Cardiac CT-

What does the generalist need to know?

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Evidence Changes Practice

- "CT coronary arteriography should be considered the index diagnostic procedure for evaluation of stable chest pain suspected due to coronary insufficiency" NICE (National Health Service-UK) *

- AETNA (2017) covers Cardiac CT before invasive angiography in situations of low or intermediate probability of CAD and CA scoring in some situations

- "Coronary Calcium scoring more accurately predicts 10 yr CV risk than Framingham criteria alone"*

- *NICE 2016 recommendations *MESA study *AETNA.com/cpb/medical/data/200

NICE-2106

National Institute for Health and Care excellence-UK

- British National Health Service recommends Cardiac CT as index test for CP suspected due to CAD in England going forward
- CT would have had to cost ~3X as much to render it less cost effective in NICE analysis
- NICE estimates diagnostic invasive angiography would decrease by ~50%
- NICE estimates Nuclear stress testing would decrease by ~50%

NICE 2106- NHS UK

Driver 1

>>50% of the patients nationally who go for heart cath have no obstructive CAD

Since outcomes are only improved if revascularization is confined to patients with an FFR of <0.8, an invasive angiogram for CAD could be considered a failure of process if the study reveals no revascularization is indicated

Driver 2

The demonstration of normal coronary arteries can eliminate the need for unnecessary testing, hospital admission, ER visits, and is associated a very favorable prognosis

