It’s not just shin splints
Evaluation of Exertional Leg Pain

Kori Hudson, MD, FACEP, FACSM
Professor of Clinical Emergency Medicine
MedStar Georgetown University Hospital, MedStar Sports Medicine

GEORGETOWN UNIVERSITY | MedStar Health

IRONMAN WORLD CHAMPIONSHIP MEDICAL SYMPOSIUM

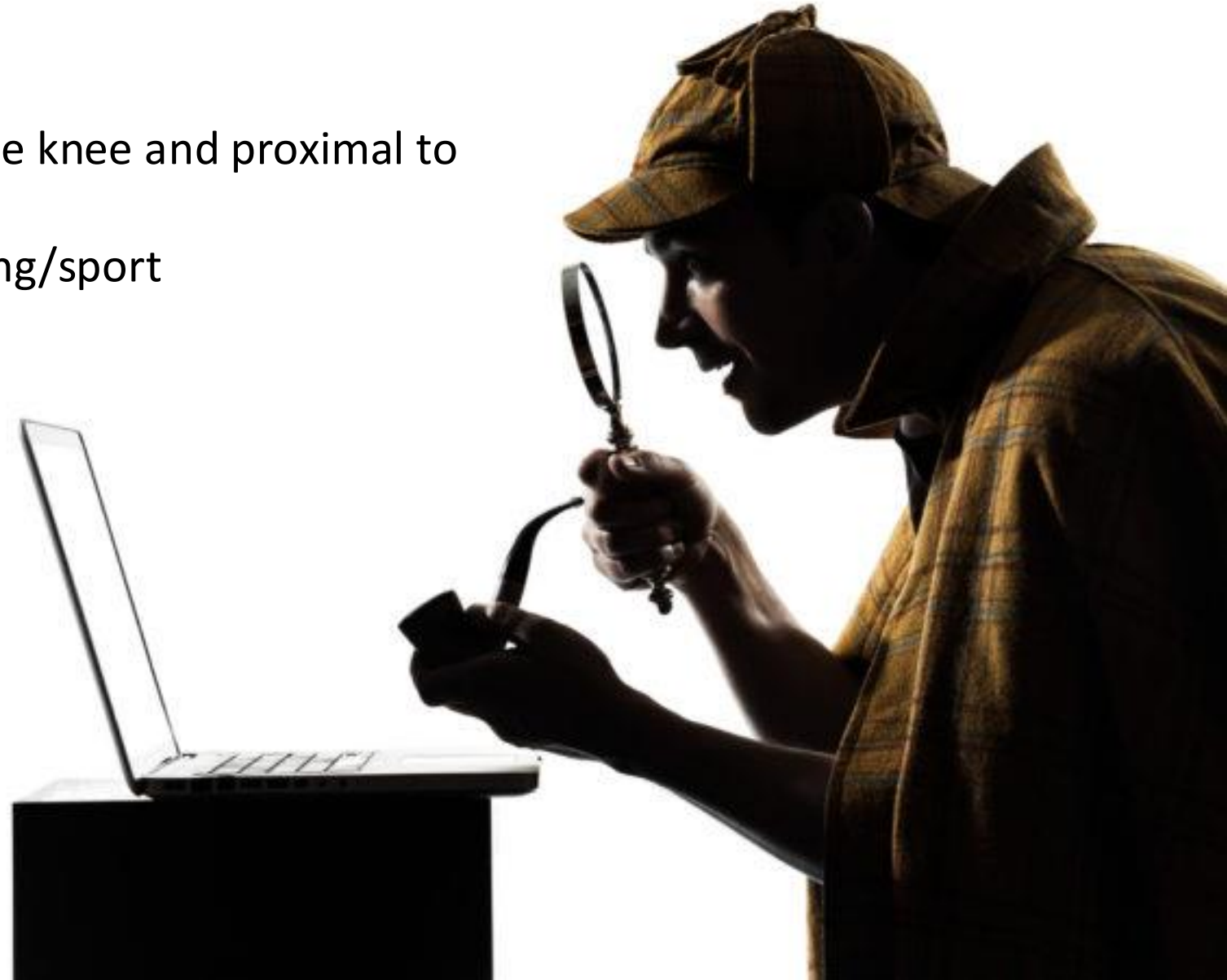
Financial Disclosures

Roadmap

- What Is Exertional Leg Pain?
- Cases
- Differential Diagnosis
- Work Up & Treatment
- Cases, Revisited

What is exertional leg pain

- Chronic Exertional Leg Pain
  - Typically defined at pain distal to the knee and proximal to the talo-crural joint
  - Pain beginning with exertion/running/sport
  - May progress to pain with ADLs
  - Most often seen in runners
    - May also occur in field sport athletes



Case 1- The HS Athlete

- 17 yo FB Player
- Cross training on track team in the spring
- Bilateral anterior leg pain for approximately 8 weeks
- Pain starts at in the middle of every workout
- No pain with ADLs
- No weakness, numbness, or tingling
- Daily/weekly mileage totals?
- Shoes?

