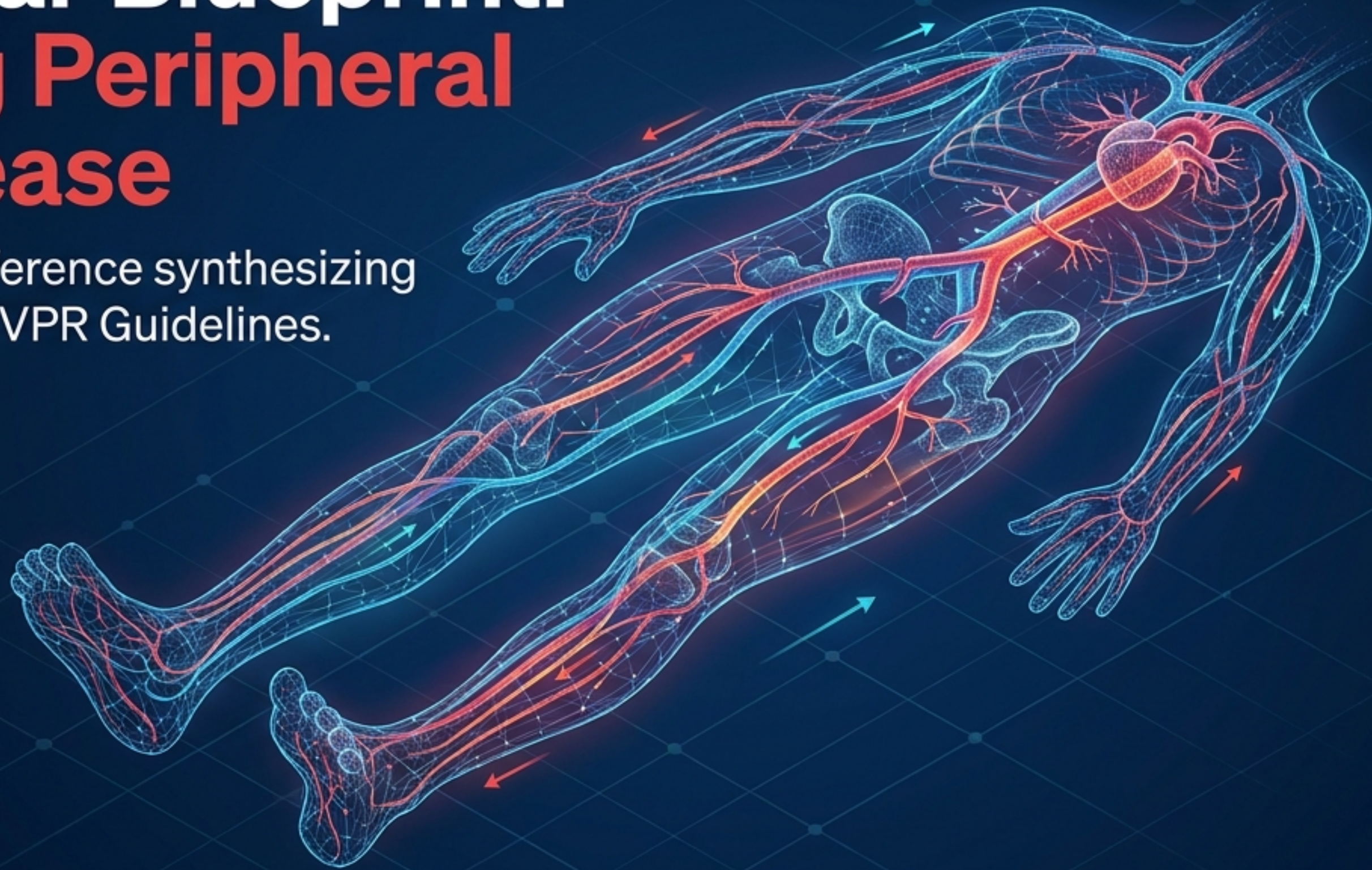


The Vascular Blueprint: Diagnosing Peripheral Artery Disease

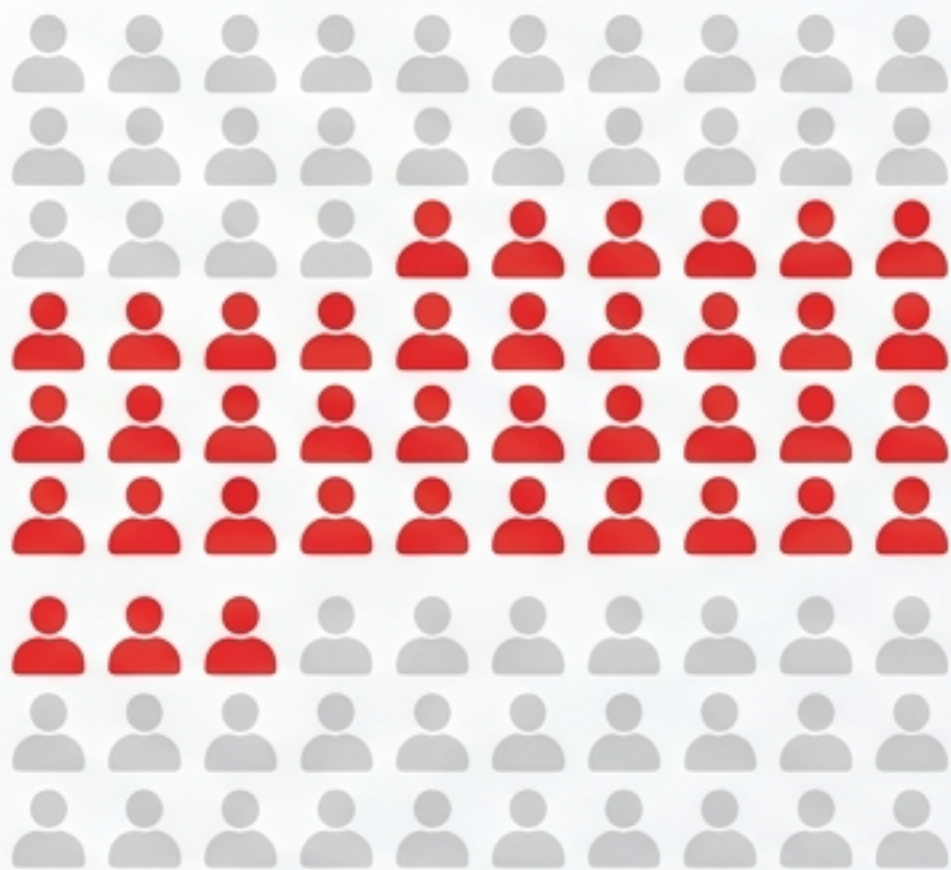
A highly visual clinical reference synthesizing
the 2024 ACC/AHA/AACVPR Guidelines.



The Hidden Burden

10-12 Million

US Adults (>40yo) affected by PAD



Up to 59% of these patients remain entirely asymptomatic but carry severe cardiovascular risk.

