

Chest Pain in Women; What Is Your Diagnostic Plan?

Noninvasive test 필요하다.

성균관대의대 삼성서울병원 박승우

Gender Differences in Heart Attack Symptoms

Typical in both sexes

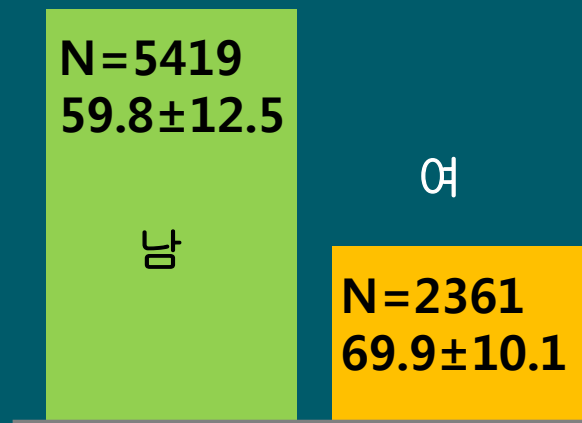
- Pain, pressure, squeezing, or stabbing pain in the chest
- Pain radiating to neck, shoulder, back, arm, or jaw
- Pounding heart, change in rhythm
- Difficulty breathing
- Heartburn, nausea, vomiting, abdominal pain
- Cold sweats or clammy skin
- Dizziness

Typical in women

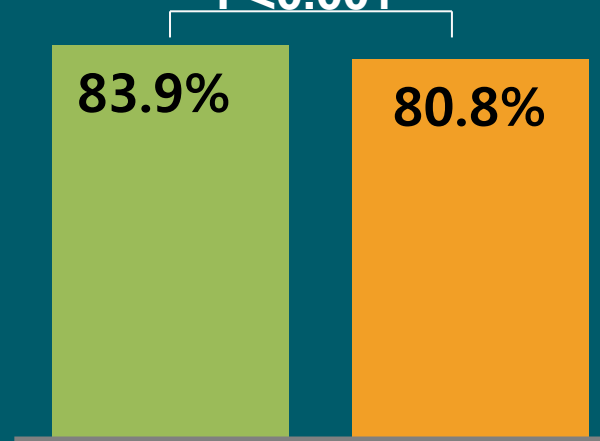
- Milder symptoms (without chest pain)
- Sudden onset of weakness, shortness of breath, fatigue, body aches, or overall feeling of illness (without chest pain)
- Unusual feeling or mild discomfort in the back, chest, arm, neck, or jaw (without chest pain)

2005년도 대한순환기학회 50주년 기념 다기관 연구 한국인 급성 심근경색증의 현황에 대한 등록 연구 (Korea Acute Myocardial Infarction Registry)

