2024 MID-ATLANTIC CONFERENCE

12th ANNUAL CURRENT CONCEPTS IN

VASCULAR THERAPIES

2024

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

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The primary care perspective on carotid disease: Who needs screening and referral

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2024

Carotid Artery Screening:

A Primary Care Perspective

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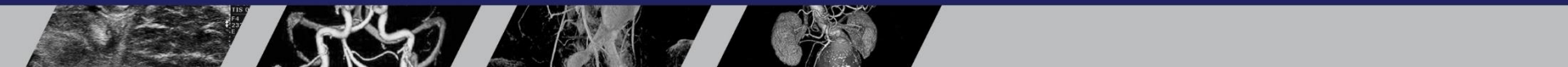
SMJH

Carotid Artery Screening

- Bad news, Good news
- Learning opportunity
- Why do I do what I do?
- To be clear: While this talk is intended to provide guidelines regarding the role of screening for carotid artery stenosis (CAS) from the perspective of primary care. These guidelines should apply to all practitioners, including the specialist to see patients at risk for extracranial atherosclerosis

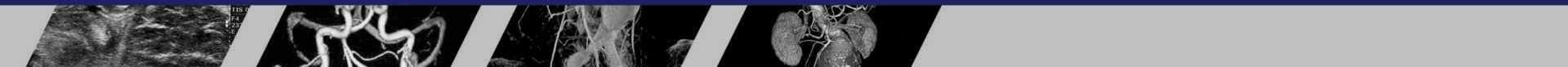


Carotid Artery Screening

- The goal of any screening program should be to identify patients with a specific problem, with a focus on providing treatment for that specific problem without causing harm in doing so.

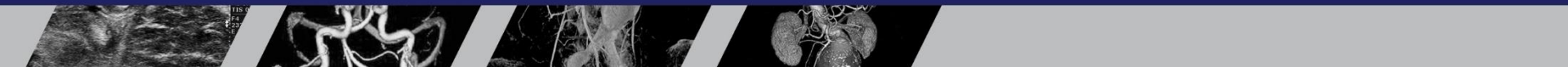
- Screening for CAS should actually be helpful to our patients

- In that regard, 2 questions need to be answered:
  1. Should every patient be screened for CAS?
  2. Is there a specific cohort of patients that should be screened for CAS?