Case 2- Ultra Distance Runner

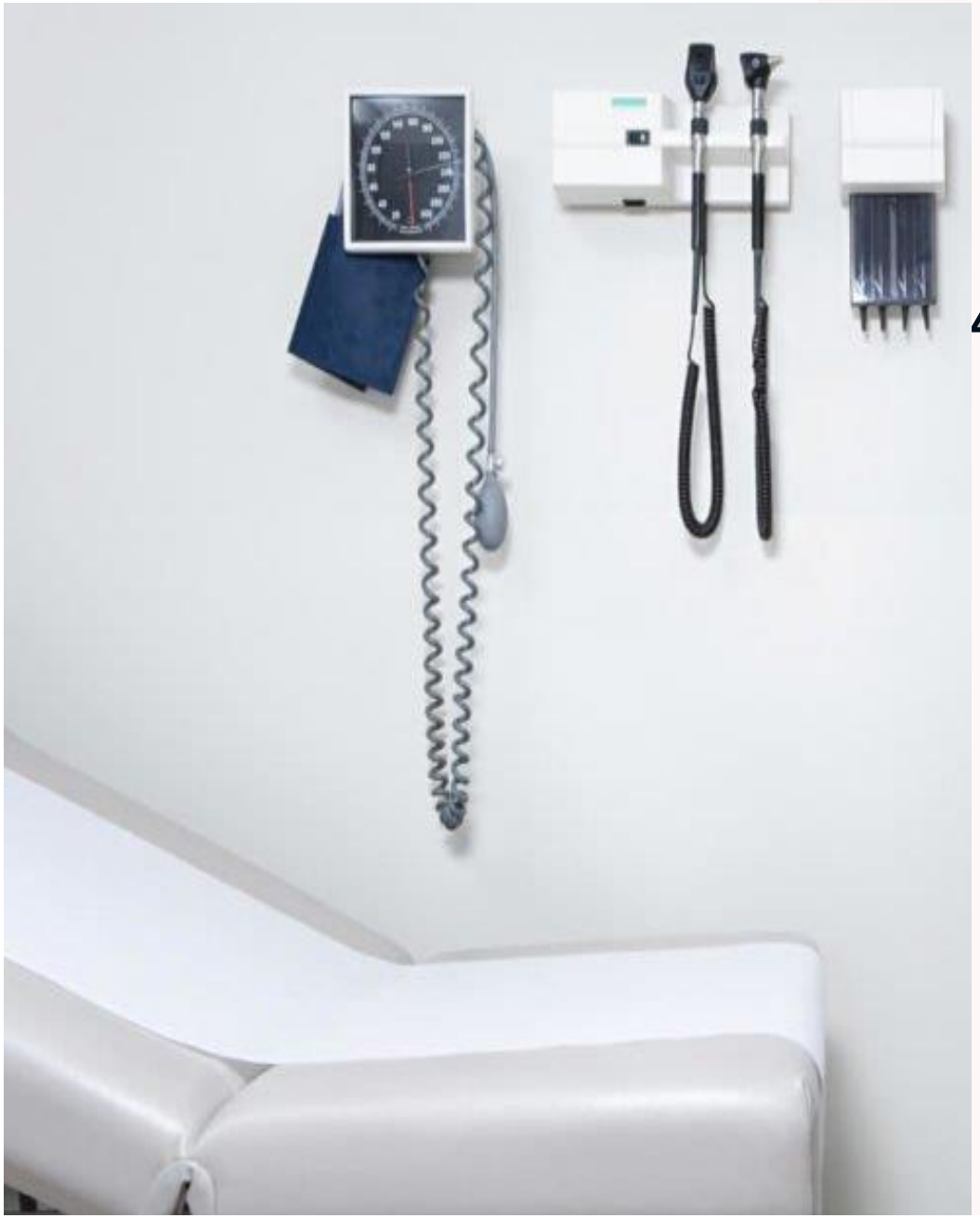
- **34 yo ultra marathoner with 2 years of bilateral calf pain**
- **Evaluation/Course complicated by herniated cervical**
  - **now s/p surgical decompression and fusion**
- **Possible lumbar radiculopathy**
  - **But EMG/MRI neg**
  - **s/p injection w/o relief**
- **Pain with walking on uneven ground**
  - **Can’t run w/o pain**
  - **Can walk ~1 mi on flat level ground before pain starts**
- **Feels “dead”, weak, and numb in foot/heel**

Case 3- Elite Soccer Player

- **20yo soccer player**
- **Pain when running/training**
- **Legs feel swollen, heavy, weak**
- **Increased symptoms as he has been training for the upcoming season**

