

Exercise Testing in Women with Suspected Coronary Artery Disease

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ACCURACY OF EXERCISE TESTING

Meta-Analyses – ST Segment Depression

	Sens	Spec
■ Gianrossi et al - Men and women Circulation 1989;80: 87	67%	72%
■ Kwok et al - Women AJC 1999;83:660	61%	69%

Variable	Choose response	Sum
Maximal Heart Rate	Less than 100 bpm = 20	
	100 to 129 bpm = 16	
	130 to 159 bpm =12	
	160 to 189 bpm =8	
	190 to 220 bpm =4	
Exercise ST Depression	1-2mm =6	
	> 2mm =10	
Age	>65 yrs =25	
	50 to 65 yrs = 15	
Angina History	Definite/Typical = 10	
	Probable/atypical =6	
	Non-cardiac pain =2	
Smoking?	Yes=10	
Diabetes?	Yes=10	
Exercise test	Occurred =9	
induced Angina	Reason for stopping =15	
Estrogen Status	Positive=-5, Negative=5	

Total Score

Exercise Test Score Women

Choose
only one
per
group

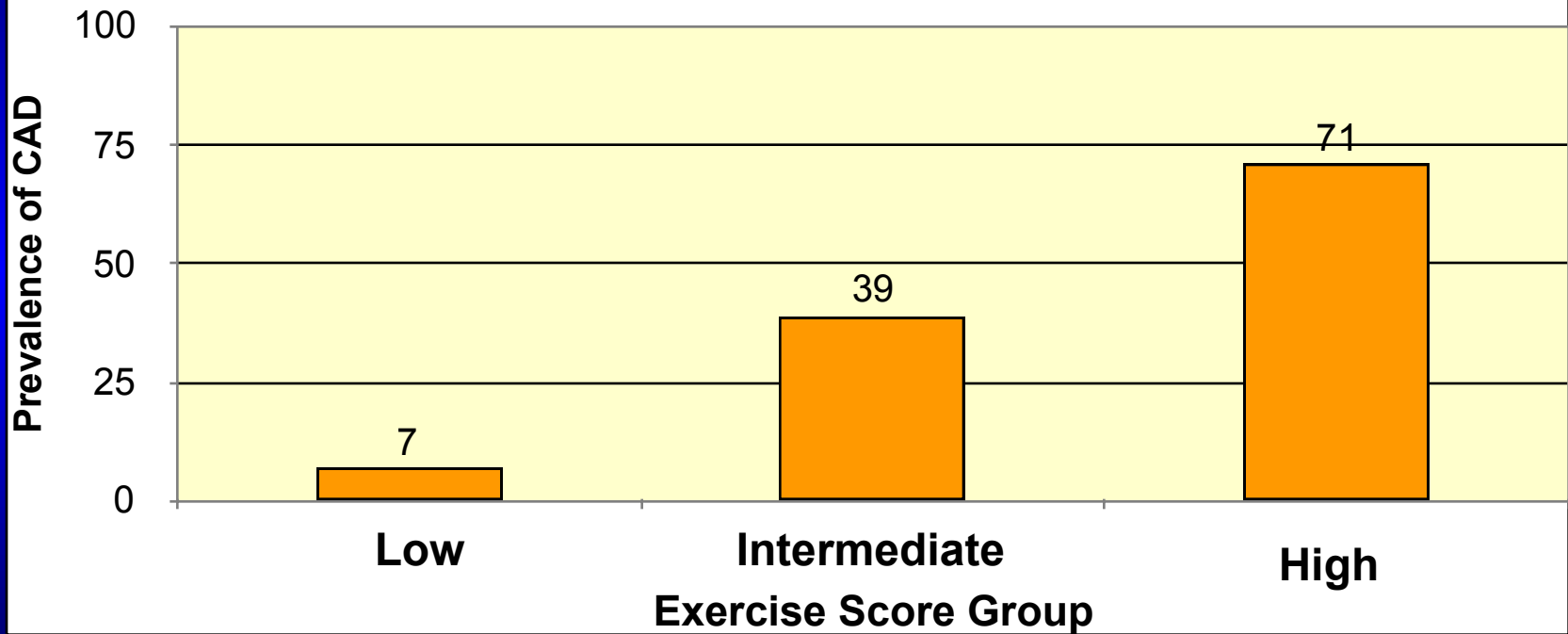
<40=low
probability

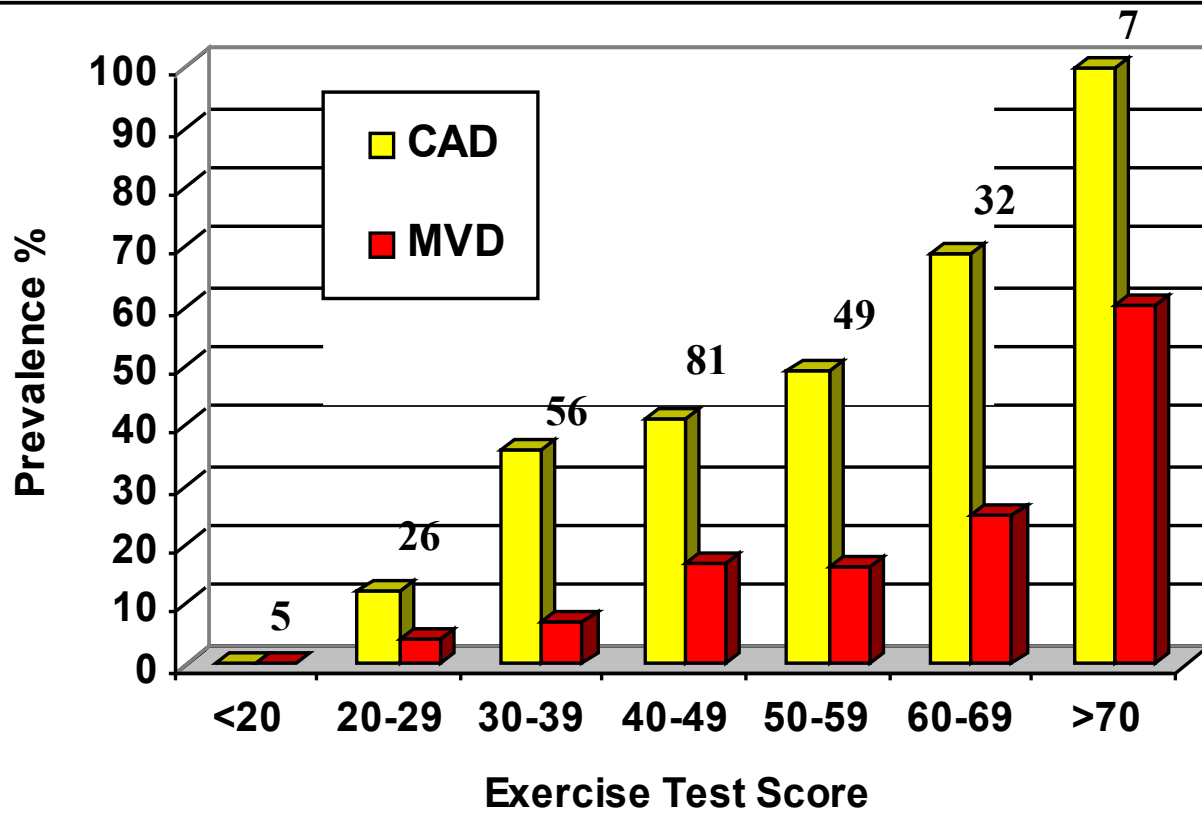
40-60=
intermediate
probability

>60=high
probability

AHJ 2002, 144:818

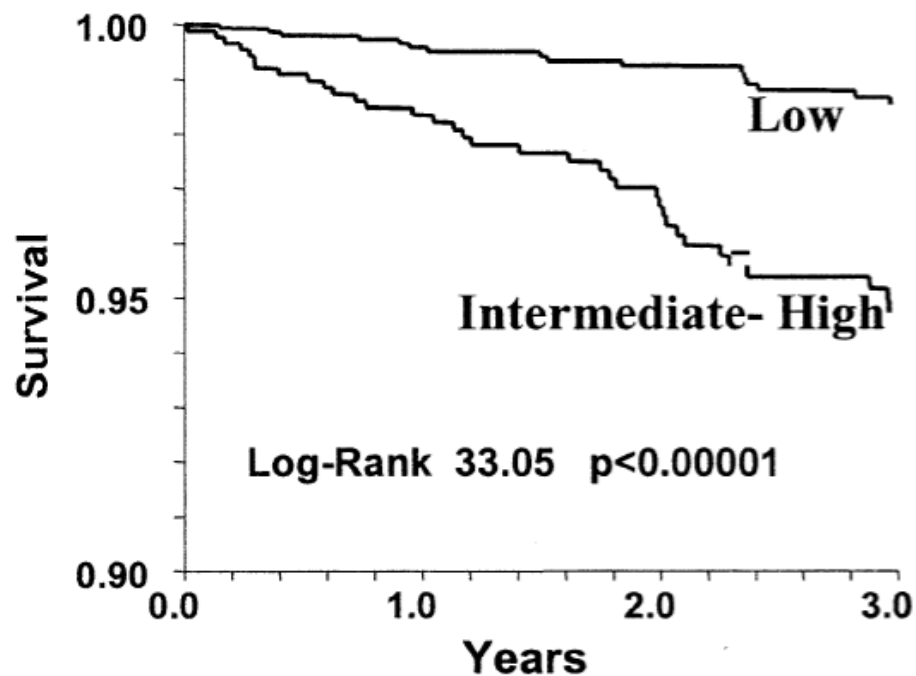
Validation of Exercise Score in Women



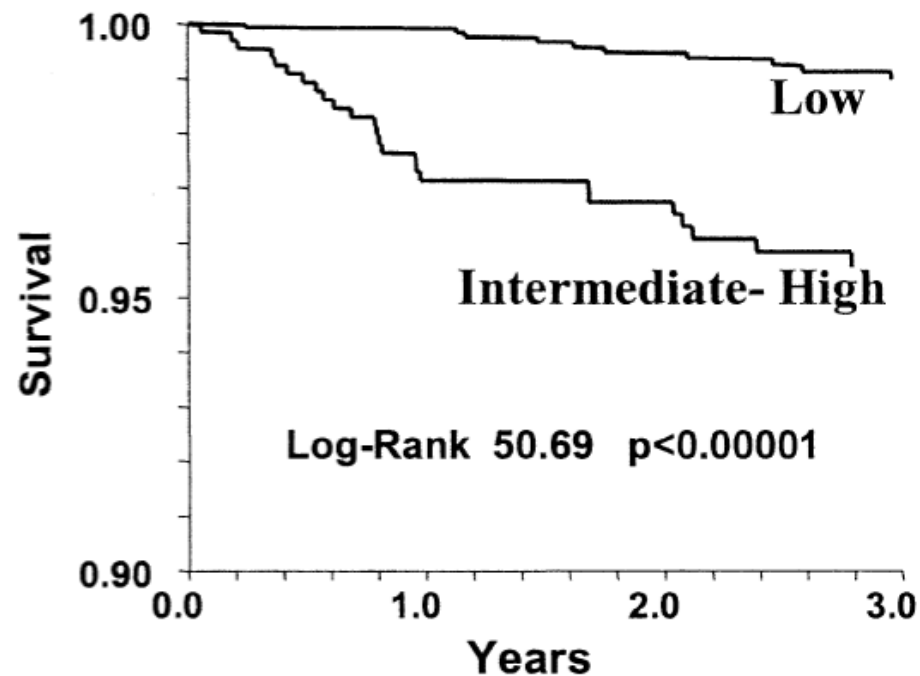


Am Heart J 2002; 144:818

Exercise Score - Men



Exercise Score - Women