The Stakes

MACE & MALE

Major Adverse Cardiovascular Events (MACE)



MI



Stroke



Death

Major Adverse Limb Events (MALE)



ALI

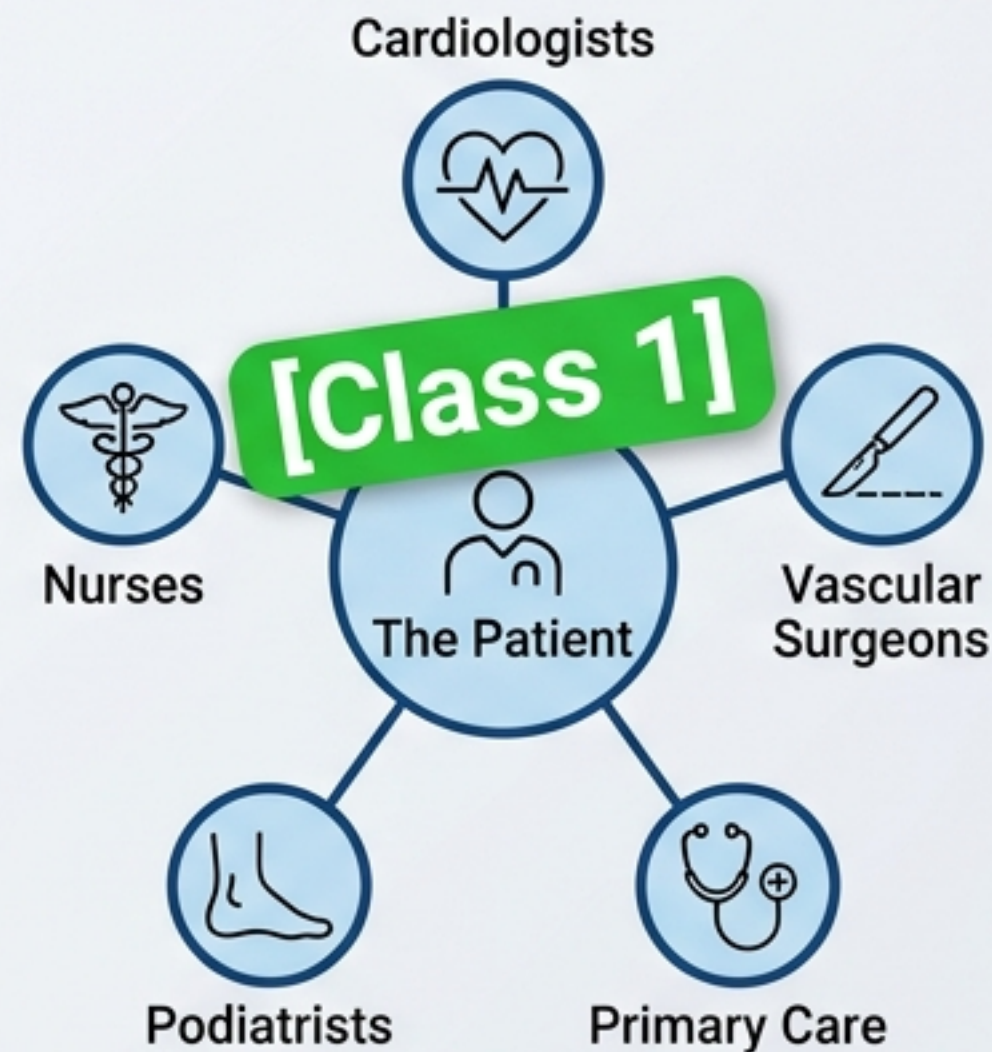


Amputation



The 2024 Paradigm

Multispecialty Care



The Weathering Ripple Effect

The Biological Result: Delayed diagnosis, lower rates of GDMT prescription, lower rates of revascularization