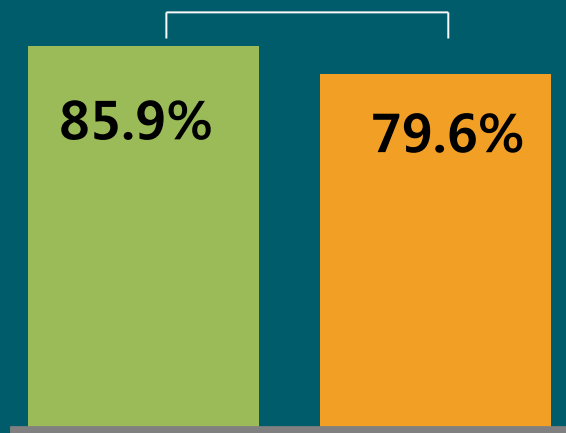
전체 환자



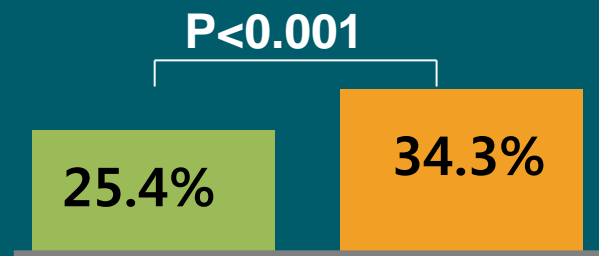
흉통 호소
P<0.001



전형적인 증상 호소
P<0.001



호흡곤란 호소



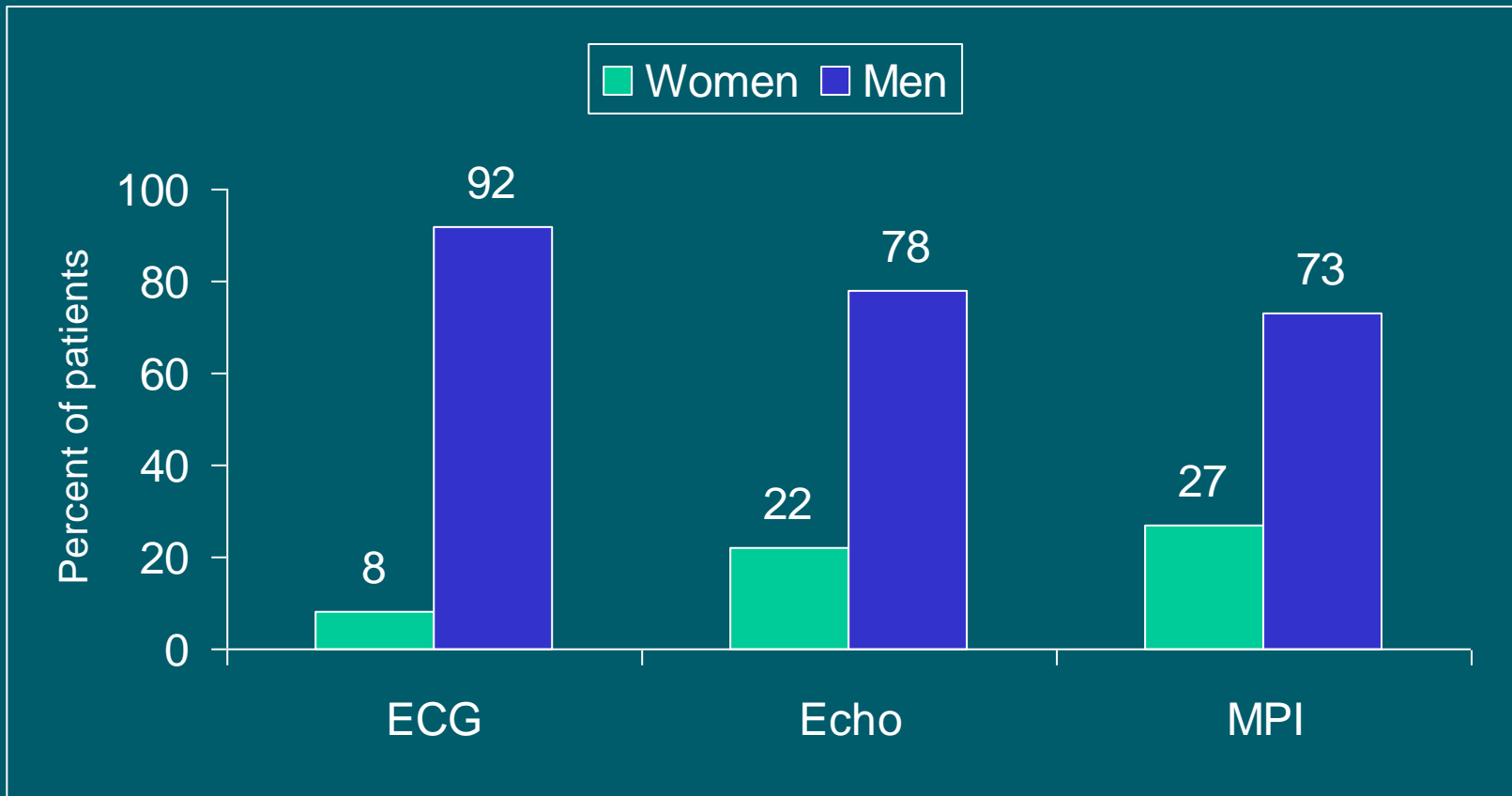
Heart Disease in Women: Lessons From the Past Decade

