2022 MID-ATLANTIC CONFERENCE

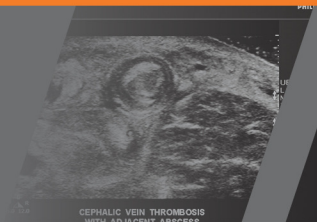
10th ANNUAL CURRENT CONCEPTS IN

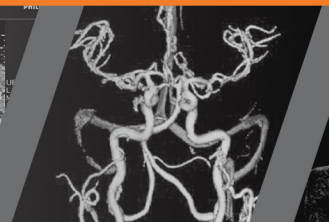
VASCULAR THERAPIES

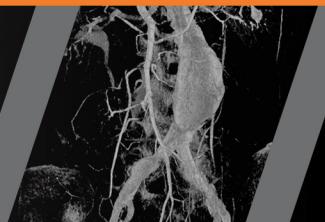
2022

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

APRIL 28-30







Sentara Vascular Specialists

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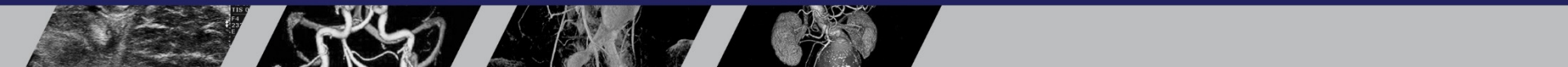
Clinical Signs of Critical Limb Ischemia

Jason R. Moore, MD
FACS, FSVS, RPVI

Objectives

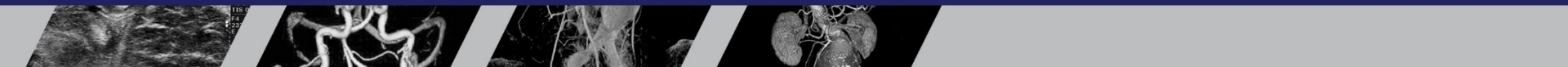
- Chronic Limb Threatening Ischemia (CLTI)
  - Definition
  - Risk Factors
  - Natural History
  - Diagnosis
  - Classification of Disease

- CLTI Definition
  - Objective evidence of atherosclerotic PAD in association with ischemic rest pain and/or tissue loss
  - Replace the antiquated “Critical Limb Ischemia”
    - Rest Pain with ankle pressure <40 mmHg
    - Tissue loss with ankle pressure < 60 mmHg
  - Clinical Presentation with hemodynamic confirmation as opposed to pure hemodynamic measurements

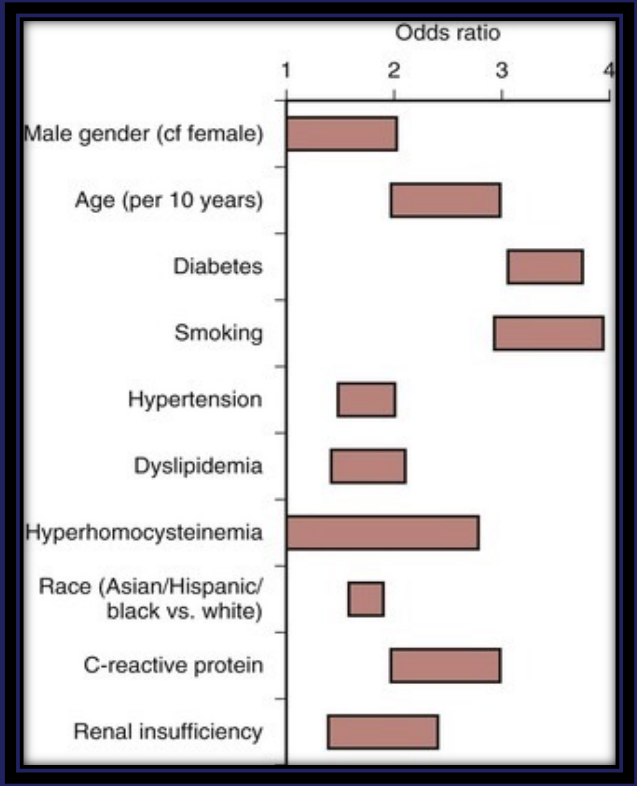


Risk Factors for PAD

- **Smoking**
- **Diabetes**
- HTN
- HLD
- Air Pollution
- CKD/ESRD
- Age
- Obesity
- Sedentary Lifestyle



Risk Factors

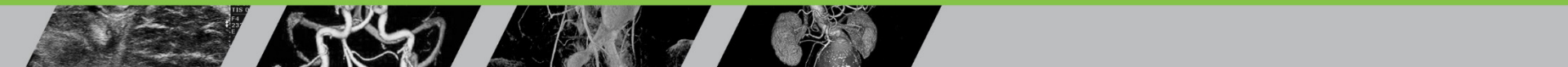


Approximate odds ratios for risk factors for symptomatic peripheral arterial disease

CLTI is an end-stage manifestation systemic atherosclerosis:

- Often accompanied by significant CV disease
- High mortality from MI and stroke
- Prognosis is Poor (1yr mortality ~20-26% without aggressive treatment of risk factors)

