



Advances in the treatment of PAD

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Disclosures

Consultant for device design with Shockwave Medical and Akura medical



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AHA/ACC GUIDELINE

2016 AHA/ACC Guideline on the Management of Lower Extremity Peripheral Artery Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Marie D. Gerhard-Herman, MD, FACC, FAHA, Chair, Health

ATVB IN FOCUS:

The Science of the ATVB Early Career Committee

Series Editor: Robert A. Hegele

Evidence-Based Medical Management of Peripheral Artery Disease

Graham H. Bevan, Khendi T. White Solaru

ABSTRACT: Peripheral artery disease is an atherosclerotic disease of the lower extremities associated with high cardiovascular mortality. Management of this condition may include lifestyle modifications, medical management, endovascular repair, or surgery. The medical approach to peripheral artery disease is multifaceted and includes cholesterol reduction, antiplatelet therapy, anticoagulation, peripheral vasodilators, blood pressure management, exercise therapy, and smoking cessation. Adherence to this regimen can reduce limb-related complications like critical limb ischemia and amputation, as well as systemic complications of atherosclerosis like stroke and myocardial infarction. Relative to coronary artery disease, peripheral artery disease is an undertreated condition. In this article, we explore the evidence behind medical therapies for the management of peripheral artery disease.

Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II)

L. Norgren,^a W.R. Hiatt,^b J.A. Dorma,^c et al.
the TASC II Working Group, Örebro, Sweden

Circulation

Volume 147, Issue 8, 21 February 2023; Pages e03-e021
<https://doi.org/10.1161/CIR.0000000000001123>

AHA STATISTICAL UPDATE

Heart Disease and Stroke Statistics—2023 Report From the American Heart Association

Connie W. Tsao, MD, MPH, FAHA, Chair, Aaron W. Aday, MD, MSc, FAHA, Zaid I. Almarzooq, MBBCh, MPH, Cheryl A.M. Anderson, PhD, MPH, FAHA, Pankaj Arora, MD,

REVIEWS



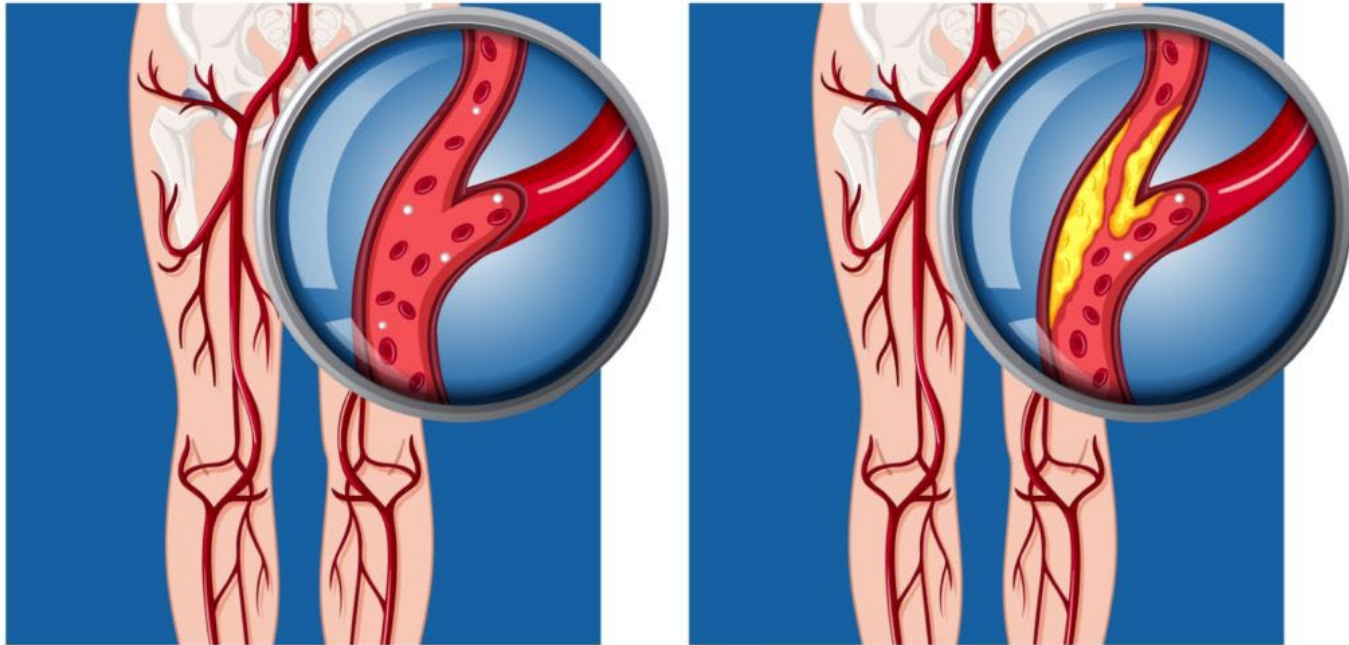
Update on the pathophysiology and medical treatment of peripheral artery disease

Jonathan Golledge^{1,2,3}

Abstract | Approximately 6% of adults worldwide have atherosclerosis and thrombosis of the

Diagnosis	Definition	AKA
Peripheral arterial disease	Stenosis or occlusion of the arteries to the lower limb	PAD, PVD

Peripheral Artery Disease (Arteriosclerosis)

