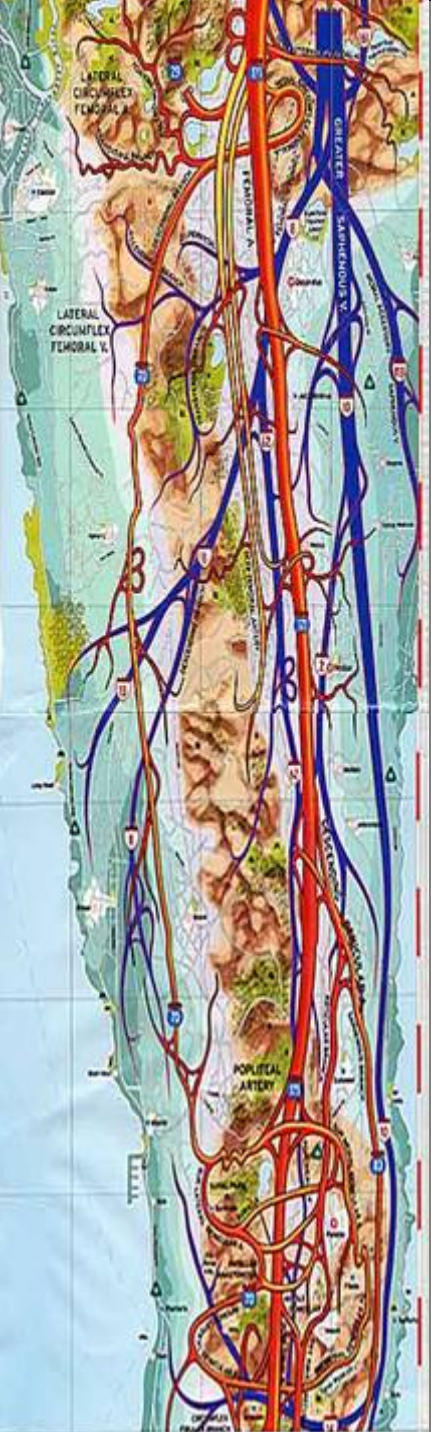


Non Invasive Diagnosis of PAD

« *PAD is the preferred clinical term that should be used to denote stenotic, occlusive, and aneurysmal diseases of the aorta and its branch arteries, exclusive of the coronary arteries.* »

ACC/AHA guidelines. JACC, 2006;47:1239-312

Serge Kownator MD, FESC, FACC
Thionville, France



Diagnosis of PAD: The Goal

- Identification, of people with an increased risk of cardiovascular events.
- Optimization of the prevention strategy in this population i.e. appropriate interventions to diminish the increased risk
- Appropriate investigation and therapeutic intervention to improve the local(s) vascular condition

Individuals at Risk for Lower Extremity PAD

- Age less than 50 years, with diabetes and one other atherosclerosis risk factor (smoking, dyslipidemia, hypertension, or hyperhomocysteinemia)
- Age 50 to 69 years and history of smoking or diabetes
- Age 70 years and older
- Leg symptoms with exertion (suggestive of claudication) or ischemic rest pain
- Abnormal lower extremity pulse examination
- Known atherosclerotic coronary, carotid, or renal artery disease

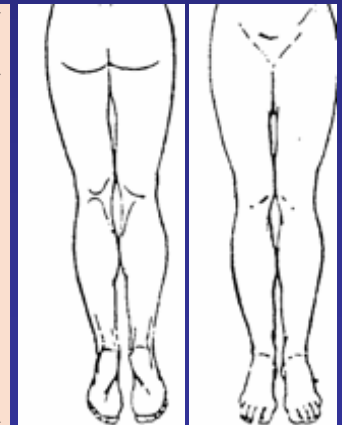
The First Step : Clinical Evaluation

- History and Symptoms
 - Definitions
 - Asymptomatic*: Without obvious symptomatic complaint (but usually with a functional impairment).
 - Classic Claudication*: Lower extremity symptoms confined to the muscles with a consistent (reproducible) onset with exercise and relief with rest.
 - “Atypical” leg pain*: Lower extremity discomfort that is exertional, but that does not consistently resolve with rest, consistently limit exercise at a reproducible distance.
 - A history of walking impairment, claudication, and ischemic rest pain is recommended as a required component of a standard review of systems for Pts ≥ 50 years with CVRFs, or ≥ 70 years.
- Asymptomatic PAD should be identified in order to offer therapeutic interventions known to limit the risk of CVE.