- The importance of studying gender-specific aspects of CAD have helped in the following clinical dilemmas:
 - At Presentation of CAD: women are older than men
 - Less specific clinical manifestations of CAD in women
 - **Greater difficulty in diagnosis: women > men**
 - More severe consequences on MI when it occurs in women

Diagnosis and Management of CAD in Women

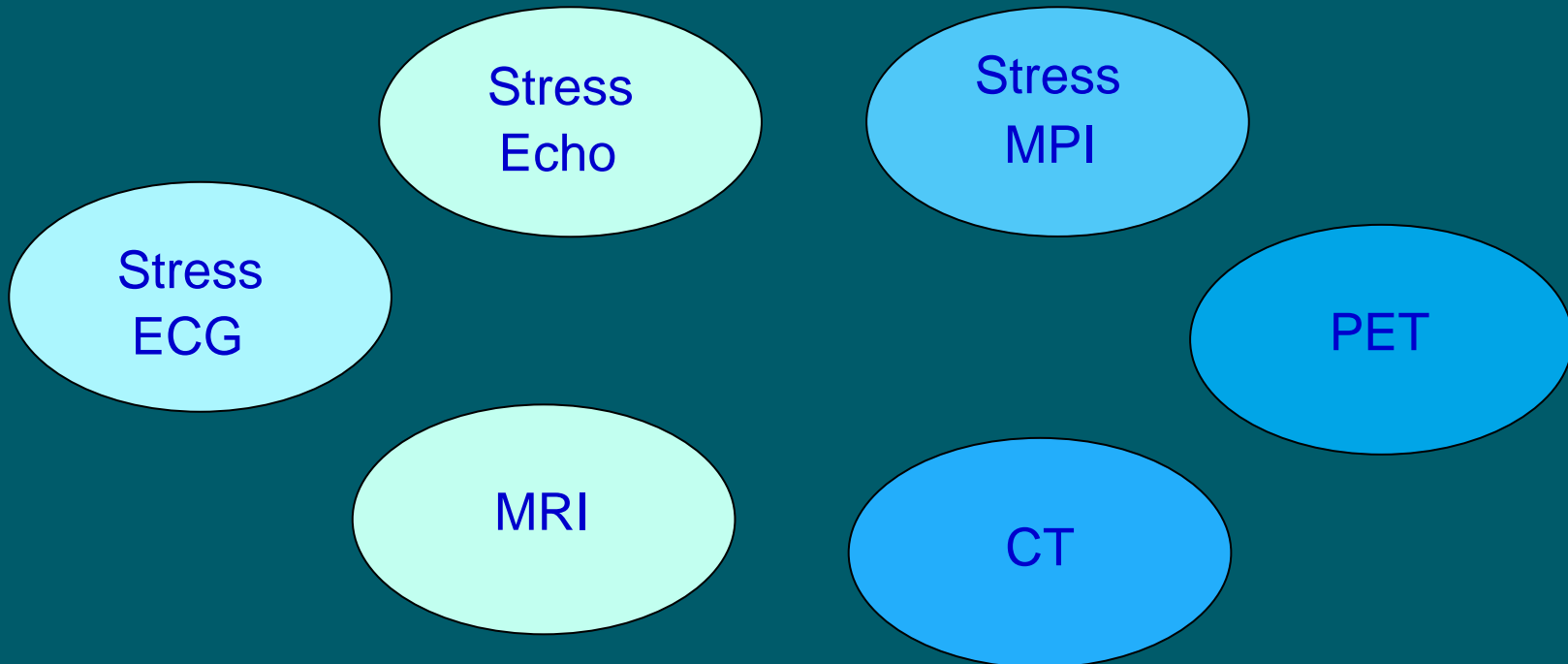
- Gender differences: presentation, manifestation, and diagnosis of CAD
- Gender differences in mortality
 - 63% of women who die suddenly from CAD had no prior warning symptoms
 - 42% of women vs 24% of men will die within 1 year after MI
- Thus, early recognition of symptoms and accurate diagnosis of CAD is of great importance

