Case

- 40-year-old female s/p hospitalization for acute shortness of breath and chest tightness. EKG showed ST-segment elevations and had a elevated troponin 0.48 (normal <0.04). CT scan showed no evidence of pulmonary emboli. A CCTA showed no obstructive CAD. The patient was discharged from the hospital without specific diagnosis.
- Five years ago, she was diagnosed with a positive ANA which appeared to be borderline. She was later tested and was diagnosed with systemic lupus with a positive ANA.
- She is a para 2 gravida 2, and had hypertension postpartum with both of her sons.
- ECG now has NSSTWs and echo normal WM and EF.
- CURRENT MEDICATIONS: Brimonidine 0.5% eyedrops, BuSpar orally 10 mg p.o. b.i.d, enteric coated aspirin 81 mg p.o. daily, Nexium 40 mg taken once daily, Ativan as needed, Zofran as needed, Plaquenil 100 mg p.o. b.i.d., Pravachol 40 mg p.o. at bedtime, verapamil 120 mg p.o. daily

What is the Diagnosis

1. Non-cardiac
2. Pericarditis
3. Ischemic heart disease (IHD) s/p ACS/AMI

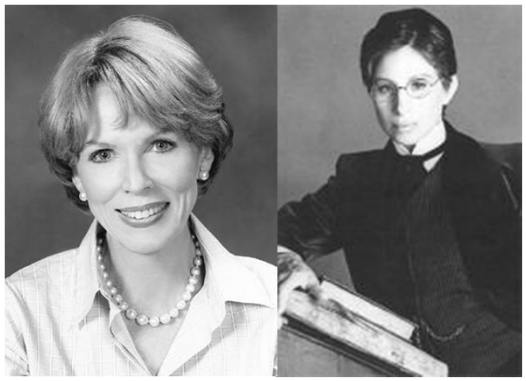
Should she have any further evaluations?

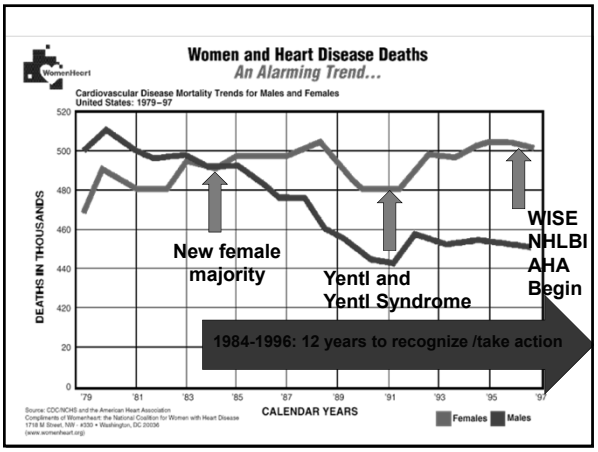
1. Nothing further is needed
2. Exercise stress ECG testing
3. Stress testing with imaging

How should she be treated?

1. Current treatment is fine
2. Indocin and steroids for SLE-pericarditis
3. Add or replace CCB with beta-blocker, add ACE/ARB and intensify statin therapy

The Yentl Syndrome 1991





Coronary Artery Disease in Women: Pitfalls in Diagnosis and Management

1. Recognition
2. Diagnosis
3. Management

Paradox: Women have a two-fold increase in "normal" coronary arteries in the setting of ACS, nonSTE and STEMI

Table. Prevalence of "Normal" and Nonobstructive Coronary Arteries in Women Compared With Men

	No./Total (%)		
	Women	Men	*P* Value
Acute coronary syndrome			
GUSTO[2]	343/1768 (19.4)	394/4638 (8.4)	<.001
TIMI 18[3]	95/555 (17)	99/1091 (9)	<.001
Unstable angina[2]	252/826 (30.5)	220/1580 (13.9)	<.001
TIMI IIIa[3]	30/113 (26.5)	27/278 (8.3)	<.001
MI without ST-segment elevation[2]	41/450 (9.1)	55/1299 (4.2)	.001
MI with ST-segment elevation[2]	50/492 (10.2)	119/1759 (6.8)	.02

Abbreviations: GUSTO, Global Utilization of Streptokinase and t-PA for Occluded Coronary Arteries; MI, myocardial infarction; TIMI, Thrombosis In Myocardial Infarction.