History

- Non standardized HPI
 - Location of Symptoms
 - Description of Discomfort
 - Exacerbating/Ameliorating Characteristics
 - Reproducible Symptoms....
- Questionnaires
 - Edinburgh Claudication Questionnaire
 - Sensitivity : 99 %
 - Specificity : 91 %

Question	Response	Sensitivity (%)	Specificity (%)
Do you get pain or discomfort in your leg(s) when you walk?	Yes (If patient answers no, then stop here)	99.3	13.1
Does this pain ever begin when you are standing still or sitting?	No	99.3	80.3
Do you get pain if you walk uphill or hurry?	Yes	98.8	13.1
Do you get pain if you walk at an ordinary pace on level ground?	Yes or no, dependent on severity of claudication	—	—
What happens if you stand still?	Pain gone in 10 minutes or less	90.6	63.9
Where do you get this pain?	Calf,* thigh, or buttock† marked	—	—



The First Step: Clinical Evaluation

- Physical examination
 - Inspection
 - Pulse palpation
 - 0, absent
 - 1, diminished
 - 2, normal
 - 3, bounding
 - Auscultation
 - Lower limbs and abdomen



Diagnosis of PAD

Comments on clinical evaluation

- HPI & ROS
 - The ratio of symptomatic to asymptomatic PAD ranges from 1/0.9 to 1/6
 - Based on classical claudication the diagnosis is missed in 85 %[1]
- Physical examination
 - One pulse is not detected in 10 % of the general population
 - Based on pulse examination the diagnosis is missed in 50 % [2]

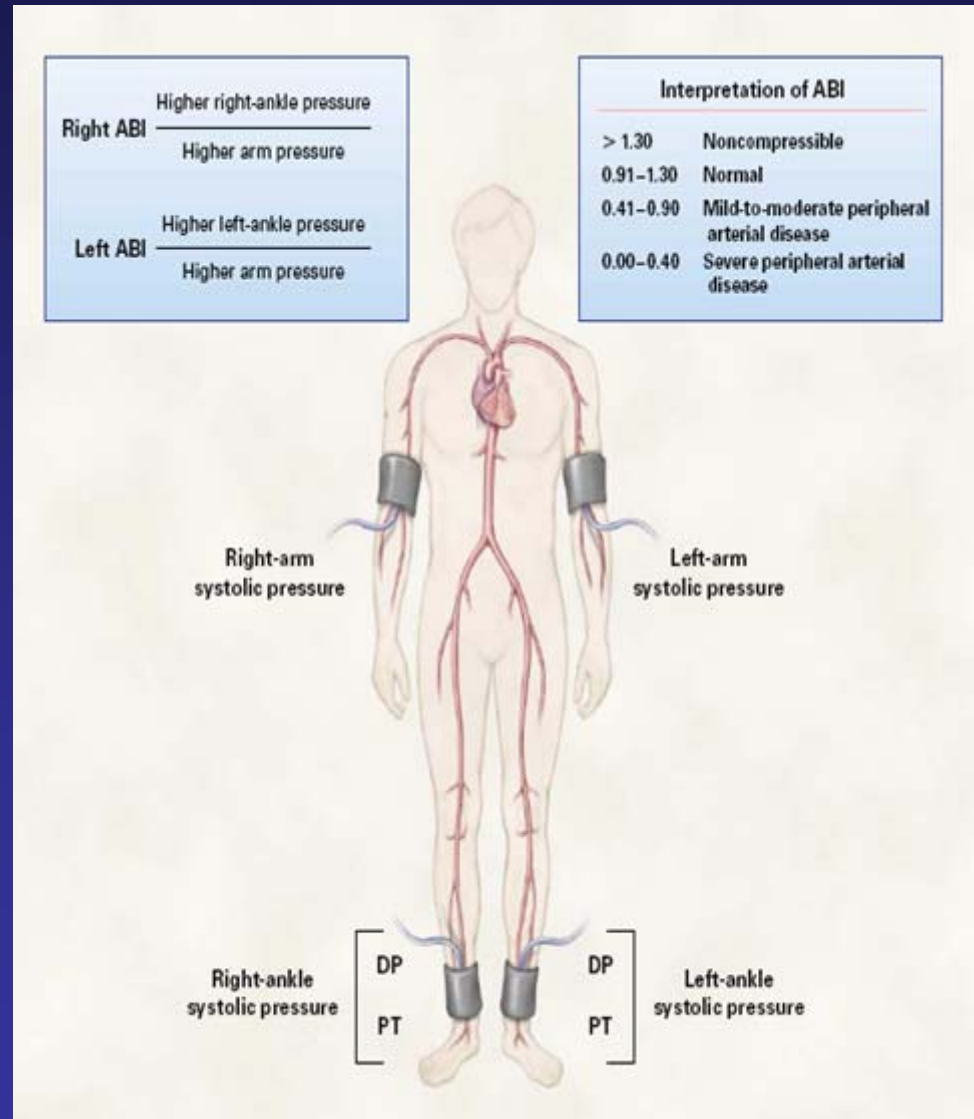
1) Hirsch AT et al. *JAMA*. 2001;286:1317-1324
2) Criqui MH et al. *Circulation*. 1985;71:516-521)

