

Calcium Scoring Improves Patient Compliance

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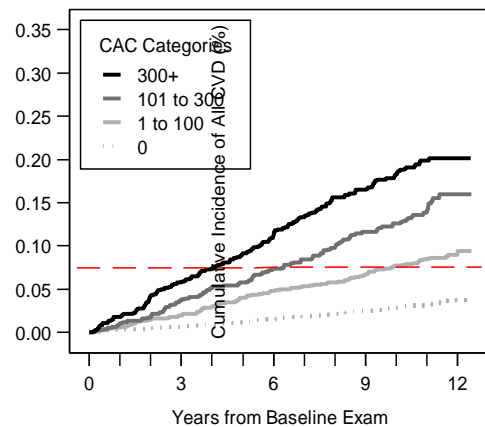
Disclosure

The following speakers have
conflicts of interest:

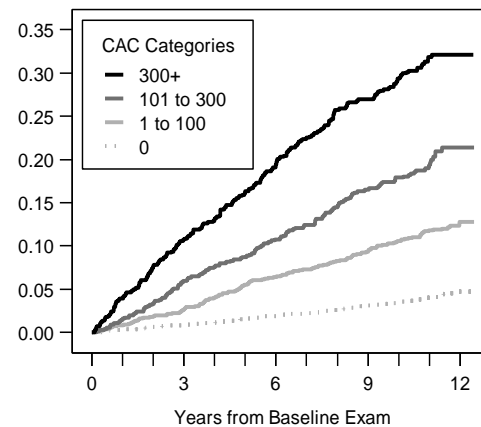
Matthew Budoff
Grant Support from General
Electric

MESA 10 Year Follow Up

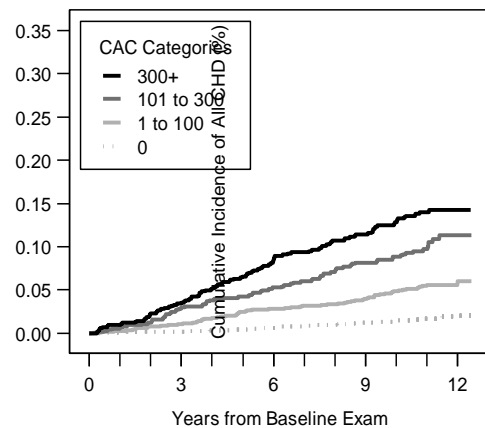
(A)



(B)



(C)



(D)

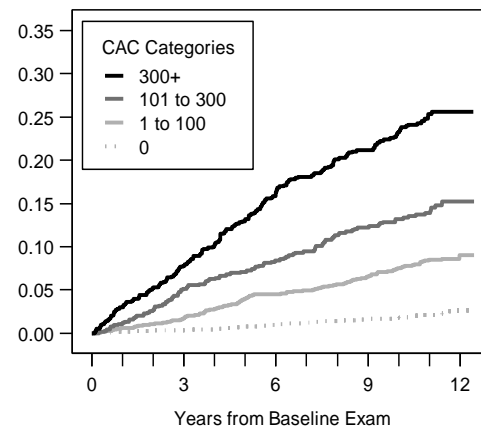
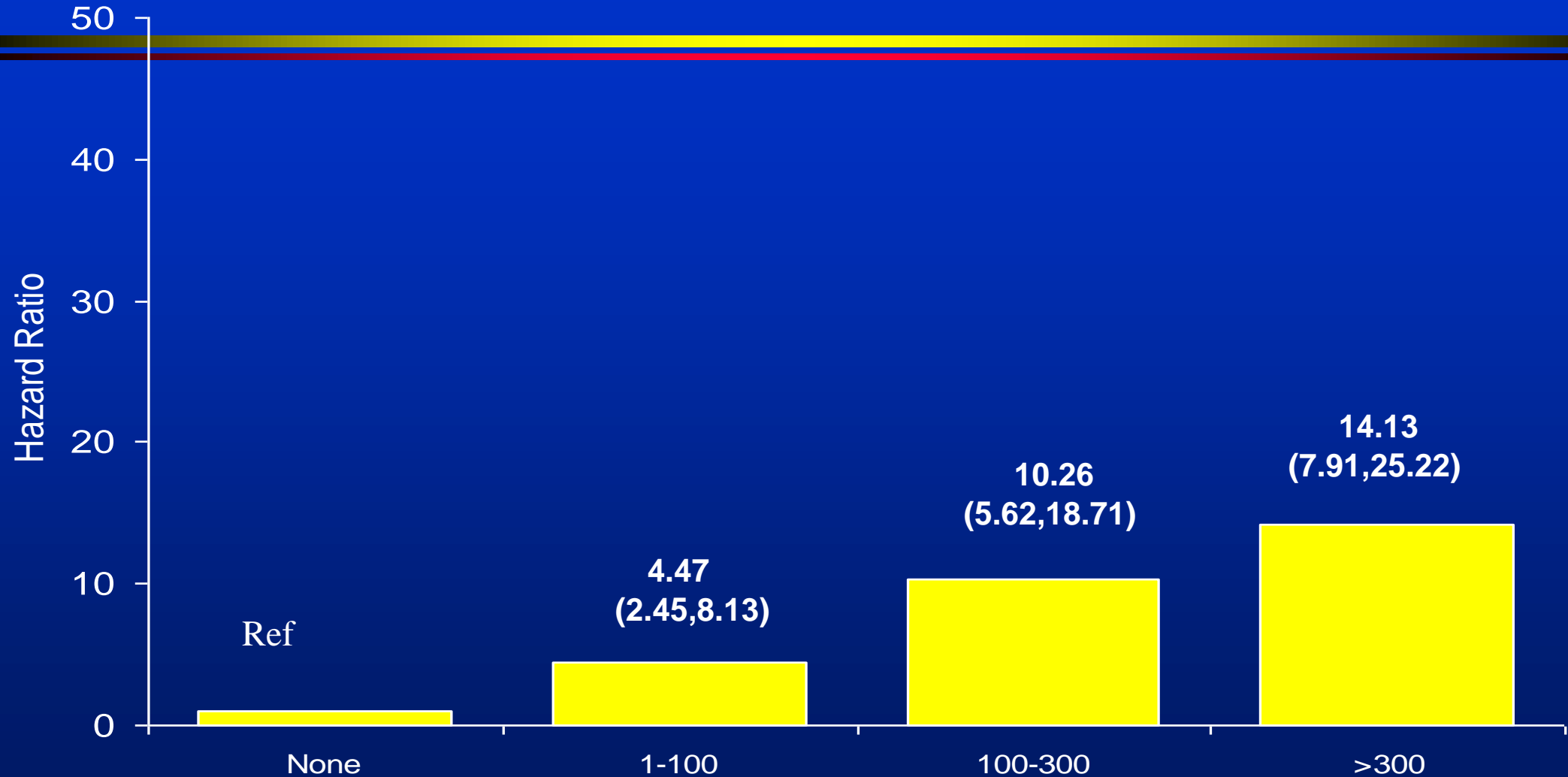


