Lower extremity peripheral arterial disease - lePAD

I can’t walk 500 miles

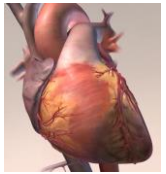
Viet Le, DMSc MPAS PA-C FACC FAHA
Associate Professor of Research, Preventive Cardiology PA
Intermountain Heart & Vascular; Patients Health First, L.C.
@VietHeartPA

Disclosures

- Relationship with Novartis Pharmaceuticals Corporation, Amgen, Amarin, Bayer, Pfizer, Lexicon Pharmaceuticals, and Idorsia that includes consulting or advising.
- Relationship with Janssen that includes research grant funding paid directly to the research department

Objectives

- Diagnosis, Prognosis, Prevention, and Treatment

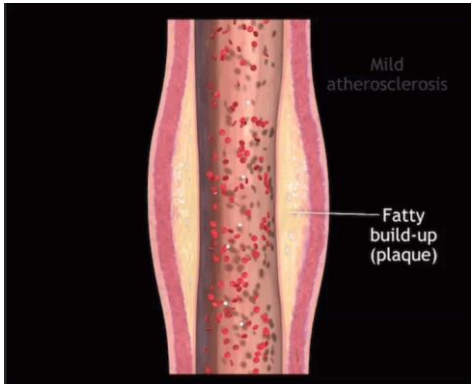


We will

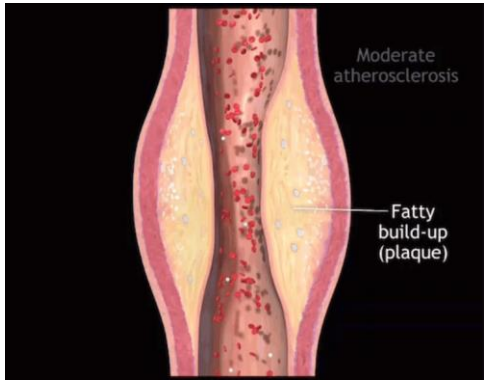
- Review peripheral arterial disease and the importance of screening and early intensive management
- Discuss strategies to reduce the risk of amputations and other cardiovascular disease events through lifestyle and pharmacologic treatment.

