

**Increased participation** Inadequate athlete education Disappearance of "natural selection" Overindulgence syndrome





### **Inflammation ₹ Swelling**

- Tenosynovitis
- Tendonitis
- Strains, sprains
- Bursitis
- Compartment syndromes
- Stress fractures

## Overuse – "Syndromes"

Tendinitis

Stress fracture

Secondary amenorrhea

"Burned out", stale athlete

#### **POMS Scores in Conditioned Athletes**

Tension
Depression
Anger
Vigor
Fatigue
Confusion

**Peaked Burned Out**  $\uparrow \uparrow$  $\uparrow \uparrow$  $\uparrow \uparrow$ 

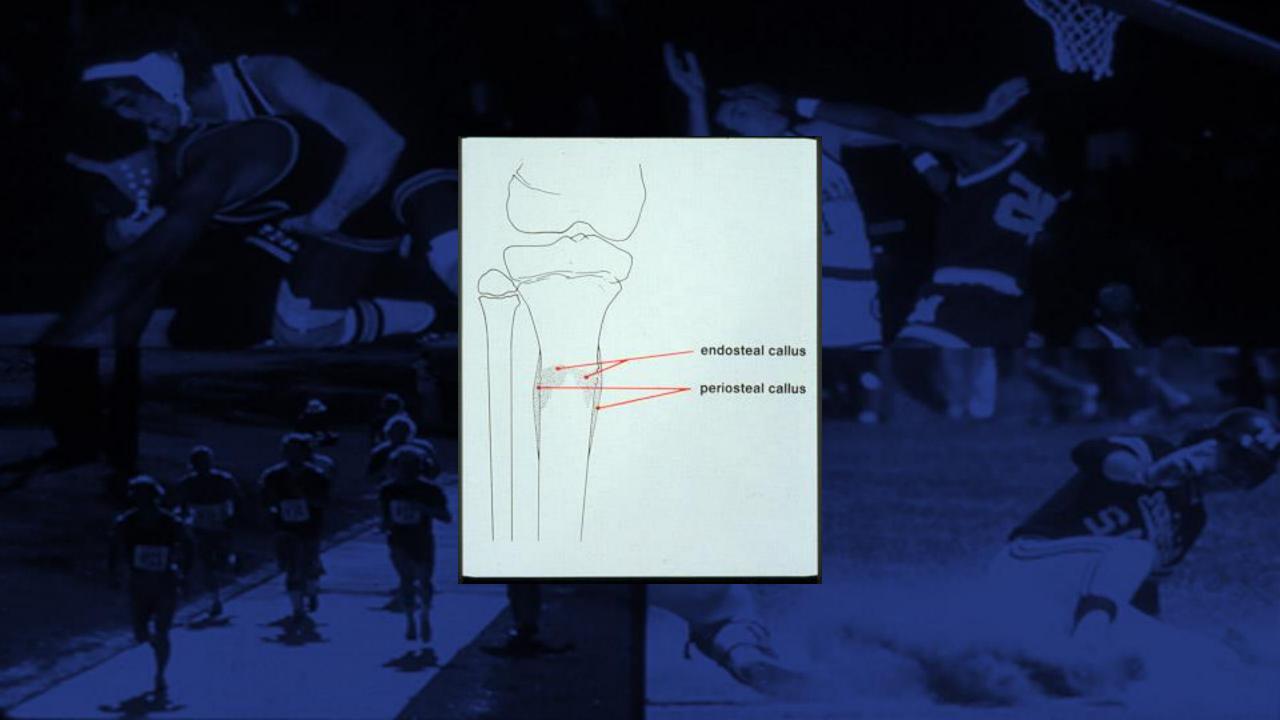












## **Pathophysiology**

Repetitive, cumulative force **Overwhelms tissue Tissue injury/destruction ↑Creatine kinase Delayed muscle soreness Arachidonic acid release** PGG2, PGH2 Inflammation Pain **Musculoskeletal dysfunction** 

#### **Profile of Stress Fractures**

- Sport running
- Anatomy lower extremities (95%)
- Bones tibia, metatarsals
- Female > male (12X)



# Age: Young

- Etiology
  - Running
  - Fitness class
- Diagnosis
  - PFD
  - Stress fracture



## Age: Old

- Etiology
  - Racquet sports
  - Walking
- Diagnosis
  - Metatarsal pain
  - Plantar fasciitis





