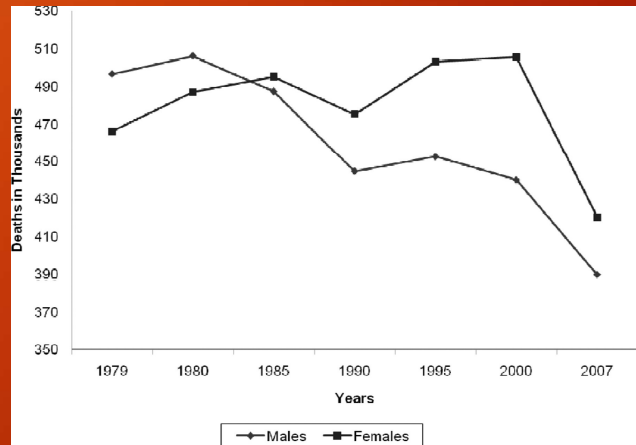
Cardiovascular disease is the leading cause of death



# Epidemiology

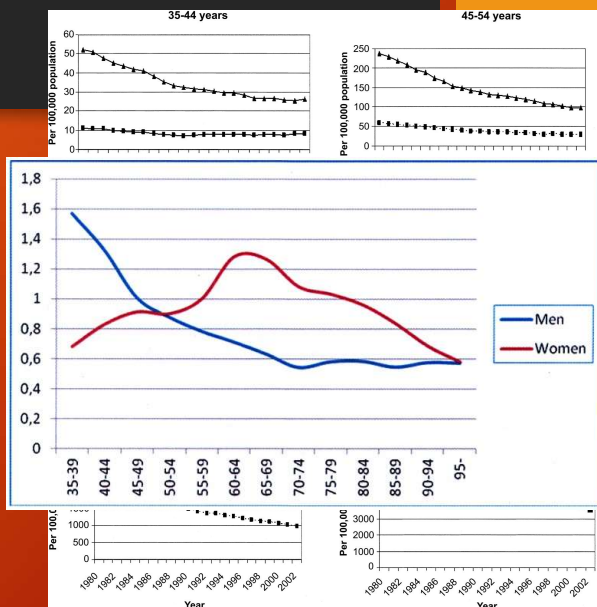
- CVD is the leading cause of death for women
  - Accounts for 400,000 deaths per year<sup>1</sup>
    - 1 in 3 deaths (1 per minute)
- Absolute number of CV deaths is higher in women
  - 60% of stroke deaths<sup>2</sup>
- Around 50% women are aware that CVD is the leading cause of death in women<sup>3</sup>

1. Circulation. 2011;124:2145-2154  
 2. Circulation. 2011; 123:e18-e209  
 3. Circ Cardiovasc Qual Outcomes. 2010; 3:120-127.



- Mortality rate among women age 35-44 has increased by 1.3% per year since 1997

J Am Coll Cardiol 2007;50:2128-32  
 PLoS One. 2013; 8(5): e63347.



## Risk Factors for CVD

- Diabetes Mellitus
  - Earlier occurrence of MI and higher rates of mortality
    - Adjusted HR 9.5 vs. 2.8<sup>3</sup>
  - Higher risk of developing heart failure
  - Stronger risk factor for stroke
  - Stronger risk factor for claudication
  - Decreased long term survival post revascularization for peripheral arterial disease

1. JAMA. 1991; 265:627-631  
 2. Circulation Research. 2016;118:1273-1293  
 3. Diabetes Care. 2004; 27:2898-2904

## Risk Factors for CVD

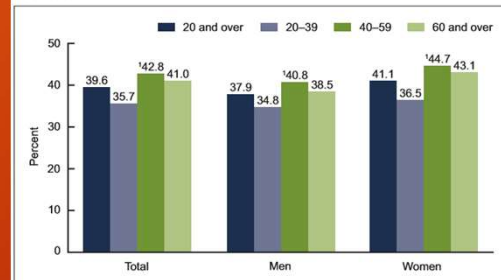
- Smoking
  - Increased risk of CAD<sup>1</sup>
  - Synergistic effect with oral contraceptive use on MI, stroke, and venous thromboembolism
- Dyslipidemia
  - Highest population adjusted risk among women<sup>2</sup>