Estrogen Status and Outcomes

	CDMI
<u>ES positive</u>	19 (1.4%)
Premenopausal	6 (1.0%)
Hysterectomy, intact ovaries, age ≤ 50 yrs	1 (1.1%)
HRT, nonsurgical menopause	2 (1.1%)
HRT, hysterectomy, ovaries in	3 (2.0%)
HRT, hysterectomy, ovaries out	7 (2.4%)
<u>ES negative</u>	53 (7.1%)
Nonsurgical menopause	38 (7.9%)
Hysterectomy, intact ovaries, age > 50 yrs	4 (4.5%)
Hysterectomy, ovaries out	11 (5.6%)

ACC/AHA CONSENSUS

Diagnostic Applications of EST for Obstructive CAD (2002)

- **Class I** - All with Intermediate pretest probability of CAD
- **Class IIb** - Low or High pretest probability
- **Class III** - WPW, Paced, LBBB, deep T invers, >1mm ST dep

PRETEST PROBABILITY

Diamond-Forrester

Age	Gender	TA	AA	NA
30-39	M	I	I	L
	W	I	L	L
40-49	M	H	I	I
	W	I	L	L
50-59	M	H	I	I
	W	I	I	L
60-69	M	H	I	I
	W	H	I	I

H=>90% I=10-90% L=<10%

Variable			Choose response	Sum
Age	Men	Women		
	<40	<50	3	
	40-54	50-64	6	
	≥55	≥65	9	
Estrogen Status			Positive = -3	
Women only			Negative = +3	
Angina History			Typical = 5	
Diamond Method			Atypical = 3	
			Non-anginal = 1	
Diabetes?			2	
Hyperlipidemia?			1	
Hypertension?			1	
Smoking? (Any)			1	
Family Hx CAD? 1°			1	
Obesity? BMI>27			1	
			Total Score:	