J Vasc Surg 45:s9A, 2007



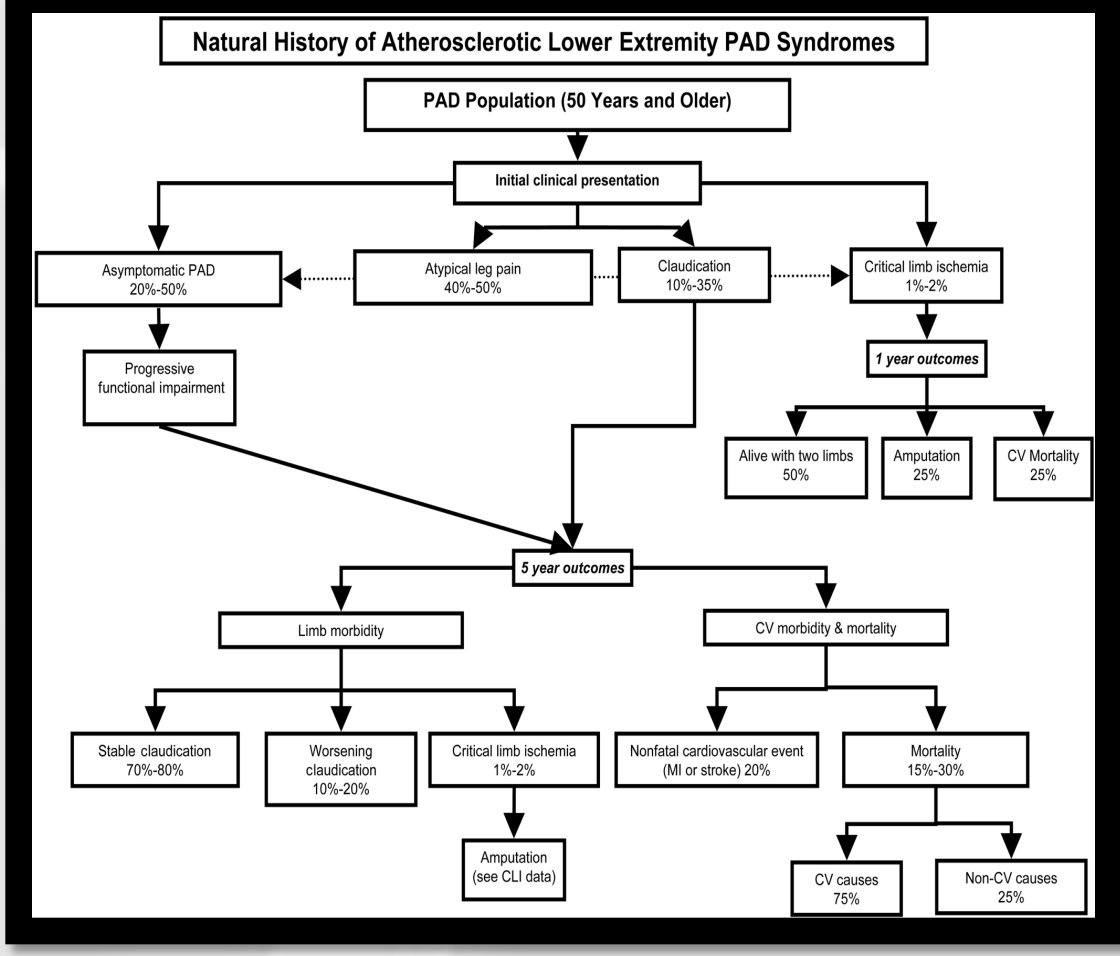
- More recent studies estimate the rate of progression to CLTI from PAD is ~5-21% at 5 years

(*J Am Coll Cardiol 2006;47(6):1239-1312*)

(*Eur J Vasc Endovas Surg 2016;51:395-403*)

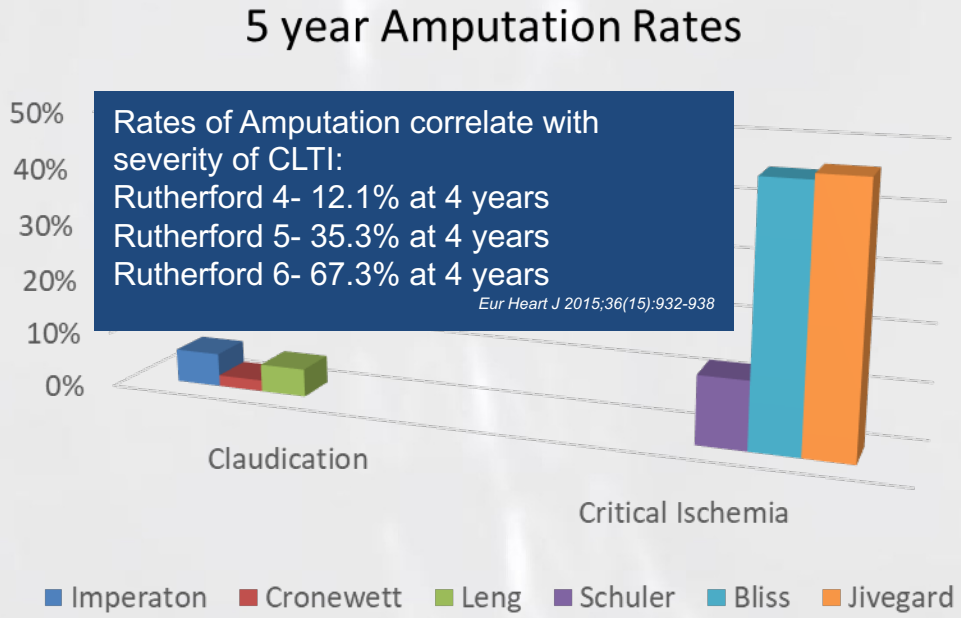
- ~50% of CLTI patients had no prior diagnosis of PAD

(J Vasc Surg 2003;37(3):704-708)