Case 4- State Department Employee

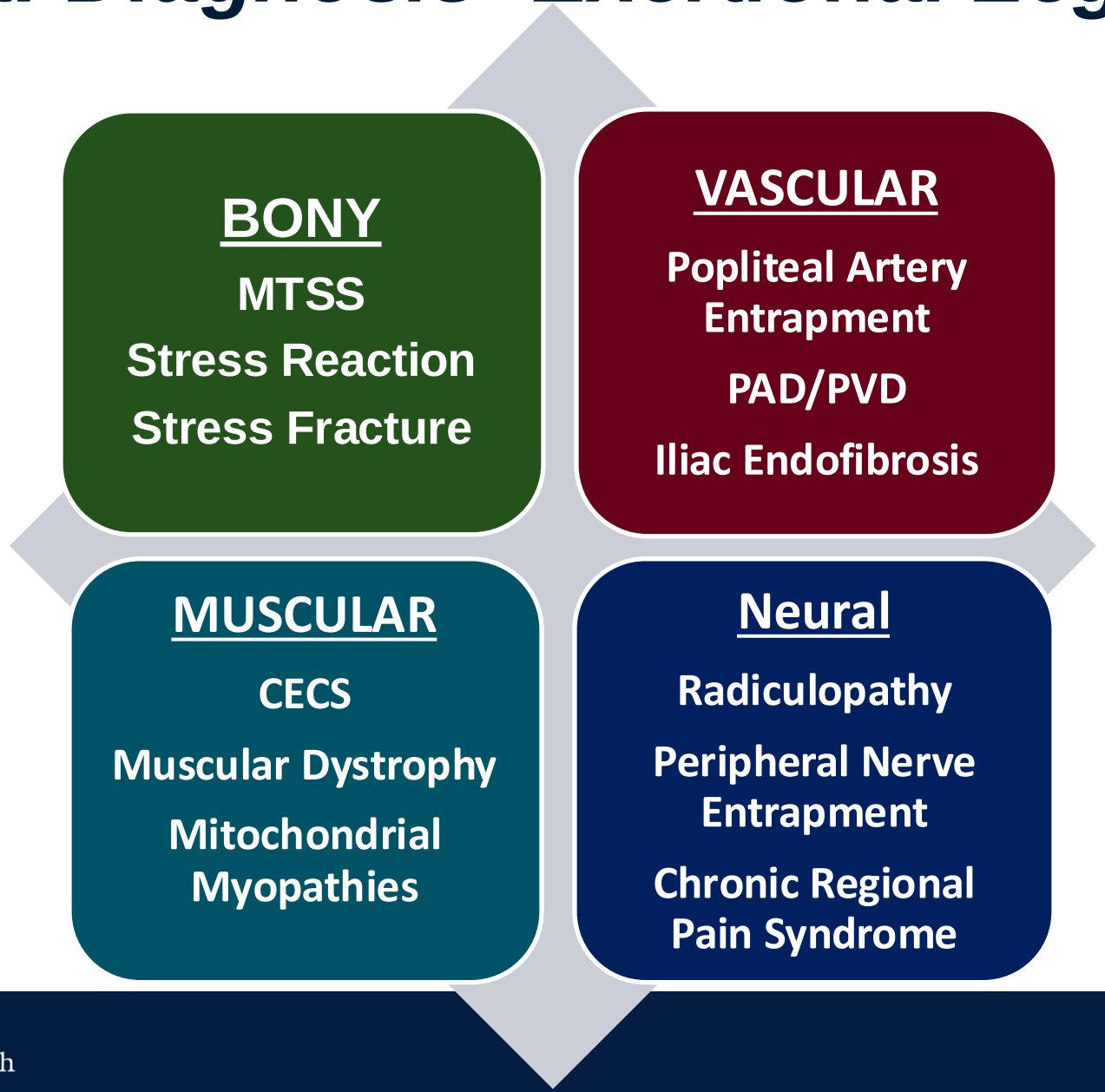
- **Presenting for recurrent exertional leg pain, bilateral**
- **S/p anterior and lateral compartment release 18 months ago for CECS**
- **Ongoing bilateral leg pain limiting running**
  - **Affecting job readiness**



Evaluation

- History
- Exam
- Imaging/Testing
- Therapy Referrals
- Interventions

Differential Diagnosis- Exertional Leg Pain



Bony- MTSS (aka “shin splints”)

- 13-20% of runners
- Etiology unclear
- Post/Med border of tibia; middle or distal 1/3
- No pain at rest, begin with exercise, subside with rest
- Correlates with: Navicular drop/pronation, increased BMI, hip EROT and ankle PF

Stress Injury- stress reaction & stress fracture

- Incidence unclear, may be up to 50% in long distance runners
- Fatigue stress injury vs. Insufficiency injury