Social Determinants of Health:
Lower health literacy, limited access to quality food, inadequate health insurance, chronic systemic stress

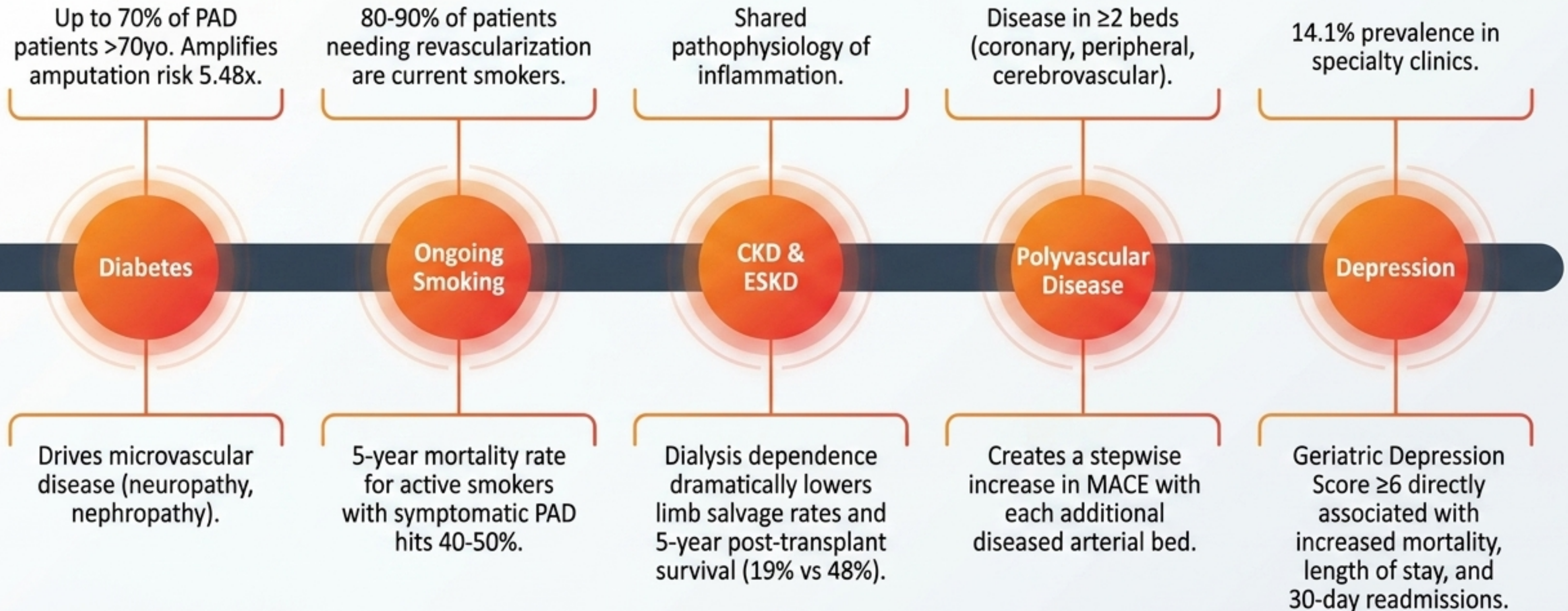
Structural Inequities

Geography, Socioeconomic Status, Systemic Bias

The Amputation Gap

- Black patients face a 2- to 4-fold higher risk of amputation.
- 30% higher CVD mortality rate.
- More frequently treated with primary amputation without revascularization attempts compared to White patients.

PAD Risk Amplifiers: The Systemic Radar



The PAD Severity Spectrum

Asymptomatic PAD

- 20-59% of patients.
- May self-limit activity to stay below the ischemic threshold.
- Still carries high risk for MACE/mortality.

Chronic Symptomatic PAD

- Classic Claudication: fatigue/aching induced by walking, relieved in <10 mins.
- Atypical exertional symptoms.
- Impaired walking performance.