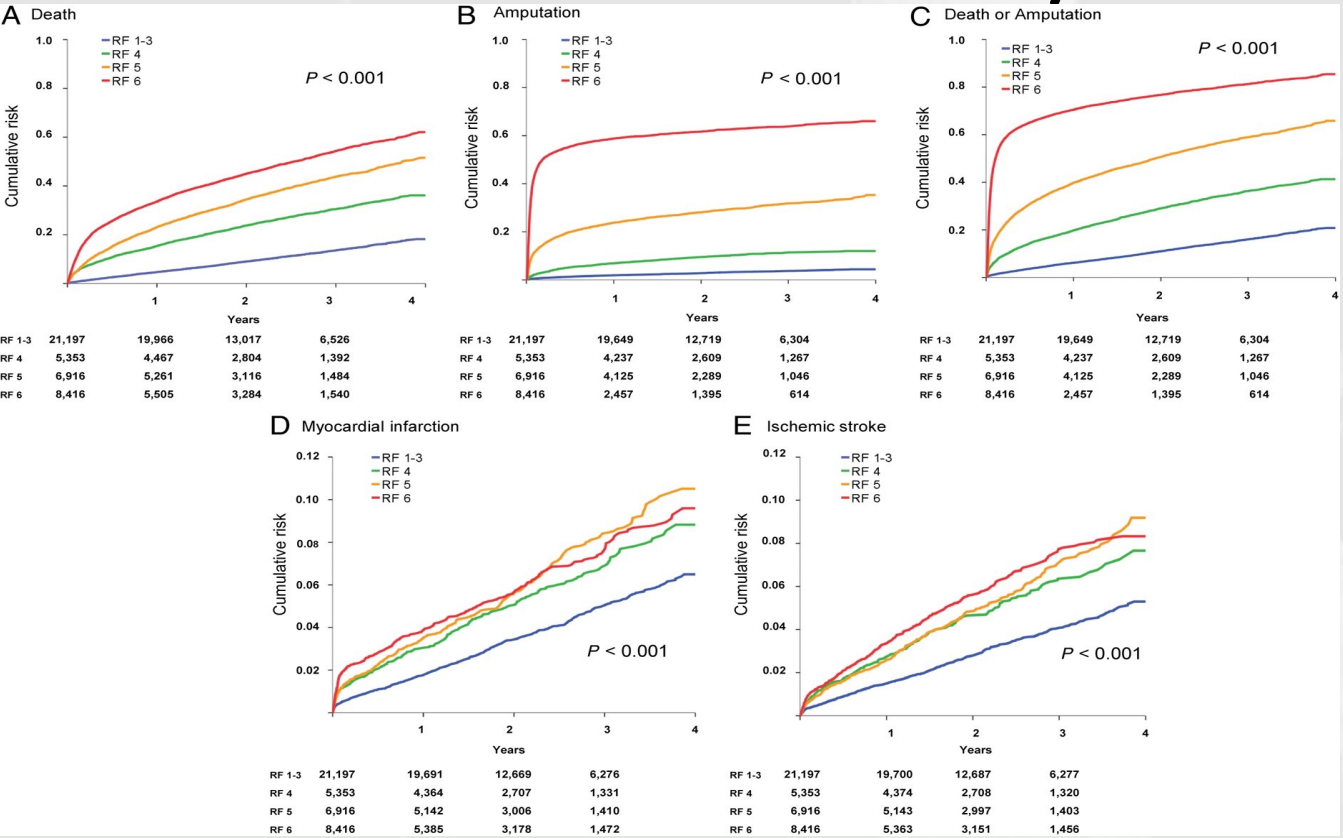


Alan T. Hirsch et al. *J Am Coll Cardiol* 2006; 47:1239-1312.

Natural History of PAD

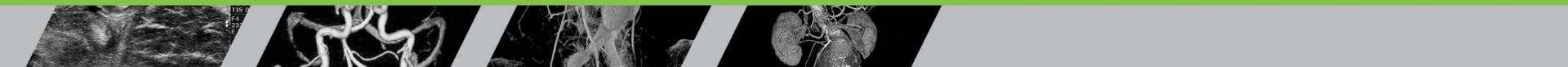


Comorbidities/Mortality



- Patients with CLTI are high-risk for premature mortality given the associated comorbidities.
- Reniecke et al. demonstrated 4 year mortality rates as follows
  - Rutherford 1-3: 18.9%
  - Rutherford 4: 37.7%
  - Rutherford 5: 52.2%
  - Rutherford 6: 63.5%

Eur Heart J 2015;36(15):932-938

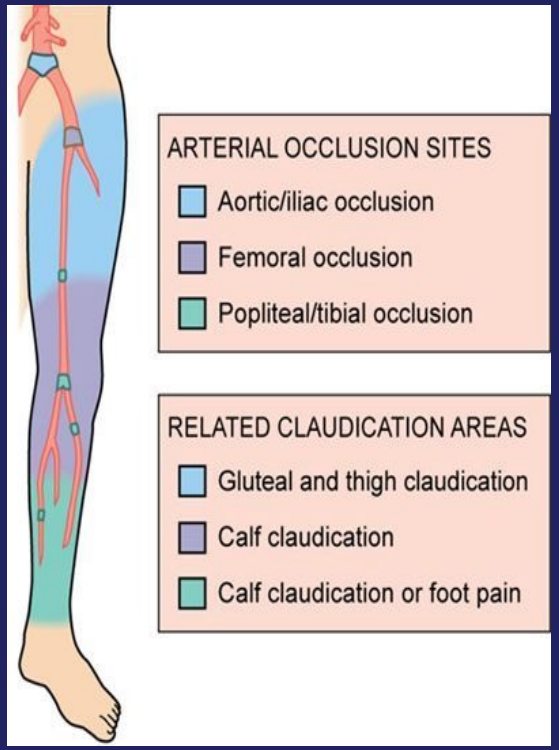


Diagnostic Evaluation

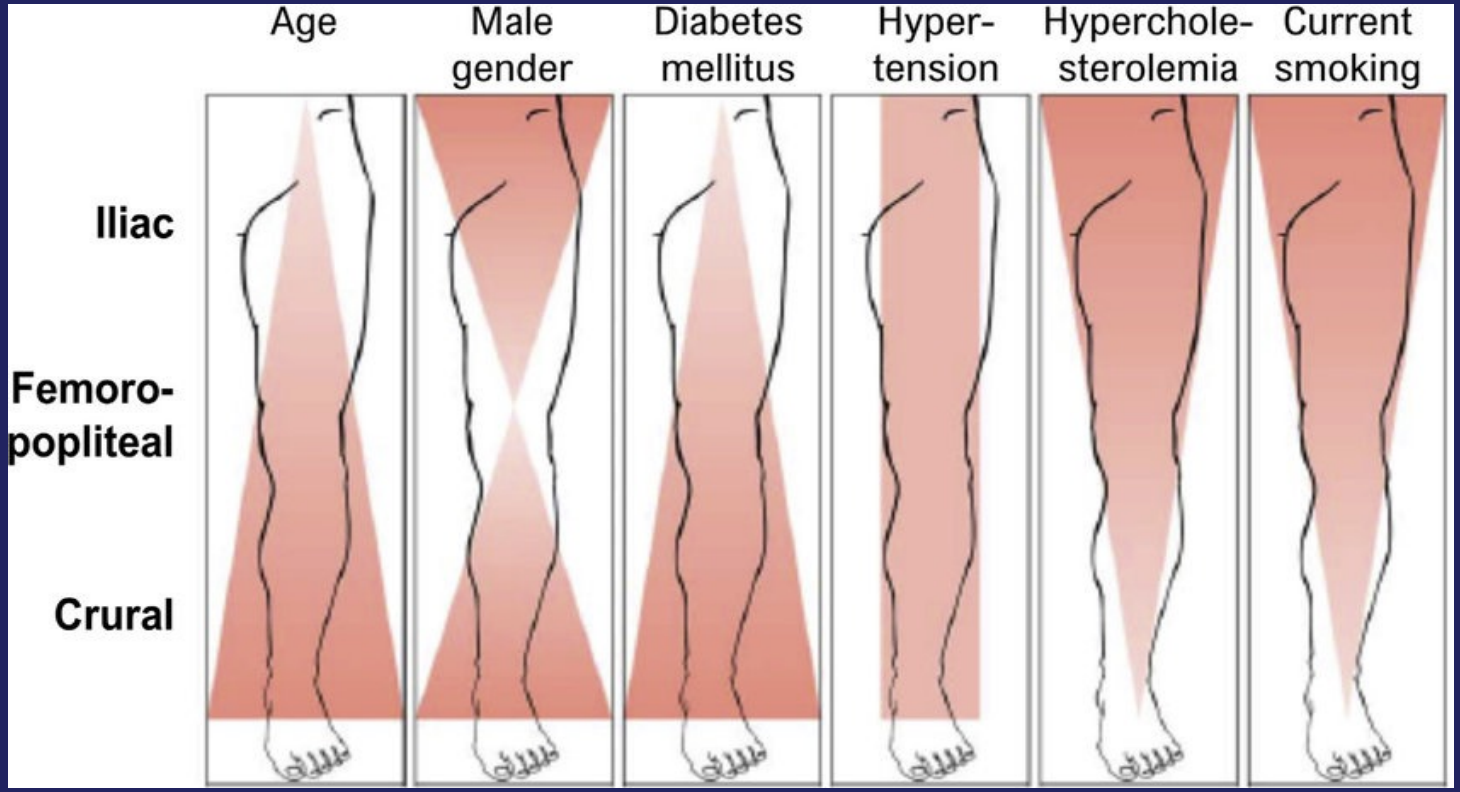
- History
  - Description/Duration of Symptoms
    - Ischemic rest pain usually affects the forefoot
    - Neuropathy
  - CV risk factors
  - Drug history
  - Previous vascular intervention
  - Frailty/HRQL assessment
- Physical
- Non-Invasive/invasive imaging

