Determining Coronary Heart Disease Risk

OBJECTIVES

- Define Atherosclerosis
- Explain Methods of Determining Cardiovascular Disease Risk
- Explain the Potential Consequences of Untreated Atherosclerosis
- Explain the Value of Coronary Artery Calcium Scoring in Determining Cardiovascular Disease Risk
- Introduce the CACS Study

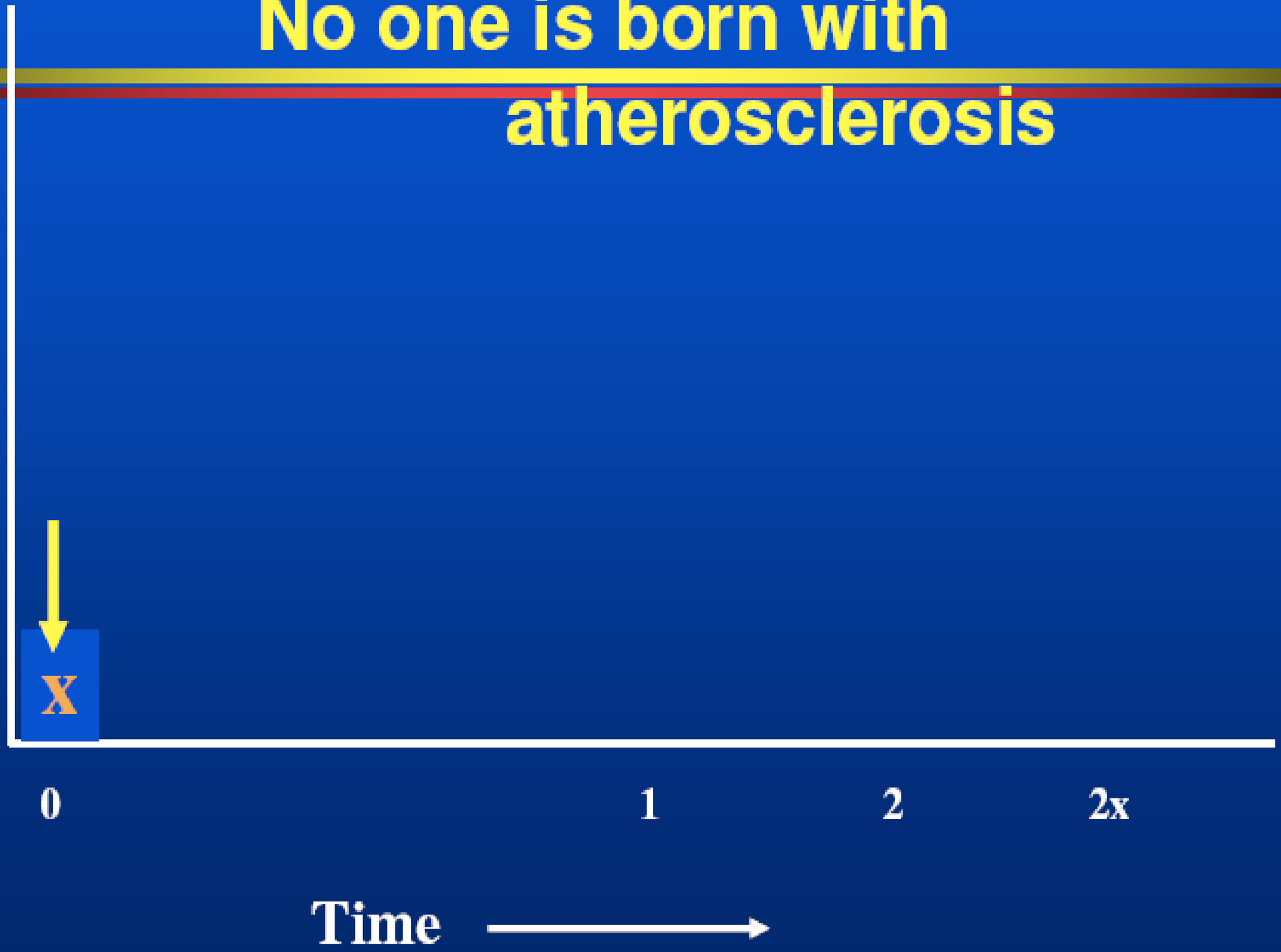
Cardiovascular Diseases

- **Arteriosclerosis** – loss of elasticity of the arteries; thickening and hardening of artery walls.
- **Atherosclerosis** – process where fatty material is deposited along walls of arteries. This material thickens, hardens, and can eventually block the artery. Atherosclerosis is just one type of Arteriosclerosis.
- Our understanding of the development and progression of atherosclerosis (atherogenesis) is still incomplete

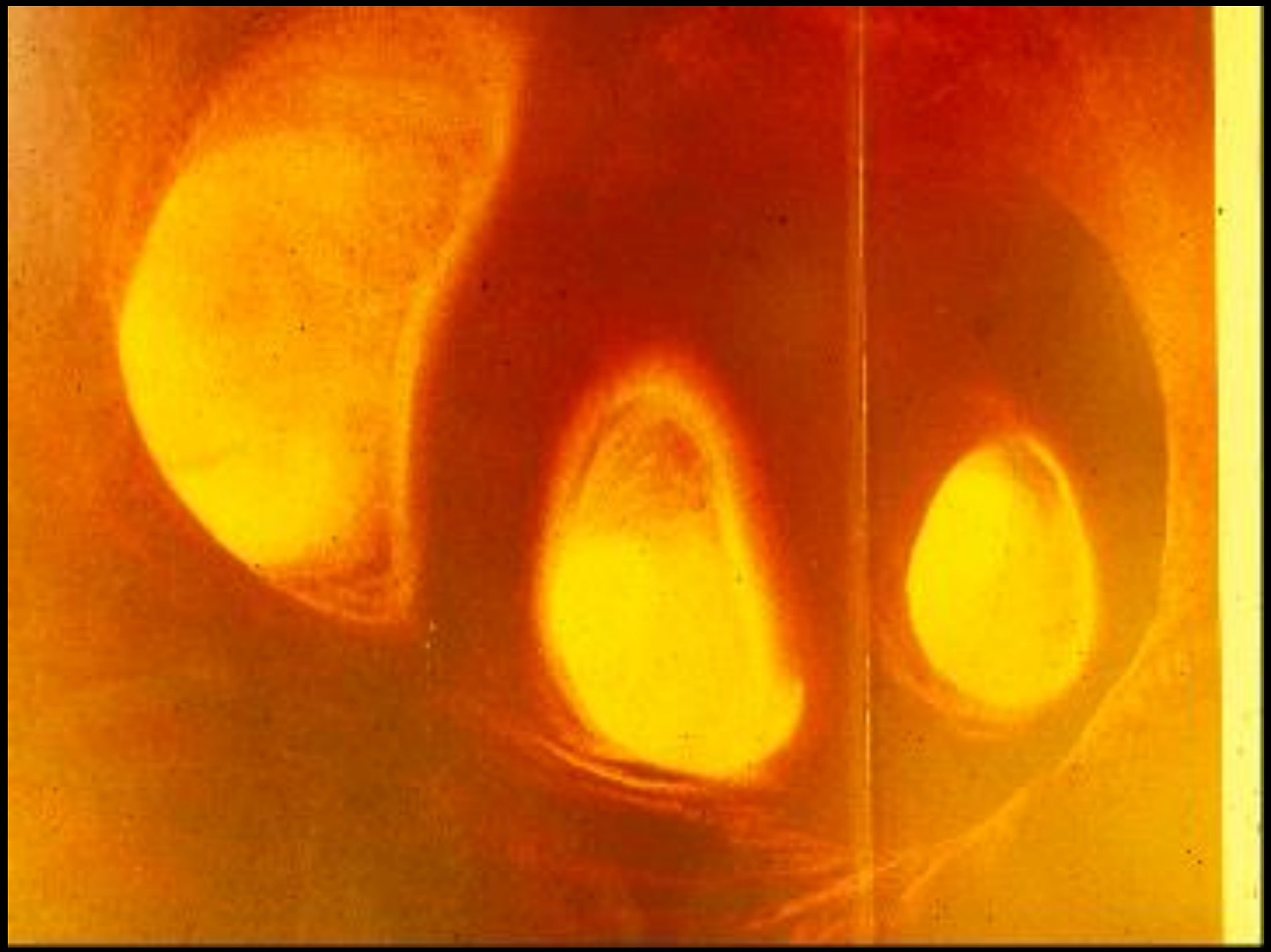
Coronary atherosclerotic burden –

No one is born with atherosclerosis

A.S.