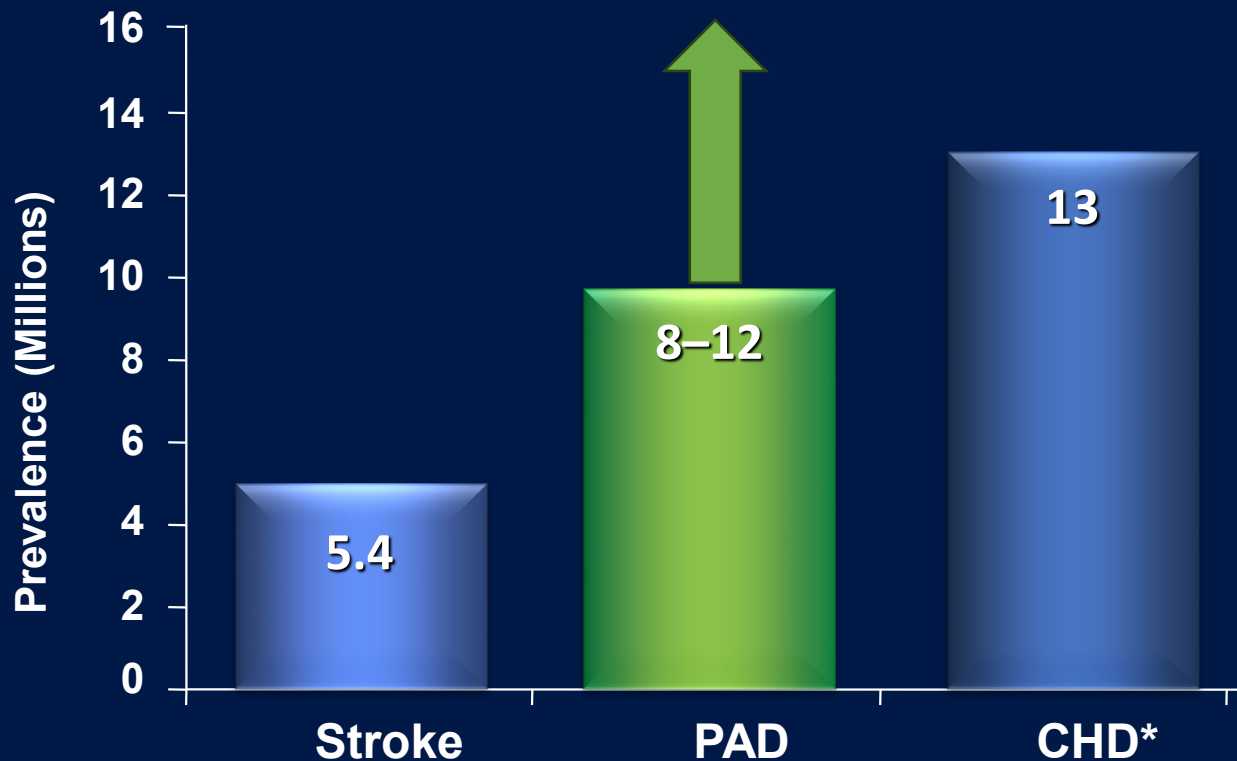




Prevalence



PAD affects 8–12 million Americans ... and rising



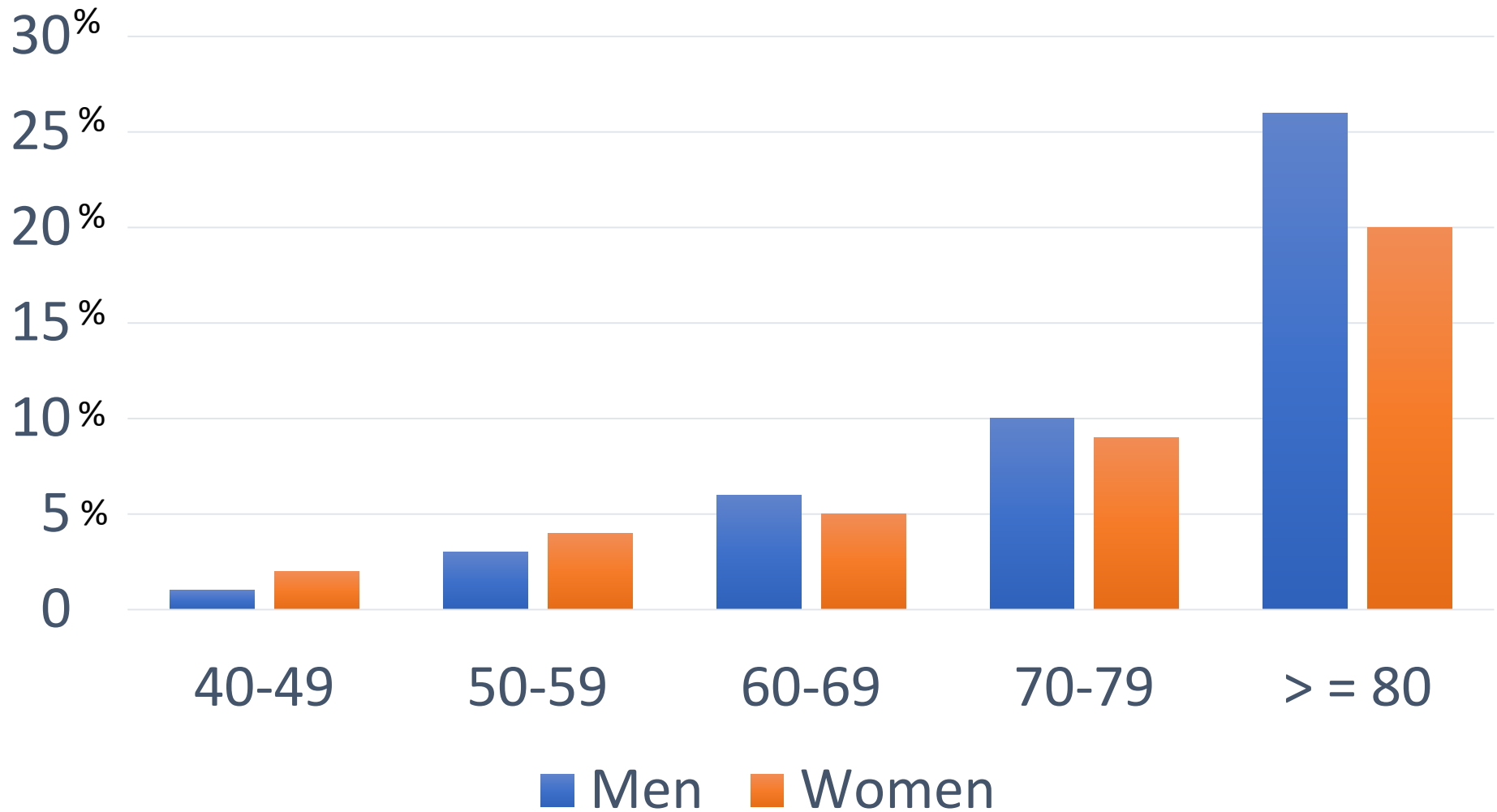
By 2050,
prevalence
is expected
to reach 19
million

CHD = coronary heart dx (inc. myocardial infarction and angina pectoris)

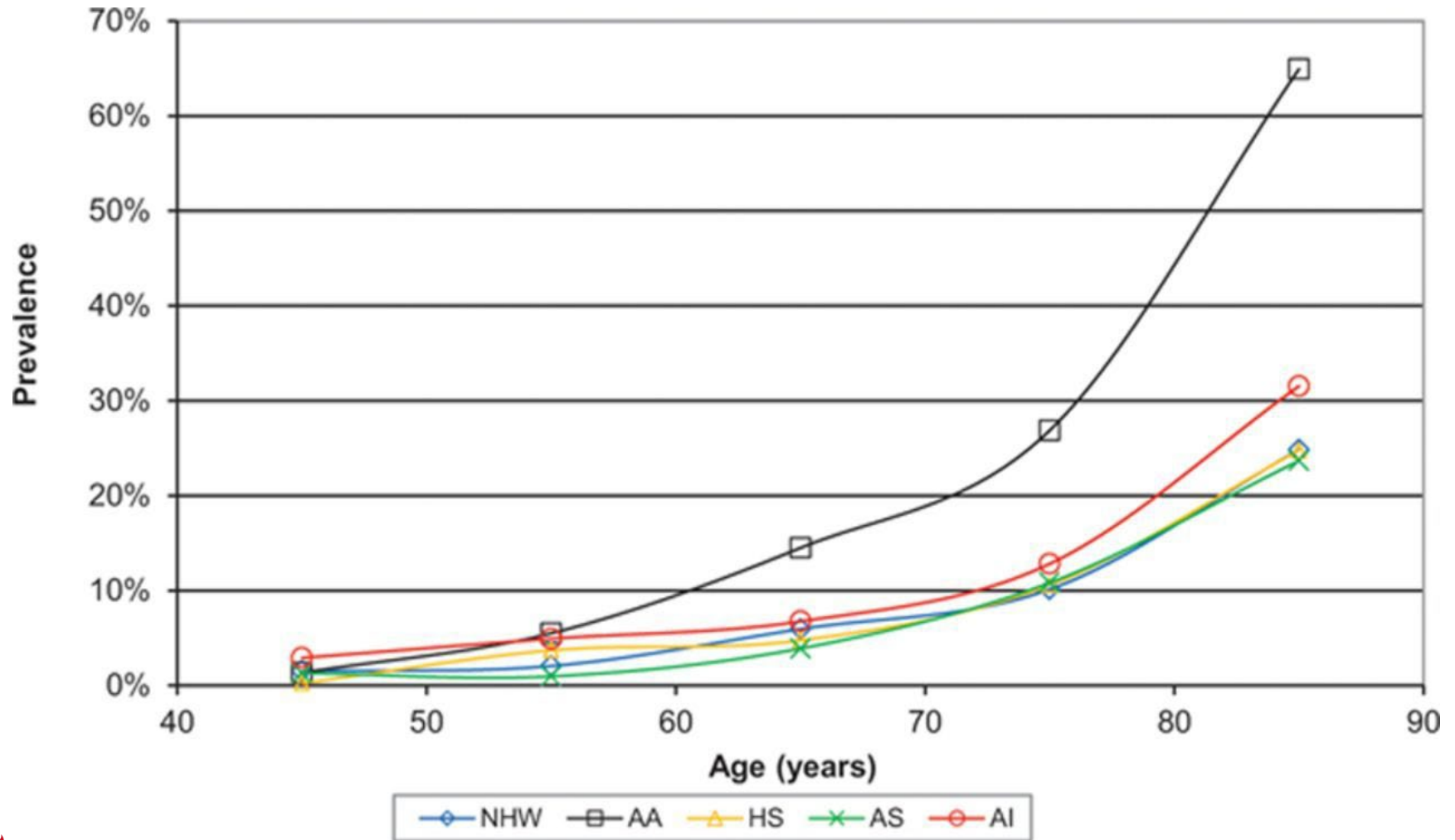
American Heart Association. *Heart Disease and Stroke Statistics—2005 Update*. 2005.