Segments of Disease

- Symptoms occur distal to disease
  - Aorto-iliac- hip/buttock
  - Fem-pop- calf
  - Tibio-peroneal- ???
- One segment
  - Claudication
- Two segments
  - Rest/pain/non-healing wounds
  - Chronic Limb Threatening Ischemia



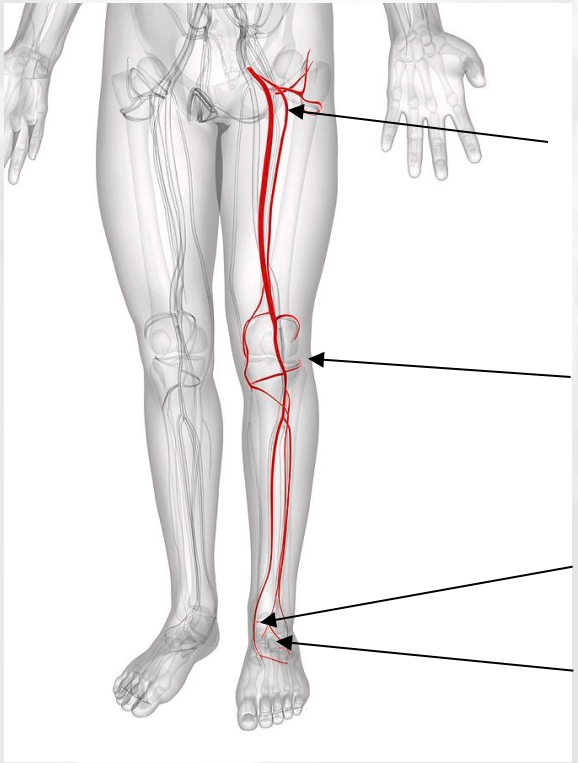
Disease Distribution



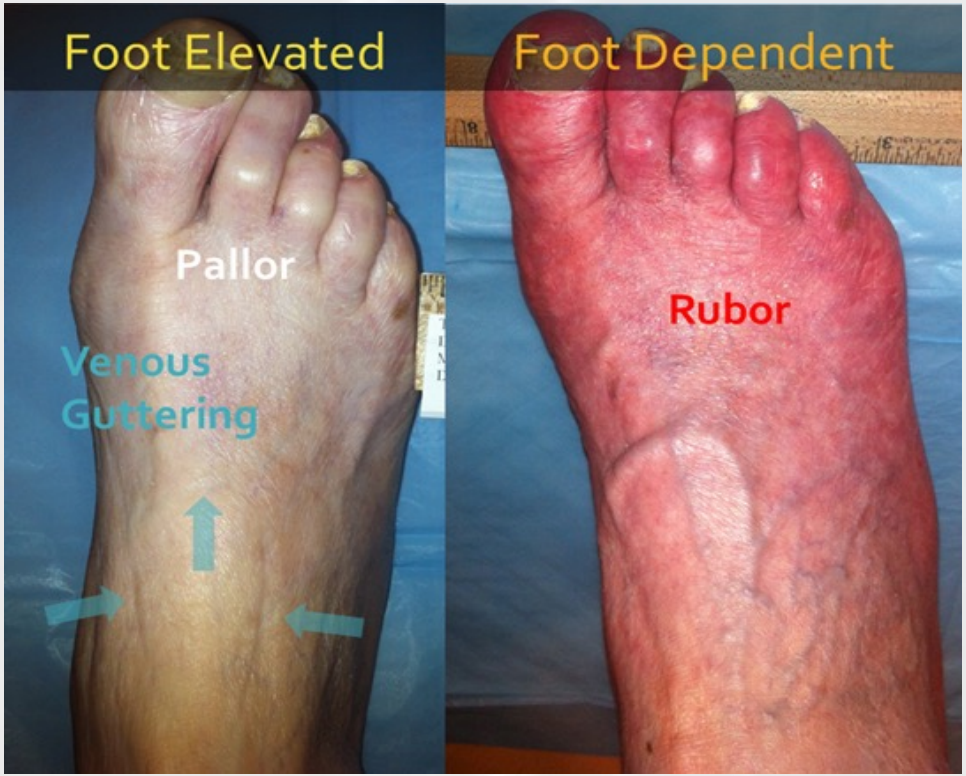
Eur J Vasc Endovasc Surg 2006:31(1):59-63

Physical Exam

- Vascular Exam begins with checking for pulses
- Cap refill (>5 seconds typically)
- Cool dry skin
- Muscle atrophy
- Hair loss to limb



