

2024 MID-ATLANTIC CONFERENCE
12th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

2024

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

APRIL 18-20

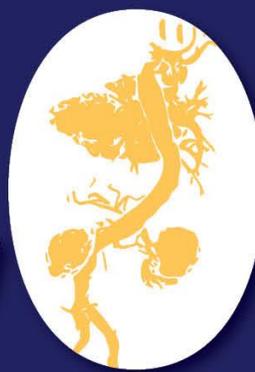


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VASCULAR THERAPIES

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Primary Care of PAD

Prevention, screening,
and initial evaluation

Kimberly Seal, DO, RPVI
Sentara Vascular Specialists

AI Generated Jokes



create joke about claudication|



Why did the claudication go to the party?

Because it heard there was going to be a "limp" sync battle!

Case scenario

Angela

- 46 yo black F presenting at 3am c/o worsening foot pain and diminishing ability to move foot. R foot wound for 3 mo also worsening.
- CTA – occluded R common iliac, internal iliac, SFA, and no runoff to foot.

Case scenario

Angela

- PMH: 1 year history of neuropathy in R foot with pain at rest, waking up at night, requiring her to move around to alleviate pain. Wound developed... burn?
 - (has seen 1 PCP and 3 specialists, ED x 2)
 - ? Auto immune disease
- SH: 1ppd smoker, alcohol abuse
- FH: mother decease in ~40s breast CA

Case scenario

Angela

- Multiple attempts at revascularization... ultimately...
 - Groin dehiscence/washout/infection
 - AKA
 - Dehiscence, VAC, washout x 4
 - 2 mo hospital stay and rehab
- Now, prosthetic...

Case scenario

Angela

- Rare disease?
- Pulse exam?
- **EVERYONE** gets sick



Introduction

- Peripheral Arterial Occlusive Disease: chronic, atherosclerotic occlusive disease of the lower extremities
- Rising global health issue
- Worldwide prevalence estimated at 12%
 - True prevalence unknown due to varying and asymptomatic symptoms



Epidemiology

- Global (meta-analysis of 34 studies)
 - > 202 million
 - ~25% increase in prevalence worldwide from previous decade
 - Higher increase in low and middle income countries
 - Higher prevalence in F at younger ages in LMIC
 - Equal between sexes in LMIC and HIC

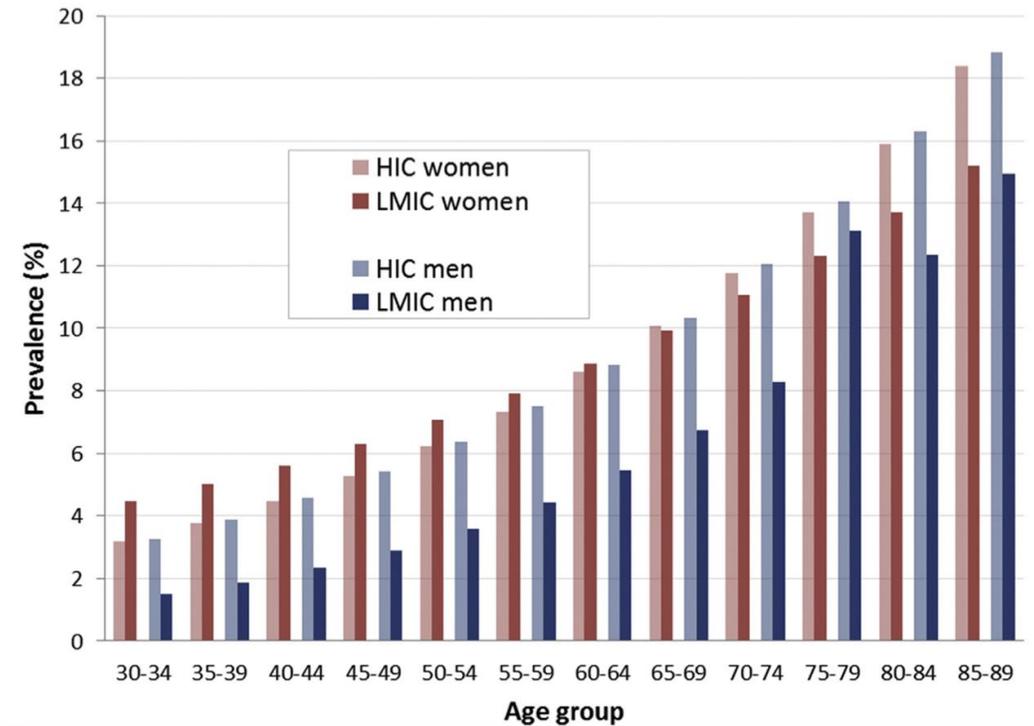


Fig 2.1. Prevalence of peripheral artery disease (PAD; ankle-brachial index [ABI] <0.9) by age and sex in high-income countries (HICs) and in low- and middle-income countries (LMICs).¹

1. Fowkes FG, Rudan D, Rudan I, Aboyans V, Denenberg JO, McDermott MM, et al. Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis. *Lancet* 2013;382:1329-40.

Epidemiology

- US
 - Estimated 8-12 million Americans have PAD
 - 4 Stages (simplified)

- Asymptomatic
- Intermittent claudication
 - Most common symptom: IC
 - 6% of individuals older than 65

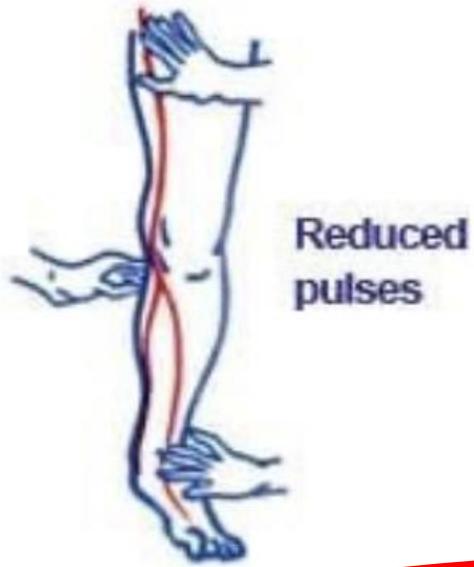
- Rest pain → CLTI
- Wounds → 2 million Americans

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← AI Generated Image

STAGE I



STAGE II



STAGE III



STAGE IV

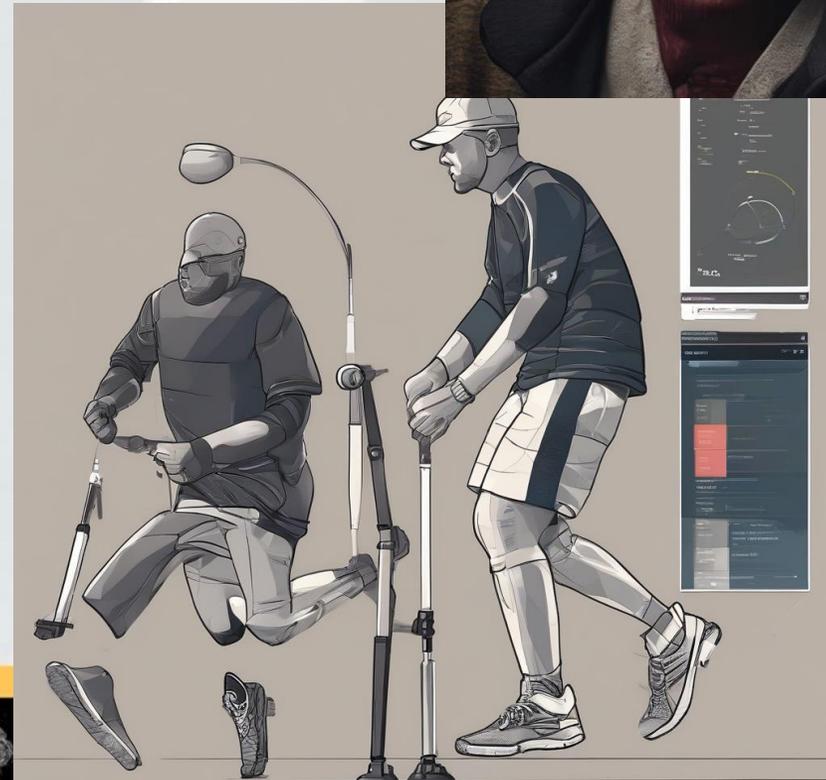


Chronic limb threatening ischemia (CLTI)

AI Generated Image →

Risk factors

- Strongest in all nations → age, tobacco use, and diabetes
 - Age – 6-8th decades (25%)
 - Smoking – primary and secondary 2-4x odds ratio increase
 - DM – 2-4x OR, markedly higher risk for amputation



AI Generated Image →

Risk factors

- HLD - \uparrow TC and LDL, \downarrow HDL
- HTN – correlation vs causation
- Obesity – control for smoking and DM...
- Homocysteine levels – worse PAD

- Socioeconomic status – control for other risk factors
- Black race – incidence changes with location... environmental?
- CKD, Alcohol, air pollution, elevated biomarkers (inflammation)

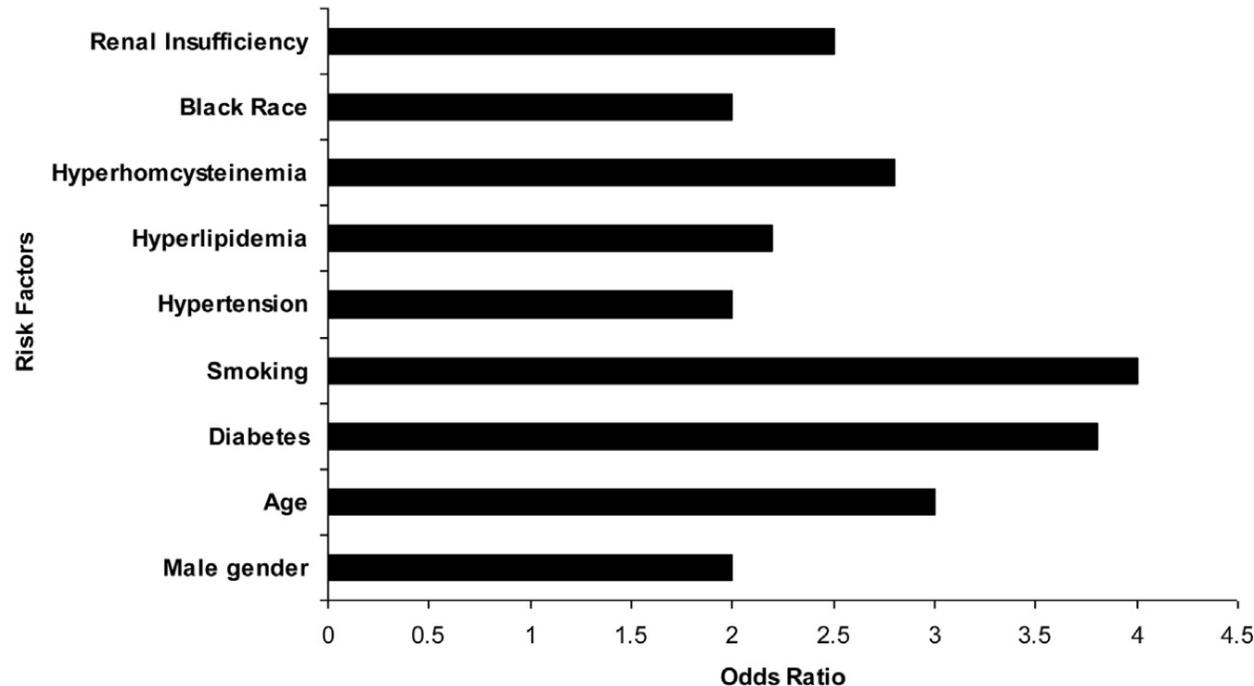


Fig 1. The approximate odds ratios (ORs) for risk factors associated with the development of peripheral arterial disease (PAD). Adapted from Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II).⁹