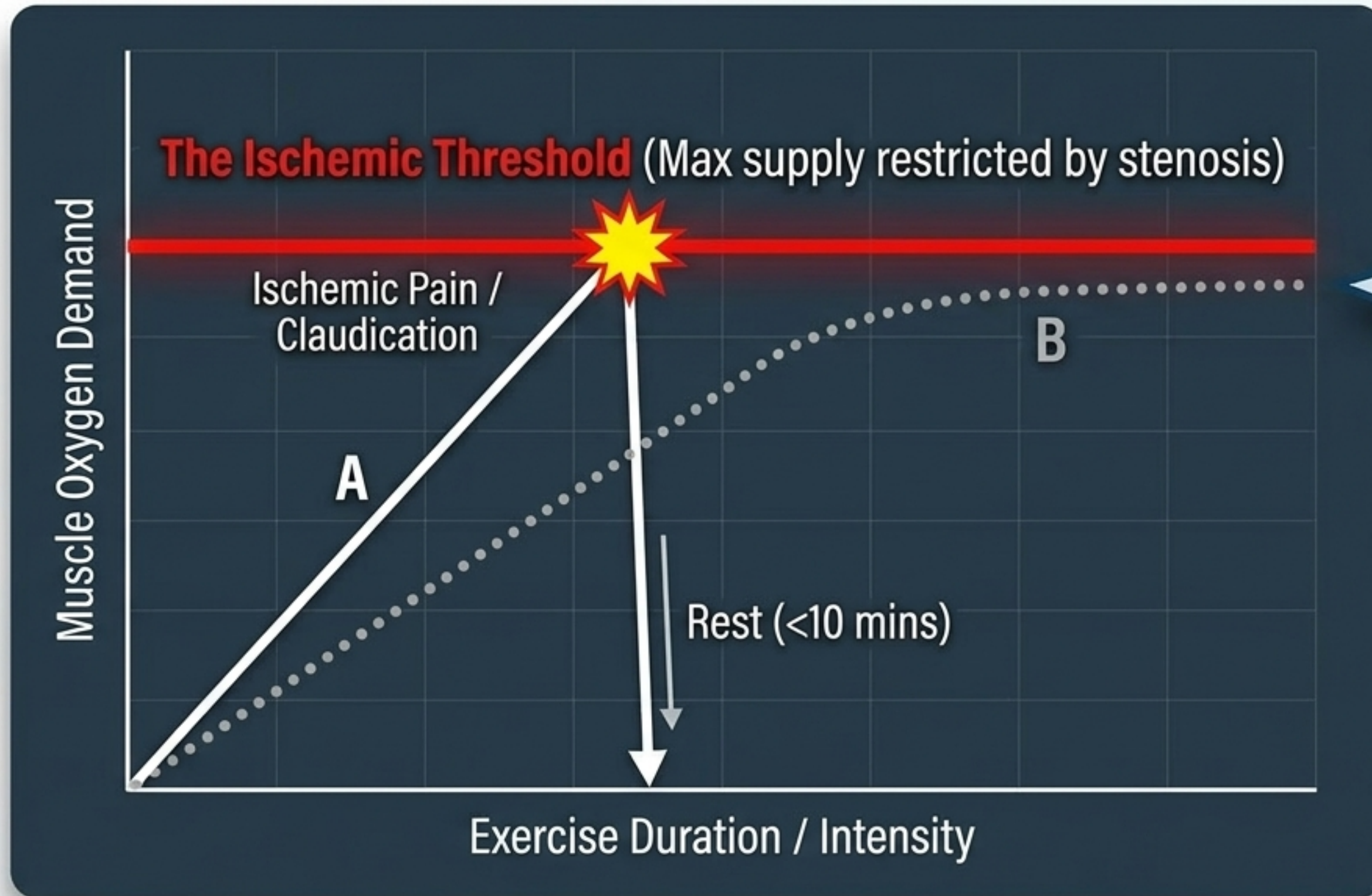
CLTI (Chronic Limb-Threatening Ischemia)

- Severe subset.
- Chronic (>2 weeks) ischemic rest pain, nonhealing wounds, or gangrene.
- Accounts for most amputations.

ALI (Acute Limb Ischemia)

- Sudden hypoperfusion (≤ 2 weeks).
- The '6 Ps': Pain, Pallor, Pulselessness, Poikilothermia, Paresthesias, Paralysis.
- Requires emergent triage.

The Ischemic Threshold: Masking the Disease



The 'Asymptomatic' Adapter

Functional Impairment:
The patient subconsciously reduces their walking speed or alters lifestyle to avoid triggering pain, falsely presenting as asymptomatic.

The Exam Room: Clinical Anatomy Map

Auscultation

Check epigastric, periumbilical, and groin for bruits.

[Class 1]

Pulse Palpation

Rate 0 (Absent) to 3 (Bounding).

Concordance of 4 palpable distal pulses heavily rules out PAD.

Visual Signs

- Asymmetric hair loss
- Dependent rubor (redness when hanging down)
- Elevation pallor (paleness when elevated)
- Calf muscle atrophy
- Slow-healing wounds on pressure points



Differential Diagnosis: PAD vs. Mimics

Condition	Pain Characteristic	Effect of Exercise	Effect of Rest	Postural Triggers
True PAD (Claudication)	Cramping/aching	Consistently induced by walking	Relieved quickly (<10 mins) by standing still	None
Spinal Stenosis	Weakness/pain radiating down posterior leg	Triggered by standing/walking	Not quickly relieved by rest	Requires lumbar spine flexion (sitting/leaning forward) for relief
Venous Claudication	Tight, bursting pain in entire leg	Triggered by walking	Subsides very slowly	Relieved significantly by leg elevation
Nerve Root Compression	Sharp, lancinating pain	Varies, induced by movement	Often present at rest	Improved by changing positions
Chronic Compartment Syndrome	Tight, bursting pain in calf	Triggered ONLY by strenuous exercise (jogging)	Subsides very slowly	None

The Physiological Testing Arsenal

[Class 1]

Resting ABI



The diagnostic cornerstone. Ratio of ankle to brachial systolic pressure.

Normal: 1.00 - 1.40 |
Abnormal: ≤ 0.90 .

[Class 1] & [Class 2a]

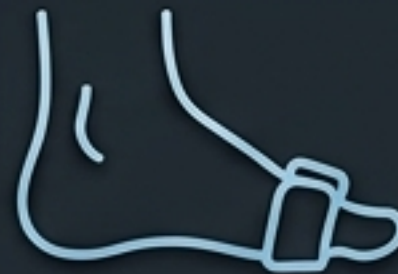
Exercise ABI



Used for borderline/normal resting ABIs with exertional symptoms, or to objectively assess walking performance.