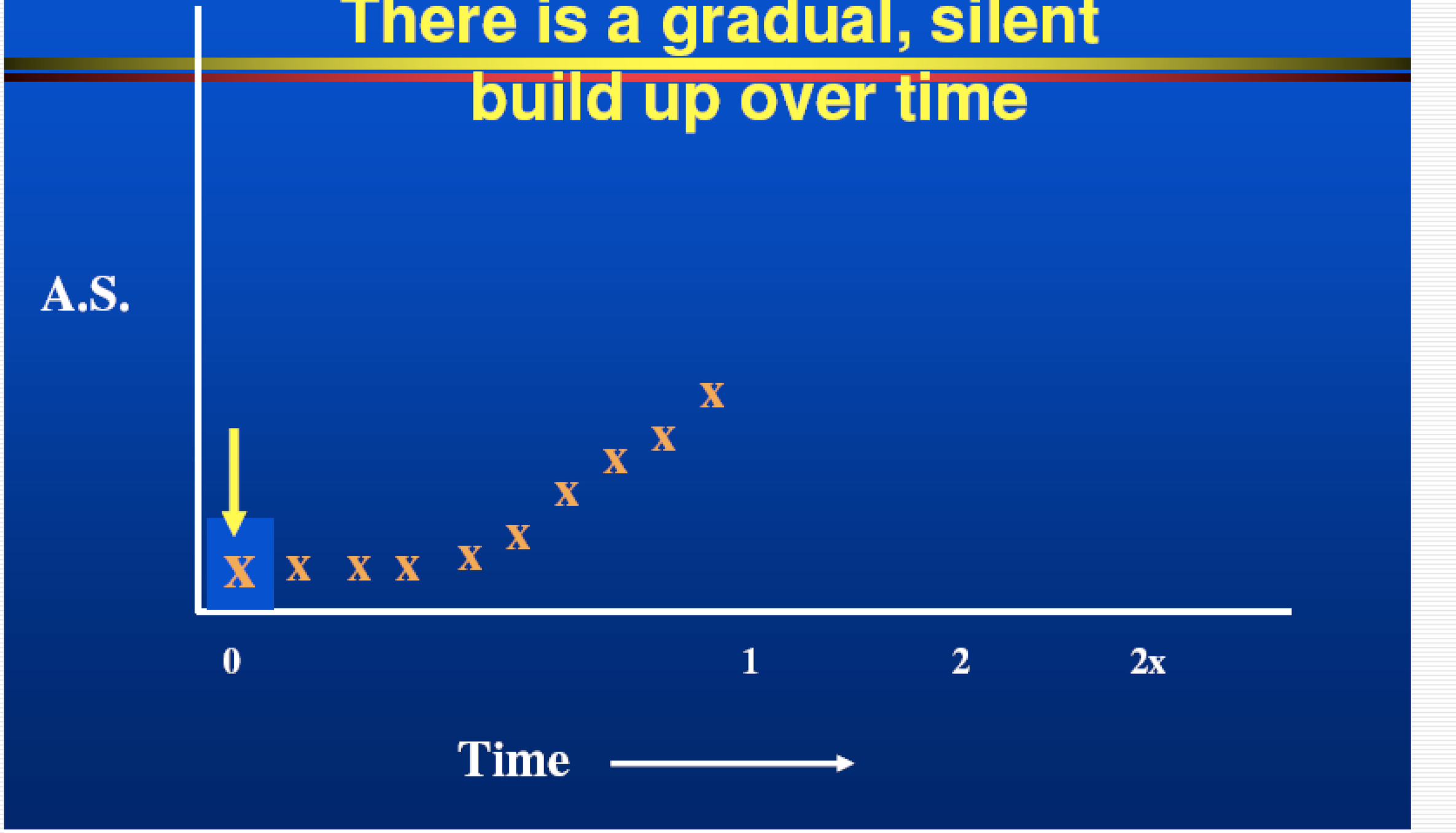


Infant Aorta

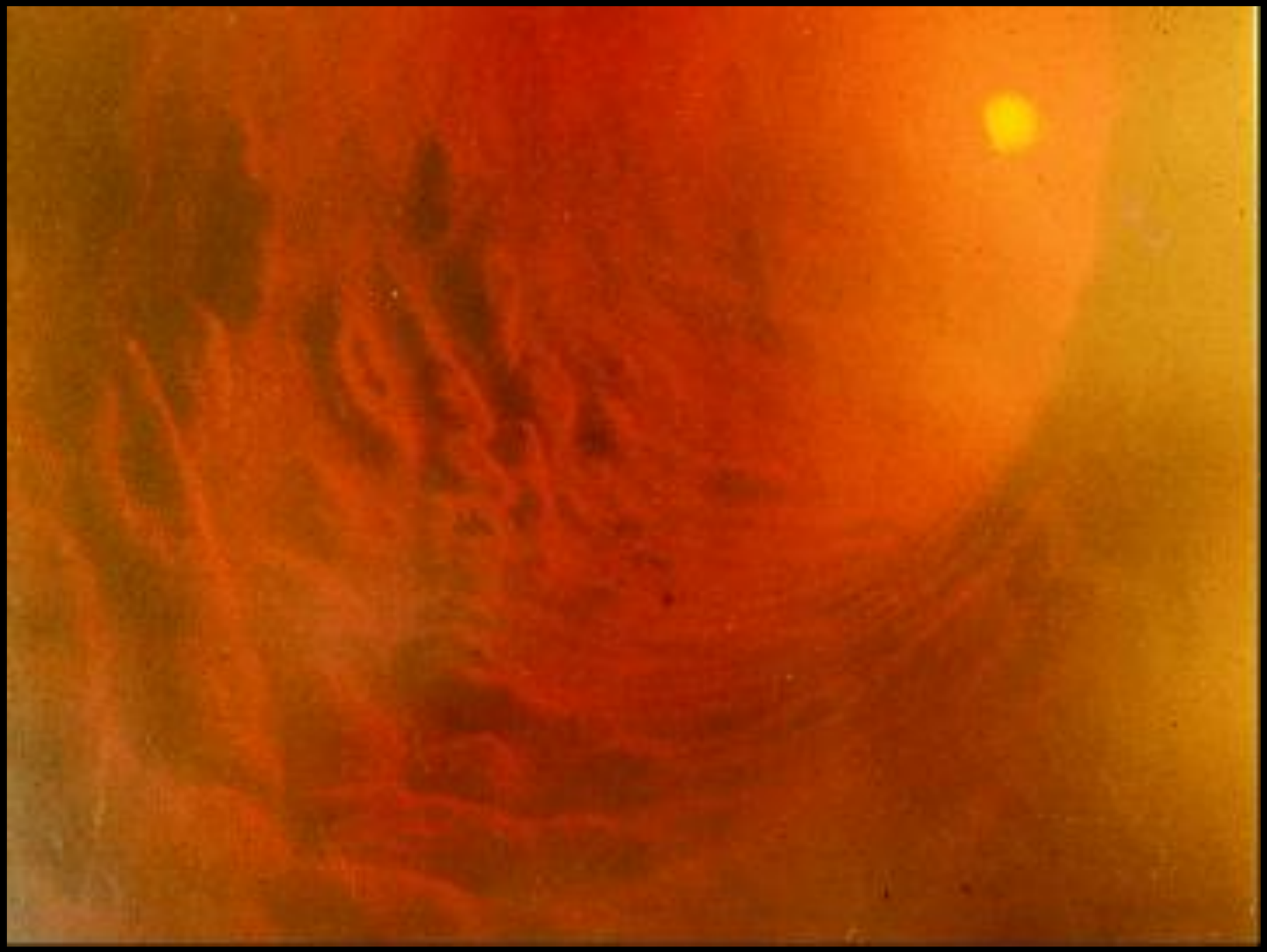


Coronary atherosclerotic burden –

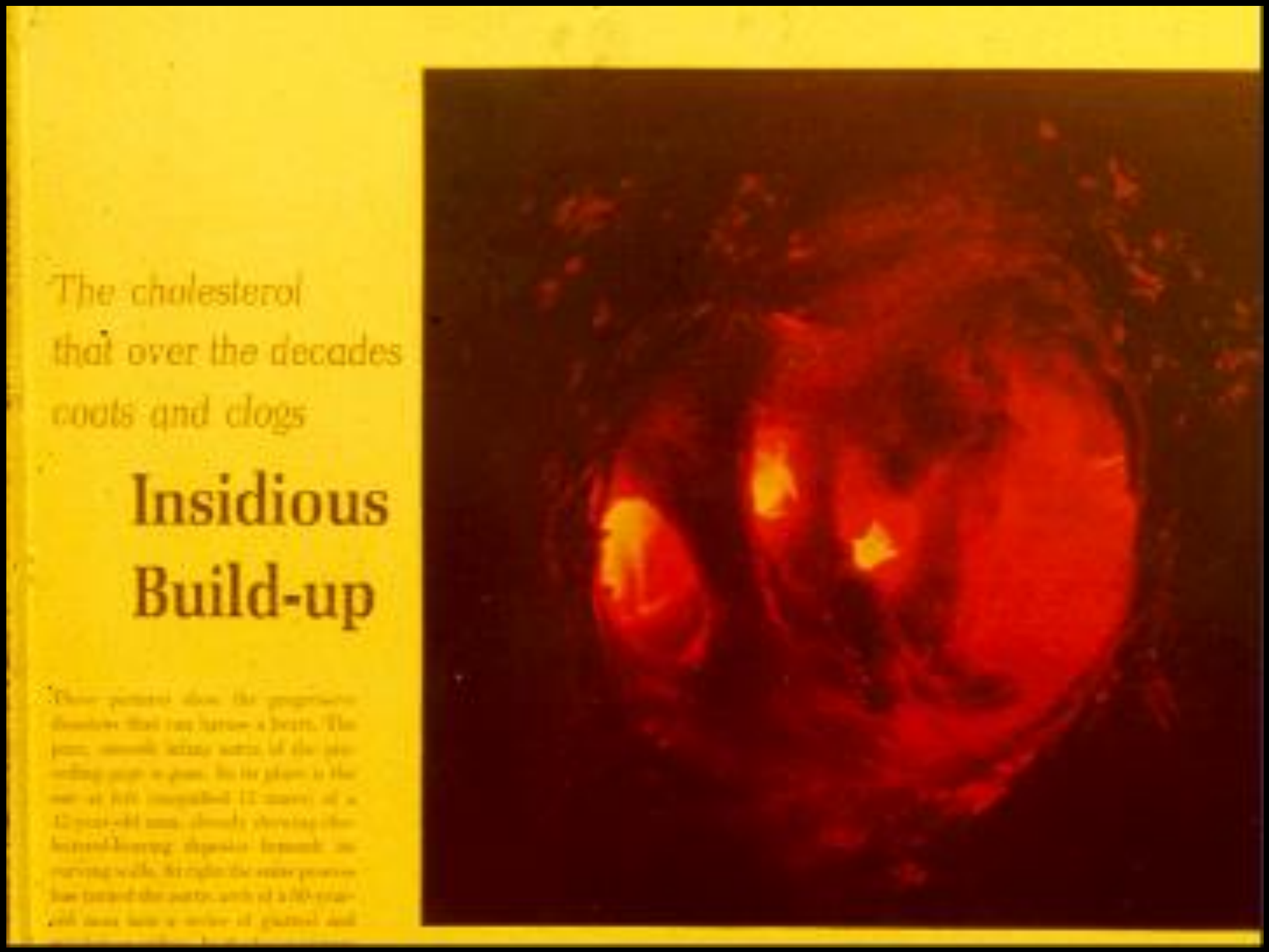
There is a gradual, silent build up over time



