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## CAC – Atrius Guidelines August 17, 2021

### Coronary Artery Calcium Screening and Treatment Recommendations

#### **Aim**

To lower CV morbidity and mortality at Atrius Health we would like to give clear guidance to practitioners on how to treat patients that have incidentally been found to have coronary calcifications. These recommendations can be extended to dedicated Coronary CTAs.

#### **Overview**

These guidelines set the Atrius Health standard of care for managing coronary artery calcification (CAC) diagnosed on chest CTs. These recommendations are based on convincing evidence that CAC is associated with adverse cardiovascular outcomes, and that statin initiation reduces the risk of such outcomes.

Cardiovascular atherosclerotic vascular disease is the number one cause of death in the United States. Atherosclerosis is a progressive illness in which cholesterol crystals accumulate in the subintimal stratum of the arteries. In autopsy studies atherosclerotic plaque has been found even in adolescent individuals and at age 60 microscopic evidence of plaque is found in virtually every individual. Atherosclerotic plaque burden on autopsy studies can be estimated by the amount of calcium deposits. Calcium deposits can easily be seen on CT scans. Calcium deposits strongly correlate with CV morbidity and mortality. Cholesterol lowering with statin medication has been shown to consistently reduce the risk of CV morbidity and mortality.

Plaque progression is arrested in homozygous familial hypercholesterolemia when LDL is < 100 mg/dL. When LDL levels drop to < 70 mg/dL a modest decrease in plaque volume of 2-4%/year can be expected. In addition, vulnerable plaque volume decreases significantly with aggressive statin therapy. Taken together, coronary calcifications predict CV mortality strongly and is the best test to augment clinical risk calculators when trying to estimate short and long-term CV risk. Statin therapy reduces CV risk and also reduces plaque volume.

CAC scoring appears to be useful for making decisions about preventive statin as well as aspirin use (Greenland et al). In fact, in multiple large international registries CAC has been consistently shown to be the single best tool for risk discrimination (Hecht et al).

One large study, the Multi-Ethnic Study of Atherosclerosis (MESA), measured CAC in 6814 asymptomatic individuals without known coronary heart disease from among multiple racial groups. Subjects were followed for incidental coronary heart disease death and non-fatal coronary events. This study demonstrated that increased CAC consistently predicted cardiac events beyond traditional factors, with strength across all ethnicities (Budoff & Young et al).

Given the growing convincing evidence that CAC scores are superior for predicting cardiac events as compared to traditionally used risk factors and calculators, the Atrius department of cardiology will begin making recommendations for statin and ASA use based on coronary calcium findings noted on all chest CTs completed Atrius.

## Target population

This recommendation applies to all asymptomatic men and women noted to have CAC on chest CT. Within Atrius, all chest CTs comment on CAC severity for patients <79 yo.

## Identification and staging

CAC severity is rated as none, mild, moderate, and severe. There are both qualitative and quantitative reporting systems for scoring, depending on imaging modality used. Both types of reporting systems appear to have similar prognostic implications (Hecht et al).

## Recommendations by Major Societies

Organization Name	Statin Recommendations Using Quantitative Score	Statin Recommendations Using Qualitative Score
<b>American College of Cardiology/American Heart Association</b>	<p>&gt;<u>CAC Score 0</u>: statin therapy may be withheld or delayed (except in smokers, DM, and fhx premature ASCVD).</p> <p>&gt;<u>CAC Score 1-99</u>: favors statin therapy, especially in those ≥55 years of age, but consider risk/benefit discussion</p> <p>&gt;<u>CAC Score &gt;100 or &gt;75th percentile</u>: statin therapy is indicated</p>	No comment
<b>USPSTF</b>	Current evidence is insufficient to assess the balance of benefits and harms of adding CAC score to traditional risk assessment for CVD prevention	No comment
<b>Society of Cardiovascular Computed Tomography/Society of Thoracic Radiology</b>	<p>&gt;<u>CAC Score 0</u>: statin not recommended (excluding familial hypercholesterolemia)</p> <p>&gt;<u>CAC Score 1-99</u>: mod intensity statin</p> <p>&gt;<u>CAC Score 100-299</u>: mod-high intensity statin + ASA 81</p> <p>&gt;<u>CAC Score &gt;300</u>: high intensity statin + ASA 81</p>	<p>&gt;<u>CAC none</u> – statin not recommended (excluding familial hypercholesterolemia)</p> <p>&gt;<u>CAC mild</u>- mod intensity statin</p> <p>&gt;<u>CAC moderate</u> – mod-high intensity statin + ASA 81</p> <p>&gt;<u>CAC severe</u> – high intensity statin + ASA 81</p>
<b>European Society of Cardiology</b>	<p>No comment on statin, but does comment on risk</p> <p>&gt;<u>CAC Score 0</u>: has a negative predictive value of nearly 100% for ruling out significant coronary narrowing</p> <p>&gt;<u>CAC Score &gt;300 or &gt;75th percentile</u>: increased CV risk.</p>	No comment
<b>Uptodate</b>	<p>&gt;<u>CAC Score 0</u>: no statin unless compelling risk factors (DM, smoking, fhx)</p> <p>&gt;<u>CAC Score 1-99</u>: statins should be considered based on patient and provider shared decision making</p> <p>&gt;<u>CAC Score &gt;100 or &gt;75th percentile</u>: statin therapy is indicated + lifestyle changes and risk factor modification</p> <p><i>Aspirin recommendations:</i></p> <p>&gt;<u>CAC Score &lt;100</u>: Does not recc ASA 81 for primary prevention</p> <p>&gt;<u>CAC Score ≥100</u>: Shared decision making</p>	No comment
<b>American College of Radiology</b>	No comment	No comment