<http://pbrain.hpermart.net/medrules.html>

Pretest

MedRules

**Choose
only one
per
group**

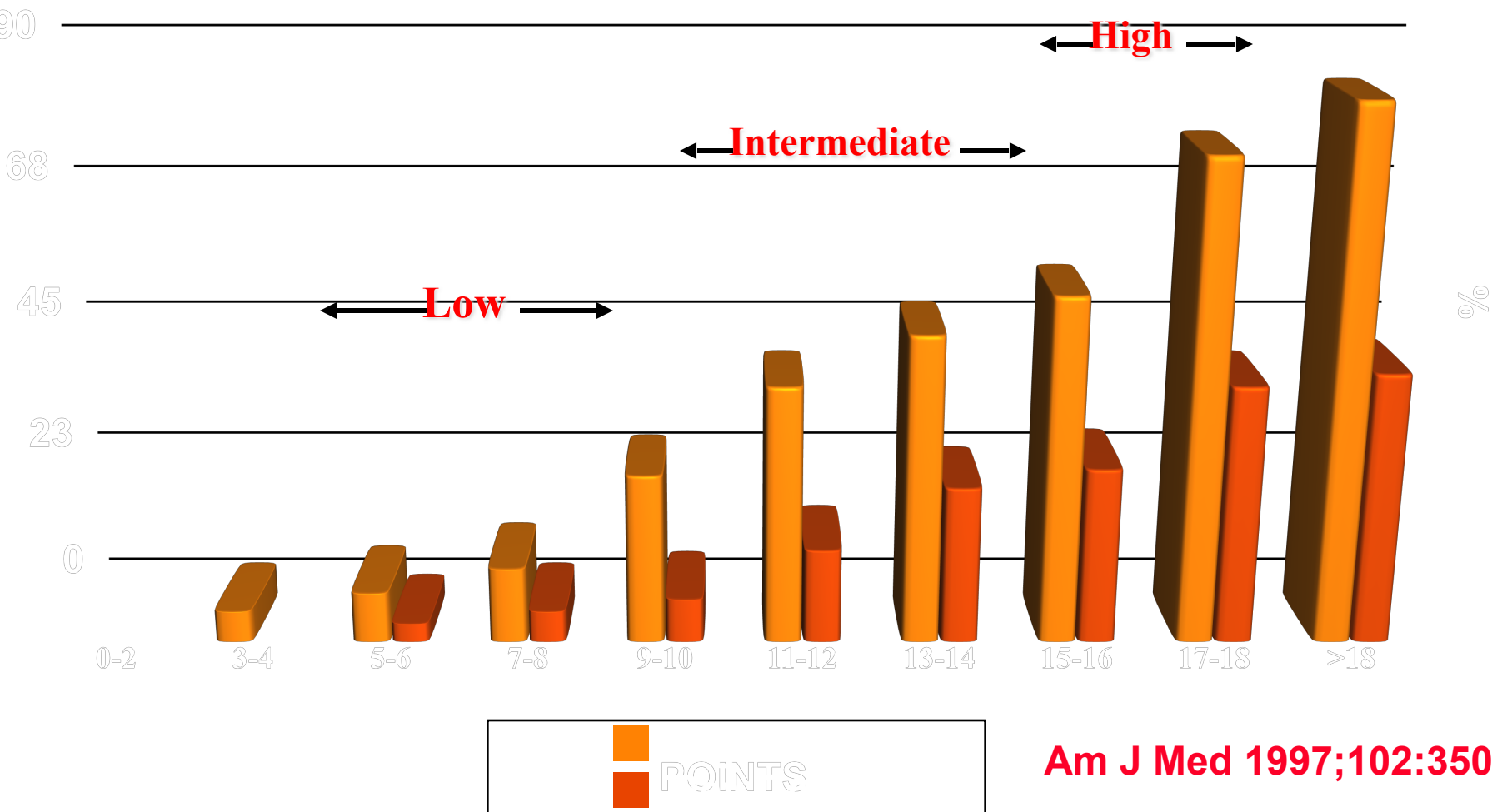
≤8=low