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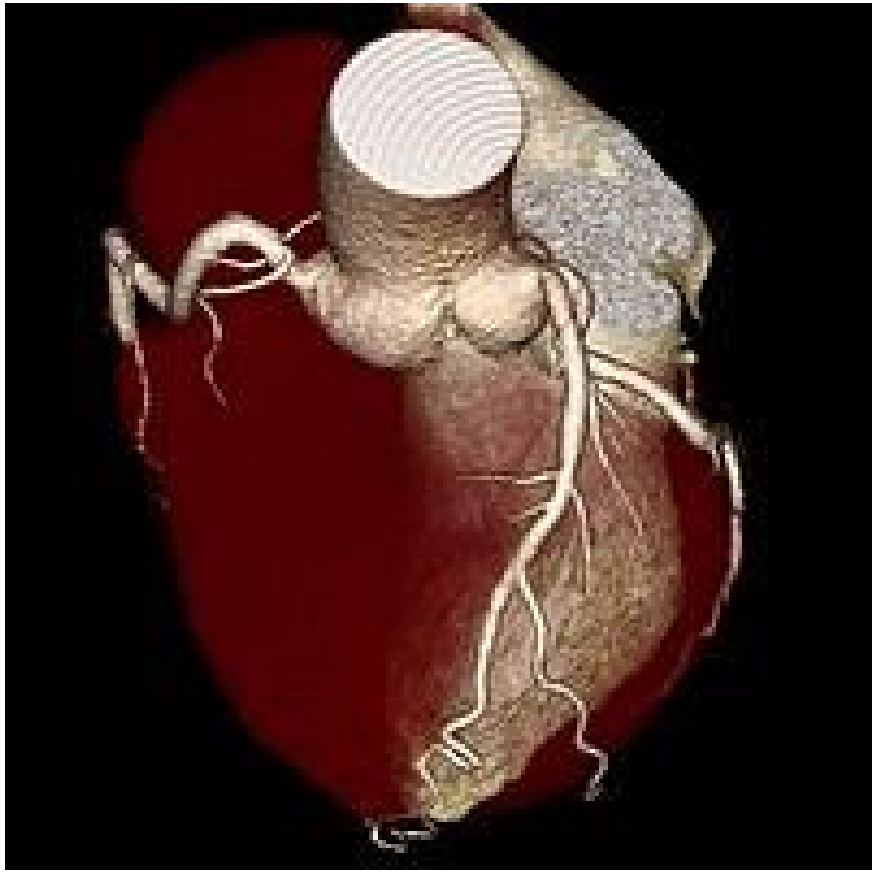
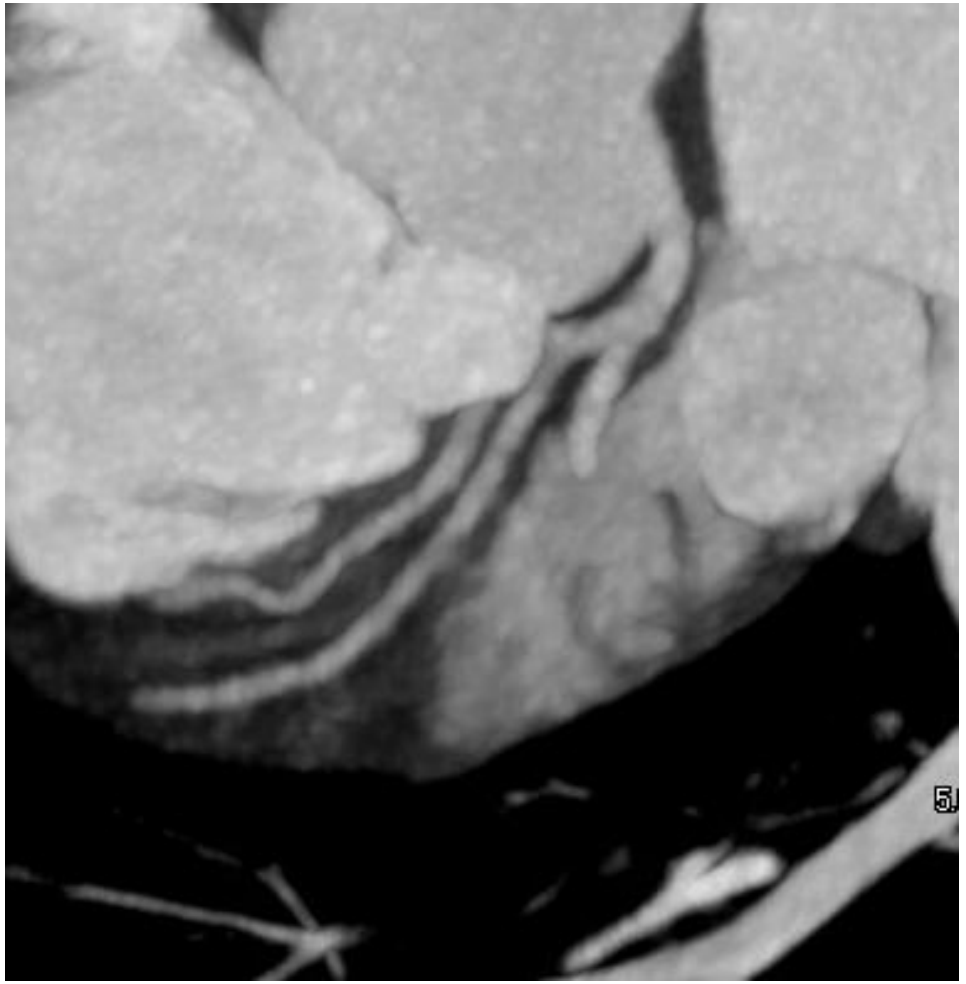
