KNEE & FOOT PROBLEMS IN THE NOT SO YOUNG ADULT

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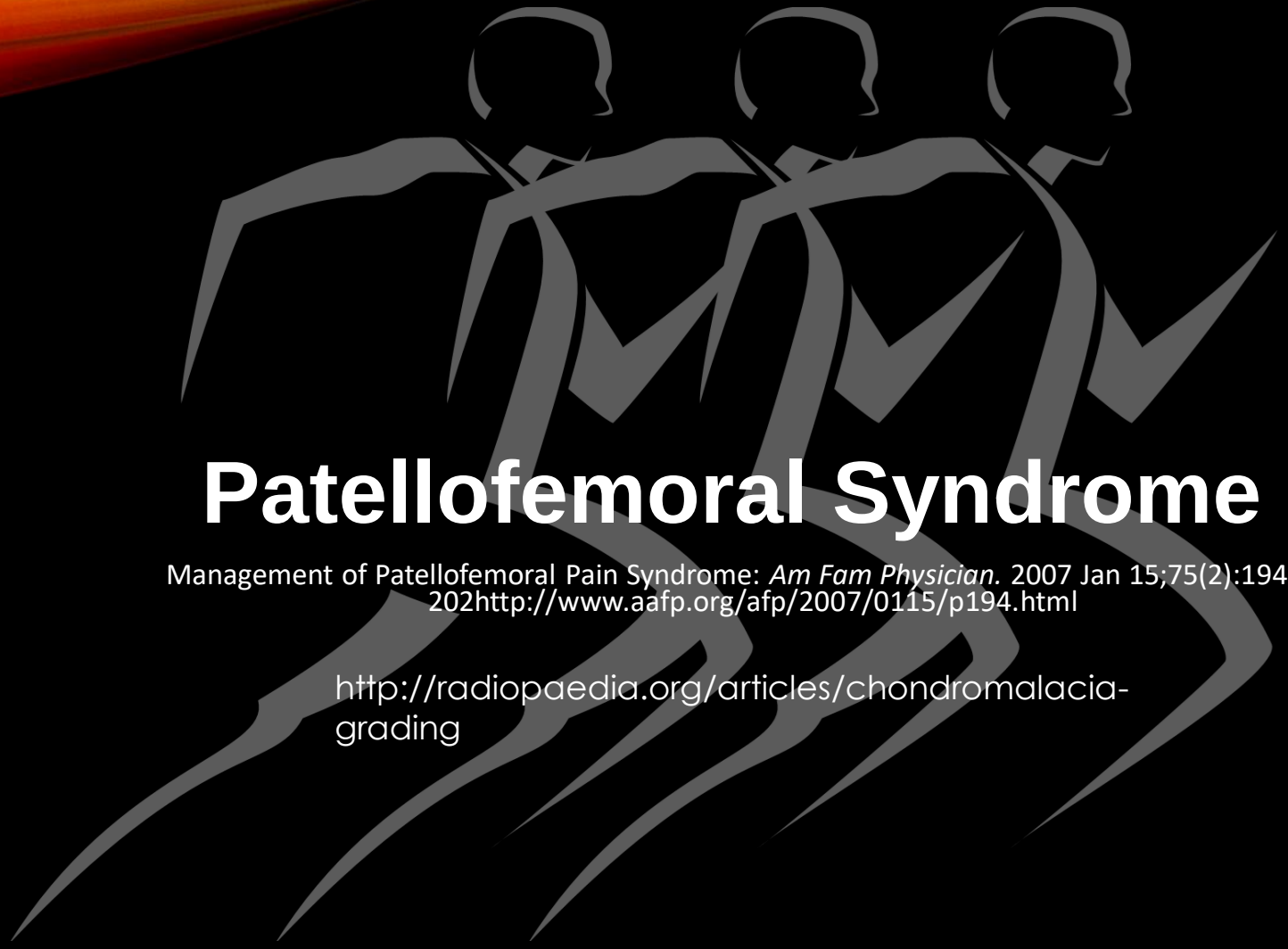
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LEARNING OBJECTIVES

At the end of this lecture attendees will be able to ……

- Recognize, evaluate and treat causes of Patellofemoral syndrome
- Recognize, evaluate and treat causes of Knee osteoarthritis
- Recognize , evaluate and treat Posterior Tibial Tendinitis/Dysfunction
- Recognize, evaluate and treat common causes of Heel pain to include Plantar Fasciitis, Retrocalcaneal Bursitis and Calcaneal stress fracture
- Recognize, evaluate and treat fracture associated with the 5th Metatarsal

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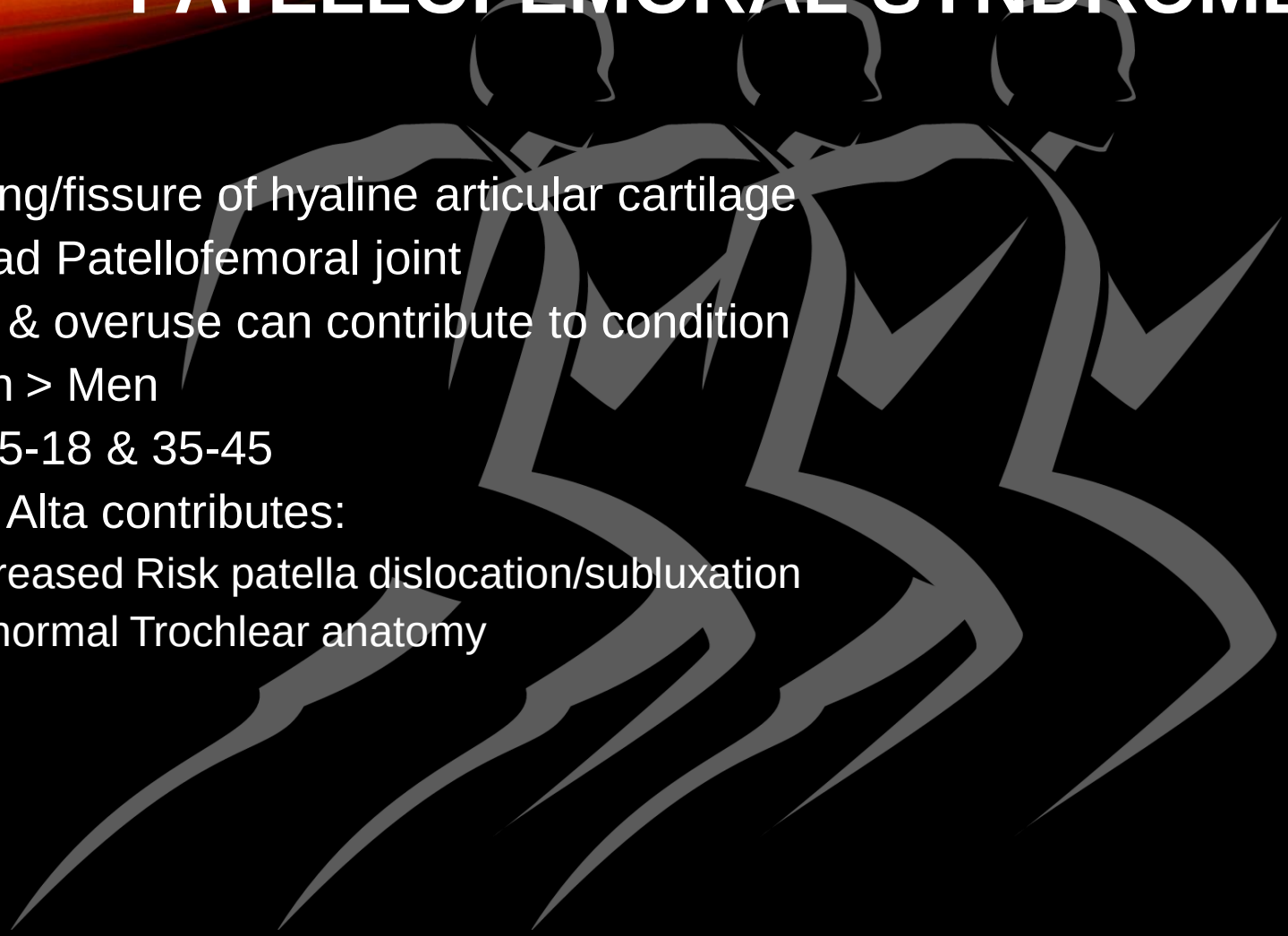
Patellofemoral Syndrome

Management of Patellofemoral Pain Syndrome: *Am Fam Physician.* 2007 Jan 15;75(2):194-202http://www.aafp.org/afp/2007/0115/p194.html

http://radiopaedia.org/articles/chondromalacia-grading

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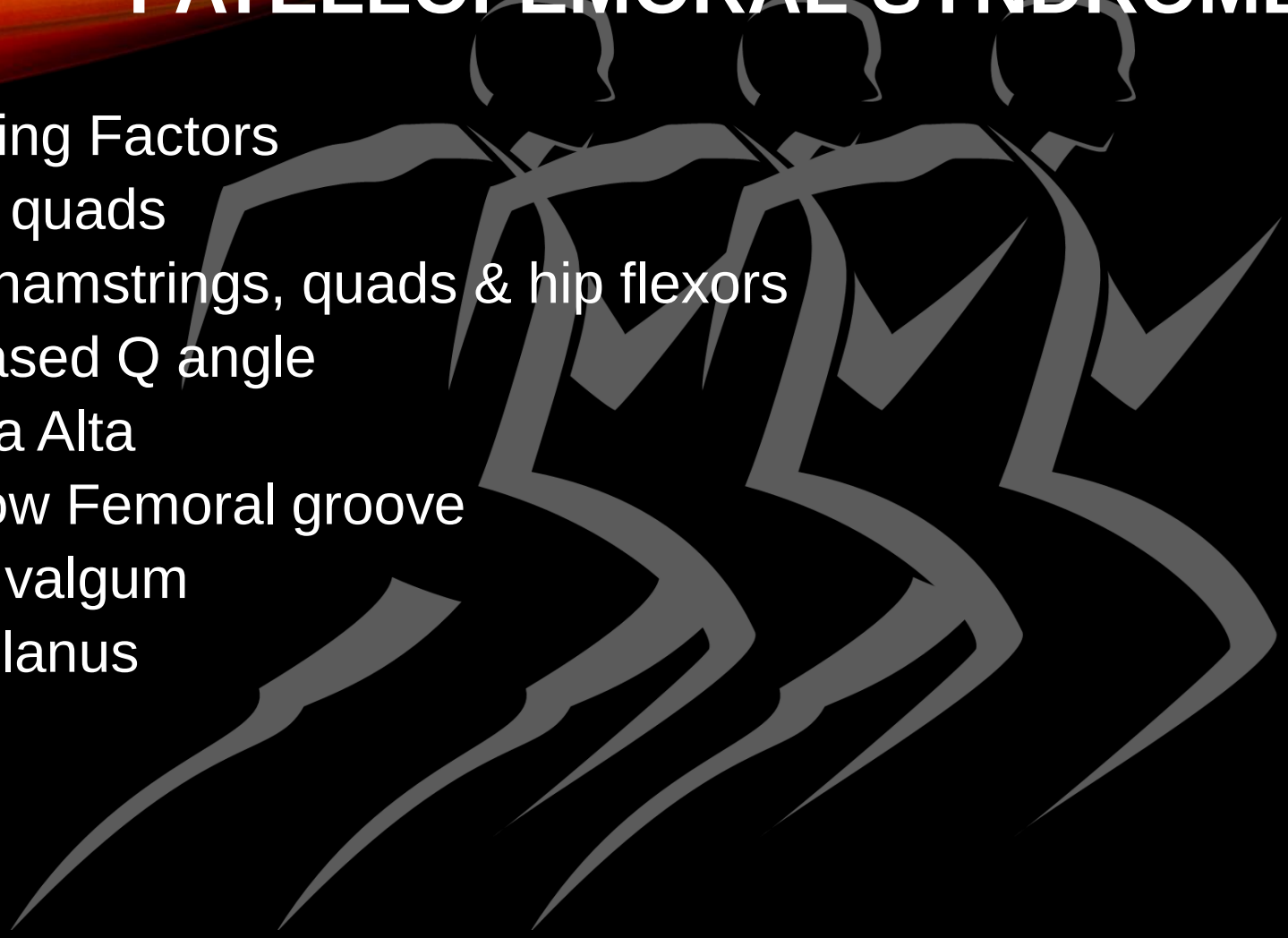
PATELLOFEMORAL SYNDROME



- General
  - Softening/fissure of hyaline articular cartilage
  - Overload Patellofemoral joint
  - Disuse & overuse can contribute to condition
  - Women > Men
  - Ages 15-18 & 35-45
  - Patella Alta contributes:
    - Increased Risk patella dislocation/subluxation
    - Abnormal Trochlear anatomy

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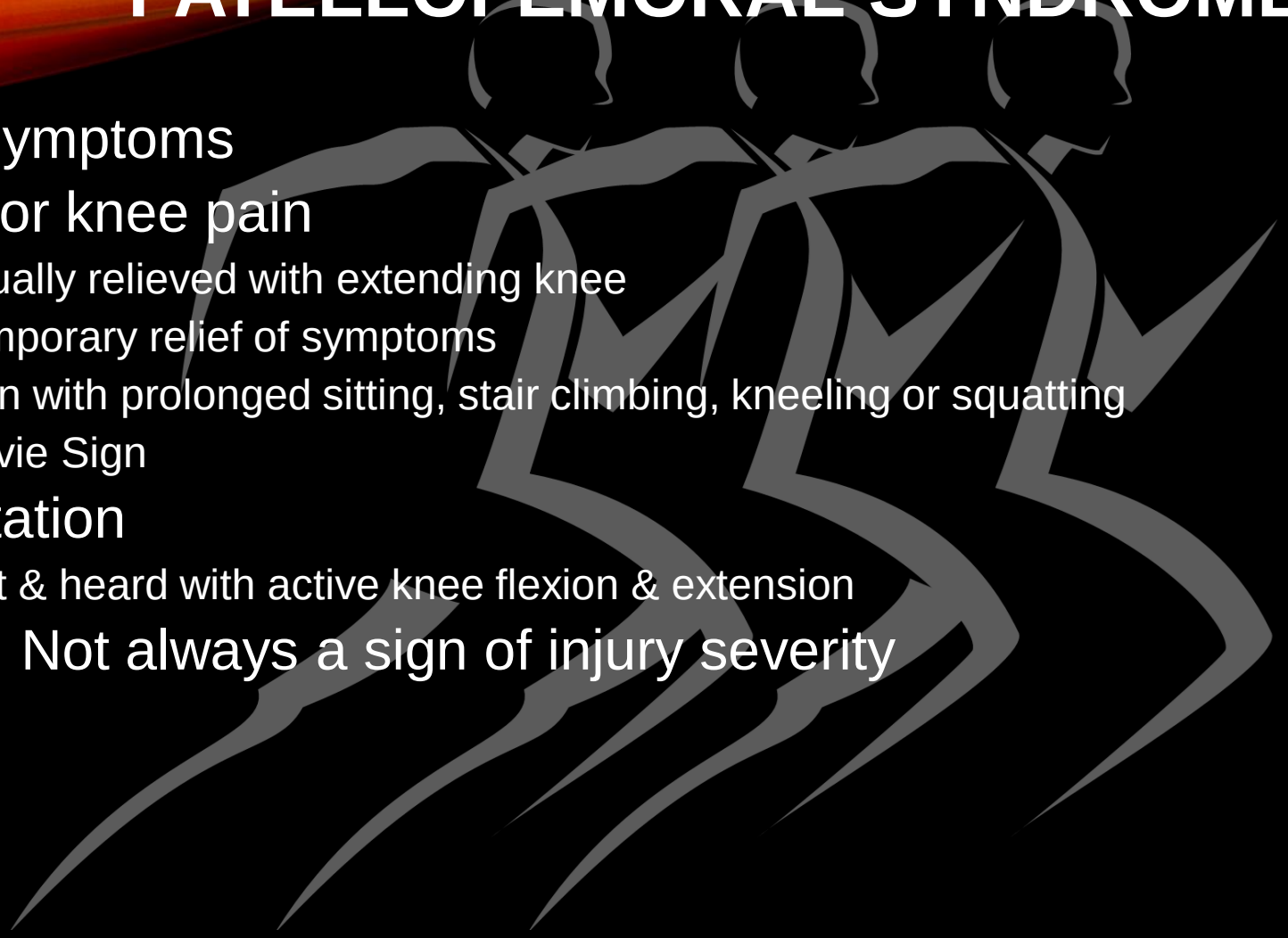
PATELLOFEMORAL SYNDROME



- Contributing Factors
  - Weak quads
  - Tight hamstrings, quads & hip flexors
  - Increased Q angle
  - Patella Alta
  - Shallow Femoral groove
  - Genu valgum
  - Pes Planus