probability

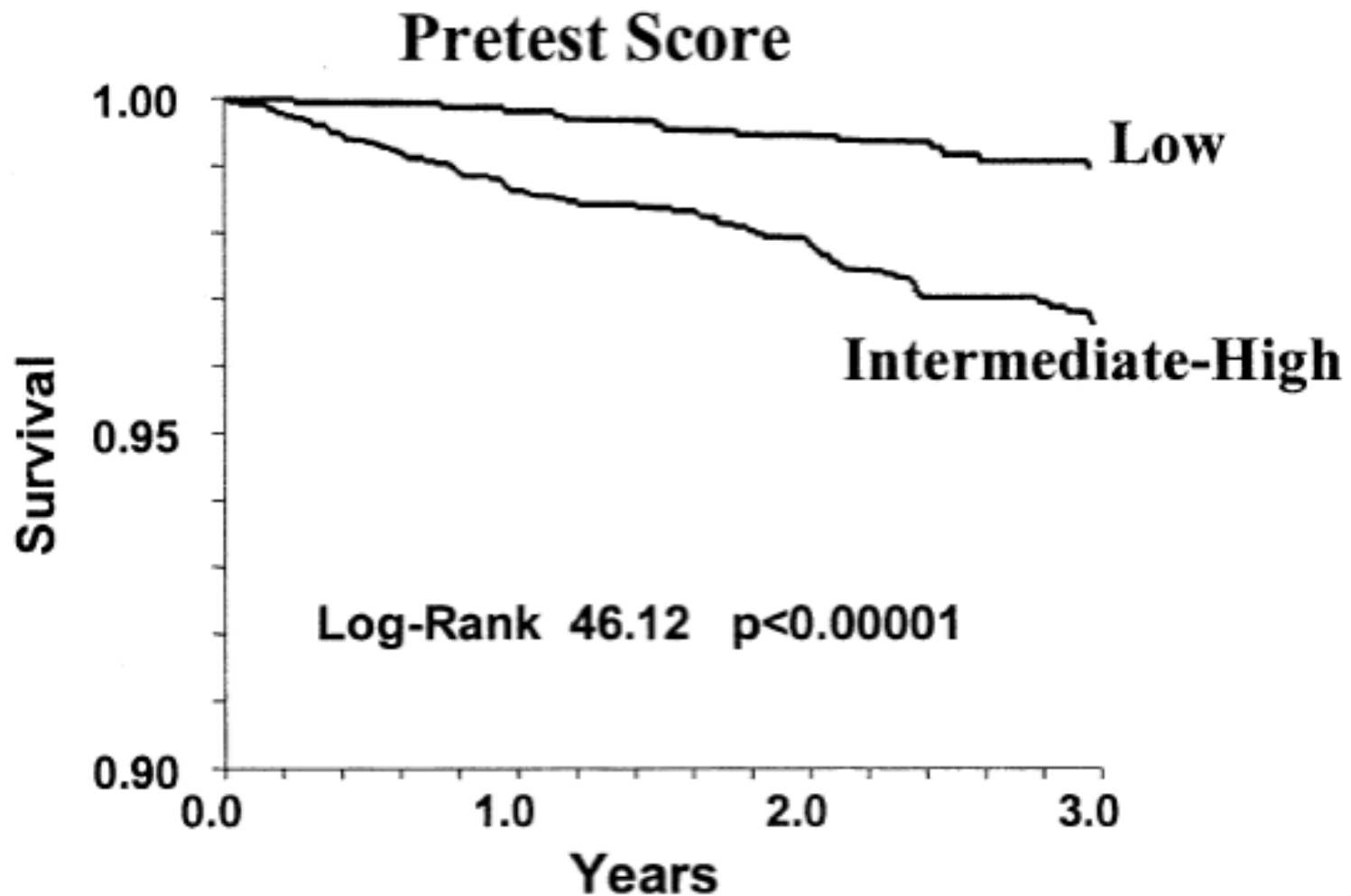
9-15=
intermediate
probability

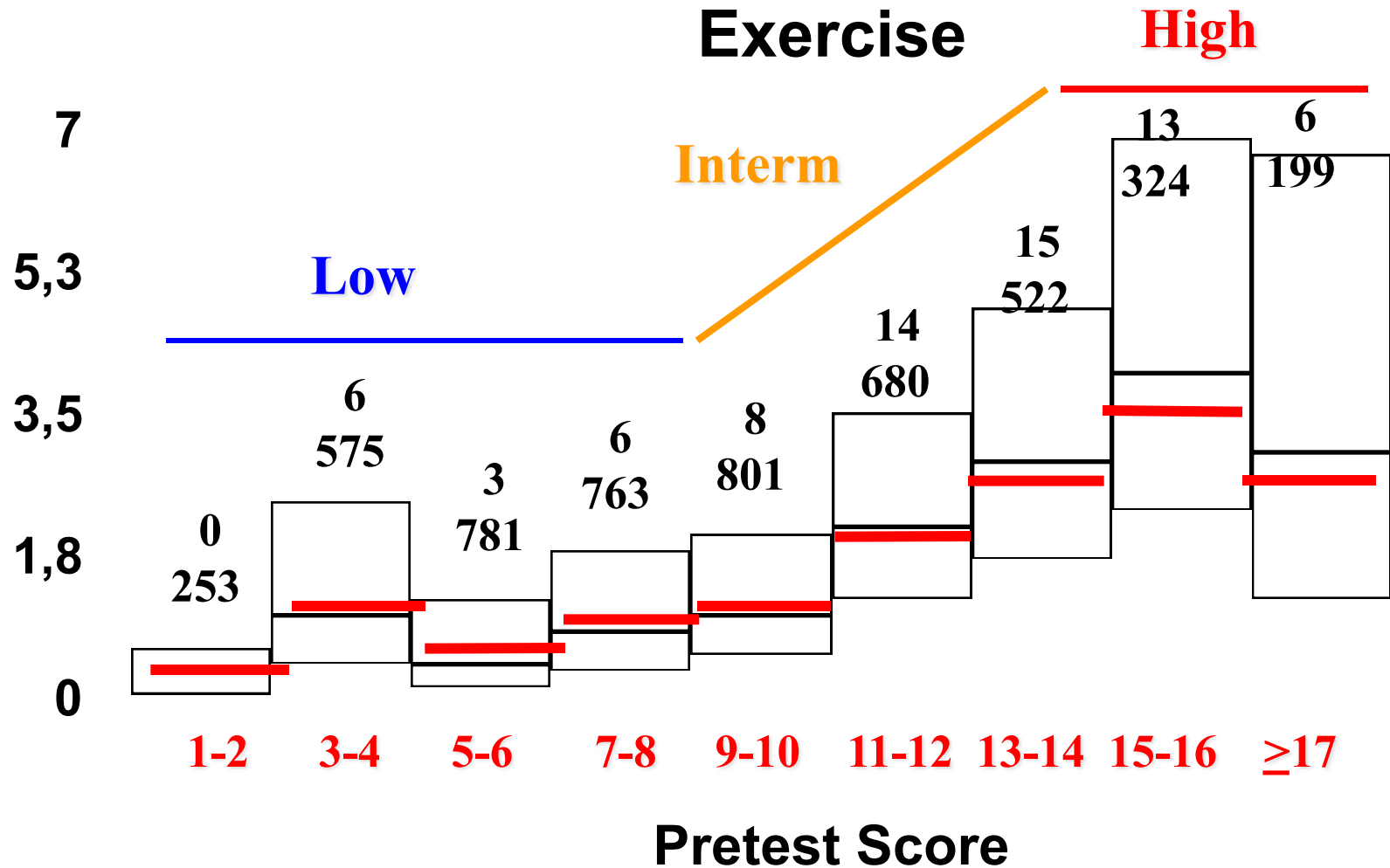
≥16=high
probability