Adapted from PowerPoint by Dr. Robert Eberhardt, MD, Boston University School of Medicine

Prevalence increases with age

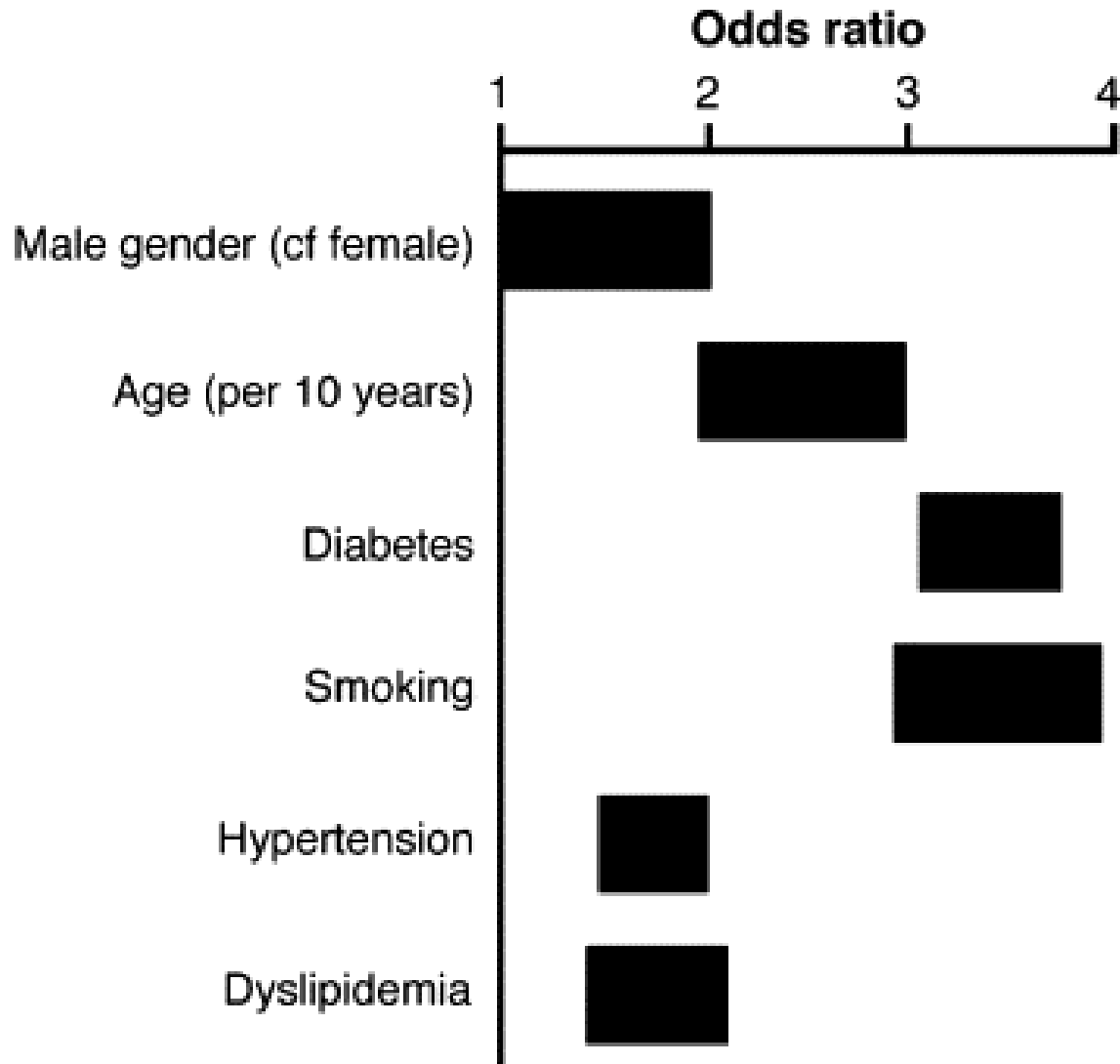


Disparity

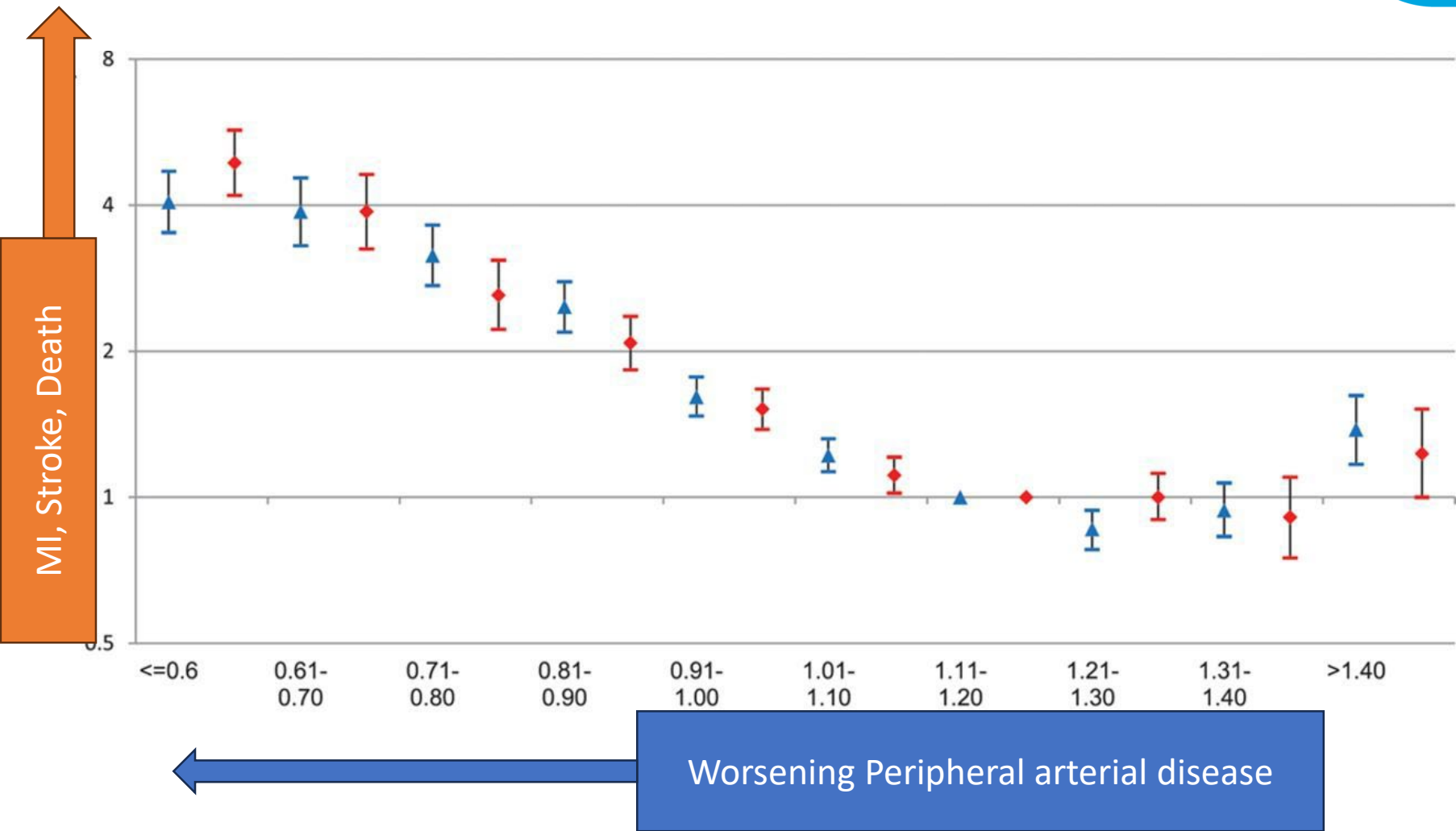


Michael H. Criqui. Circulation Research. Epidemiology of Peripheral Artery Disease, Volume: 116, Issue: 9, Pages: 1509-1526, DOI: (10.1161/CIRCRESAHA.116.303849)

Risk Factors



PAD as a harbinger of CVD




Michael H. Criqui. Circulation Research. Epidemiology of Peripheral Artery Disease, Volume: 116, Issue: 9, Pages: 1509-1526



Treatment opportunities





Diagnosis	Definition	AKA
Peripheral arterial disease	Stenosis or occlusion of the arteries to the lower limb	PAD, PVD
Acute limb ischemia	Acute thrombosis of the arteries leading to pulselessness, pallor, motor and sensory loss	
Intermittent claudication	Pain in the calf, thigh, buttocks with walking, relieved by rest	IC

Usually conservative management, with exceptions

Why conservative?