Physical Exam

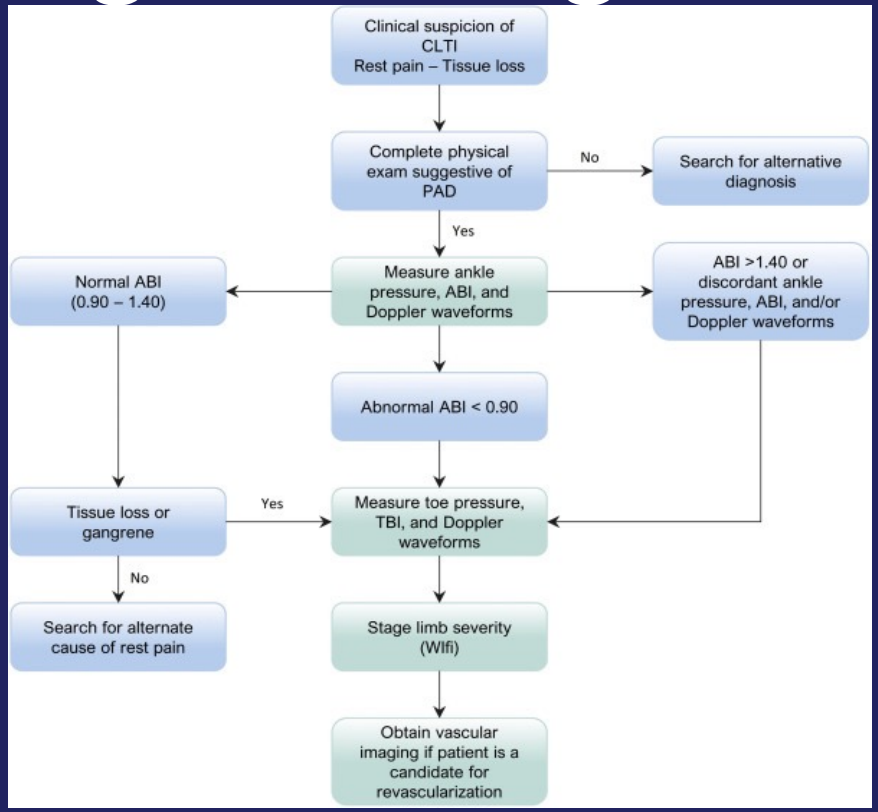


Buerger's sign

Physical Exam

Physical Exam

Diagnostic Algorithm



Global Vascular Guideline on the Management of Chronic Limb Threatening Ischemia

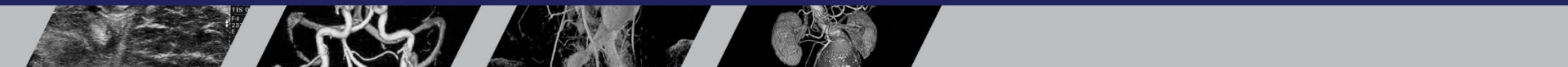
Diagnostic Algorithm

Ankle Pressure and ABI

- ABI= highest ankle pressure divided by highest brachial systolic pressure
- First-line noninvasive hemodynamic test in all patients

Toe Pressure and TBI

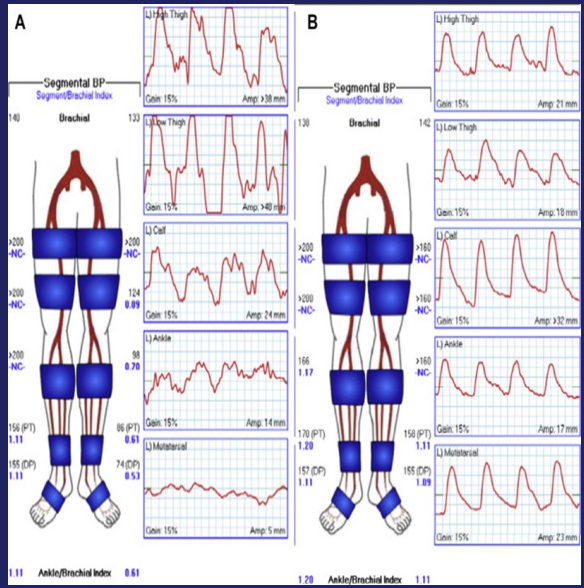
- Toe pressures less often affected by incompressibility
- Toe pressures are generally 20-40 mm Hg lower than ankle pressures
- Toe pressures <30 mmHg are typically associated with advanced ischemia



Diagnostic Algorithm

Pulse Volume Recordings

- Use air plethysmography to provide waveform analysis of blood flow
- May help establish diagnosis as well as localization and severity of PAD
- Air-filled cuff around extremity at segmental levels(i.e., thigh, calf, foot)
- If limb not well perfused minimal to no change in cuff volume
- Accuracy maintained in patients with noncompressible vessels
- Not precise in distal disease and not accurate in patients with CHF or low stroke volumes



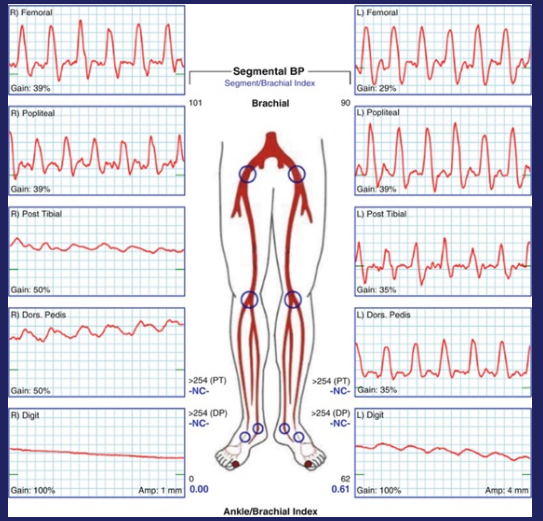
Diagnostic Algorithm

Segmental Pressures

- Can provide information on anatomic localization of lower limb vascular disease