## **Importance of "Handedness"**

- Young, adult recreational runner
- Left lower leg pain after exercise
- Change in training
- Completed run
- PMH right ankle strain

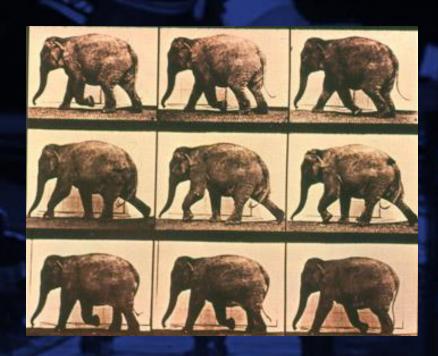
#### Malalignment, "Pathobiomechanics" Knee

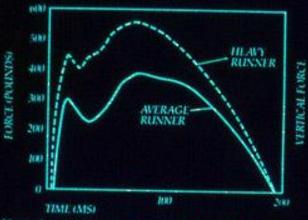
Femoral anteversion

Patella alta

- Weak quadriceps
- Increased Q angle

# **Body Habitus**





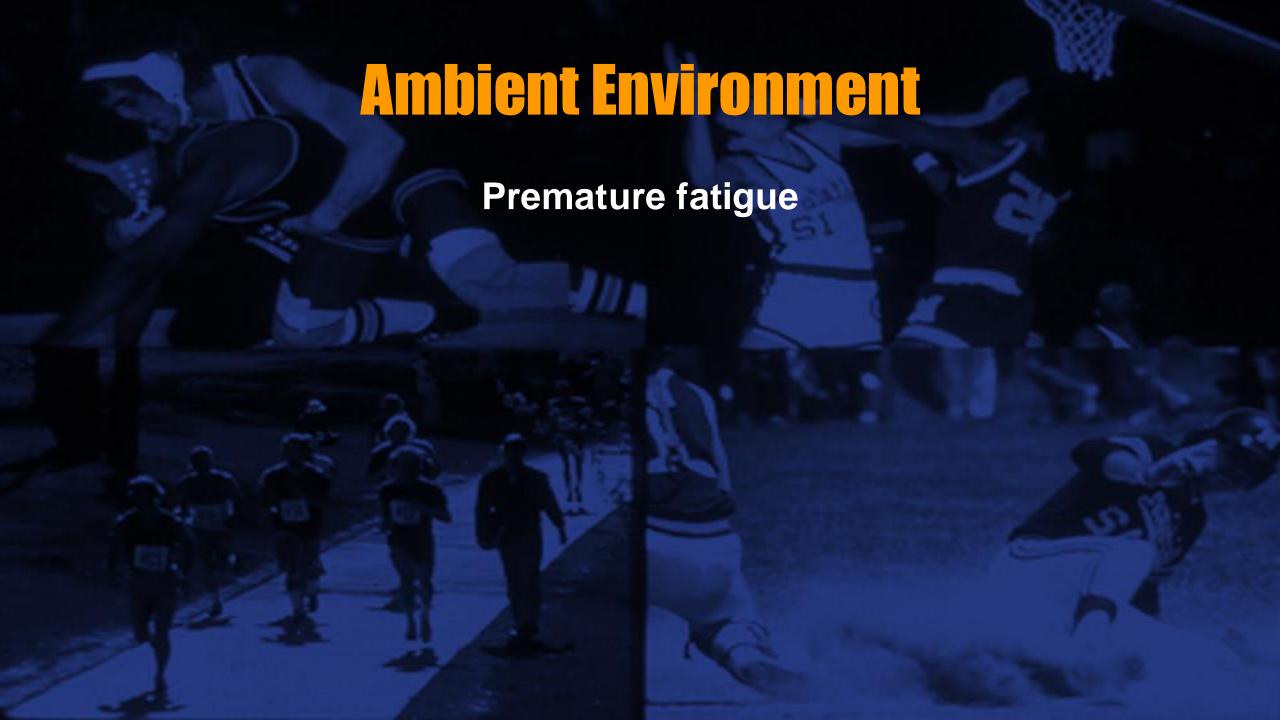
Vertical ground reaction forces for a 200 lb. runner and a 150 lb. runner at the same pace. Forces under heel and forefoot are both proportionally larger for the heavy runner.