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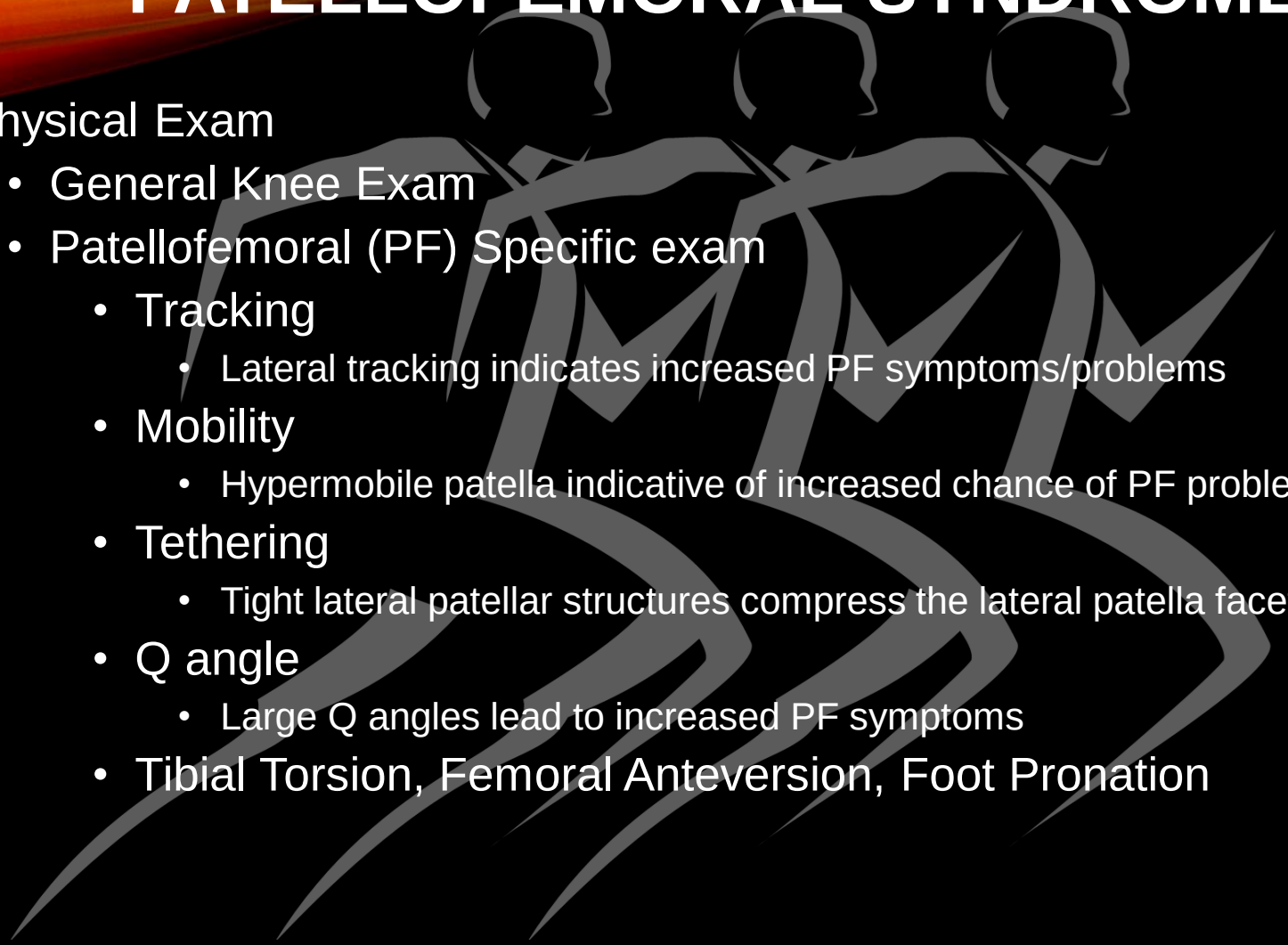
PATELLOFEMORAL SYNDROME



- Clinical Symptoms
  - Anterior knee pain
    - Usually relieved with extending knee
    - Temporary relief of symptoms
    - Pain with prolonged sitting, stair climbing, kneeling or squatting
    - Movie Sign
  - Crepitation
    - Felt & heard with active knee flexion & extension
      - Not always a sign of injury severity

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PATELLOFEMORAL SYNDROME



- Physical Exam
  - General Knee Exam
  - Patellofemoral (PF) Specific exam
    - Tracking
      - Lateral tracking indicates increased PF symptoms/problems
    - Mobility
      - Hypermobile patella indicative of increased chance of PF problems
    - Tethering
      - Tight lateral patellar structures compress the lateral patella facet
    - Q angle
      - Large Q angles lead to increased PF symptoms
    - Tibial Torsion, Femoral Anteversion, Foot Pronation

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PATELLOFEMORAL SYNDROME

- Patellofemoral (PF) Specific exam
  - Tracking
    - Lateral tracking indicates increased PF symptoms/problems
    - J sign: lateral patellar motion during terminal knee extension
    - Owl's eye position: over tight lateral band pulling patella laterally
    - Look for medial and lateral patellar facet tenderness on palpation
  - Mobility
    - Normal mobility: displace patella <50% of patella width
    - Hypermobile - increased risk PF problems & patellar subluxation or dislocation
    - Seen more in adolescent females
    - Think collagen disorder if Hypermobile all joints

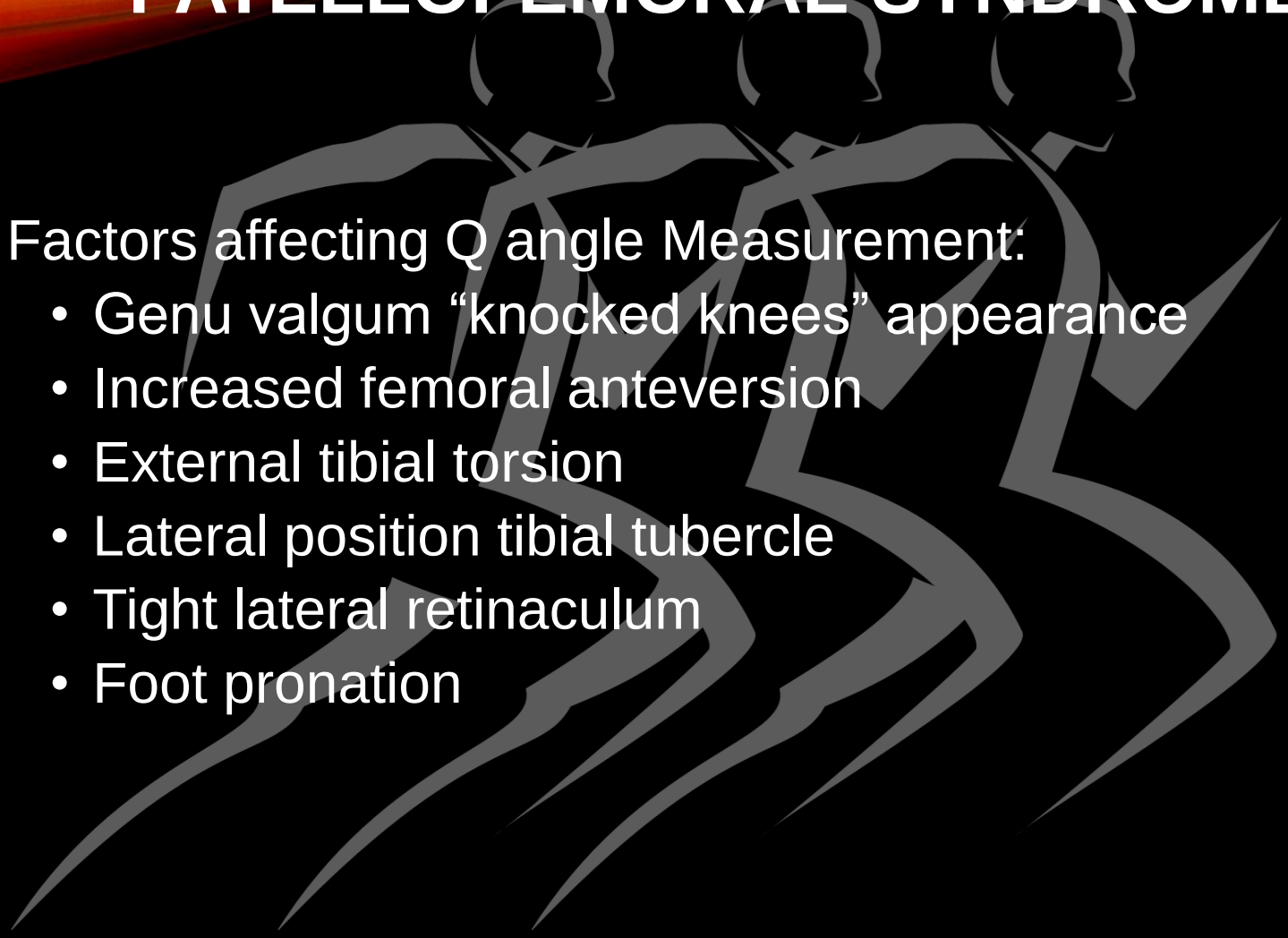
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PATELLOFEMORAL SYNDROME

- Patellofemoral (PF) Specific exam
  - Tethering
    - Tight lateral patellar structures compress the lateral patella facet
    - Normally can tilt up lateral patella limited amount
    - Limited or painful lateral patella tilt 2nd to tight lateral retinaculum
  - Q angle
    - Measurement of patellar alignment
    - Measure:
      - Draw a line from ASIS thru the central patella then, draw a second line thru the patella that bisects the tibial tuberosity. Measures angle formed by these 2 lines.
      - Normal range:
        - men 10-12 degrees
        - women 12-14 degrees

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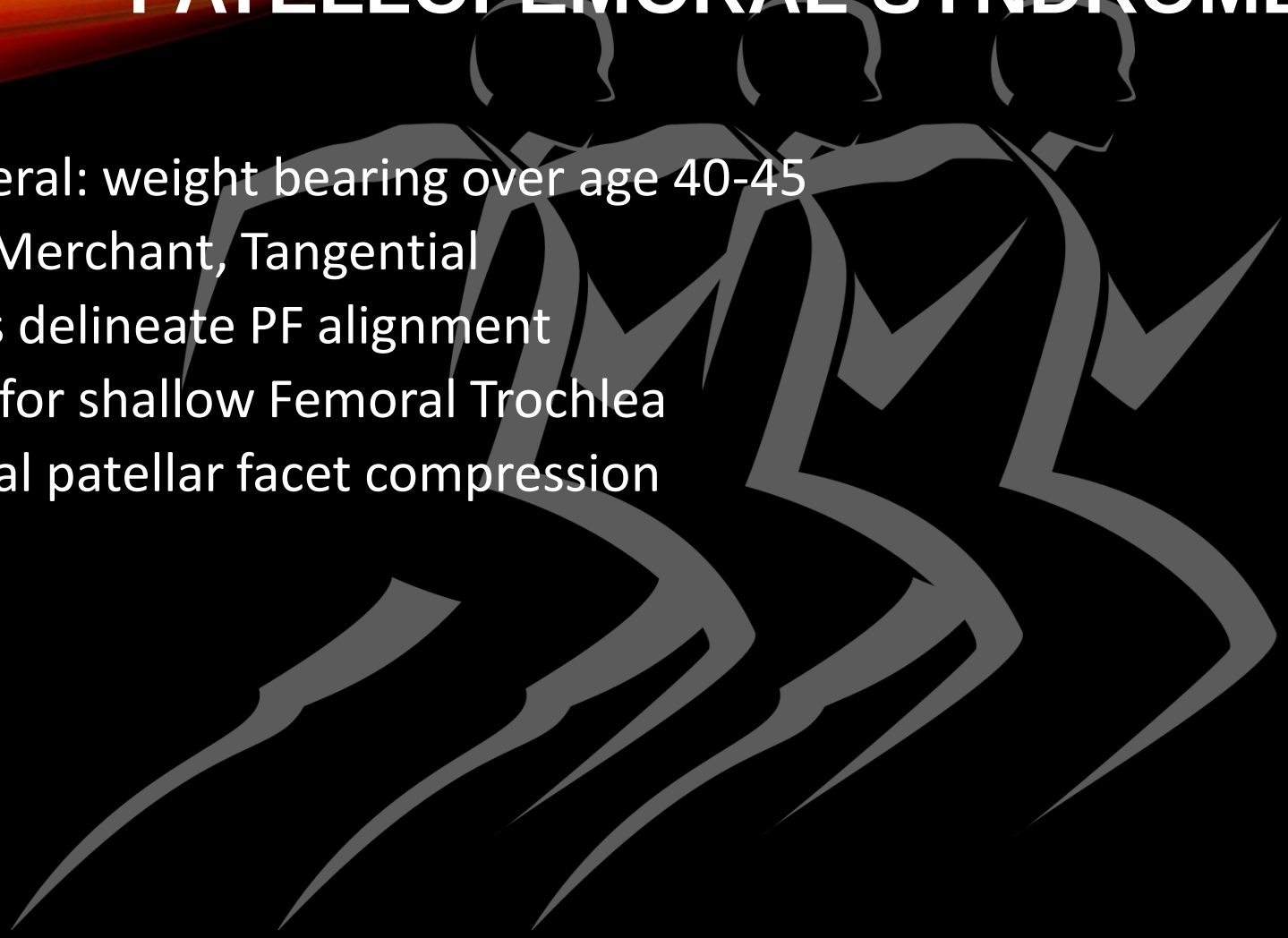
PATELLOFEMORAL SYNDROME



- Factors affecting Q angle Measurement:
  - Genu valgum “knocked knees” appearance
  - Increased femoral anteversion
  - External tibial torsion
  - Lateral position tibial tubercle
  - Tight lateral retinaculum
  - Foot pronation

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PATELLOFEMORAL SYNDROME



- Radiographs
  - AP & Lateral: weight bearing over age 40-45
  - Sunrise, Merchant, Tangential
    - Helps delineate PF alignment
    - Look for shallow Femoral Trochlea
    - Lateral patellar facet compression

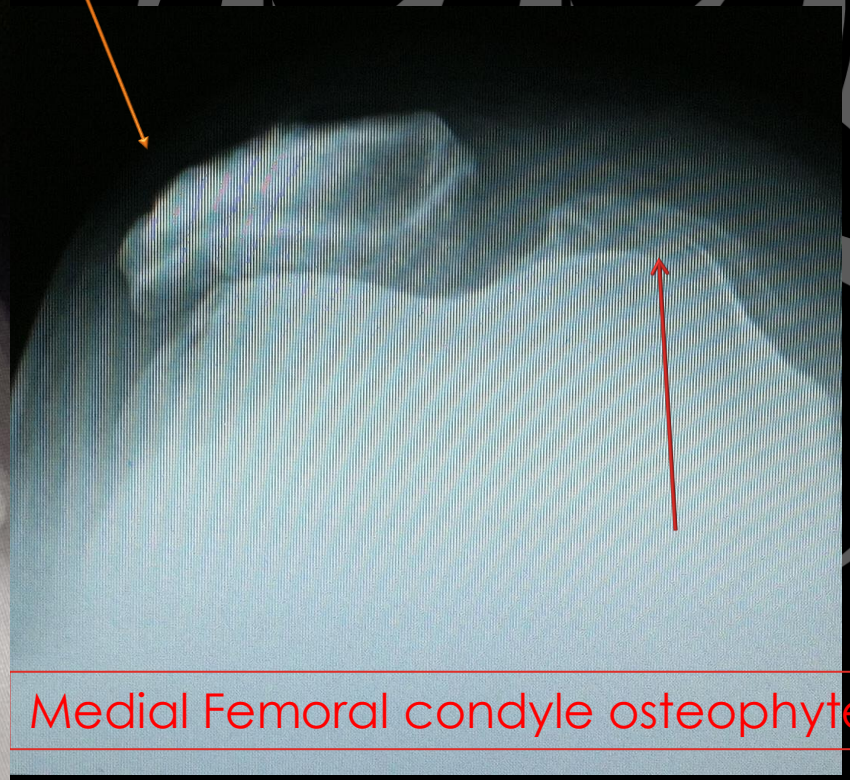
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PATELLOFEMORAL SYNDROME