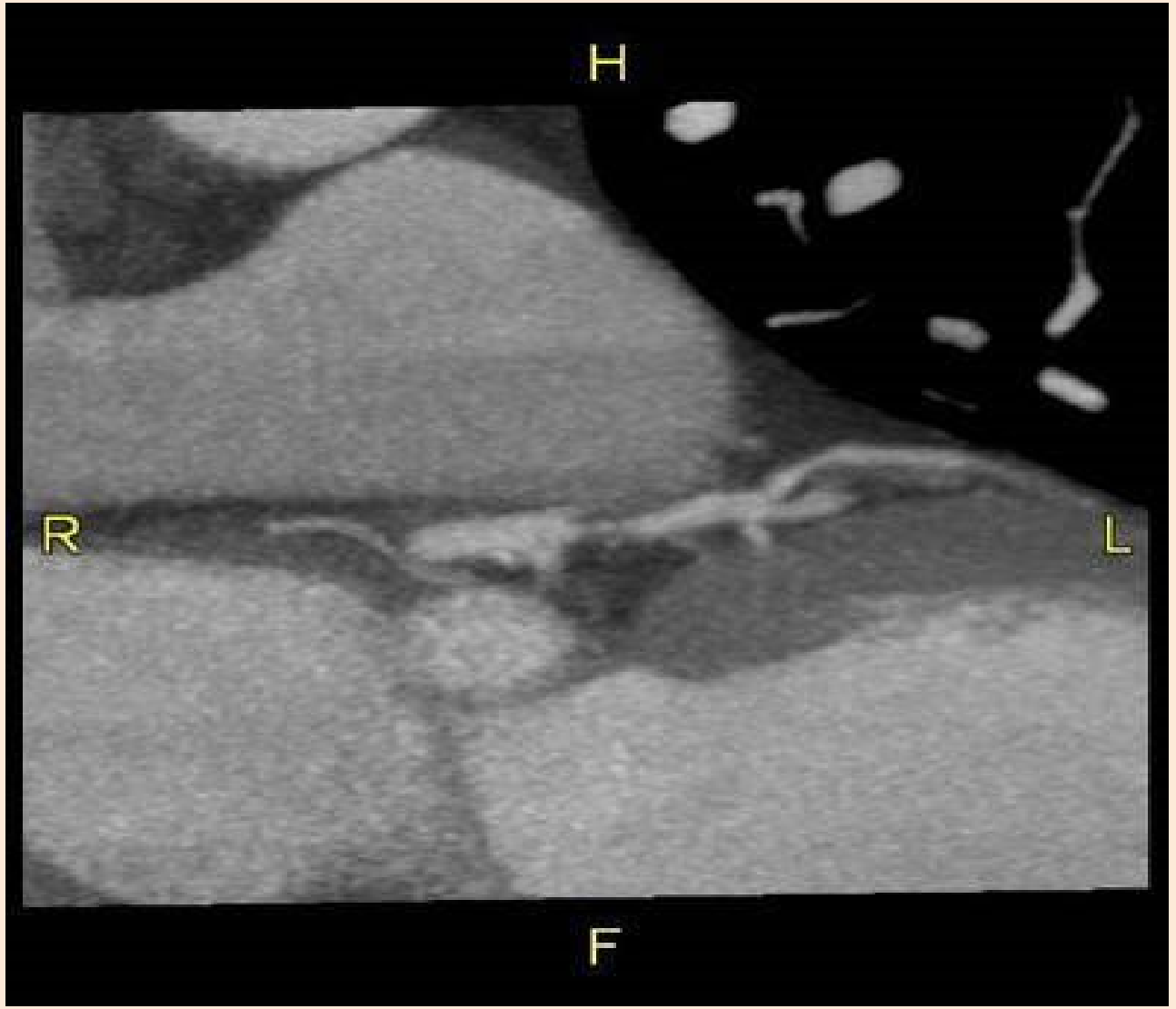
The sensitivity of CTA for the detection of CAD is superior to any other non-invasive test