Figure: N=6,783.
Panel A hard CVD
Panel B all CVD
Panel C hard CHD
Panel D all CHD

MESA Study – 6,814 Patients: 3.5 year follow-up

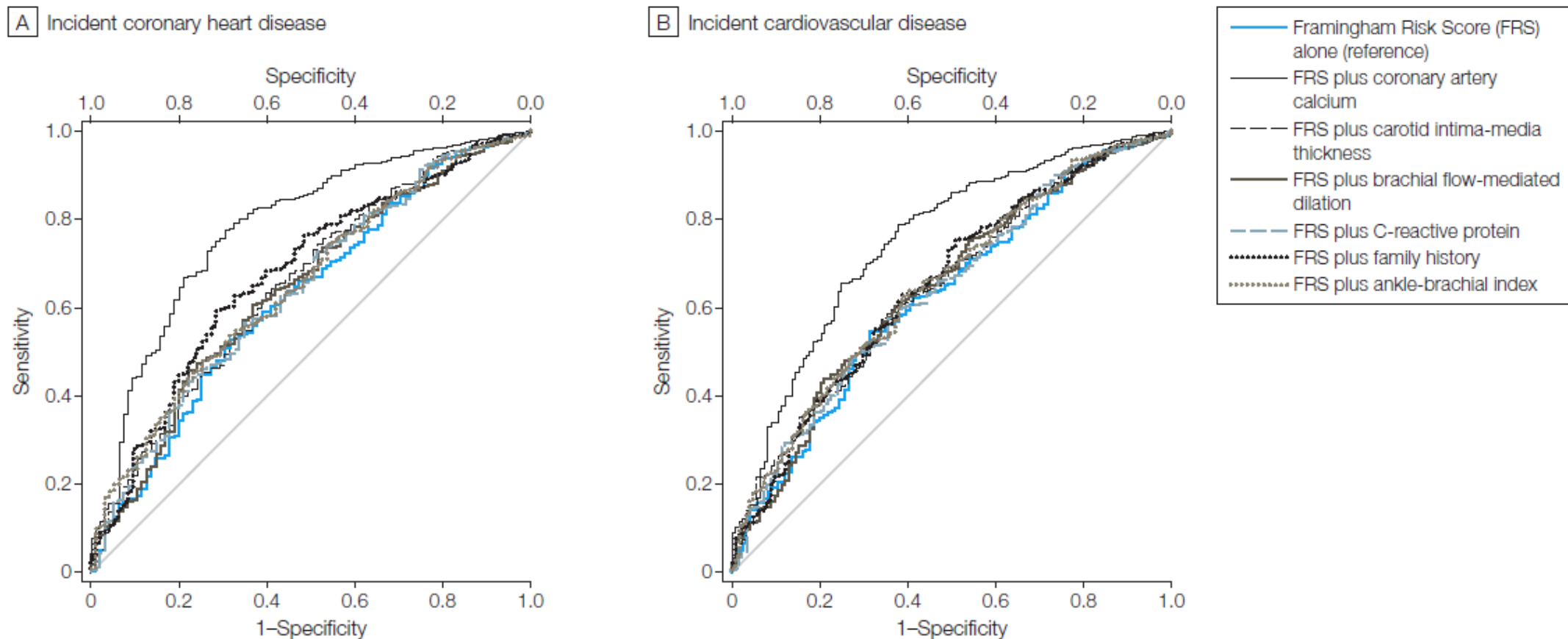
Nonfatal MI & CHD Death



Fully adjusted – Detrano et al– NEJM - 2008

Yeboah JAMA 2012 - MESA

Figure. Receiver Operator Characteristic Curves Showing Area Under the Curve for Incident Coronary Heart Disease and Incident Cardiovascular Disease in Intermediate-Risk MESA Participants



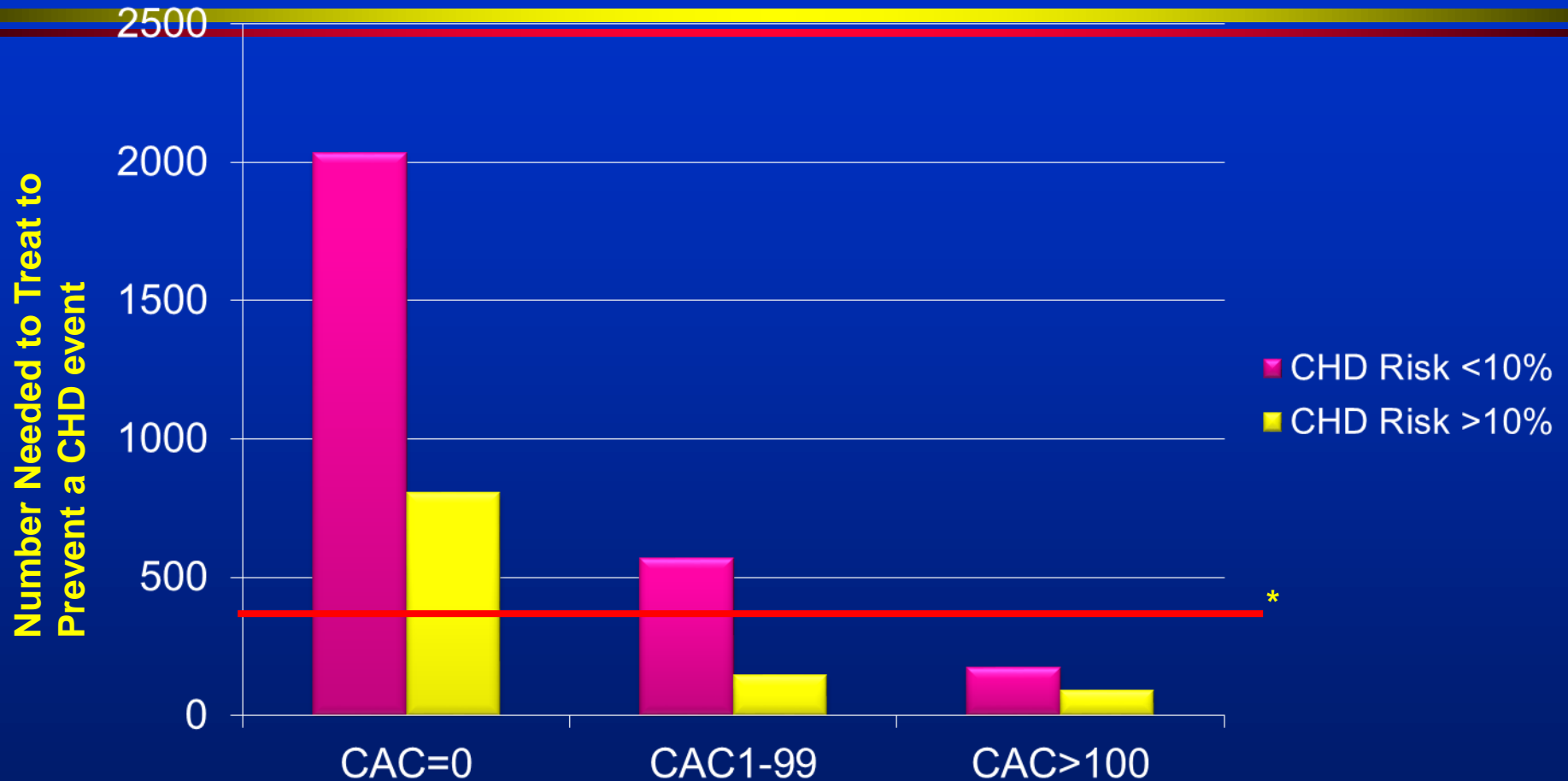
A, Receiver operator characteristic curves showing area under the curve for FRS alone, 0.623; FRS plus coronary artery calcium, 0.784 ($P < .001$); FRS plus intima-media thickness, 0.652 ($P = .01$); FRS plus flow-mediated dilation, 0.639 ($P = .06$); FRS plus high-sensitivity C-reactive protein, 0.640 ($P = .03$); FRS plus family history, 0.675