Am J Med 1997;102:350
Am Heart J 1999;138:740

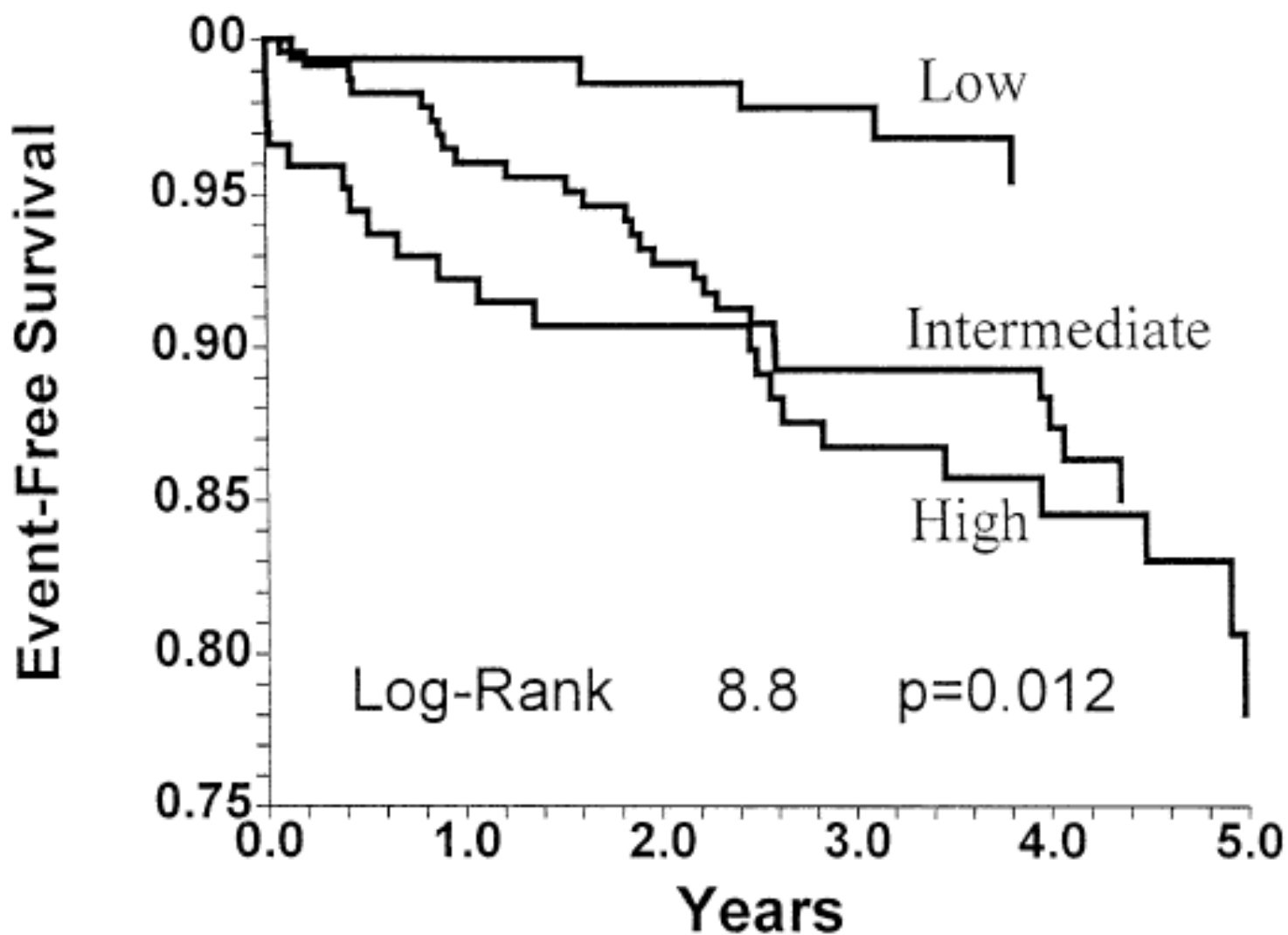
PRETEST PROBABILITY







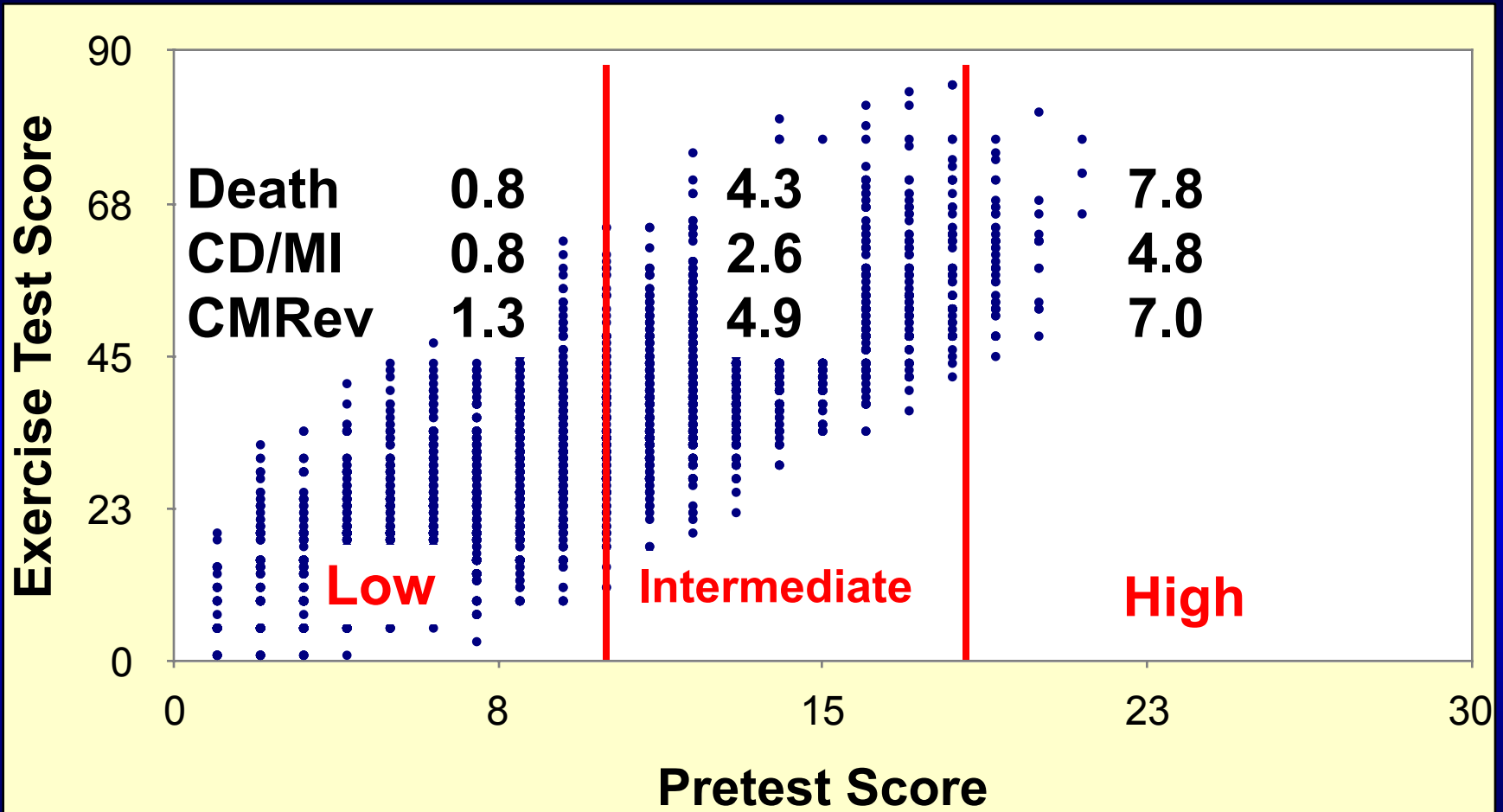