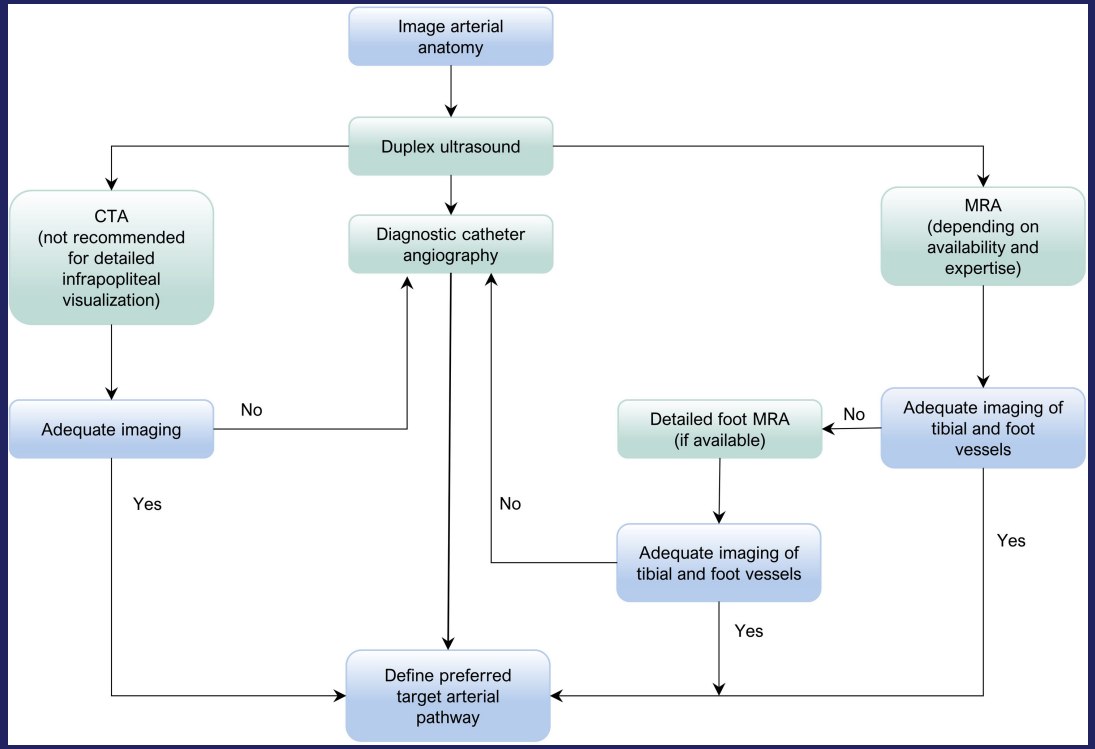
Several other noninvasive tests

- Laser Doppler flowmetry
- Transcutaneous Oximetry (TcPO2)
- Skin perfusion pressure



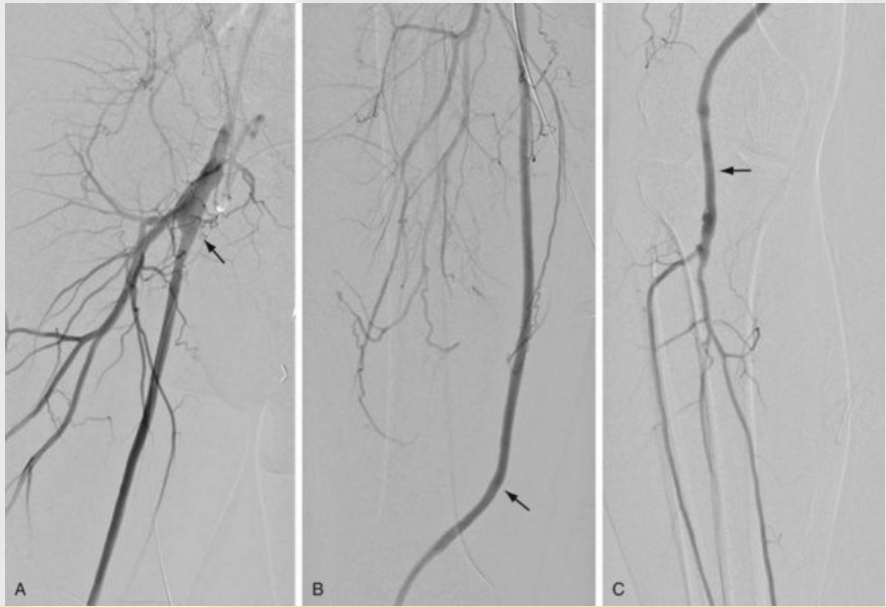
Global Vascular Guideline on the Management of Chronic Limb Threatening Ischemia

Diagnostic Algorithm

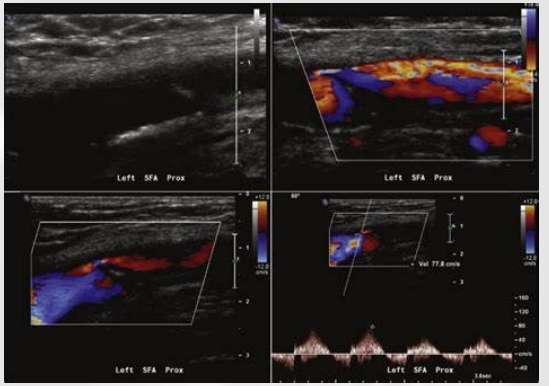


Global Vascular Guideline on the Management of Chronic Limb Threatening Ischemia

Diagnostic Evaluation- Imaging of Vascular Anatomy



Diagnostic Evaluation- Imaging of Vascular Anatomy



- Duplex Ultrasound
  - Advantages
    - Noninvasive
    - Low cost
    - No iodinated contrast
    - No radiation
    - Mobile
  - Disadvantages
    - Time consuming
    - Operator Dependent
    - NO continuous lesion map
    - Poor at estimating collateral blood supply

Diagnostic Evaluation- Imaging of Vascular Anatomy

CT Angiography

- High Sensitivity and Specificity in aortoiliac (95 and 96%) and fem-pop segments (97 and 94%)
- Inferior in the infra-popliteal segments compared with digital subtraction angiography (95% and 91%)

JAMA 2009;301:415–24

Diagnostic Evaluation- Imaging of Vascular Anatomy

- MRA
  - Potential to produce images comparable in quality to DSA
  - No exposure to radiation or iodinated contrast
  - Can fail visualize vessel wall calcification
  - Problems visualizing in-stent restenosis

Diagnostic Evaluation- Imaging of Vascular Anatomy

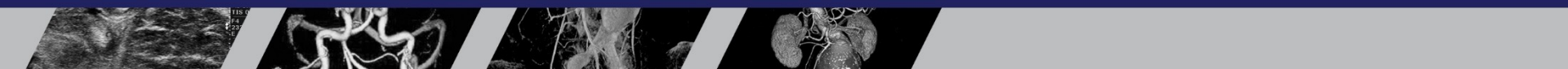
- DSA
  - With advent of other imaging diagnostic less common
  - Still gold standard
- CO_2 Angiography
  - Can be used in patients with contrast allergy or severe CKD
  - Can cause significant discomfort

Classification of Disease

- The Use of multiple classification systems (Rutherford, Fontaine, Wagner, TASC) has hindered the development of treatment algorithms given the heterogeneity amongst the commonly used systems

  - Historic classifications tend to focus more on pure hemodynamic or anatomic features

  - Ischemia-dominant models do not appreciate the absolute perfusion that needs to be considered in diabetic patients with underlying neuropathic changes