- Insidious onset; good history is critical
- Night pain is common in severe cases
- Can occur in the diaphysis, metaphysis or epiphysis

- Risk Factors include: REDS, shoes > 6mo, rapid increase in training
- Evaluation: focal tenderness , tuning fork test
- MRI > bone scan > Xray

Vascular- PAD/PVD

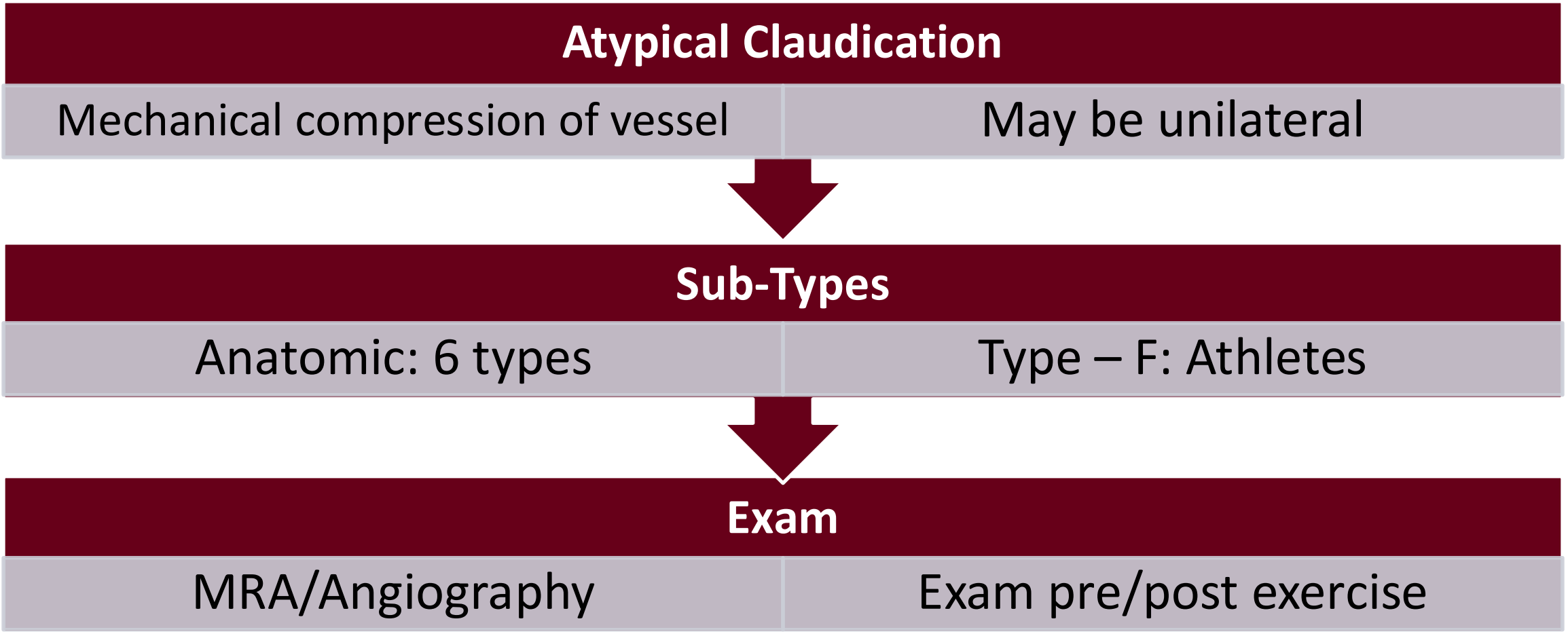
Peripheral Artery Disease

- More common in older patients
- Claudication symptoms

Peripheral Venous Disease

- Stasis
- Discoloration
- Wounds

Popliteal Artery Entrapment Syndrome (PAES)