The First Step: We need more !

- Ankle Brachial Index (ABI)
 - An ABI \leq 0.9 allows 99 % specificity and 95 % sensitivity
 - Simple, painless, accurate, highly reproducible
 - Needs only a continuous wave handheld Doppler (2-300 €)

ABI

- Patient resting supine for 5-10 minutes
- Measure Systolic BP in both arms
 - Higher value is *denominator* of ABI
- Measure Systolic BP in DP and PT
 - Higher value is *numerator* of ABI

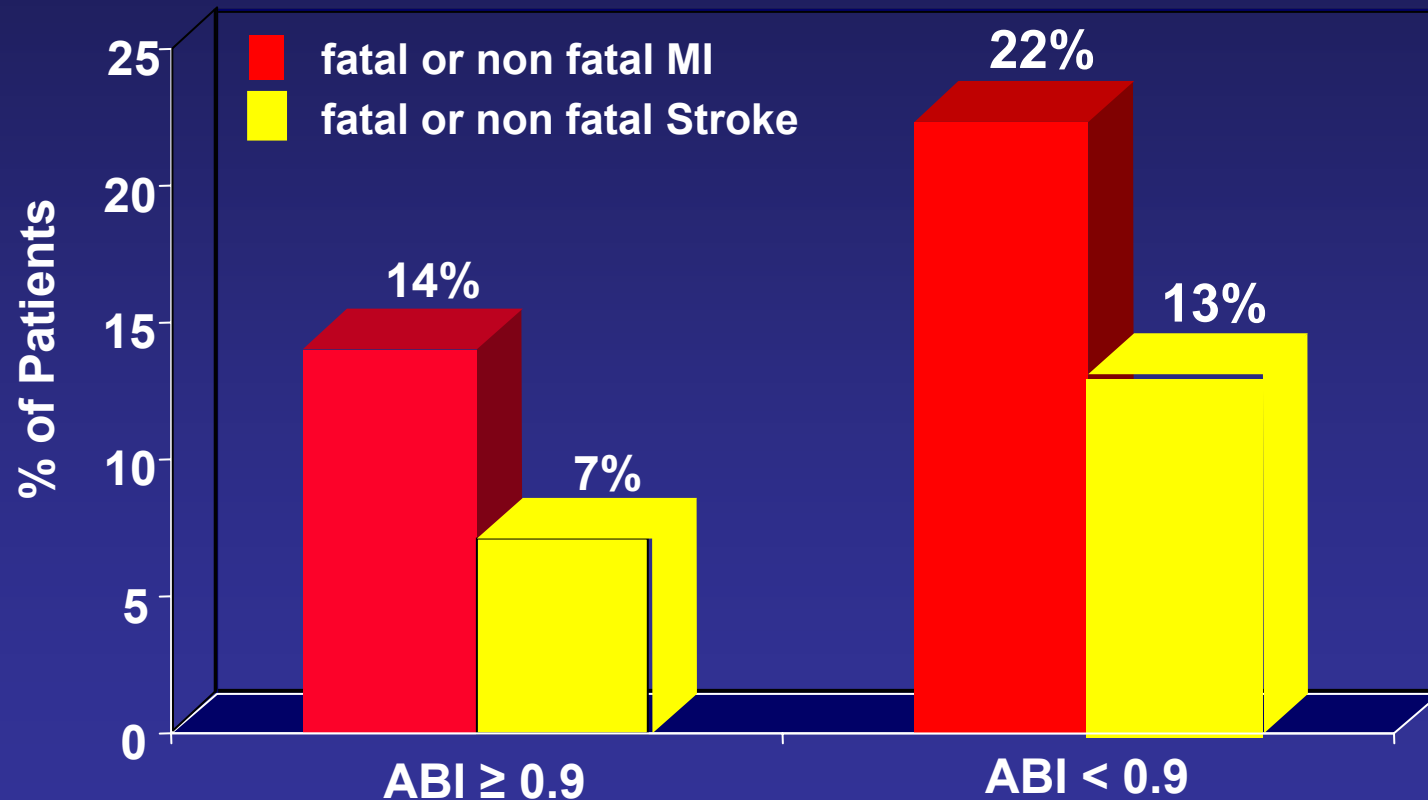


ABI

- Provides information on the severity of the arterial occlusive disease
 - Mild disease: 0.9 to 0.7
 - Moderate disease: 0.4 to 0.7
 - Severe disease : < 0.4
- Limitations
 - Calcified ankle vessels
 - Artificially “normal” ABI (DM, RF)
 - Normal ABI in highly suspect patients needs exercise testing
- More information with
 - Exercise ABI
 - Toe – brachial index