## Treatment Recommendations by Atrius Department of Cardiology

While there may not be uniform consensus among major cardiology, radiology, and preventative health societies in utilizing CAC to guide statin therapy, given the convincing data that individuals with higher CACs benefit from statins, the Atrius cardiology department recommends utilizing this data to inform prescribing practices.

The recommendations from the Atrius Department of Cardiology (below) closely follow the recommendations from the American College of Cardiology (ACC) and American Heart Association (AHA). These recommendations are also endorsed by the Atrius Clinical Standards Committee.

Qualitative / Quantitative CAC Score	Treatment recommendations in radiology report
None	At this time, patient does not have cardiovascular disease based on CT scan
0-99 / Mild	Assess cardiovascular risk; Atrius Clinical guidelines recommend low dose statin therapy if cardiovascular risk $\geq$ 5%, if no clinical contraindication
100-299 / Moderate	Atrius Clinical guidelines recommend moderate dose statin therapy, if no clinical contraindication
> 300 / Severe	Atrius Clinical guidelines recommend high dose statin therapy and aspirin 81 mg/day if no clinical contraindication

**\*\*Note:** If the patient has associated symptoms recommend management as per chest pain guidelines.

**\*\*Note:** These recommendations do not apply to patients with other indications for statin or aspirin

## References

Budoff MJ, Möhlenkamp S, McClelland R, Delaney JA, Bauer M, Jöckel HK, Kälsch H, Kronmal R, Nasir K, Lehmann N, Moebus S, Mukamal K, Erbel R; Multi-Ethnic Study of Atherosclerosis and the Investigator Group of the Heinz Nixdorf RECALL Study. A comparison of outcomes with coronary artery calcium scanning in unselected populations: the Multi-Ethnic Study of Atherosclerosis (MESA) and Heinz Nixdorf RECALL study (HNR). *J Cardiovasc Comput Tomogr.* 2013 May-Jun;7(3):182-91. doi: 10.1016/j.jcct.2013.05.009. Epub 2013 Jun 13. PMID: 23849491; PMCID: PMC3732186.

Budoff MJ, Young R, Burke G, Jeffrey Carr J, Detrano RC, Folsom AR, Kronmal R, Lima JAC, Liu KJ, McClelland RL, Michos E, Post WS, Shea S, Watson KE, Wong ND. Ten-year association of coronary artery calcium with atherosclerotic cardiovascular disease (ASCVD) events: the multi-ethnic study of atherosclerosis (MESA). *Eur Heart J.* 2018 Jul 1;39(25):2401-2408. doi: 10.1093/eurheartj/ehy217. PMID: 29688297; PMCID: PMC6030975.

Greenland P, Blaha MJ, Budoff MJ, Erbel R, Watson KE. Coronary Calcium Score and Cardiovascular Risk. *J Am Coll Cardiol.* 2018 Jul 24;72(4):434-447. doi: 10.1016/j.jacc.2018.05.027. PMID: 30025580; PMCID: PMC6056023.

Hecht HS, Blaha MJ, Kazerooni EA, Cury RC, Budoff M, Leipsic J, Shaw L. CAC-DRS: Coronary Artery Calcium Data and Reporting System. An expert consensus document of the Society of Cardiovascular Computed Tomography (SCCT). *J Cardiovasc Comput Tomogr.* 2018 May-Jun;12(3):185-191. doi: 10.1016/j.jcct.2018.03.008. Epub 2018 Mar 30. PMID: 29793848.

Mahabadi AA, Möhlenkamp S, Moebus S, Dragano N, Kälsch H, Bauer M, Jöckel KH, Erbel R; Heinz Nixdorf Investigator Group. The Heinz Nixdorf Recall study and its potential impact on the adoption of atherosclerosis imaging in European primary prevention guidelines. *Curr Atheroscler Rep.* 2011 Oct;13(5):367-72. doi: 10.1007/s11883-011-0199-7. PMID: 21826478.

Society of Cardiovascular Computed Tomography (SCCT). *J Cardiovasc Comput Tomogr.* 2018 May-Jun;12(3):185-191. doi: 10.1016/j.jcct.2018.03.008. Epub 2018 Mar 30. PMID: 29793848.

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