Acute Coronary Syndrome/Chronic Stable

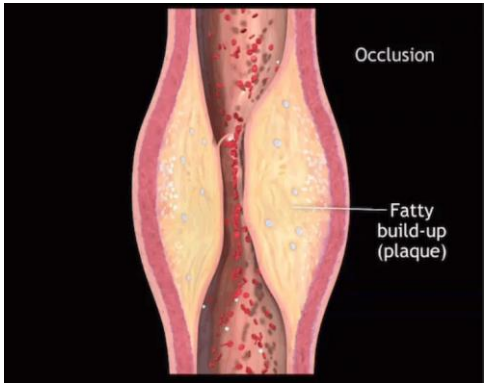
Stable Angina



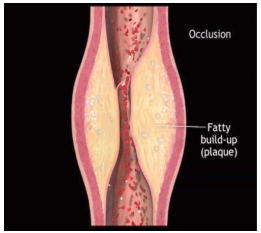
NSTE-ACS



STEMI



Arterial disease – PAD vs CAD



STEMI

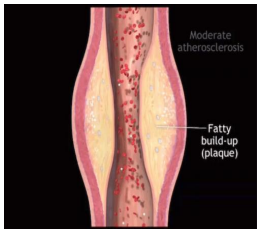
NSTEMI

ACS

ALI/CLI

Gangrene

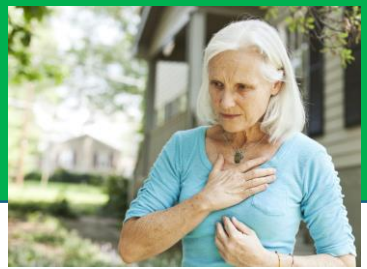
Wound



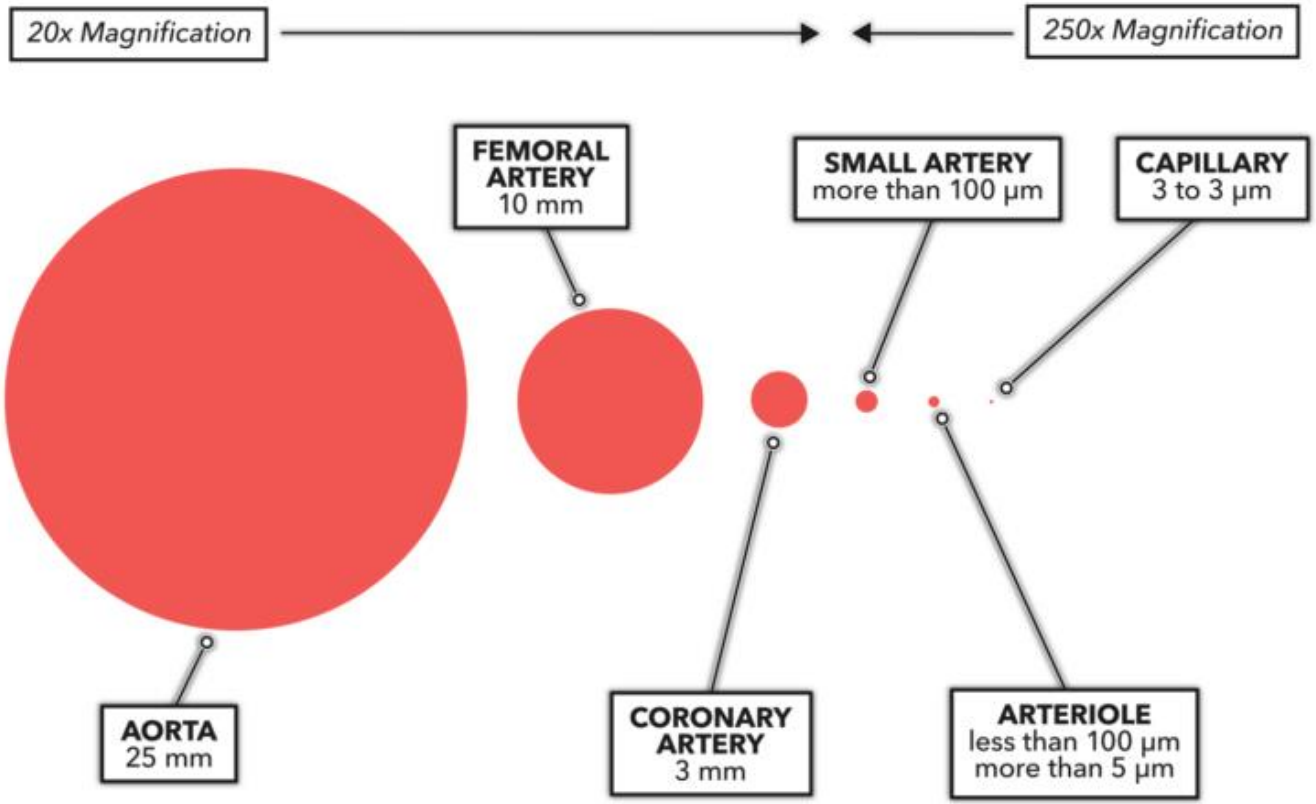
Unstable Angina

Rest Pain

Stable Angina

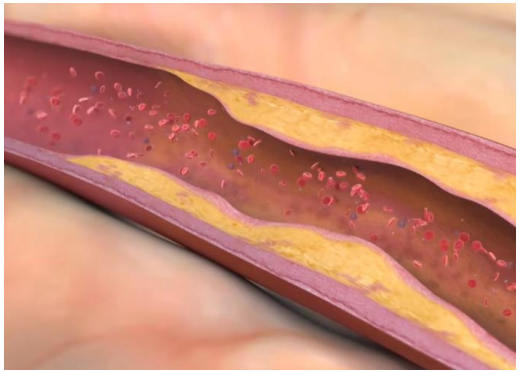


Claudication



https://www.crossfit.com/essentials/the-heart-part-6-blood-vessel-basics; Lorbeer. 2018. PLoS One. 13(6): e0197559; Dodge Jr. 1992. Circulation. 86:232–246; Paruchuri. 2015. Cardiology. 131:265-272