1. Lancet. 2011; 378:1297-1305.  
 2. Lancet. 2004; 364:937-952.

## Risk Factors for CVD

- Obesity
  - Stronger risk factor for CAD<sup>1</sup>
    - 64% vs. 46%

Figure 1. Prevalence of obesity among adults aged 20 and over, by sex and age: United States, 2015–2016



<sup>1</sup>Significantly different from those aged 20–39.  
NOTES: Estimates for adults aged 20 and over were age adjusted by the direct method to the 2000 U.S. census population using the age groups 20–39, 40–59, and 60 and over. Crude estimates are 39.8% for total, 38.0% for men, and 41.5% for women. Access data table for Figure 1 at: [https://www.cdc.gov/nchs/data/tables/nbels/b2298\\_table.pdf#1](https://www.cdc.gov/nchs/data/tables/nbels/b2298_table.pdf#1). SOURCE: NCHS, National Health and Nutrition Examination Survey, 2015–2016.

1. Arch Intern Med. 2002; 162:1867-1872
2. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity among adults and youth: United States, 2015–2016. NCHS data brief, no 288. Hyattsville, MD: National Center for Health Statistics. 2017.

## Risk Factors for CVD

- Non-traditional
  - Pregnancy related disorders
  - Autoimmune
  - Radiation and chemotherapy
  - Depression
  - Menopause



## Risk Factors for CVD

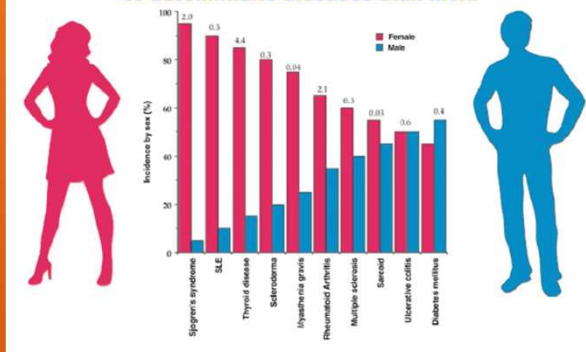
- Pregnancy Related Disorders
  - Pre-term delivery (<37 weeks)
    - Independent risk factor for CV hospitalizations<sup>1</sup>
  - Preeclampsia<sup>2</sup>
    - RR 3.7 for developing hypertension
    - RR 2.1 for developing ischemic heart disease
    - RR 1.8 for developing stroke
    - RR 1.8 for developing venous thromboembolism
  - Gestational Diabetes
    - 4 times more likely to suffer MI and 2 times more likely to develop stroke<sup>3</sup>



1. Am J Obstet Gynecol. 2013; 209:368.e1-368.e8.
2. BMJ. 2007; 335:974.
3. Int J Endocrinol. 2012; 2012:458610.

## Risk Factors for CVD

Women are generally more susceptible to autoimmune diseases than men.



- Autoimmune
  - Rheumatoid Arthritis (2.5:1 ratio)
    - RR 2-2.5 for MI and 1.5 for stroke
  - Lupus (9:1 ratio)
    - RR 10 for MI and 7.9 for stroke

1. Ann Rheum Dis. 2014; 73:1301-1308.
2. Arthritis Rheum. 2001; 44:2331-2337

## Risk Factors for CVD

- Radiation
  - 7.4% increase in rates of CAD with each gray of radiation delivered<sup>1</sup>
  - Higher rates of CAD with left breast radiation than right breast
- Chemotherapy
  - Anthracyclines
  - Trastuzumab-like agents



1. N Engl J Med. 2013; 368:987-998.

## Risk Factors for CVD

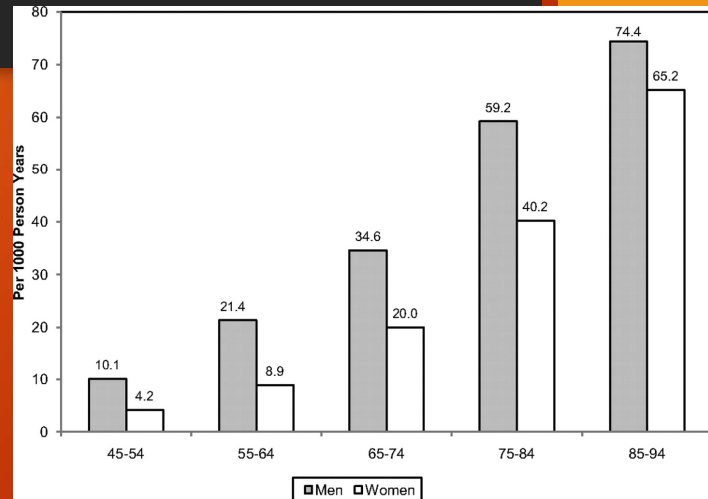
- Depression
  - RR 1.6 for developing CAD<sup>1</sup>
  - RR 1.8 for mortality in pre-existing CAD<sup>2</sup>
  - 5 times greater 6 month mortality post MI<sup>3</sup>