42 Y/O Male



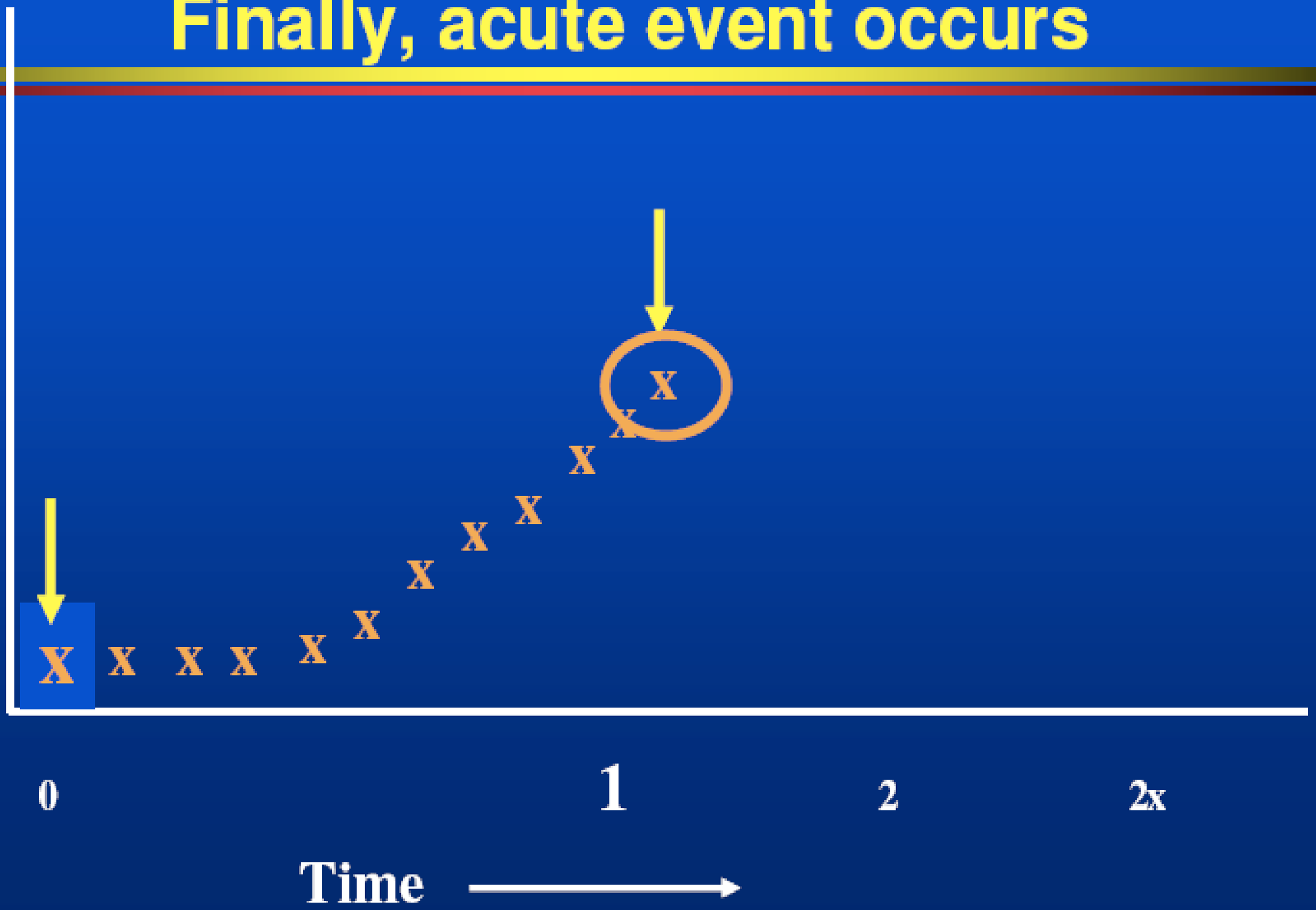
65 Y/O Male


The cholesterol
that over the decades
coats and clogs
Insidious
Build-up

82 Y/O Male

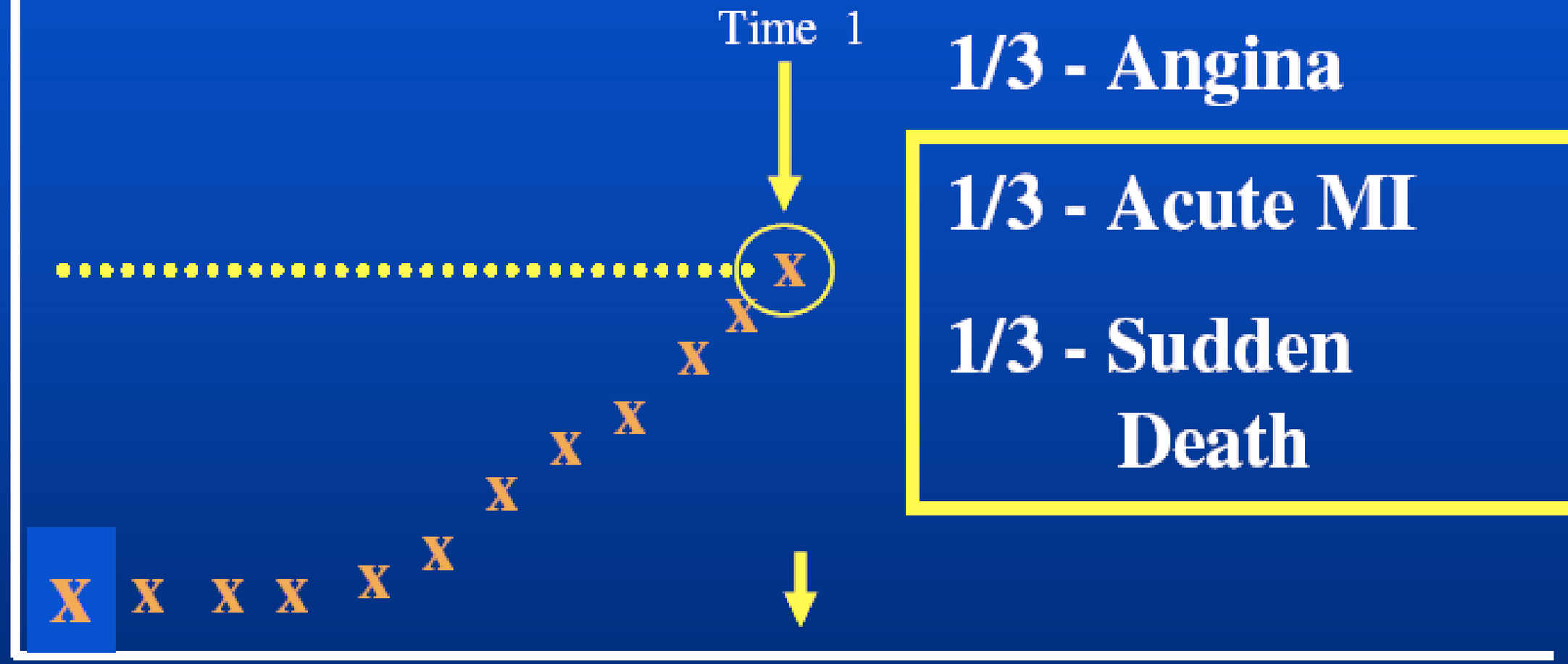
Coronary atherosclerotic burden –

Finally, acute event occurs



Coronary atherosclerotic burden –

Sx onset -- Permanent damage

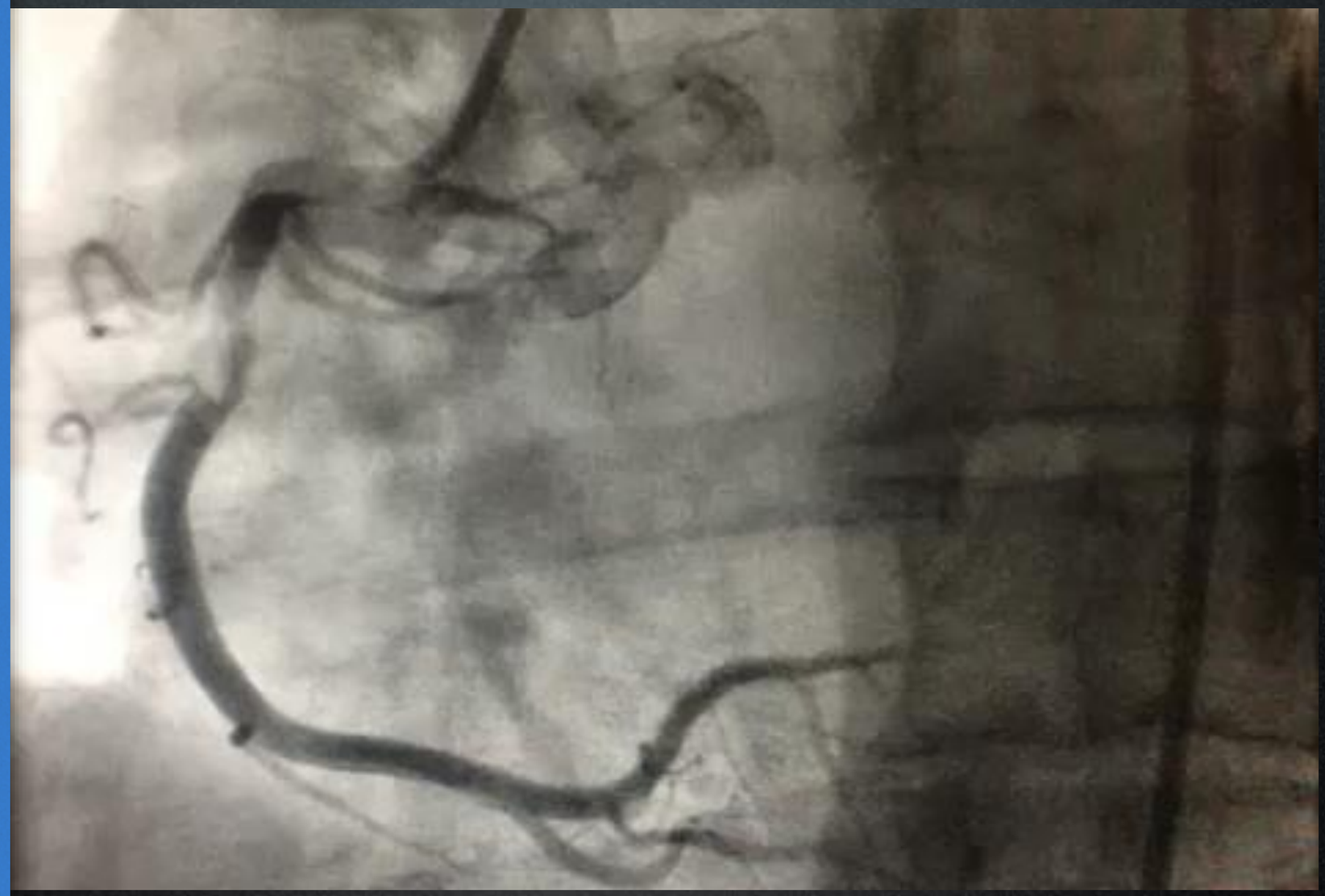


1/3 - Angina

1/3 - Acute MI

1/3 - Sudden Death

Health Span
40y/o Female



What Is Your Risk of Having CVD ?

- High Risk : Age > 75 y/o
- Low Risk - Men < 45, Women < 55
- Very Low Risk
  - Total Cholesterol < 150mg%)
  - BP <= 120/80 mmhg
  - No Diabetes
  - No Smoking
  - No Premature Family Hx
  - **No Metabolic Syndrome**

Determining Risk in Men above age 44 and Women above age 54

Gender

Male | **Female**

Age

20-79

Race

- **White**
- **African American**
- **Other**

HDL - Cholesterol
(mg/dL)

20-100

Total Cholesterol
(mg/dL)