Iliac Endofibrosis

Incidence

- **Most common sub-type of arterial endofibrosis (90%)**

Population

- **More often in cyclists, but may be seen in any endurance athlete**

Exam

- **More often L**
- **Bruit w/ exercise**

Muscular- CECS

14-27% of athletes with otherwise undiagnosed leg pain

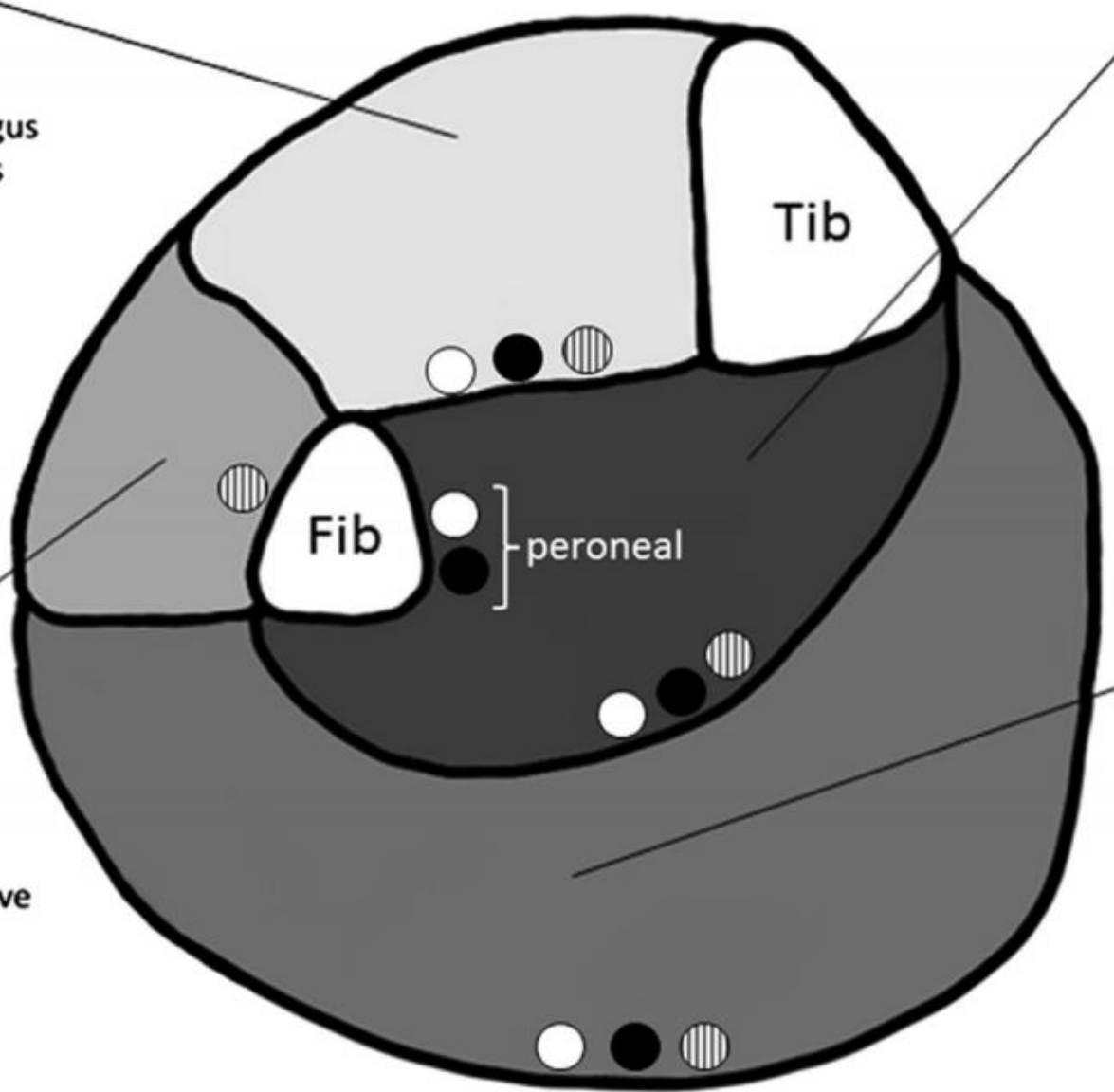
95% lower leg

Pathophysiology not well understood

Pain generator also not well understood

4 LE compartments: anterior (40-60%) and deep posterior (32-60%) more common

Less frequently in lateral (12-35%) and superficial posterior (2-20%)



Anterior Compartment
- Muscles
  - Tibialis anterior
  - Extensor digitorum longus
  - Extensor hallucis longus
  - Peroneus Tertius
- Vessels
  - Anterior tibial artery
  - Anterior tibial vein
- Nerve
  - Deep peroneal nerve

Deep Posterior Compartment
- Muscles
  - Flexor digitorum longus
  - Tibialis posterior
  - Flexor hallucis longus
  - Popliteus
- Vessels
  - Posterior tibial artery
  - Posterior tibial vein
  - Peroneal artery
  - Peroneal vein
- Nerve
  - Tibial nerve

Lateral Compartment
- Muscles
  - Peroneus Longus
  - Peroneus Brevis
- Nerve
  - Superficial peroneal nerve

Superficial posterior compartment
- Muscles
  - Soleus
  - Gastrocnemius
  - Plantaris
- Vessels
  - Branch of tibial artery
  - Branch of tibial vein
- Nerve