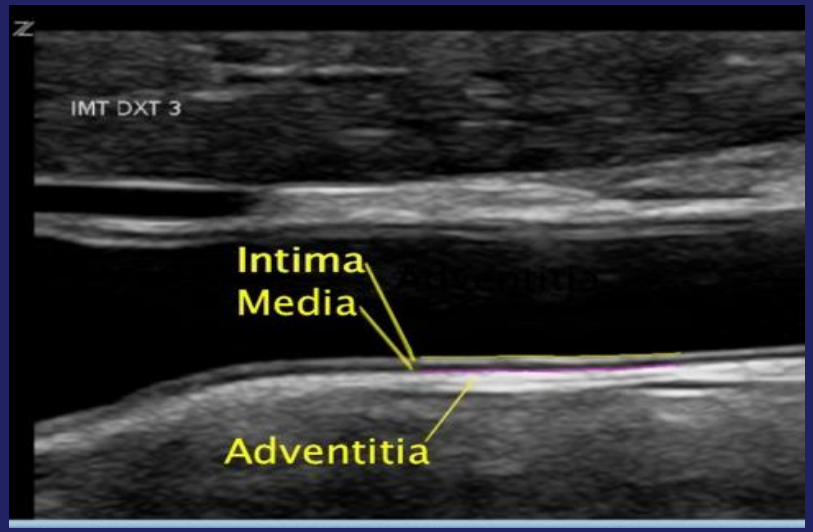
Carotid Artery Screening

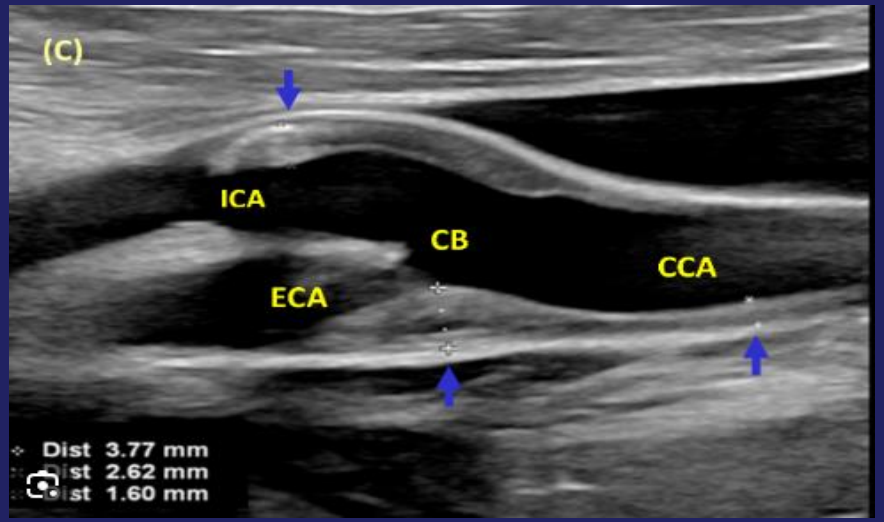
- To be clear – NOT Carotid intimal thickness (CIMT)
- CIMT has its role in providing primary care providers with information regarding the presence of atherosclerosis of a much milder degree than vascular surgeons typically see.
- Unless they are found to have frank CAS
  - Do not need to be seen by a vascular surgeon
  - Because I basically tell them the same thing that the primary care team does.
  - That is, aggressive medical therapy, lifestyle modification, a heart healthy diet, exercise, smoking cessation, and primary care follow-up.
- While I see probably 10-15 or perhaps more of these patients yearly, and to be clear I am happy to see them, there is really no role for vascular surgery management of patients with intimal thickening only.



CIMT

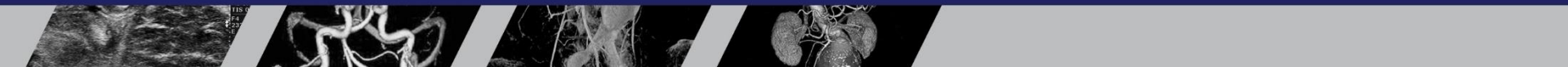
- In the certified vascular lab, a CIMT study is performed in a similar fashion to carotid screening. However, the results are reported differently than a comprehensive extracranial study. In addition, maneuvers are performed to measure thickness of the intima and/or associated carotid plaque.





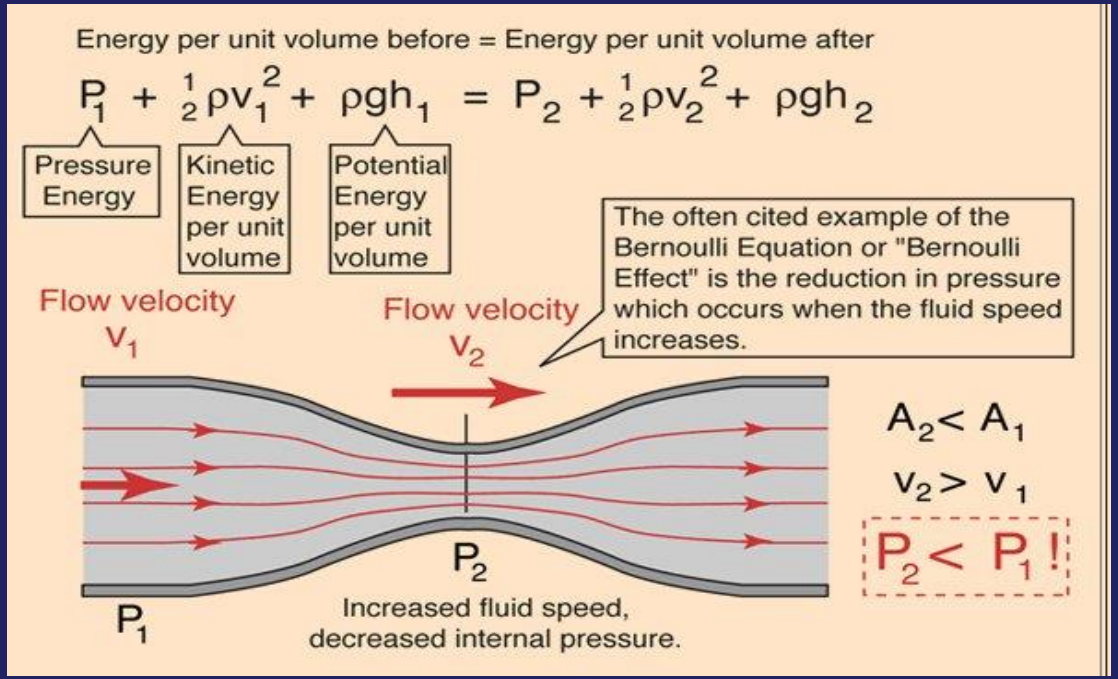
Carotid Artery Screening

- Role for carotid screening is to identify CAS
- The study of choice to perform carotid screening is a noninvasive extracranial arterial duplex ultrasound.
- Comprehensive ultrasound study (sometimes challenging due to patient body habitus or tortuous arterial anatomy). To be sure, it requires a great deal of technical skill to perform accurate extracranial imaging - we are very lucky at Sentara Martha Jefferson to have an excellent and experienced vascular lab staff.
- In addition to imaging of the vessels, equally or more importantly, color Doppler and pulsed Doppler are used to specifically identify areas of significant stenosis. Areas with increased peak systolic/end-diastolic velocities suggest areas of stenosis.