Clinical Syndromes of PAD Stages

Asymptomatic

- Lower burden of disease, adequate collateral flow, limited activity levels, and other sources of disability
- Significant CV risk is still present
- Criqui et al: 2.7x higher risk of mortality and 5.6x risk of CAD related death.
- 7% (4-11%) of patients will deteriorate to IC over a 5-year period on average
 - The actual progression rate is difficult to ascertain



Clinical Syndromes of PAD Stages

Intermittent Claudication

- Reproducible leg pain brought on by exercise and relieved by rest
- Symptoms arise at one level below the level of disease
- Calf claudication → femoropopliteal disease (MC)
- Thigh/buttock claudication → aortoiliac occlusive disease
 - Leriche syndrome triad – claudication, impotence, absence of femoral pulses
- Individuals with infrapopliteal disease typically do not have IC of the foot



Clinical Syndromes of PAD Stages

Ddx of Intermittent Claudication

- Clinical pearls to distinguish cause
 - Neurogenic (pseudoclaudication) – radiates, pain persists with standing
 - Venous – usually thighs, have other sx (swelling, tightness, absence of PAD)
 - Joint/MSK – pain in joints, stiffness, swelling
- Atypical leg symptoms are common in PAD patients



Clinical Syndromes of PAD

CLTI

- Advanced stage PAD, signified by ischemic rest pain or tissue necrosis present for greater than *two weeks*
 - Inclusive term for the full spectrum of ischemia and neuropathy
- Traditionally rest pain and tissue loss were different stages
- 1-10% of PAD patients, global incidence is 0.8% (1.3% USA >60)
- Many patients present with rest pain or tissue loss without hx of IC



Clinical Syndromes of PAD

CLTI

- 1-year mortality: 22% (12-33%)
- 1-year major amputation: 22% (2-42%)
- In addition to other comorbidities (cardiac, renal and pulmonary), frailty has been added as a functional indicator of prognosis
- WiFi Classification → →



Distribution of Disease

- Aortoiliac- Younger/Smoking
- Femoropopliteal- Smoking/DM
- Tibiopodal- DM/Older

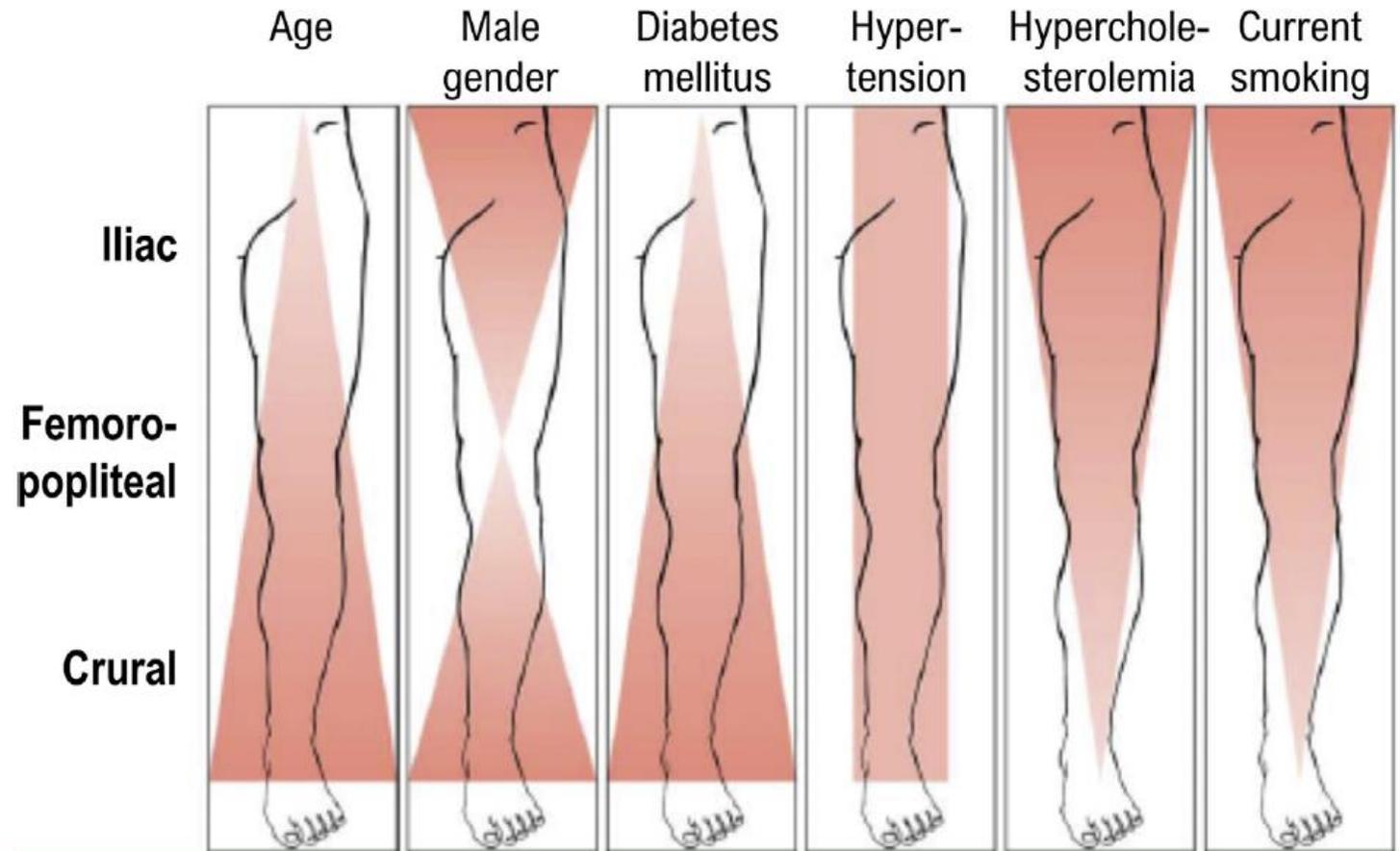


Fig 2.3. Association of risk factors with the level of atherosclerotic target lesions. The *red overlay* on the anatomic cartoon illustrates the association of risk factor with patterns of atherosclerotic disease.²¹⁷ (Reprinted from Diehm N, Shang A, Silvestro A, Do DD, Dick F, Schmidli J, et al. Association of cardiovascular risk factors with pattern of lower limb atherosclerosis in 2659 patients undergoing angioplasty. *Eur J Vasc Endovasc Surg* 2006;31:59-63.)

TASC II (2007)

Natural history

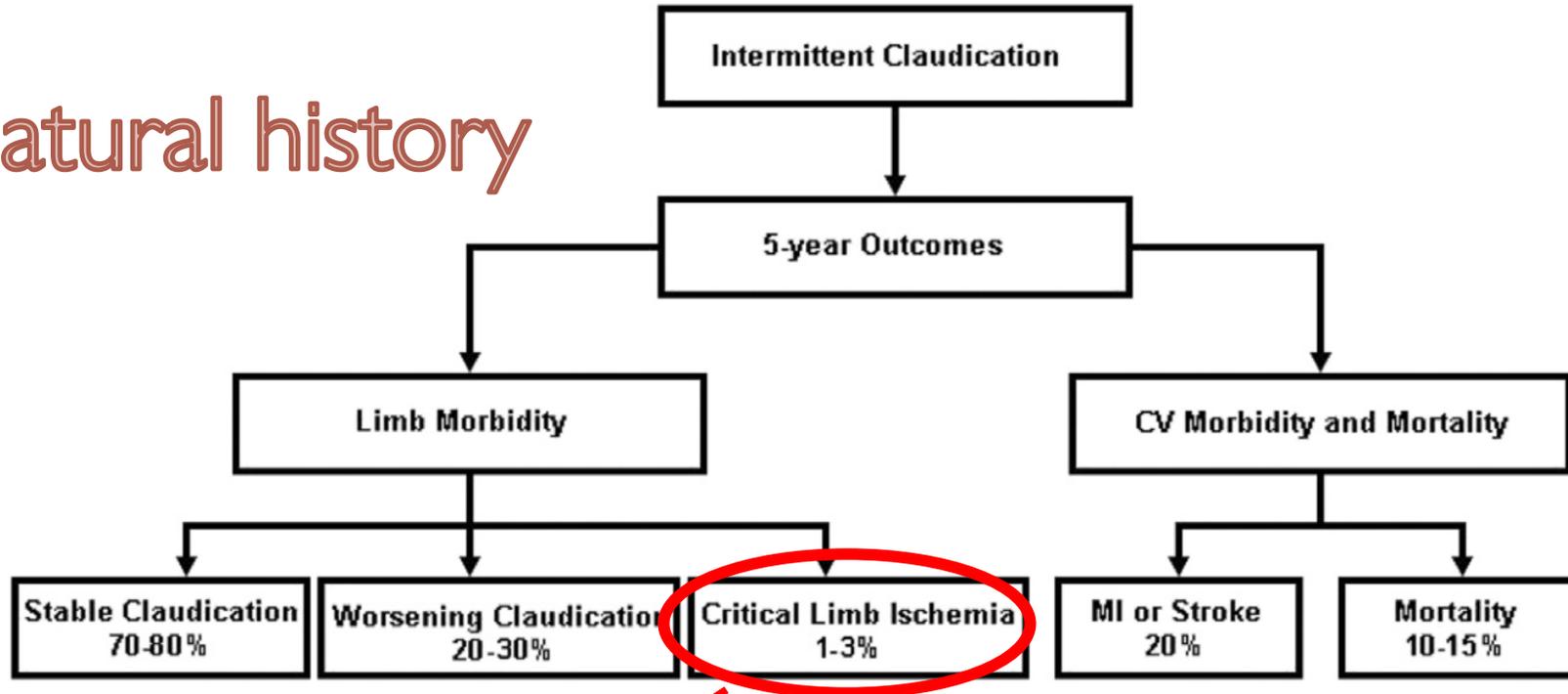


Fig 2. The natural history of patients with intermittent claudication (IC) treated with non-invasive management. *CV*, Cardiovascular; *MI*, myocardial infarction. Adapted from American College of Cardiology/American Heart Association guidelines.⁴³