From: Rajesekaran et al
PMR, 2012

Neurogenic Pain

Radiculopathy

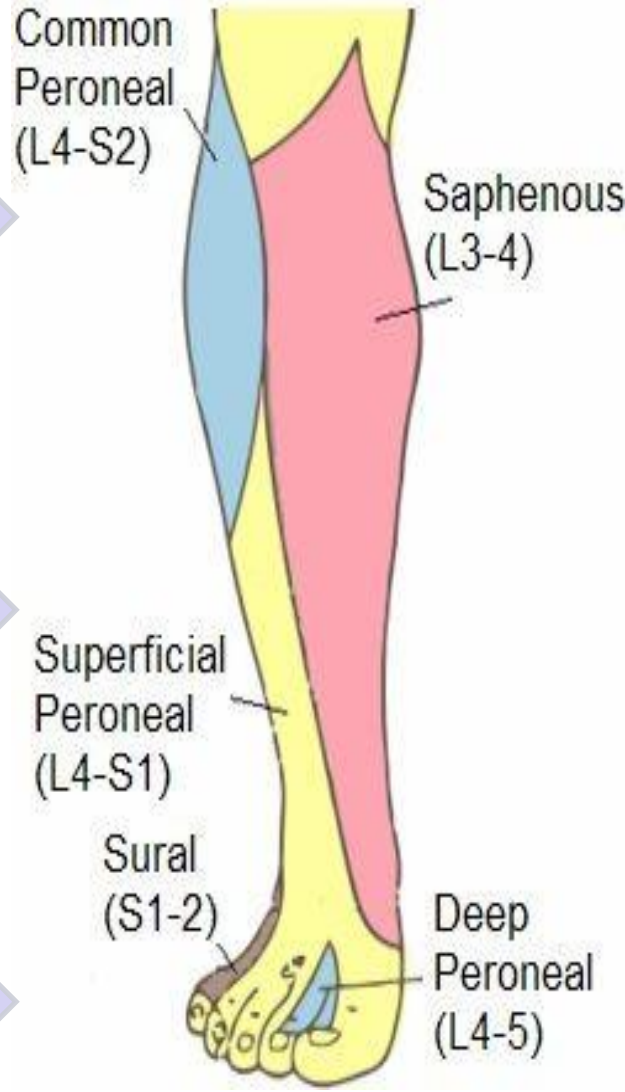
- L4, L5, S1
- Discogenic etiology

Peripheral Nerve Entrapment

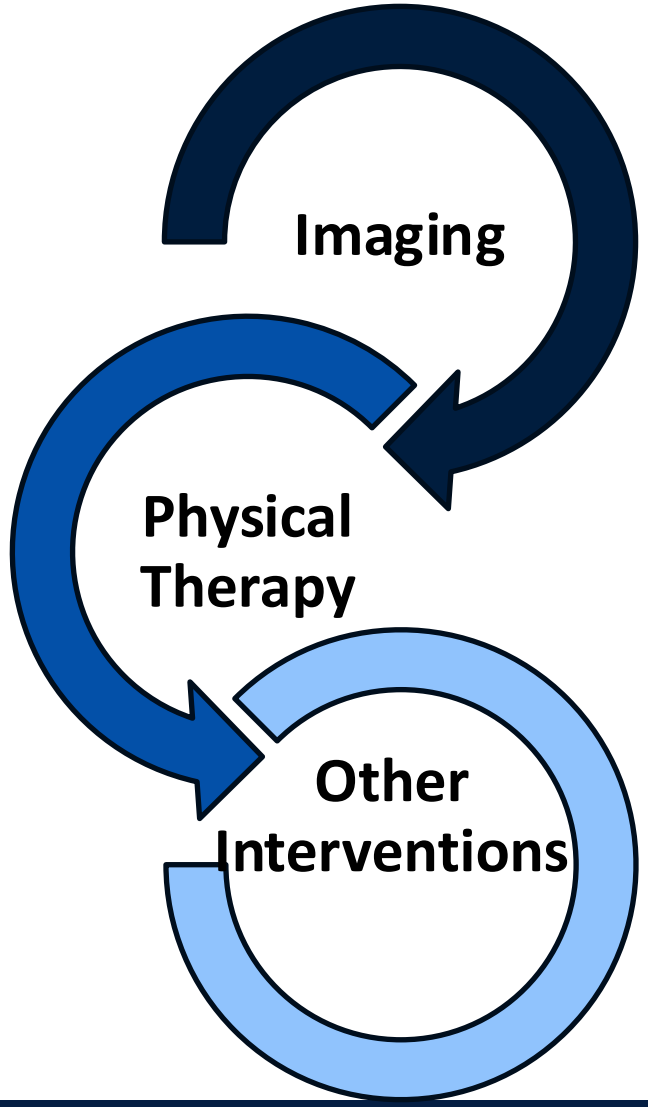
- Saphenous, Common Peroneal, Sup. Peroneal & Deep Peroneal
- External compression, or repetitive micro-trauma