1. J Gen Intern Med. 2004 Dec; 19(12):1192-9  
 2. Eur Heart J. 2006 Dec; 27(23):2763-74  
 3. Front Psychiatry. 2016; 7: 33.

## Risk Factors for CVD

- Menopause
  - Estrogen has beneficial properties on vasodilation and endothelium.
  - “Catch up” Effect



Circulation. 2011;124:2145-2154

## Disease Presentation

- More likely to present with:
  - Fatigue
  - Shortness of breath
  - Sleep disturbances
  - Nausea/Vomiting
  - Dizziness/Diaphoresis
  - Pain in the neck or back



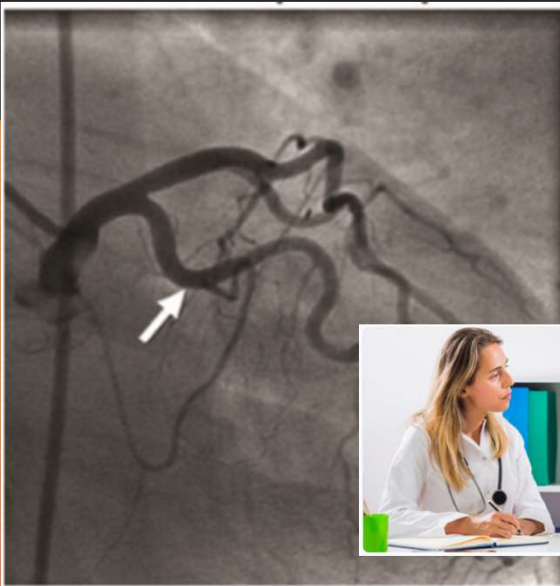
N Engl J Med 1996;334:1311-5  
Theheartfoundation.org

## Disease Presentation



- DIFFERENT Disease
  - Coronary Artery Disease vs Ischemic Heart Disease
    - More anginal symptoms
    - Higher rates of non-obstructive CAD on angiography
    - Poorer prognosis

Am Heart J. 2001; 141:735-741



Health > Diseases & Conditions > Cardiovascular Disease > Heart > Heart Attack

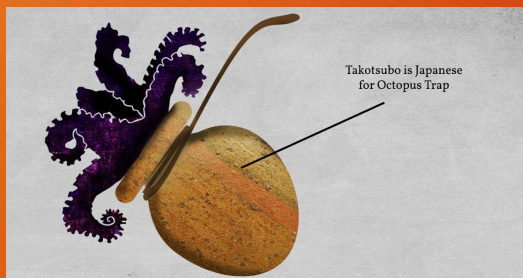
### MINOCA: The Heart Attack You've Never Heard Of

Bottom Line: Even doctors don't fully understand this mysterious type of heart attack.

## Acute Coronary Syndromes

- Takotsubo Cardiomyopathy
- Spontaneous coronary artery dissection
- Coronary artery spasm