130-320

Diabetes

Yes | **No**

Treatment for Hypertension

Yes | **No**

Systolic Blood Pressure

90-200

Smoker

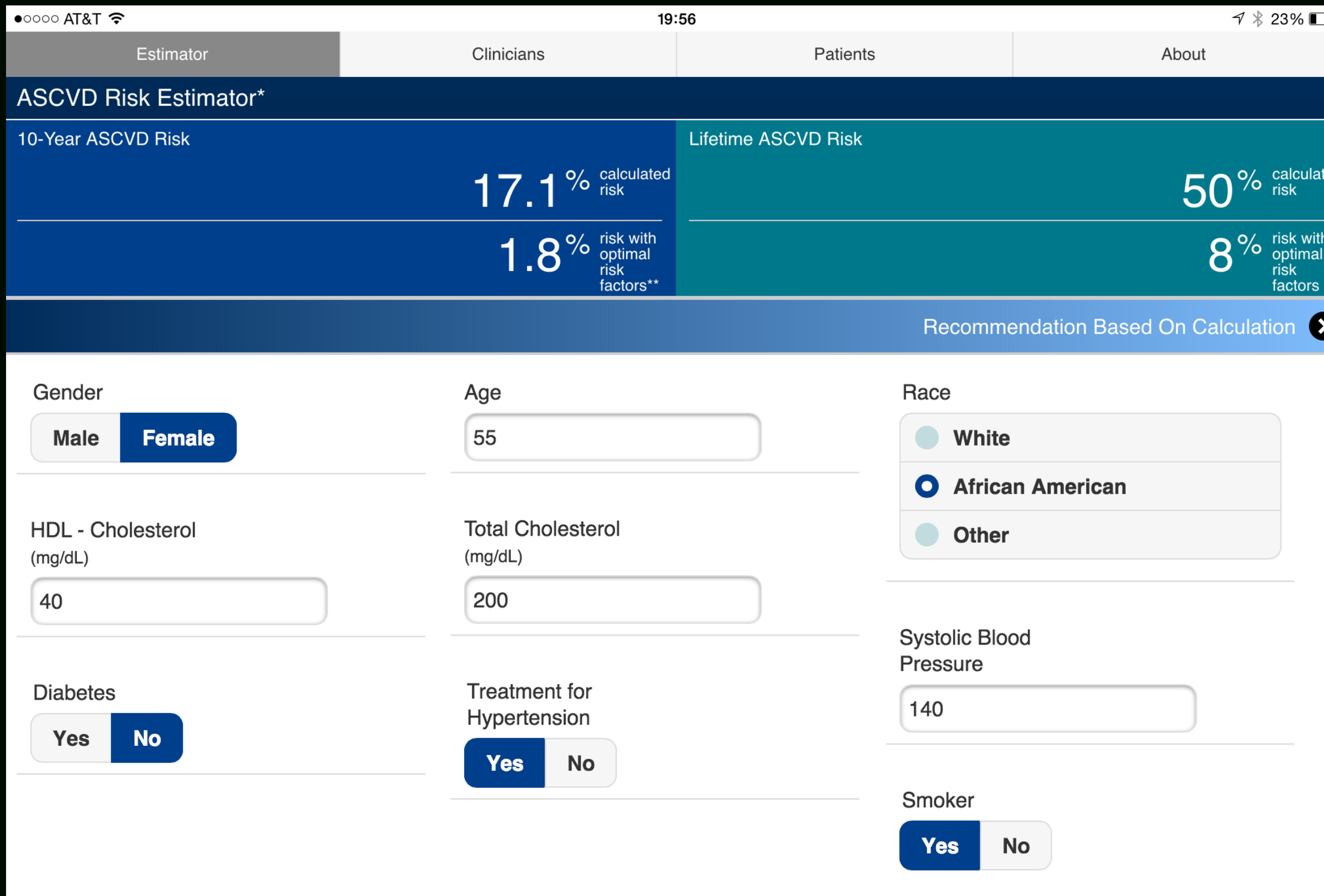
Yes | **No**

**Intended for use if there is not ASCVD and the LDL-cholesterol is <190 mg/dL*

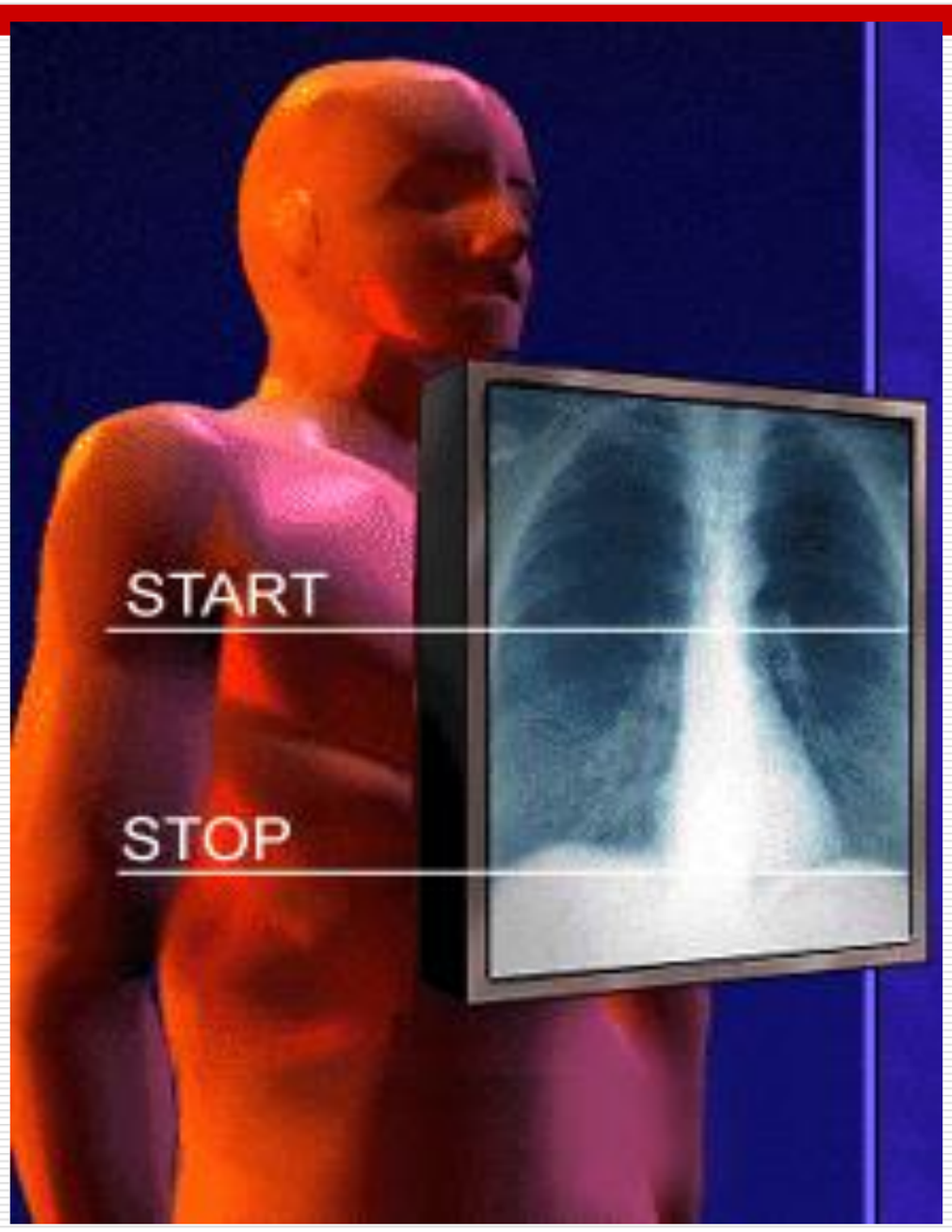
***Optimal risk factors include: Total cholesterol of 170 mg/dL, HDL-cholesterol of 50 mg/dL, Systolic BP of 110 mm Hg, Not taking medications for hypertension, Not a diabetic, Not a smoker*

AMERICAN COLLEGE of CARDIOLOGY | American Heart Association.

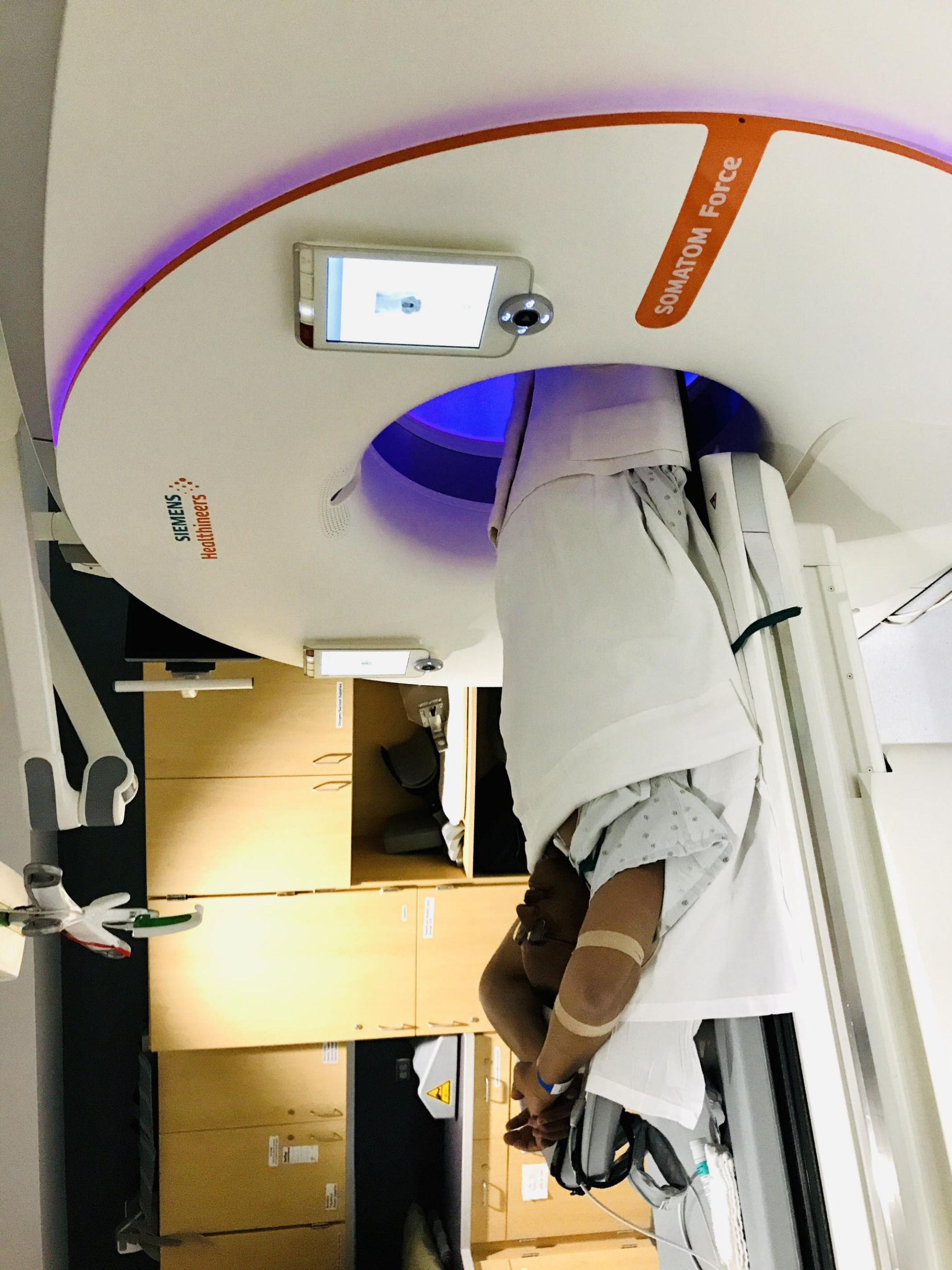
Determining Risk in Men above age 44 and Women above age 54