Lateral tracking & tethering patella

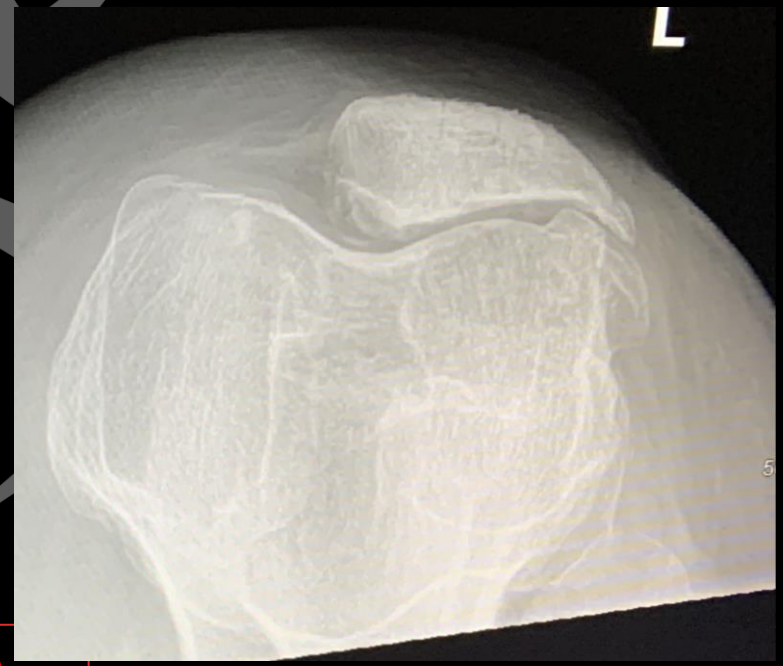
NORMAL PF ALIGNMENT





Medial Femoral condyle osteophyte

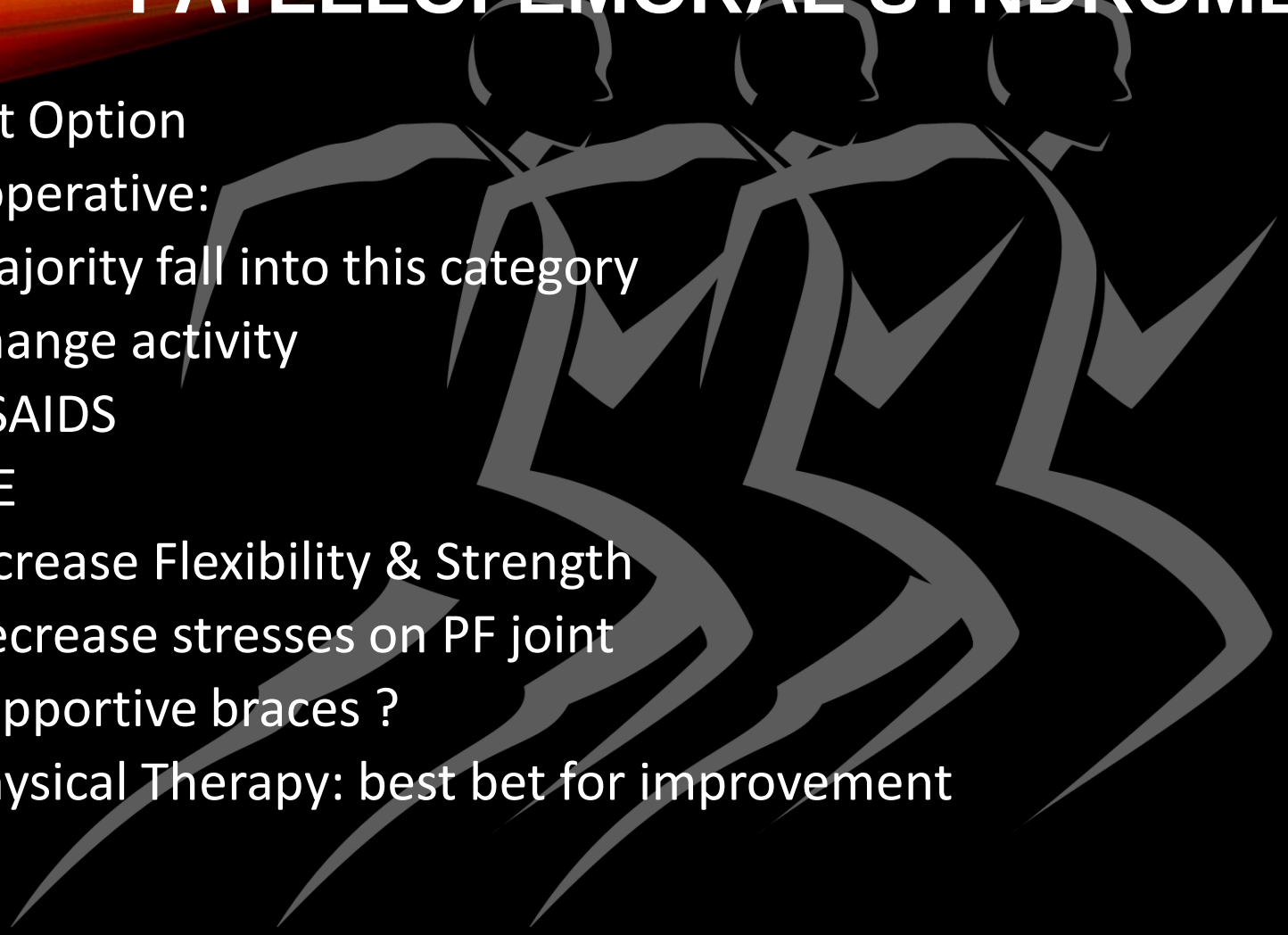
ARTHRITIC PF JOINT



Photos courtesy TGocke, PA-C

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PATELLOFEMORAL SYNDROME



- Treatment Option
  - Non-operative:
    - Majority fall into this category
    - Change activity
    - NSAIDS
    - ICE
    - Increase Flexibility & Strength
    - Decrease stresses on PF joint
    - Supportive braces ?
    - Physical Therapy: best bet for improvement

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KNEE OSTEOARTHRITIS

25 Treatments for Arthritis Hip & Knee Painhttp://www.arthritistoday.org/about-arthritis/types-of-arthritis/osteoarthritis/treatment-plan/25-treatments-for-hip-knee-oa.php

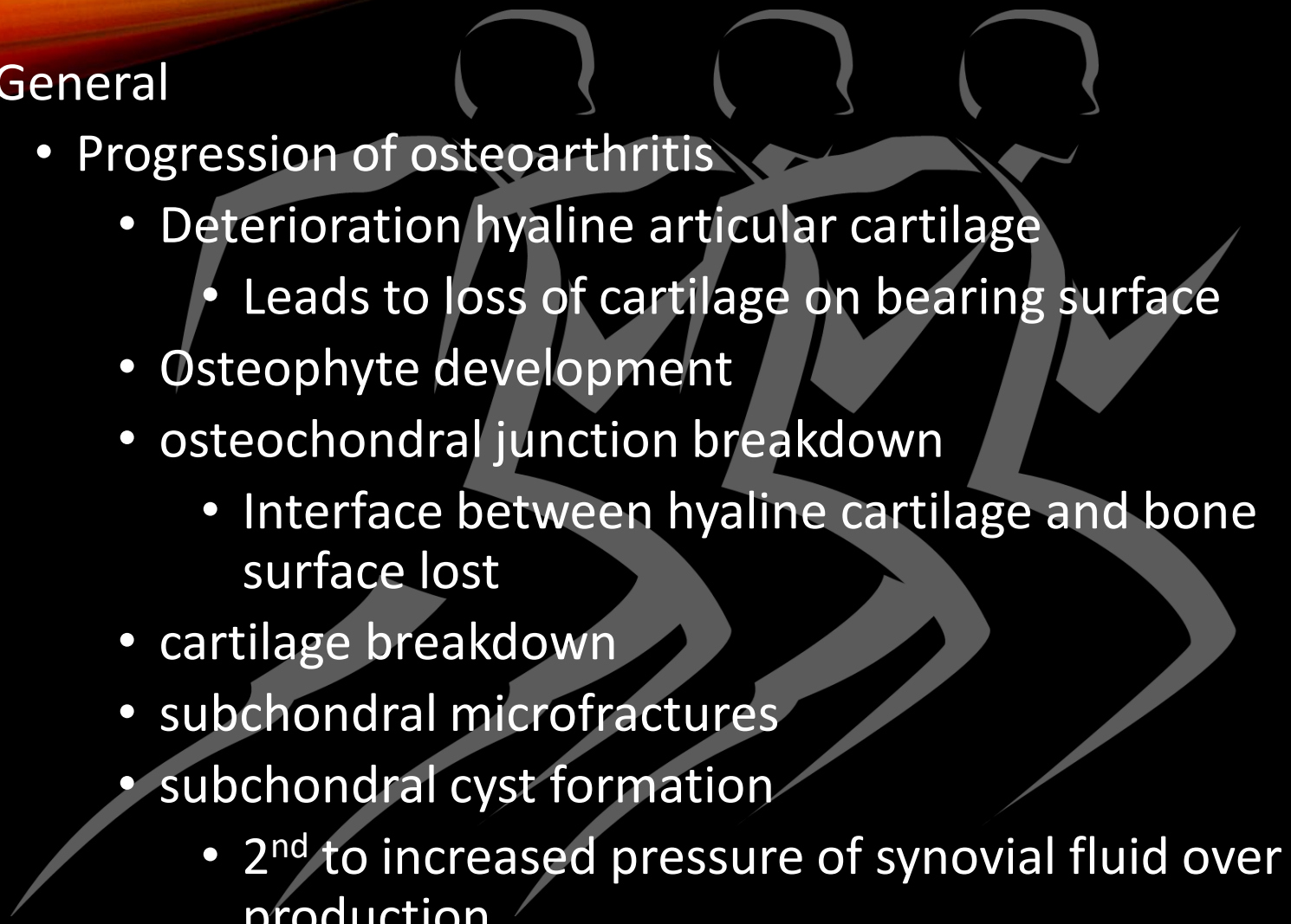
Sasek C: An Update on Primary Care management of Knee Osteoarthritis; JAAPA 2015, www.jaapa.com

KNEE OSTEOARTHRITIS



- General
  - Most common form arthritis
  - Knee most often involved
  - Can affect other joints
  - Advanced age > younger age
  - Men=Women
  - Immobility stiffness
  - Non-inflammatory arthritis
    - Primary: native defect
    - Secondary: due to trauma, infection
    - Chondrocytes unable to repair following injury

KNEE OSTEOARTHRITIS



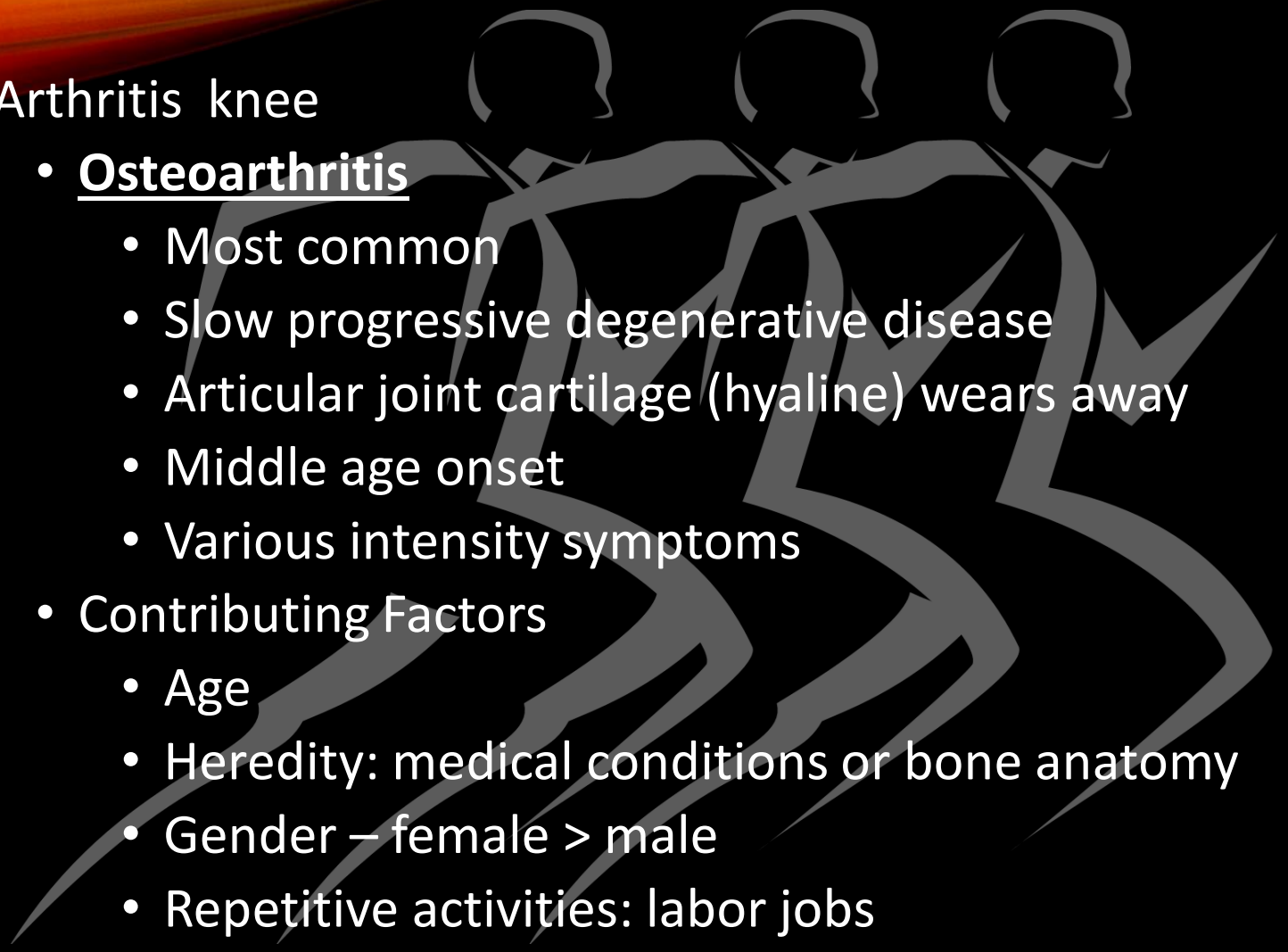
- General
  - Progression of osteoarthritis
    - Deterioration hyaline articular cartilage
      - Leads to loss of cartilage on bearing surface
    - Osteophyte development
    - osteochondral junction breakdown
      - Interface between hyaline cartilage and bone surface lost
    - cartilage breakdown
    - subchondral microfractures
    - subchondral cyst formation
      - 2nd to increased pressure of synovial fluid over production

KNEE OSTEOARTHRITIS



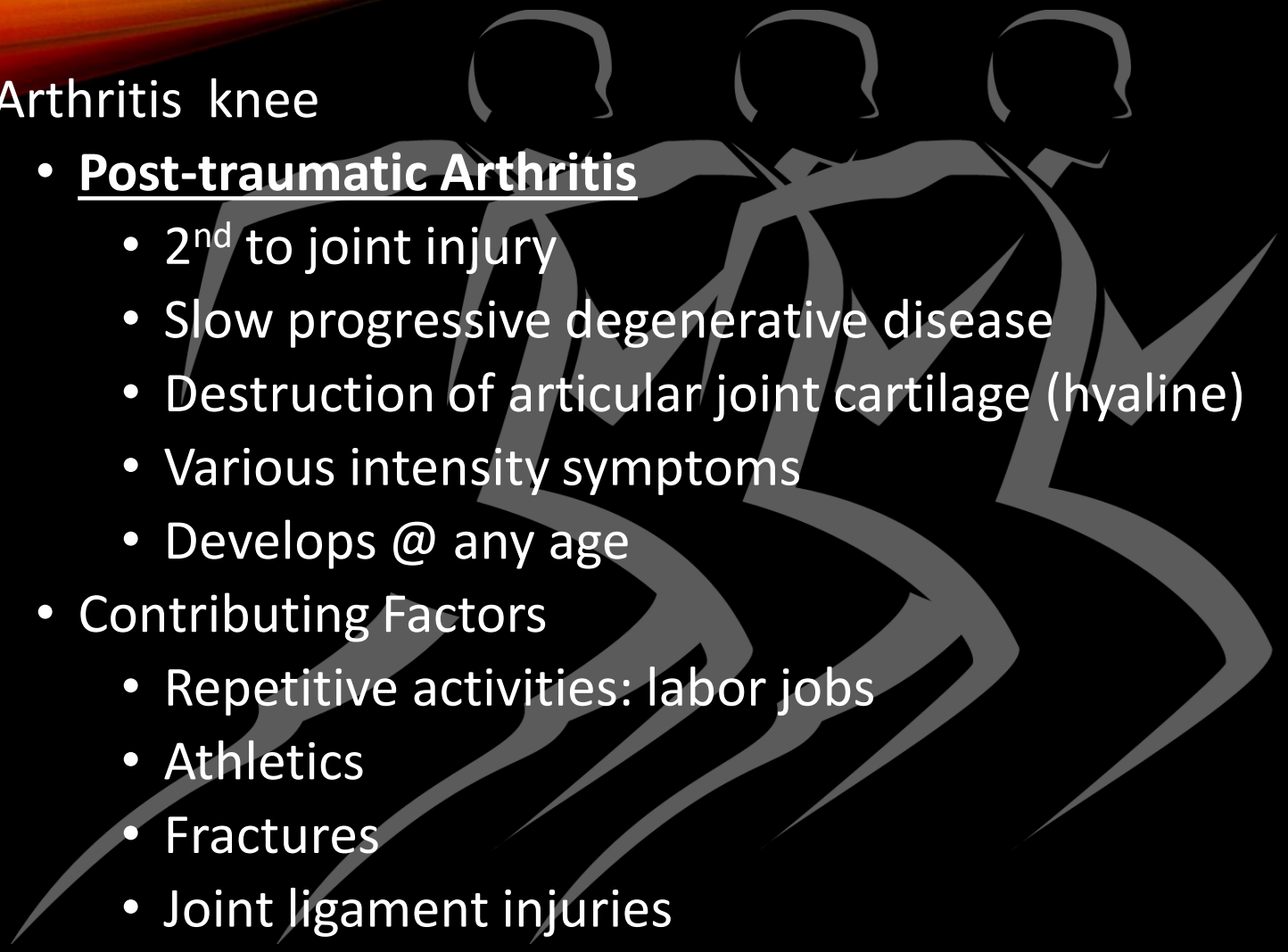
- Arthritis knee
  - Osteoarthritis: age and activity related
  - Rheumatoid arthritis: autoimmune disease
  - Post traumatic Arthritis: injury related
    - Delayed onset
    - Similar symptoms
    - Variable treatments
    - Similar outcomes