Limited Representation of Women in Studies of CAD Testing



Adapted from: Shaw LJ, et al. *Coronary Artery Disease in Women: What All Physicians Need to Know*. 1999

Noninvasive Testing Options



Pretest probability of CAD in Women

Age, y	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain	Asymptomatic
30–39	Intermediate	Very low	Very low	Very low
40–49	Intermediate	Low	Very low	Very low
50–59	Intermediate	Intermediate	Low	Very low
60–69	High	Intermediate	Intermediate	Low
≥70	High	Intermediate	Intermediate	Low

Adapted with permission from Gibbons et al (*Circulation*. 2002;106:1883–1892).²⁹

Duke activity status index

	Can You:	Yes	No	Weight
1.	Take care of self (ie, eating, dressing, bathing, or using the toilet)?			2.75
2.	Walk indoors, such as around the house?			1.75
3.	Walk a block or two on level ground?			2.75
4.	Climb a flight of stairs or walk uphill?			5.50
5.	Run a short distance?			8.00
6.	Do light work around the house like dusting or washing dishes?			2.70
7.	Do moderate work around the house like vacuuming, sweeping floors, or carrying in groceries?			3.50
8.	Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?			8.00
9.	Do yard work around the house like raking leaves, weeding, or pushing a power mower?			4.50
10.	Have sexual relations?			5.25
11.	Participate in moderate recreational activities like golf, bowling, dancing, double tennis, or throwing a baseball or football?			6.00
12.	Participate in strenuous sports like swimming, single tennis, football, basketball, or skiing?			7.50

Scoring the Duke Activity Status Index (DASI): Add the point values for all questions checked in the Yes column and divide by 3.5 to calculate the estimated DASI metabolic equivalents

Exercise ECG (Treadmill)

- Despite advances in technology, the exercise ECG remains an important tool in the diagnosis and prognosis of the patient suspected of having CAD
- The exercise ECG has an overall **sensitivity of 68%** and a **specificity of 77%** for the detection of CAD in men
- The sensitivity and specificity of the exercise ECG in women are about **61% and 70%** respectively

ECG Testing in Women

Sensitivity and Specificity

Study, Year	No. of Women	Sensitivity (%)	Specificity (%)
Detry et al, 1977	47	80	63
Weiner et al, 1979	580	76	64
Barolsky et al, 1979	92	60	68
Friedman et al, 1982	60	32	41
Guiteras et al, 1982	112	79	66
Hung et al, 1984	92	73	59

Gender Differences in Exercise ECG Testing

- ↓↓ sensitivity in women >65 years
- ↓↓ specificity in women on hormone replacement therapy
- ↑↑ false-positive results due to autonomic/hormonal influences
- Digoxin like effect of estrogen

Stress Echocardiography in Women

- Overall
 - Convenient/readily available^{1,2}
 - Avoids ionizing radiation²
 - Identifies cardiac structure and left ventricular function (LVF)
- Sensitivity and specificity vs ECG testing^{1,2}
 - Increased sensitivity (79%-88%)
 - Increased specificity (77%-86%)

1. Williams MJ, et al. *Am J Cardiol.* 1994

2. Marwick T, et al. *J Am Coll Cardiol.* 1995

Exercise Stress Echo vs. Exercise ECG in Women Without History of Coronary Artery Disease