Bugiardini and Bairey Merz JAMA 2005;293:477-84

NHLBI-WISE

Coronary Microvascular Dysfunction

Exertional angina

Abnormal SPECT

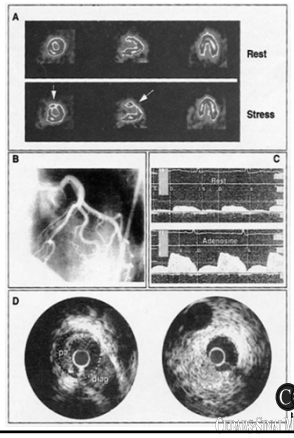
No obstructive CAD

Abnormal coronary flow reserve and elevated LVEDP

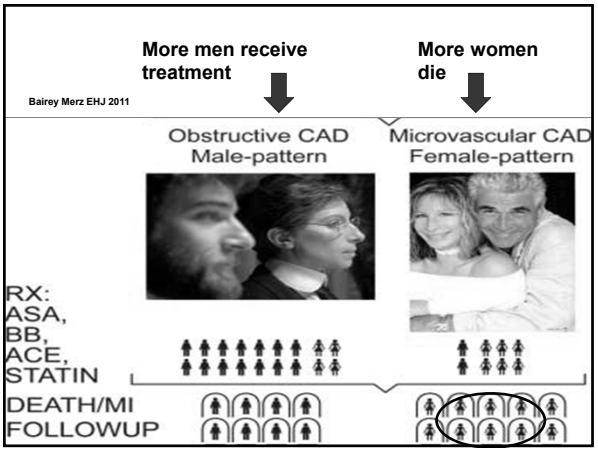
Diffuse atherosclerosis by IVUS

NCDR estimate 3 million women in the US – a larger problem than breast cancer.

Circulation. 1999;99:1774



Bairey-Merz/Slide8



Clinical Practice Guidelines

- This slide set was adapted from the following 2004-6 ACC/AHA guidelines:
- *Cardiovascular Disease Prevention in Women 2004, 2007, 2010*
- *Management of Patients With ST-Elevation Myocardial Infarction*
- *Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction*
- *Preventing Heart Attack and Death in Patients with Atherosclerotic Cardiovascular Disease*
- *Management of Patients with Chronic Stable Angina*
- *Update for Coronary Artery Bypass Graft Surgery*
- *Evaluation and Management of Chronic Heart Failure in the Adult*
- The full-text guidelines and executive summaries are also available on the
- ACC and AHA websites at www.acc.org and www.americanheart.org

ACC=American College of Cardiology,
AHA=American Heart Association

CEDARS-SINAI MEDICAL CENTER

Guideline Implementation and ACS and the Sex Survival Gap

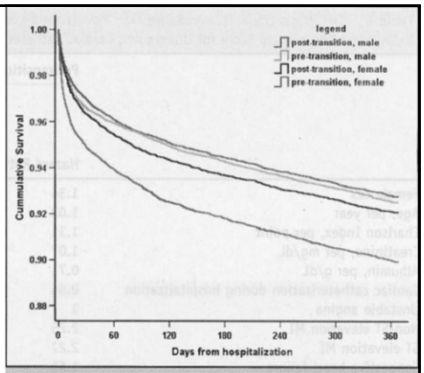


Figure Cox proportional hazard functions for 1-year survival at mean of covariates pre- and post-transition stratified by women vs men.