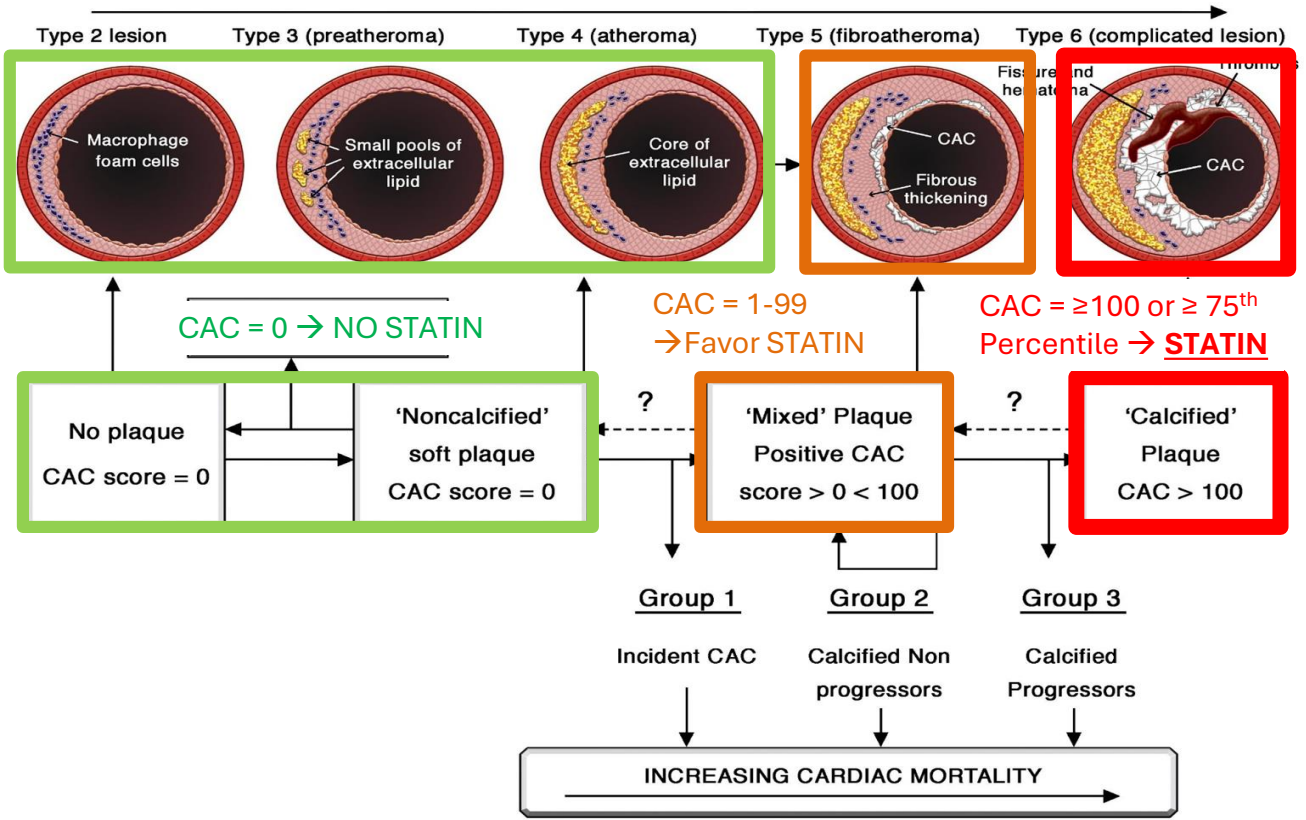
Coronary Calcium



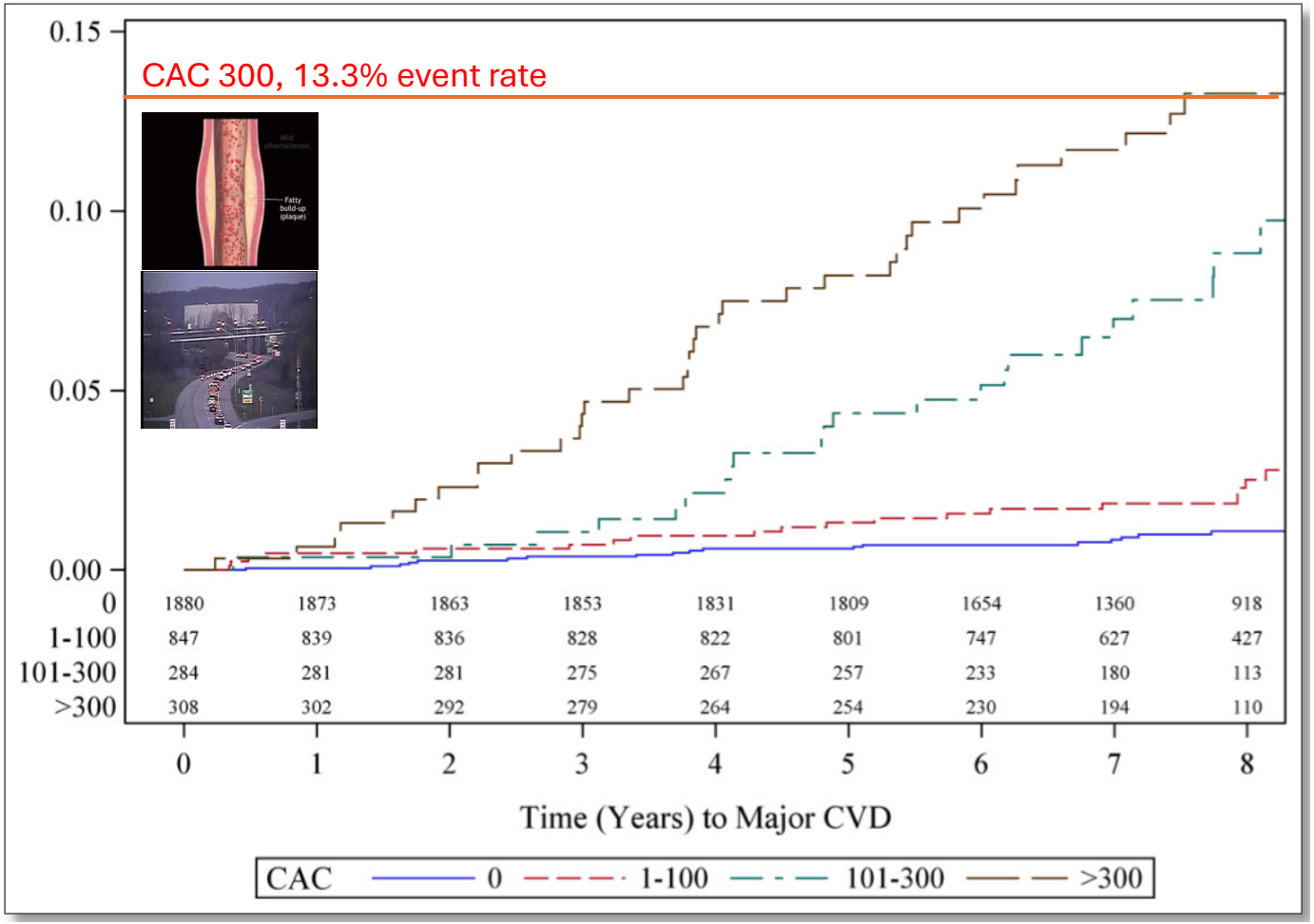
CAC = 0 → NO STATIN

CAC = 1-99 → Favor STATIN

CAC = ≥100 or ≥ 75th Percentile → **STATIN**



McEvoy, et al, JACC 2010. https://doi.org/10.1016/j.jacc.2010.06.038



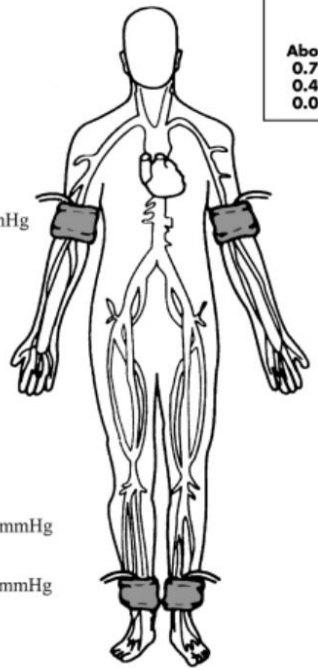
POPULATION:
Framingham (Offspring and 3rd Generation).
50±10 yrs of age. Female 50.9%.

MAJOR CVD included:
1 coronary heart disease (CHD),
2 stroke, and
3 peripheral arterial disease.
Additionally, authors included
4 MI, and
5 death from CHD (i.e., fatal coronary event, MI, or cerebrovascular accident [i.e., ischemic stroke, hemorrhagic stroke]).

Hoffmann. JAHA. 2016 Feb 22;5(2):e003144

ABI WORKSHEET

Ankle-Brachial Index Interpretation
Above 0.90: Normal
0.71 - 0.90: Mild Obstruction
0.41 - 0.70: Moderate Obstruction
0.00 - 0.40: Severe Obstruction



Right Arm:
Systolic Pressure ☐☐☐ mmHg

Left Arm:
Systolic Pressure ☐☐☐ mmHg

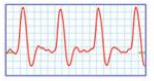
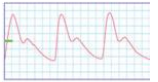
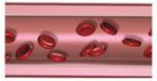
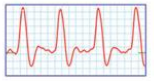
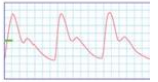
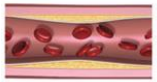
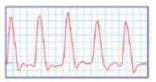
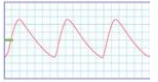
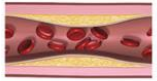
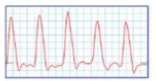
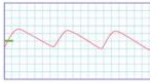
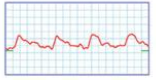
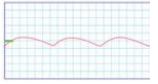
Right Ankle:
Systolic Pressure
Posterior Tibial (PT) ☐☐☐ mmHg
Dorsalis Pedis (DP) ☐☐☐ mmHg

Left Ankle:
Systolic Pressure
Posterior Tibial (PT) ☐☐☐ mmHg
Dorsalis Pedis (DP) ☐☐☐ mmHg

Right ABI equals Ratio of:
Higher of the Right Ankle Pressures (PT or DP) ☐☐☐ mmHg
Higher Arm Pressure (right or left arm) ☐☐☐ mmHg
= ☐.☐☐ *

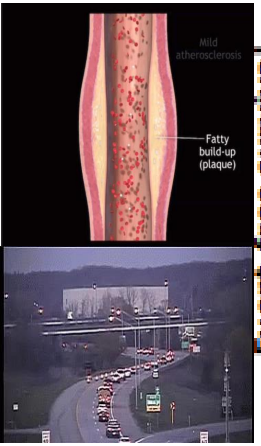
Left ABI equals Ratio of:
Higher of the Left Ankle Pressures (PT or DP) ☐☐☐ mmHg
Higher Arm Pressure (right or left arm) ☐☐☐ mmHg
= ☐.☐☐ *

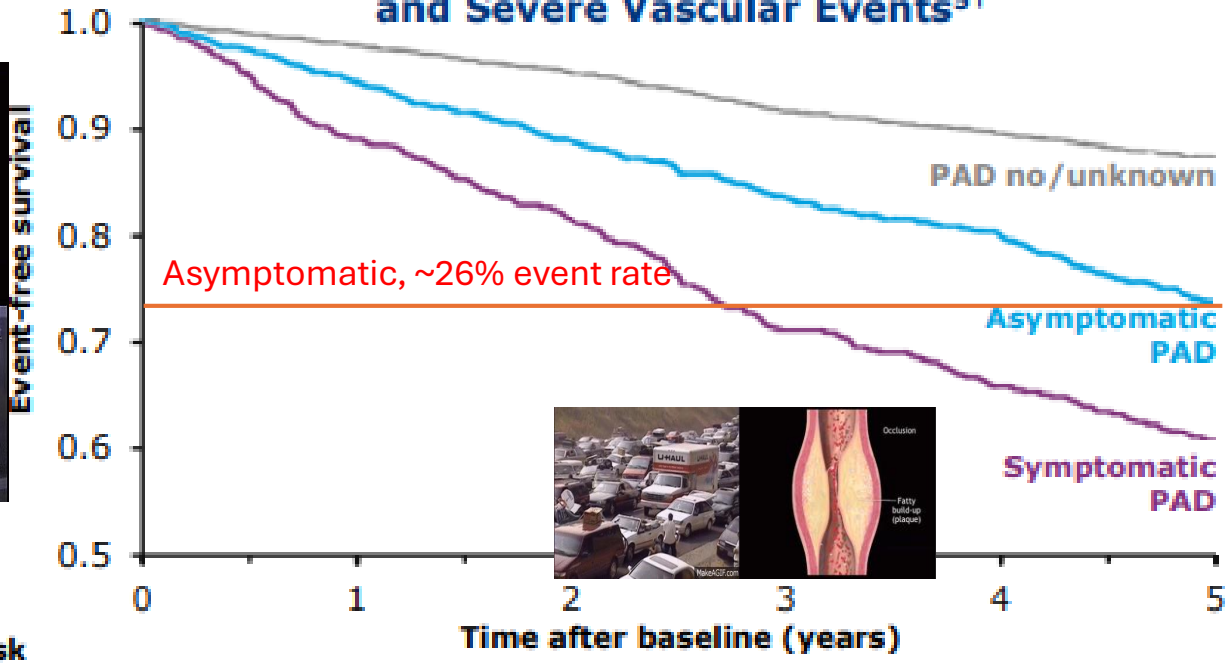
* The lower of these numbers is the patient's overall ABI.
Overall ABI (lower ABI) = _____