## Acute Coronary Syndromes

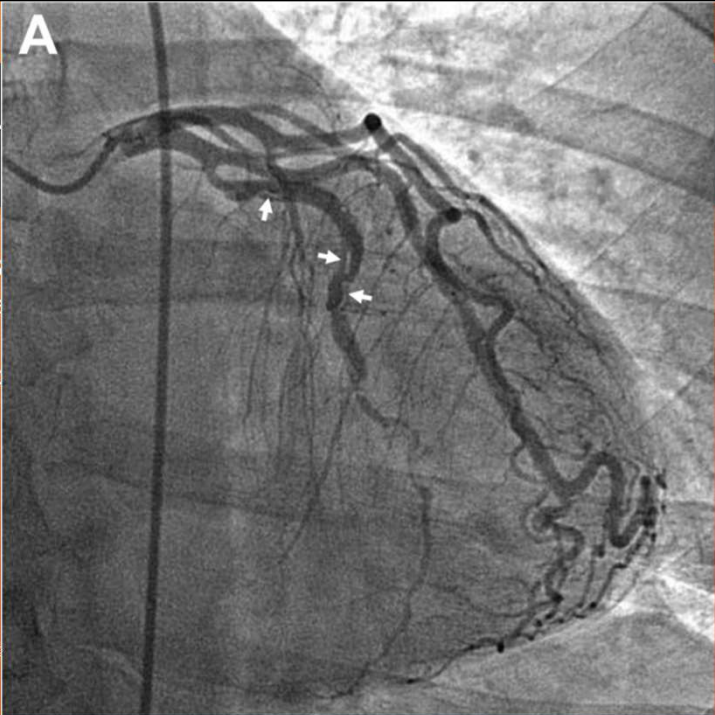


- Takotsubo Cardiomyopathy
  - Transient systolic and diastolic left ventricular dysfunction
  - Wall motion abnormalities
  - Absence of obstructive CAD
  - Preceded by emotional or physical stressor
  - Post-menopausal women

## Acute Coronary

- Spontaneous Coronary Artery Dissection
  - 80% female
  - 20-25% per
  - Statins asso

1. Circulation. 2012; 126:579-5  
2. JACC Cardiovasc Interv. 2011



Austin Heart

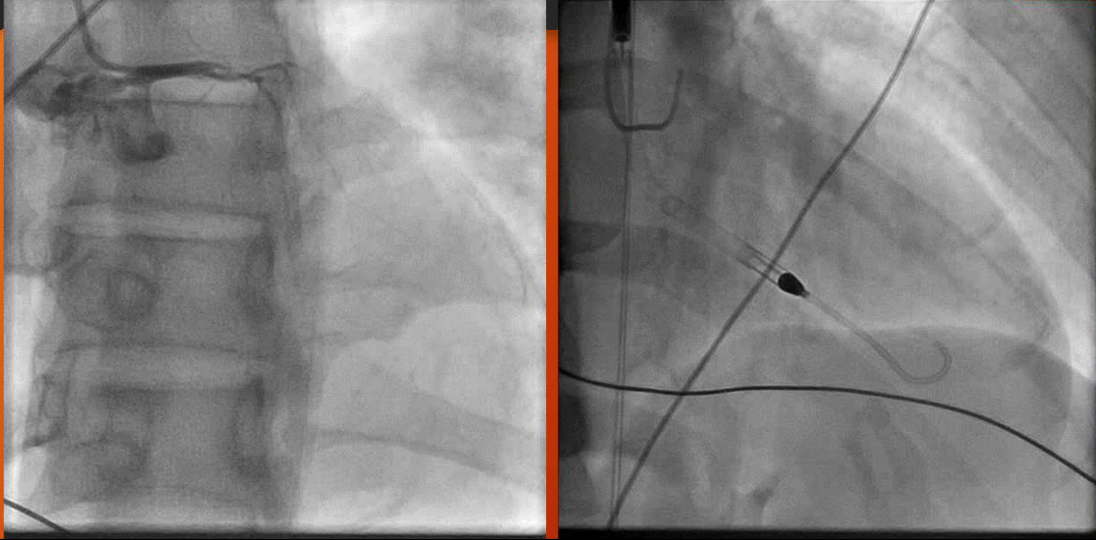
Setting the Standard in Cardiac & Vascular Care

## Acute Coronary Syndromes

- Coronary Artery Spasm (Prinzmetal's angina)
  - Intense vasoconstriction resulting in total or subtotal occlusion
  - Calcium channel blockers first line therapy
  - Beta blockers generally avoided

1. Int J Med Sci. 2014; 11(11): 1161-1171.

## Coronary Artery Spasm



## Areas for Improvement

- Education
  - Only 54% of women know that CVD is their leading cause of death
  - Delayed presentation
- Yentl syndrome
- Testing
- Representation
  - Low enrollment in clinical trials
  - Less female physicians



Thank You!!

ANY  
QUESTIONS?