CTA Example normal proximal left



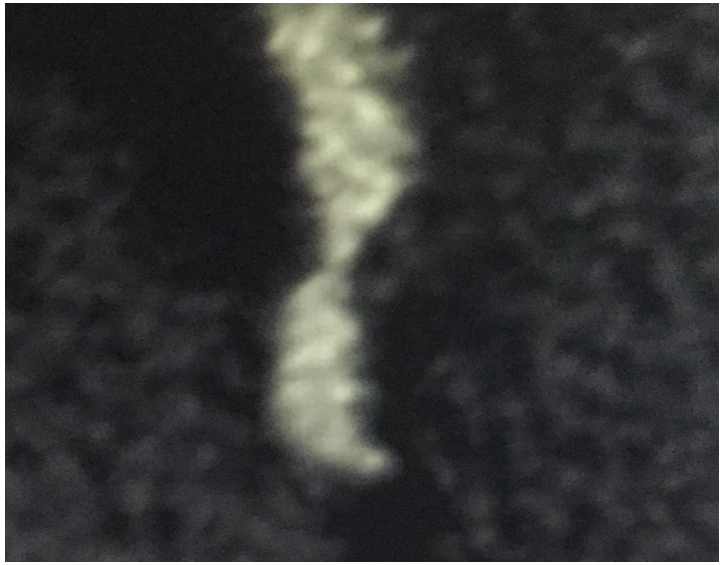


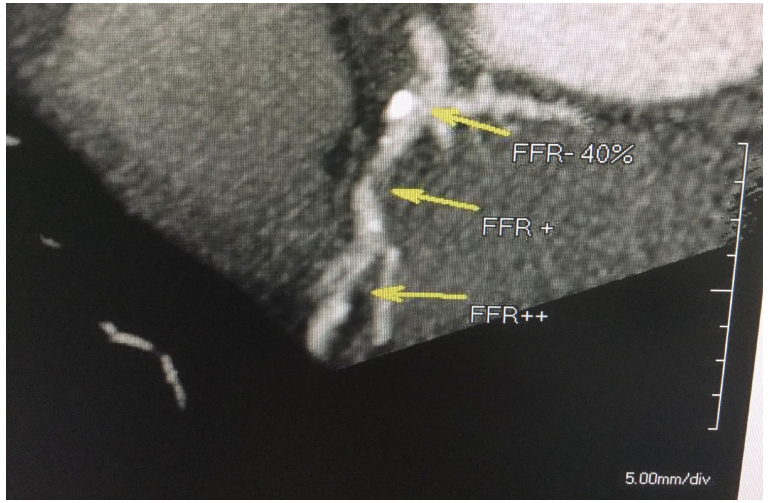
CTA “soft plaque” and CA+2 and stenosis



Achilles Heal of CTA-Heavy Calcification=unreadable

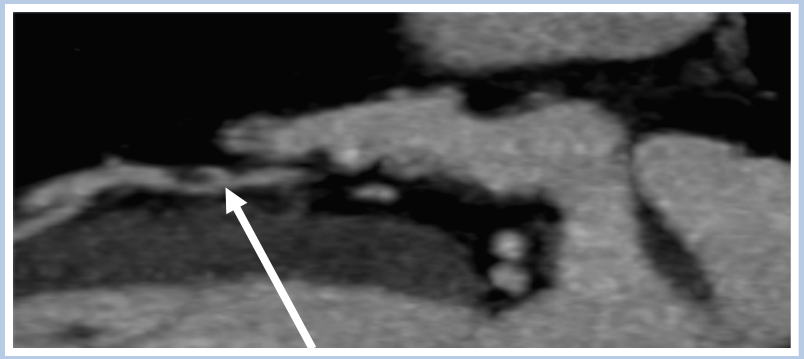
CA score >1000 here



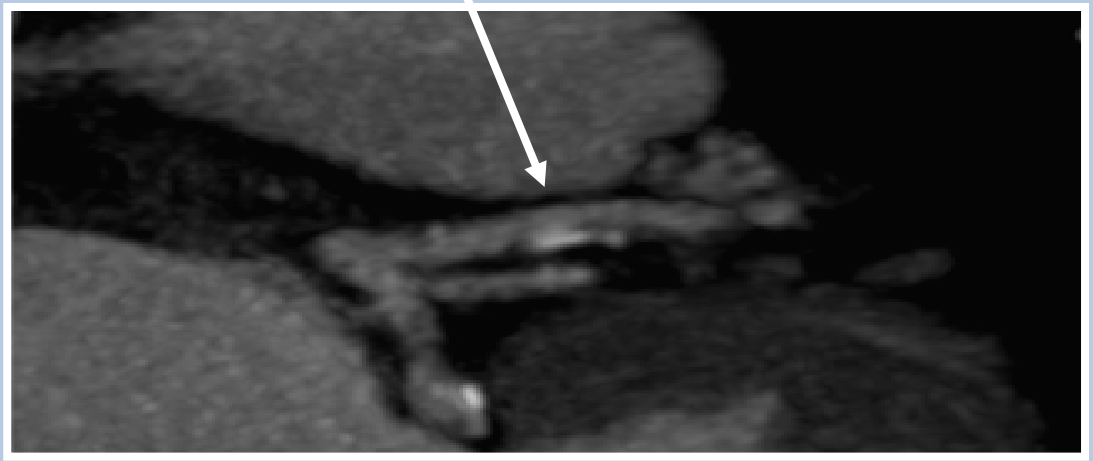

FFR- 40%
FFR +
FFR++
5.00mm/div

53 yo male with sub-clinical CAD

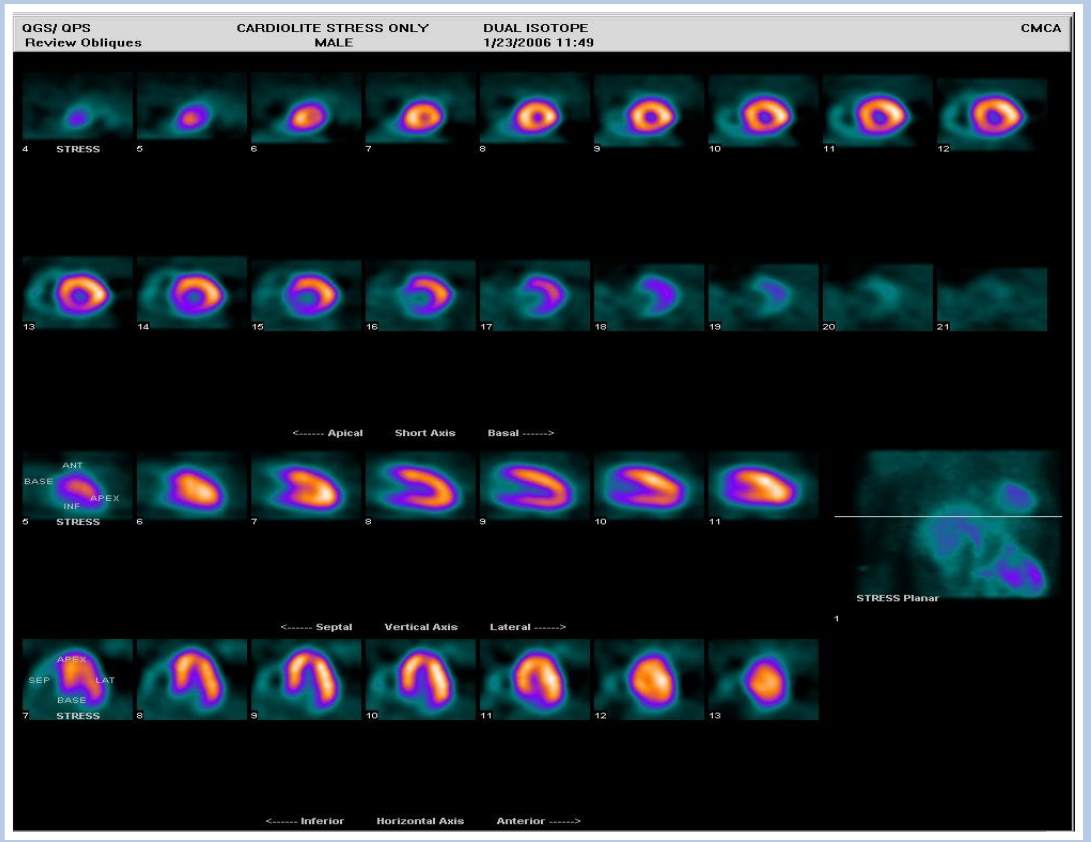
CT angiogram



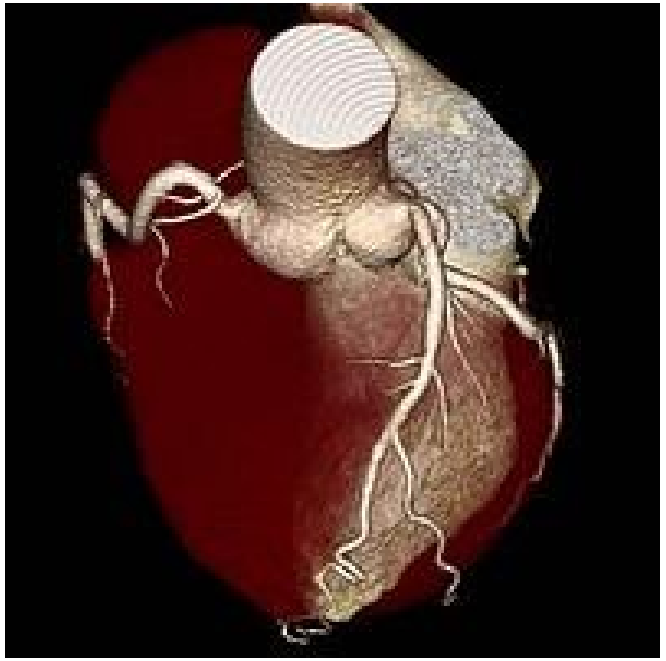
LAD

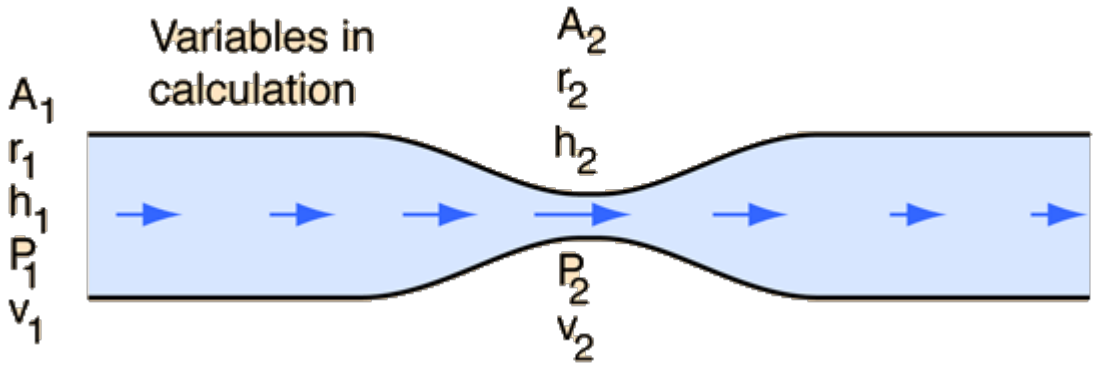


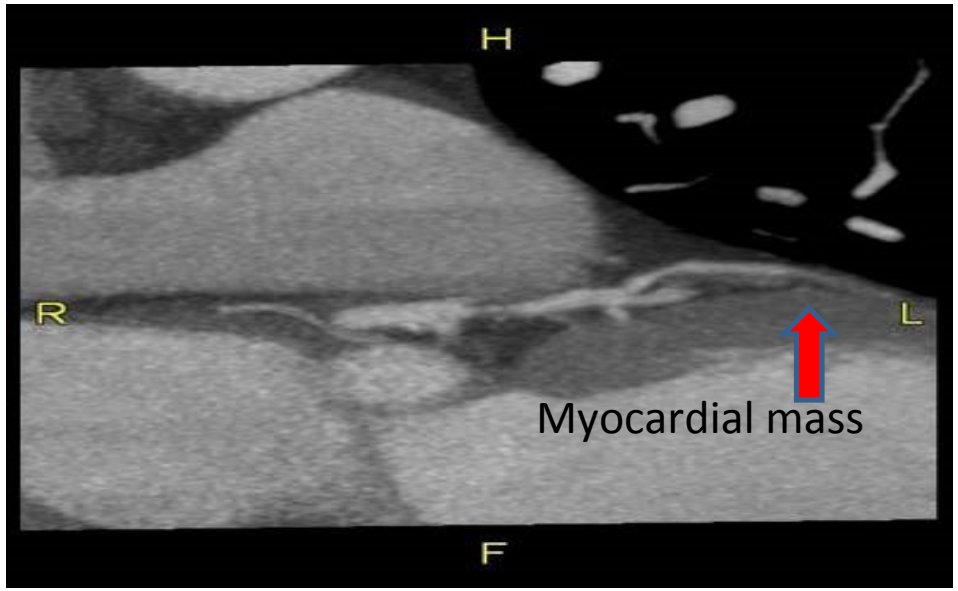