Vessel Disease		ABI	TBI	Doppler	PVR
Calcified Vessel		> 1.4	unaffected		
Normal		0.9 - 1.4	> 0.6		
Mild PAD  		0.7 - 0.89	0.34 - 0.59		
Moderate PAD  		0.51 - 0.69	0.12 - 0.34		
Severe PAD  		≤ 0.5	≤ 0.11		

Sibley III. 2017. Radiographics. 37:1, 346-357

5-Year KM Estimates of ACM and Severe Vascular Events[5†]



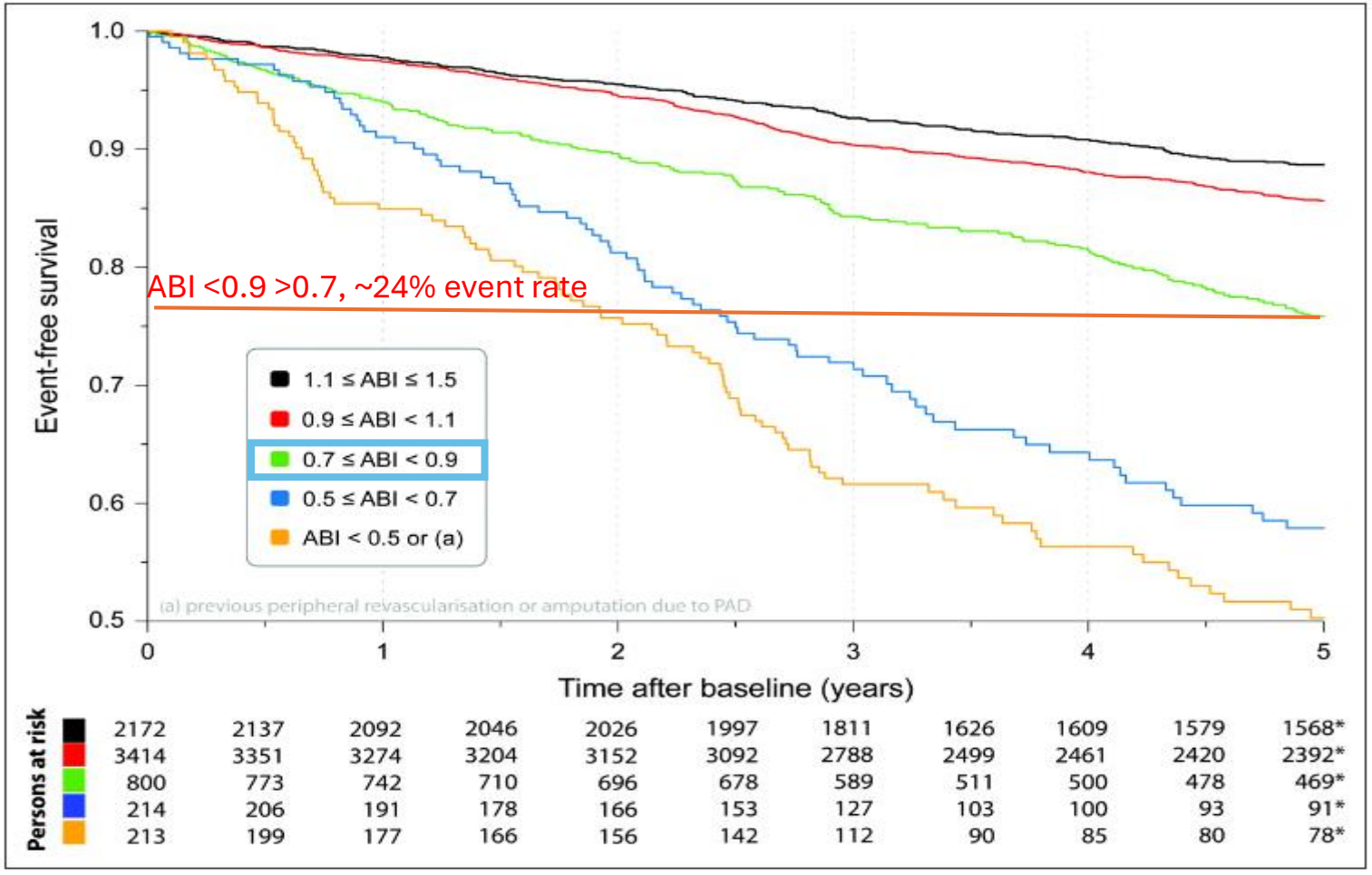


Persons at risk											
PAD no/unknown	5392	5303	5192	5085	5017	4935	4464	4004	3953	3885	3850‡
Asymptomatic PAD	836	810	776	742	722	700	612	528	520	493	484‡
Symptomatic PAD	593	561	515	484	463	433	357	301	286	276	268‡

Older: 72
Female: 58%
ABI >1.5 excluded

OUTCOMES:
1 all-cause mortality OR severe vascular events
2 myocardial infarction,
3 coronary revascularization,
4 stroke,
5 carotid revascularization,
6 peripheral revascularization, or
7 amputation

Diehm C et al. Circulation. 2009;120(21):2053-2061.



Older: 72
Female: 58%
ABI >1.5 excluded

OUTCOMES:
1 all-cause mortality OR severe vascular events
2 myocardial infarction,
3 coronary revascularization,
4 stroke,
5 carotid revascularization,
6 peripheral revascularization, or
7 amputation

Diehm C et al. Circulation. 2009;120(21):2053-2061.