Coronary Calcium Scanning

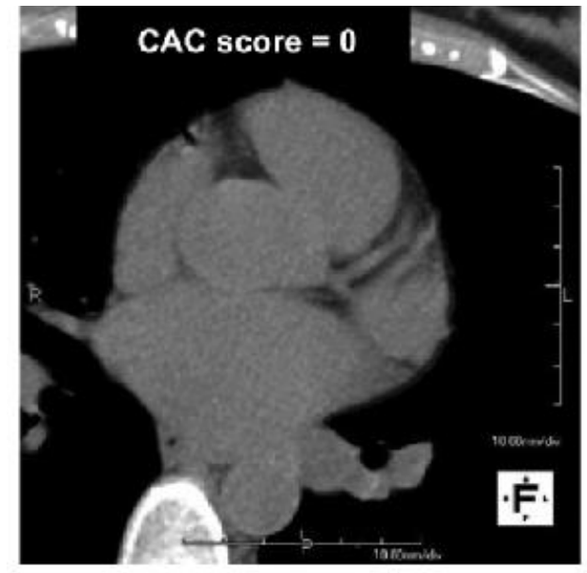


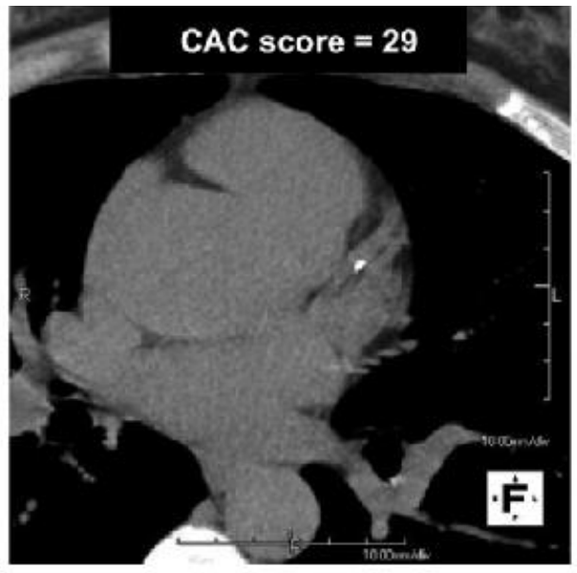
- **Coronary Artery Scanning Protocol**
- **Patient Preparation: None**
- **ECG Triggered to 60-70% of the R to R interval**
- **3mm contiguous scans**
- **From carina to the apex**

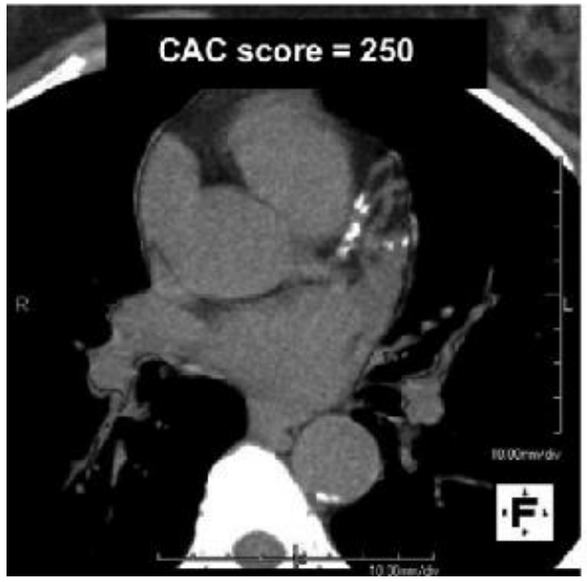

SOMATOM Force
SIEMENS
Healthineers

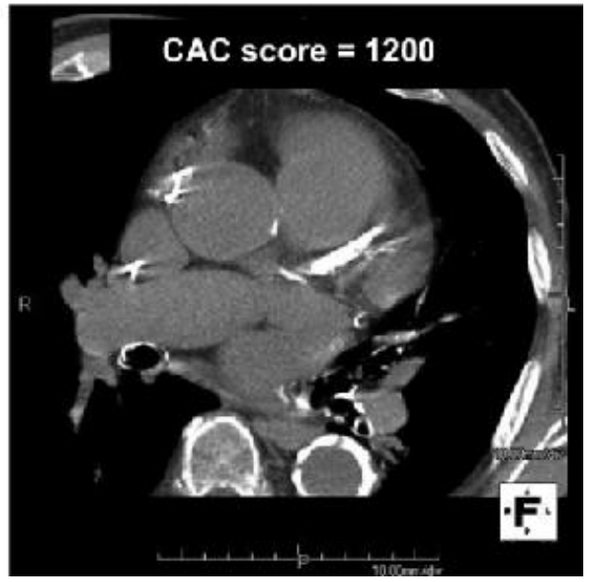
Coronary calcium score via CT:

Non-invasive method of identifying plaque build up in arteries





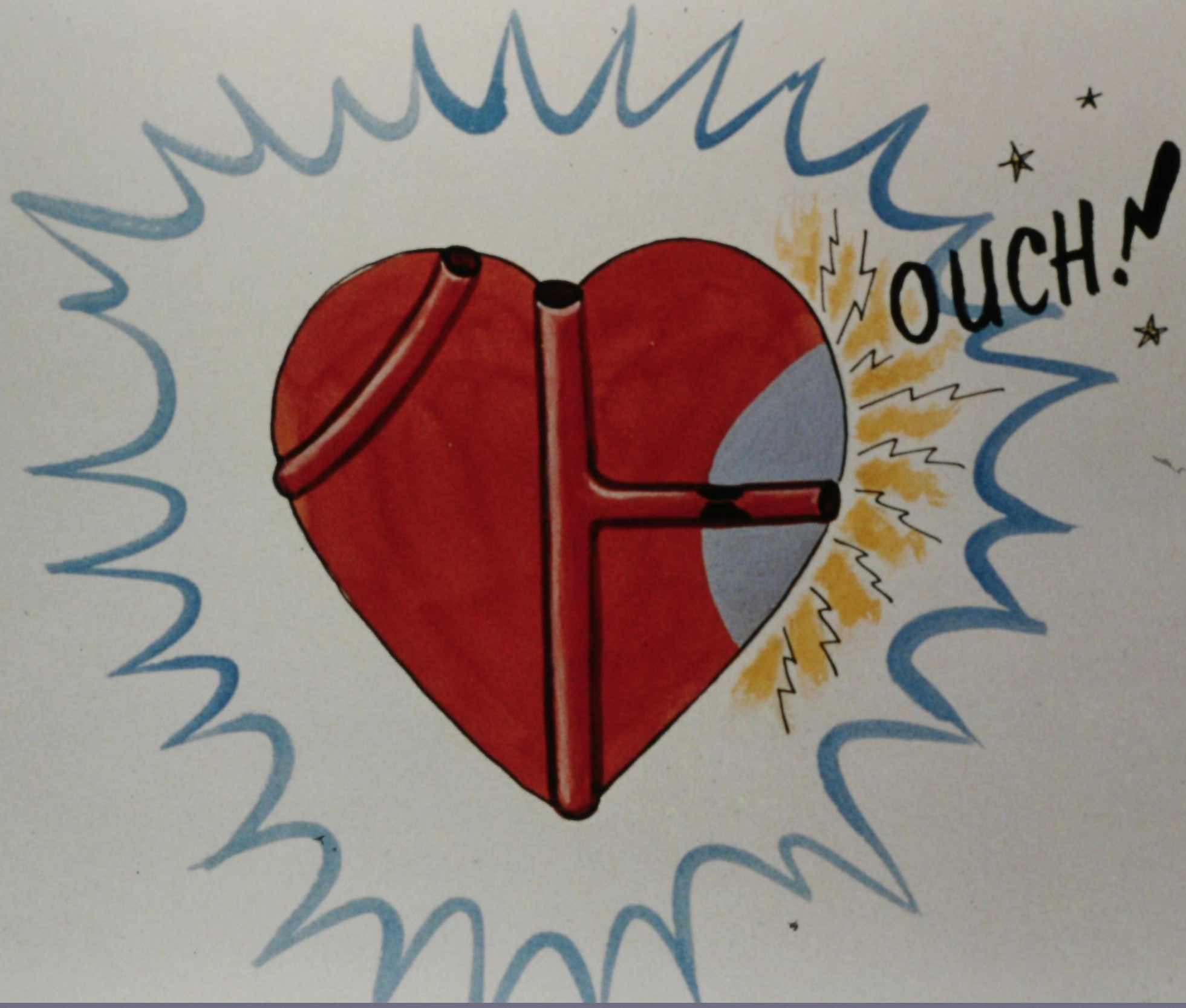


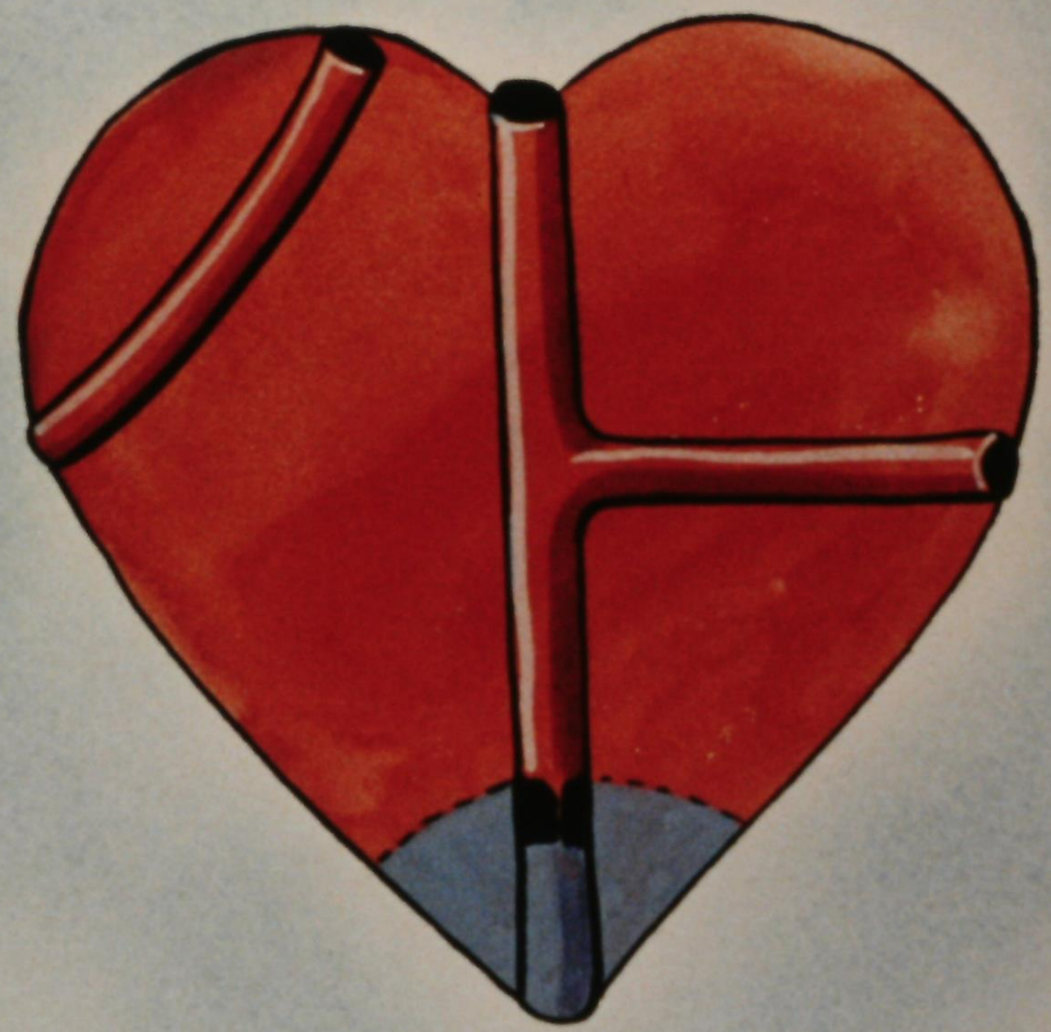


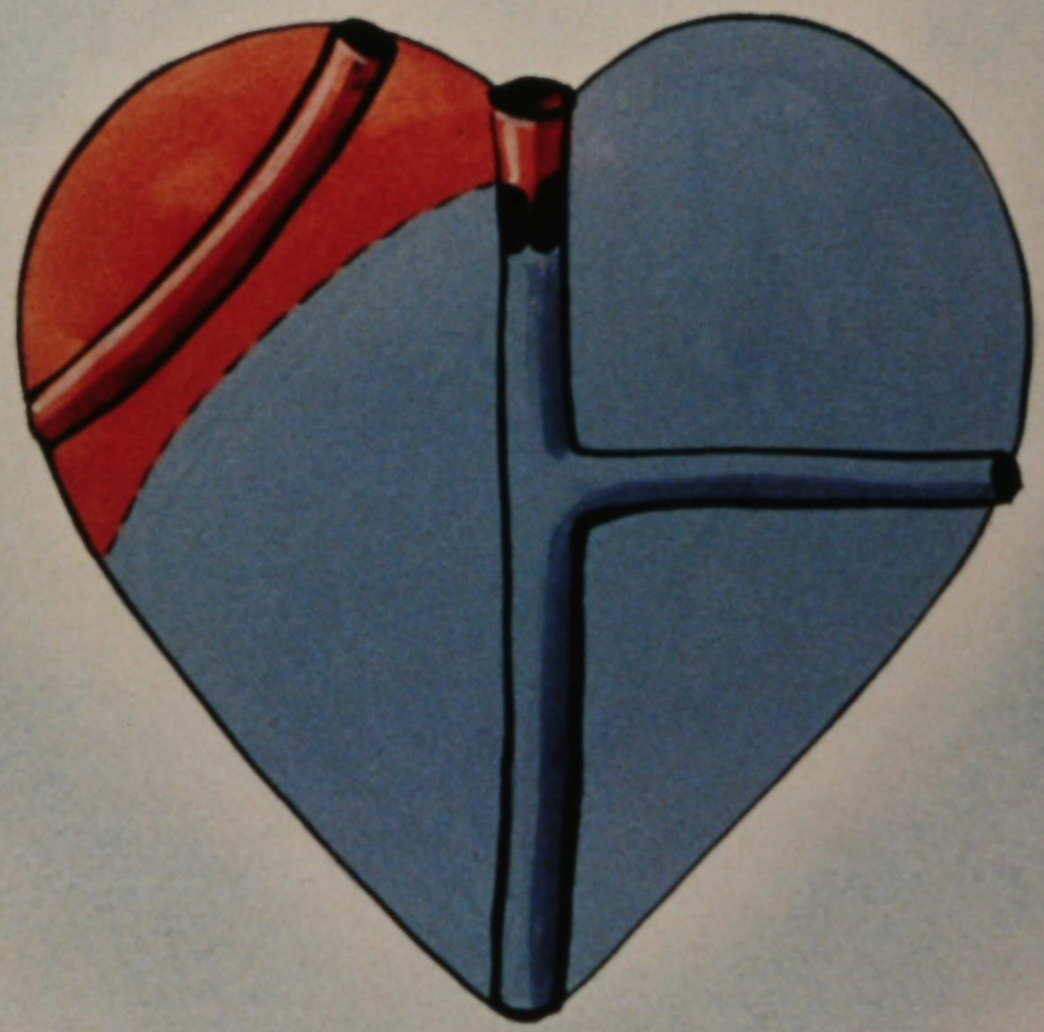
Calcium Score

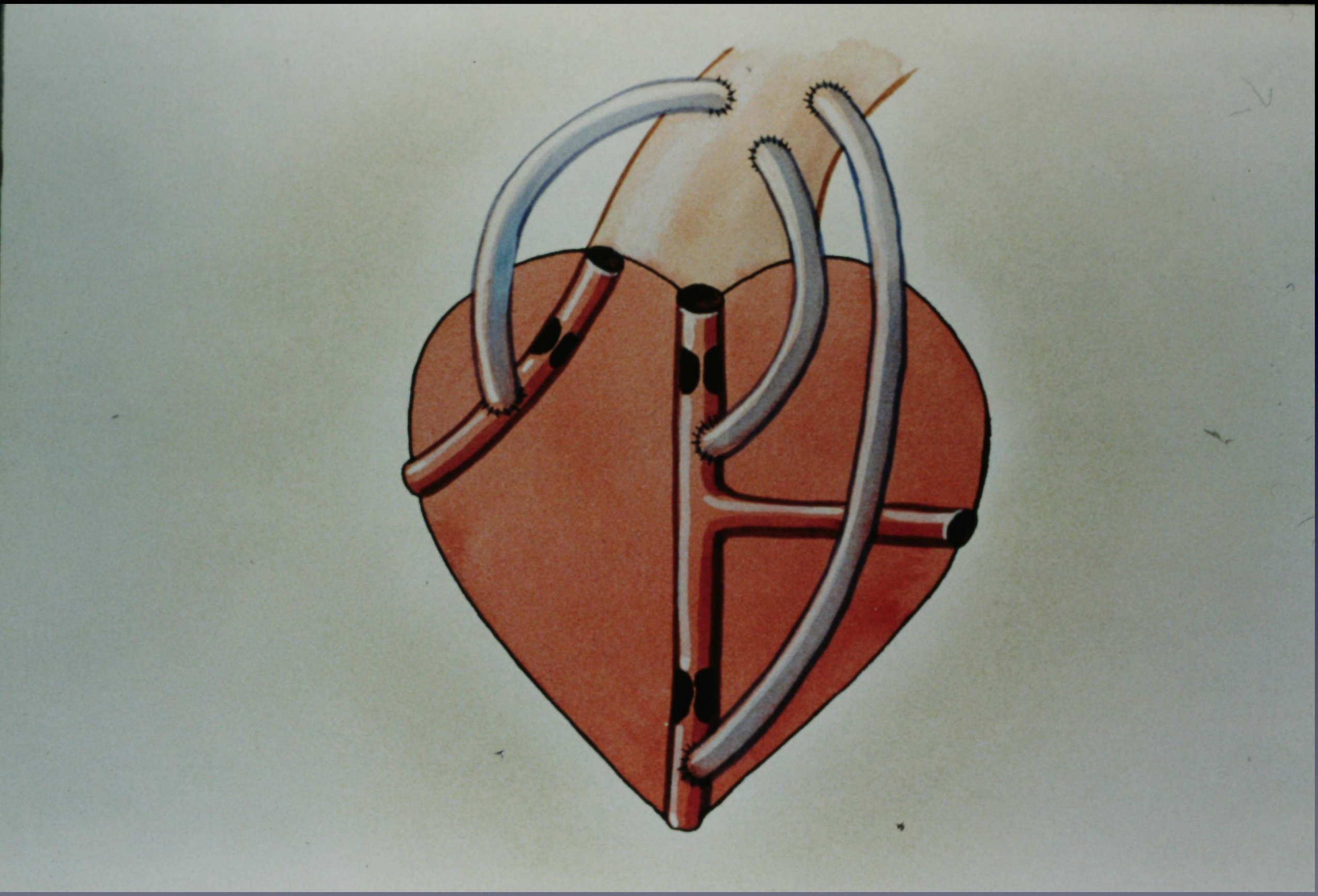
ZERO	No identifiable Plaque
001 - 010	Minimal Plaque
011 - 100	Definite Plaque but Mild
101 - 400	Moderate Plaque
>400	Significant Plaque

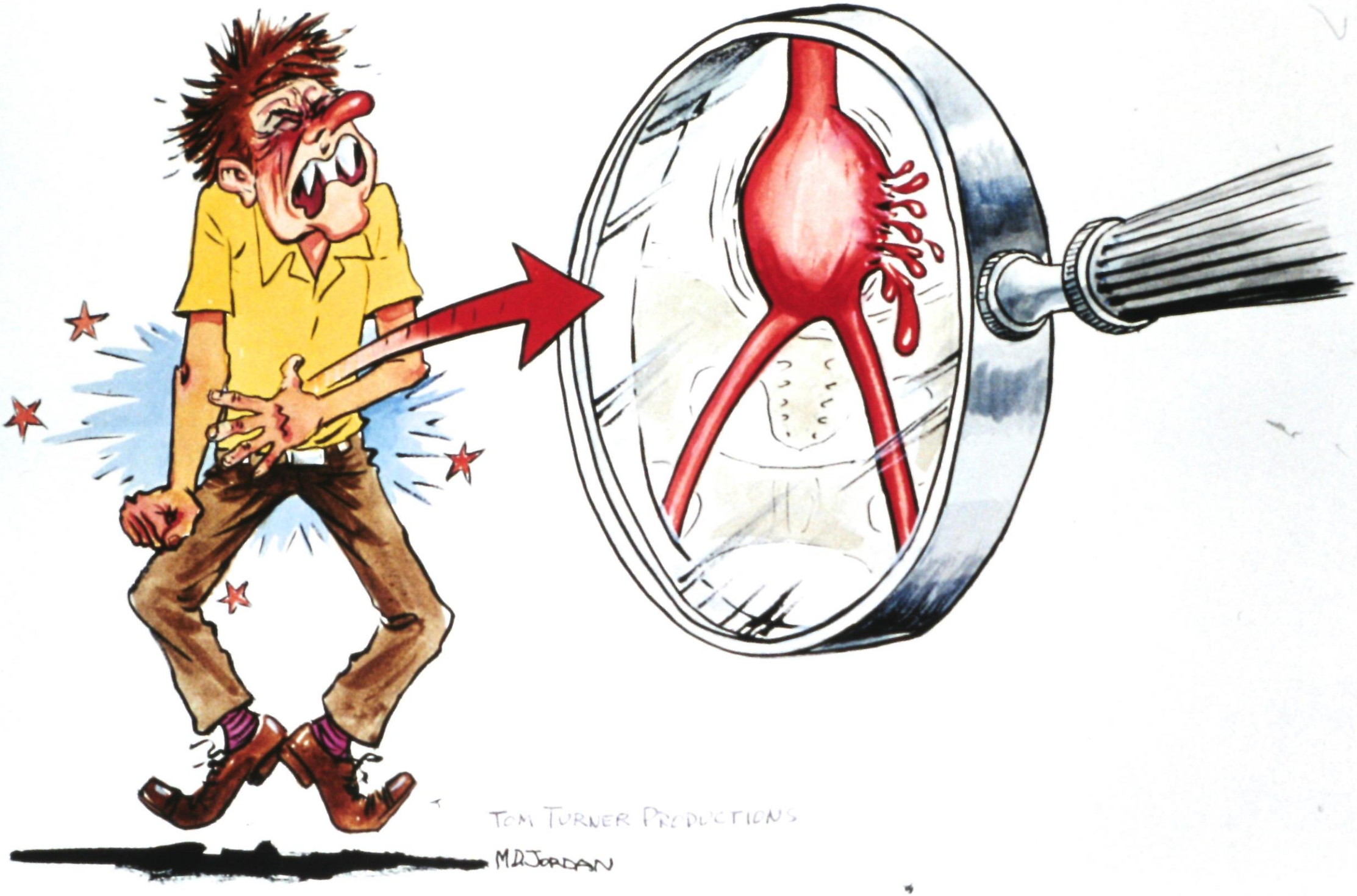
Consequences of Atherosclerosis


OUCH!