Novak et al Am J Medicine 2008;121:602

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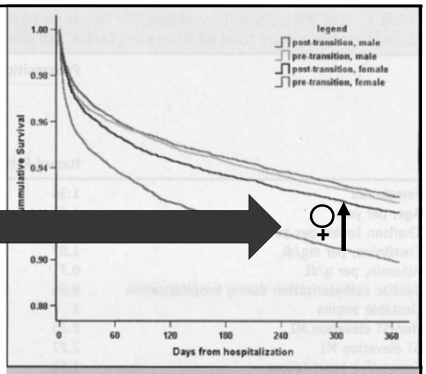
Guideline Implementation and ACS and the Sex Survival Gap

Following guideline implementation, mortality for women improves and the sex gap narrows (RED)



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Novak et al Am J Medicine 2008;121:602

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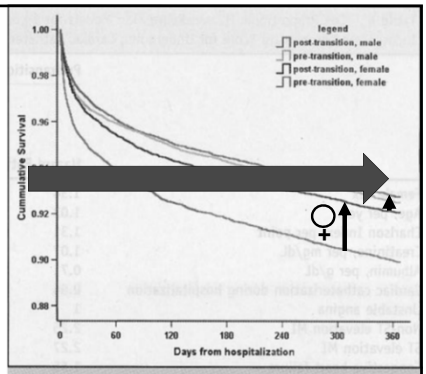
Guideline Implementation and ACS and the Sex Survival Gap

Following guideline implementation, mortality for women improves and the sex gap narrows (RED)

Persistent sex gap (BLUE) suggests more work still needed to understand sex-specific pathophysiology to improve outcomes for women and men



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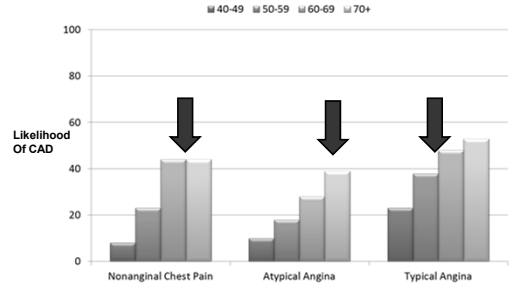
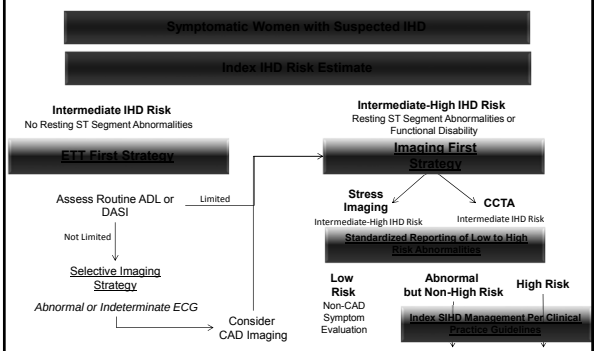
Coronary Artery Disease in Women: Pitfalls in Diagnosis and Management

1. Recognition – women are less likely to be recognized – change the name to Ischemic Heart Disease (IHD)
2. Diagnosis
3. Management

Angina Classification Does Not Adequately Stratify CAD in Women: Most Symptomatic Women over 50 yrs are at Intermediate Risk (20-50%) and Should be Tested for Ischemia



Mieres JH, Henel RC, Miller DD, Bonow RO Berman DS, Heller GV, Bairey-Merz CN, Cacciabaudo JM, Kiess MC, Polk DM, Shaw LJ, Smanio PE, Walsh MN. American Society of Nuclear Cardiology consensus statement: Task Force on Women and Coronary Artery Disease—the roles of myocardial perfusion imaging in the clinical evaluation of coronary artery disease in women [correction].{erratum appears in J Nucl Cardiol. 2003;10(2):218} Journal of Nuclear Cardiology. 2003; 10(1):95-101.