	ESE	ExECG
Sensitivity, %	100	27
Specificity, %	85	90

Nuclear Imaging in Women

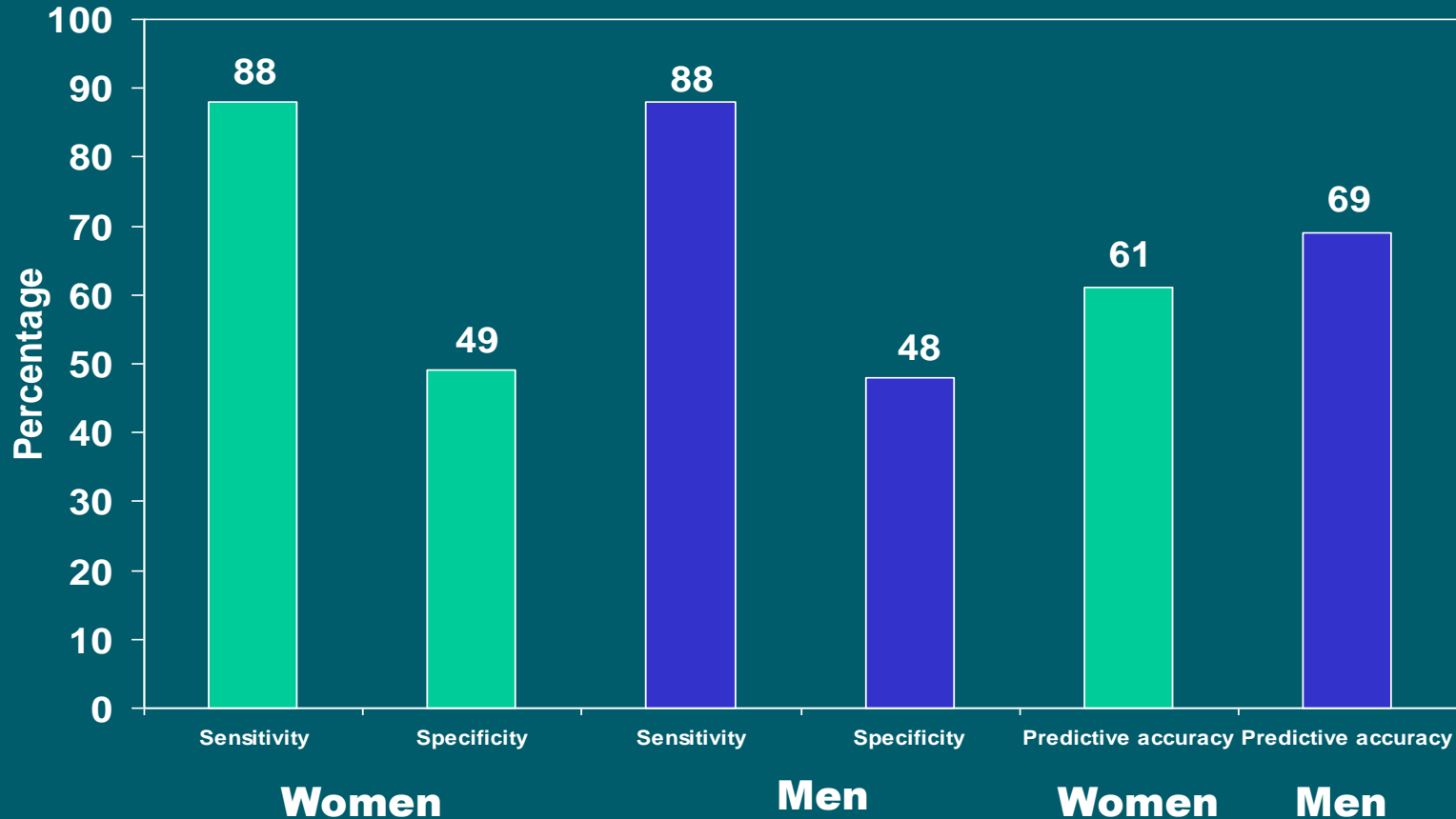
- Myocardial perfusion imaging (MPI)
- Large body of evidence in women
 - Gender-specific data available for Tl-201 and Tc-99m tracers
 - Tc-99m tracers = agent of choice for women due to decrease attenuation artifacts from breast tissue
 - Gated single-photon emission computed tomography (SPECT) provides post stress ejection fraction and regional wall motion \Rightarrow helpful to reduce false positives
 - IV adenosine/dipyridamole stress provides comparable overall accuracy in women and men