More recent meta-analysis: up to 27%

Clinical Exam

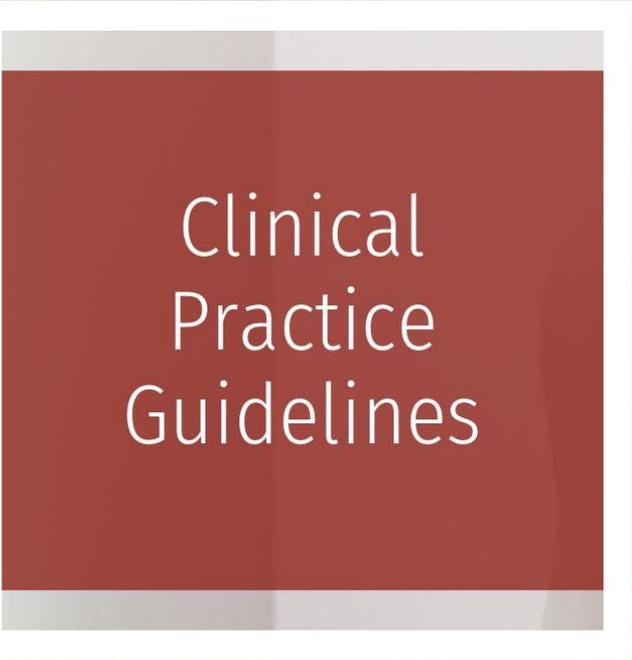
- Radial pulses
- Femoral pulses
- Popliteal pulses
- Pedal pulses



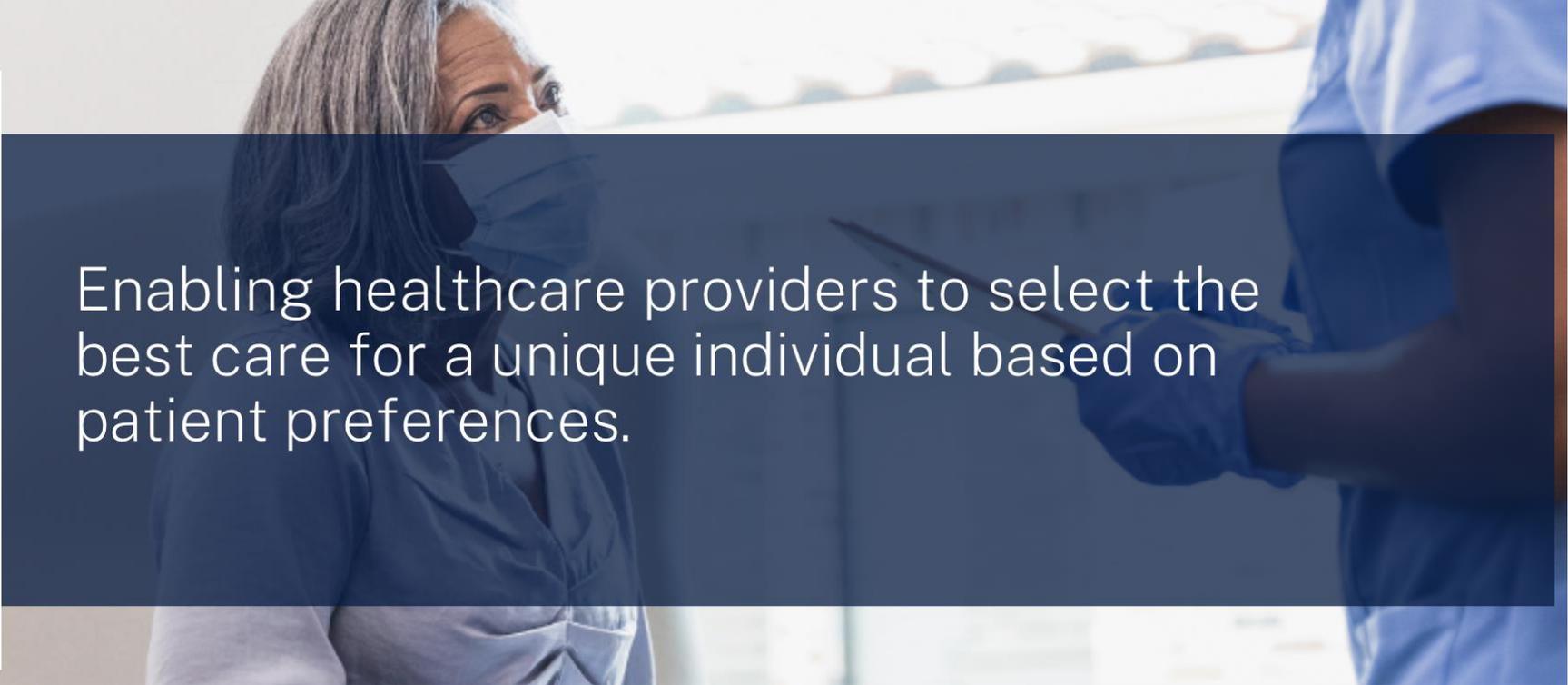
Dorsalis Pedis: To palpate pulse, place fingers just lateral to the extensor tendon of the great toe. If you cannot feel a pulse, move fingers more laterally.



Posterior Tibial: To palpate pulse, place fingers behind and slightly below the medial malleolus of the ankle. In an obese or edematous ankle, the pulse may be more difficult to feel.

A white-bordered square with a dark red background containing the text 'Clinical Practice Guidelines' in white, sans-serif font.

Clinical Practice Guidelines

A photograph of a healthcare provider wearing a blue surgical mask and a blue scrub top, looking towards the right. The image is partially obscured by a dark blue semi-transparent overlay.

Enabling healthcare providers to select the best care for a unique individual based on patient preferences.

Atherosclerotic Occlusive Disease of the Lower Extremities

Clinical practice guidelines for the **management of asymptomatic atherosclerotic occlusive disease and claudication** were published by *JVS* in March 2015.

Systematic review for screening asymptomatic patients for PAD

Systematic review of treatment of intermittent claudication in the lower extremities

[Read the Guidelines](#)

Chronic Limb-threatening Ischemia (CLI)

In June 2019, *JVS* published a supplement on chronic limb-threatening ischemia, including clinical practice guidelines, supporting systematic reviews and an editorial.

- **Revascularization outcomes of infrainguinal CTI**
- **Bypass surgery versus endovascular interventions**
- **The natural history of untreated severe or critical limb ischemia**
- **Nonrevascularization-based treatments**

From the Society for Vascular Surgery

Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: Management of asymptomatic disease and claudication

Society for Vascular Surgery Lower Extremity Guidelines Writing Group: Michael S. Conte, MD, (Co-Chair),^a Frank B. Pomposelli, MD, (Co-Chair),^b Daniel G. Clair, MD,^c Patrick J. Geraghty, MD,^d James F. McKinsey, MD,^e Joseph L. Mills, MD,^f Gregory L. Moneta, MD,^g M. Hassan Murad, MD,^h Richard J. Powell, MD,ⁱ Amy B. Reed, MD,^j Andres Schanzer, MD,^k and Anton N. Sidawy, MD, MPH,^l *San Francisco, Calif; Boston and Worcester, Mass; Cleveland, Ohio; St. Louis, Mo; New York, NY; Tucson, Ariz; Portland, Ore; Rochester, Minn; Lebanon, NH; Hershey, Pa; and Washington, D.C.*

Diagnosing



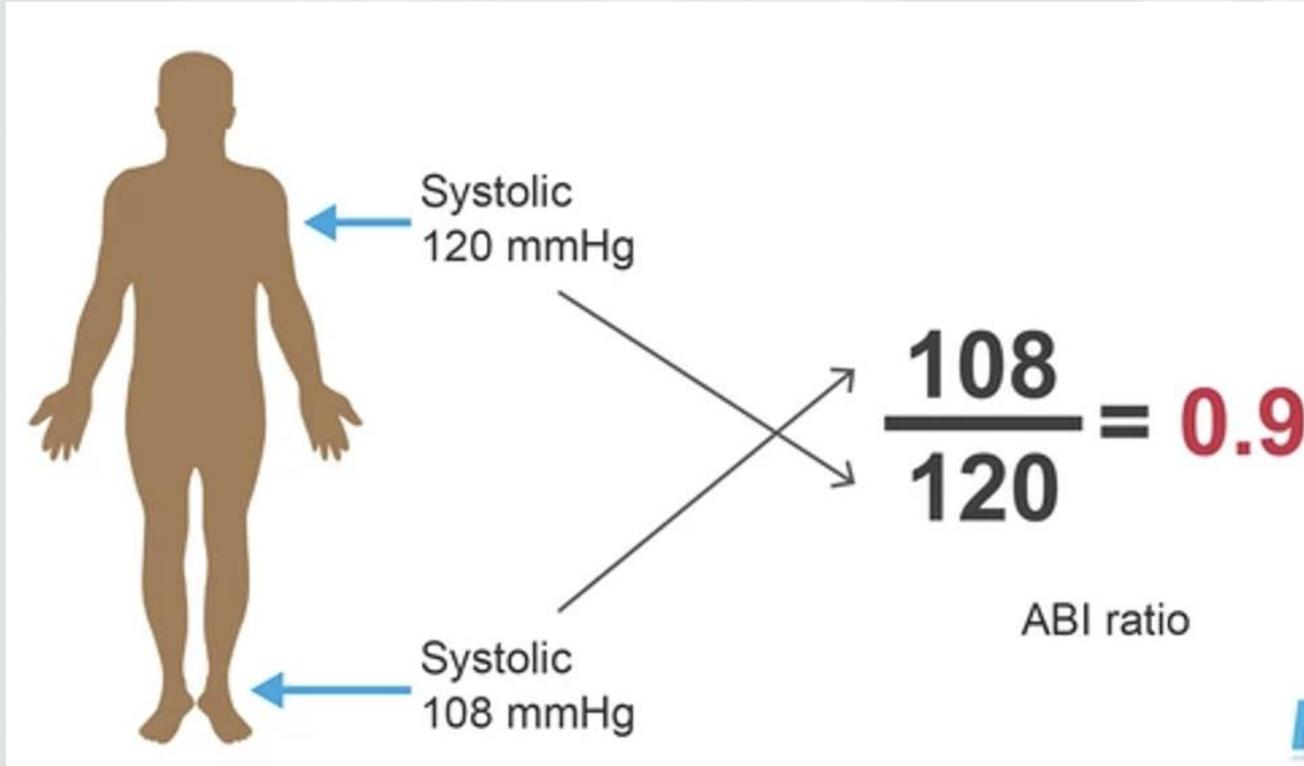
SVS Guidelines

Recommendations: Diagnosis of peripheral arterial disease (PAD)

	<i>Grade</i>	<i>Level of evidence</i>
2.1. <u>We recommend using the ABI as the first-line noninvasive test</u> to establish a diagnosis of PAD in individuals with symptoms or signs suggestive of disease. When the ABI is borderline or normal (>0.9) and symptoms of claudication are suggestive, we recommend an exercise ABI.	1	A
2.2. We suggest against routine screening for lower extremity PAD in the absence of risk factors, history, signs, or symptoms of PAD.	2	C
2.3. For asymptomatic individuals who are at elevated risk, such as those aged >70, smokers, diabetic patients, those with an abnormal pulse examination, or other established cardiovascular disease, screening for lower extremity PAD is reasonable if used to improve risk stratification, preventive care, and medical management.	2	C
2.4. In symptomatic patients who are being considered for revascularization, we suggest using physiologic noninvasive studies, such as segmental pressures and pulse volume recordings, to aid in the quantification of arterial insufficiency and help localize the level of obstruction.	2	C
2.5. In symptomatic patients in whom revascularization treatment is being considered, we recommend anatomic imaging studies, such as arterial duplex ultrasound, CTA, MRA, and contrast arteriography.	1	B

ABI, Ankle-brachial index; *CTA*, computed tomography angiography; *MRA*, magnetic resonance angiography.

$$\frac{\text{Highest ankle SBP (DP and PT)}}{\text{Highest SBP between arms}} = \text{ABI}$$



- Primary method of dx
- <0.9 = high sensitivity and specificity in dx PAD compared to gold standard angiography
- <0.9 or >1.4 = increased risk of major cardiovascular events.