CRPS

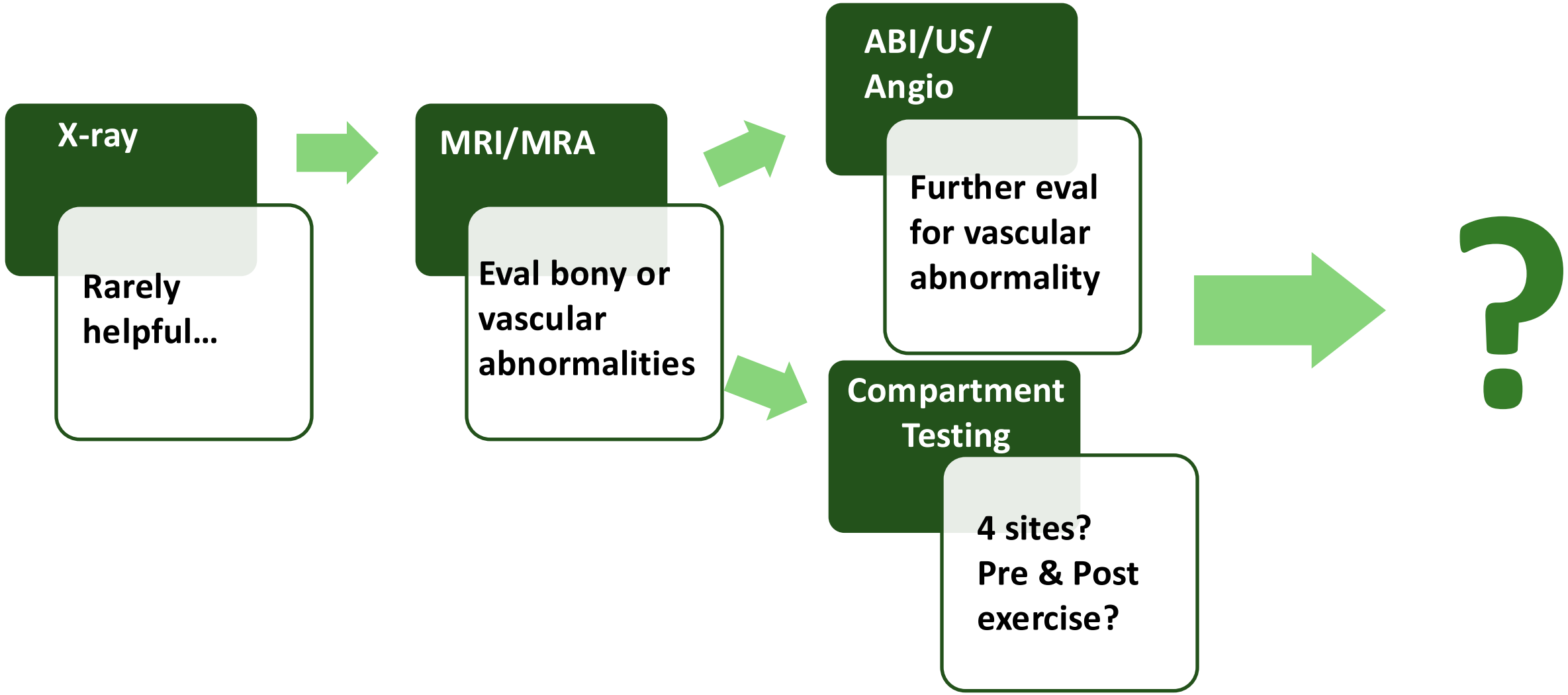
- Chronic --> 6 months
- Usually Unilateral
- Post-traumatic