Electron Beam Computed Tomography (EBCT)



- Resting study only
- Stationary tungsten target permits rapid scanning
- Detects coronary calcification
- Abnormality defined as presence of any calcium

Diagnostic Accuracy of EBCT Coronary Calcium Scores by Gender Subsets

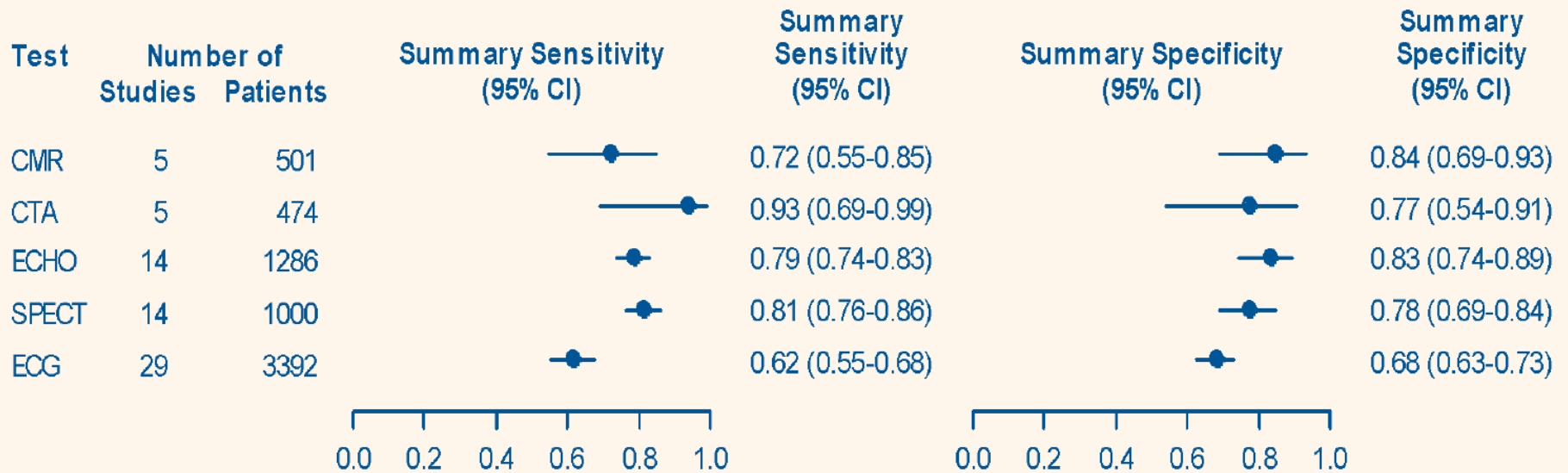


Devries S, et al. *J Am Coll Cardiol.* 1995.
Rumberger JA, et al. *Circulation.* 1995.
Detrano R, et al. *Am J Card Imaging.* 1996.

Meta-analyses on Accuracy in Women

Author, year	Exercise electrocardiography		Stress echocardiography		Stress SPECT	
	Sensitivity, %	Specificity, %	Sensitivity, %	Specificity, %	Sensitivity, %	Specificity, %
Fleischmann <i>et al.</i> , 1998	—	—	85	77	87	64
Kwok <i>et al.</i> , 1999	61	70	86	79	78	64
Beattie <i>et al.</i> , 2003	—	—	81	73	77	69
Average	61	70	84	76	81	66