Stress-only SPECT- Normal so OK



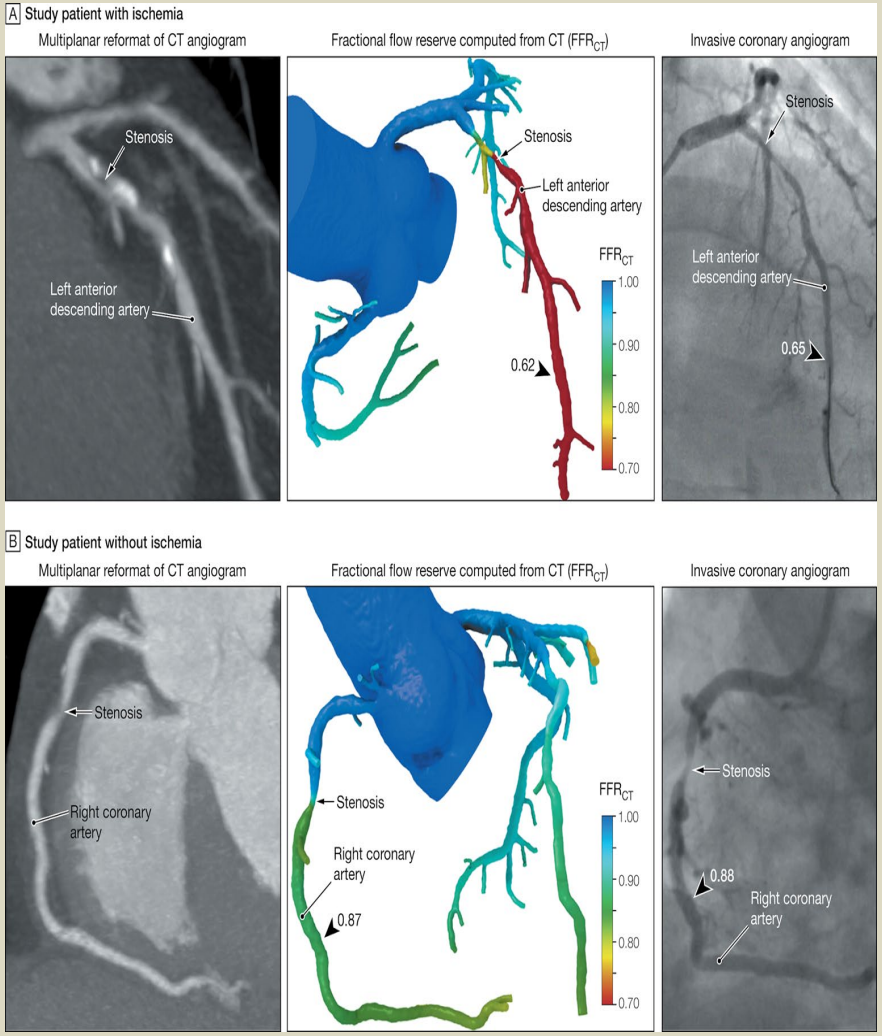
Computational Fluid Dynamics







CT ➡ intermediate stenosis ?- CT-FFR solution?



"Fractional flow reserve" <0.8 (low) associated with improved outcome revascularization

Why go invasive? If CT can establish <u>No CAD, minimal CAD or FFR-CT >0.8?</u>

NICE

IF CTA demonstrates a possible stenosis?

- Any:
- Nuclear Stress
- Stress echo
- Cardiac MRI- perfusion
- CT-FFR
- Take into account local expertise, patient preference in selecting

NICE 2106 NHS-UK

CA Scoring Drivers

- 50% of heart attacks will occur in patients not considered “low risk”

- The artery calcification is common after age 50-60 and may not necessarily indicate (much) increased risk- detection can lead to further anxiety driven CV testing that contributes nothing to improved long term outcome

Cardiac CT 101

Plaque calcifies More CA+2=More atherosclerosis

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more age then more calcification

CA is a surrogate for plaque in CA scoring but can render lumen unreadable in CTA and bears no consistent relationship to stenosis and ischemia