Carotid Artery Screening

- You will recall that this is based on the conservation of energy principal as defined by the Bernoulli equation.



Carotid Artery Screening

PACS Images

Show images for PVL CAROTID ARTERY BILATERAL

Narrative

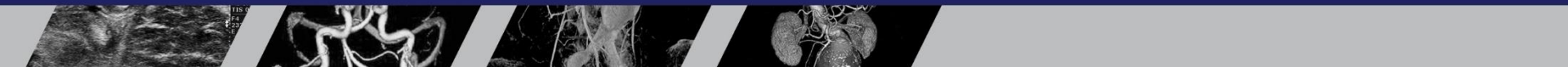
Bilateral: A bilateral internal carotid artery Doppler study was performed.
Right: B-mode imaging of the right internal carotid artery identifies moderate atherosclerotic intraluminal plaque. The right internal carotid artery Doppler spectral analysis demonstrates peak systolic velocities between 125 cm/sec and 230 cm/sec. The internal to common carotid artery ratio is between 2.0 and 4.0. The end diastolic velocity is between 40 cm/sec and 100 cm/sec. This data is consistent with the presence of moderate (50-69%) stenosis of the internal carotid artery. Antegrade flow with a normal hemodynamic profile was present in the right vertebral artery. The spectral Doppler waveform in the subclavian artery is multiphasic.
Left: B-mode imaging of the left internal carotid artery identifies atherosclerotic plaque with associated narrowing. The left internal carotid artery Doppler spectral analysis demonstrates peak systolic velocities greater than 230 cm/sec. The internal to common carotid artery ratio is greater than 4.0 and the end diastolic velocity is between 100 cm/sec and 140 cm/sec. This data is consistent with the presence of severe (70-79%) stenosis of the internal carotid artery. Antegrade flow with a normal hemodynamic profile was present in the left vertebral artery. The spectral Doppler waveform in the subclavian artery is multiphasic.
Conclusions: Moderate (50-69%) stenosis in the right internal carotid artery associated with atherosclerotic plaque.
Severe (70-79%) stenosis in the left internal carotid artery associated with atherosclerotic plaque.
Antegrade flow with a normal hemodynamic profile was present in both vertebral arteries.
When compared to the previous exam performed on 3/31/2023 , there is no significant change.

Carotid Artery Screening

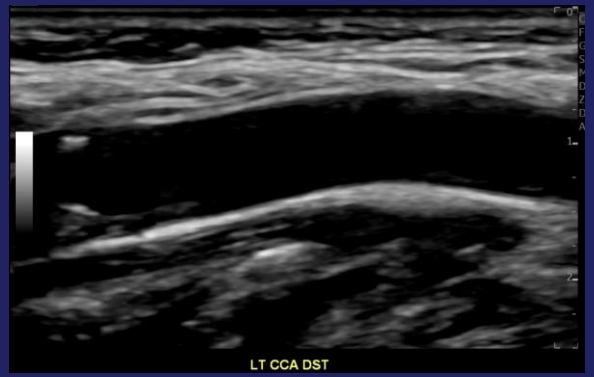
Right					Left			
PST	Systole	Diastole	% Stenosis		PST	Systole	Diastole	% Stenosis
	102.08	16.25		Prox CCA		76.79	14.17	
	89.3	16.25		Mid CCA		85.56	14.17	
	93.23	13.39		Dist CCA		74.55	11.97	
	57.6	14.6	< 50%	Prox. ICA		301.6	74.1	70 - 79 %
	96.91	21.99		Mid ICA	Yes	122.68	21.73	
	50.3	14.06		Dist ICA		47.06	11.96	
	73.58	13.39		ECA		125.3	10.2	
Yes	50.24	10.93	Antegrade Delayed SRT	Vertebral		63.41	19.53	Antegrade
	96.91	21.99		Peak ICA Velocity		301.6	74.1	