EFFICIENTLY IDENTIFYING PATIENTS

BLAHA

	Percent of Patients in MESA	CHD event rate at 5.8 years	Hazard Ratio (95% CI)	5-year NNT for CHD
JUPITER population				
▪ CAC=0	47%	0.48%	1 (ref)	549
▪ CAC 1-100	28%	2.79%	4.91	94
▪ CAC >100	25%	10.76%	27.8	24

Risk/Benefits of ASA According to CAC



* Represents number needed to harm for a major bleeding event

ADHERENCE

- Lipid lowering agents for both primary and secondary prevention of coronary events remain underused by high-risk patients and health-care providers
- The economic burden of medication non-adherence, combining direct and indirect costs, is estimated to be as high as \$100 billion annually (Aranow 2005)

Is Adherence a Problem?

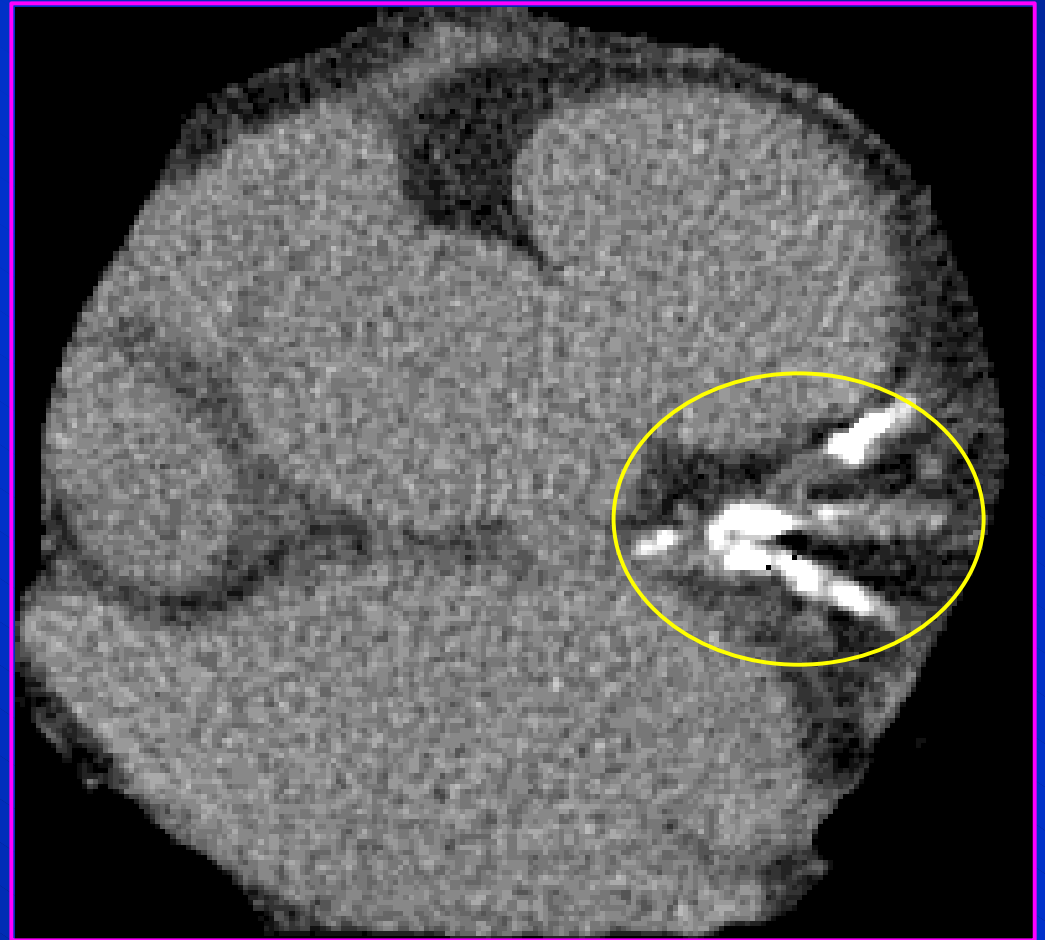
- ❑ Poor adherence to statin therapy is extremely common and repeatedly demonstrated.
- ❑ In a random-effects meta-analysis of 5 recent studies comprising 52,319 patients, adherence to statin therapy over 2 years averaged only 62% (95% confidence interval 56% to 68%).
- ❑ A recent meta-analysis demonstrated that ASA non-adherence/withdrawal was associated with three-fold higher risk of major adverse cardiac events (OR=3.14 [1.75–5.61], $P=0.0001$) (Biondi 2007)

Benefit of Persistent Use

- Penning-van Beest (2006) assessed 59 094 who started statin therapy in a three year period. In a 2 year follow-up, a total of 31 557 patients (53%) discontinued statin use within 2 years. Overall a 30% reduction in risk of hospitalization for acute myocardial infarction (AMI) with persistent statin use was observed.