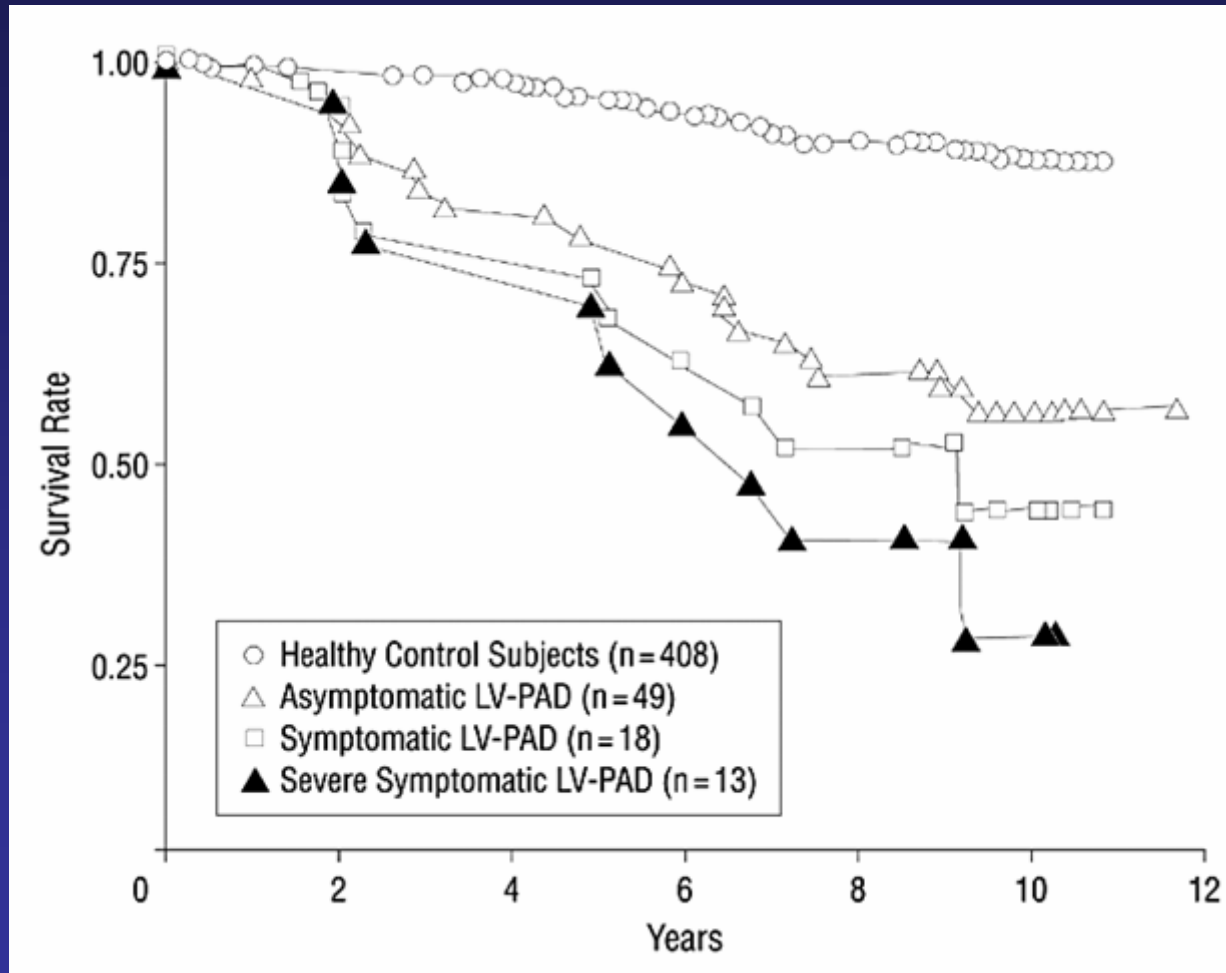
ABI and risk of CVE

The Edinburgh Artery Study :
Twelve-Year Incidence of Nonfatal CVE and Mortality According to Baseline ABI
(n=1507)