PERIPHERAL ARTERIAL DISEASE

https://lermagazine.com/article/arterial-disease-lower-extremity-implications Accessed 10/19/2022; https://www.pacecvi.com/blog/they-say-amputation-here-at-pace-we-say-second-opinion, accessed 10/20/2022. https://www.amboss.com/us/knowledge/Peripheral_arterial_disease, accessed 10/20/2022

FOURIER

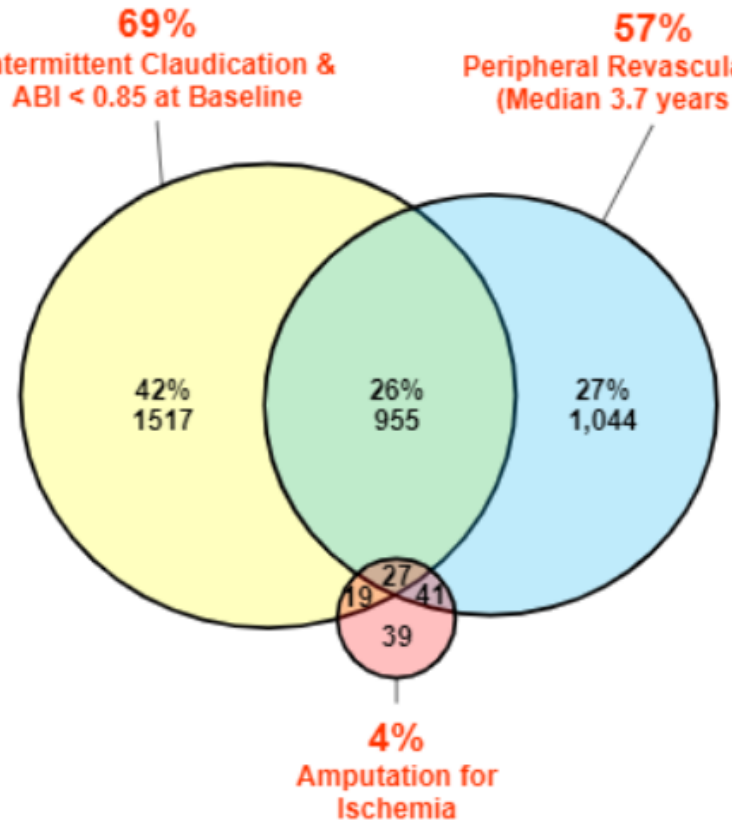
- Patients between 40-85 yrs of age
- History of ASCVD event
- Fasting LDL-C >70 or non-HDL-C >100
- Fasting Trigs <400

Patients with Peripheral Artery Disease

27,564
Patients with Atherosclerosis Randomized

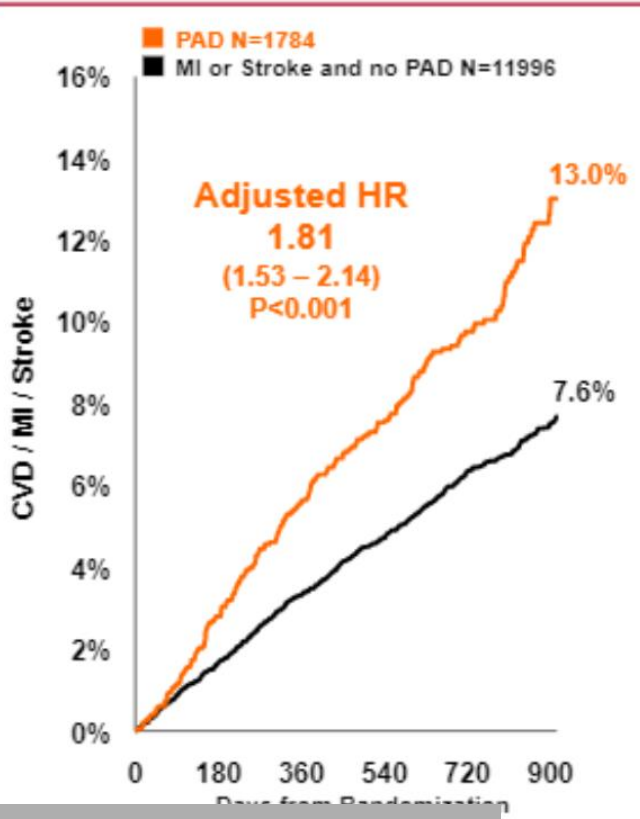
3,642
Patients with Symptomatic Lower Extremity Peripheral Artery Disease

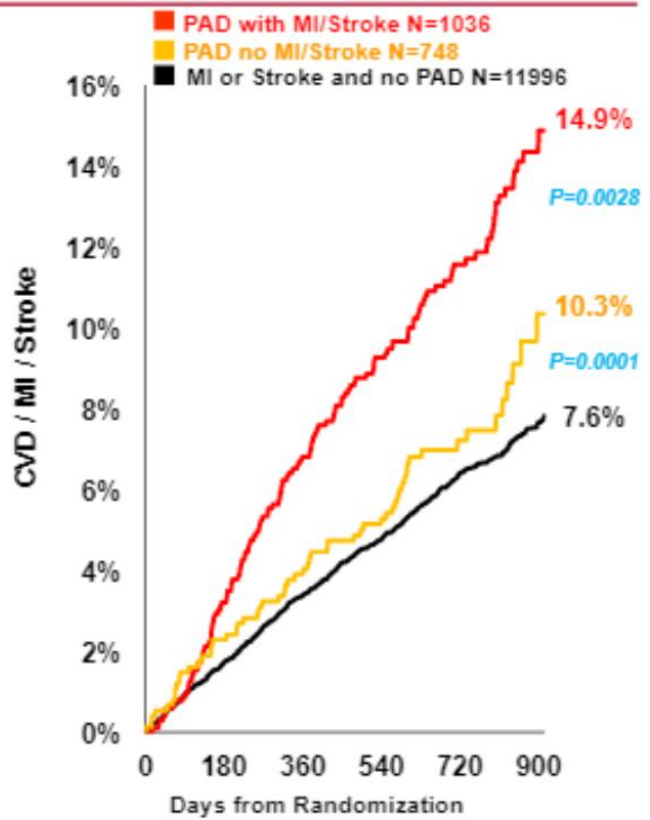
1,505
Patients with Symptomatic Lower Extremity Peripheral Artery Disease and no prior MI or Stroke