Intervening on
claudication → more
progression to limb
ischemia

Development of CLTI after:

Early PVI - 16.4%

No Intervention - 7.8%

$p < .001$

Early Peripheral Vascular Interventions (PVI) for Claudication are Associated with Higher Rates of Late Interventions and Progression to Chronic Limb Threatening Ischemia



Retrospective review of Medicare claims data



187,442 Medicare beneficiaries diagnosed with claudication

JVS

Journal of
Vascular Surgery

Official Publication of the Society for Vascular Surgery

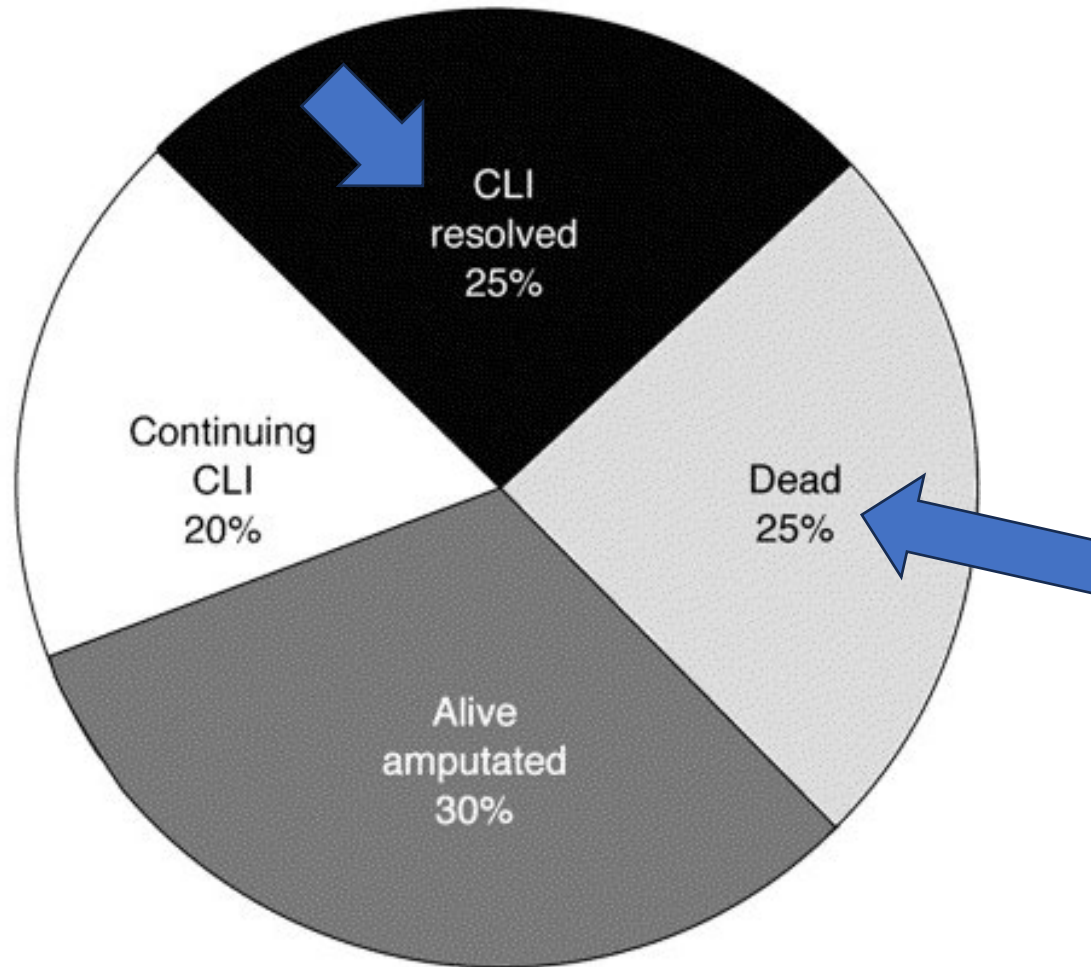
Sorber et al. *J Vasc Surg* March 2023

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Outcome with CLTI?

→ A year later





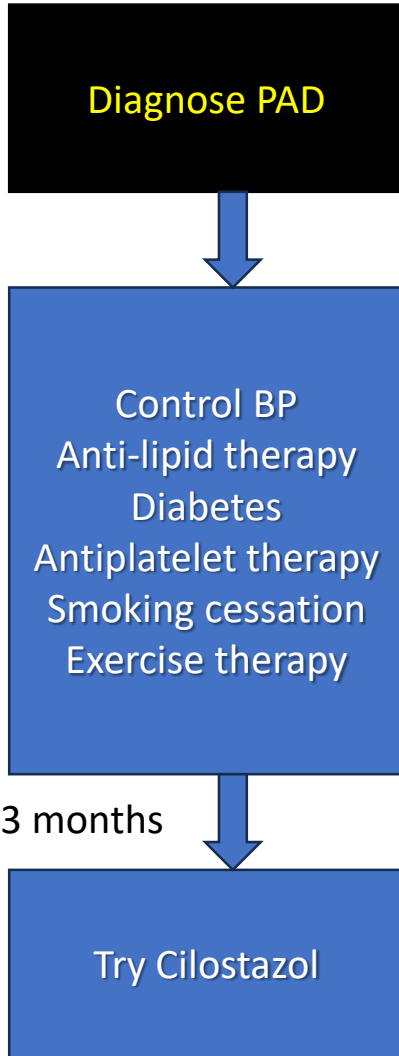
Cyndi Elledge for The New York Times

They Lost Their Legs. Doctors and Health Care Giants Profited.

Medical device makers have bankrolled a cottage industry of doctors and clinics that perform artery-clearing procedures that can lead to amputations.

13 MIN READ

Conservative Management



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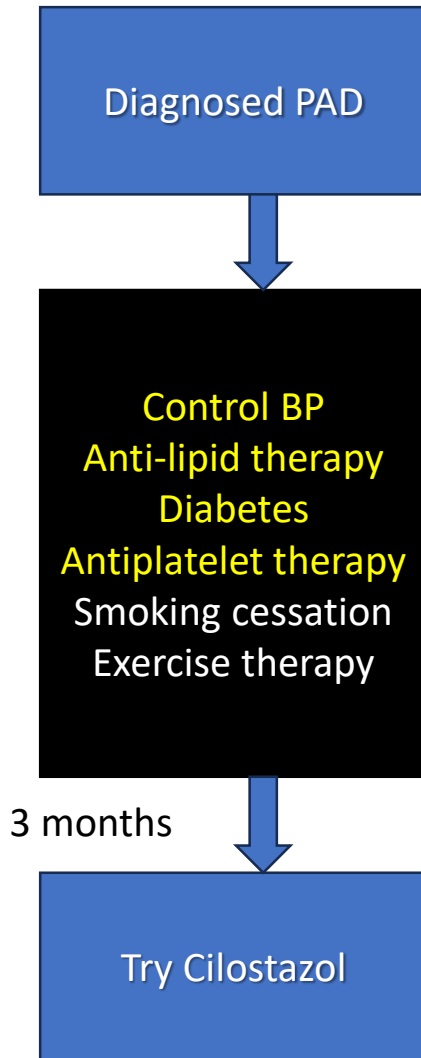
Marie D. Gerhard-Herman, MD, FACC, FAHA, Chair, Heather L. Gornik, MD, FACC, FAHA,



Diagnosis of PAD

- Use ankle brachial index (ABI) for:
 - *exertional*/leg symptoms
 - nonhealing wounds
 - age \geq 65 years
 - \geq 50 years with smoking Hx or diabetes.
 - 0.9 or 90% is normal
- TBI is preferred in patients with diabetes
 - 0.7 is normal