Adapted from Lee AJ et al. *Circulation*. 2004;110:3075-3080.

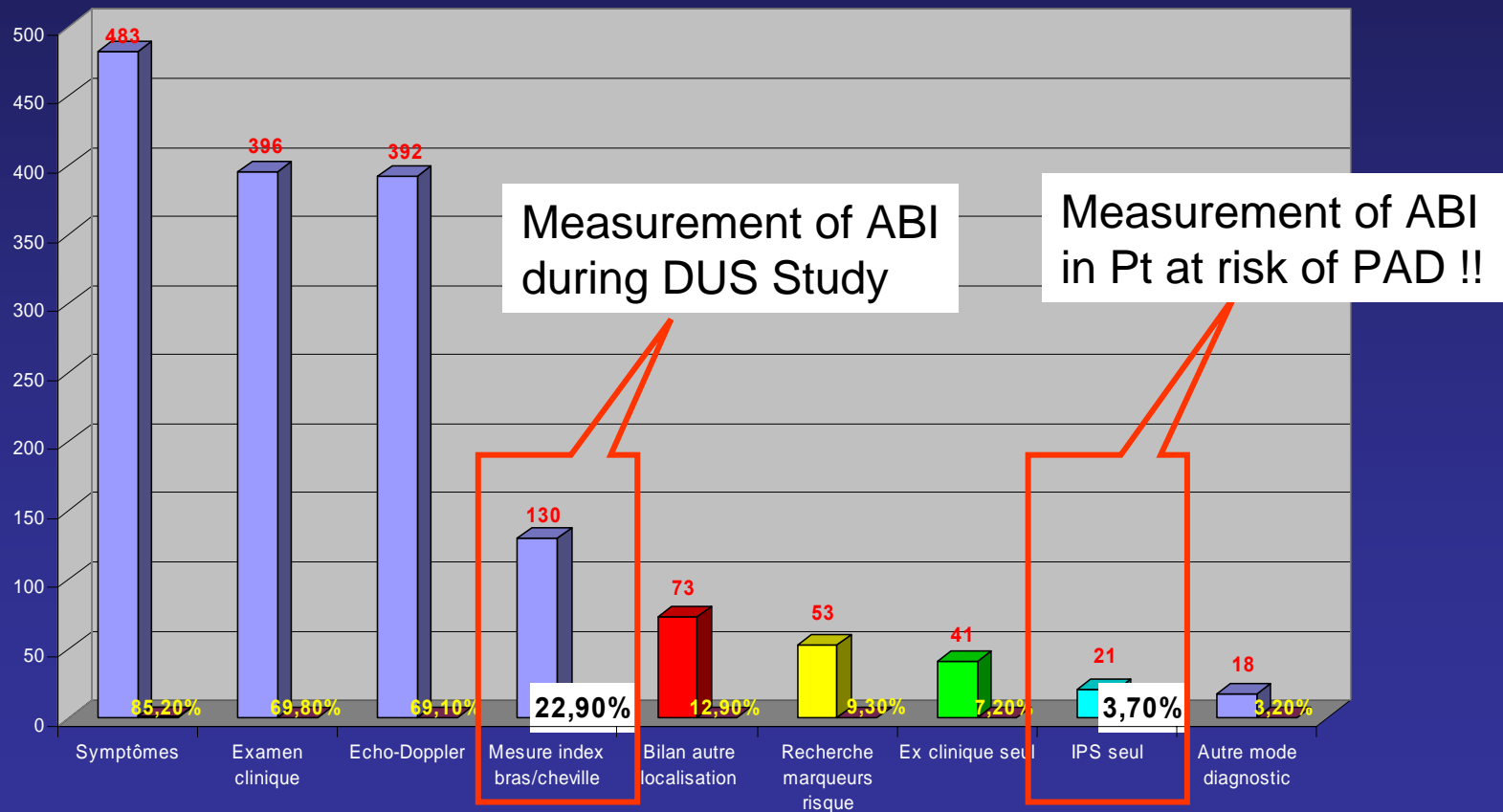
ABI as a predictor of mortality



ABI

A call to action

- ABI is often underused
 - Survey among 150 cardiologists (530 patients)