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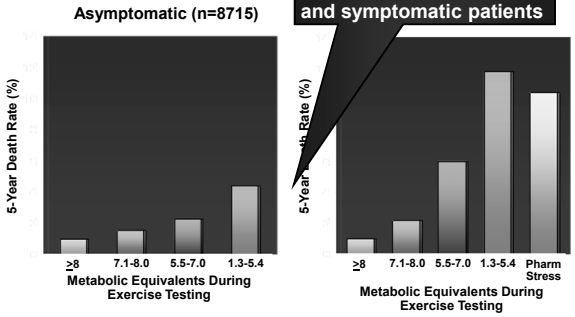
Prognostic Value of Fu… Women: 5-Year Death …

Functional capacity measured in METs is useful in asymptomatic and symptomatic patients

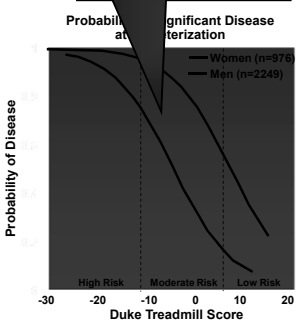


Shaw LJ, et al. *J Am Coll Cardiol.* 2006;47(suppl):4S-20S.

Duke Treadmill Score: Stratifying Diagnostic Al

The DTS works well in women and men

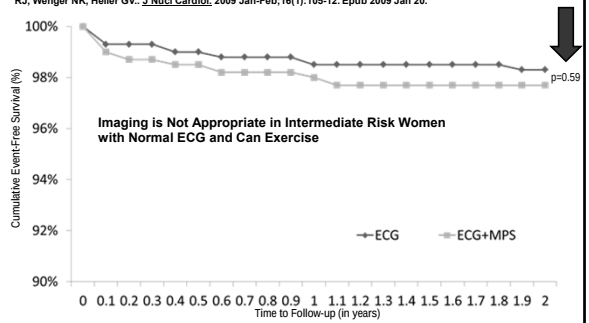
- Patients referred for evaluation of chest pain who underwent exercise treadmill testing and subsequent diagnostic cardiac catheterization (n=3225)
  - Bias regarding selection for catheterization
- Women versus men
  - Duke Treadmill Score
    - 1.6 versus -0.3 (*P*<0.0001)
  - Significant CAD
    - 32% versus 72% (*P*<0.001)
  - 2-year mortality
    - 1.9% versus 4.9% (*P*<0.0001)



Alexander KP, et al. *J Am Coll Cardiol.* 1998;32:1657-1664.

"What's the Optimal Method for Ischemia Evaluation in Women (WOMEN)s Trial":

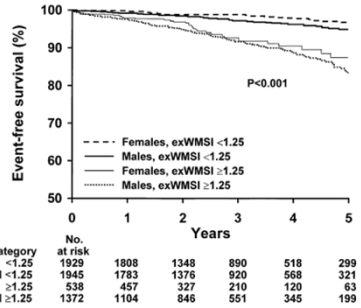
Shaw LJ, Mieres JH, Hendel RH, Gulati M, Veledar E, Boden WE, Hachamovitch R, Arrighi JA, Bairey Merz CN, Gibbons RJ, Wenger NK, Heller GV.. J Nucl Cardiol. 2009 Jan-Feb;16(1):105-12. Epub 2009 Jan 20.



No. at risk					
	388	382	380	379	376
	384	373	372	368	367

Stress Echo for Detection of Ischemia/Prognosis Stratified by Sex:

Works Equally Well In Women and Men For Obstructive CAD



Category	No. at risk					
F <1.25	1929	1808	1348	890	518	299
M <1.25	1945	1783	1376	920	568	321
F ≥1.25	538	457	327	210	120	63
M ≥1.25	1372	1104	846	551	345	199

Mieres JH, Henel RC, Miller DD, Bonow RO Berman DS, Heller GV, Bairey-Merz CN, Cacciabaudo JM, Kiess MC, Polk DM, Shaw LJ, Smanio PE, Walsh MN. American Society of Nuclear Cardiology consensus statement: Task Force on Women and Coronary Artery Disease—the roles of myocardial perfusion imaging in the clinical evaluation of coronary artery disease in women [correction].{erratum appears in J Nucl Cardiol. 2003;10(2):218} Journal of Nuclear Cardiology. 2003; 10(1):95-101.