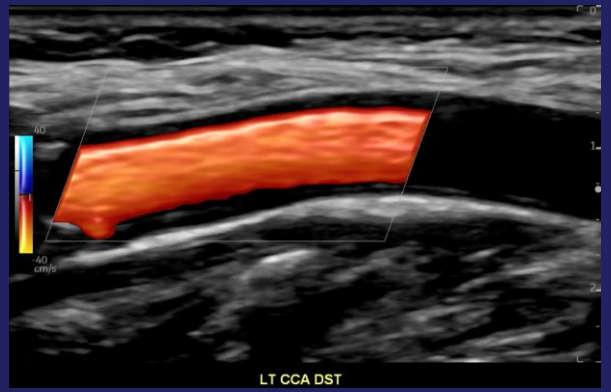
Multiphasic	Subclavian	Multiphasic

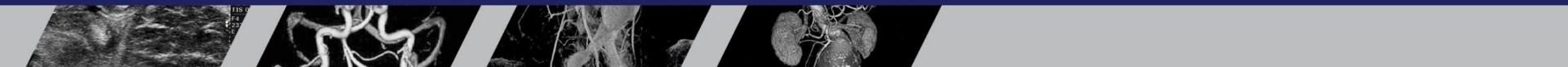
1	ICA / CCA Ratio	4
Irregular	ICA Plaque Surface	Irregular
Calcified	ICA Plaque Composition	Mixed Density