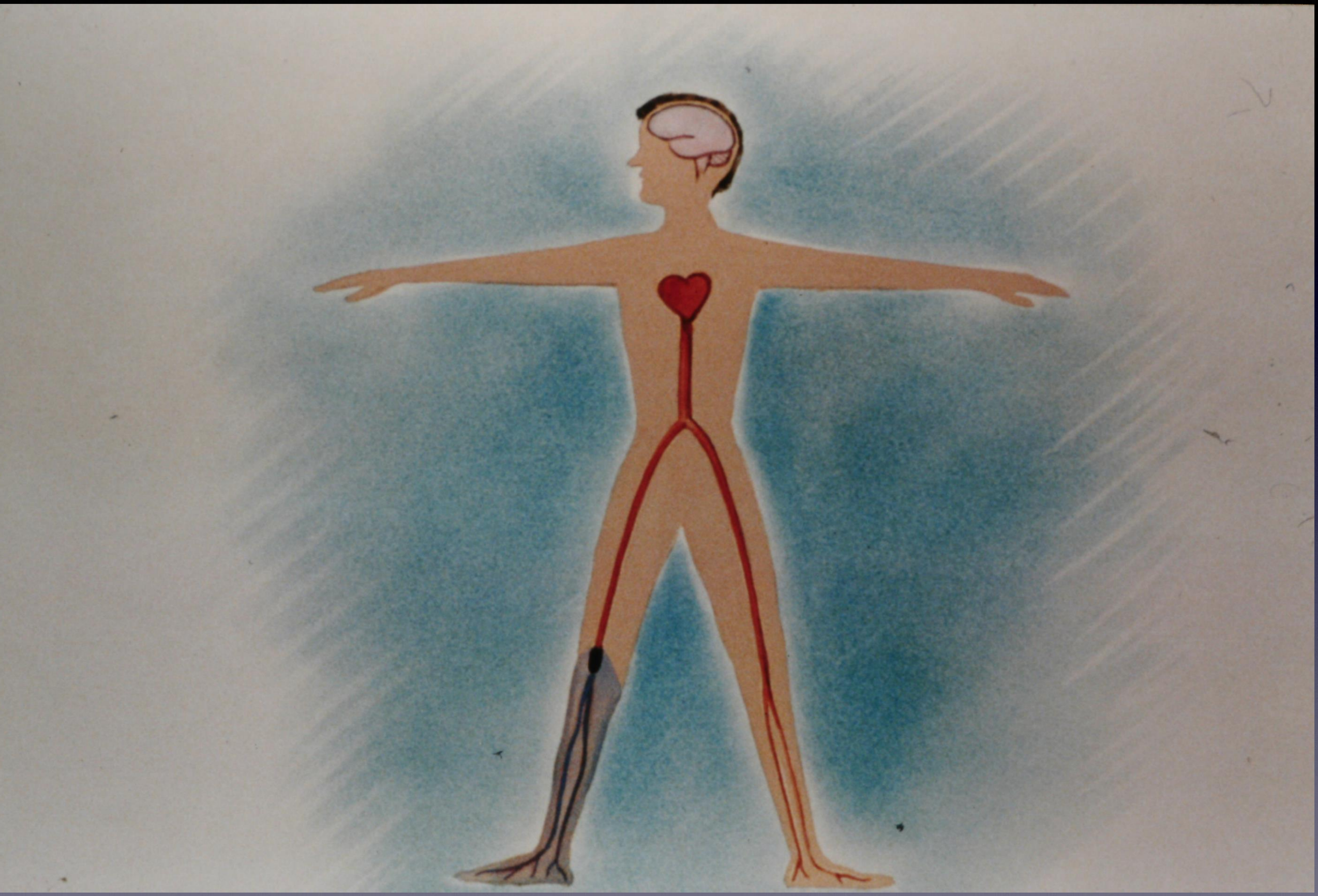






TOM TURNER PRODUCTIONS

M.R. JORDAN




DIET
EXERCISE
PREVENTION
Mel Jordan

2019

CORONARY ARTERY CALCIUM SCORING (CACS): Role of CACS in Atherosclerotic Cardiovascular Disease (ASCVD) Risk Stratification

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CACS STUDY

Preliminary Data

		PERCENT %
Number of Patients	123	
Male	54	44%
Female	69	56%
Number Reclassified	68	55%

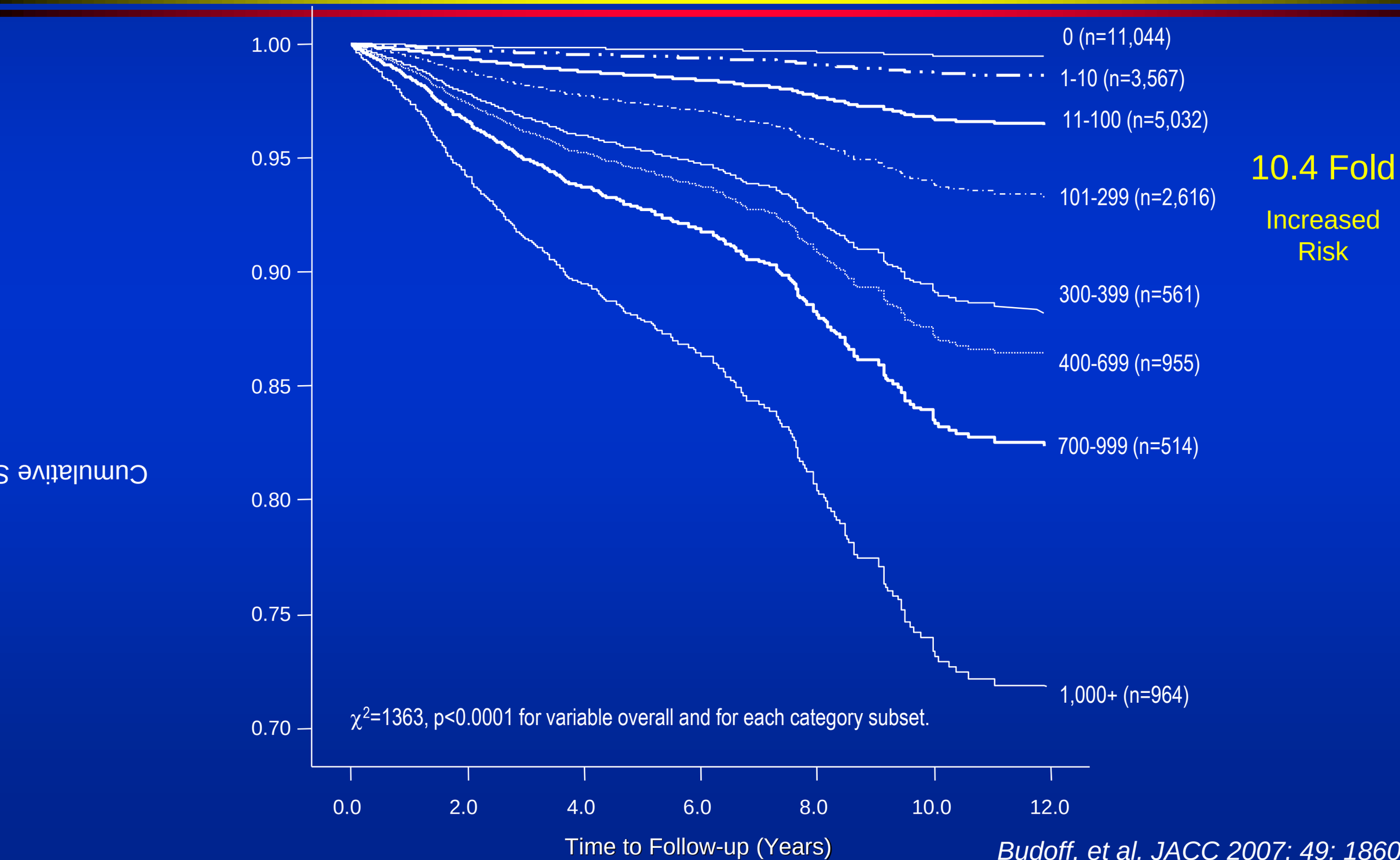
CACS STUDY

Preliminary Data

		PERCENT of Total
Number Changing Classification	68	55%
Low to Intermediate	4	3%
Low to High	1	1%
Intermediate to High	9	7%
Intermediate to Low	42	34%
Intermediate to Zero	21	17%
High to Intermediate	9	7%
High to Low	3	2%
High to Zero	0	0
Reclassified to Zero	15	12%
On Statin Inter - Zero	3	2%

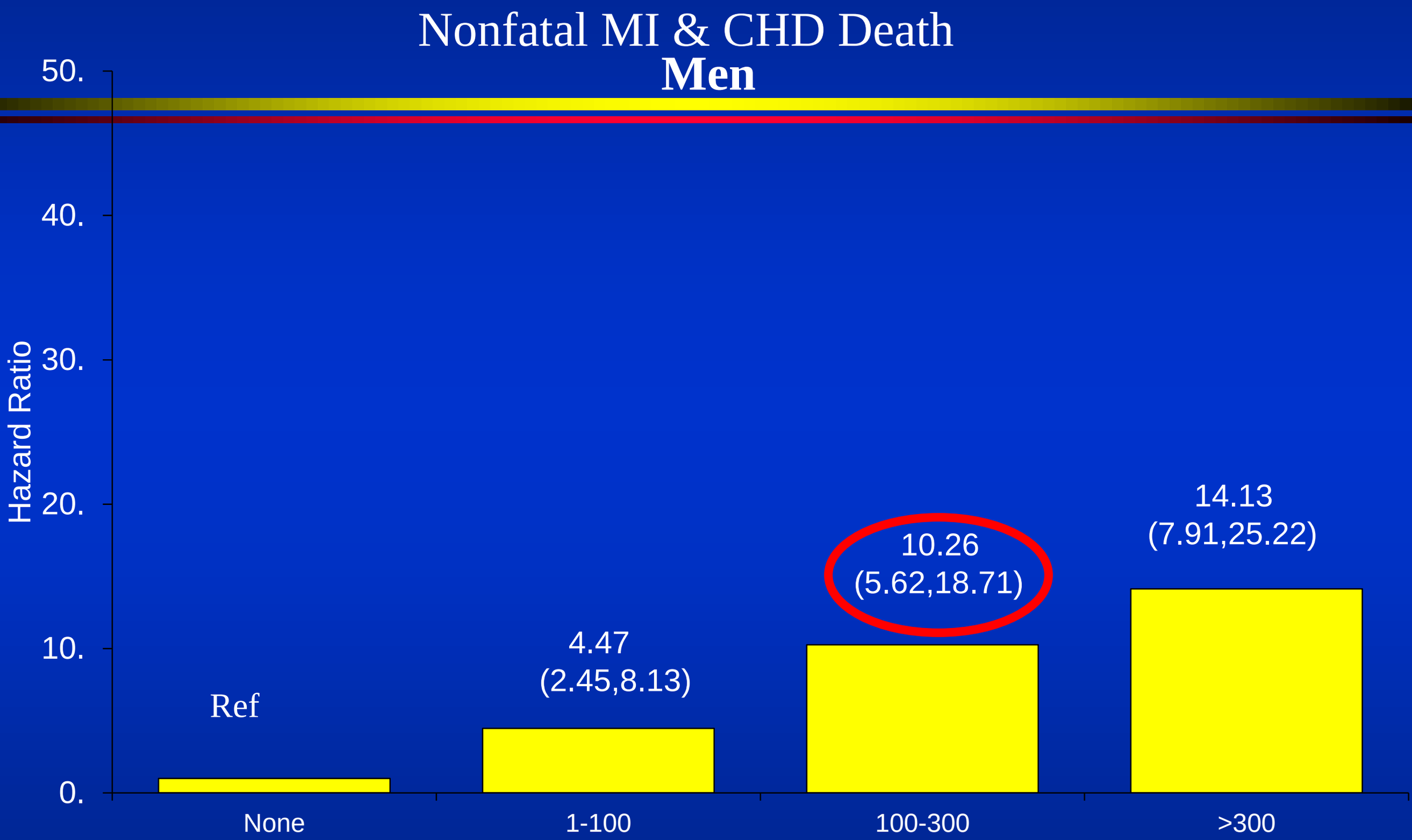
All Cause Mortality and CAC Scores:

Long Term Prognosis in 25,253 patients



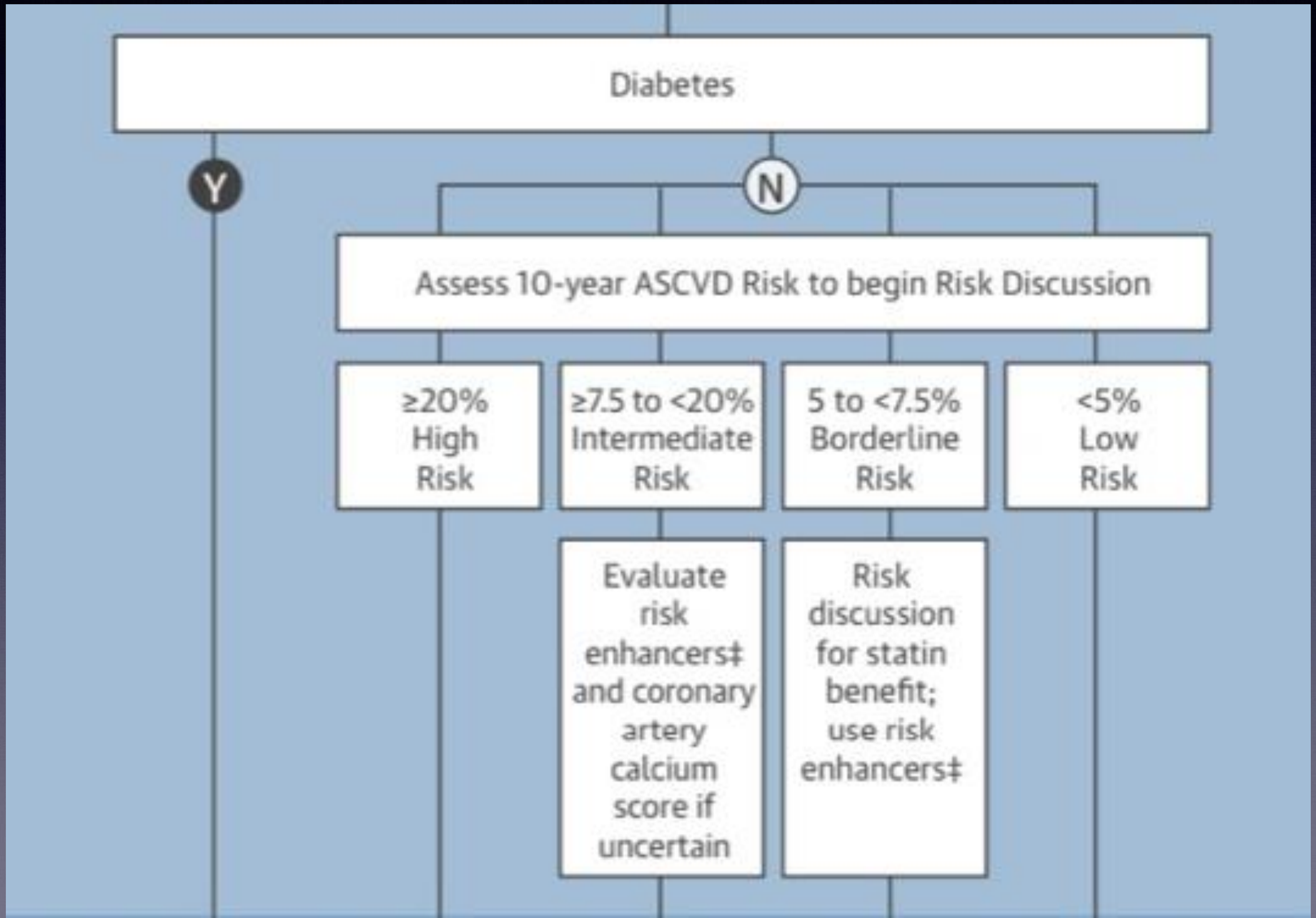
Budoff, et al. JACC 2007; 49: 1860-70

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



Fully adjusted – Detrano et al– NEJM - 2008

Approach to Non-Diabetics without Prior History of Coronary Heart Disease

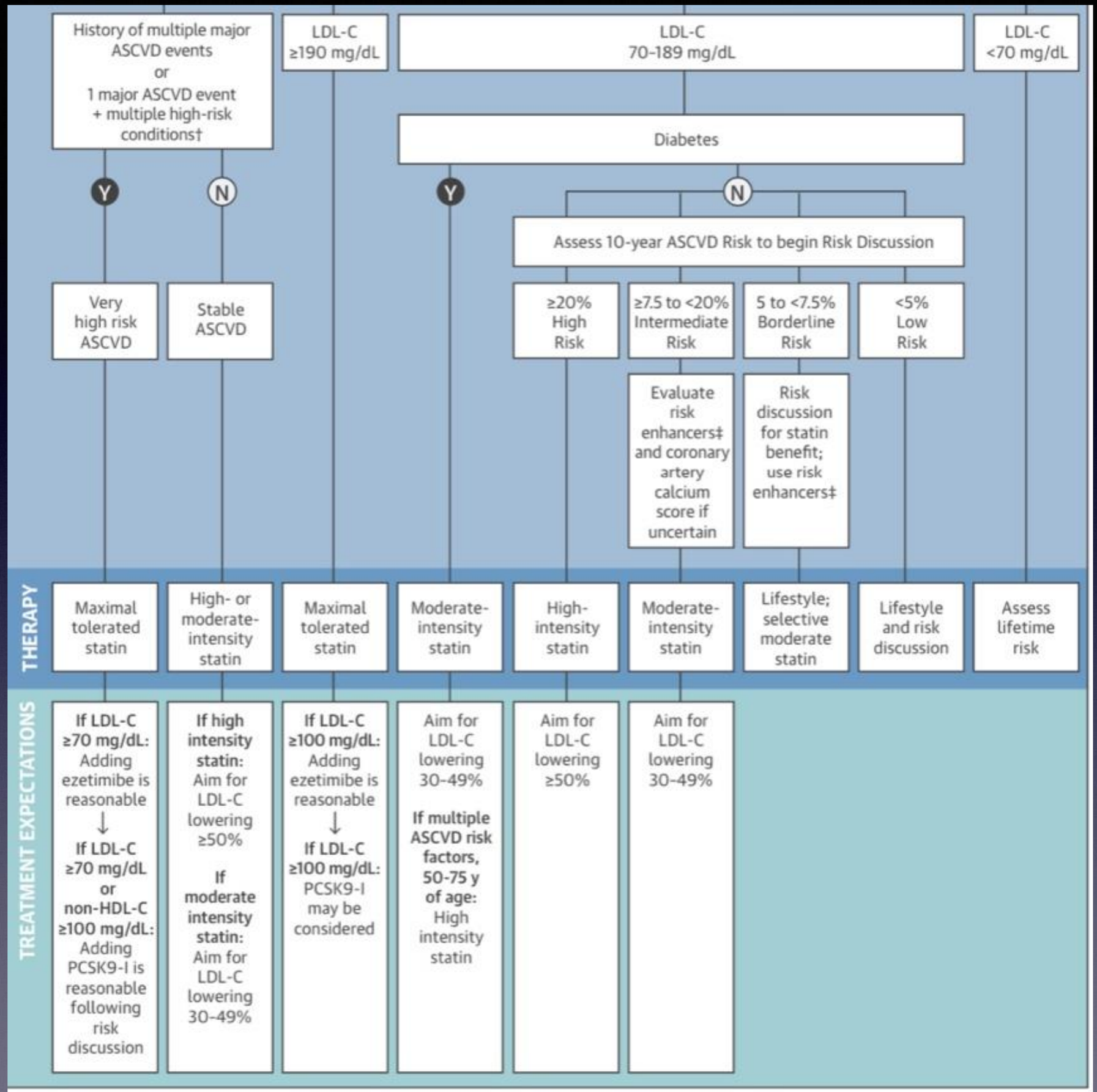


CENTRAL ILLUSTRATION **Proposed Decision-Making Approach to Selective Use of Coronary Artery Calcium Measurement for Risk Prediction**

Using 10-year ASCVD risk estimate plus coronary artery calcium (CAC) score to guide statin therapy				
Patient's 10-year atherosclerotic cardiovascular disease (ASCVD) risk estimate:	<5%	5–7.5%	>7.5–20%	>20%
Consulting ASCVD risk estimate alone	Statin not recommended	Consider for statin	Recommend statin	Recommend statin
Consulting ASCVD risk estimate + CAC				
If CAC score =0	Statin not recommended	Statin not recommended	Statin not recommended	Recommend statin
If CAC score >0	Statin not recommended	Consider for statin	Recommend statin	Recommend statin
Does CAC score modify treatment plan?	✗ CAC not effective for this population	✓ CAC can reclassify risk up or down	✓ CAC can reclassify risk up or down	✗ CAC not effective for this population

Greenland, P. et al. J Am Coll Cardiol. 2018;72(4):434–47.

The figure shows a modified approach to the guideline-based decision making by incorporating a consideration of coronary artery calcium (CAC) testing to reclassify a patient's risk up or down where it would make a clinically important change in the clinical decision. Adapted with permission from Nasir et al. (90).



* **Clinical ASCVD** consists of acute coronary syndromes, those with history of myocardial infarction, stable or unstable angina or coronary other arterial revascularization, stroke, TIA, or peripheral artery disease including aortic aneurysm, all of atherosclerotic origin.