Bonaca. 2018. Circulation. 137(4):338-350

Peripheral Artery Disease and Risk in Placebo Patients



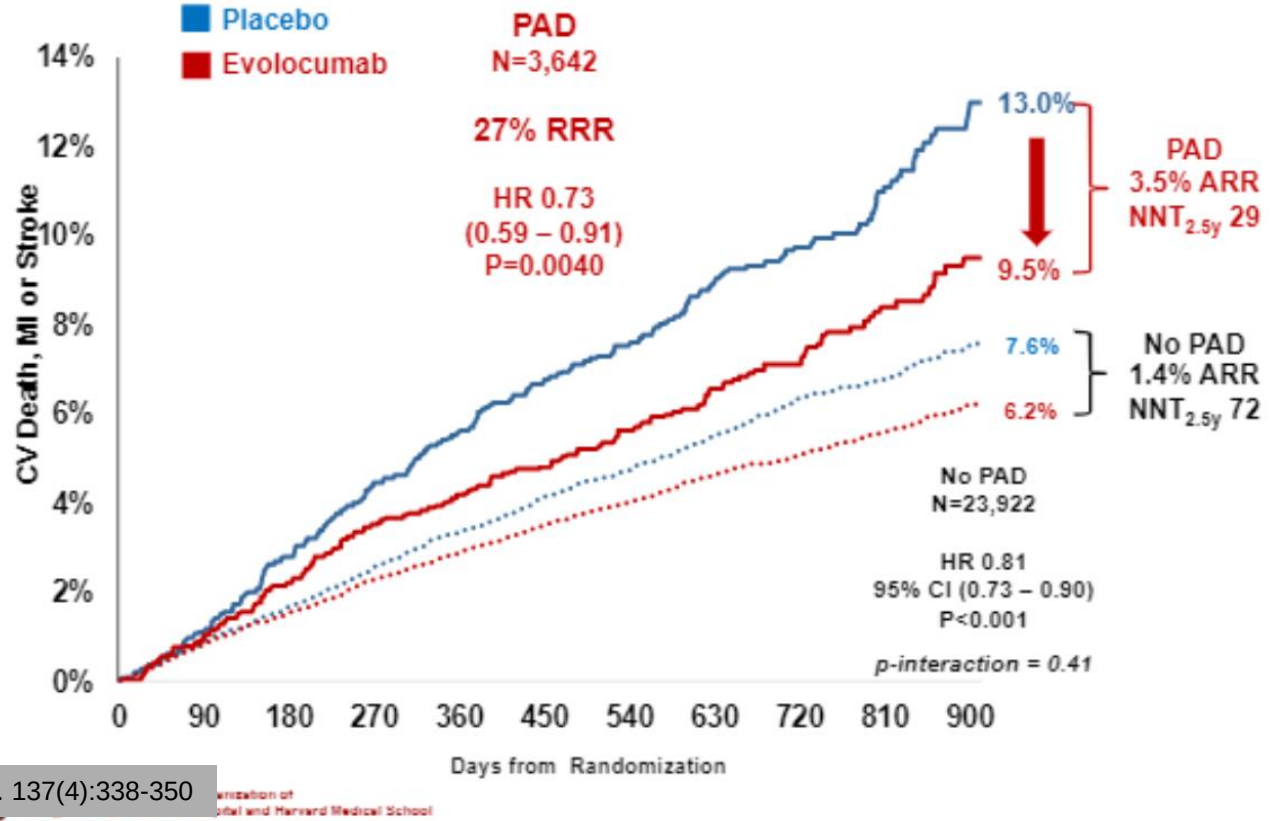


adjusted age, sex, race, BMI, diabetes, hypertension, smoking, eGFR, CHF, prior MI, CABG/ PCI, and history of stroke or TIA.

Bonaca. 2018. Circulation. 137(4):338-350

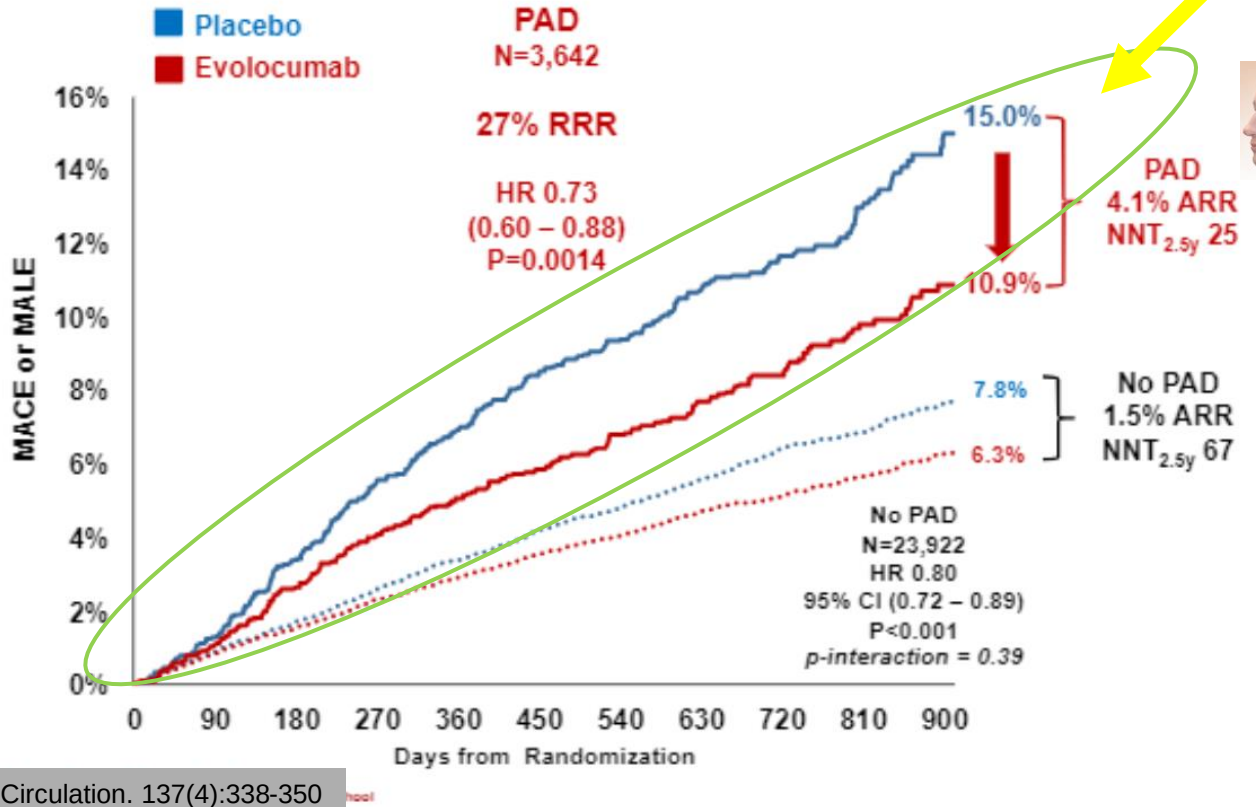
@VietHeartPA

CV Death, MI or Stroke in Patients with and without Peripheral Artery Disease

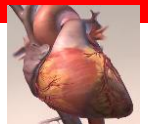


Bonaca. 2018. Circulation. 137(4):338-350

MACE or MALE
In Patients with and without PAD



THIS is Peripheral Arterial Disease

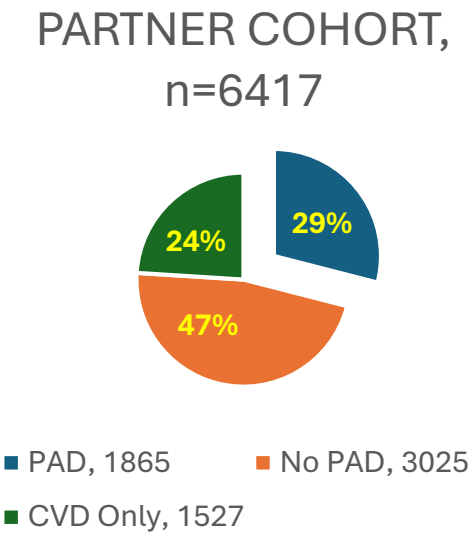

Bonaca. 2018. Circulation. 137(4):338-350

Diagnosis – Have an index of suspicion

PARTNERS Trial – Invited those aged 50-69 yrs w/history of smoking or diabetes to enroll. Evaluated by history and by ABI.