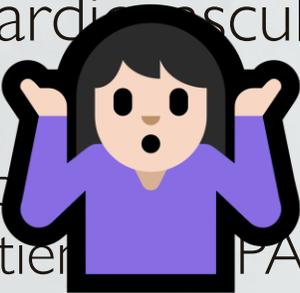
Screening?

Recommendations: Diagnosis of peripheral arterial disease (*PAD*)

	<i>Grade</i>	<i>Level of evidence</i>
2.1. We recommend using the ABI as the first-line noninvasive test to establish a diagnosis of PAD in individuals with symptoms or signs suggestive of disease. When the ABI is borderline or normal (>0.9) and symptoms of claudication are suggestive, we recommend an exercise ABI.	1	A
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ABI, Ankle-brachial index; *CTA*, computed tomography angiography; *MRA*, magnetic resonance angiography.

Screening?

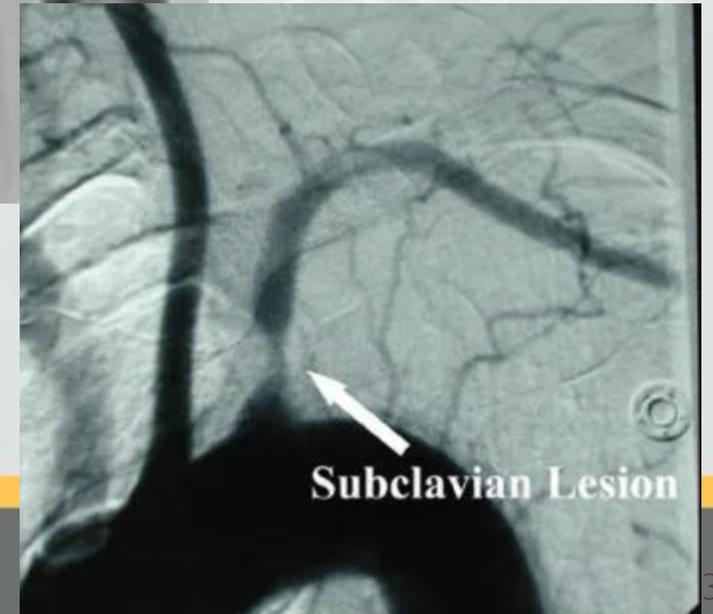
- U.S. Preventive Services Task Force  gave ABLI screening an indeterminate rating
 - Insufficient evidence to assess the balance of benefits and harms.
- The SVS-commissioned meta-analysis: ABLI testing may incrementally improve cardiovascular risk prediction, but 
 - Existing evidence does not support population screening of asymptomatic patients for PAD.

AI Generated Image →



When is ABI unreliable?

- Diabetes and CKD (medial calcinosis results in incompressibility of tibial vessels)
 - Of symptomatic patients with PAD with 50% or greater stenosis on DUS examination, 43% had normal/inconclusive resting ABIs (49% in diabetics and 57% in CKD).
- Subclavian artery stenosis (bilateral)



$$\frac{\textit{Toe SBP}}{\textit{Highest SBP between arms}} = \textit{TBI}$$

- Use a digit BP cuff and PPG monitor or doppler measurement distal to cuff
- Inflate the toe pressure cuff above normal SBP until the distal PPG signal flattens (or doppler signal ceases), indicating total arterial occlusion.
- Deflate cuff, and the pressure at which the phasic PPG waveform (or doppler signal) reappears is determined as the systolic pressure.



Management



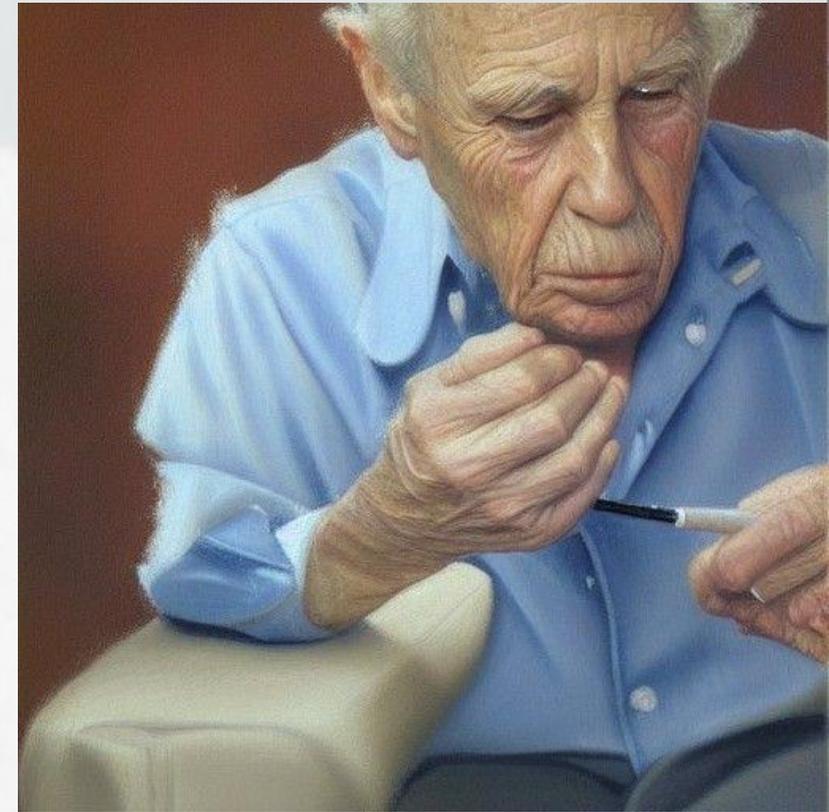
SVS Guidelines

Recommendations: Management of asymptomatic disease

	<i>Grade</i>	<i>Level of evidence</i>
3.1. <u>We recommend multidisciplinary comprehensive smoking cessation interventions for patients with asymptomatic PAD who use tobacco (repeatedly until tobacco use has stopped).</u>	1	A
3.2. We recommend providing education about the signs and symptoms of PAD progression to asymptomatic patients with PAD.	1	Ungraded
3.3. We recommend against invasive treatments for PAD in the absence of symptoms, regardless of hemodynamic measures or imaging findings demonstrating PAD.	1	B

Smoking cessation

- Unarguably one of the most significant risk factors
 - Most modifiable
 - Rates falling in HIC but not in LMIC
 - Medication assistance
 - NRT
 - Bupropion ER
 - Varenicline (nicotinic acetylcholine receptor partial agonist)
 - Clonidine – alleviate withdrawal
 - Nortriptyline – increases serotonin and norepinephrine
 - Anxiolytics
 - Buspirone (non BZD anxiolytic, targets serotonin)
 - Diazepam in combination with psychiatry
 - Ondansetron – 5-HT3 receptor agonist – lessens nicotine reinforcing effect
 - Beta blockers
 - Naltrexone
 - NicVAX
- Strongest Evidence



AI Generated Patient ↑

SVS Guidelines

Recommendations: Management of asymptomatic disease

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3.3. We recommend against invasive treatments for PAD in the absence of symptoms, regardless of hemodynamic measures or imaging findings demonstrating PAD.	1	B

SVS Guidelines

Recommendations: Medical treatment for intermittent claudication (IC)

		Grade	Level of evidence
✓ 4.1.	We recommend multidisciplinary comprehensive smoking cessation interventions for patients with IC (repeatedly until tobacco use has stopped).	1	A
4.2.	<u>We recommend statin therapy in patients with symptomatic PAD.</u>	1	A
4.3.	We recommend optimizing diabetes control (hemoglobin A _{1c} goal of <7.0%) in patients with IC if this goal can be achieved without hypoglycemia.	1	B
4.4.	We recommend the use of indicated β -blockers (eg, for hypertension, cardiac indications) in patients with IC. There is no evidence supporting concerns about worsening claudication symptoms.	1	B
4.5.	In patients with IC due to atherosclerosis, we recommend antiplatelet therapy with aspirin (75-325 mg daily).	1	A
4.6.	We recommend clopidogrel in doses of 75 mg daily as an effective alternative to aspirin for antiplatelet therapy in patients with IC.	1	B
4.7.	In patients with IC due to atherosclerosis, we suggest against using warfarin for the sole indication of reducing the risk of adverse cardiovascular events or vascular occlusions.	1	C
4.8.	We suggest against using folic acid and vitamin B ₁₂ supplements as a treatment of IC.	2	C
4.9.	In patients with IC who do not have congestive heart failure, we suggest a 3-month trial of cilostazol (100 mg twice daily) to improve pain-free walking.	2	A
4.10.	In patients with IC who cannot tolerate or have contraindications for cilostazol, we suggest a trial of pentoxifylline (400 mg thrice daily) to improve pain-free walking.	2	B