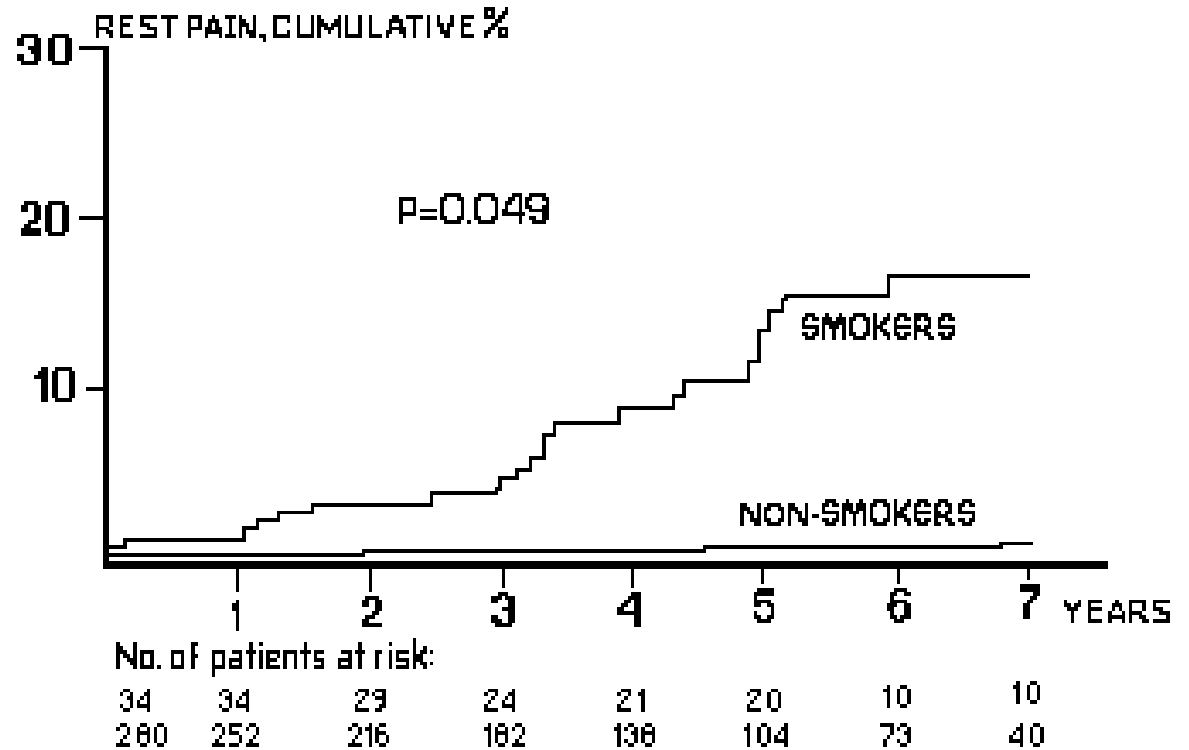
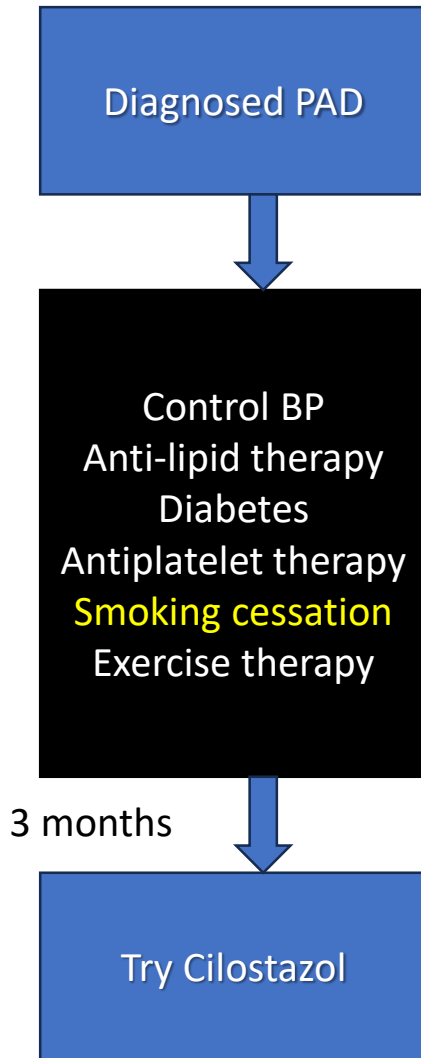
Management



- **HTN:** Goal < 140/90
 - Maybe ACE / ARB?
- **HLD:** Goal LDL < 100
 - High-dose statin
- **DM:** Goal A1c < 7%
- **ASA**
- **DAPT** → Less clear



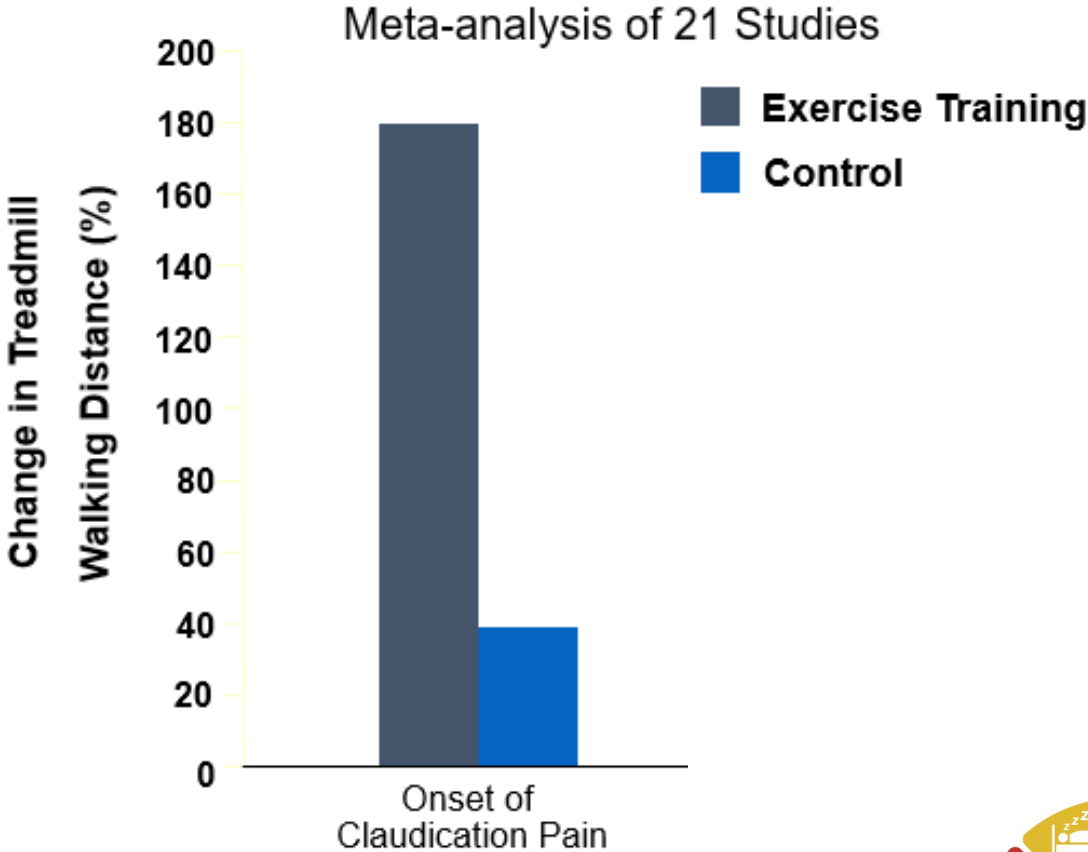
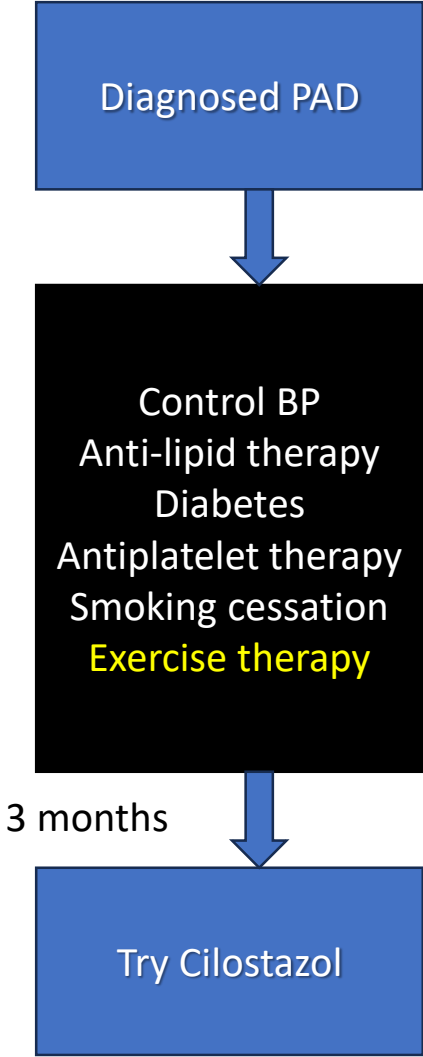
Smoking



- Quit = lower mortality



Exercise



Gardner AW. JAMA. 1995;274:975-980.

Heart Disease and Stroke Statistics—2023 Update: A Report From the AHA, [Connie W. Tsao](#) et al., 2016
AHA/ACC Guideline on the Management of patients with LE PAD, Gerhard et al. Al.