6417 were analyzed based on full records

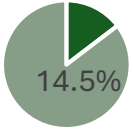
- PAD was identified in 1865 (**29%**);
  - PAD only 825/1865 (44%), PAD/CVD 1040/1865 (56%
  - Total NEW PAD 823/6417, (13%)
- CVD only 1527/6417 (**24%**)
- No PAD OR CVD 3025/6417 (**47%**)

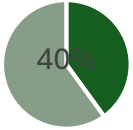


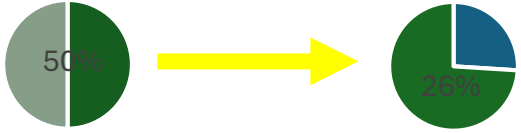
83% of patients were aware of prior PAD Dx. Only 49% of clinicians were aware at baseline

PAD Prevalence

- 8.5 Million individuals in the US >40 years of age are affected
- 14.5% of those >70 years of age in the US have PAD
- Only 10% of PAD patients experience classic claudication
- 40% have variable leg symptom presentation
- 50% do not experience any leg pain (yet 26% CVD events in 5 years)

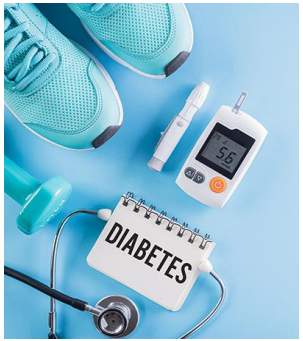






Risk Factors and treatment targets for PAD

- Smoking
- Diabetes
- Age
- Gender
- Race
- Hypertension
- Hyperlipidemia
- Hyperhomocysteinemia

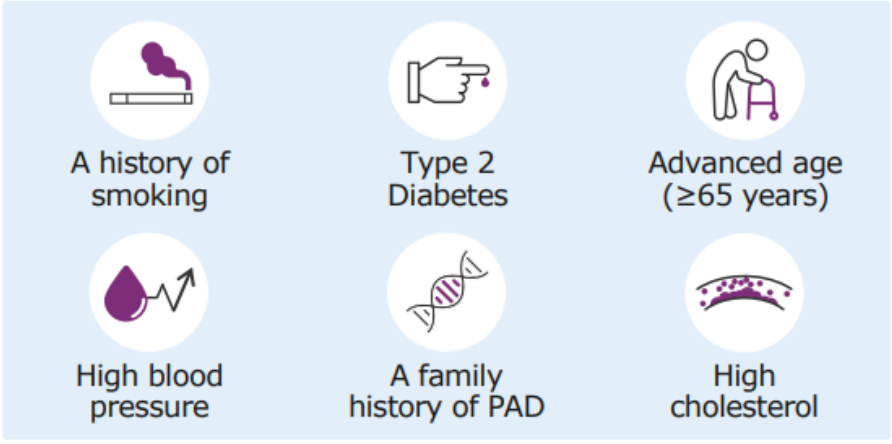


Screening

- Claudication – larger vessels=more forgiving. Low symptom presentation. Partner trial: Of 29% with PAD, **only 2% had symptoms**
- Age ≥65 years old
- Age 50–64 years old, with risk factors for atherosclerosis (e.g., diabetes mellitus, history of smoking, hyperlipidemia, hypertension) or family history of PAD
- <50 years old with diabetes mellitus and 1 additional risk factor for atherosclerosis
- Individuals with known atherosclerotic disease in another vascular bed (e.g., coronary, carotid, subclavian, renal, mesenteric artery stenosis, or AAA)

Patients at Increased Risk of PAD[2]

- Age ≥65 years old
- Age 50–64 years old, with risk factors for atherosclerosis (eg, diabetes mellitus, history of smoking hyperlipidemia, hypertension) or family history of PAD
- Age <50 years old, with diabetes mellitus and 1 additional risk factor for atherosclerosis
- Individuals with known atherosclerotic disease in another vascular bed (eg, coronary, carotid, subclavian, renal, mesenteric artery stenosis, or AAA)



History and/or Physical Examination Findings Suggestive of PAD[2]

History:

- Claudication
- Other non–joint-related exertional lower extremity symptoms (not typical of claudication)
- Impaired walking function
- Ischemic rest pain

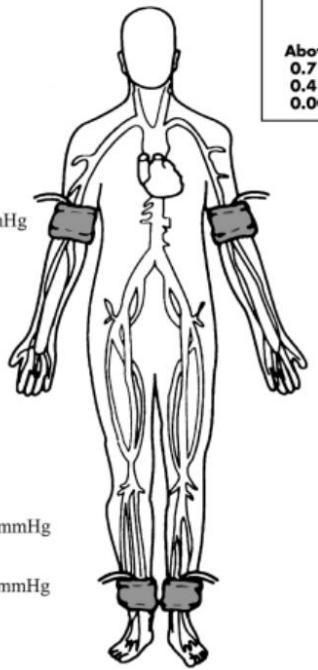
Physical Examination:

- Abnormal lower extremity pulse examination
- Vascular bruit
- Nonhealing lower extremity wound
- Lower extremity gangrene
- Other suggestive lower extremity physical findings (eg, elevation pallor/dependent rubor)

Gerhard-Herman. 2017. J

ABI WORKSHEET

Ankle-Brachial Index Interpretation
Above 0.90: Normal
0.71 - 0.90: Mild Obstruction
0.41 - 0.70: Moderate Obstruction
0.00 - 0.40: Severe Obstruction



Right Arm:
Systolic Pressure ☐☐☐ mmHg

Left Arm:
Systolic Pressure ☐☐☐ mmHg

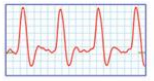
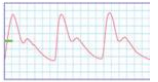
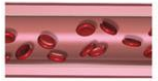
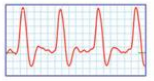
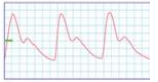
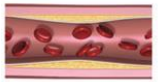
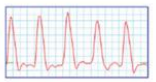
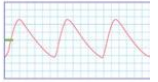
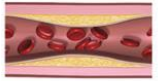
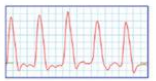
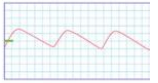
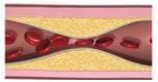
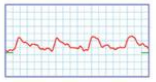
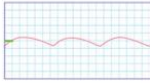
Right Ankle:
Systolic Pressure
Posterior Tibial (PT) ☐☐☐ mmHg
Dorsalis Pedis (DP) ☐☐☐ mmHg