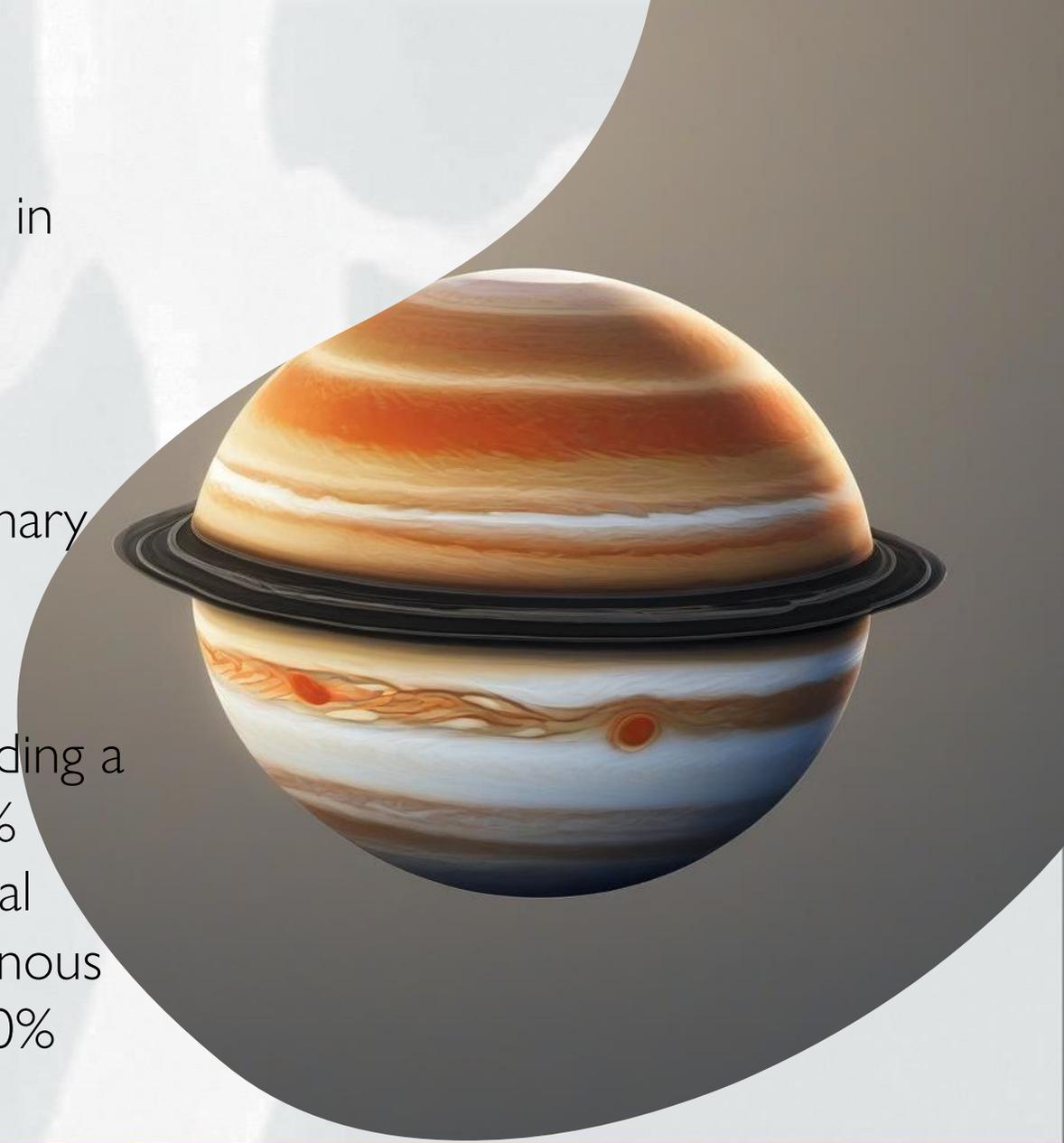
Medical Treatment

- The most important element of treatment of patients with PAD is aimed at reducing the risk of death from cardiovascular causes
 - Modern “Best Medical Therapy”
- Basic medical management: daily antiplatelet and statin therapy, in addition to optimization of other comorbidities (DM, HTN, CAD)



Lipid Lowering

- Landmark Trial: Justification for the Use of Statins in Prevention: an Intervention Trial Evaluating Rosuvastatin (JUPITER)
 - Examined the use of intensive statin therapy
 - Rosuvastatin 20 mg daily vs placebo) in a primary prevention trial.
 - 307,308 In total,
 - 44% reduction in major vascular events, including a 54% reduction in myocardial infarction, a 48% reduction in stroke, a 46% reduction in arterial revascularization, a 43% reduction in deep venous thrombosis or pulmonary embolism, and a 20% reduction in mortality.



Statins - Mechanism

- Improve endothelial function
- Reduce LDL oxidation
- Increase nitric oxide production
- Inhibit the migration of macrophages
- Inhibit smooth muscle cell proliferation
- Anti-Inflammatory Actions
- Decrease platelet activity



- PLAQUE STABILIZATION

High, Moderate, and Low-Intensity Statin Therapy

	High Intensity	Moderate Intensity	Low Intensity
LDL-C lowering†	≥50%	30%–49%	<30%
Statins	Atorvastatin (40 mg‡) 80 mg Rosuvastatin 20 mg (40 mg)	Atorvastatin 10 mg (20 mg) Rosuvastatin (5 mg) 10 mg Simvastatin 20–40 mg§	Simvastatin 10 mg
	...	Pravastatin 40 mg (80 mg) Lovastatin 40 mg (80 mg) Fluvastatin XL 80 mg Fluvastatin 40 mg BID Pitavastatin 1–4 mg	Pravastatin 10–20 mg Lovastatin 20 mg Fluvastatin 20–40 mg

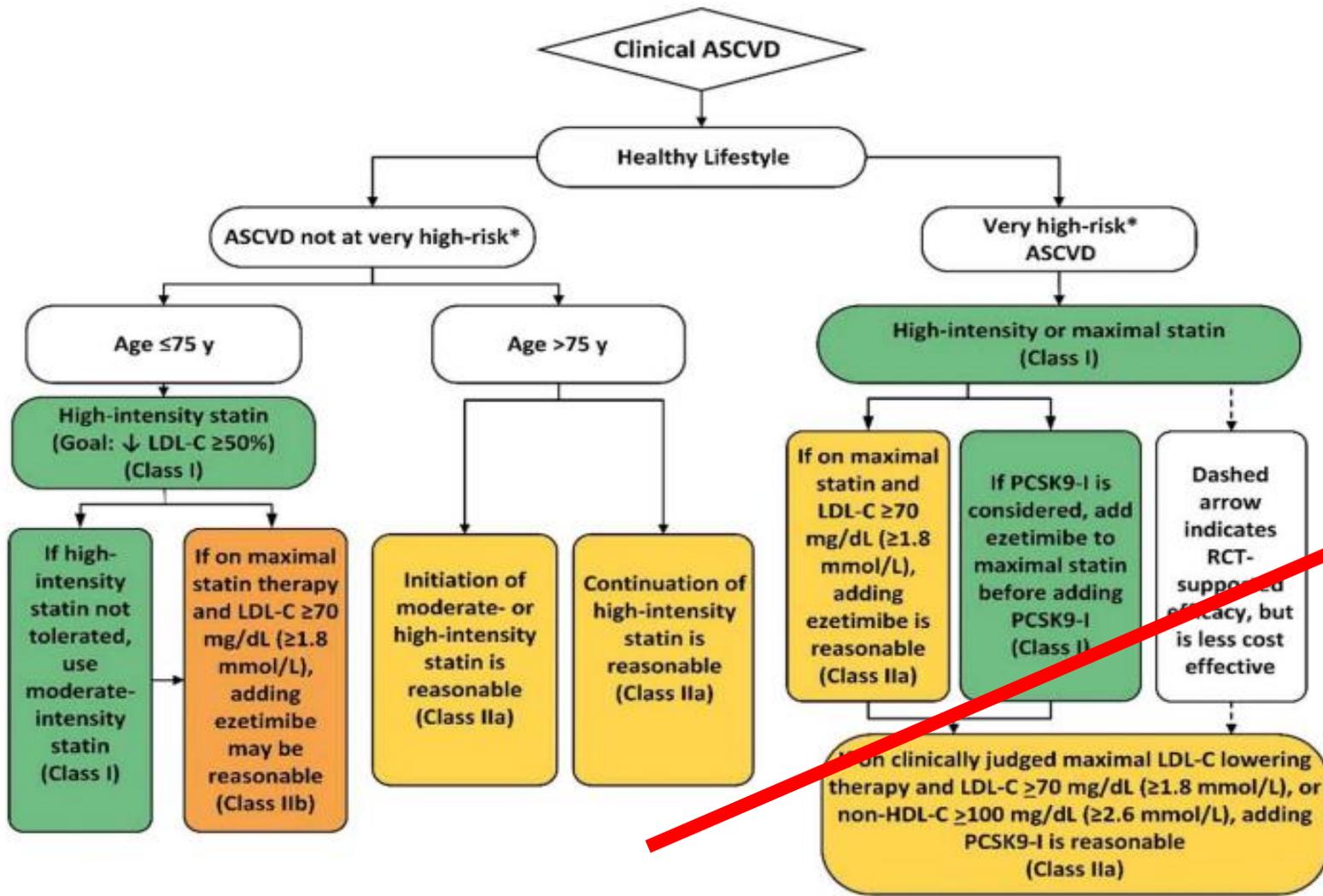
Circulation

CHOLESTEROL CLINICAL PRACTICE GUIDELINES

2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/ APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: Executive Summary

**A Report of the American College of Cardiology/American Heart
Association Task Force on Clinical Practice Guidelines**

Goal LDL <100 (70 ideal); Goal HDL >40 (60 ideal)



- High intensity statin
- If LDL-C >70, add ezetimibe
- If still >70, add PCSK9-Inhibitor.

Figure 1. Secondary prevention in patients with clinical ASCVD.

Colors correspond to Class of Recommendation in Table 2. Clinical ASCVD consists of acute coronary syndrome (ACS), those with history of myocardial infarction (MI), stable or unstable angina or coronary other arterial revascularization, stroke, transient ischemic attack (TIA), or peripheral artery disease (PAD) including aortic aneurysm, all of atherosclerotic origin. Very high-risk includes a history of multiple major ASCVD events or 1 major ASCVD event and multiple high-risk conditions (Table 4). ACS indicates acute coronary syndrome; ASCVD, atherosclerotic cardiovascular disease; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; MI, myocardial infarction; and PCSK9i, PCSK9 inhibitor.

SVS Guidelines (Asx and IC)

Recommendations: Medical treatment for intermittent claudication (IC)

		<i>Grade</i>	<i>Level of evidence</i>
4.1.	We recommend multidisciplinary comprehensive smoking cessation interventions for patients with IC (repeatedly until tobacco use has stopped).	1	A
4.2.	We recommend statin therapy in patients with symptomatic PAD.	1	A
4.3.	<u>We recommend optimizing diabetes control (hemoglobin A_{1c} goal of <7.0%) in patients with IC if this goal can be achieved without hypoglycemia.</u>	1	B
4.4.	We recommend the use of indicated β -blockers (eg, for hypertension, cardiac indications) in patients with IC. There is no evidence supporting concerns about worsening claudication symptoms.	1	B
4.5.	In patients with IC due to atherosclerosis, we recommend antiplatelet therapy with aspirin (75-325 mg daily).	1	A
4.6.	We recommend clopidogrel in doses of 75 mg daily as an effective alternative to aspirin for antiplatelet therapy in patients with IC.	1	B
4.7.	In patients with IC due to atherosclerosis, we suggest against using warfarin for the sole indication of reducing the risk of adverse cardiovascular events or vascular occlusions.	1	C
4.8.	We suggest against using folic acid and vitamin B ₁₂ supplements as a treatment of IC.	2	C
4.9.	In patients with IC who do not have congestive heart failure, we suggest a 3-month trial of cilostazol (100 mg twice daily) to improve pain-free walking.	2	A
4.10.	In patients with IC who cannot tolerate or have contraindications for cilostazol, we suggest a trial of pentoxifylline (400 mg thrice daily) to improve pain-free walking.	2	B

Summary of evidence: Medical treatment for intermittent claudication (IC)

<i>Clinical question</i>	<i>Data source</i>	<i>Finding</i>	<i>Quality of evidence</i>
The effect of diabetes control on mortality and morbidity of patients with IC	No direct trials in PAD; indirect evidence considered	Tight glycemic control in patients with type 2 diabetes reduced amputation (RR, 0.65; 95% CI, 0.45-0.94) ¹⁰⁵	B

SVS Guidelines (Asx and IC)

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Cardiac Output (CO)

CO = stroke volume X heart rate

- **Strong association** between hypertension and CVD, including PAD; however, the relative risk is less for hypertension than for smoking or diabetes.
- Treatment of hypertension is indicated to **reduce** cardiovascular events, including **congestive heart failure, stroke, and death**.
- There is no evidence that β -adrenergic blockers worsen the symptoms of IC.
- ACEIs reduce the risk of death and nonfatal cardiac events in patients with left ventricular dysfunction.
- Heart Outcomes Prevention Evaluation study: 4051 patients with PAD treated with ramipril had a 25% reduction of cardiac events and may help increase walking performance.