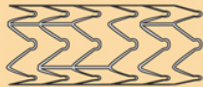
When done right, as good as PVI

Long-term results of revascularization in patients with intermittent claudication

[Patient population in study (n=158)]

RANDOMIZATION

Invasive treatment



Exercise training



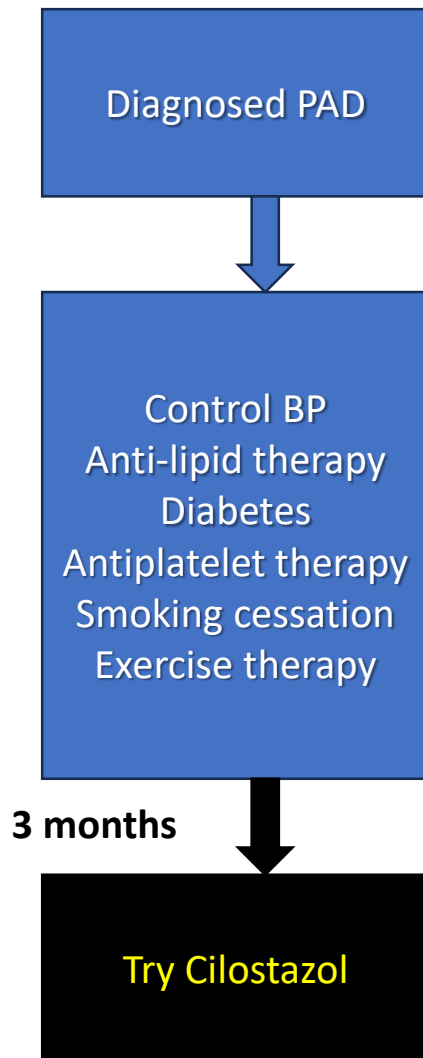
Outcomes after 5 years

No difference seen in HRQoL.
Almost double the costs for
invasive treatment.

Djerf et al. Circ Cardiovasc Interv. 2020

Circulation:
Cardiovascular Interventions

Cilostazol



- Cilostazol 100 mg BID
 - increase walking distance
 - **Contraindicated in patients with heart failure**
- Pentoxifylline
 - Not effective, no benefit

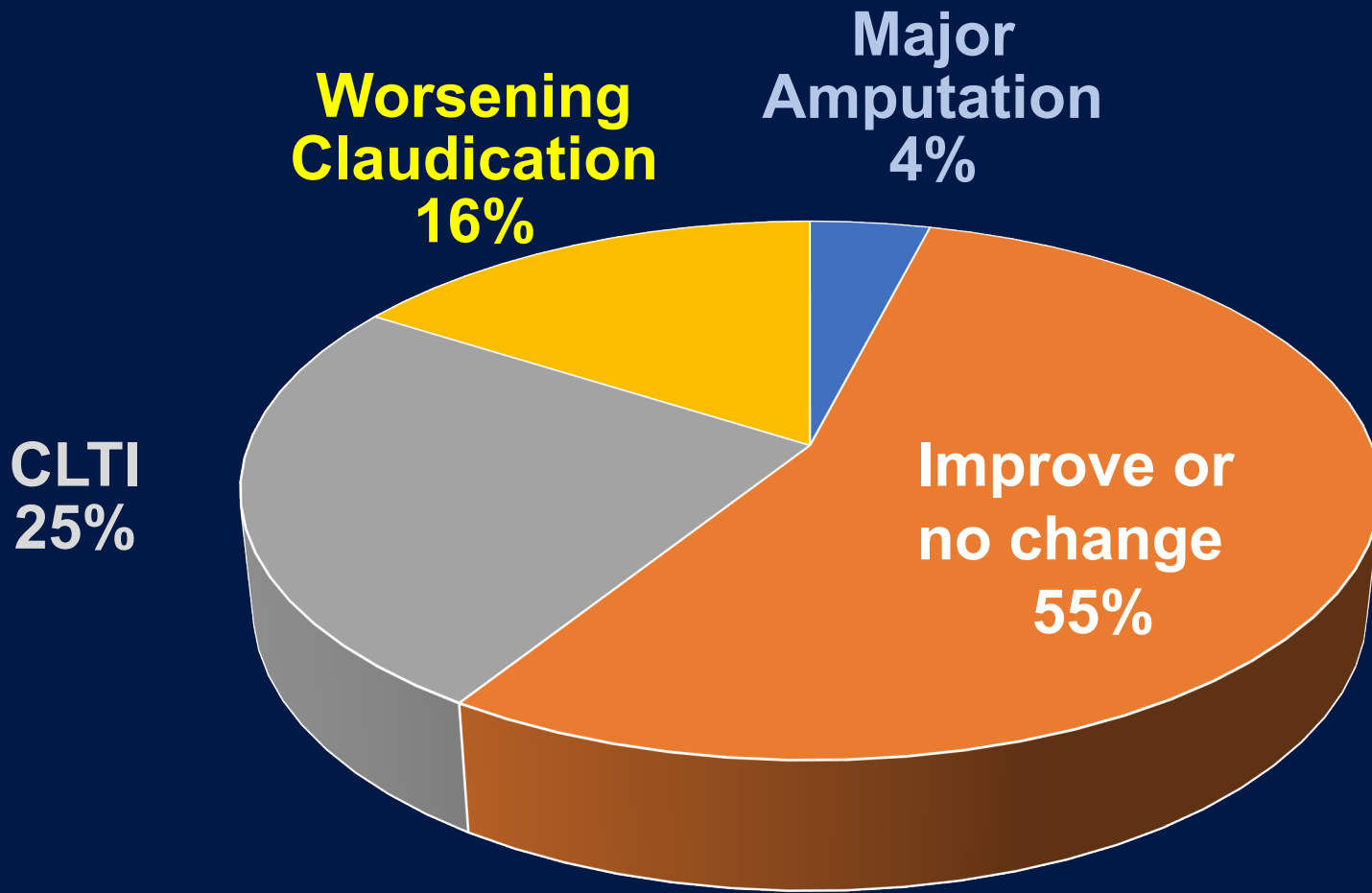
40-53% patients quit from side effects in 3 mo

And for all that...

... Not much has changed

- Gene therapy hasn't panned out
- Growth factors – no change
- DNA and RNA products have been developed to stimulate angiogenesis in the last 10 years, none successful.
- New data on spa therapy...?

Natural History of IC



When to intervene?

- Lifestyle limiting
 - Failed medical management trial
 - Aortoiliac or Femoral-popliteal disease
 - Tibial alone not suggested

Diagnosis		AKA
Peripheral artery disease	...ries to	PAD, PVD
Acute limb ischemia	...motor and sensory loss	
Intermittent claudication	Pain in the calf, thigh, buttocks with walking, relieved by rest	IC
Rest pain	PAD + pain in the foot, at rest Worse with raising the leg, better when dependent	

Require revascularization – risk of limb loss!

Rare!