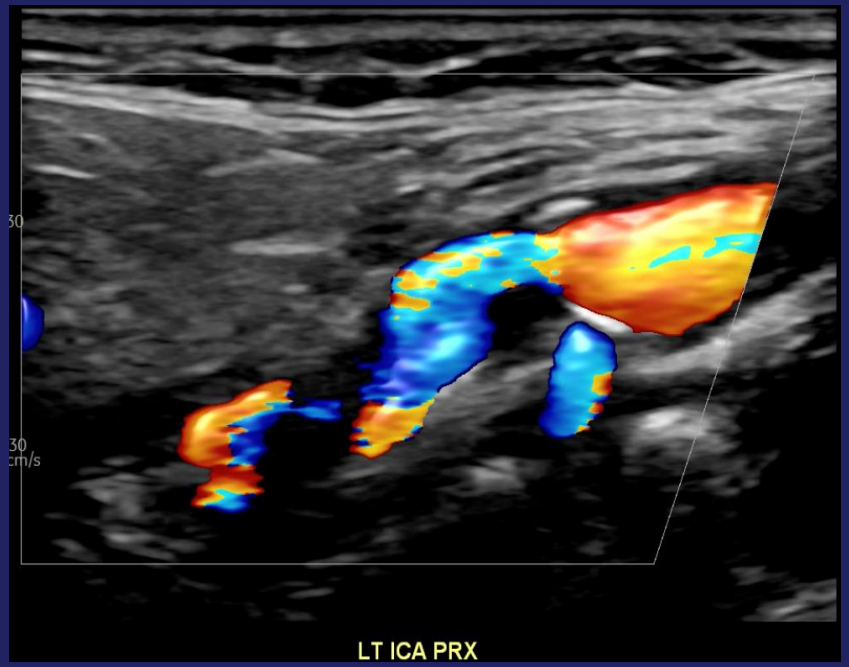
Carotid Artery Screening

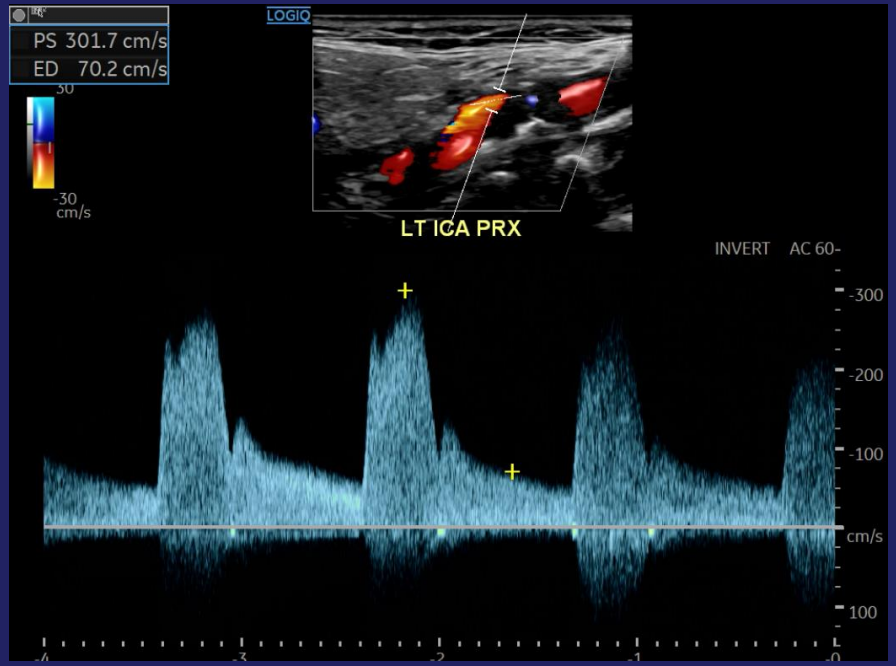


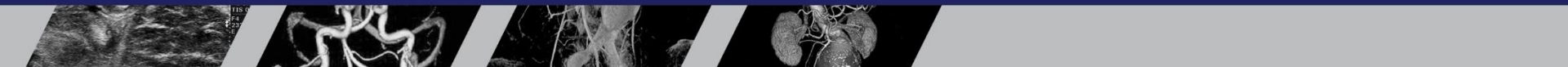




Carotid Artery Screening

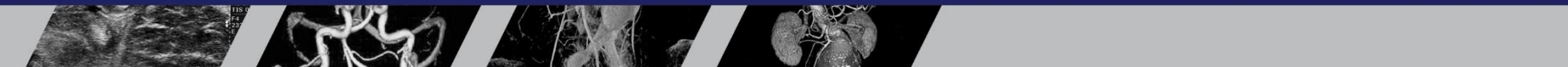






Carotid Artery Screening

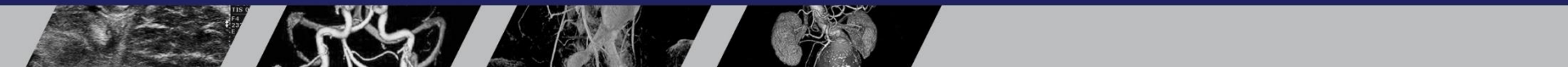
- Importance of identifying CAS?
  - Stroke is a leading cause of death and disability in the United States, and CAS can lead to stroke.
  - CAS is an atherosclerotic process that affects extracranial carotid arteries.
  - Asymptomatic CAS refers to stenosis in persons without a history of ischemic stroke, transient ischemic attack, or other neurologic symptoms referable to the carotid arteries, which in turn defines symptomatic carotid artery stenosis as a patient with symptoms referable to the carotid arteries.
  - So, one would likely make the argument that identifying patients with CAS is very important. And if carotid duplex imaging is the best screening tool, where do I find the recommendations regarding the use of the screening tool?



Carotid Artery Screening

- U.S. Preventive Services Task Force (USPSTF)
  - Screening for Asymptomatic Carotid Artery Stenosis: Recommendation Statement – 2021

The USPSTF recommends against screening for asymptomatic carotid artery stenosis in the general adult population - D recommendation.



Carotid Artery Screening

Summary of USPSTF Rationale: Screening for Asymptomatic Carotid Artery Stenosis

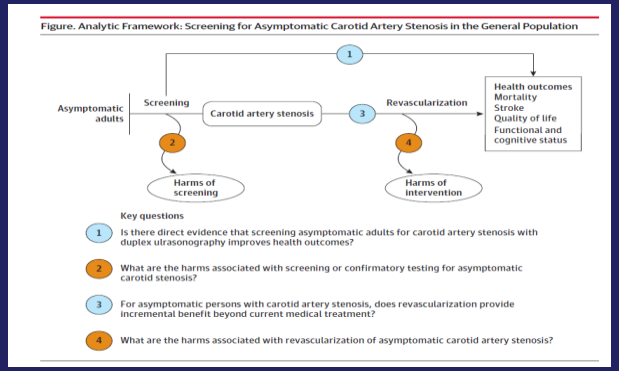
Rationale	General adult population
Detection	• Adequate evidence that duplex ultrasonography has reasonable sensitivity and specificity for detecting clinically relevant carotid artery stenosis. However, duplex ultrasonography yields many false-positive results when screening the general population. • Adequate evidence that auscultating the neck for carotid bruits has poor accuracy for detecting clinically relevant carotid artery stenosis.
Benefits of early detection, intervention, and treatment	• Inadequate direct evidence that screening for asymptomatic carotid artery stenosis reduces adverse health outcomes such as stroke or mortality. • Adequate evidence that treating asymptomatic patients with carotid artery stenosis using carotid endarterectomy or carotid artery angioplasty and stenting provides no to small benefit in reducing adverse health outcomes, including stroke, myocardial infarction, or mortality, compared with current medical therapy.
Harms of early detection, intervention, and treatment	• Inadequate direct evidence that screening for asymptomatic carotid artery stenosis can cause harms. However, there are known harms associated with confirmatory testing and interventions. • Adequate direct evidence that treating asymptomatic patients with carotid artery stenosis using carotid endarterectomy or carotid artery angioplasty and stenting can cause harms, including stroke or death. • The overall magnitude of harms of screening for and treatment of asymptomatic carotid artery stenosis is small to moderate.
USPSTF assessment	Using a reaffirmation process, the USPSTF concludes with moderate certainty that screening for asymptomatic carotid artery stenosis in the general population has no benefit and may be harmful.