[Class 1]

Toe-Brachial Index (TBI)



The workaround for noncompressible vessels. Digital arteries resist calcification.

Abnormal: ≤ 0.70 .

[Class 2a]

Perfusion (TcPO₂ / SPP)



Microvascular flow measurements used specifically for predicting wound healing in CLTI.

Healing thresholds:
TcPO₂ >30 mm Hg;
SPP >40 mm Hg.

The Mechanics of Noncompressible Arteries

Why an ABI >1.40 is a False Negative

A) The Normal Artery (Valid ABI)



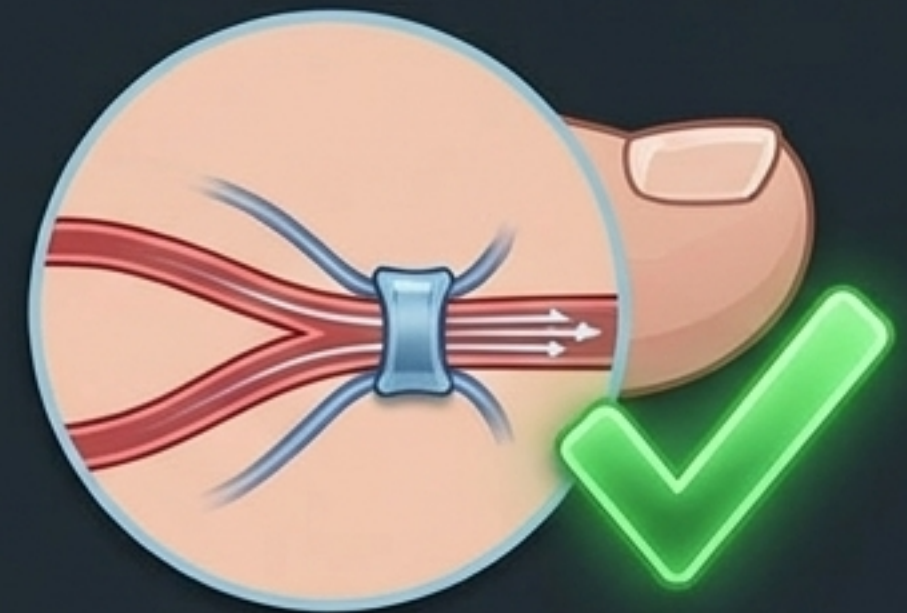
Healthy artery collapses.
Reliable pressure reading
(1.00 - 1.40).

B) The Calcified Artery (False High ABI)



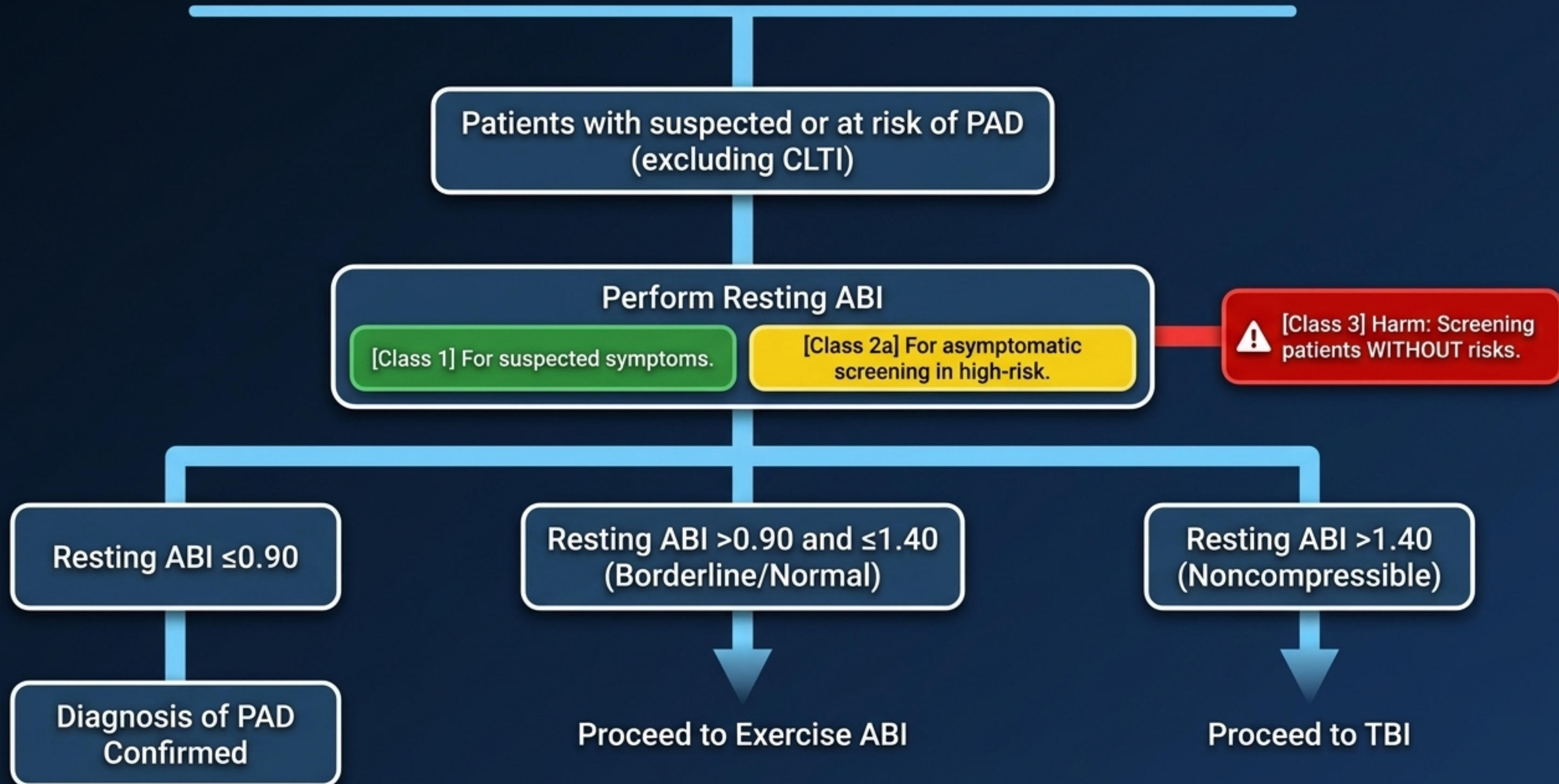
Typical of Diabetes/CKD. Artery
resists cuff, requiring
artificially massive pressure.
Yields false-negative ABI >1.40 .