Pretest Score – WISE Cohort



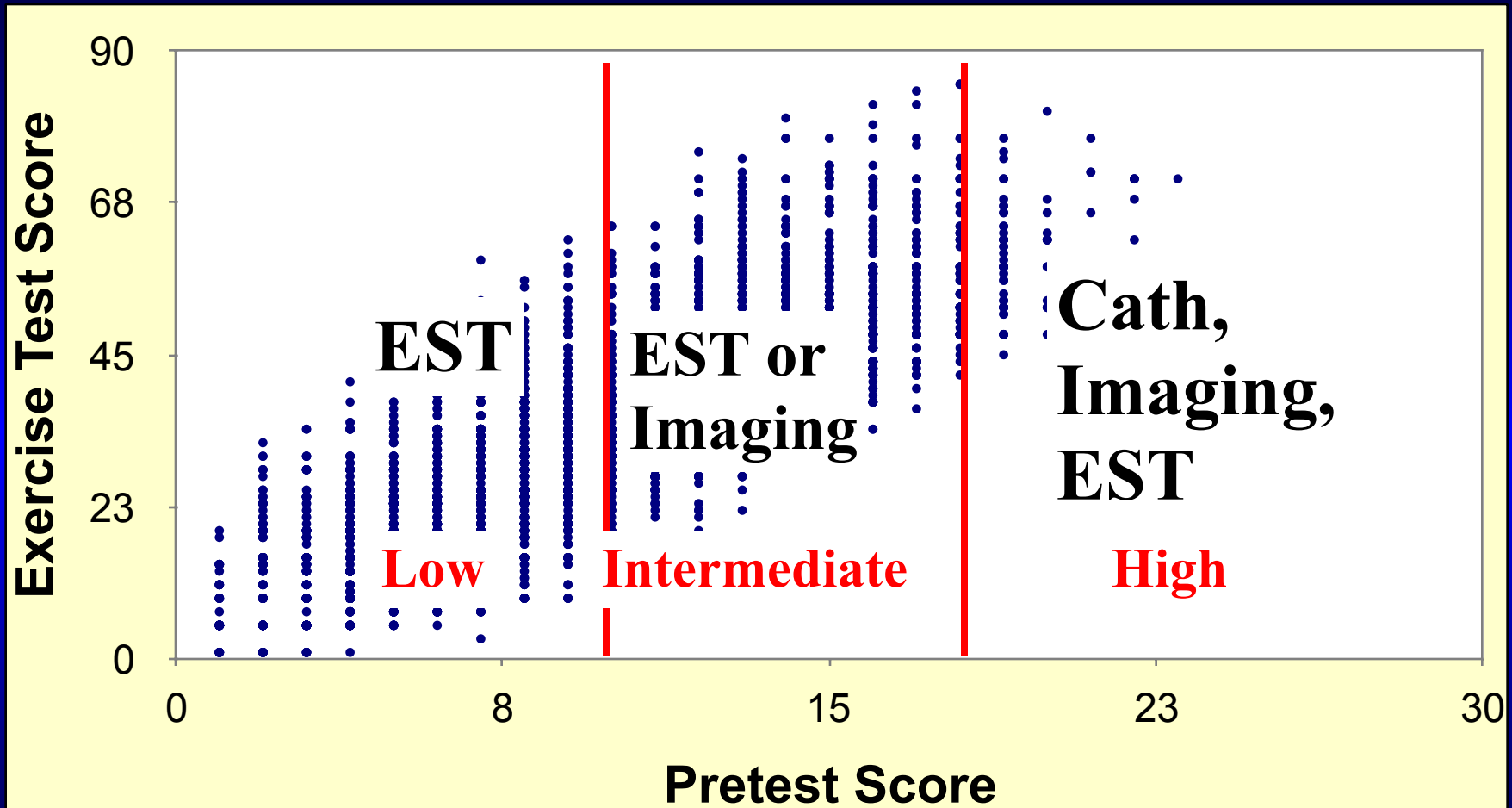
PRETEST PROBABILITY
Frequency of Groups Presenting
for Exercise Testing