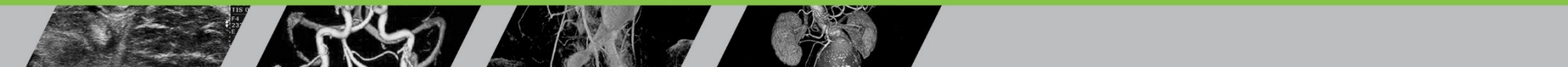
Classification of Disease Severity

SVS WIFi Index

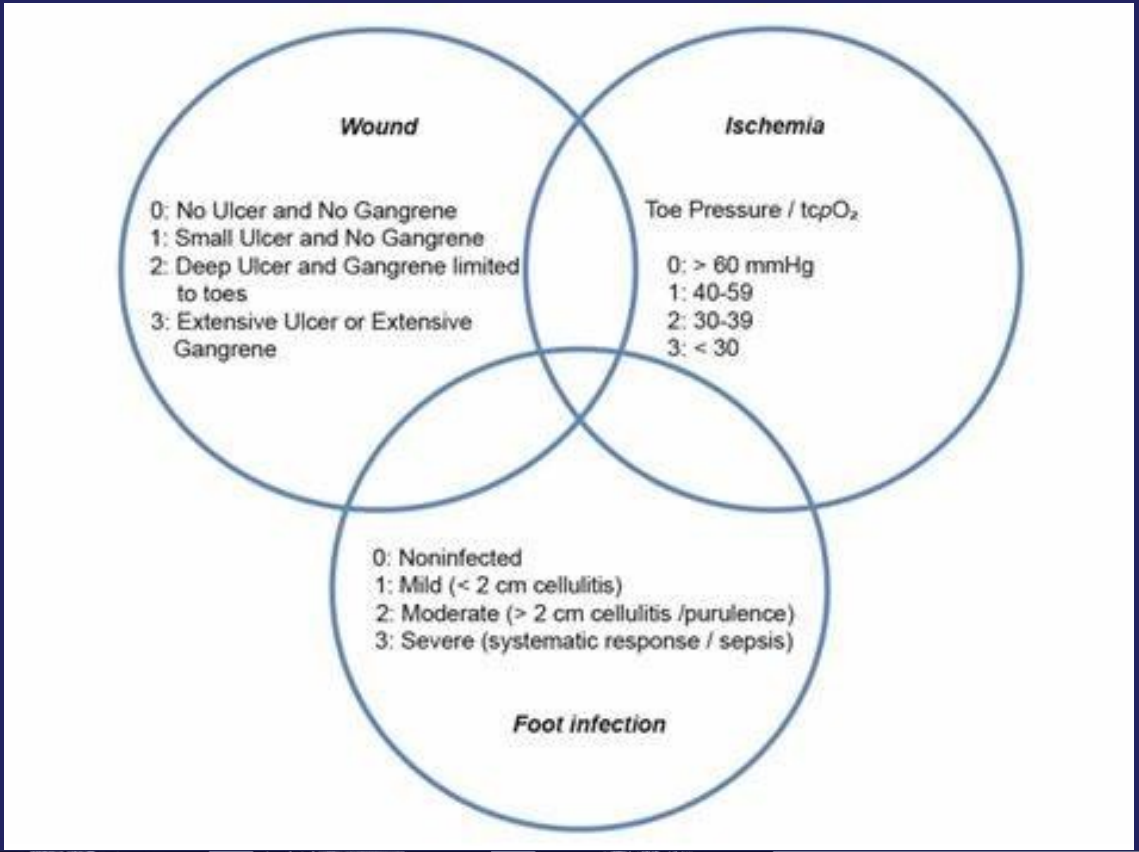
- Wound: extent and depth
- Ischemia: perfusion/flow
- Foot Infection: presence and extent

- 4 point scale
  - 0=none
  - 1=mild/moderate
  - 2=moderate/severe
  - 3=severe

J Vas Surg 2014;59:220-234

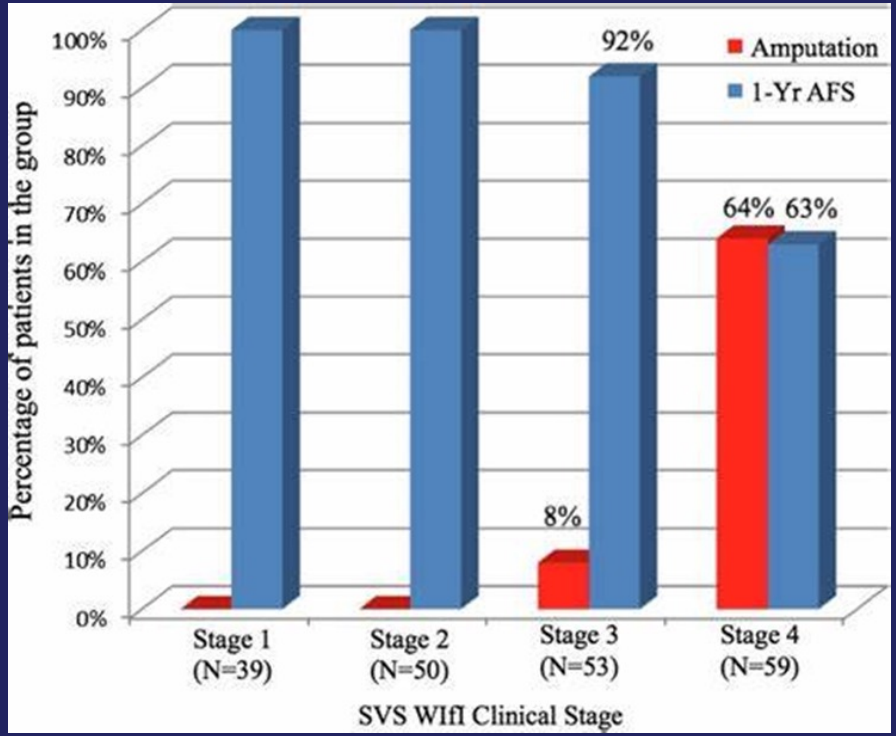


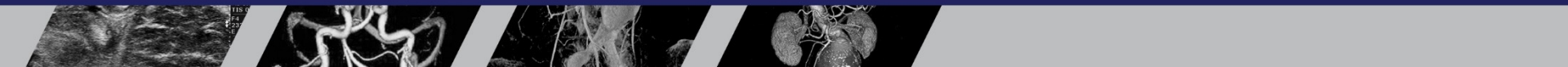
WIFi


Wound
0: No Ulcer and No Gangrene
1: Small Ulcer and No Gangrene
2: Deep Ulcer and Gangrene limited to toes
3: Extensive Ulcer or Extensive Gangrene
Ischemia
Toe Pressure / tcpO2
0: > 60 mmHg
1: 40-59
2: 30-39
3: < 30
0: Noninfected
1: Mild (< 2 cm cellulitis)
2: Moderate (> 2 cm cellulitis /purulence)
3: Severe (systematic response / sepsis)
Foot infection