C) The TBI Solution

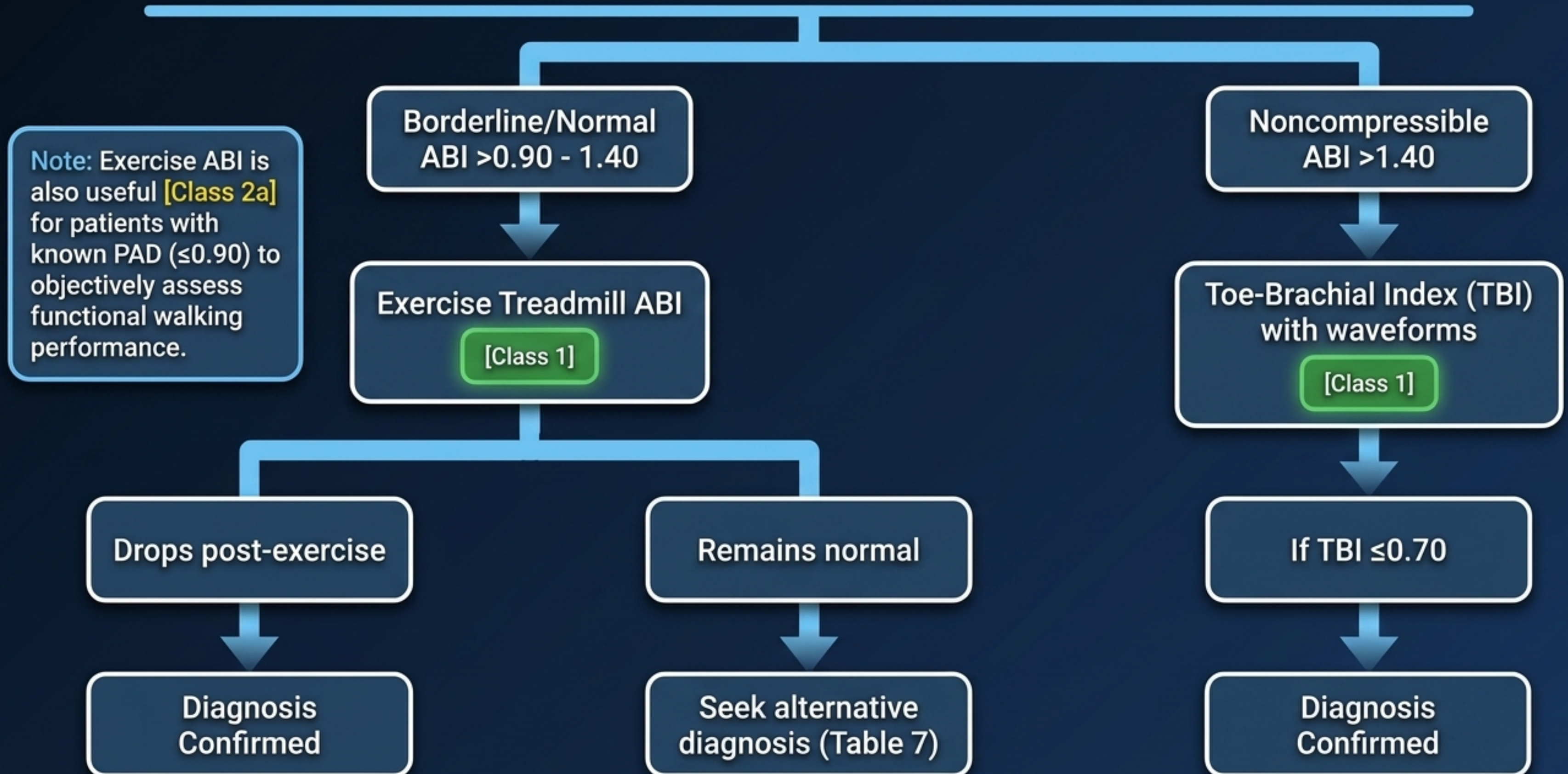


Digital vessels are spared from
medial calcification. Toe cuff
successfully occludes flow for a
true reading (≤ 0.70 = abnormal).