	All	Men	Women
Low	47%	30%	64%
Int	45%	64%	27%
High	7%	6%	9%

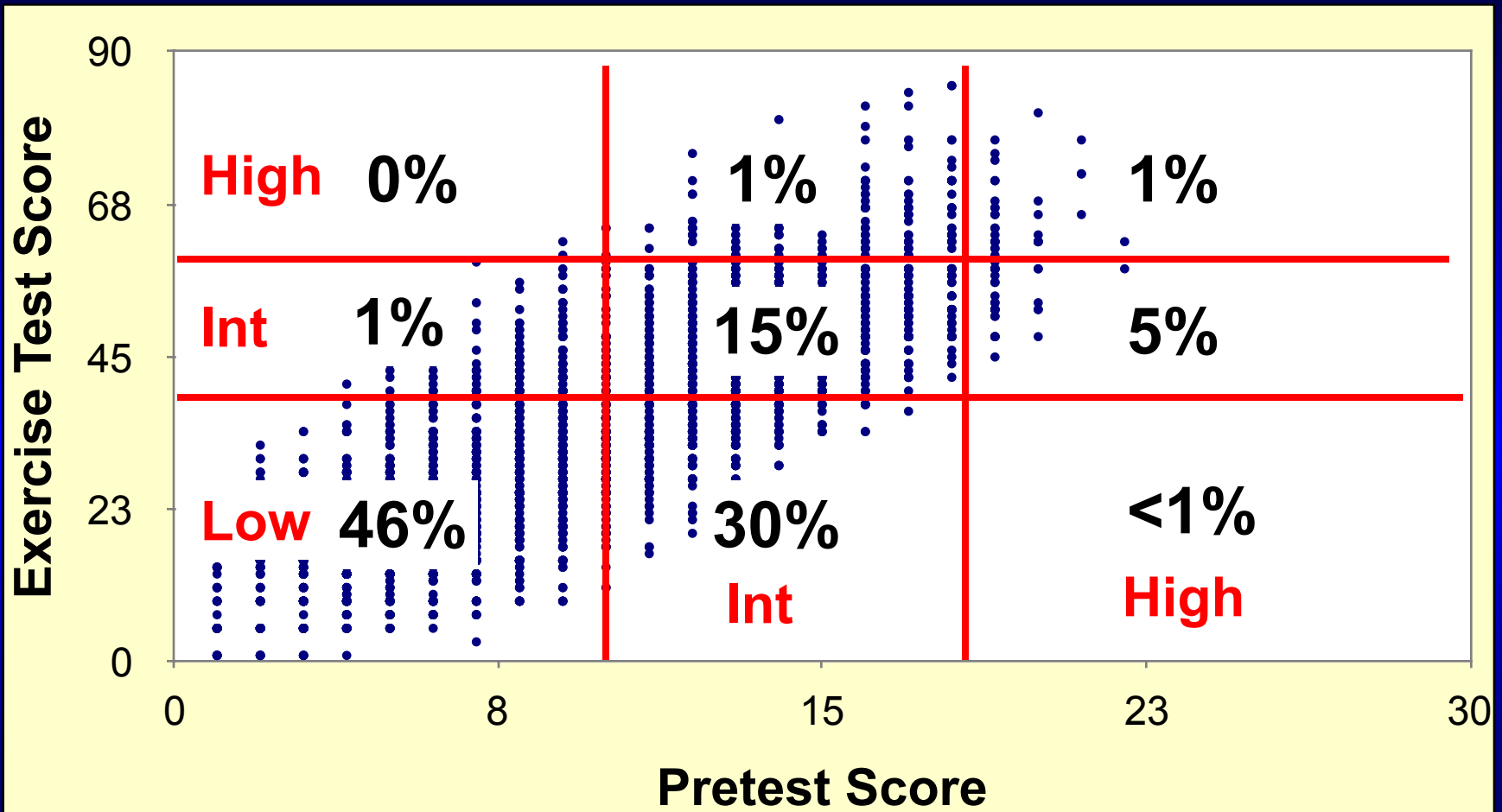
Outcomes By Pretest Score Group



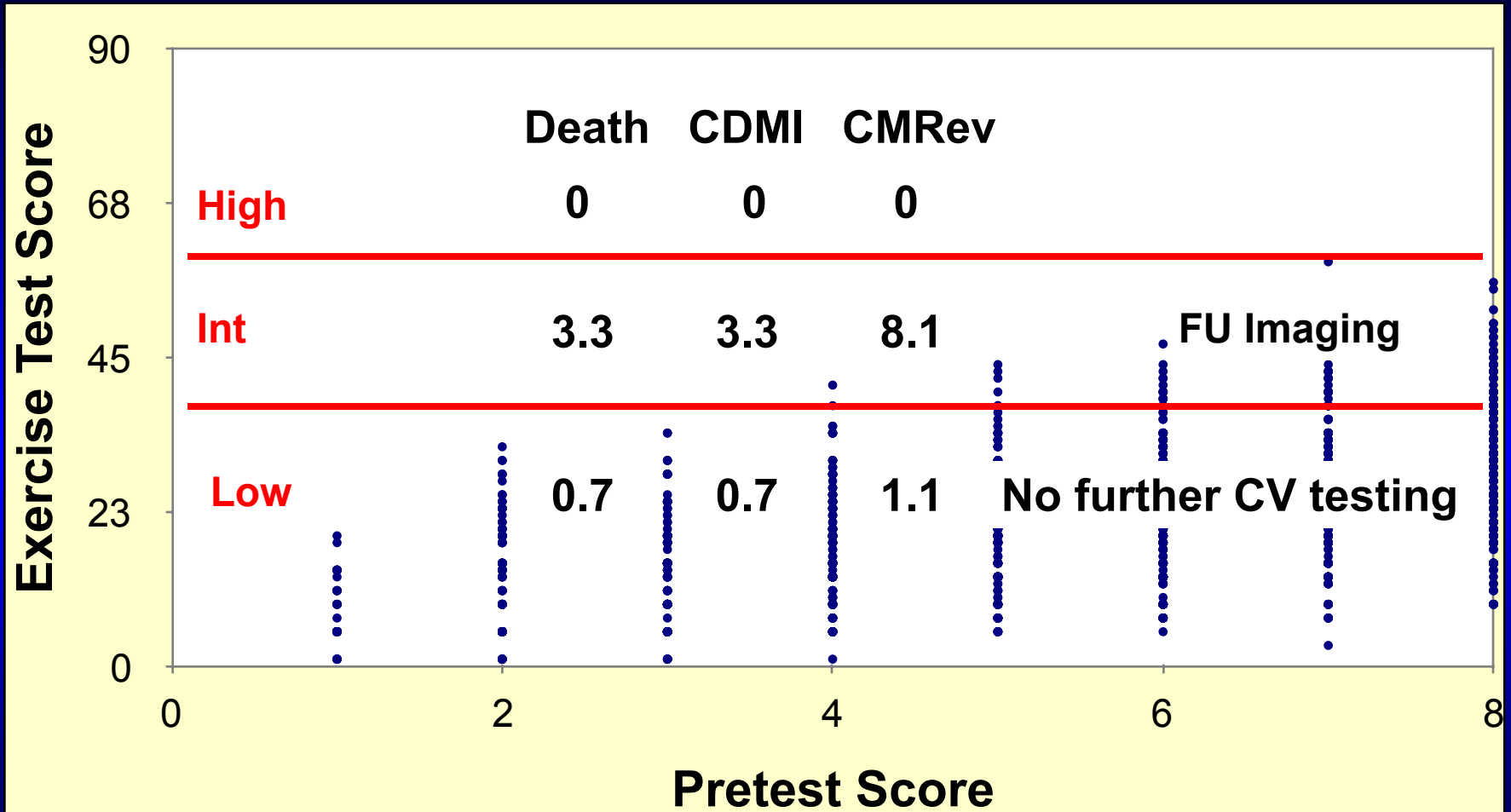
Suspected CAD – Test Selection



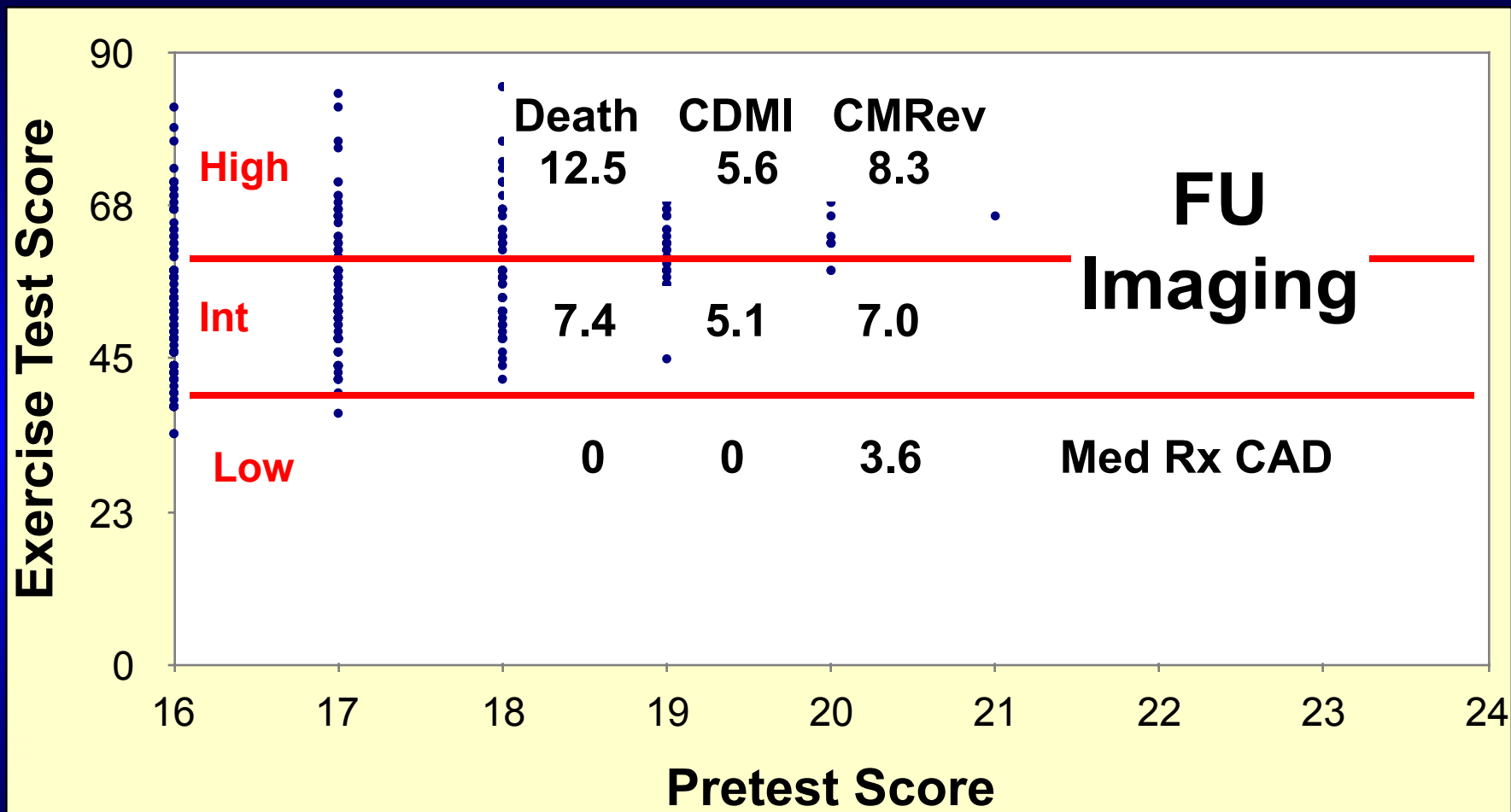
Frequency Group by Both Scores



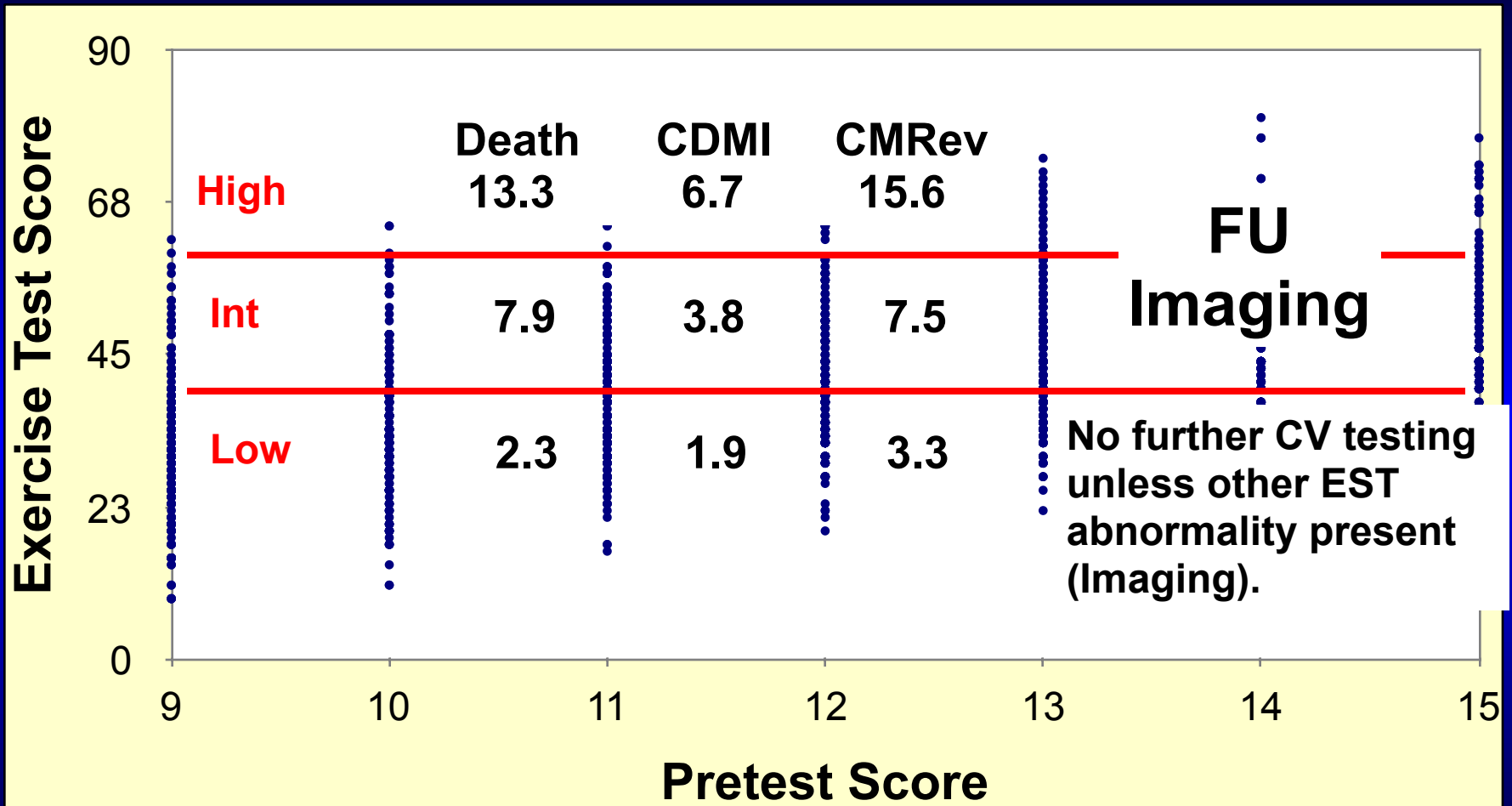
Outcomes Within Low Pretest Subgroups



Outcomes Within High Pretest Subgroups



Outcomes Within Intermediate Pretest Subgroups



EXERCISE TESTING

Other EST Abnormalities

No more CV tests

≥ Average Ex Capacity

Low Duke Score

HR responses NL

BP response NL

No Arrhythmias

FU Imaging

≤ Fair Ex Capacity

> Low Duke Score

HR responses ABNL

Chronotropic

Recovery

BP response ABNL

Arrhythmias