Initial Evaluation & Treatment Pathway



Imaging & Initial Testing



Advanced Evaluation Options

Inflammatory Markers

- RF
- ESR/CRP
- HLA-B27
- ANA
- Anti-CCP
- Etc.
- Rheumatology Consult

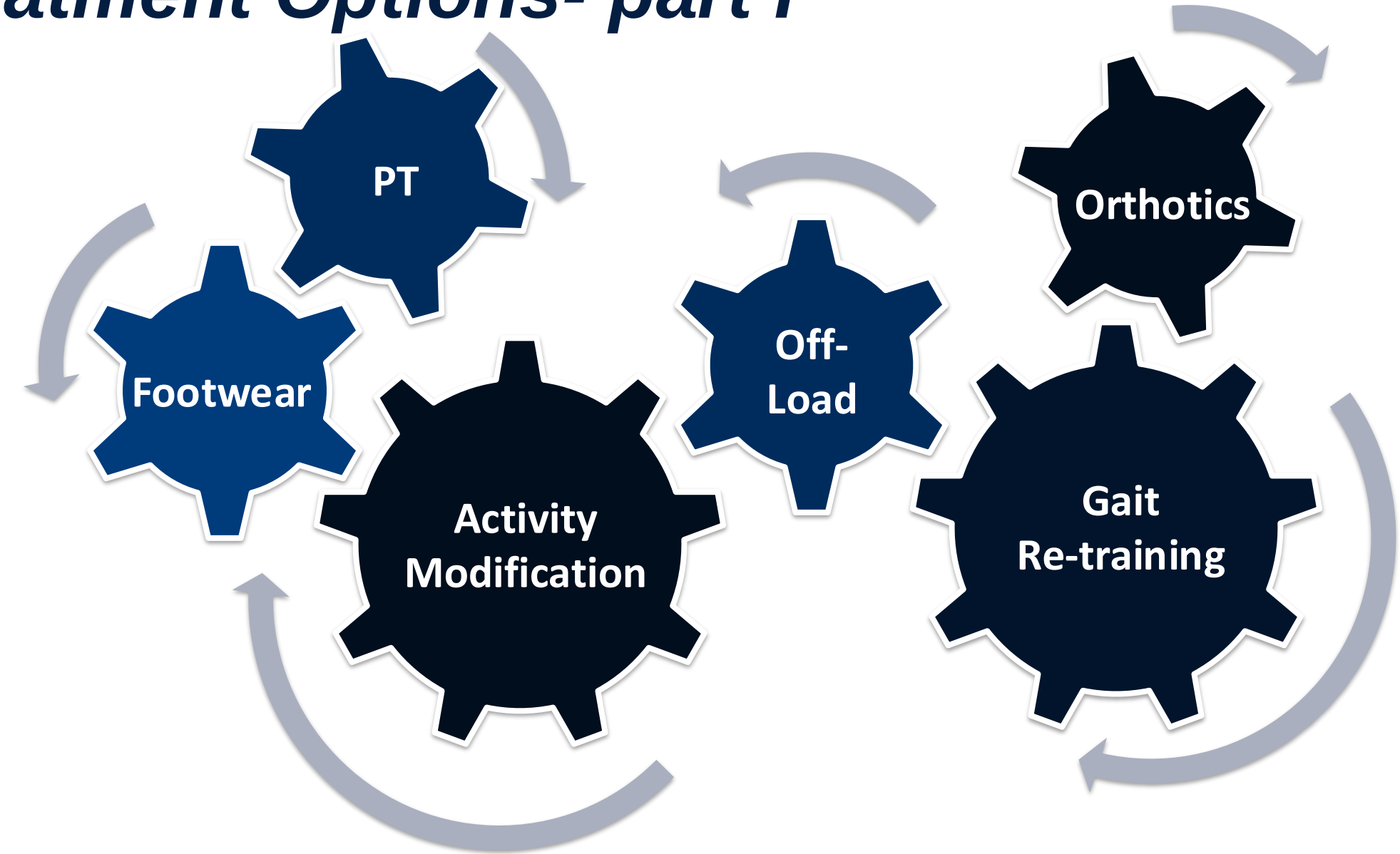
Neuro-Muscular Testing

- EMG
- NCS
- PM&R or Neuro to perform
- Neuro-Muscular Consult

Other

- Post Exertion MRI
- MR Neurogram
- Muscle Biopsy
  - Neuro-Muscular Consult

Treatment Options- part I



Treatment Options- part II

Modalities

Surgical Options

Injections

Case 1- The HS Athlete

- **MRI:**
  - **Bilateral Tibial Stress Reactions**
  - **Normal vessels**
  - **Compartment testing NOT performed**

- **Treatment-**
  - **Activity Modification:**
    - **Relative rest, cross train, alter-G**
  - **Gait Analysis**
  - **Appropriate Footwear**

Case 2- Ultra Distance Runner

- **MRA- bilateral Popliteal Artery Entrapment Syndrome**
  - **Type III- fibrous band or accessory slip of muscle**
- **Normal ABI- no intrinsic Peripheral Artery Disease**
- **Successful surgical release**

Case 3- Elite Soccer Player

- **MRI:**
  - **no bony changes**
  - **”feathery edema” in the anterior and lateral compartments**
  - **Normal vessels**
- **Compartment pressures in the 90s**
- **Initially treated successfully with Botox per military protocol**
- **Later with recurrent symptoms– underwent bilateral 4 compartment release and returned to high level play**

Case 4- State Dept Employee

- **Post op (now from 4 compartment release) with recurrent symptoms… again**

- **MRI/MRA:**
  - **No bony change, tibial artery compression "c/w compartment syndrome"**
- **Labs: normal**
- **EMG: c/w compressive changes in deep peroneal n.**
- **Repeat Pressure Testing- 30s- 40s throughout**
- **Diagnostic/Therapeutic Injections**
- **What's next??**

Conclusion

- Chronic leg pain is often more than “shin splints”
- Differential diagnosis is complex
- Do not delay treatment while searching for diagnosis.
- The diagnosis may be elusive and can require a multi-disciplinary approach and several months of testing.

Korin.b.Hudson@medstar.net