Coronary Artery Scanning

- ◆ SEVERE
CALCIFICATION

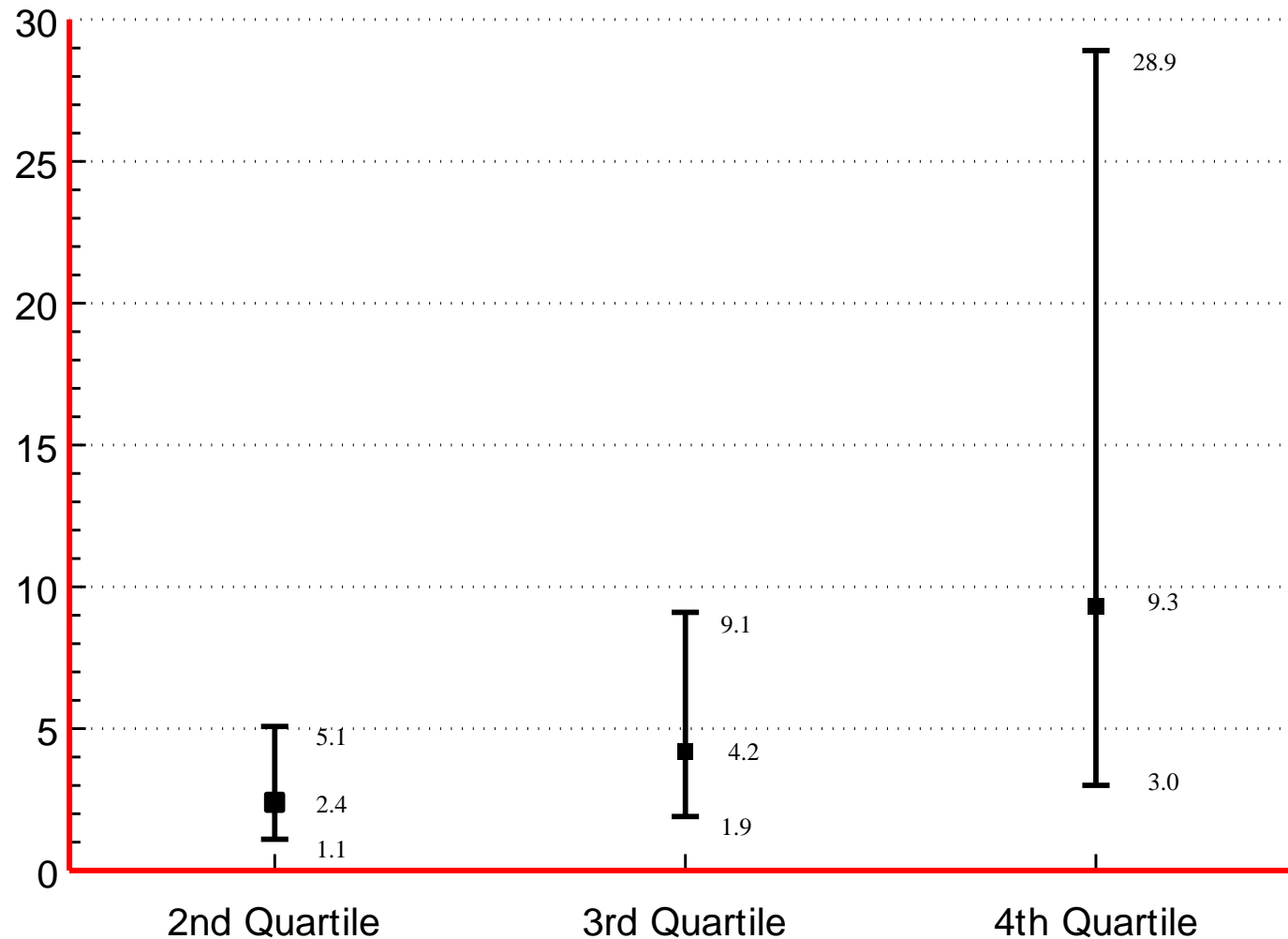


□ IS A PICTURE WORTH 1000 WORDS?

CAC & Improved Adherence to Preventive Therapy / Lifestyle Δ s

- Behavioral modification
 - Weight Loss More Effective Higher CAC Scores ($p < 0.001$)
 - Statin and Aspirin Use, Exercise and healthy lifestyles all impacted
- 16 studies = 3 RCT & 13 observational studies
 - CAC screening enhanced medication adherence in 14 of 16 studies

Odds ratio of maintaining statin therapy with various levels of baseline CAC (3.6 yr f/u) – Kalia et al. 2006