SVS Guidelines (Asx and IC)

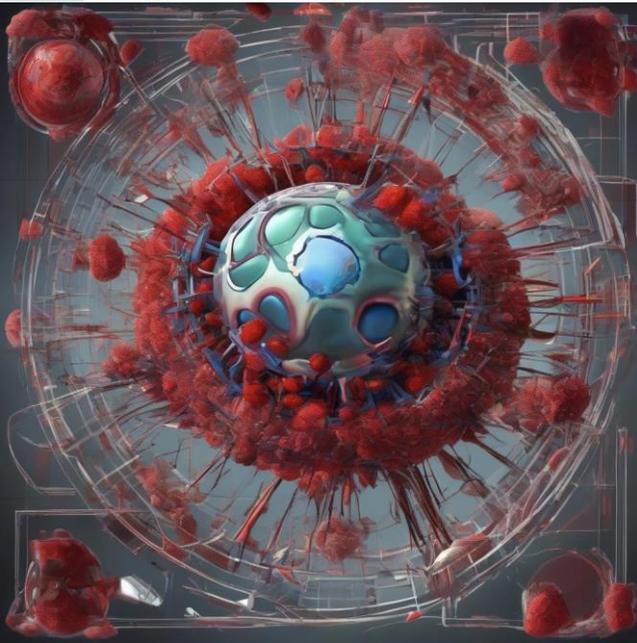
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4.7.	In patients with IC due to atherosclerosis, we suggest against using warfarin for the sole indication of reducing the risk of adverse cardiovascular events or vascular occlusions.	1	C
4.8.	We suggest against using folic acid and vitamin B ₁₂ supplements as a treatment of IC.	2	C
4.9.	In patients with IC who do not have congestive heart failure, we suggest a 3-month trial of cilostazol (100 mg twice daily) to improve pain-free walking.	2	A
4.10.	In patients with IC who cannot tolerate or have contraindications for cilostazol, we suggest a trial of pentoxifylline (400 mg thrice daily) to improve pain-free walking.	2	B

Summary of evidence: Medical treatment for intermittent claudication (IC)

<i>Clinical question</i>	<i>Data source</i>	<i>Finding</i>	<i>Quality of evidence</i>
The effect of antiplatelet therapy on mortality and morbidity of patients with IC	Meta-analysis ¹⁰⁶ of 12 trials in patients with IC	Antiplatelet agents reduced all cause (RR, 0.76; 95% CI, 0.60-0.98), cardiovascular mortality (RR, 0.54; 95% CI, 0.32-0.93), and the risk of needing revascularization (RR, 0.65; 95% CI, 0.43-0.97). Major bleeding estimate was imprecise (RR, 1.73; 95% CI, 0.51-5.83). In one trial, clopidogrel had a modest advantage over aspirin	A

“clopidogrel”



“baby aspirin”



SVS Guidelines (Asx and IC)

Recommendations: Medical treatment for intermittent claudication (IC)

		<i>Grade</i>	<i>Level of evidence</i>
4.1.	We recommend multidisciplinary comprehensive smoking cessation interventions for patients with IC (repeatedly until tobacco use has stopped).	1	A
4.2.	We recommend statin therapy in patients with symptomatic PAD.	1	A
4.3.	We recommend optimizing diabetes control (hemoglobin A _{1c} goal of <7.0%) in patients with IC if this goal can be achieved without hypoglycemia.	1	B
4.4.	We recommend the use of indicated β -blockers (eg, for hypertension, cardiac indications) in patients with IC. There is no evidence supporting concerns about worsening claudication symptoms.	1	B
4.5.	In patients with IC due to atherosclerosis, we recommend antiplatelet therapy with aspirin (75-325 mg daily).	1	A
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- Warfarin: reduces MI or stroke in patients with CAD; but 4.5-fold increase in major bleeding.
- No evidence that warfarin decreases the likelihood of adverse events related to PAD alone.
- One prospective trial exists comparing the effect of warfarin vs aspirin on graft patency.
 - Similar number of graft occlusions in both study cohorts, with a twofold increased risk of major bleeding in the warfarin cohort.



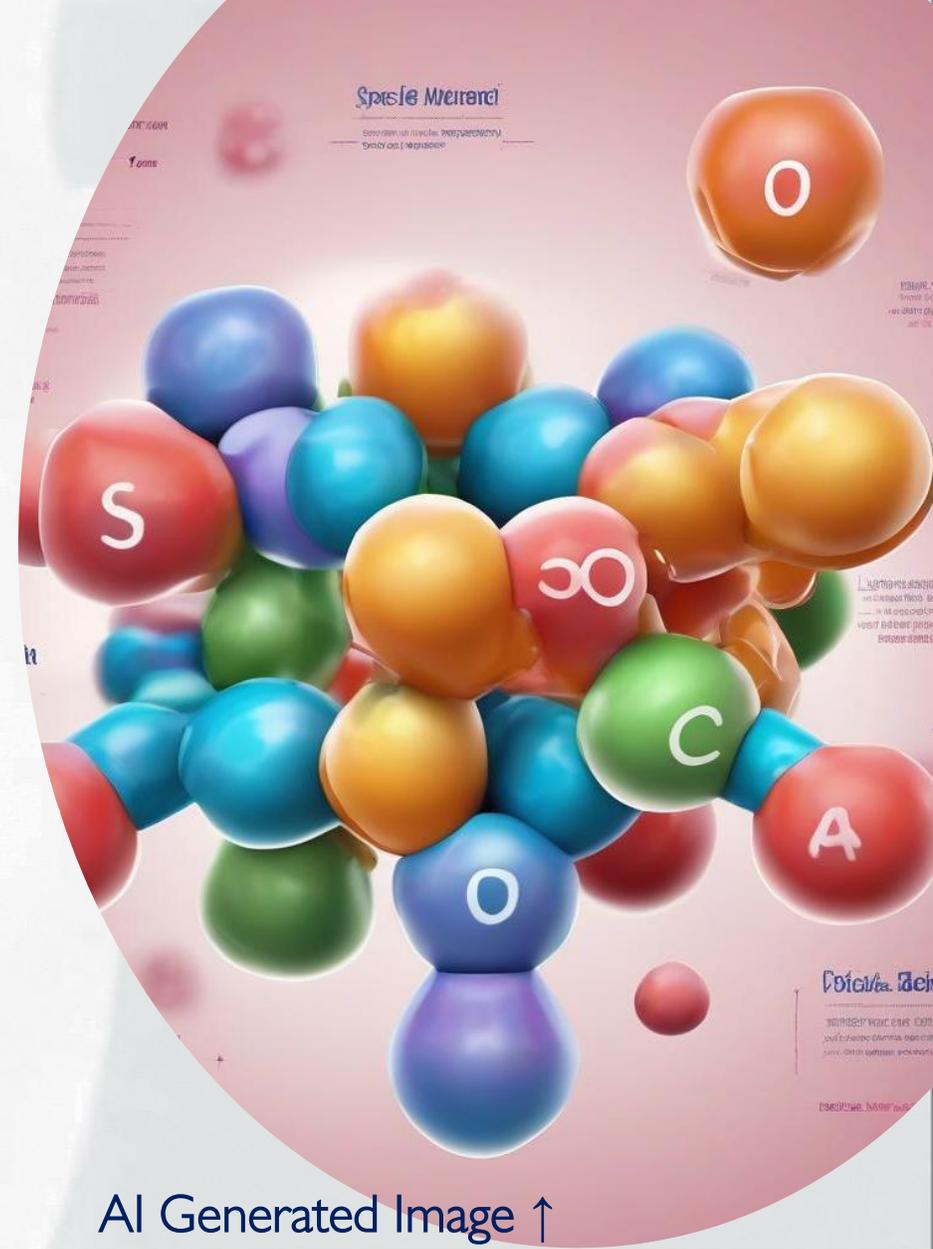
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- ~30% of patients with PAD have elevated serum levels of homocysteine compared with 1% in the general population.
- Folic acid and B12 can reduce serum homocysteine levels by 25% and 7%, respectively
- NO data that shows reducing homocysteine serum levels decreases the likelihood of adverse cardiovascular events in patients with PAD, although clinical trials are ongoing.
- Pending the outcomes of prospective trials, treating hyperhomocysteinemia with folic acid to reduce serum levels to <10 mmol/L is generally safe and well tolerated but currently no proven benefit.



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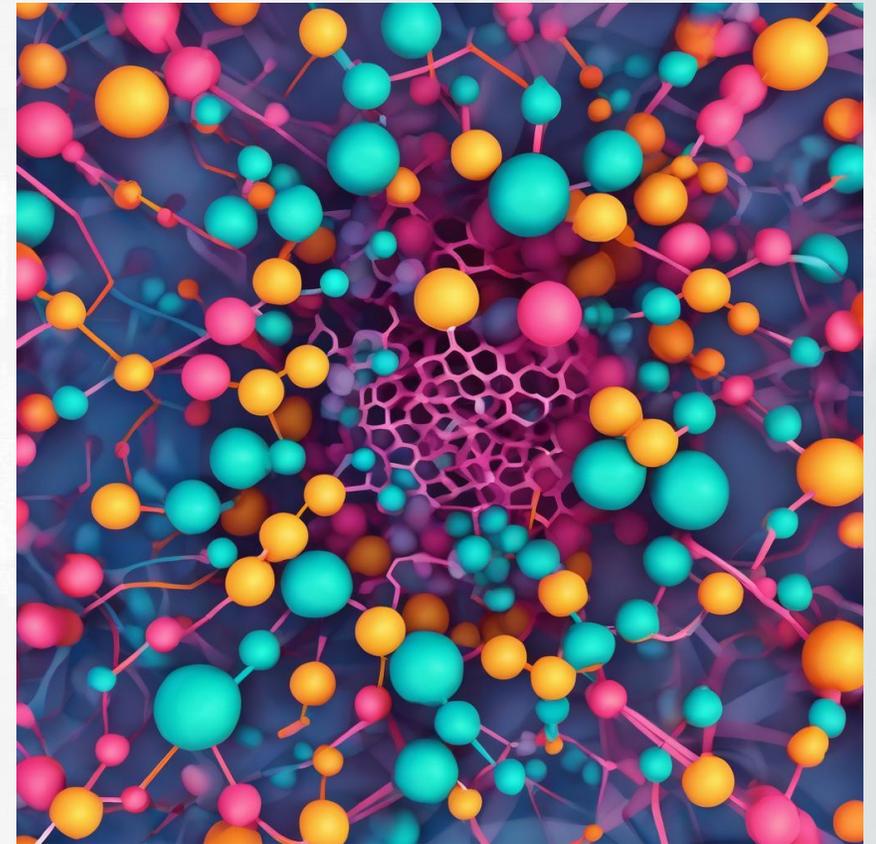
SVS Guidelines (Asx and IC)

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- Cilostazol [50 or 100mg BID]
 - Phosphodiesterase III inhibitor [Increases cAMP → inhibits smooth muscle cells and platelet aggregation, raises HDL, ?modulates VEGF]
 - Metabolized by P-450
- Contraindicated in heart failure patients, increases risk of exacerbation and hospitalization
- When effective, walking distances can be **increased up to 56%**. Noticed in as little as 4 weeks.
- Little symptom relieve with medical therapy alone. Best results with exercise therapy.