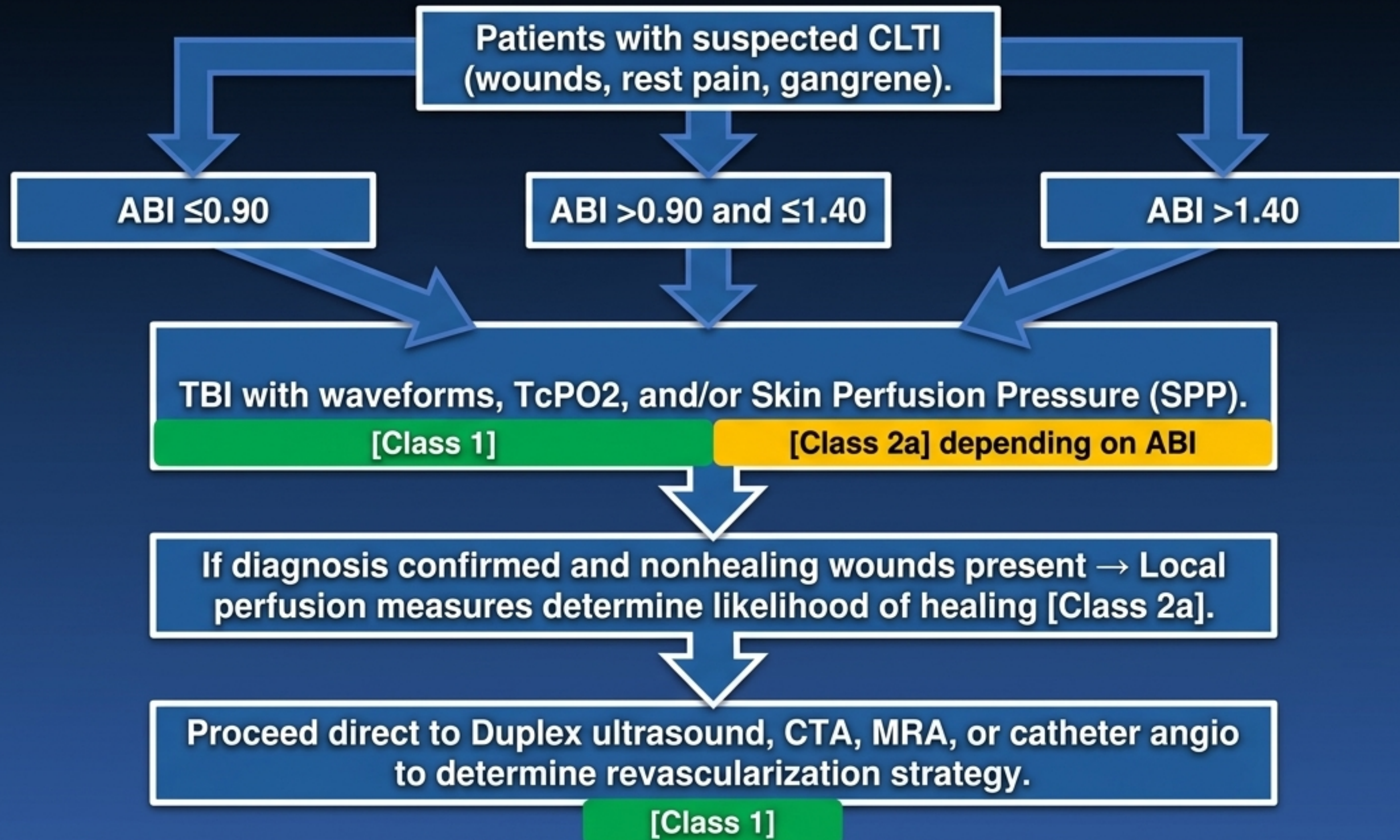
Diagnostic Pathway: Part 1 - Initial Triage