Orakzai, Budoff et al. AJC 2008

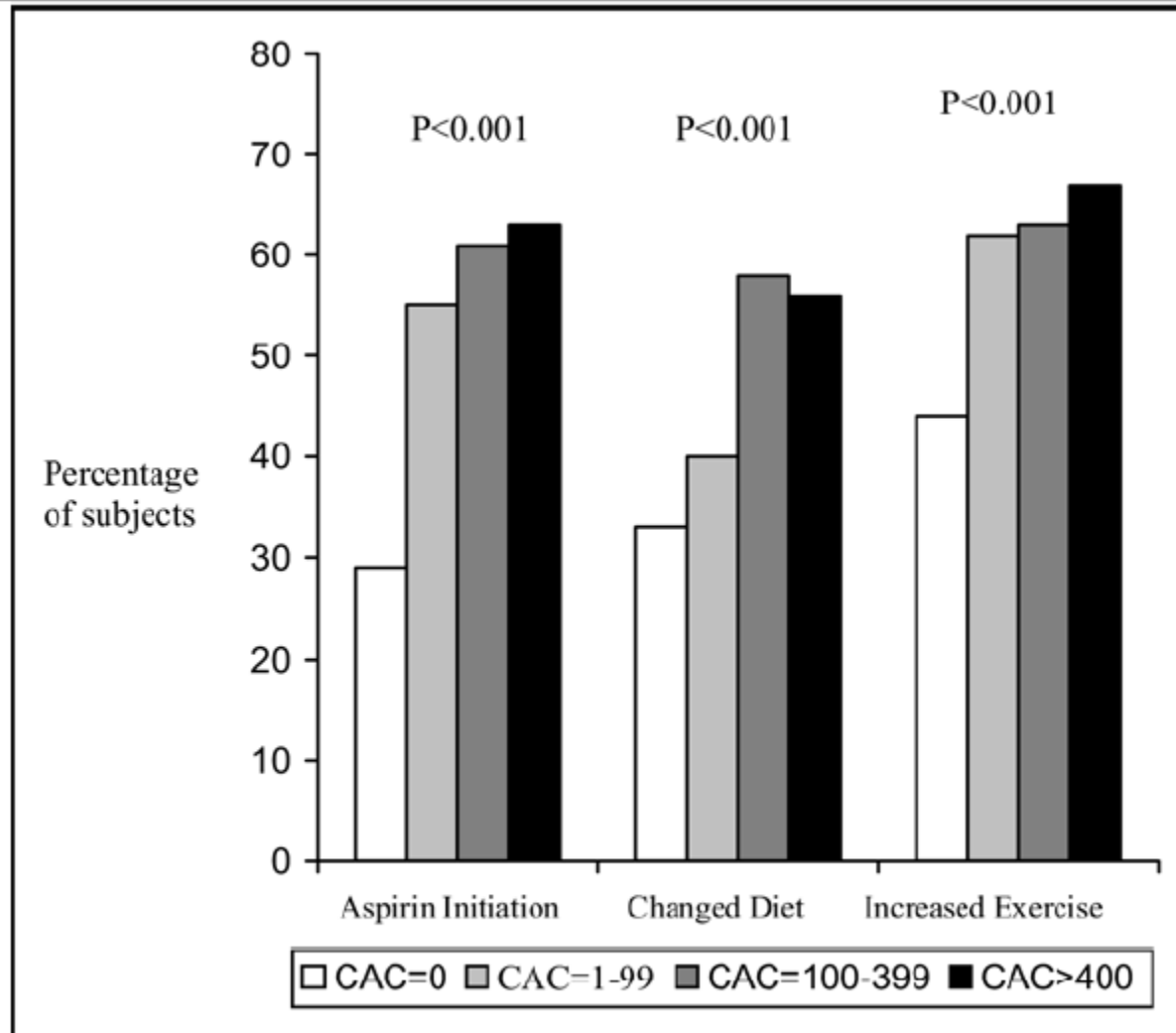
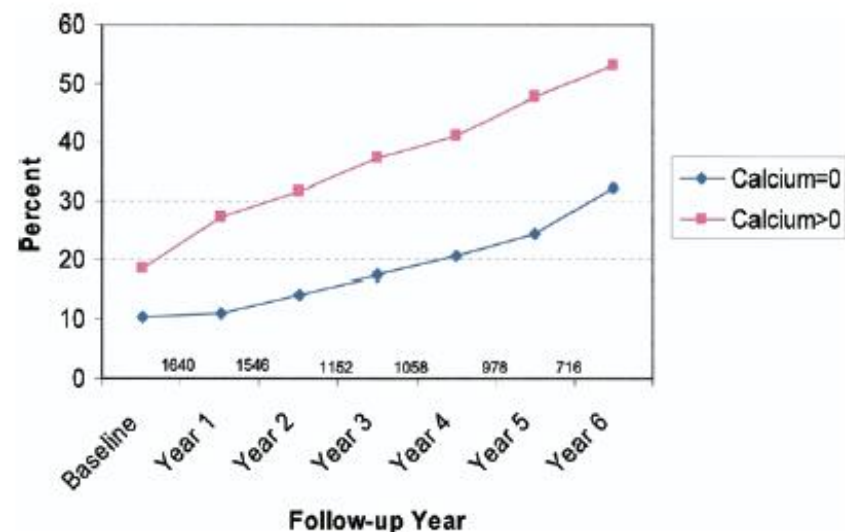
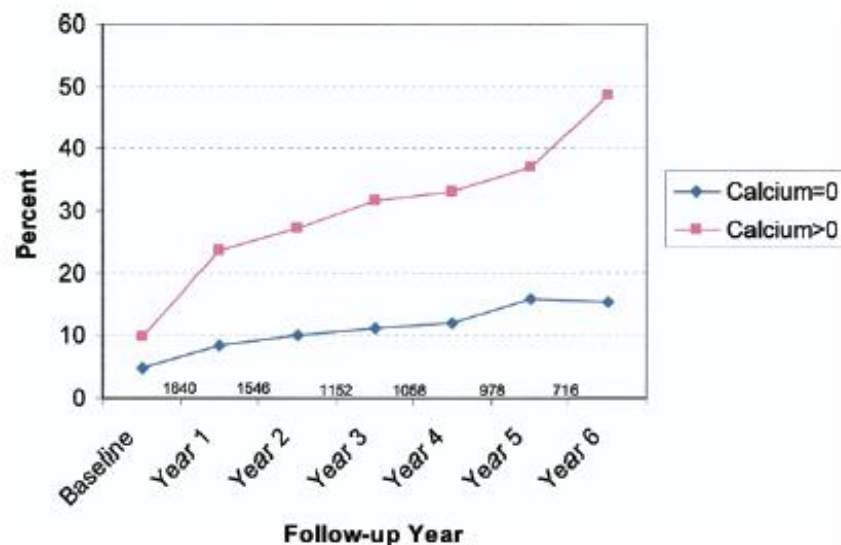


Figure 1. Percentage of subjects with ASA initiation, dietary changes, and increased exercise, according to CAC scores.