Left Ankle:
Systolic Pressure
Posterior Tibial (PT) ☐☐☐ mmHg
Dorsalis Pedis (DP) ☐☐☐ mmHg

Right ABI equals Ratio of:
Higher of the Right Ankle Pressures (PT or DP) ☐☐☐ mmHg
Higher Arm Pressure (right or left arm) ☐☐☐ mmHg = ☐.☐☐ *

Left ABI equals Ratio of:
Higher of the Left Ankle Pressures (PT or DP) ☐☐☐ mmHg
Higher Arm Pressure (right or left arm) ☐☐☐ mmHg = ☐.☐☐ *

* The lower of these numbers is the patient's overall ABI.
Overall ABI (lower ABI) = _____

Vessel Disease		ABI	TBI	Doppler	PVR
Calcified Vessel		> 1.4	unaffected		
Normal		0.9 - 1.4	> 0.6		
Mild PAD  		0.7 - 0.89	0.34 - 0.59		
Moderate PAD  		0.51 - 0.69	0.12 - 0.34		
Severe PAD  		≤ 0.5	≤ 0.11		

Sibley III. 2017. Radiographics. 37:1, 346-357

PAD Treatment = Traditional **ASCVD +**

- Smoking Cessation

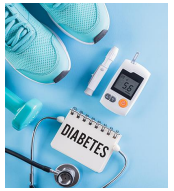
- Optimize Diabetes Control

- Blood pressure control

- Lipid lowering therapies

- Structured Exercise Program

PAD Treatment = Traditional **ASCVD +**



- Smoking Cessation
- Optimize Diabetes Control – in the current era = SGLT2i (e.g., empagliFLOZIN, dapagliFLOZIN; the FLOZINs); GLP1ra (e.g., semaglutide, dulaglutide, etc.) and GIP/GLP1. A1c goal is <6.5%. Teach self-foot examination, consider biannual clinical foot examination.

- Blood pressure control – Consider RAASi, ACEi or ARB (HOPE and ONTARGET trials). BP goal is <130/<80.
- Lipid lowering therapies – ASCVD Secondary prevention = high intensity statin therapy (Rosuvastatin 20 and 40 mg; Atorvastatin 40 and 80 mg) for **>50% reduction of LDL-C from baseline** AND **LDL-C target of <70 mg/dL**.

PAD Treatment = Traditional **ASCVD +**

- Structured Exercise Program
  - Supervised Exercise Program (hospital or outpatient)
    - Standalone vs Part of an established Cardiac Rehab Program
    - Structured Community- or Home-Based Exercise Program

PAD Treatment = Traditional **ASCVD +**

Evidence for benefit from supervised walking therapy:

Meta-analysis of 25 randomized trials of patients with PAD and intermittent claudication (n=1,054). Supervised walking exercise or control (no exercise).

12-26 weeks in duration.

BENEFITS

Maximal treadmill walking distance increased by 180 meters (590 feet or nearly 2 football field lengths), pain-free walking 128 meters (420 feet).

Nearly 3 of 4 patients reported at least 50% improvement, 1 in 5, 100% improvement.

PAD Treatment = Traditional **ASCVD +**

Standalone vs Part of an established Cardiac Rehab Program

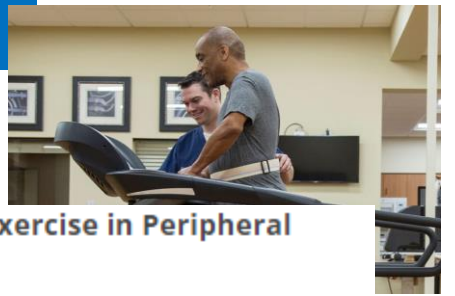
- Direct supervision by healthcare providers
- Minimum 30 to 45 minutes per session, at least 3 times/week for 12 weeks.
  - Intermittent bouts of walking → moderate-to-maximum claudication alternating with periods of rest
  - Warm-up and cool-down before exercise

PAD Treatment = Traditional **ASCVD +**

Structured Community- or Home-Based Exercise Program

- Self-directed with guidance, regimen like supervised program
- Counseling and education on how to begin, maintain, progress
- Incorporate behavioral change using health coaching, activity monitors, or both.
- Minimum 30 to 45 minutes per session, at least 3 times/week for 12 weeks.
  - Intermittent bouts of walking → moderate-to-maximum claudication alternating with periods of rest
  - Warm-up and cool-down before exercise

PAD Treatment = Traditional **ASCVD +**

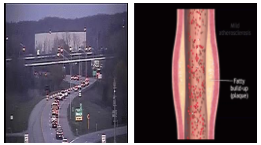


Who and How under CMMS

Table 1: Characteristics of Center for Medicare and Medicaid Services Coverage for Supervised Exercise in Peripheral Artery Disease[12]

Components and Requirements of Supervised Exercise Programs for PAD Under CMS
• Exercise must be prescribed by a physician after a face-to-face meeting with the patient that includes counseling on cardiovascular disease prevention. • Prescribed exercise must consist of exercise sessions three times weekly for 12 weeks. • An additional 36 sessions may be prescribed, with written justification, after the first 12 weeks are completed and may take place over a longer period of time. • The exercise sessions must take place in a physician's office or outpatient hospital-affiliated setting. • Exercise must be delivered by qualified personnel with training in basic and advance life support and exercise therapy for PAD. • Exercise must be supervised by a physician, physician's assistant, or nurse practitioner/clinical nurse specialist.

PAD Treatment = Traditional **ASCVD +**



- Antiplatelet therapy – Plaque = potential rupture and fibrin/clots. Either Aspirin 81 mg OR Clopidogrel 75 mg daily is recommended. Recommend rivaroxaban 2.5 mg po BID + ASA 81 mg (see Voyager and Compass Trials; 2024 PAD Guidelines).
- Claudication reduction and control – Cilostazol has been shown to improve walking distance. Dosing is Cilostazol 100 mg po bid, 30 minutes before meals or 2 hours after meals. Supervised exercise programs improve functional status, quality of life, and reduce leg symptoms. Consider a structured home-based exercise program with behavioral change techniques.
- Flu Vaccine – Protect PAD patients with annual influenza vaccination.

Patient Perspectives

SUMMARY

- PAD has a high prevalence, up to 1 in 3 patient aged 50+ and history of smoking or diabetes.
- Symptomatic PAD is not common. Up to 50% fully asymptomatic.
- Asymptomatic PAD carries a 1 in 4 (~25%) cardiovascular event rate in 5 years.
- ABI is a relatively cheap and sensitive screening tool for identifying PAD, regardless of the presence or absence of symptoms. ABI <0.9 is Abnormal.
- PAD is an amplifier of risk for those with concomitant cardio- and cerebrovascular. Intensify existing ASCVD risk reducing therapies.

Enlist preventive cardiology, vascular medicine, endocrinology, etc. to team-up with you and your patients with PAD.