ABI

« The corner stone of PAD »

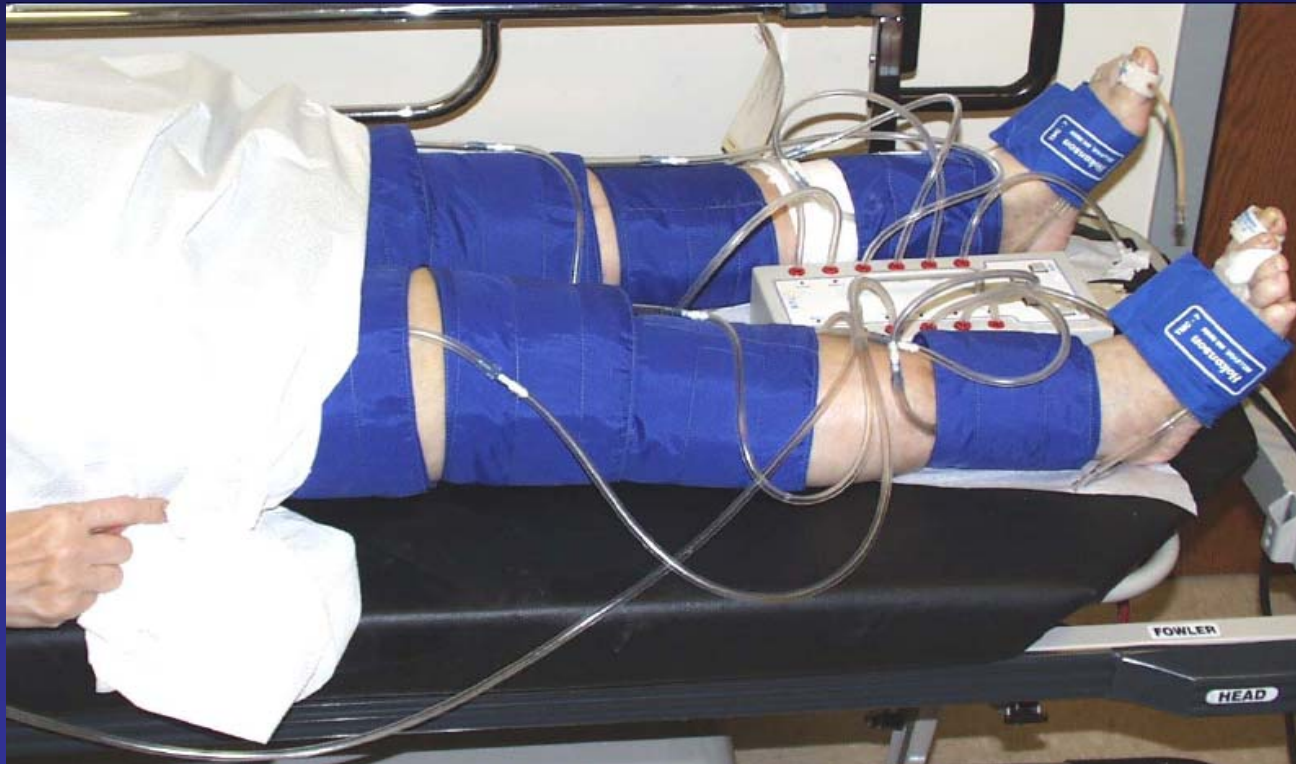
5679 pts in primary care in France

	Suspected PAD symptoms	Documented atherothrombotic disease	CV risk factors only	Total
Number	1209	2393	2077	5679
ABI < 0.9	37.4%	38.0%	10.4%	27.8%
ABI < 0.50	0.7%	2%	0%	1.0%
ABI 0.50-0.75	16.6%	17.6%	2.6%	11.9%
ABI 0.75-0.90	20.1%	18.3%	7.7%	14.8%
ABI > 0.9	62.6%	62.0%	89.6%	72.2%

Other non invasive test

- Segmental Limb Pressures
- Pulse Volume Recordings
- Duplex Ultrasonography

Segmental Pressures/Pulse Volume Recordings



- Combined utilization provides a 95 % accuracy

Duplex ultrasonography

- Useful to diagnose anatomic location and degree of stenosis of peripheral arterial disease.
- Reproducible, reliable, accurate
 - Sens. : 90 % - Spec 95 % to detect stenosis or occlusion
- Painless, risk-free, relatively inexpensive
- Direct visualization and characterization of arterial stenosis, occlusion, injury
- Predicts ideal access for intervention

Kohler TR et al *Circulation*. 1987;76:1074–1080.