Improving Adherence

Aspirin Use

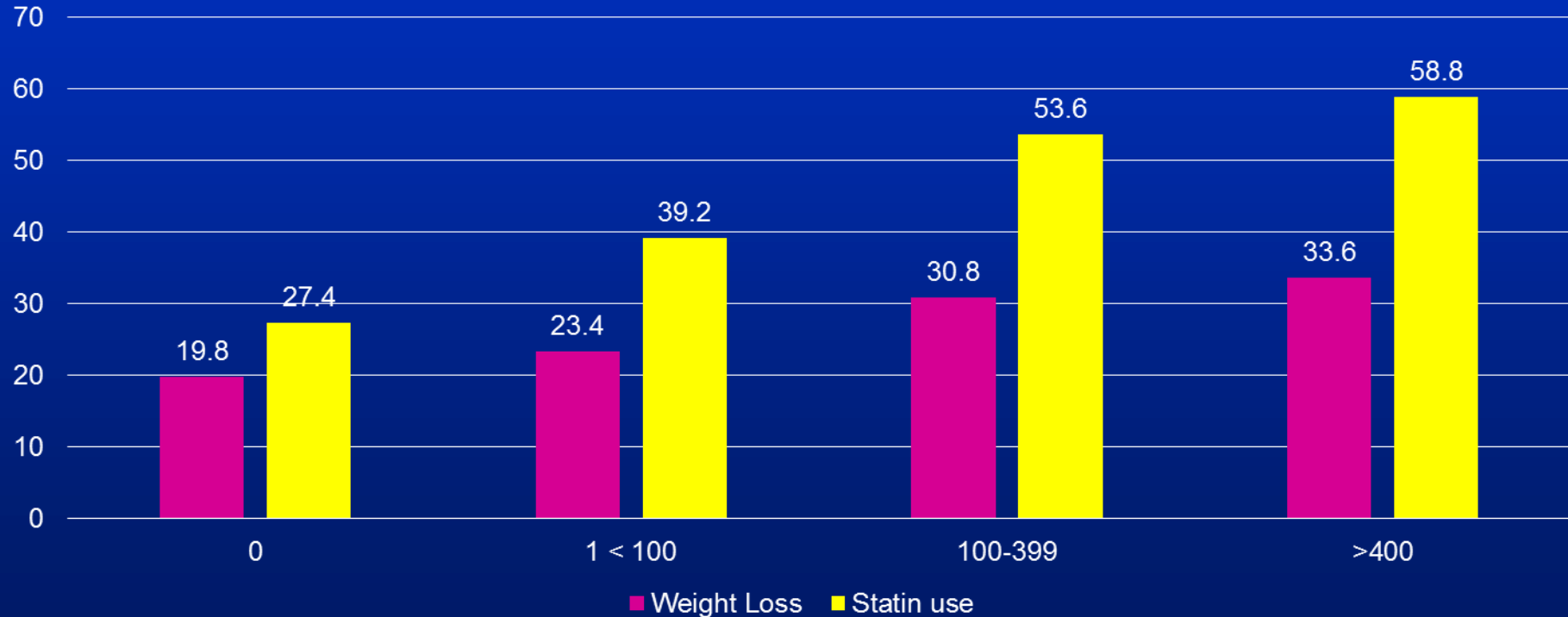
Statin use



	CAC		NCEP Risk Factors	
	Odds Ratio	p Value	Odds Ratio	p Value
Statin Use	3.5 (2.7–4.7)	<0.001	1.4 (1.2–1.6)	<0.001
Aspirin Use	3.1 (2.3–4.1)	<0.001	1.3 (1.1–1.4)	0.001
Statin & Aspirin Use	7.0 (4.8–10.1)	<0.001	1.5 (1.3–1.8)	<0.001

Kalia – Coron Art Disease 2015

2608 Patients, Follow up 4.2 years



Nasir 2008 - MESA

	Initiation of Lipid Lowering Therapy		Initiation of Aspirin
	NCEP Recommends Drug Therapy?		
CAC Group:	No - RR (95% CI)	Yes - RR (95% CI)	RR (95% CI)
Score 0	Reference	Reference Group	Reference Group
1-100	1.31 (1.00, 1.71)	1.04 (0.75, 1.44)	1.22 (1.15, 1.55)
101-400	2.20 (1.67, 2.91)	1.18 (0.81, 1.72)	1.87 (1.59, 2.21)
>400	2.78 (2.06, 3.75)	1.70 (1.21, 2.39)	2.24 (1.88, 2.68)

**Figure 1a: Initiation on New Lipid Lowering Medication
Among MESA Participants Not Recommended Drug
Therapy by NCEP According to Increasing CACS**