“Cilostazol”



SVS Guidelines (Asx and IC)

Recommendations: Medical treatment for intermittent claudication (IC)

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- Pentoxifylline – reduces blood viscosity and inhibits platelet Aggregation → improved blood flow and enhanced tissue oxygenation
- Walking distance can be increased up to 30%



SVS Guidelines (Asx and IC)

Recommendations: Exercise therapy

	<i>Grade</i>	<i>Level of evidence</i>
4.12. <u>We recommend as first-line therapy a supervised exercise program consisting of walking a minimum of three times per week (30-60 min/session) for at least 12 weeks to all suitable patients with IC.</u>	1	A
4.13. We recommend home-based exercise, with a goal of at least 30 minutes of walking three to five times per week when a supervised exercise program is unavailable or for long-term benefit after a supervised exercise program is completed.	1	B
4.14. In patients who have undergone revascularization therapy for IC, we recommend exercise (either supervised or home based) for adjunctive functional benefits.	1	B
4.15. We recommend that patients with IC be followed up annually to assess compliance with lifestyle measures (smoking cessation, exercise) and medical therapies as well as to determine if there is evidence of progression in symptoms or signs of PAD. Yearly ABI testing may be of value to provide objective evidence of disease progression.	1	C

SVS Guidelines (Asx and IC)

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	<i>Grade</i>	<i>Level of evidence</i>
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Supervised Exercise Therapy

- Improvements in pain-free ambulation and overall walking performance
- Best initial therapy for IC
 - **AHA** recommendation
- Exercise: 30-45min, 3-4 times/week, >12 weeks, walk until pain threshold is met
- Poor patient compliance is a major setback
- 34% of patients cannot exercise, 30% refuse
- Medicare supports 12 weeks, 36 sessions of supervised exercise



Our Program

We designed our vascular rehab program for people who have early-stage PAD with intermittent claudication (occasional leg pain).

Our 12-week program includes:

Supervised exercise therapy with our specially trained staff three days a week

Our expert staff includes:

- Certified cardiac yoga instructor
- Certified diabetes educator
- Exercise physiologist
- Registered dietitian

How to Get Started

To participate in our vascular rehab program, you'll need to:

- Have your doctor's referral
- Be able to walk, even for short distances

Medicare covers PAD supervised exercise therapy for people who have PAD with intermittent claudication. Many private health insurance plans also cover this therapy. Before you begin the program, our team can help you find out whether your health insurance plan covers it.

Initial assessment that includes:

- Functional assessment on a treadmill to see how well you can walk
- Quality of life evaluation to understand how PAD is affecting your home life
- Depression screening to assess your emotional health
- Dietary review to recommend a healthy eating plan

Education through group sessions and one-on-one counseling

Coordination with your vascular surgeon for your initial assessment and approval of your treatment plan

Regular updates through comprehensive session reports to keep your doctors informed



SVS Guidelines (Asx and IC)

Recommendations: General considerations on invasive treatment for intermittent claudication (IC)

	<i>Grade</i>	<i>Level of evidence</i>
5.1. <u>We recommend EVT or surgical treatment of IC for patients with significant functional or lifestyle-limiting disability when there is a reasonable likelihood of symptomatic improvement with treatment, when pharmacologic or exercise therapy, or both, have failed, and when the benefits of treatment outweigh the potential risks.</u>	I	B
5.2. We recommend an individualized approach to select an invasive treatment for IC. The modality offered should provide a reasonable likelihood of sustained benefit to the patient (>50% likelihood of clinical efficacy for at least 2 years). For revascularization, anatomic patency (freedom from hemodynamically significant restenosis) is considered a prerequisite for sustained efficacy.	I	C

CLINICAL PRACTICE GUIDELINE DOCUMENT

Global vascular guidelines on the management of chronic limb-threatening ischemia



Michael S. Conte, MD (Co-Editor),^a Andrew W. Bradbury, MD (Co-Editor),^b Philippe Kolh, MD (Co-Editor),^c John V. White, MD (Steering Committee),^d Florian Dick, MD (Steering Committee),^e Robert Fitridge, MBBS (Steering Committee),^f Joseph L. Mills, MD (Steering Committee),^g Jean-Baptiste Ricco, MD (Steering Committee),^h Kalkunte R. Suresh, MD (Steering Committee),ⁱ M. Hassan Murad, MD, MPH,^j and the GVG Writing Group,* *San Francisco, Calif; Birmingham, United Kingdom; Wallonia, Belgium; Niles, Ill; St. Gallen, Switzerland; Adelaide, South Australia; Houston, Tex; Poitiers, France; Bangalore, India; and Rochester, Minn*

Joint guidelines of the Society for Vascular Surgery, European Society for Vascular Surgery, and World Federation of Vascular Societies

Endorsed by the American Podiatric Medical Association, British Cardiovascular Society, British Society for Endovascular Therapy, British Society of Interventional Radiology, Circulation Foundation, College of Podiatry, Society of Interventional Radiology, Society for Vascular Nursing, the Society for Vascular Technology of Great Britain and Ireland, and the Vascular Society of Great Britain and Ireland

SVS Guidelines (CLTI)

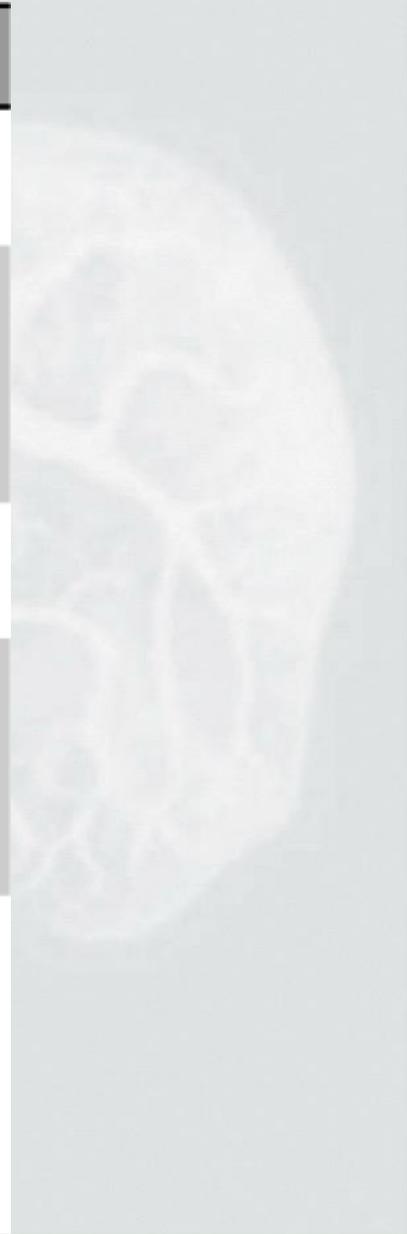
	Recommendation	Grade	Level of evidence	Key references
1. Definitions and nomenclature				
1.1	Use objective hemodynamic tests to determine the presence and to quantify the severity of ischemia in all patients with suspected CLTI.	1 (Strong)	C (Low)	de Graaff, ¹⁶ 2003 Brownrigg, ¹⁷ 2016 Wang, ¹⁸ 2016
1.2	Use a lower extremity threatened limb classification <u>staging system</u> (eg, SVS's Wifl classification system) that grades wound extent, degree of ischemia, and severity of infection to guide clinical management in all patients with suspected CLTI.	1 (Strong)	C (Low)	See Table 1.2 in full guideline.
2. Global epidemiology and risk factors for CLTI				
No recommendations				
3. Diagnosis and limb staging in CLTI				
3.1	Perform a detailed history to determine symptoms, past medical history, and cardiovascular risk factors in all patients with suspected CLTI.	Good practice statement		
3.2	Perform a complete cardiovascular physical examination of all patients with suspected CLTI.	Good practice statement		
3.3	Perform a <u>complete examination of the foot</u> , including an assessment of neuropathy and a probe-to-bone test of any open ulcers, in all patients with pedal tissue loss and suspected CLTI.	Good practice statement		
3.4	Measure AP and ABI as the first-line noninvasive test in all patients with suspected CLTI.	1 (Strong)	B (Moderate)	Lijmer, ¹⁹ 1996 Dachun, ²⁰ 2010

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Alt text: Christopher Murter, MD

	Recommendation	Grade	Level of evidence	Key references
3.5	Measure <u>TP and TBI in all patients with suspected CLTI and tissue loss (Fig 3.1 in full guideline).</u>	1 (Strong)	B (Moderate)	Aboyans, ²¹ 2008 Salaun, ²² 2018
3.6	<u>Consider using alternative methods for noninvasive assessment of perfusion, such as PVR, transcutaneous oximetry, or skin perfusion pressure, when ankle and toe pressures, indices, and waveforms cannot be assessed.</u>	2 (Weak)	C (Low)	Aboyans, ²¹ 2008 Shirasu, ²³ 2016 Saluan, ²² 2018
3.7	Consider DUS imaging as the first arterial imaging modality in patients with suspected CLTI.	2 (Weak)	B (Moderate)	Hingorani, ²⁴ 2008
3.8	Consider noninvasive vascular imaging modalities (DUS, CTA, MRA) when available before invasive catheter angiography in patients with suspected CLTI who are candidates for revascularization.	2 (Weak)	B (Moderate)	Larch, ²⁵ 1997 Adriaensen, ²⁶ 2004 Hingorani, ²⁷ 2004 Collins, ²⁸ 2007 Hingorani, ²⁴ 2008 Met, ²⁹ 2009
3.9	<u>Obtain high-quality angiographic imaging of the lower limb (with modalities and techniques to be determined by local availability of facilities and expertise). This should include the ankle and foot in all patients with suspected CLTI who are considered potential candidates for revascularization.</u>	Good practice statement		