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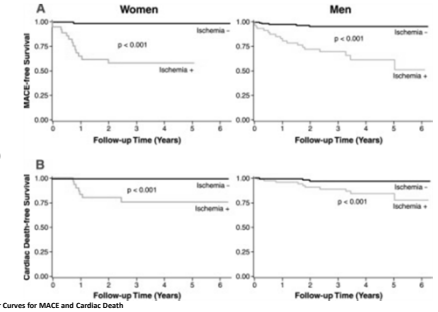
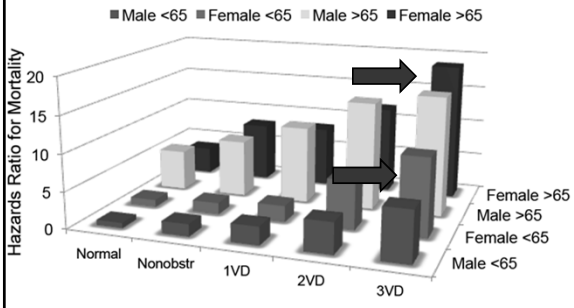


Figure Legend: Kaplan-Meier Curves for MACE and Cardiac Death
Kaplan-Meier curves for major adverse cardiac events (MACE) (A) and cardiac death (B) stratified by evidence of ischemia in each sex.

Mieres JH, Henel RC, Miller DD, Bonow RO Berman DS, Heller GV, Bairey-Merz CN, Cacciabaudo JM, Kiess MC, Polk DM, Shaw LJ, Smanio PE, Walsh MN. American Society of Nuclear Cardiology consensus statement: Task Force on Women and Coronary Artery Disease—the roles of myocardial perfusion imaging in the clinical evaluation of coronary artery disease in women [correction].{erratum appears in J Nucl Cardiol. 2003;10(2):218} Journal of Nuclear Cardiology. 2003; 10(1):95-101.

Coronary Artery Angiography for Prediction of Prognosis Stratified by Sex: Women are at HIGHER Prognostic Risk for CAD Burden



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1. Recognition – women are less likely to be recognized – change the name to Ischemic Heart Disease (IHD)
2. Diagnosis – symptomatic women have intermediate risk – test symptomatic women for ischemia/prognosis
3. Management

Women Remain the Majority of Victims and Still Receive Fewer Interventions to Prevent and Treat Heart Disease

- Less cholesterol screening
- Fewer lipid-lowering therapies
- Less use of heparin, beta-blockers and aspirin during myocardial infarction
- Less antiplatelet therapy for secondary prevention
- Fewer referrals to cardiac rehabilitation
- Fewer implantable cardioverter-defibrillators and heart transplants compared to men with the same recognized indications

Sources: Chandra 1998, Nohria 1998, Scott 2004, O'Meara 2004, Hendrix 2005, Mosca 2005, Chou 2007, Hernandez 2007, Chou 2008, **29**

How to Get Results

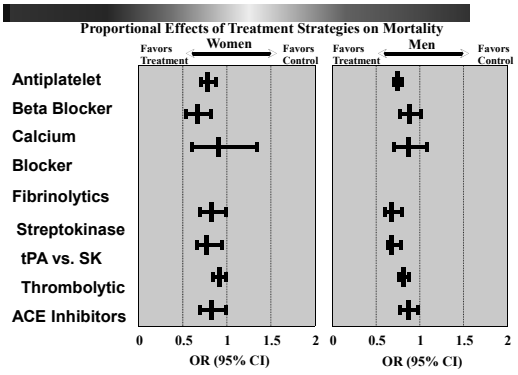
- Rename Coronary Artery Disease (CAD) ⇨ Ischemic Heart Disease (IHD)
- A simplified approach to IHD management helps to increase adherence to guidelines
- This can be achieved using an ABC format to present important pharmacologic therapies and lifestyle approaches