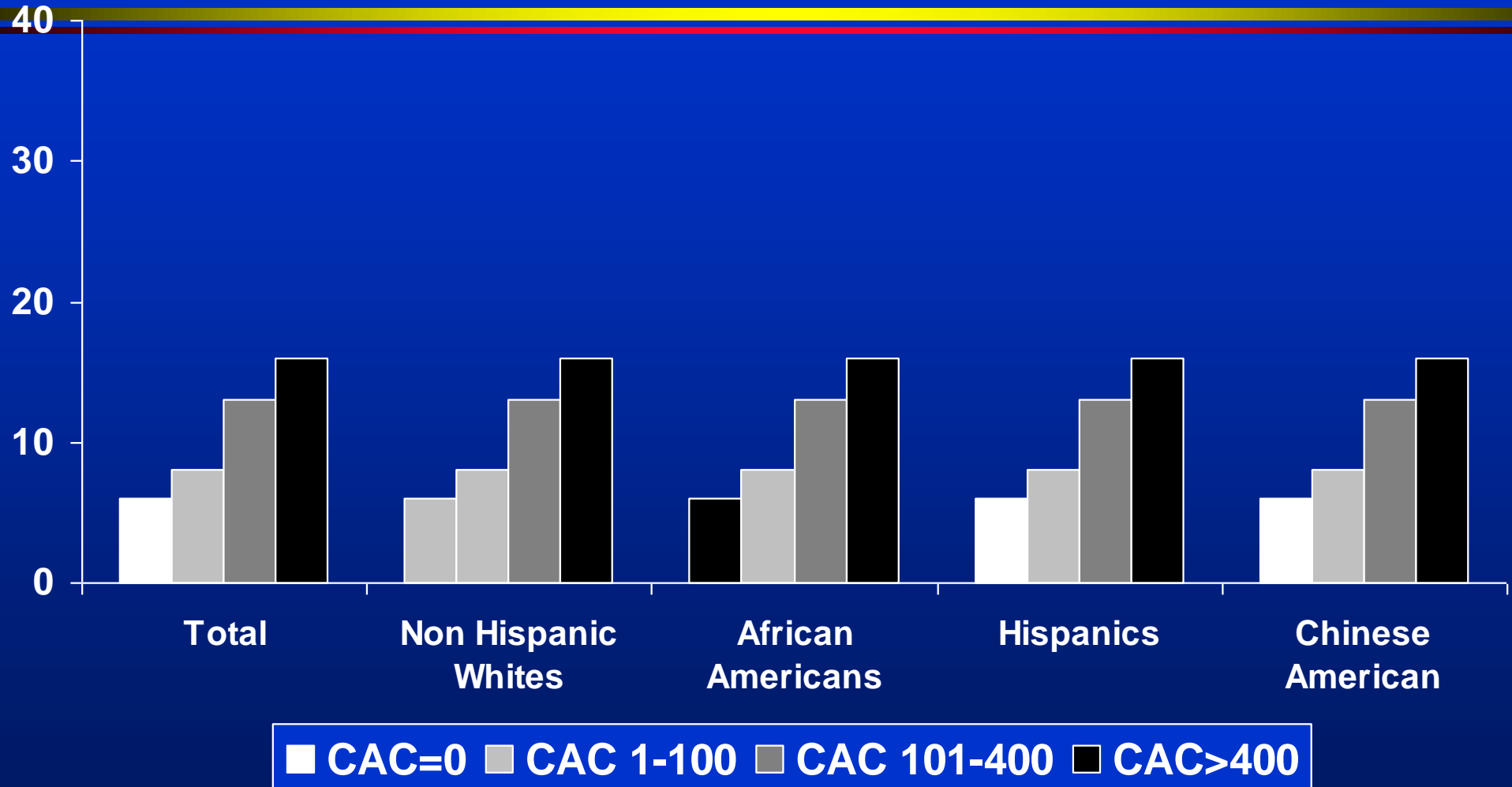
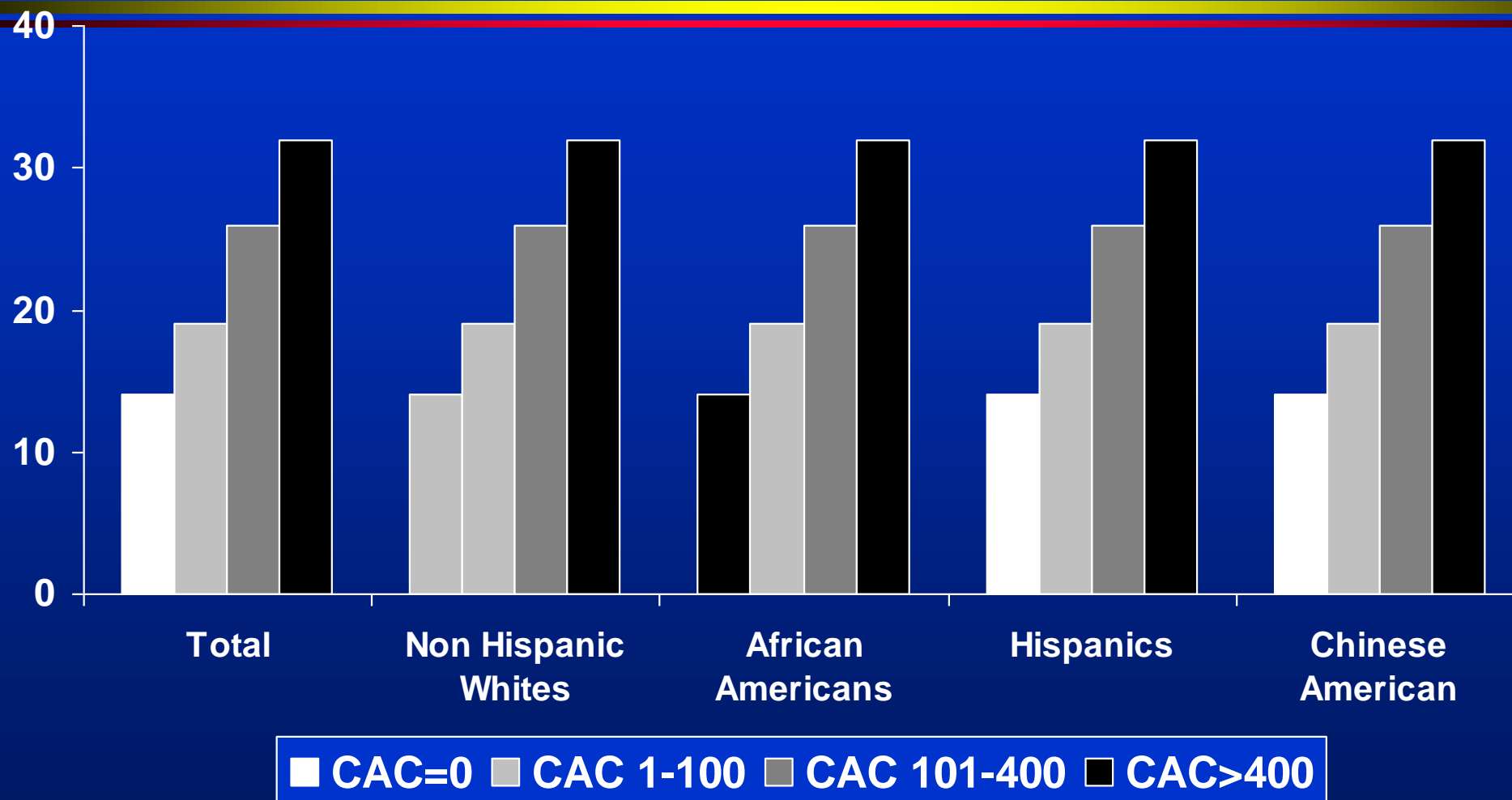
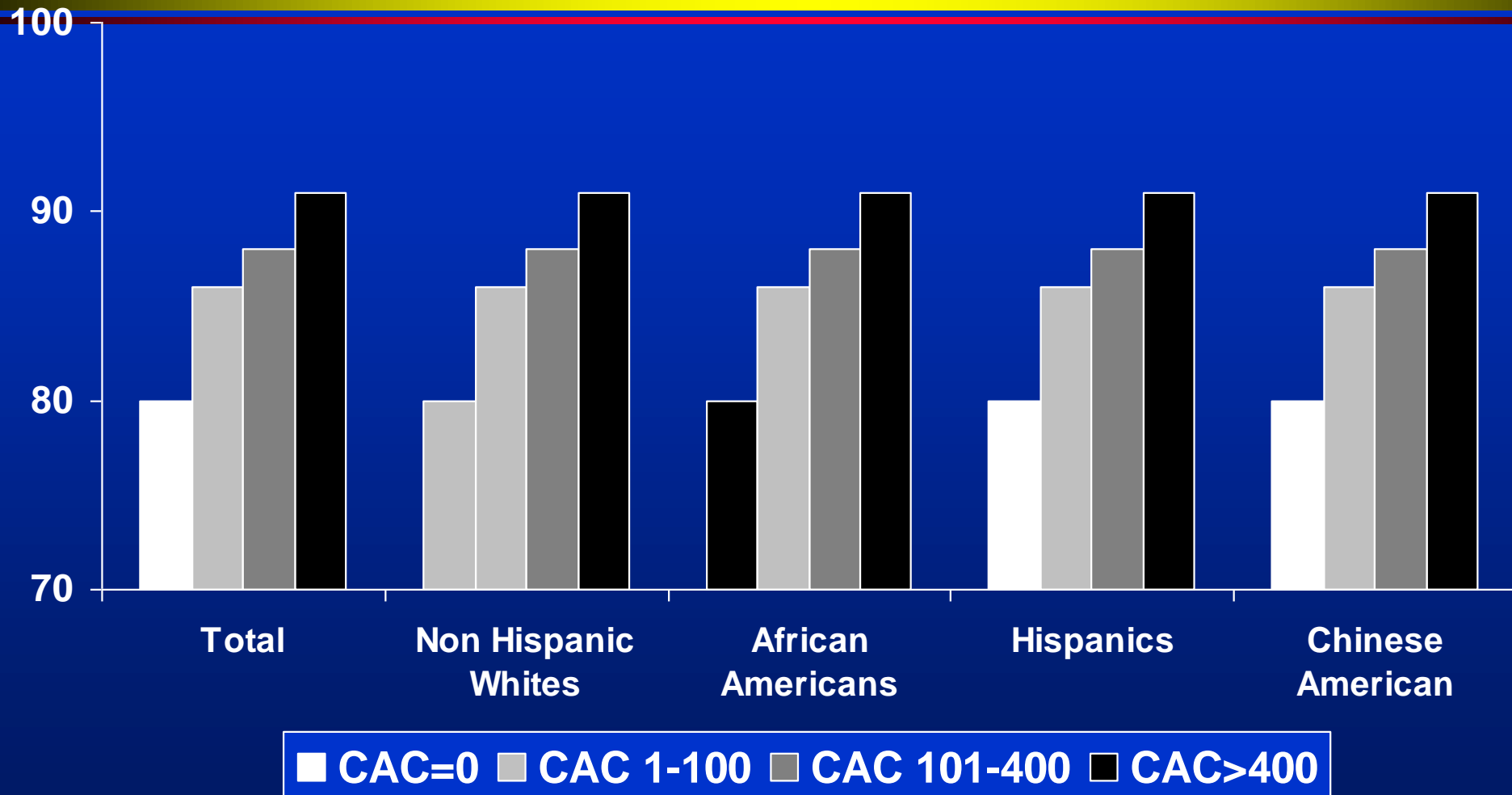