USPSTF = U.S. Preventive Services Task Force.

Carotid Artery Screening

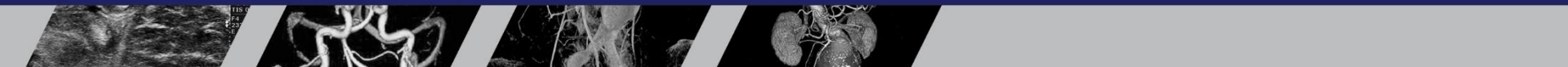
Basis for recommendations

- The prevalence of asymptomatic CAS is low in the general population.
- Although asymptomatic CAS is a risk factor for stroke and a marker for increased risk for myocardial infarction, it causes a relatively small proportion of strokes
- Improvements in medical therapy have decreased the stroke rate in medically treated patients in general, that is likely going to decrease the need for carotid intervention.
- Carotid interventions provide no to small benefit in reducing adverse health outcomes



de Weerd M, Greving JP, Hedblad B, et al. Prevalence of asymptomatic carotid artery stenosis in the general popu¬lation: an individual participant data meta-analysis. Stroke. 2010; 41(6): 1294-1297

Abbott AL, Brunser AM, Giannoukas A, et al. Misconcep¬tions regarding the adequacy of best medical intervention alone for asymptomatic carotid stenosis. J Vasc Surg. 2020; 71(1): 257-269.



Carotid Artery Screening

Academy of Medical Royal Colleges

Home

Recommendation

This guidance applies to those 18 years and over.

- Screening for carotid artery stenosis should **NOT** be performed in asymptomatic individuals
- There is no indication for asymptomatic screening even in patients with known peripheral vascular disease
- Other than to risk stratify patients for coronary intervention, there is no indication for asymptomatic screening of the carotid arteries in patients undergoing other forms of cardiac surgery
- There is no routine indication for follow up for asymptomatic patients with carotid artery stenosis.

Please note that this guidance is intended as a standard threshold for access. However, if you/ your patient falls outside of these criteria, the option to apply for an Individual Funding Request is still available to you.

Additionally, there is no evidence that patients diagnosed with peripheral vascular disease benefit from undergoing carotid artery stenosis screening for this indication only. There is no clear evidence for being able to risk stratify an asymptomatic patient population for carotid artery stenosis screening.

Carotid Artery Screening

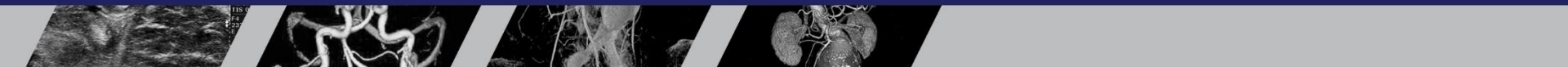
How many screening studies are actually being done?

- It is worth noting that individuals who are asymptomatic are being screened in high numbers.

  - An estimated 1.3 to 1.6 million asymptomatic individuals undergo screening for carotid artery stenosis every year.
  - Data from 2009 Medicare claims found that screening for asymptomatic carotid artery stenosis occurred in 6.6% of Medicare beneficiaries
  - An analysis of patients ages 65 years and older undergoing carotid revascularization for asymptomatic carotid stenosis between 2005 and 2009 in the Veterans Health Administration found that the rates of imaging deemed appropriate based on expert opinion was only 5.4%.
  - The most common indications listed for carotid imaging in individuals who are asymptomatic was carotid bruit, an examination finding recognized in previous USPSTF reviews as having limited value for identifying stenosis.
  - The second most common indication was previously documented carotid stenosis, a reminder that an often hidden harm of the initial screening is the multiple cascade of images that are then produced.

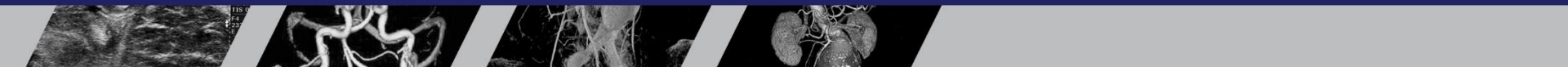
Guirguis-Blake JM,Webber EM, Coppola EL. Screening for asymptomatic carotid artery stenosis in the general population: updated evidence report and systematic review for the US Preventive Services Task Force. JAMA. 2021;325(5):1-3. doi:10.1001/jama.2020.20364

Reed J, Pearson S; Institute for Clinical and Economic Review. Choosing Wisely recommendation analysis: prioritizing opportunities for reducing inappropriate care—carotid artery stenosis screening for asymptomatic patients. Accessed March 23, 2024.