Comparison with CAG for Dx. of CAD in Women with no History of CAD



Strength of Evidence in Diagnostic Accuracy

ECG: High

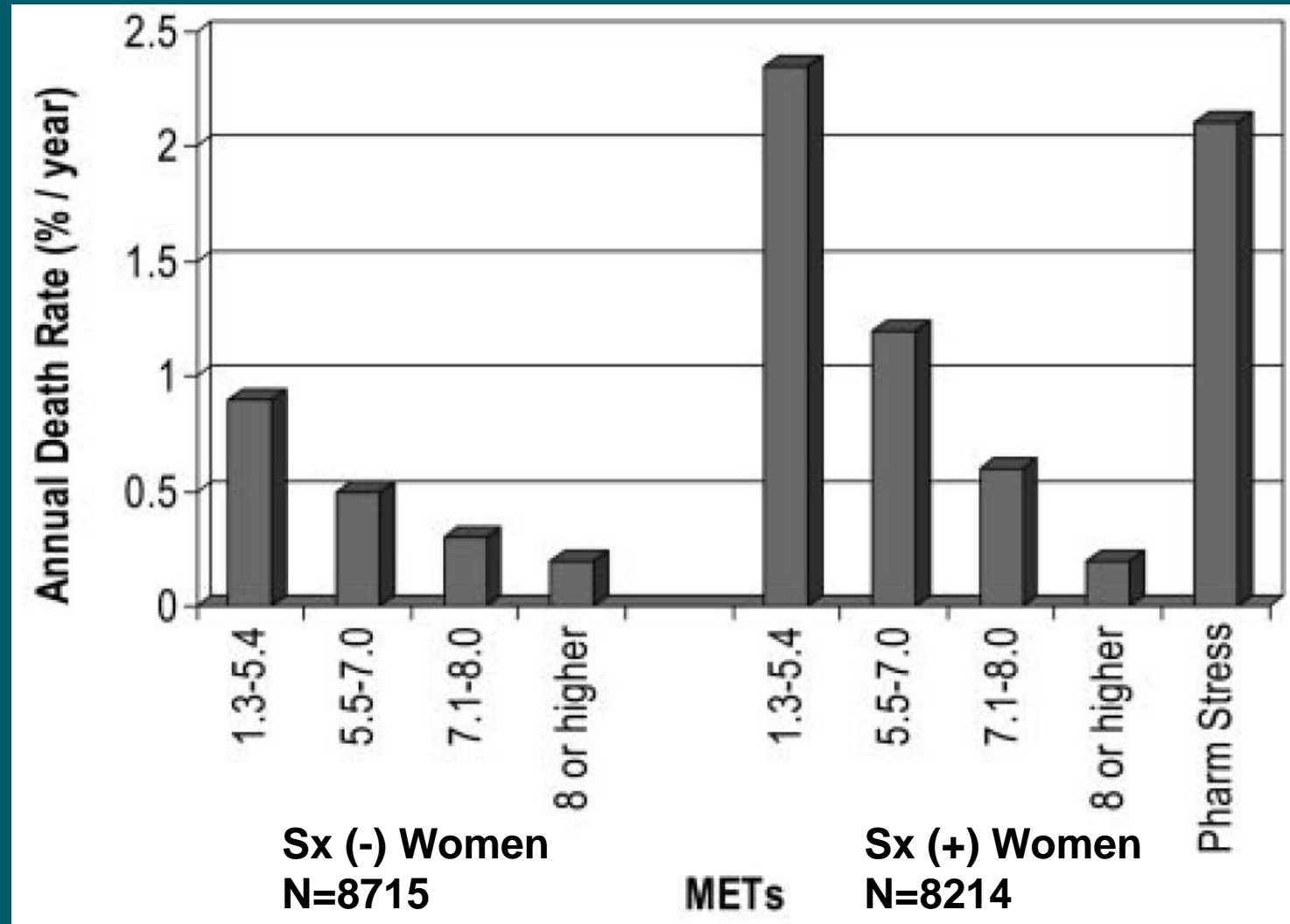
ECHO: High

SPECT: High

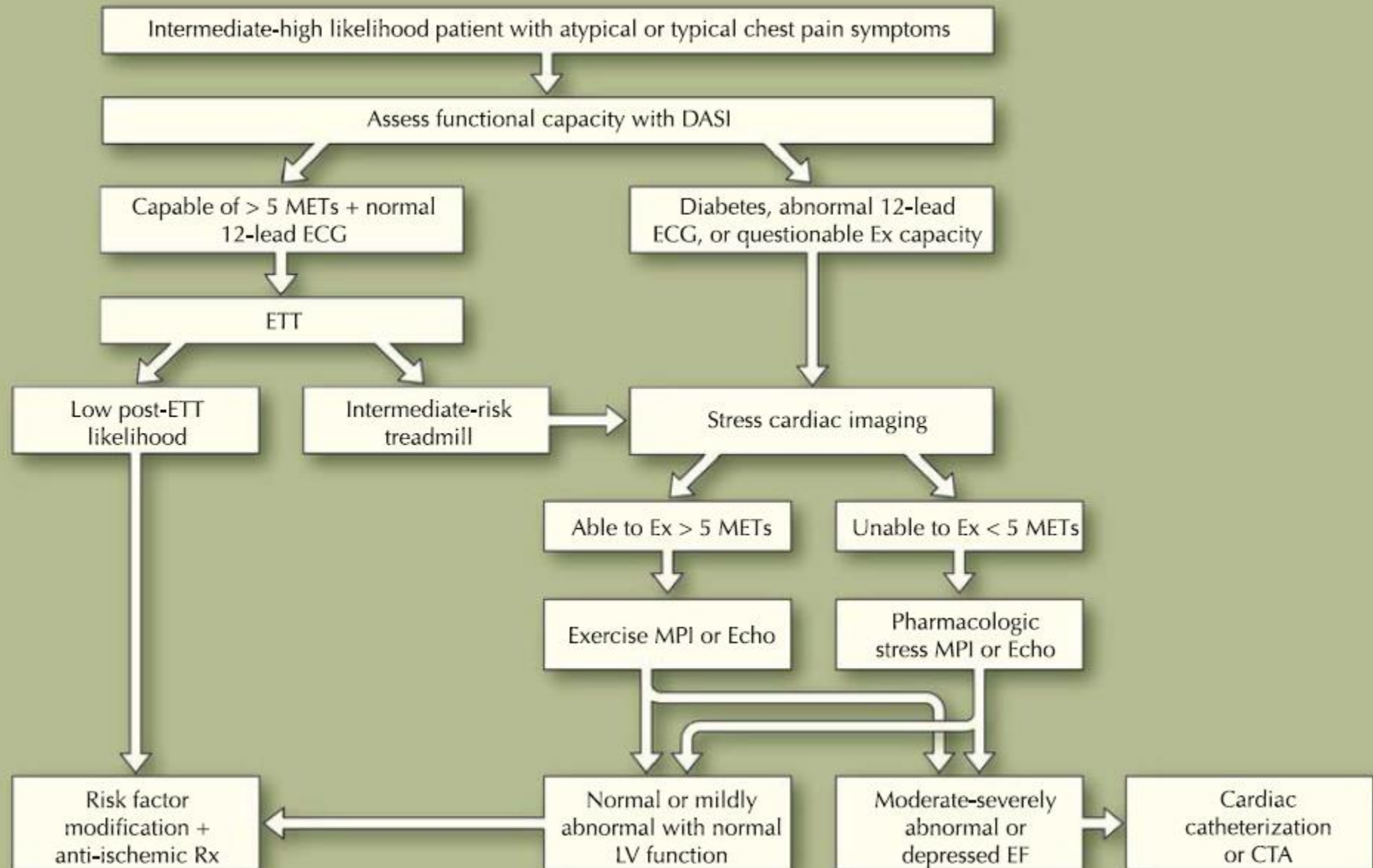
CMR: Low

Coronary CTA: Low

Prognostic Value of Functional Capacity



Algorithm for CAD Evaluation in Women



Conclusion

Noninvasive test는 여성의 허혈성 심질환 진단에 있어 반드시 필요하다. 특히 **stress imaging test**의 역할이 중요하다.

경청해주셔서 감사합니다.