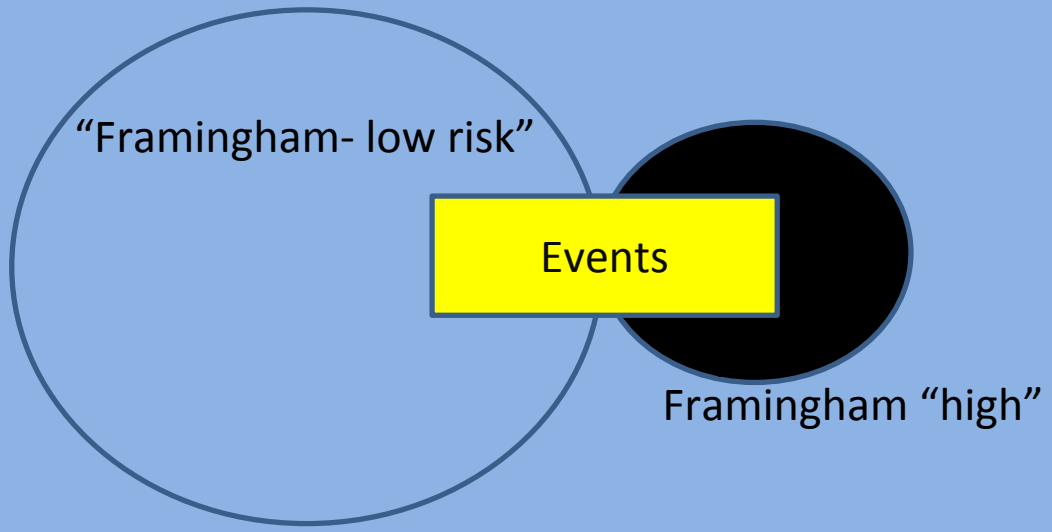
Calcium Scoring 50/50 and 50/60 Rule

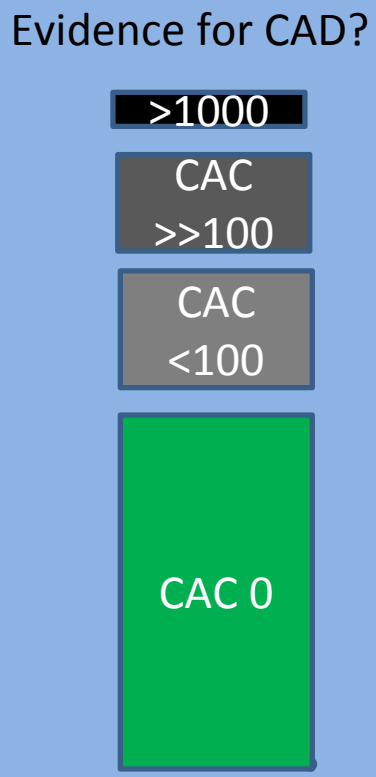
- Half of men will have some coronary CA+2 at age 50
- Half of women will have some coronary CA+2 at age 60

Prepare patients to understand the implications of a 0, median (50%) and >>75% score

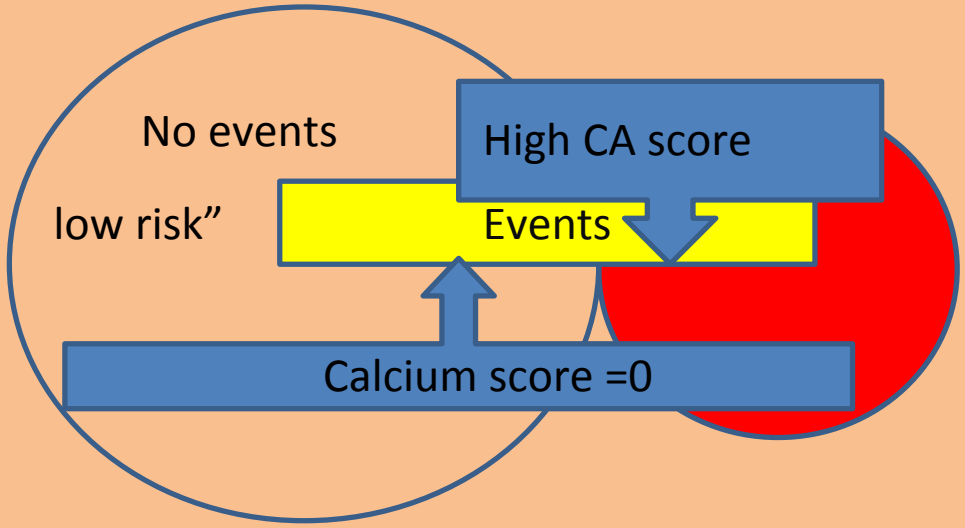
It’s about context (Gender and Age)

Calcium Scoring- more predictive of 10 year risk than anything single factor but your age