Carotid Artery Screening

- A word about the USPSTF
  - Created in 1984, the U.S. Preventive Services Task Force is an independent, volunteer panel of national experts in prevention and evidence-based medicine. The Task Force works to improve the health of people nationwide by making evidence-based recommendations about clinical preventive services such as screenings, counseling services, and preventive medications. All recommendations are published on the Task Force's Web site and/or in peer-reviewed journals.
  - The Task Force is funded by and reports to Congress annually.
- As such, recommendations arising from the task force are often widely accepted, frequently quoted, and often followed.



Carotid Artery Screening

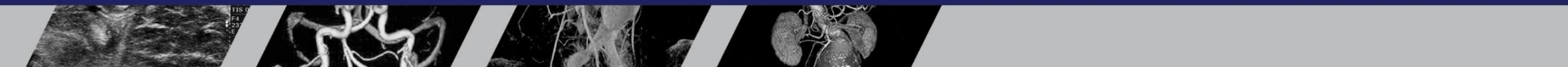
NO

Carotid Artery Screening

- However, in my opinion, there is much more to the story of carotid artery screening than a blanket statement can cover.

- In addition, when I review recommendations arising from a government agency, funded by the government, and reporting to the government, with a long list of "experts", I tend to be a bit more skeptical. I do not mean to say that money is the bottom line, but quite often it is. By the way, if the USPSTF is made up of a “volunteer panel of national experts”, why is funding even necessary?

- In fact, deep dive into the USPSTF recommendations, one would quickly note the population under consideration to be adults without a history of transient ischemic attack, stroke, or other neurologic signs or symptoms referable to the carotid arteries. As such, immediately there are exceptions to the rule of no screening.

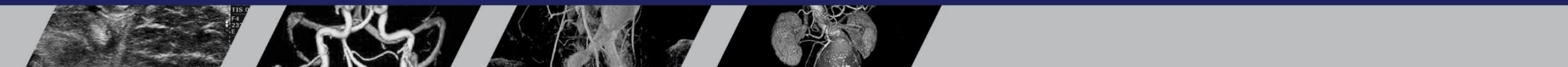


Carotid Artery Screening

- But do not forget, recommendations arising from the USPSTF require constant consideration of evidence of new surgical treatments that will have varying benefit-to-harm ratios, and these will be judged against also improving general medical therapies that would be recommended regardless of the screening.

- None of these studies of treatments address the larger issue of whether to screen with carotid ultrasonography and who is most likely to benefit.

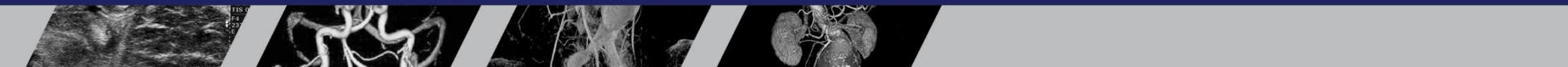
- The only answer? A randomized clinical trial conducted for imaging to detect CAS with the goal of preventing stroke. Screening for CAS should be put through the same rigorous evaluation as medical treatments and surgical interventions, particularly when the imaging directly results in the use of such treatments and medications.



Carotid Artery Screening

So, you want to take on this trial?

- Asymptomatic screen or not screen
- Follow patients over the course of 3 to 5 (preferably even 10) years
- Endpoint to see if patients who were screened had improved or worsened outcomes than those who were not.
- Since there are very well-characterized and expected immediate complications after the interventional treatments of endarterectomy and stenting, any trial would have to be long enough for patients to accrue the potential benefit of reduced strokes, since the immediate 30-day outcomes would always be worse in these intervention groups.
- Since there remains uncertainty regarding the best treatment approach for patients identified with carotid narrowing, patients could be further randomized to the treatment if identified with significant carotid narrowing, including best medical therapy (ie, statins, antiplatelets, antihypertensives, and lifestyle modifications), revascularization techniques, and combinations of both.
- Such a trial would not be judged by the outcome of whether the patient was helped or harmed by the screening itself
- The trial of diagnostic ultrasonography would be judged on the basis of clinically meaningful outcomes (eg, death, stroke, and other cardiovascular outcomes, such as myocardial infraction), which would be driven by benefits and harms of the medical and surgical treatments that result from the ultrasonographic screening.