Foot Ulcers

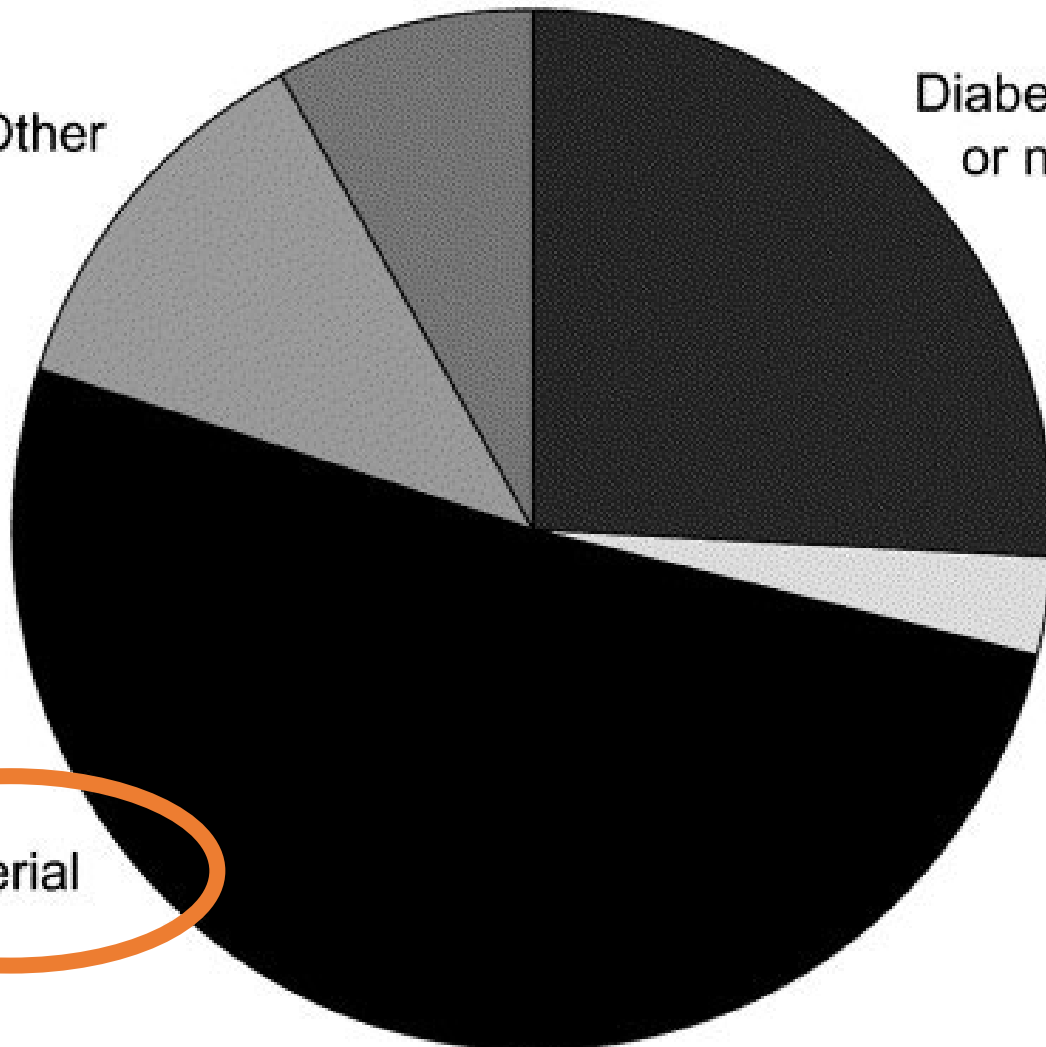
Multifactorial

Diabetic (neuropathic or neuroischemic)

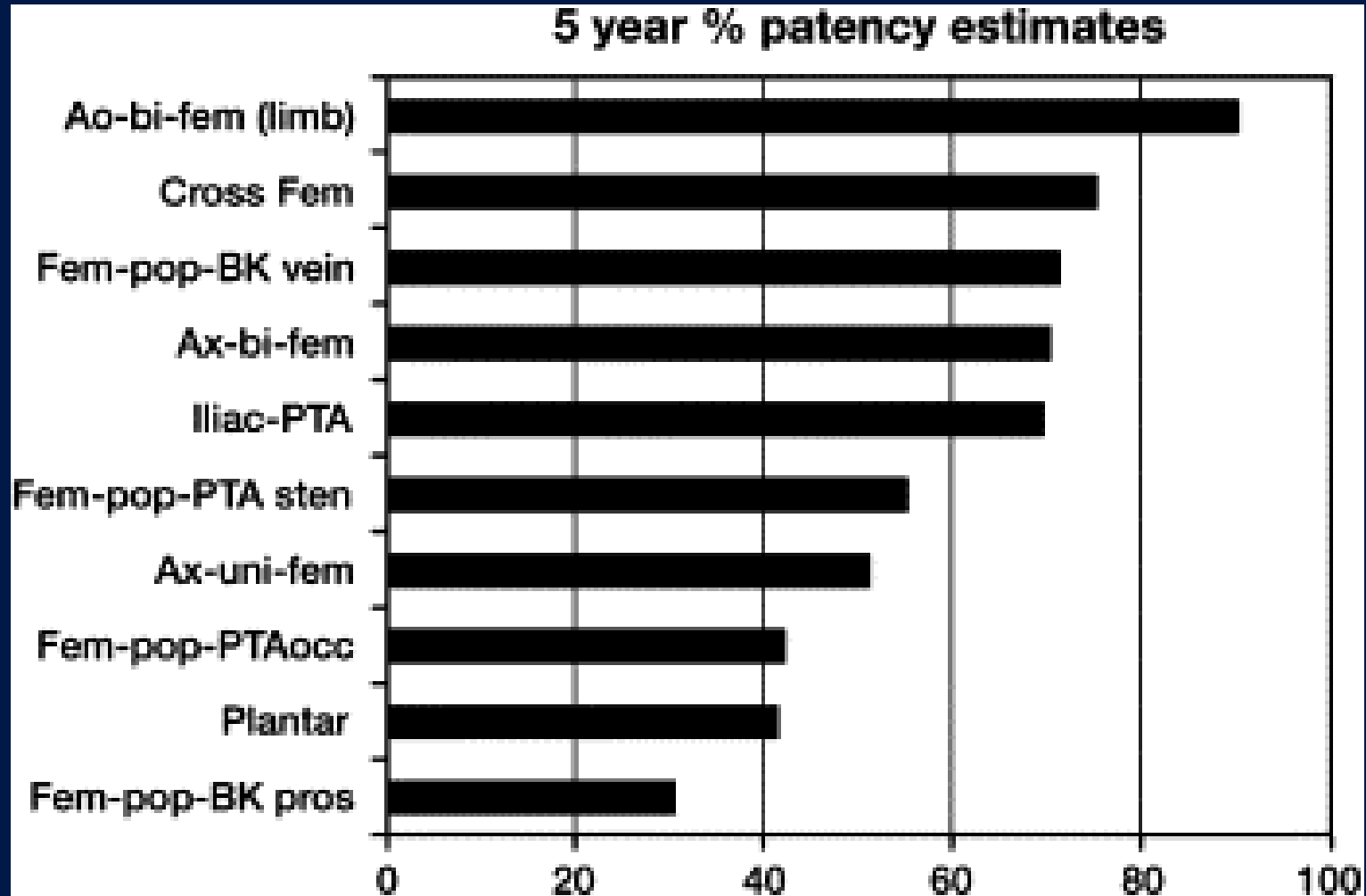
Other

Venous

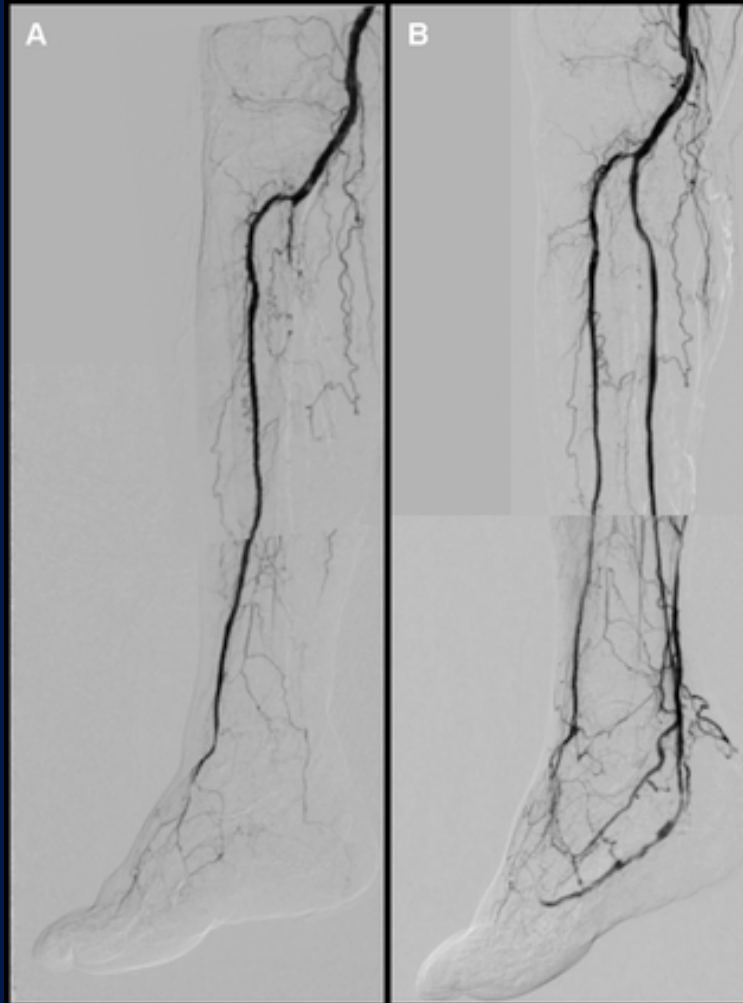
Arterial



Surgery gold standard but...