Figure 2: Initiation on New Aspirin Among MESA Participants According to Increasing CACS (Exam 1-Exam 2)



**Figure 3: Continuation on Lipid Lowering Medication
Among MESA Participants According to Increasing
CACs (Exam 1-Exam 3)**



EISNER Randomized Controlled Trial

2137 middle-aged + risk factors without CVD
45-79y without CAD/CVD followed 4 years

No Scan

- Clinical evaluation
 - Questionnaire
- Risk factor consultation

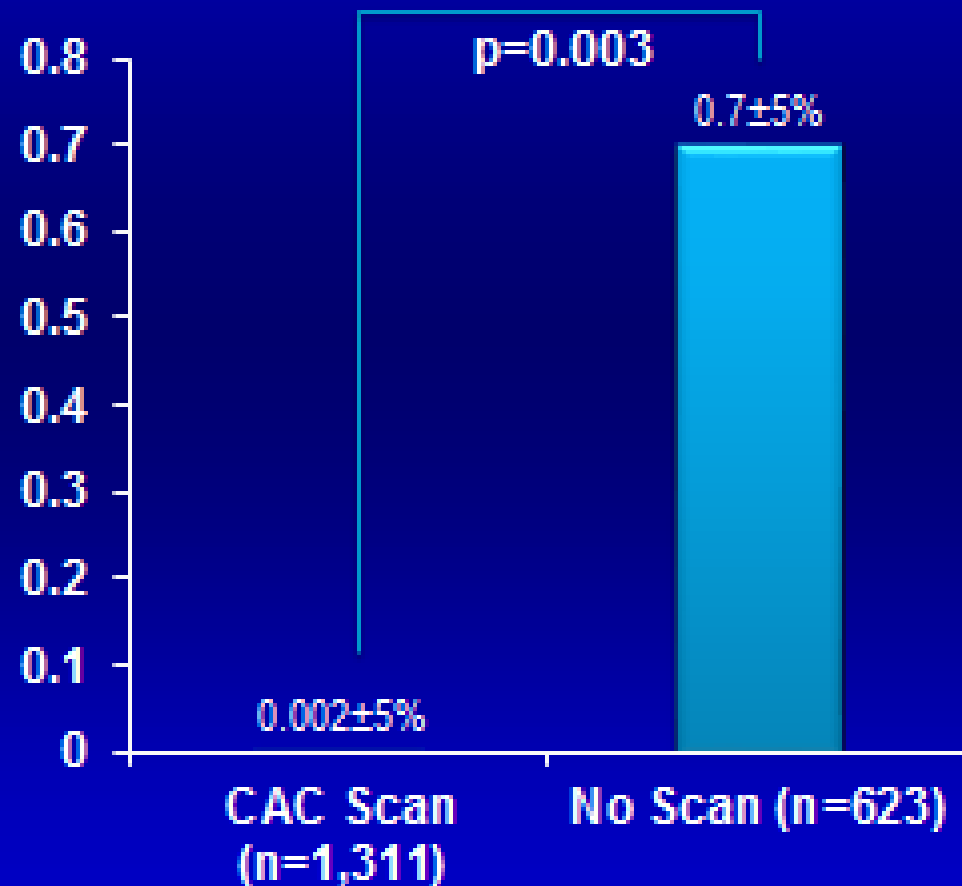
Scan

- Clinical evaluation
 - Questionnaire
- Risk factor consultation
 - CAC scan
- Scan consultation

EISNER Trial

Primary Endpoint:

Change in Framingham Risk Score



Risk Factor Changes

- Compared to No-Scan, Scan showed a net favorable Δ in:
 - **SBP** (p=0.02),
 - **LDL-Cholesterol** (p=0.04),
 - **Waist Circumference** for those w/ \uparrow abdominal girth (p=0.01), and
 - **Weight Loss** (among overweight) (p=0.07)

Does CAC scanning improve outcomes?

Parameters	No SCAN	CACS>400	P
Change in LDL-C	-11 mg/dL	-29 mg/dL	<0.001
Change in SBP	-5 mm Hg	-9 mm Hg	<0.001
Exercise	36%	47%	0.03
New Lipid Rx	19%	65%	<0.001
New BP Rx	18%	46%	<0.001
New ASA Rx	7%	21%	<0.001
Lipid Adherence	80%	88%	0.04

CAC IMPROVES STATIN DELIVERY

- Better Risk Stratification
 - – matching risk with intensity of therapy
- IMPROVE COMPLIANCE
 - We all recognize the new guidelines (treat most) will lead to low compliance in asymptomatic patients
 - “Can’t Make an asymptomatic person feel better”

ACC/AHA PREVENTION GUIDELINES 2013

“assessing CAC is likely to be the most useful of the current approaches to improving risk assessment among individuals found to be at intermediate risk after formal risk assessment.”