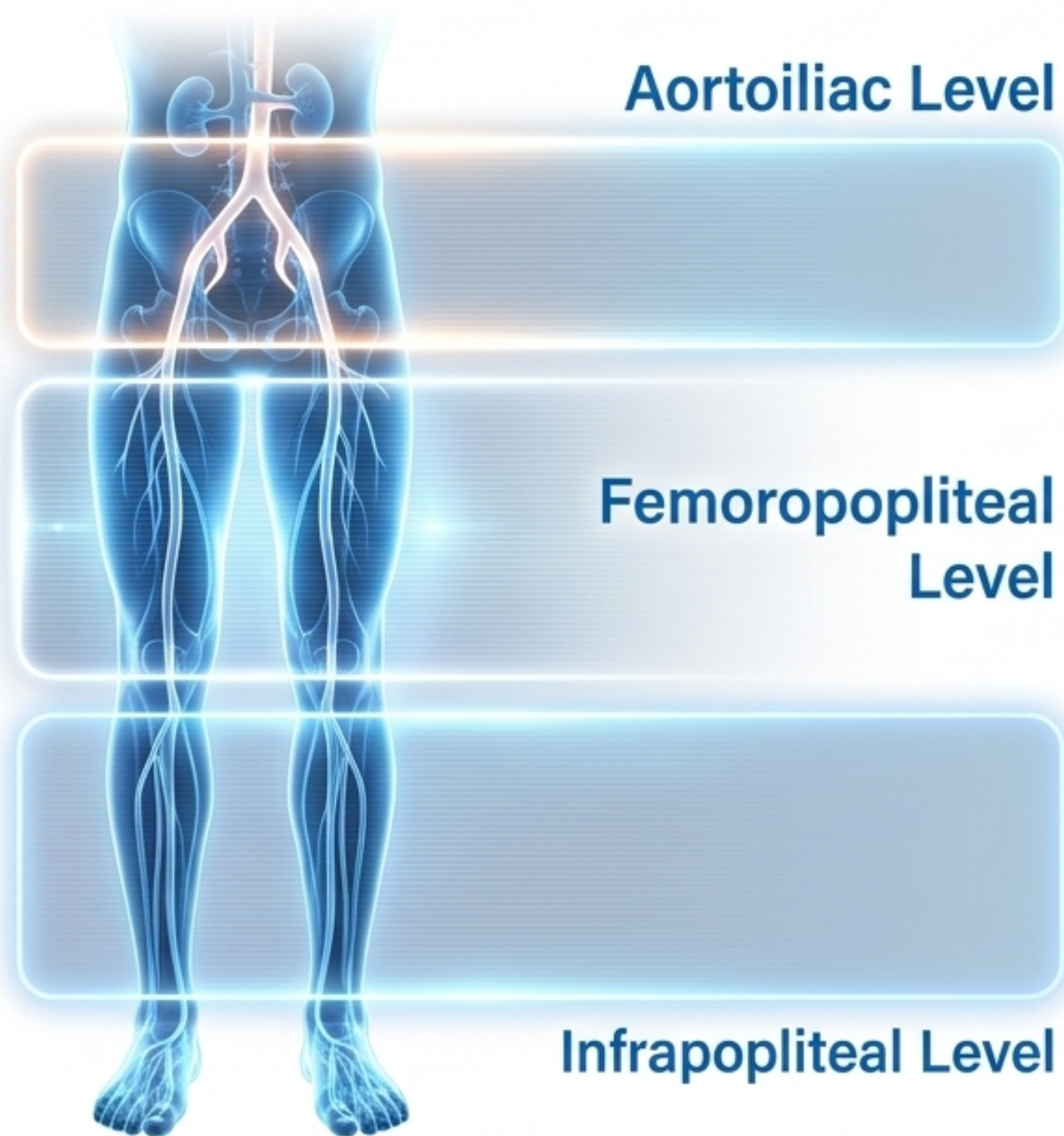
Diagnostic Pathway: Part 2 - Uncovering Hidden PAD



Diagnostic Pathway: Part 3 - The CLTI Emergency



Localization: Segmental Leg Pressures



Clinical Application

[Class 2a]

Segmental leg pressures with PVR and/or Doppler waveforms help delineate the anatomic level of PAD to guide procedural planning.

Concept: Inflow vs Outflow

Proximal to the superficial femoral artery is 'inflow'; distal is 'outflow'. In-line pulsatile flow via named infrapopliteal arteries to the foot is required for tissue salvage.

ADVANCED IMAGING RULES OF ENGAGEMENT

Invasive/contrast tools are strictly for operative planning, not passive surveillance.

THE GREEN LIGHT

[Class 1]

WHEN TO IMAGE

Trigger

Functionally limiting claudication unresponsive to GDMT, **OR** presentation of CLTI.

Tools

- **Duplex Ultrasound** (non-invasive)
- **CTA** (excellent resolution / radiation+contrast risk)
- **MRA** (high spatial resolution / gadolinium risk)
- **Catheter Angiography** (invasive but allows immediate endovascular treatment)

THE RED WALL

[Class 3: Harm]

WHEN TO STOP

Trigger

A confirmed diagnosis of PAD where revascularization is **NOT** being considered (e.g., asymptomatic, or claudication well-managed on GDMT).

Warning

- Performing CTA, MRA, or catheter angiography solely for anatomic assessment exposes patients to unnecessary contrast nephropathy, radiation, and vascular access risks without clinical benefit.

Synthesis: The Holistic PAD Profile



**Anatomic Disease + Clinical Subset + Risk Amplifiers + SDOH
= The True PAD Risk Profile**

Patient A

ABI 0.8, 50yo, asymptomatic.

Action: GDMT, routine foot care, structured exercise.

Patient B

ABI 0.8, 75yo Black patient, ESKD, limited access to care.

Action: High-risk profile requiring urgent multispecialty team intervention, aggressive MALE surveillance, and SDOH intervention.

Diagnostic Quick-Reference Dashboard

2024 AHA/ACC COR & LOE Summary

[Class 1 - Strong Recommendation: Benefit >>> Risk]

- **Resting ABI** for suspected signs/symptoms.
- **TBI** for noncompressible ABI >1.40.
- **Exercise ABI** for suspected PAD with normal/borderline resting ABI.
- **Advanced imaging** to determine revascularization strategy for **CLTI** or refractory claudication.

[Class 2a - Moderate Recommendation: Benefit >> Risk]

- **Resting ABI** to screen asymptomatic high-risk patients.
- **Exercise ABI** to objectively assess walking performance in known PAD.
- **Segmental pressures** to delineate anatomic level.
- **Perfusion tools** (TcPO₂, SPP) for healing potential in CLTI.

[Class 3 - Harm / No Benefit]

- Screening **ABI** in patients without risk factors (No Benefit).
- Advanced imaging strictly for anatomic curiosity without revascularization intent (Harm).