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P: In low risk patients presenting to the ED with chest pain
I: Is the Coronary Artery Calcium Score (CACS)
C: Compared with our current standard of care
O: A better predictor of future cardiac events?

A 51 yo male presents to the ED at 1pm, complaining of substernal chest/epigastric pain which gradually started around 10am. Pt described the pain as sharp/burning in character. He states he's never experienced such pain before and has no known hx of CAD. En route, he received aspirin and nitro x 2 via EMS, which completely resolved his symptoms. EKG is nondiagnostic, with no comparison. Initial cardiac w/u including CXR and cardiac enzymes is unremarkable.
T 98 BP 153/93 HR 85 RR 16 SaO2 100%
PMH- HTN, arthritis
PSH- hernia repair 2002
Meds- lisinopril, naprosyn PRN
All- PCN, iodine
FH- CAD/HTN in father, first MI at age 78, high chol in Mother
SH- tob use in his 20s, drinks approx 3 beers/weekly, denies illicit drug use

Pt is vacationing in Va Beach and he and his family have a flight home to catch tomorrow morning at 630am. Can we safely discharge this patient home, knowing he is at low risk for a future cardiac event?

Article	Patients	Study Type	Key Results	Conclusions	Limitations
JAMA 2010 Coronary Artery Calcium Score and Risk Classification for Coronary Heart Disease Prediction	6814 persons aged 45-84 without known CAD	Prospective Cohort Study	Model 1- 69% was classified in highest or lowest risk category. Model 2- 77%	Adding CACS to a prediction based model of traditional risk factors improves classification of risk and places more individuals in the extreme risk categories	*How often should we obtain a CACS? *Does CACS improve clinical outcomes? *Risk calculated at 5 years *Diabetics were excluded

AJC 2009 Comparison of the Value of Coronary Calcium Detection to CTA and Exercise Testing in Patients with CP	471 patients with new stable chest pain complaints	Prospective Cohort Study	175 pts had CACS 0, 3 had sig CAD on CTA, with only 1 confirmed by cath. 65 pts had CACS >400, CTA could exclude sig CAD in only 4 . CTA and CCS (>0) were more sensitive than XECG, whereas XECG and CCS (>400) were significantly more specific than CTA.	CACS is a reliable means to exclude obstructive CAD in stable, symptomatic patients. CTA can exclude significant CAD in patients with low-intermediate CCS but is limited in patients with high CCS.	*Can we use a very low CACS (<10) to r/o sig CAD? *XECG not performed in 48 pts, inconclusive in 140 pts. *Cardiac catheterization was not performed in all patients, it is not possible to exclude angiographic CAD in all patients. *Did not follow clinical outcomes.
Mayo Clin Proc. 2010 Computed Tomographic Coronary Artery Calcium Asessment for Evaluating Chest Pain in the Emergency Department: Long-term Outcome of a Prospective Blind Study	263 patients presenting to the ED with CP, men aged 30-62, and women aged 30-65, in the low or intermediate risk groups	Prospective Blind Study	133 CACS 0, only 1 (<1%) had cardiac chest pain. Of 31 patients shown to have cardiac chest pain, 30 (97%) had evidence of CAC on CT. CAC cutoff of 36 gave a sensitivity of 90%, specificity of 85%, PPV 44%, NPV 99%. No cardiac events at 5 yrs for CACS 0.	A CACS score <36 makes cardiac chest pain extremely unlikely, a CACS of 0 suggests excellent long term prognosis.	*95% of patients were white *Focused primarily on middle aged patients.
Annals of EM 2010 Coronary Artery Calcium Scoring in the ED: Identifying Which Patients With Chest Pain Can Be Safely Discharged Home	1,031 patients presenting to ED with acute CP, >18yo, CP within 24hrs sugestive of ischemia, admission under OBS status	Prospective Observational Cohort Study	625 patients had a CACS of 0, 2 events occurred in these patients (.3%). CACS sens 94%, spec 62%, PPV 7%, NPV 99.7%. SPECT sens 62%, spec 98%, PPV 50%, NPV 98.8%	Patients with a CACS of 0 can be safely discharged home, without further cardiac testing	*Single center study *Physicians were not blinded to CACS results possibly influencing decisionmaking *CACS of 0 may miss noncalcified plaque

European Radiology 2008 Measurement of Coronary Calcium Scores by Electron Beam CT or exercise testing as initial diagnostic tool in low-risk patients with suspected CAD	304 consecutive low risk patients with cp or other symptoms of CAD	Prospective Observational Cohort Study	ROC analysis showed AUC of 0.89 for CACS, compared with 0.69 for stress testing, (P< 0.0001)	Measurement of CACS is an appropriate initial screening test in a well defined low risk population with suspected CAD	*Follow up was short *absence of a "gold standard" in every patient *large # of nondiagnostic stress tests

Clinical Bottom Line- In low risk individuals presenting to the emergency department with chest pain, a Coronary Artery Calcium Score of 0 predicts of very low risk of future cardiac events. However, further studies are necessary to determine how best to implement CACS into our everyday ED approach to low risk chest pain patients. Benefits of CACS- does not require an extended ED OBS admission, no use of beta blockers, no use of iodinated contrast, and radation doses are much lower when compared with other common cardiac testing.

References

George, A., & Movahed, A. (2008). Coronary Artery Calcium Scores: Current Thinking and Clinical Applications. The Open Cardiovascular Medicine Journal, 2, 87-92.

Geluk, C, et al. (2008). Measurement of coronary calcium scores by electron beam computed tomography or exercise testing as initial diagnostic tool in low-risk patients with suspected coronary artery disease. European Radiology, 18: 244-252.

Ioannidis, J., & Tzoulaki, I. (2010). What Makes a Good Predictor?: The Evidence Applied to Coronary Artery Calcium Score. Journam of the American Medical Association, 303(16): 1646-1647.

Laudon, D., et al. (2010). Computed Tomographic Coronary Artery Calcium Assessment for Evaluating Chest Pain in the Emergency Department: Long-term Outcome of a Prospective Blind Study. Mayo Clinical Proceedings, 85(4): 314-322.

Nabi, Faisal, et al. (2010). Coronary Artery Calcification Scoring in the Emergency Department: Identifying Which Patients With Chest Pain Can Be Safely Discharged Home. Annals of Emergency Medicine.

Nieman, K., et al. (2009). Comparison of the Value of Coronary Calcium Detection to Computed Tomographic Angiography and Exercise Testing in Patients with Chest Pain. American Journal of Cardiology, 104:1499-1504.

Polonsky, T., et al. (2010). Coronary Artery Calcium Score and Risk of Classification for Coronary Heart Disease Prediction. Journal of the American Medical Association, 303(16): 1646.