KNEE OSTEOARTHRITIS



- Arthritis knee
  - **Osteoarthritis**
    - Most common
    - Slow progressive degenerative disease
    - Articular joint cartilage (hyaline) wears away
    - Middle age onset
    - Various intensity symptoms
  - Contributing Factors
    - Age
    - Heredity: medical conditions or bone anatomy
    - Gender – female > male
    - Repetitive activities: labor jobs
    - Athletics/Injury

KNEE OSTEOARTHRITIS



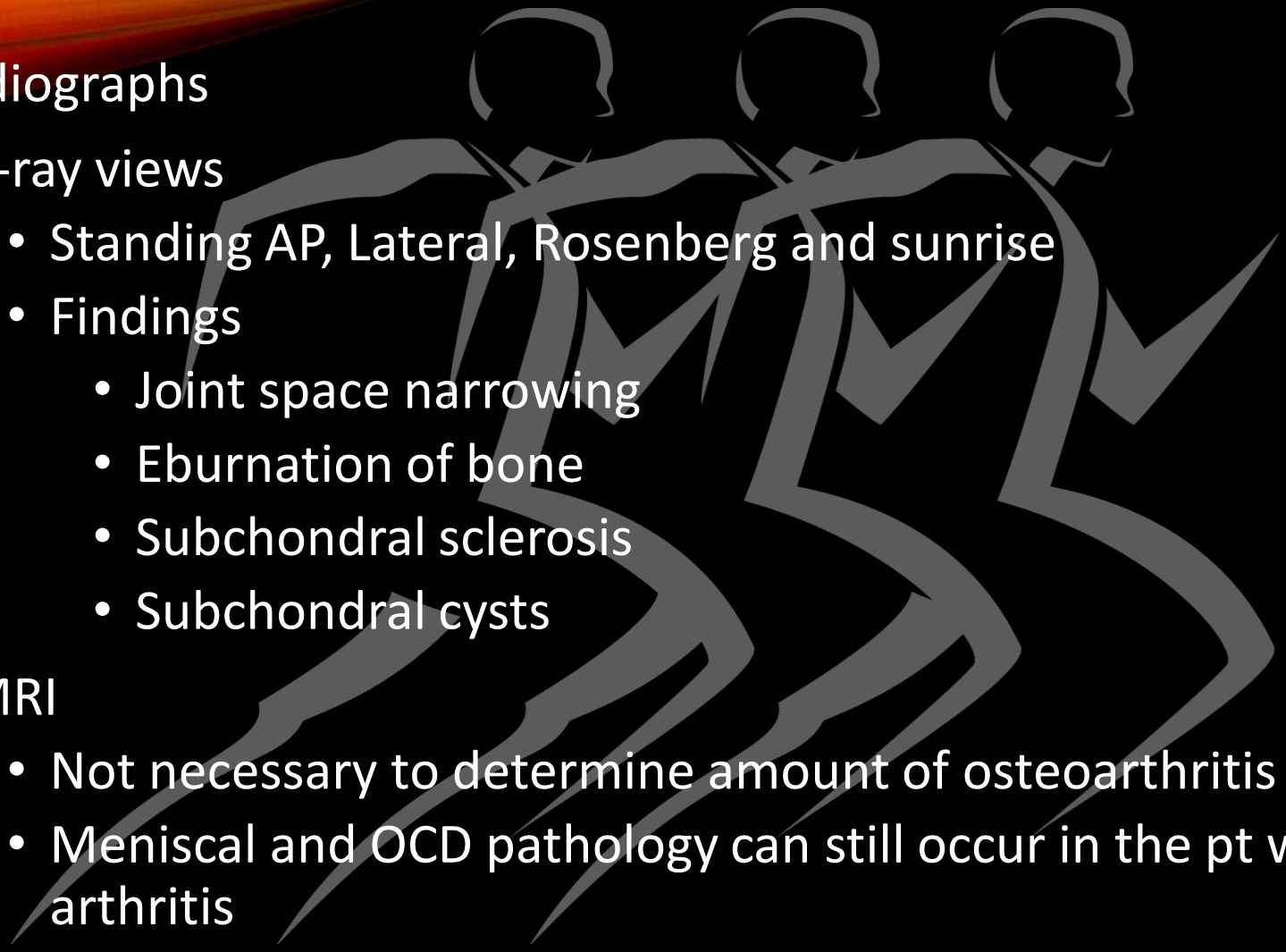
- Arthritis knee
  - **<u>Post-traumatic Arthritis</u>**
    - 2nd to joint injury
    - Slow progressive degenerative disease
    - Destruction of articular joint cartilage (hyaline)
    - Various intensity symptoms
    - Develops @ any age
  - Contributing Factors
    - Repetitive activities: labor jobs
    - Athletics
    - Fractures
    - Joint ligament injuries
    - Meniscus injury

KNEE OSTEOARTHRITIS



- Arthritis knee
  - **<u>Symptoms</u>**
    - Gradual onset to sudden onset
    - Start-up symptoms
      - Stiffness getting better after some motion
      - Swelling
      - Redness/warmth
      - Variable pain locations
      - Weakness/giving out
      - Catching/locking

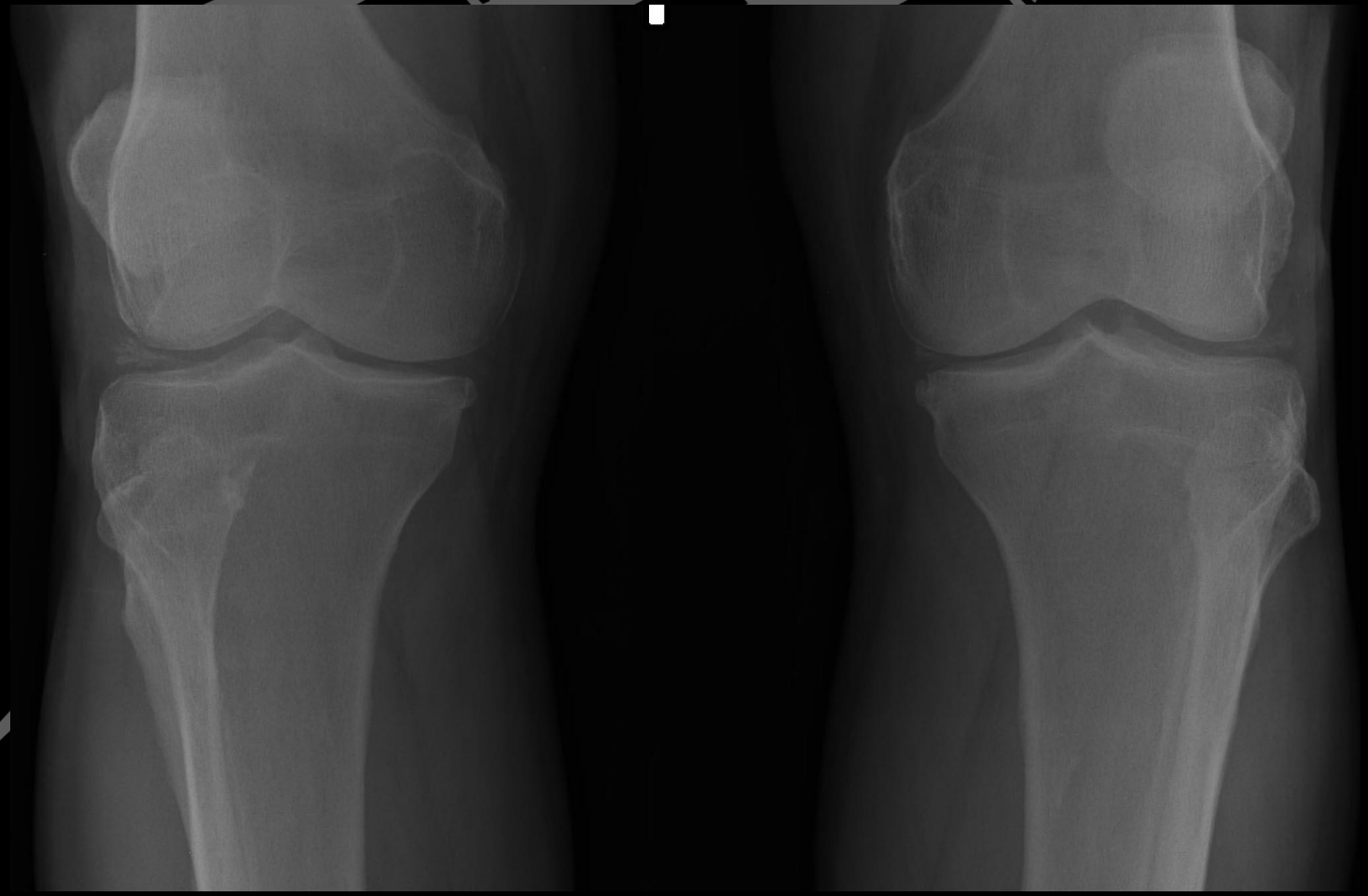
KNEE OSTEOARTHRITIS



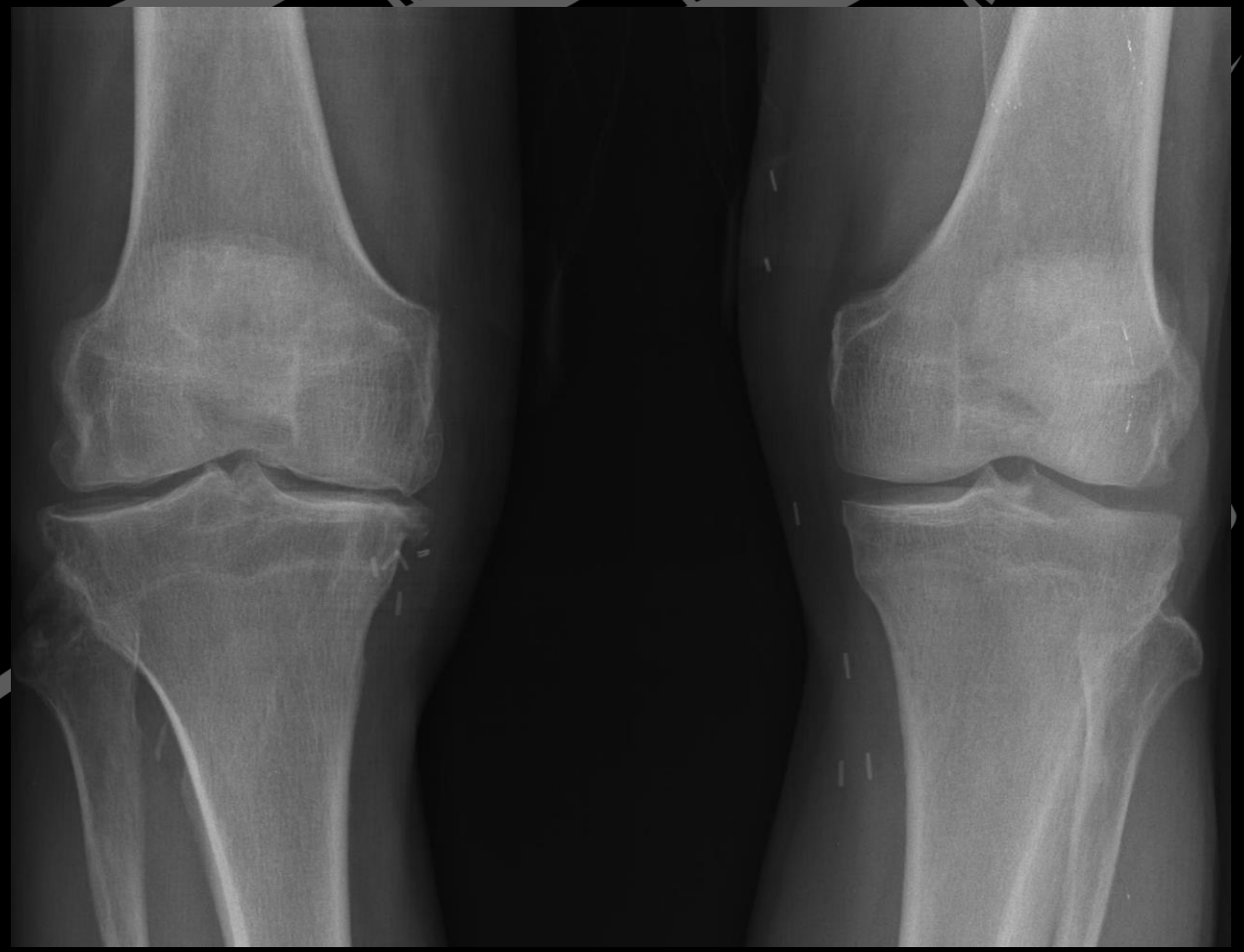
Radiographs

- X-ray views
  - Standing AP, Lateral, Rosenberg and sunrise
  - Findings
    - Joint space narrowing
    - Eburnation of bone
    - Subchondral sclerosis
    - Subchondral cysts
- MRI
  - Not necessary to determine amount of osteoarthritis
  - Meniscal and OCD pathology can still occur in the pt with knee arthritis