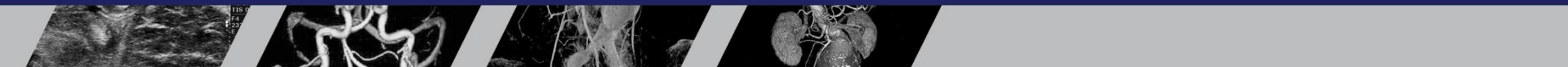
Carotid Artery Screening

OK - There is no patient benefit to the random screening of the general population for CAS

Society for Vascular Surgery: Clinical Practice Guidelines for Management of Extracranial Cerebrovascular Disease

Recommendation 4.1: We recommend against the routine screening for clinically asymptomatic carotid artery stenosis for individuals without cerebrovascular symptoms or significant risk factors for carotid artery disease (grade IB).

J Vasc Surg 2022;75:4S-22S



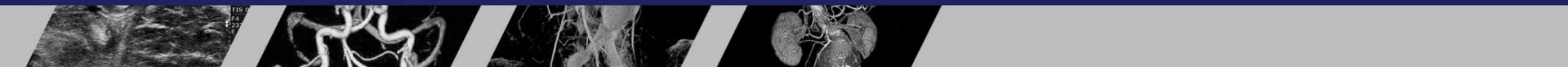
Carotid Artery Screening

- Is there a high-risk population for which carotid artery screening is beneficial and what are the endpoints measured to prove benefit.
  - Screening has been found to identify CAS in a cost-effective manner when the prevalence of significant stenosis is > 20%
  - Several risk factors increase the prevalence of CAS, including older age, male sex, hypertension, smoking, hypercholesterolemia, diabetes, and heart disease.
  - Specifically examining risk factors, the prevalence of significant CAS was only 2% if none of these risk factors were present but increased to 14% with two risk factors, 16% with three risk factors, and 67% with four risk factors.
  - 22.1% of patients with both hypertension and known cardiac disease of any type had a prevalence of CAS of >50%.

Meschia JF, Bushnell C, Boden-Albala B, et al.; American Heart Association Stroke Council; Council on Cardiovas¬cular and Stroke Nursing; Council on Clinical Cardiology; Council on Functional Genomics and Translational Biol¬ogy; Council on Hypertension. Guidelines for the primary prevention of stroke: a statement for healthcare profes¬sionals from the American Heart Association/American Stroke Association. Stroke. 2014; 45(12): 3754-3832.(3)

Jacobowitz GR, Rockman CB, Gagne PJ, Adelman MA, Lamparello PJ, Landis R, et al. A model for predicting occult carotid artery stenosis: screening is justified in a selected population. J Vasc Surg 2003;38:705-9.

Rockman CB, Jacobowitz GR, Gagne PJ, Adelman MA, Lamparello PJ, Landis R, et al. Focused screening for occult carotid artery disease: patients with known heart disease are at high risk. J Vasc Surg 2004;39:44-51.



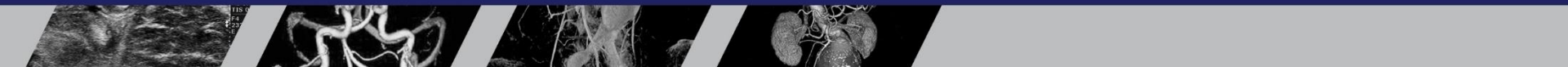
Carotid Artery Screening

Society for Vascular Surgery: Clinical Practice Guidelines for Management of Extracranial Cerebrovascular Disease

- Recommendation 4.2 . In selected asymptomatic patients who are at an increased risk of CAS, we suggest screening for clinically asymptomatic CAS, especially if patients are willing to consider carotid intervention if significant stenosis is discovered (grade 2B). These high-risk groups include:
  - Patients with lower extremity PAD
  - Patients undergoing coronary artery bypass surgery
  - Patients aged >55 years with at least two traditional atherosclerotic risk factors
  - Patients aged >55 years and active cigarette smoking
  - Patients with diabetes, hypertension, or CAD
  - Patients with clinically occult cerebral infarction noted on brain imaging studies
- Additional remarks.

  1. In these patient cohorts, the presence of a carotid bruit increases the likelihood of detecting a significant stenosis

  2. Asymptomatic individuals with an AAA or previous radiotherapy to the neck who do not meet the criteria for any of the high-risk groups noted above do not require screening



Carotid Artery Screening

Conslusions

- Screening for CAS in the general population provides no patient benefit
- Screening in a select cohort with increased risk factors for CAS may identify a patient population at risk for stroke
- When CAS is identified, therapy must be individualized, and the vast majority of patients should receive recommendations for medical therapy - not an arterial intervention.
- With regard to follow-up of those patients found to have CAS, the follow-up must be individualized. However, there are no data on which to rely to provide a follow-up algorithm.
- Finally, without a large, multi-institutional trial examining the utility of screening with real clinical endpoints we all be left to rely on our experience, government and societal guidelines, and hopefully some of the recommendations I have detailed for you today.