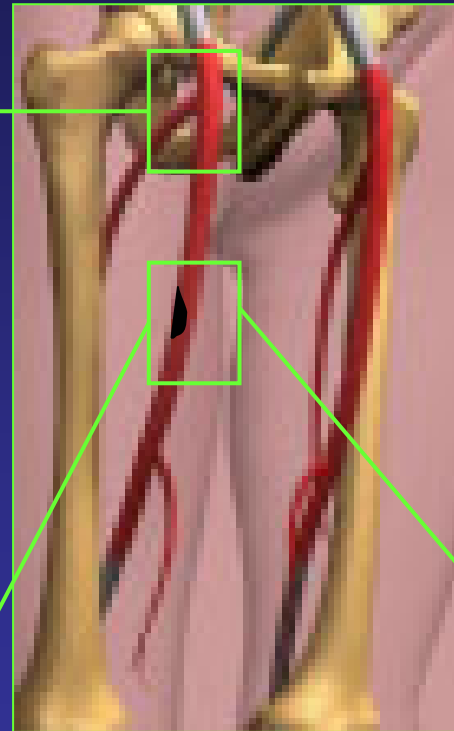
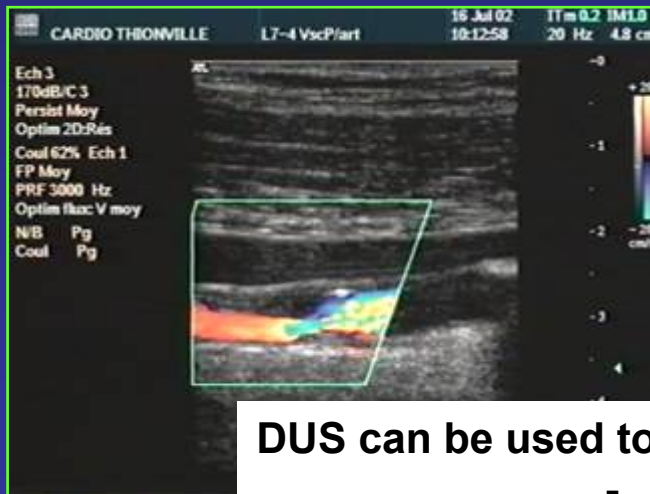
Elsman BH et al. *Cardiovasc Intervent Radiol*. 1996;19:313–316.

Whelan JF. *J Clin Ultrasound*. 1992;20:369–374.

Duplex Ultrasonography



Short stenosis of the right SFA
- PSV = 350 cm/s
- VR = 4.4

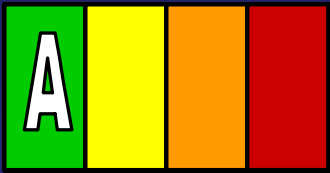


DUS can be used to select candidates for :

- Endovascular intervention
- Surgical bypass
- To select sites of surgical anastomosis.

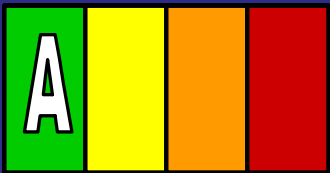
DUS Guidelines

I IIa IIb III



Duplex ultrasound of the extremities is useful to diagnose the anatomic location and degree of stenosis of PAD.