4. Medical management

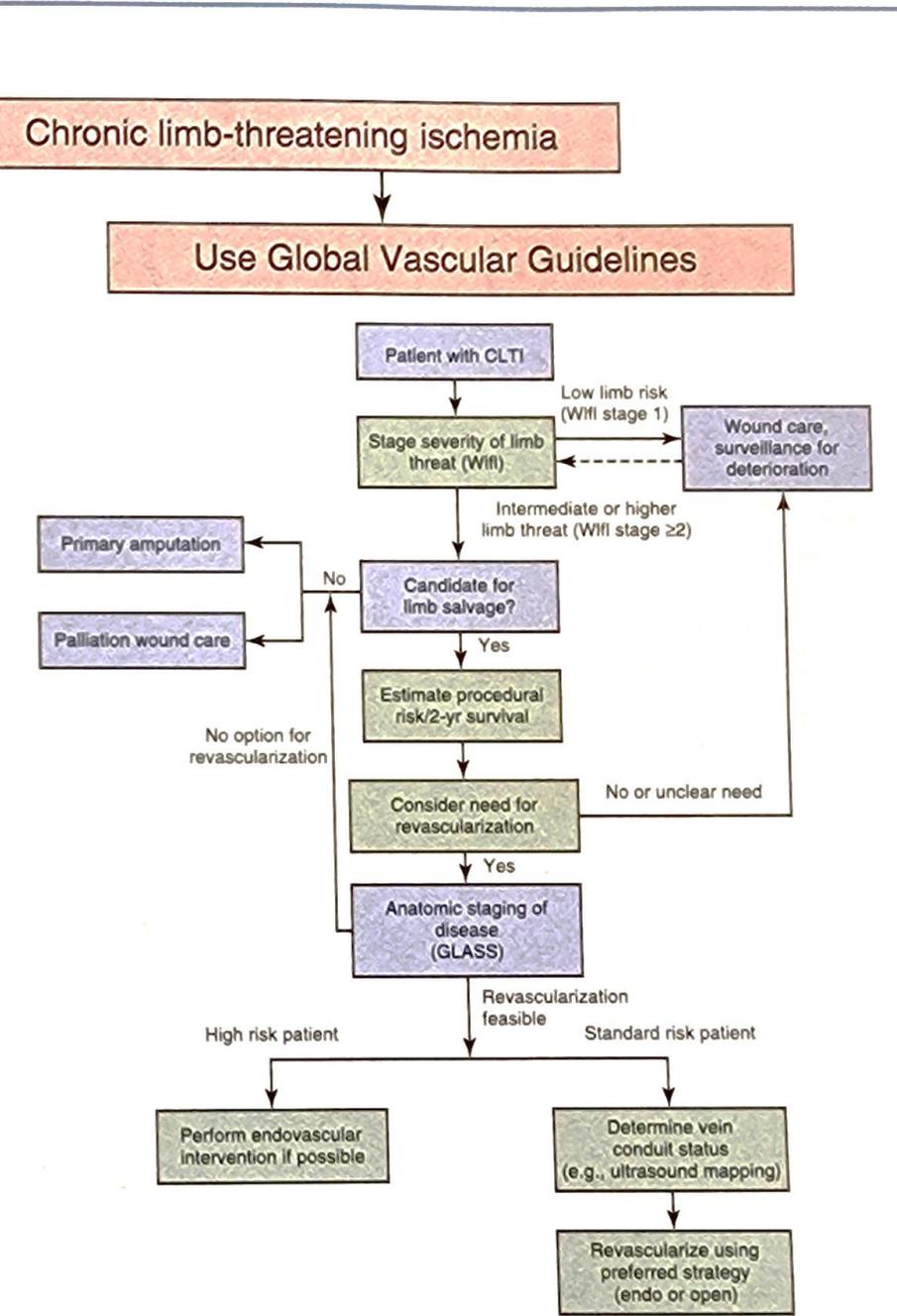
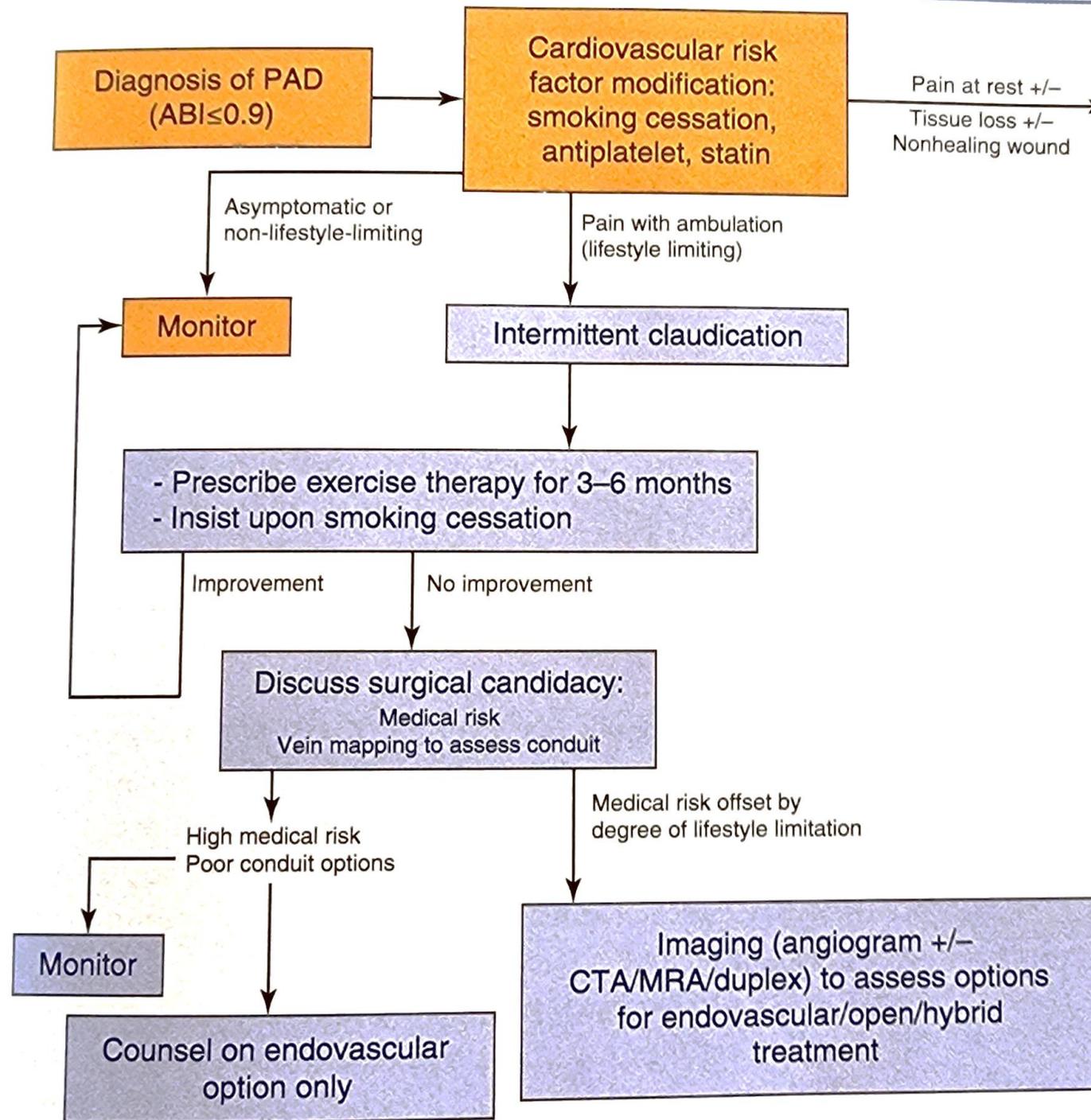
4.1	Evaluate cardiovascular risk factors in all patients with suspected CLTI.	1 (Strong)	B (Moderate)	I.C.A.I. Group, ³⁰ 1997
4.2	Manage all modifiable risk factors to recommended levels in all patients with suspected CLTI.	1 (Strong)	B (Moderate)	Armstrong, ³¹ 2014 Faglia, ³² 2014
4.3	Treat all patients with CLTI with an antiplatelet agent.	1 (Strong)	A (High)	Antithrombotic
4.4	<u>Consider clopidogrel as the single antiplatelet agent of choice in patients with CLTI.</u>	2 (Weak)	B (Moderate)	Jan Steffel, John W. Eikelboom, Sonia S. Anand, Olga Shestakovska, Salim Yusuf and Keith A.A. Fox ✉
4.5	<u>Consider low-dose aspirin and rivaroxaban, 2.5 mg twice daily, to reduce adverse cardiovascular events and lower extremity ischemic events in patients with CLTI.</u>	2 (Weak)	B (Moderate)	Originally published 21 May 2020 https://doi.org/10.1161/CIRCULATIONAHA.120.046048 Circulation. 2020;142:40–48
4.6	Do not use systemic vitamin K antagonists for the treatment of lower extremity atherosclerosis in patients with CLTI.	1 (Strong)	B (Moderate)	Anand, ³⁸ 2007
4.7	Use moderate- or high-intensity statin therapy to reduce all-cause and cardiovascular mortality in patients with CLTI.	1 (Strong)	A (High)	Leng, ³⁹ 2000 Heart Protection Study Collaborative Group, ⁴⁰ 2002 Meade, ⁴¹ 2002 Aung, ⁴² 2007 Mills, ⁴³ 2011 Rodriguez, ⁴⁴ 2017

The COMPASS Trial

Net Clinical Benefit of Low-Dose Rivaroxaban Plus Aspirin as Compared With Aspirin in Patients With Chronic Vascular Disease



	Recommendation	Grade	Level of evidence	Key references
4.8	Control hypertension to target levels of <140 mm Hg systolic and <90 mm Hg diastolic in patients with CLTI.	1 (Strong)	B (Moderate)	ACCORD Study Group, ⁴⁵ 2010 Bavry, ⁴⁶ 2010 Wright, ⁴⁷ 2015 (SPRINT) Moise, ⁴⁸ 2016
4.9	Consider control of type 2 DM in CLTI patients to achieve a hemoglobin A _{1c} of <7% (53 mmol/mol [International Federation of Clinical Chemistry]).	2 (Weak)	B (Moderate)	Selvin, ⁴⁹ 2004 Nathan, ⁵⁰ 2005 van Dieren, ⁵¹ 2014 Fox, ⁵² 2015 American Diabetes Association, ⁵³ 2018
4.10	Use metformin as the primary hypoglycemic agent in patients with type 2 DM and CLTI.	1 (Strong)	A (High)	Palmer, ⁵⁴ 2016
4.11	Consider withholding metformin immediately before and for 24 to 48 hours after the administration of an iodinated contrast agent for diabetic patients, especially those with an estimated glomerular filtration rate <30 mL/min/1.73 m ² .	2 (Weak)	C (Low)	Nawaz, ⁵⁵ 1998 Goergen, ⁵⁶ 2010 Stacul, ⁵⁷ 2011
4.12	Offer smoking cessation interventions (pharmacotherapy, counseling, or behavior modification therapy) to all patients with CLTI who smoke or use tobacco products.	1 (Strong)	A (High)	Dagenais, ⁵⁸ 2005 Athyros, ⁵⁹ 2013 Blomster, ⁶⁰ 2016
4.13	Ask all CLTI patients who are smokers or former smokers about status of tobacco use at every visit.	1 (Strong)	A (High)	Kondo, ⁶¹ 2011 Newhall, ⁶² 2017
4.14	Prescribe analgesics of appropriate strength for CLTI patients who have ischemic rest pain of the lower extremity and foot until pain resolves after revascularization.	Good practice statement		
4.15	In CLTI patients with chronic severe pain, use paracetamol (acetaminophen) in combination with opioids for pain control.	Good practice statement		



Take home message

Physical exam

Noninvasive testing

Optimize medical management

Conservative surgical management

Horses not zebras

EVERYONE gets sick

THEN



NOW



THE
END