KNEE OSTEOARTHRITIS- MILD



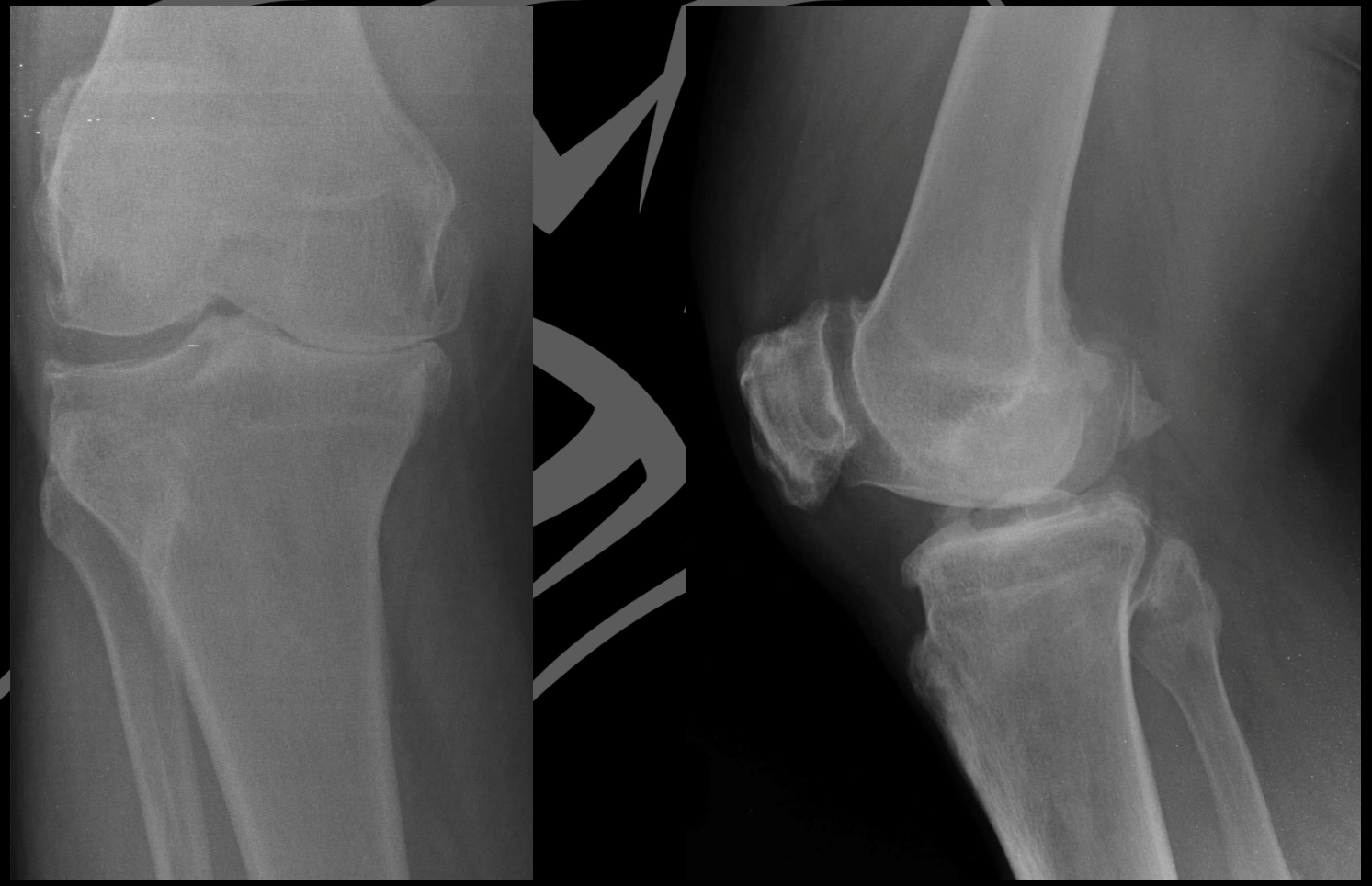
KNEE OSTEOARTHRITIS-MODERATE



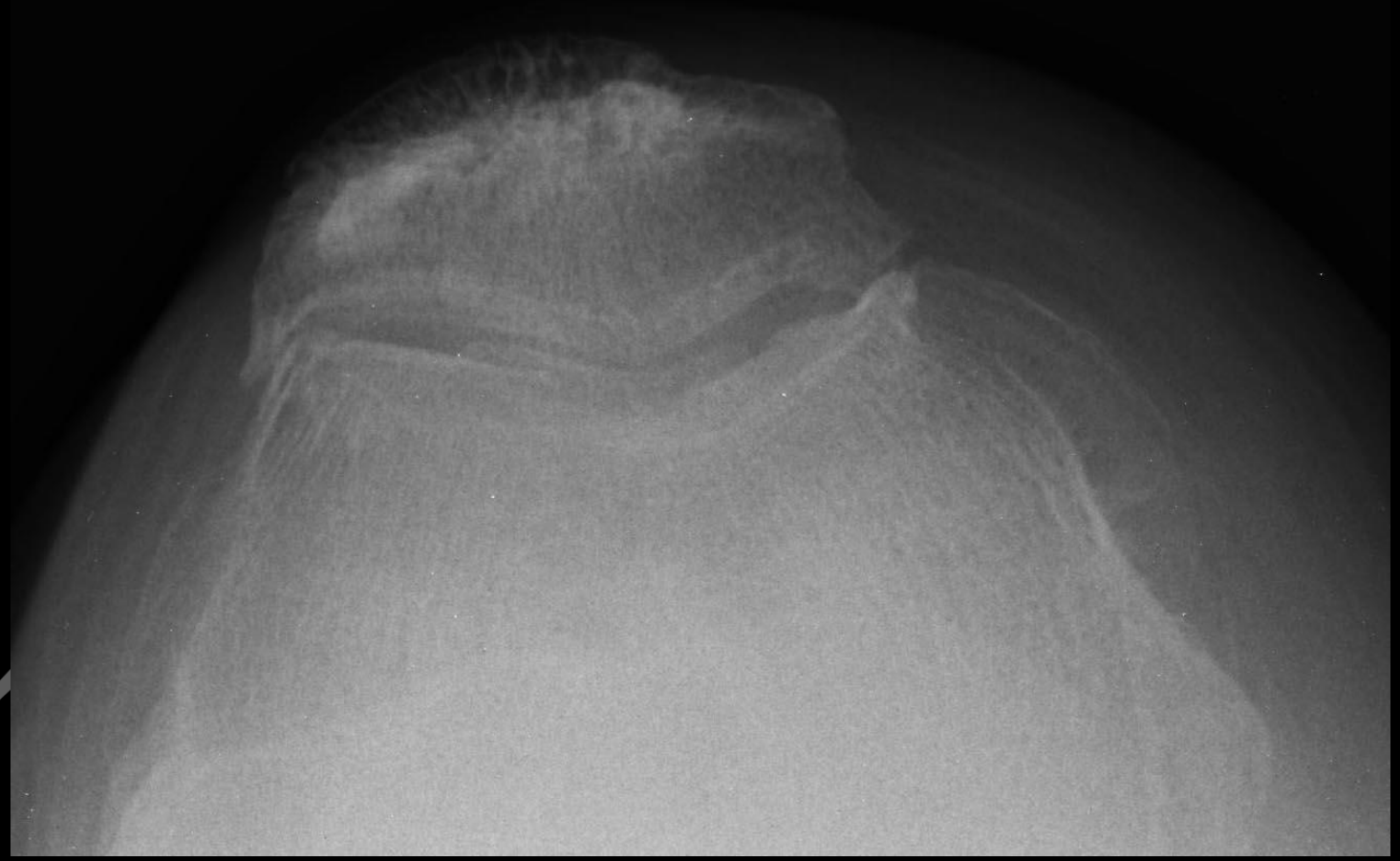
KNEE OSTEOARTHRITIS



KNEE OSTEOARTHRITIS MODERATE TO SEVERE



KNEE OSTEOARTHRITIS



KNEE OSTEOARTHRITIS - SEVERE

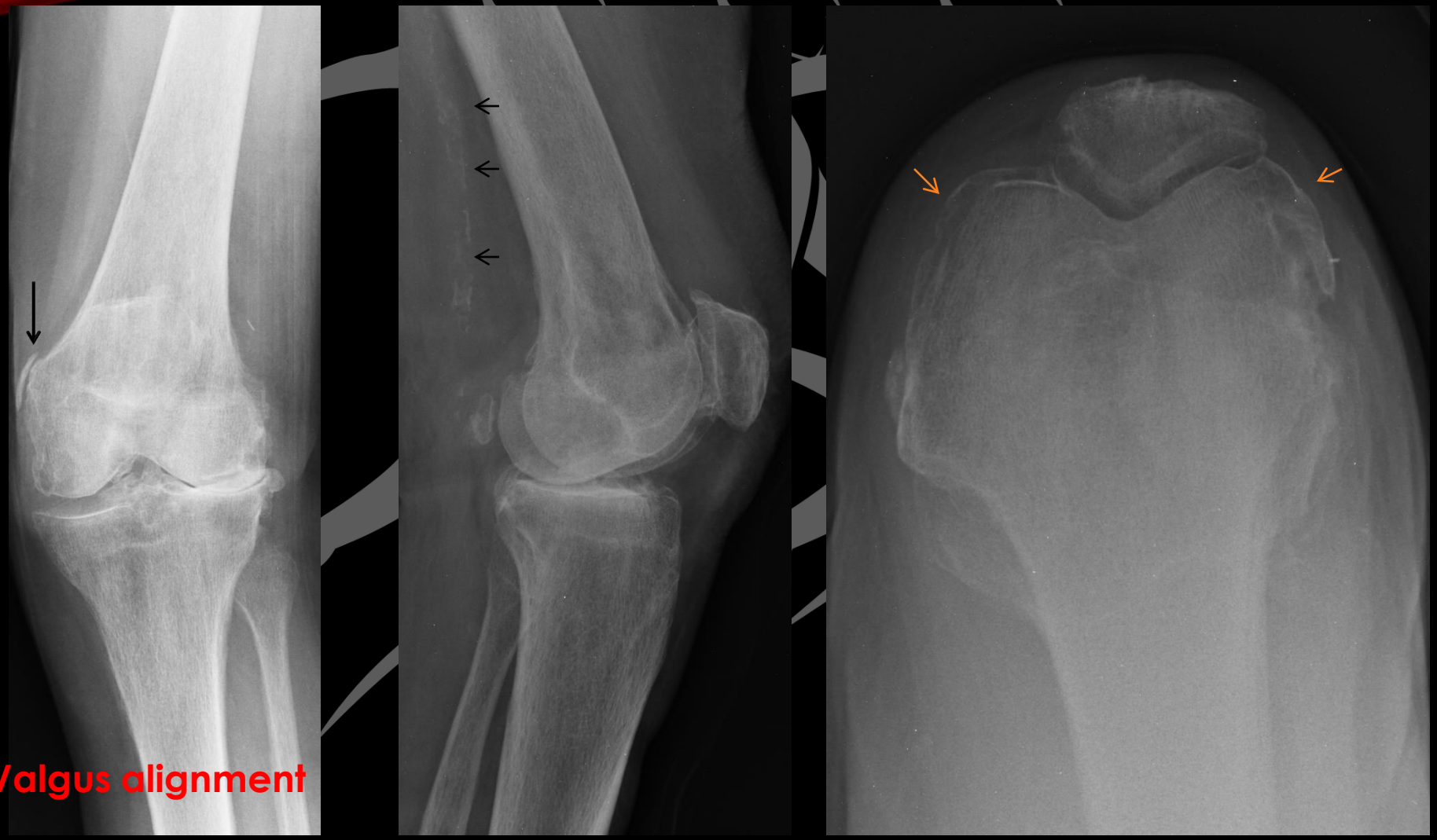


KNEE OSTEOARTHRITIS-SEVERE





KNEE OSTEOARTHRITIS - SEVERE



KNEE OSTEOARTHRITIS



KNEE OSTEOARTHRITIS

Treatment

- Nonoperative
  - First line treatment all forms osteoarthritis
  - Modify activities
  - Improve strength & flexibility
    - Dynamic shock absorbers help to reduce joint stress
    - Improved flexibility reduces joint stress & allows for strengthening muscle in full ROM
  - Body weight reduction
    - Reduces joint stress
    - Improves mobility
  - Ice vs. Heat
    - Therapeutic relief

KNEE OSTEOARTHRITIS

Treatment - Nonoperative

- NSAIDS
  - Reduce inflammatory effects & pain reduction
  - Acetaminophen pain relief – no anti-inflammatory effects
- Physical Therapy
  - Improve gait
    - Unloading braces : ? improve alignment and gait
  - Improve strength & flexibility
  - Structured programs
- Injection therapy
  - Corticosteroid joint injections
  - Viscosupplimentation joint injections
    - no strong evidence to support

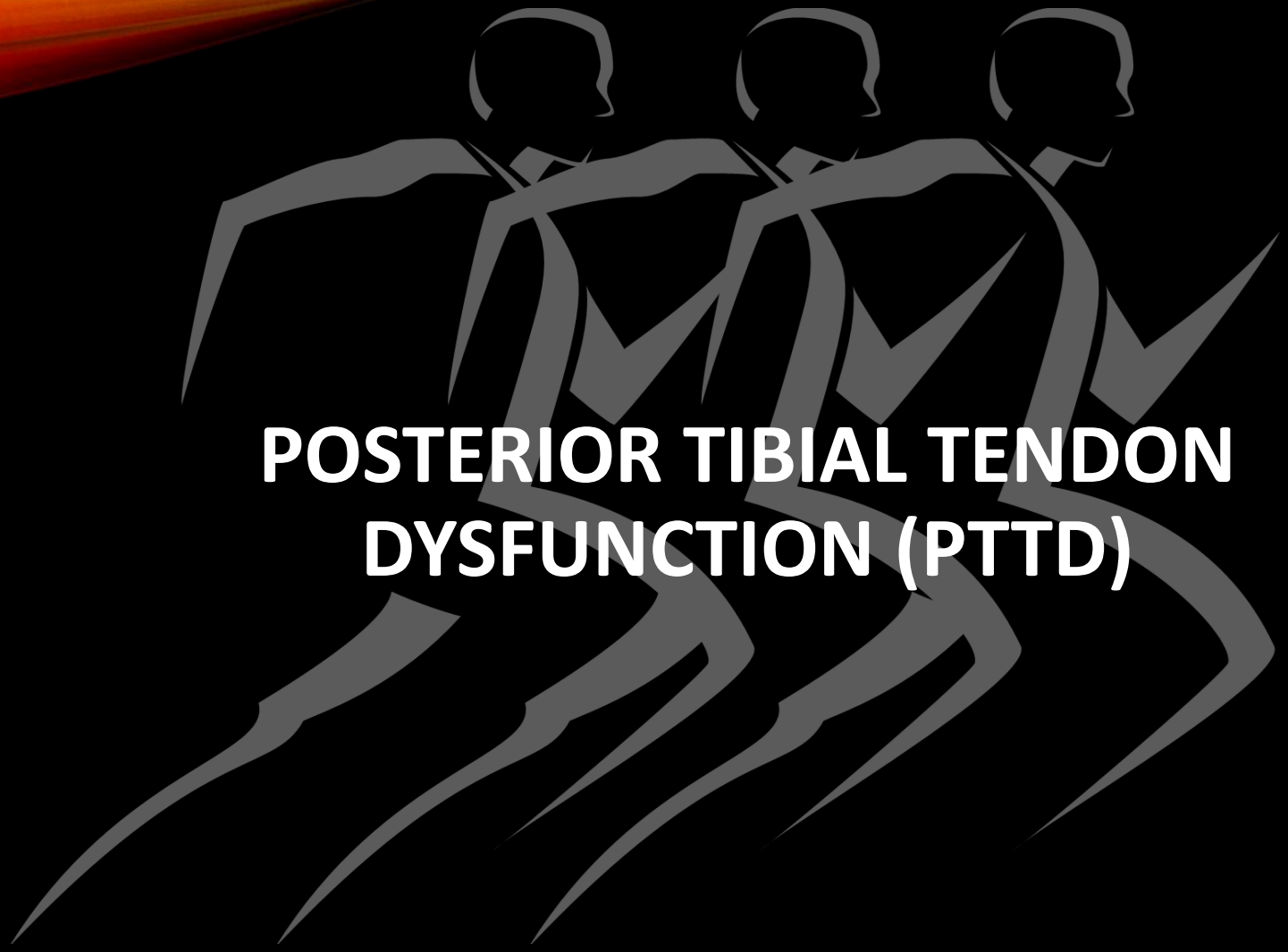
CORTICOSTEROID INJECTION

Technique

- Sitting position
- Knee flexed 90 degrees.
- Palpate the lateral joint line & inferior-lateral
  aspect of the patella.
- Dimple or window in lateral joint space (same medial)
- Using a 21/22 gauge, 1.5 inch needle
- Aim 45 degrees medially, level of the joint line.
- Resistance or you feel bone:
  - Redirect needle
- Injection Meds:
  - 3ml Bupivacaine & 2ml Kenalog 40mg/ml

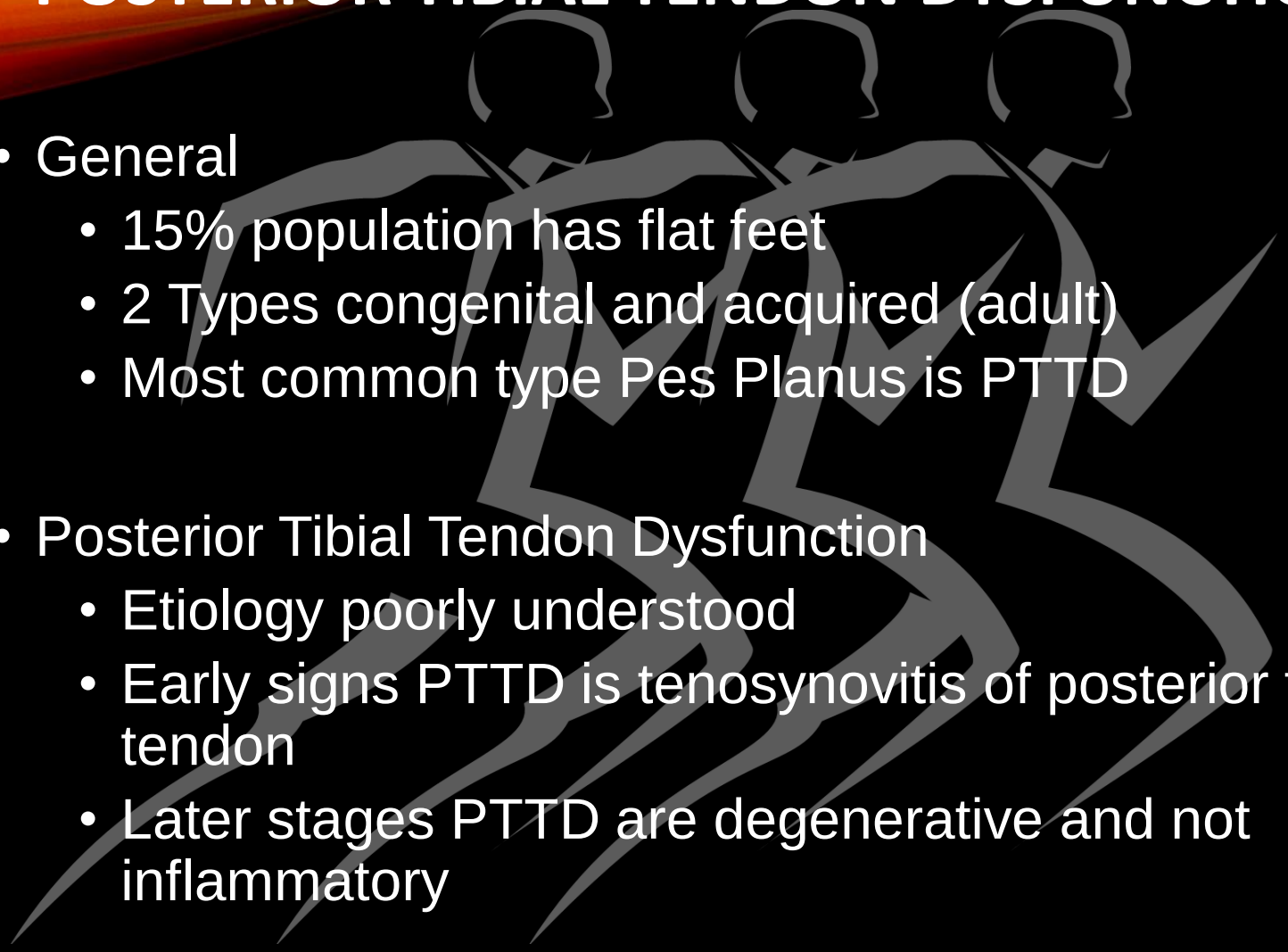

Photo Courtesy TGocke, PA-C


Photo Courtesy TGocke, PA-C



POSTERIOR TIBIAL TENDON DYSFUNCTION (PTTD)