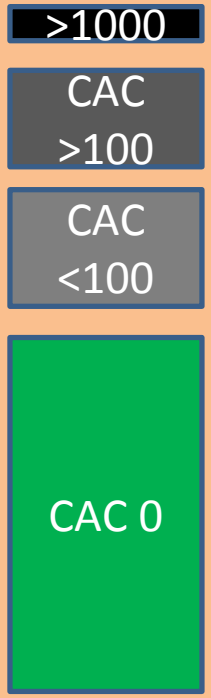




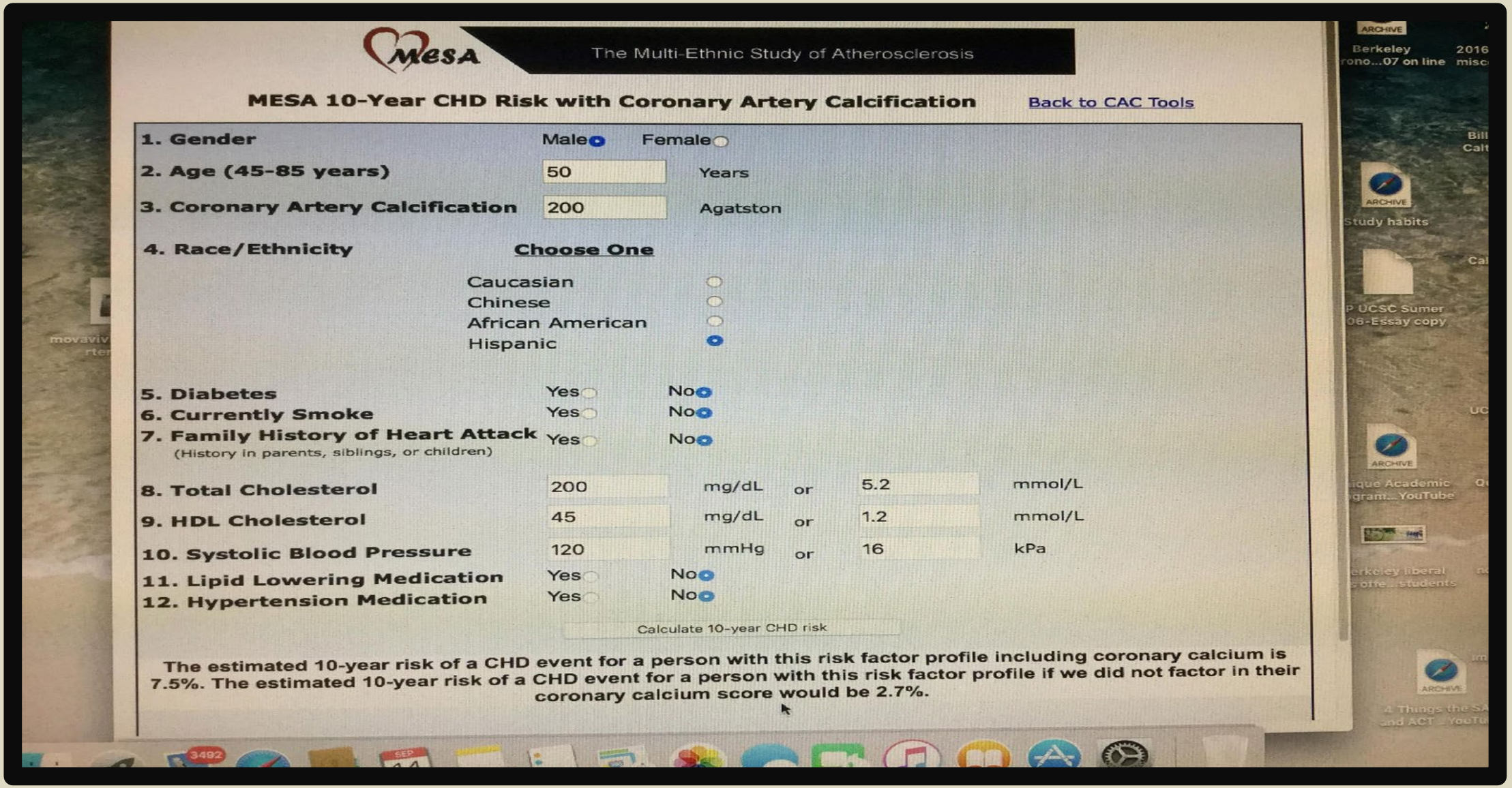
Calcium Scoring-Is the score 0 or >400?



Evidence for CAD?



MESA Risk Calculator -Online



My Father/Mother had an MI at 50 and my LDL is 90

CA score?

I can’t tolerate Statins

- I’m 60 my LDL is 195 and my father who didn’t smoke died at 50 from and MI
  - My CAC score is 0
  - My CAC score is 0 and my Lp(a) is 2X normal
  - My CAC score is 300

  -What if my carotid scan is normal and my stress test is normal every year?

I am on a statin 60-70 and and cannot get my LDL below 90

My CA score is 0

What now?

My CA score is 300

I am 45 have anginal-like chest pain

- Calcium score 0- done now ?
- Calcium score 0 and normal stress test –done?
- CTA- everybody, males, females, all ages 35-85 with chest pain

75 yo female with dyspnea on exertion

- CTA? Calcium score useful?
- What if 75 you male?
- I had a regular Chest CT and there was no coronary artery calcification? Is that a 0 calcium score?

50 yo male with atypical CP

- Had non-gated CT to rule out PE 1 year ago
- Had a normal carotid scan
- Has no risk factors other than LDL 150 HDL 45
- Has a normal Lp(a)

I have anginal chest pain and a normal stress test

- Calcium score is 0 – done now ?
- CTA normal done?
- CTA shows very mild disease- done?
- CTA shows 30-50% narrowings- done?