Know Your ABCs

- **A**
  - Antiplatelets/anticoagulants*
  - Angtiotensin-converting enzyme (ACE) inhibitors/angiotensin-receptor blockers (ARBs)*
  - Antianginals
- **B**
  - Blood pressure control
  - Beta-blocker*
- **C**
  - Cholesterol management (statin)*
  - Cigarette smoking cessation

* 4 Magic Pills- Associated with a 90% reduction in recurrent major adverse cardiac events

MI Treatment: Women and Men have similar risk benefit



What About Women (and Men) with Female-Pattern Ischemic Heart Disease?

- Remember, IHD ACS/angina guidelines are not "cath" based – treat evidence of ischemia and angina, not the cath
- Abundant evidence exists documenting lifesaving risk reduction of the 4 magic pills (ASA, ACE, BB, statin)
- The power of the prescription pen to implement guidelines therapy preferentially saves women's lives

Myocardial Ischemia and Diastolic Dysfunction Measured by CMRI in Women: and WISE- CMD – HFpEF and Takotsubo

(Bairey Merz et al)

- **Registry studies of non-invasive imaging**
- **Adenosine CMRI, functional brain MRI, cardiac MIBG**
- **DATA COLLECTED**
- **Baseline demographic, angina and QOL questionnaires**
- **Invasive LVEDP, provocative acetylcholine and adenosine coronary artery testing in the cardiac catheterization laboratory in a subset**
- **Adenosine CMRI perfusion and diastolic function**
- **Costs participation free of charge; out of state travel stipend**
- **For questions or referral merz@cshs.org or 310 423 9680**

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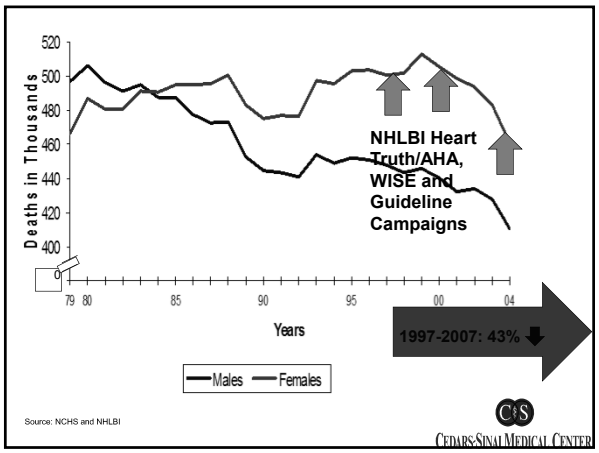

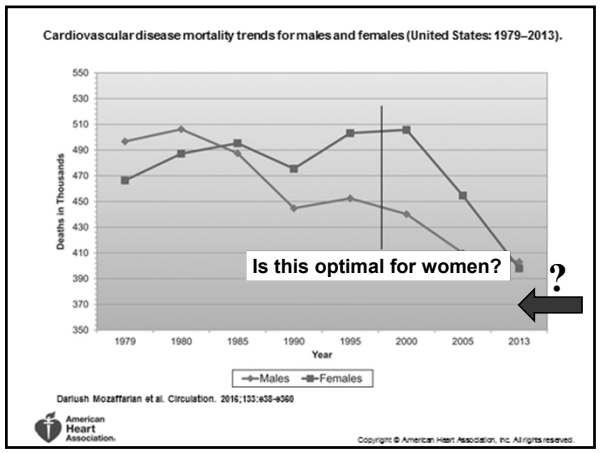

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2. Diagnosis – symptomatic women have intermediate risk – test symptomatic women for ischemia/prognosis
3. Management – treat IHD (ACS) and SIHD (angina) in women with guidelines to improve outcomes

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