POSTERIOR TIBIAL TENDON DYSFUNCTION

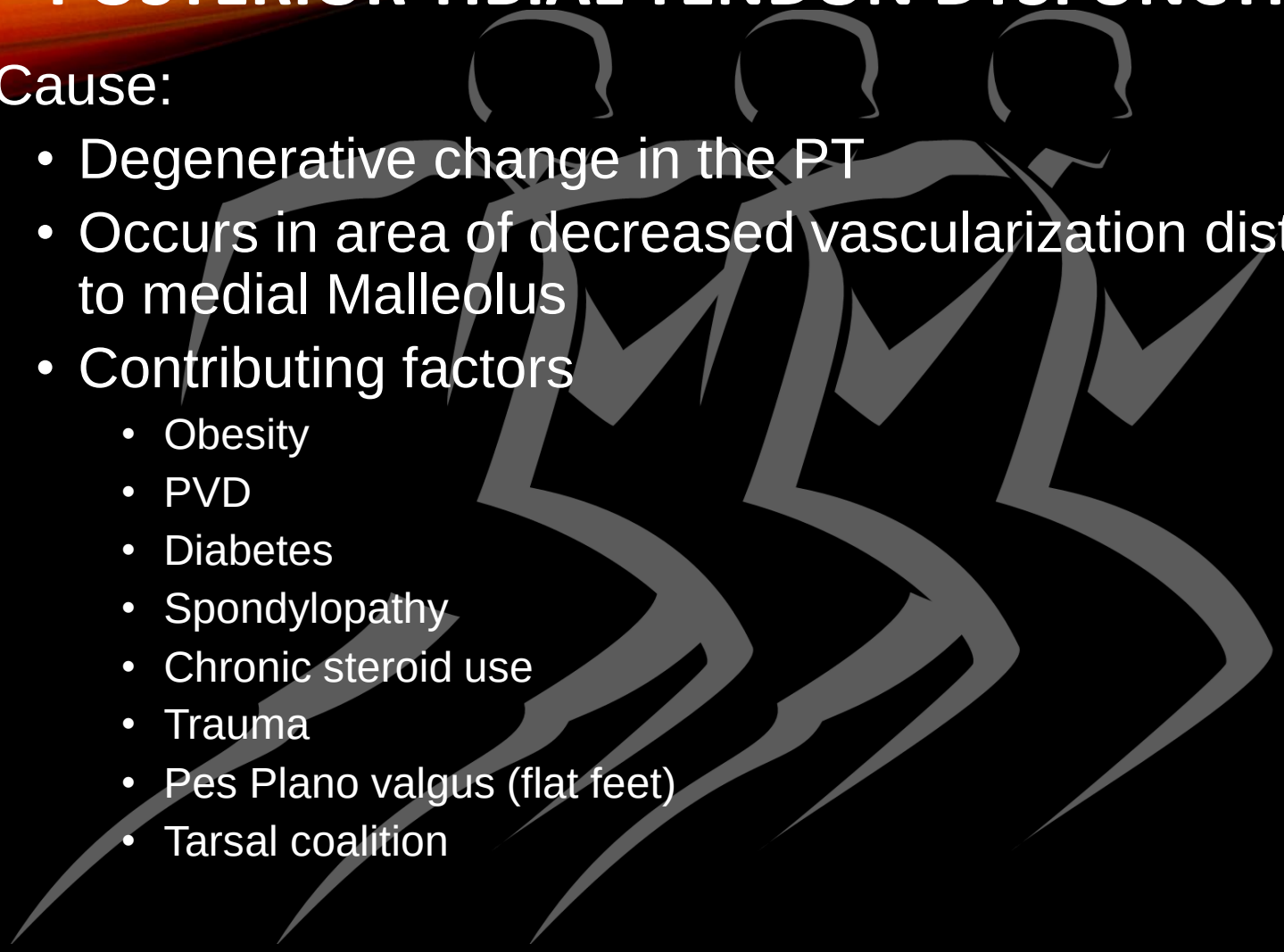


- General
  - 15% population has flat feet
  - 2 Types congenital and acquired (adult)
  - Most common type Pes Planus is PTTD

- Posterior Tibial Tendon Dysfunction
  - Etiology poorly understood
  - Early signs PTTD is tenosynovitis of posterior tibial tendon
  - Later stages PTTD are degenerative and not inflammatory

POSTERIOR TIBIAL TENDON DYSFUNCTION

- Cause:
  - Degenerative change in the PT
  - Occurs in area of decreased vascularization distal to medial Malleolus
  - Contributing factors
    - Obesity
    - PVD
    - Diabetes
    - Spondylopathy
    - Chronic steroid use
    - Trauma
    - Pes Plano valgus (flat feet)
    - Tarsal coalition



Posterior Tibial Tendon Dysfunction



- Stages of PTTD
  - Stage I:
    - medial ankle pain & swelling
    - Tenosynovitis
    - No midfoot deformity
    - Mild PT weakness
    - Can Single Toe Raise
  - Stage II:
    - PT attenuated vs. rupture
    - Flexible flatfoot deformity
    - Hind foot valgus
    - Too Many Toes sign
    - Unable to single toes raise

Posterior Tibial Tendon Dysfunction

- Stages of PTTD
  - Stage III:
    - Same as stage II
    - PT disruption w/ rigid flatfoot deformity
  - Stage IV:
    - Ankle valgus deformity in addition for foot deformities

Johnson KA, Strom DE. Tibialis posterior tendon dysfunction. Clin *Orthop. 1989;239:196-206.*

William M. Geideman, MD, Jeffrey E. Johnson, MD; Posterior Tibial Tendon Dysfunction, Journal of Orthopaedic & Sports Physical Therapy, 2OOO;3O (2) :68-77

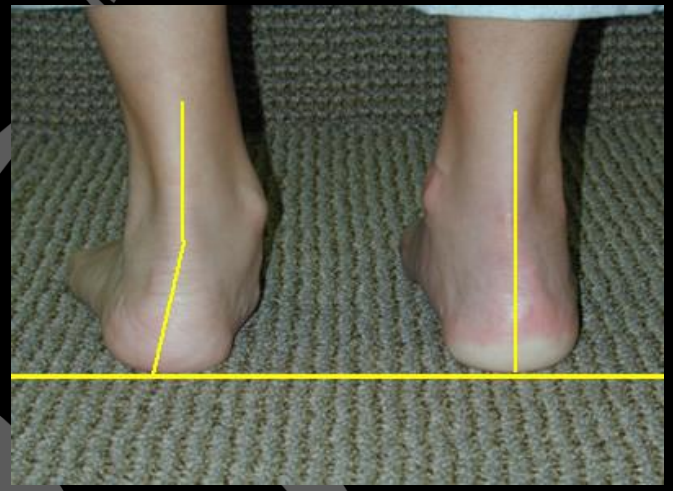
Posterior Tibial Tendon Dysfunction



- Clinical Presentation
  - Gradual Onset
  - Medial ankle pain and swelling (PTT)
  - Pain with ambulation – better at rest
  - Progressive arch deformity
  - Lateral ankle pain – sub fibular impingement
    - Peroneal and sinus tarsi

Posterior Tibial Tendon Dysfunction

- Examination:
  - Standing alignment (heel/arch position)
  - Palpate PTT – tender/boggy
  - Marked Pes planus midfoot
  - Achilles/Gastroc tightness
  - Weak inversion (active/resistive)
  - Poor single toe raise affected side





Posterior Tibial Tendon Dysfunction

- Diagnostic Exam:
  - History and Physical exam key component
  - Radiographs
    - Standing AP and Lateral (foot)
      - Morays' line – loose linear relationship talar neck-1st ray
      - Peritalar subluxation
        - Severe - 50-70% talar neck uncovered at navicular
    - Ankle:
      - AP, Lateral, Mortise
      - Check for ankle valgus deformity
  - CT Scan
    - Arthritic joints will change treatment options
  - MRI
    - Not always indicated

Posterior Tibial Tendon Dysfunction

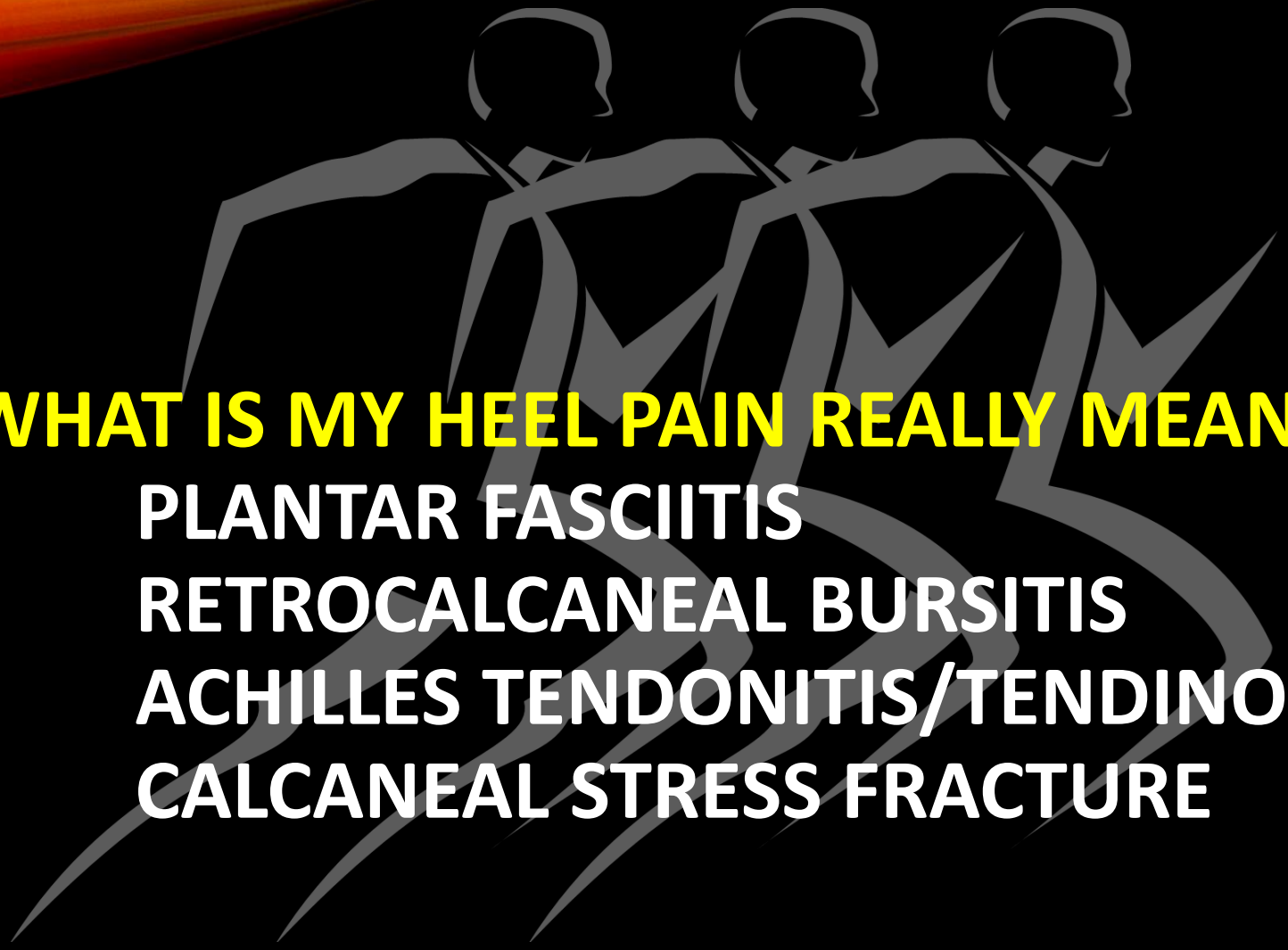
- Non-operative Treatment
  - Stage I- medial heel wedge, arch support, cast/boot, NSAIDS
  - Stage II- medial heel wedge, orthotics, PT, AFO
  - Stage III- custom accommodative orthotic/orthosis
  - Stage IV- AFO
    - Non-op TX not very successful stage II or worse



Posterior Tibial Tendon Dysfunction



- Operative Treatment
  - Stage I- Debride PTT (variable)
  - Stage II-
    - Early: Debride PTT, FDL transfer, Calcaneal osteotomy (medial)
    - Late: Debride PTT, FDL transfer, lengthening Calcaneal osteotomy
      - 6 weeks cast NWB
  - Stage III- Triple Arthrodesis
    - 8 weeks NWB
  - Stage IV- Plantar Arthrodesis vs. Triple Arthrodesis & ankle replacement