Hasn't changed much. Old is becoming new:



High Flexion Zones

Aneurysmal Disease

Covered Stent

Atherosclerotic Disease

Drug Eluting Stent

Bare Nitinol Stent

Graft Thrombosis

Bypass graft

Subintimal Re-Entry

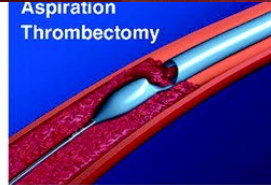
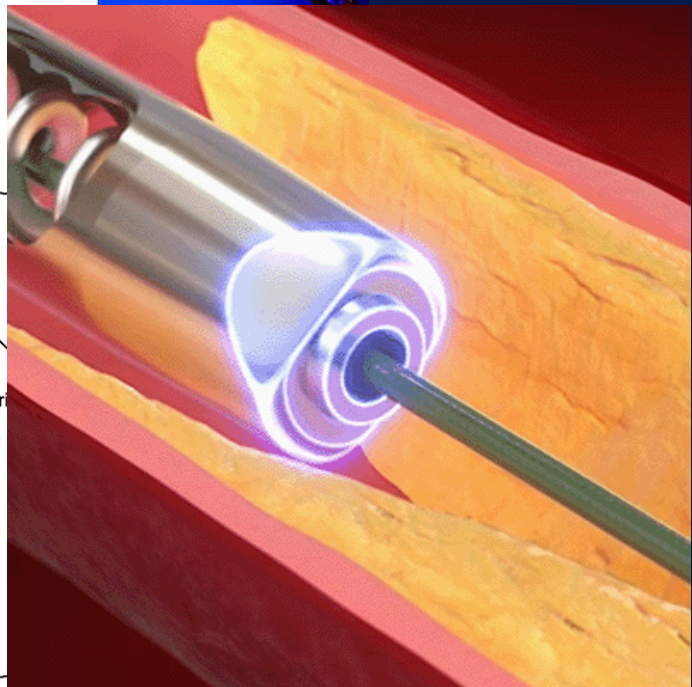
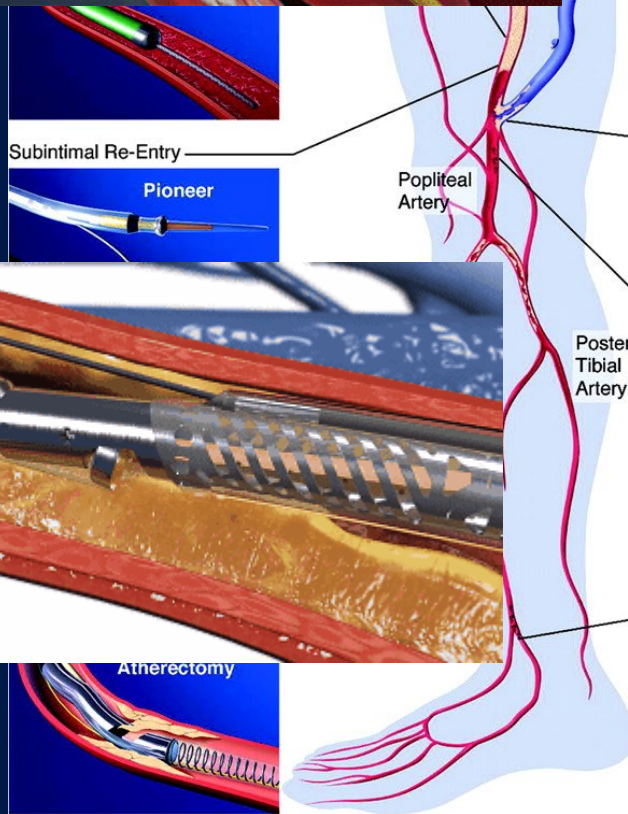
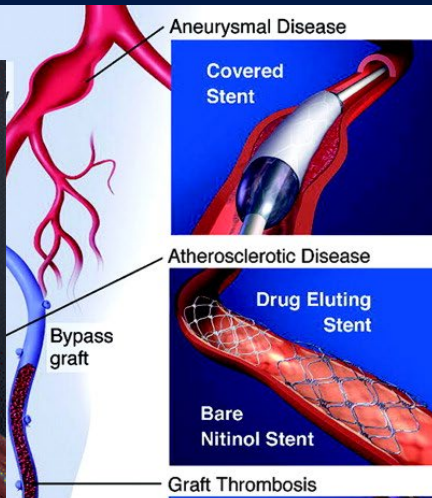
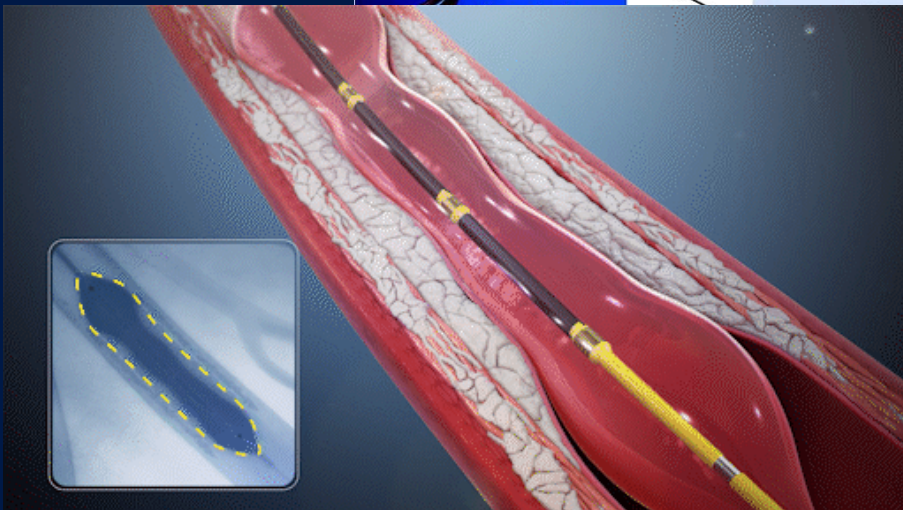
Pioneer

Popliteal Artery

Poster Tibial Artery

Atherectomy

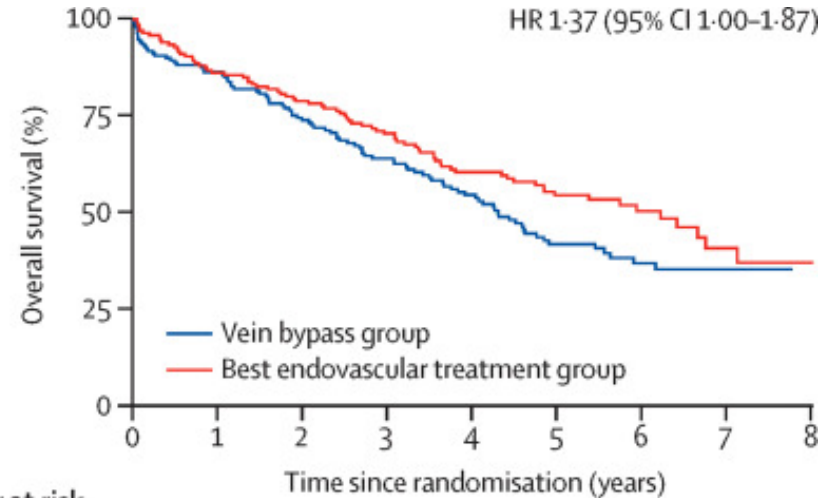
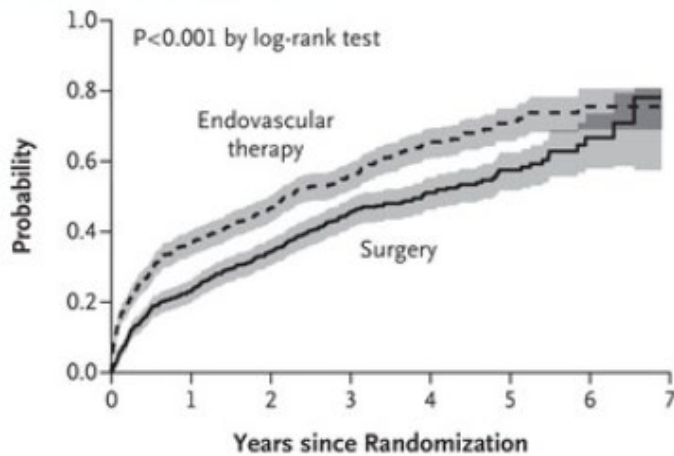
Aspiration Thrombectomy



Endo v Open Drama

BEST-CLI	BASIL2
CLI patients with vein	CLI with Infrapopliteal disease
US Vascular Surgeons	UK interventionalists (IR)
Freedom from death, major amputation, major reintervention	Amputation free survival
Surgery is better amp-free survival	Endo is better amp-free survival

A Major Adverse Limb Events or Death



No. at Risk	0	1	2	3	4	5	6	7
Endovascular therapy	716	404	304	175	102	46	14	0
Surgery	718	463	349	204	117	52	12	0

Number at risk	0	1	2	3	4	5	6	7	8
Vein bypass group	172	141	116	94	72	46	25	14	0
Best endovascular treatment group	173	142	125	106	79	61	30	12	1



Thank you!