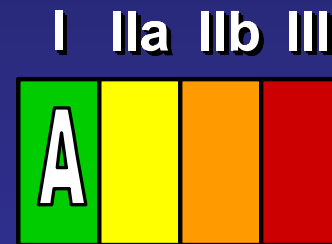
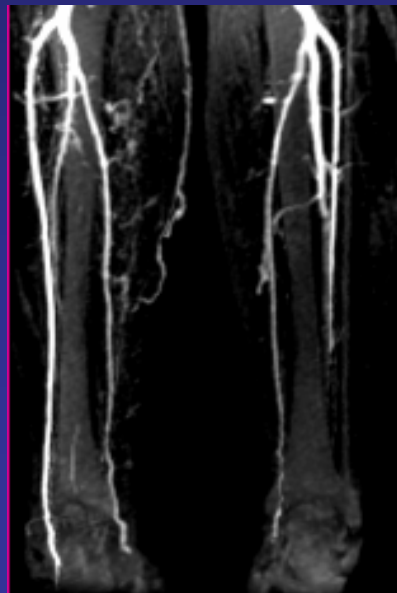
I IIa IIb III



Duplex ultrasound is recommended for routine surveillance after femoral-popliteal or femoral-tibial-pedal bypass with a venous conduit. minimum surveillance intervals are approximately 3,6, and 12 months, and then yearly after graft placement.

Non invasive Tests : More !

- MRA
 - Gadolinium enhanced
 - Sens.: 97 % - spec.: 96 %

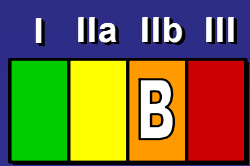


MRA of the extremities is useful to diagnose anatomic location and degree of stenosis of PAD.

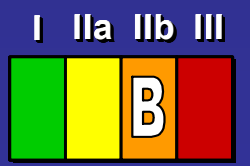


Non invasive Tests : More !

- CTA
 - 100% concordance for presence or absence of disease
 - Scan times 48 –66 sec
 - Contrast volume 150cc at 3.5cc/sec
 - Sens. 96% -spec. 97%



CTA of the extremities may be considered to diagnose anatomic location and presence of significant stenosis in patients with lower extremity PAD.



CTA of the extremities may be considered as a substitute for MRA for those patients with contraindications to MRA.

Indication for anatomic evaluation

- DUS, MRA or CTA are generally recommended when a revascularization is necessary
- Clinical presentation is the basis of the diagnostic strategy

Clinical Presentation	Noninvasive Vascular Test
Asymptomatic lower extremity PAD	ABI
Claudication	ABI, PVR, or segmental pressures Duplex ultrasound Exercise test with ABI to assess functional status
Possible pseudoclaudication	Exercise test with ABI
Postoperative vein graft follow-up	Duplex ultrasound
Femoral pseudoaneurysm; iliac or popliteal aneurysm	Duplex ultrasound
Suspected aortic aneurysm; serial AAA follow-up	Abdominal ultrasound, CTA, or MRA
Candidate for revascularization	Duplex ultrasound, MRA, or CTA

Don't forget

- Screening for AAA with one time Ultrasound
 - High risk population
 - All men aged 60 to 85 years
 - Women aged 60 to 85 years with cardiovascular risk factors
 - Men and women older than 50 years with a family history of AAA.
- RAS

Conclusion

The United States Preventive Services Task Force Recommendation Statement on Screening for Peripheral Arterial Disease More Harm Than Benefit?

Joshua A. Beckman, MD, MS; Michael R. Jaff, DO; Mark A. Creager, MD

Abstract—Under the auspices of the Agency for Healthcare Research and Quality, the United States Preventive Services Task Force (USPSTF) recently released an update to its 1996 Peripheral Arterial Disease (PAD) Screening Recommendation Statement. The USPSTF recommended against PAD screening, giving the practice a “D” level recommendation. This level suggests that little or no benefit could accrue from PAD screening and that screening-associated harm could occur. The present commentary disputes the Task Force’s recommendation. The USPSTF statement omitted important peer-reviewed data on the prevalence, screening efficacy, and short-term adverse prognosis of patients with PAD and failed to consider the beneficial outcomes that probably would result from timely diagnosis and treatment of this important manifestation of atherosclerosis. The Task Force implied that screening may lead to unnecessary tests, including increased risk associated with use of contrast angiographic studies. However, most patients with PAD have neither classic symptoms of leg claudication nor threatened limbs but have an extraordinarily high rate of adverse cardiovascular events, such as myocardial infarction, stroke, and death—events that should serve as a key rationale for screening. Medical therapy, including risk factor modification and antiplatelet medications, is known to reduce cardiovascular morbidity and mortality rates in these patients. The Task Force’s recommendation against PAD detection may itself adversely result in inadequate recognition and treatment of PAD, with adverse public health consequences. We encourage the USPSTF to reevaluate the extant data, add vascular specialty expertise to its review group, and reconsider its recommendation. (*Circulation*. 2006;114:861-866.)