WHAT IS MY HEEL PAIN REALLY MEAN

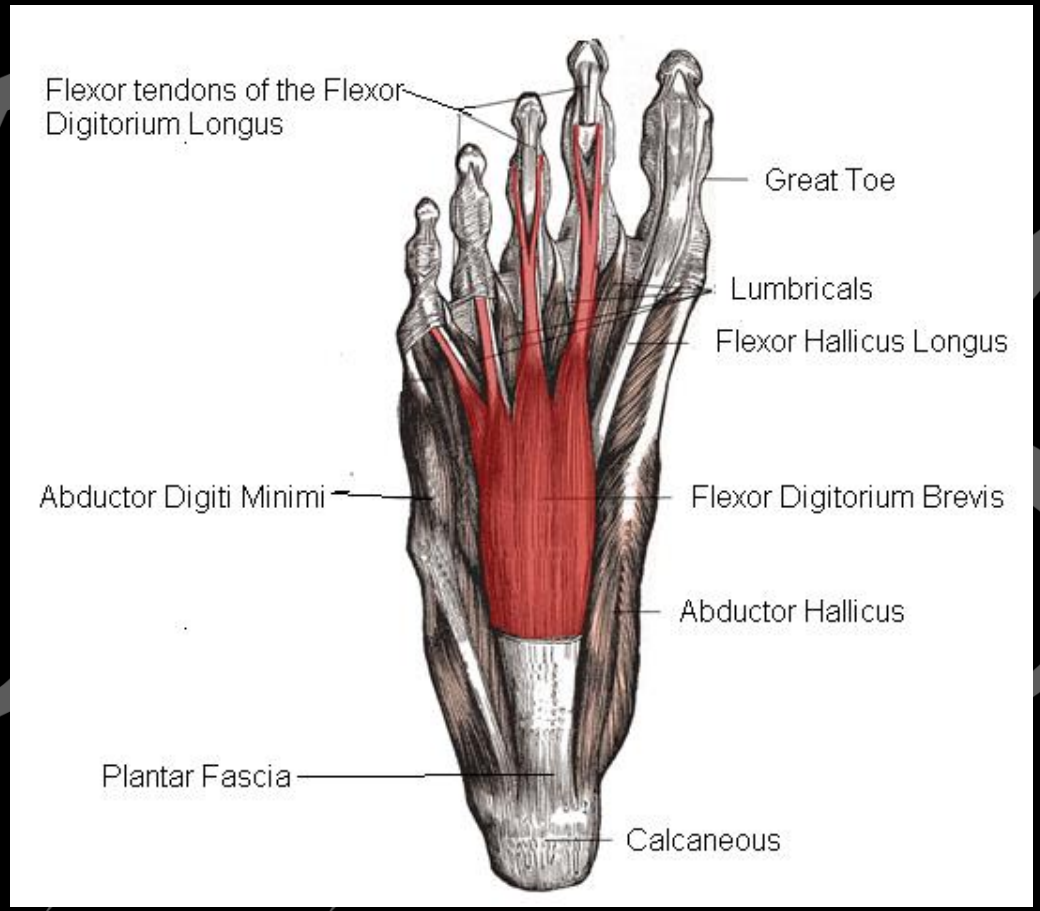
PLANTAR FASCIITIS

RETROCALCANEAL BURSITIS

ACHILLES TENDONITIS/TENDINOSIS

CALCANEAL STRESS FRACTURE

PLANTAR FOOT



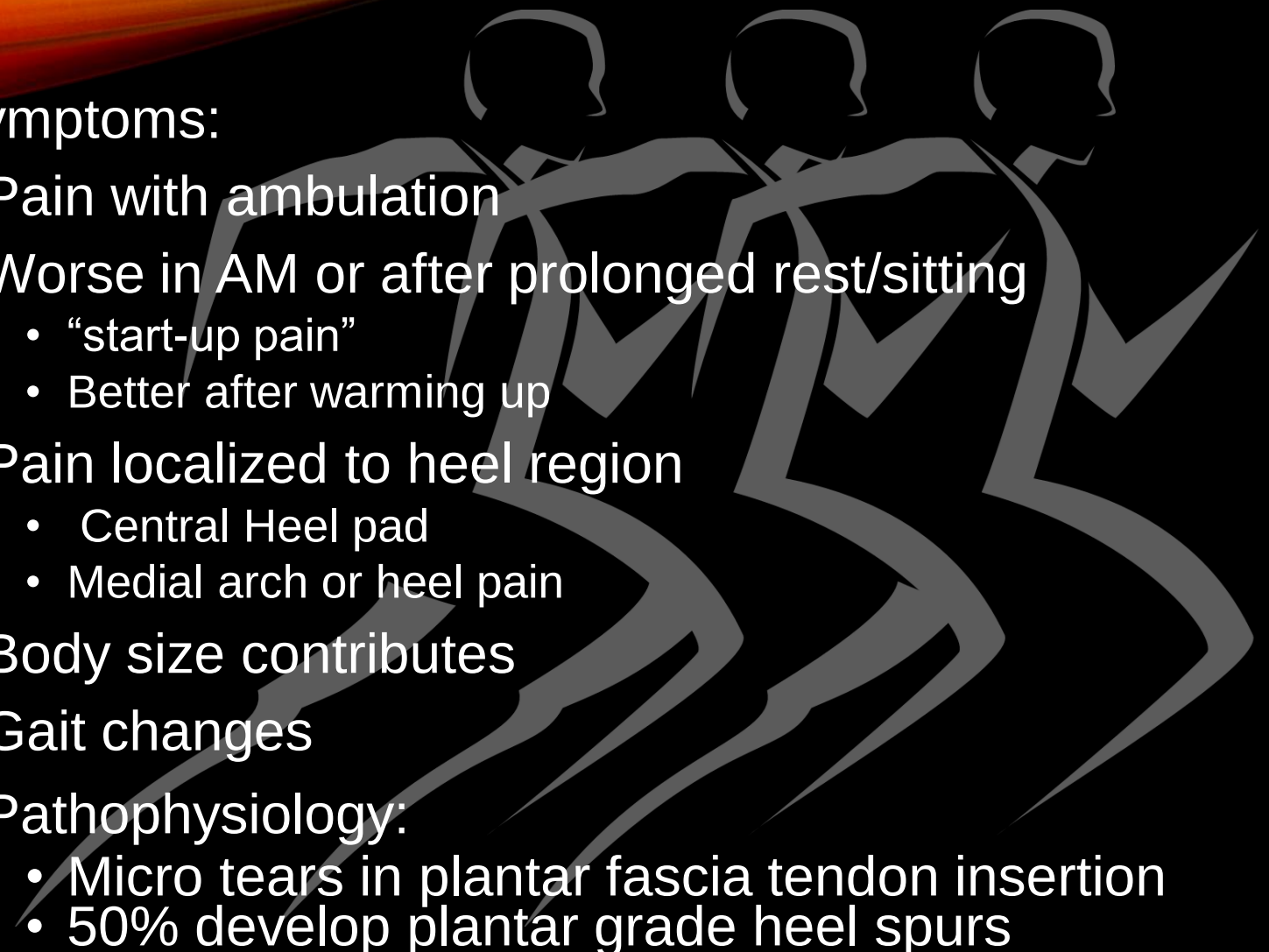
From Wikimedia Commons

PLANTAR FASCIITIS



- Definition: inflammation of the fascia
- “Heel spur pain”
- Plantar fascia has 3 slips.
  - Medial – Central – Lateral
  - Central slip arises from medial Calcaneal tuberosity and inserts to 5 digits
- Primary function is for support longitudinal arches (med/lat)
- Affects women > men
- Average onset 45 yrs
- Obesity worse
- Extreme changes in activity
- Poor foot wear choices
- Poor Flexibility

Plantar Fasciitis



Symptoms:

- Pain with ambulation
- Worse in AM or after prolonged rest/sitting
  - “start-up pain”
  - Better after warming up
- Pain localized to heel region
  - Central Heel pad
  - Medial arch or heel pain
- Body size contributes
- Gait changes
- Pathophysiology:
  - Micro tears in plantar fascia tendon insertion
  - 50% develop plantar grade heel spurs

Plantar Fasciitis



Examination

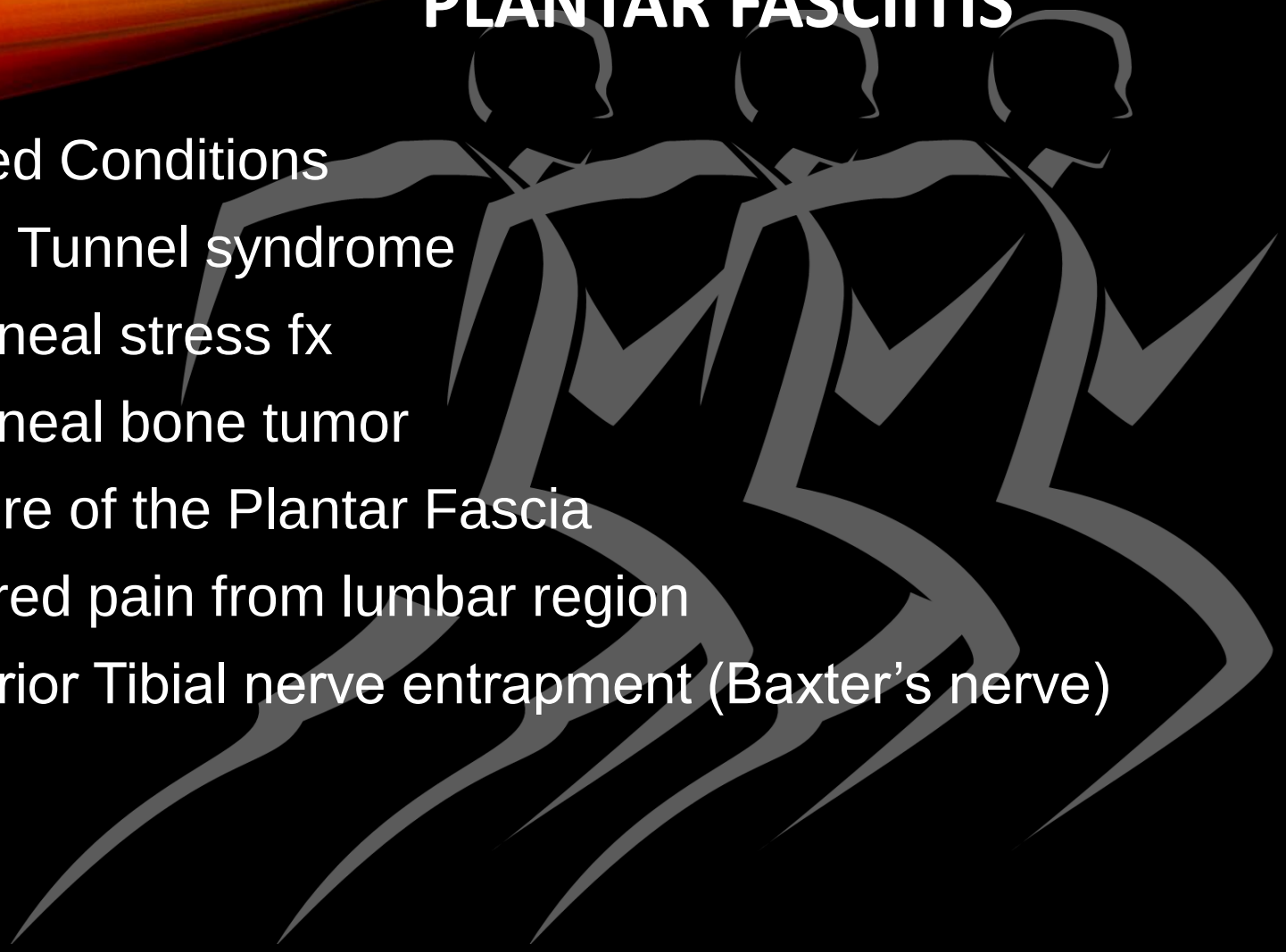
- Observe Gait
- Observe foot posture
  - Planus – Hind foot valgus – plantar callosities
- Assess flexibility Achilles and toe flex/ext groups
- Palpate plantar fascia
- Assess Posterior Tibial tendon integrity (strength)
- Neuro/Vascular (Tarsal Tunnel vs. Baxter’s neuropathy)

PLANTAR FASCIITIS

- X-ray: Standing lateral
  - Traction spur considered a normal finding (arrow)
  - Not cause for Plantar Fasciitis
  - High suspicion for Calcaneal stress fracture or tumor
  - Prior to corticosteroid injection
  - Consider CT, MRI or bone scan if failed treatment
    4-6 weeks



PLANTAR FASCIITIS



- Associated Conditions
  - Tarsal Tunnel syndrome
  - Calcaneal stress fx
  - Calcaneal bone tumor
  - Rupture of the Plantar Fascia
  - Referred pain from lumbar region
  - Posterior Tibial nerve entrapment (Baxter’s nerve)

PLANTAR FASCIITIS

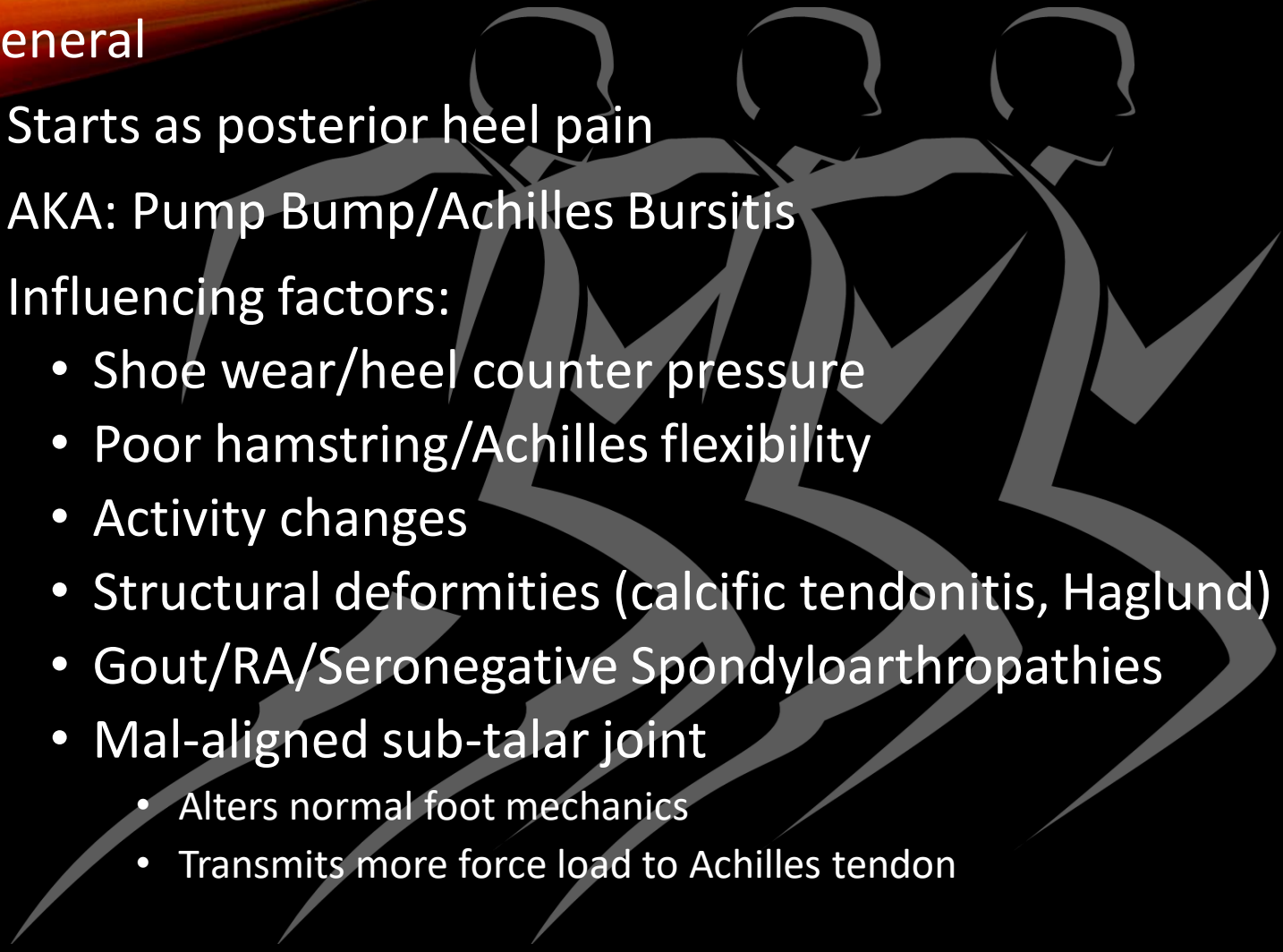
- Treatment
  - Conservative care cures most cases
  - Achilles and plantar fascia flexibility - **KEY**
  - NSAIDS
  - ICE (“frozen plastic bottle foot massage”)
  - Heel pad vs. cushioned foot wear
  - Immobilization (cast vs. ankle boot)
  - Night splint
  - Injection
  - Surgery – last resort
    - failed after 6 months



RETROCALCANEAL BURSITIS

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RETROCALCANEAL BURSITIS



General

- Starts as posterior heel pain
- AKA: Pump Bump/Achilles Bursitis
- Influencing factors:
  - Shoe wear/heel counter pressure
  - Poor hamstring/Achilles flexibility
  - Activity changes
  - Structural deformities (calcific tendonitis, Haglund)
  - Gout/RA/Seronegative Spondyloarthropathies
  - Mal-aligned sub-talar joint
    - Alters normal foot mechanics
    - Transmits more force load to Achilles tendon

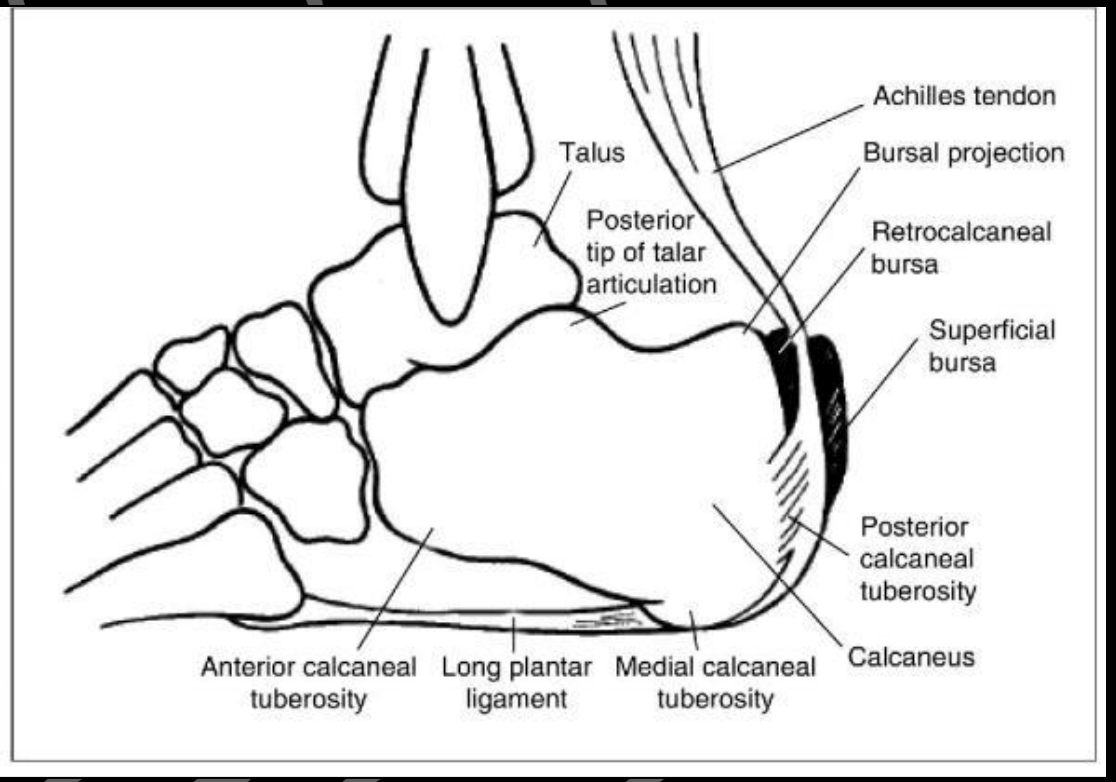
Reddy SS: Surgical Treatment for Diseases and Disorders of the Achilles Tendon; JAAOS 17(1):3-14, Jan 2009

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Retrocalcaneal Bursitis

Anatomy

- Achilles tendon inserts into Calcaneous
- Calcaneous usually down sloping
  - Haglund deformity increases contact pressure of Achilles or calcaneous Dorsiflexion
- Bursa
  - Retrocalcaneal: between bone and tendon
  - Superficial: between skin and tendon



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RETROCALCANEAL BURSITIS

Physical Examination

- Inspection
  - Assess gait
  - Rear-foot alignment
    - Neutral-Varus-Valgus
    - Pes Planus – Cavus
    - “Too many toes sign”
- Palpation – tender Achilles insertion calcaneous
- ROM/Strength
  - Decreased KBDF/KEDF
  - Hind foot varus & Rigid 1st ray predisposed ?
- Neuro/vascular – no changes
- Ortho exam – Look @ mortise & sub-talar stability