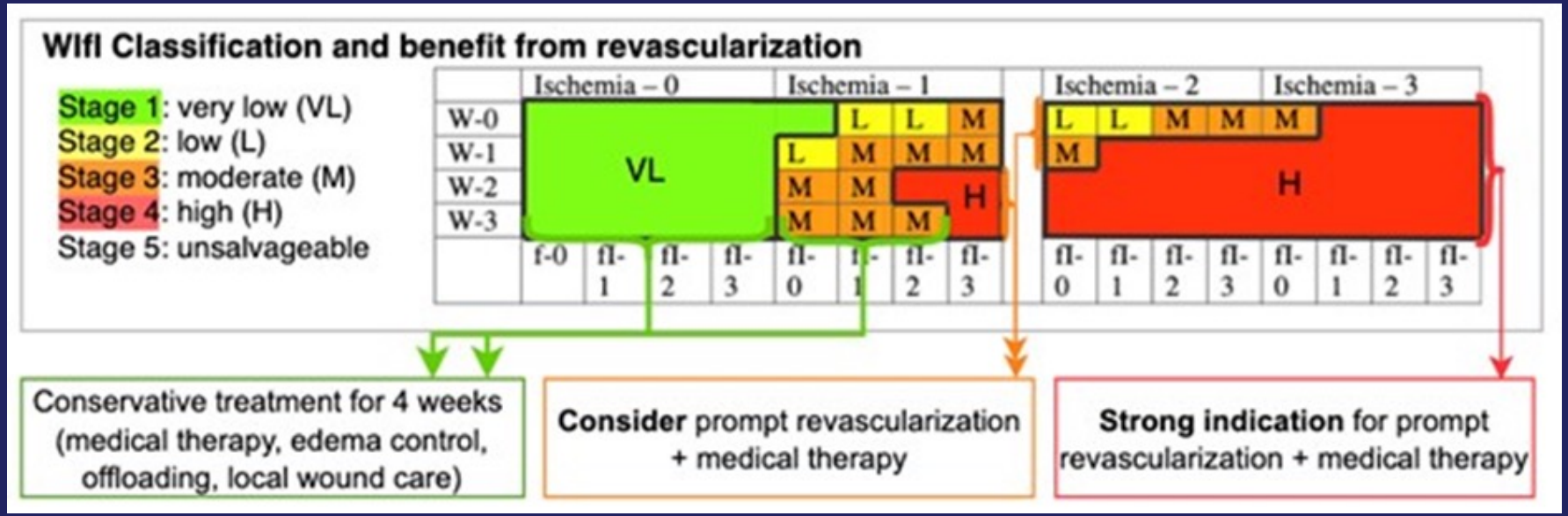
Clinical Stages of Major Limb Amputation Risk based on WIFi Classicication

Risk of amputation	Proposed clinical stages	WIfI spectrum score
Very low	Stage 1	W0 I0 fI0,1 W0 I1 fI0 W1 I0 fI0,1 W1 I1 fI 0
Low	Stage 2	W0 I0 fI2 W0 I1 fI1 W0 I2 fI0,1 W0 I3 fI0 W1 I0 fI2 W1 I1 fI1 W1 I2 fi0 W2 I0 fI0/1
Moderate	Stage 3	W0 I0 fI3 W0 I2 fI1,2 W0 I3 fI1,2 W1 I0 fI3 W1 I1 fI2 W1 I2 fI1 W1 I3 fI0,1 W2 I0 fI2 W2 I 1 fI0,1 W2 I2 fi0 W3 I0 fi0,1
High	Stage 4	W0 I1,2,3 fI3 W1 I1 fI3 W1 I2,3 fI2,3 W2 I0 fi3 W2 I1 fI2,3 W2 I2 fi1,2,3 W2 I3 fI0,1,2,3 W3 I0 fI2,3 W3 I1,2,3 fI0,1,2,3

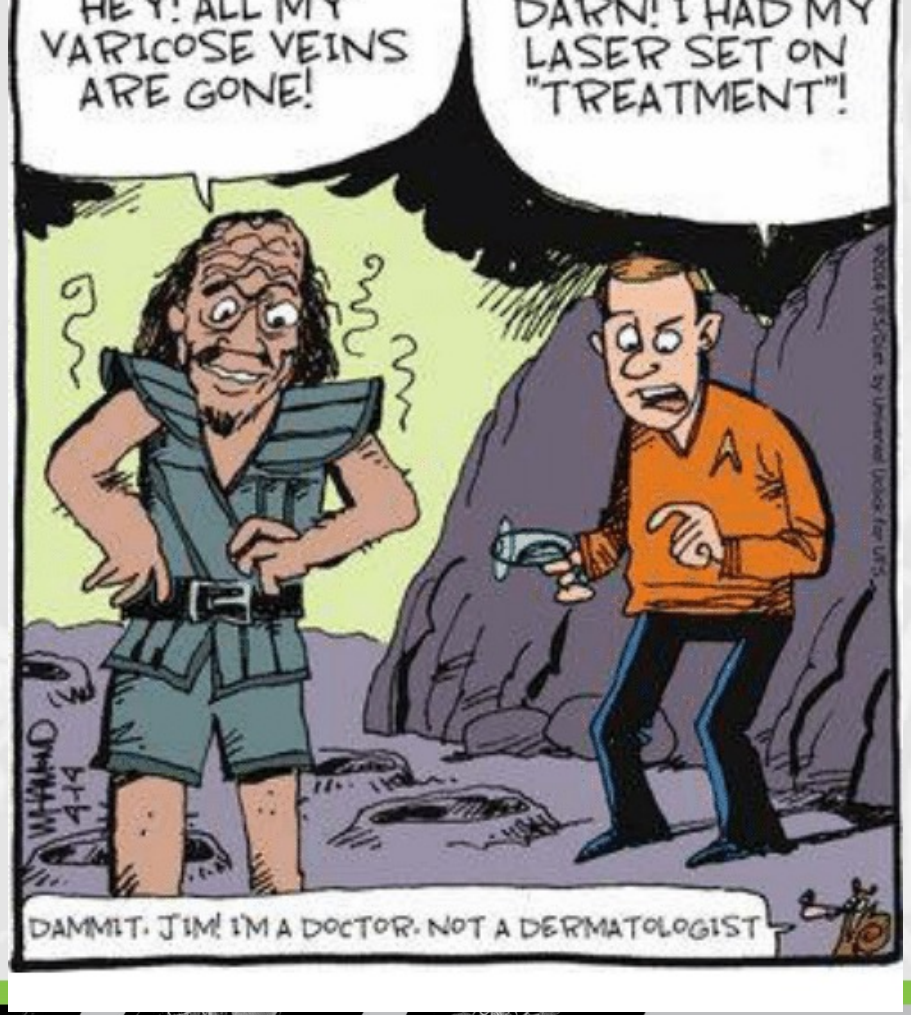




Benefit from revascularization



Thank You


HEY! ALL MY VARICOSE VEINS ARE GONE!
DARN! I HAD MY LASER SET ON "TREATMENT"!
DAMMIT. JIM! I'M A DOCTOR. NOT A DERMATOLOGIST