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RETROCALCANEAL BURSITIS

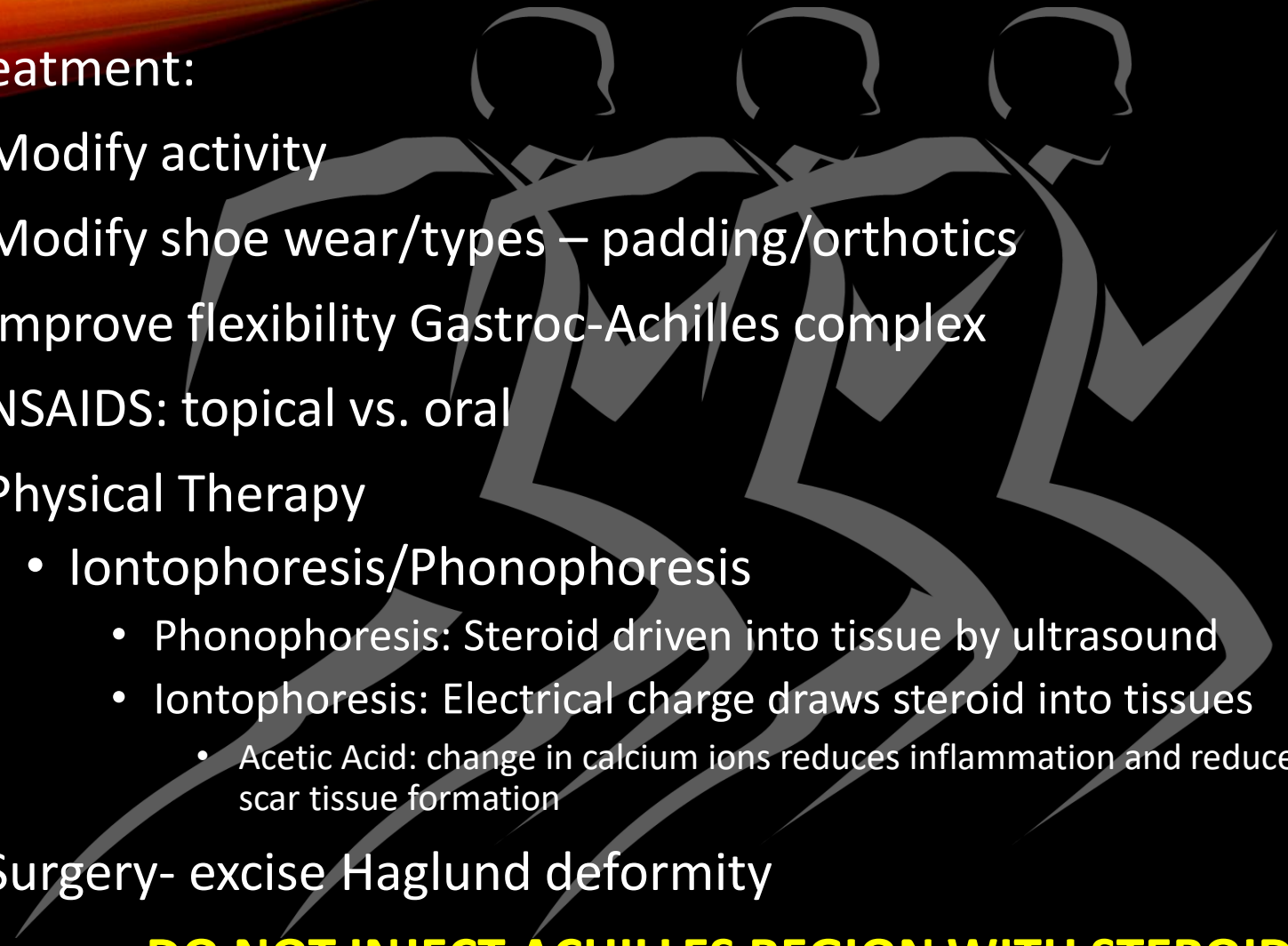
- Radiographic views
  - Ankle: AP, Lateral, Mortise (standing)
  - Foot: AP, Lateral, Oblique (standing)





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RETROCALCANEAL BURSITIS



Treatment:

- Modify activity
- Modify shoe wear/types – padding/orthotics
- Improve flexibility Gastroc-Achilles complex
- NSAIDS: topical vs. oral
- Physical Therapy
  - Iontophoresis/Phonophoresis
    - Phonophoresis: Steroid driven into tissue by ultrasound
    - Iontophoresis: Electrical charge draws steroid into tissues
      - Acetic Acid: change in calcium ions reduces inflammation and reduces chance of scar tissue formation
- Surgery- excise Haglund deformity

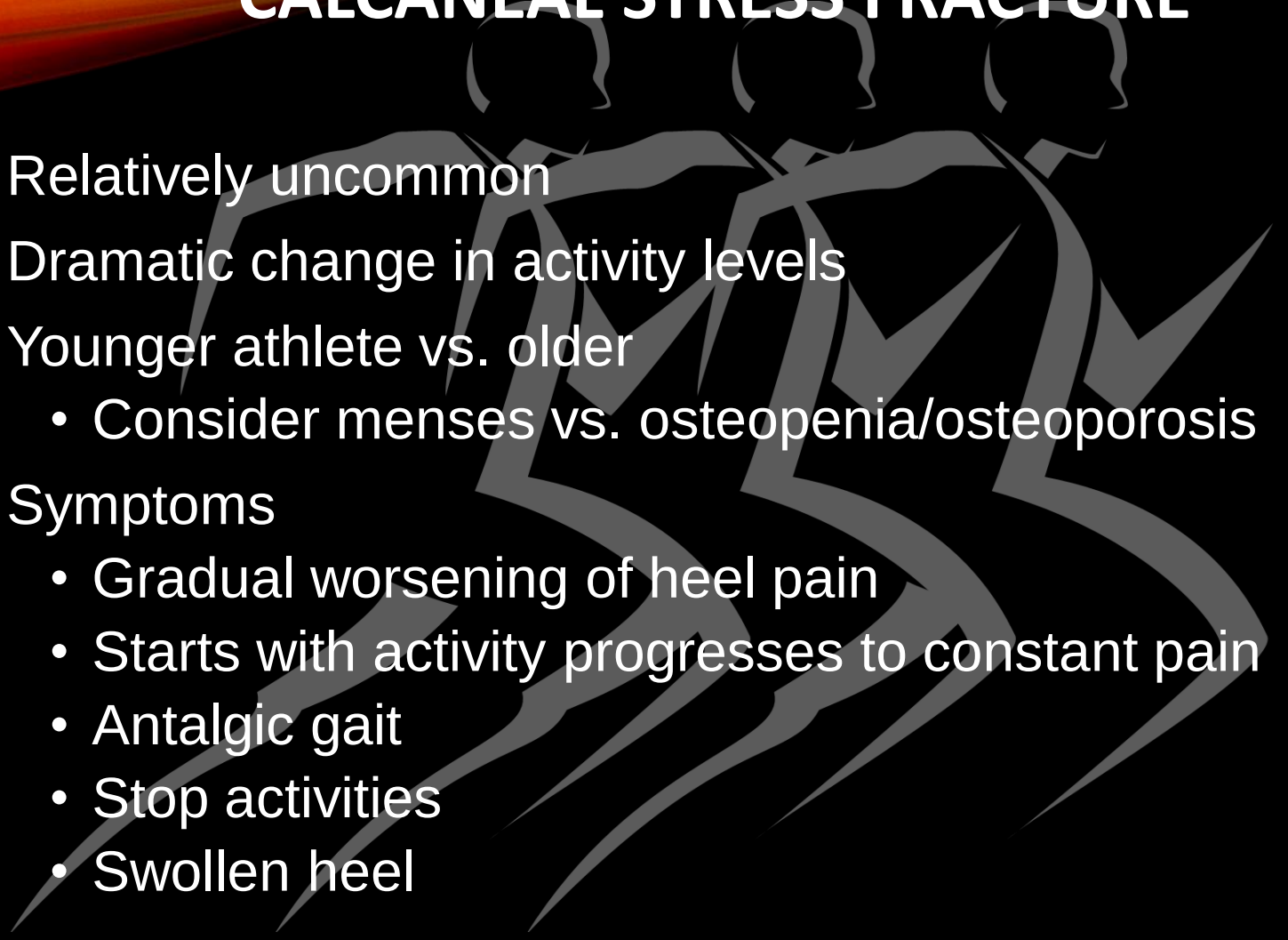
DO NOT INJECT ACHILLES REGION WITH STEROIDS

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CALCANEAL STRESS FRACTURE

CALCANEAL STRESS FRACTURE



- Relatively uncommon
- Dramatic change in activity levels
- Younger athlete vs. older
  - Consider menses vs. osteopenia/osteoporosis
- Symptoms
  - Gradual worsening of heel pain
  - Starts with activity progresses to constant pain
  - Antalgic gait
  - Stop activities
  - Swollen heel

Calcaneal Stress Fracture

Physical Examination

- Observe Gait
- Observe foot posture
  - Planus – Hind foot valgus – plantar callosities
- Assess flexibility Achilles and toe flex/ext groups
- Palpate plantar fascia & calcaneous
- Assess tendon integrity ankle & foot
- Neuro/Vascular
- "**Calcaneal Squeeze" test** (aka: heel squeeze test)
  - Increased pain involved side
  - Can reproduce with medial band plantar fasciitis

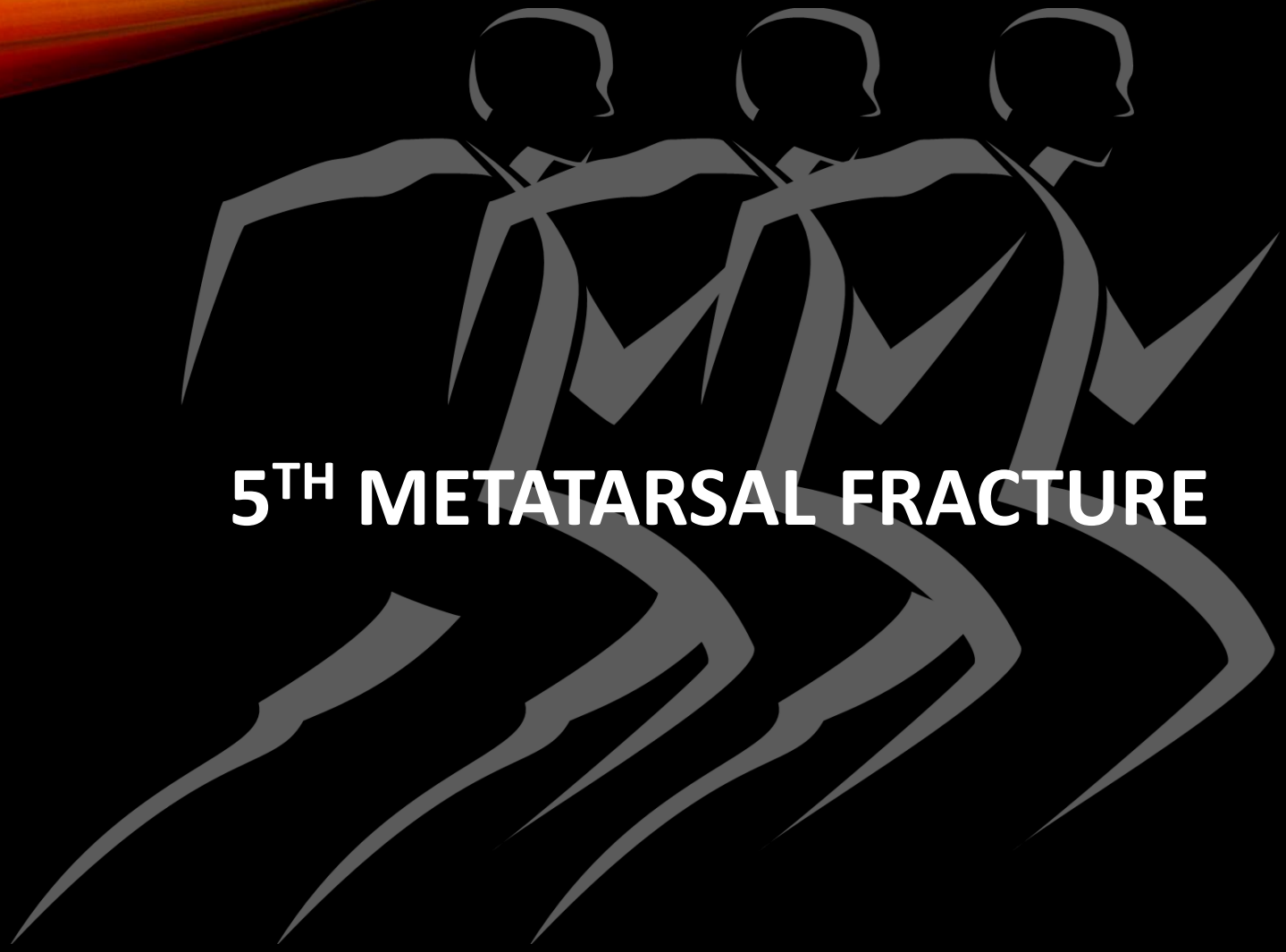
CALCANEAL STRESS FRACTURE

Radiologic Examination

- Wt-bearing AP, Lateral foot and Harris Heel
- X-ray: initially negative
- MRI or Bone Scan: more sensitive to stress reaction in bone

Treatment:

- Recognize possibility of injury
- Conservative measures initially
  - Rest – Immobilize – Crutches – Ice - NSAIDS
- Persistent long-term pain – consider MRI vs. Bone scan early
- 8-12 week recovery – limit impact activities



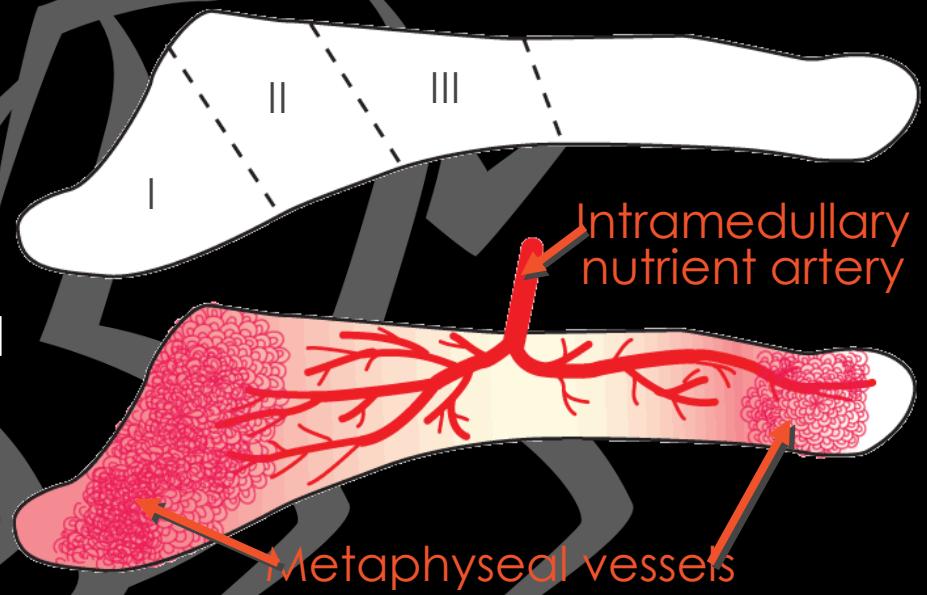
5TH METATARSAL FRACTURE

5TH METATARSAL FRACTURE

- Anatomic location important in description of fx and treatment options
- Blood supply comes from central intramedullary nutrient vessel and surrounding joint capsule, muscle and tendon attachments.
- Strong ligament structures @ 4th-5th MT plantar and dorsal dissipate forces
- Fx 2nd to inversion traction force and pull from apposing Peroneus Brevis tendon

5TH METATARSAL FRACTURES

- **3 Zones base 5th MT**
- Zone I- articular surface for the metatarsocuboid joint
- Zone II – articulation of the 4th and 5th metatarsals (Jones Fracture)
- Zone III – extends 1.5 cm distal to zone II



Dameron, TB: Fractures of the Proximal Fifth Metatarsal: Selecting the best Treatment option; JAAOS 3(2), March/April 1995.

5TH METATARSAL FRACTURE

- Zone I
  - Most proximal and is considered the base of the 5th MT
  - Peroneus Brevis and lateral cord of plantar aponeurosis
  - Fx starts lateral cortex and extends medially into the metatarsocuboid joint
  - Good healing associated w/ Zone I injuries
  - X-ray - > 3mm dorsal displacement may need surgical fixation
    - Symptoms subside long before healing seen on x-ray
    - Asymptomatic non-union not uncommon



5TH METATARSAL FRACTURE

- Zone II
  - More distal part tuberosity
  - Strong ligament attachment dorsal / planta for 4th-5th MT
  - Fx this area extend into articulation of 4-5 MT
  - More painful than zone I injury
  - Symptoms dependant on activity level
  - No improvement on healing WBAT vs. non-Wt-bear
  - Higher incidence asymptomatic non-union



5TH METATARSAL FRACTURE

- Zone III
  - Most often assoc w/ stress fx mechanism
  - Fx distal to ligament attachment binding
    4/5 MT together
  - Slow healing
  - Responds better to ORIF
    - Intramedullary 4.5 cancellous lag screw
    - Non-union may need grafting
  - SLWC 4-6 wks





TAKE HOME POINTS

TAKE HOME POINT

- Patellofemoral syndrome is not always a young person problem.
- Patellofemoral OA will mimic Patellofemoral symptoms
- Knee OA is a manageable dz but requires effort by patient to make significant changes in daily life
- PTTD may start out simple but usually gets complex if not recognized and treated appropriately early
- Plantar Fasciitis can be persistently painful & take a while to resolve
- Recalcitrant Plantar Fasciitis is not always Plantar Fasciitis
- Recognize the radiographic cues associated with fractures of the 5^{th} metatarsal and their treatment principles.