## Diagnostic -- Specificity

Jumper's knee

**Tennis elbow** 

**Bowler's thumb** 

Runner's ankle

Swimmer's shoulder

Weightlifter's back



# Musculoskeletal Overuse Injuries

#### **A Clinical Guide**

1	History	Physical Exam	Pathophysiology	Diagnostic Aids	Treatment	Comments
Grade 1	<ul> <li>Transient pain – after activity – usually hrs</li> <li>"Soreness"</li> <li>(HX &lt; 2 weeks)</li> </ul>	Generalized tenderness		• None	•± ice	<ul><li>Looking at training regimen</li><li>"New" athlete</li><li>"Getting in shape"</li></ul>
Grade 2	•Longer standing pain  – late in activity or immediately after activity •(HX – 2-3 weeks)	Localized pain, but not discrete point tenderness	Mild musculotendinous (soft tissue)     Inflammation	• None	•lce •↓ regimen •10% - 25%	<ul><li>True overuse</li><li>Wrong</li><li>environment</li><li>Wrong equipment</li><li>Poor technique</li></ul>
Grade 3	Pain in early or middle of activity (getting closer to beginning of activity)  (HX > 4 weeks)	<ul> <li>Point tenderness</li> <li>Percussion tenderness</li> <li>Pressure elsewhere produces pain at point</li> <li>Other evidence of inflammation (head, erythema, swelling, crepitation)</li> </ul>	<ul> <li>Major musculotendinous</li> <li>Inflammation</li> <li>Periostitis</li> <li>Bone Microtrauma</li> </ul>	•X-ray ± •Bone scan + 40%	<ul> <li>Ice</li> <li>↓ regimen 25- 75%</li> <li>Initial 5-7 day rest period with concurrent NSAID course</li> </ul>	• "Pre-stress" fracture syndrome
Grade 4	•Pain before or early in exercise preventing or affecting performance •(HX > 4 weeks)	<ul> <li>All of the Grade 3 signs plus:</li> <li>disturbance in function</li> <li>↓ ROM</li> <li>muscle atrophy</li> </ul>	Breakdown in soft tissue     Street fracture     Compartment syndrome     (especially if swelling is major finding)	•X-ray ± •Bone scan + 95%	•Ice •Rest from exercise •NSAID	•Immobilization? – usually not

#### Grade 1

History Transient pain – <u>after</u> activity

"Soreness"

MX < 2 weeks

Physical Exam Generalized tenderness

Muscle breakdown

Minor inflammation

Diagnostic tests None

Treatment ± Ice

Notes Look at training regimen

"New" athlete

"Getting into shape"

## Grade 2

History Longer standing pain – <u>late</u> in activity

or immediately after activity

HX - 2-3 weeks

Physical Exam Localized pain

Pathophysiology Mild soft tissue inflammation

Diagnostic tests None

Treatment Ice

↓ Regimen 10-25%

Notes True overuse

Wrong environment

Wrong equipment

### Grade 3

History Pain in <u>early</u> or <u>middle</u> of activity

HX – 3 weeks

Physical Exam Point tenderness

Pressure elsewhere produces pain at point

Other evidence of inflammation (heat,

erythema, swelling, crepitation)

Pathophysiology Major soft tissue inflammation

**Periostitus** 

**Bone microtrauma** 

Diagnostic tests X-ray

Bone scan @ 40%

**Treatment Ice** 

**↓ Regimen 25-75%** 

Initial 5-7 day rest w/concurrent NSAID course

## Grade 4

History Pain <u>before</u> or <u>early</u> in exercise preventing

activity or affecting performance

HX – 4 weeks

Physical Exam All the grade 3 signs plus:

Disturbance in function, decreased range of

motion, muscle atrophy

Pathophysiology Breakdown in soft tissue unit

**Stress fracture** 

Diagnostic tests X-ray

Bone scan @ 95%

Treatment Ice

**Rest from exercise** 

**NSAID** 

# Musculoskeletal Overuse Injuries: Pathophysiology

#### **Grade**

- 1 Muscle breakdown
  Minor soft tissue inflammation
- 2 Mild soft tissue inflammation
- 3 Major soft tissue inflammation Periostitis Bone microtrauma
- 4 "Pre-stress" fracture
  Stress fracture

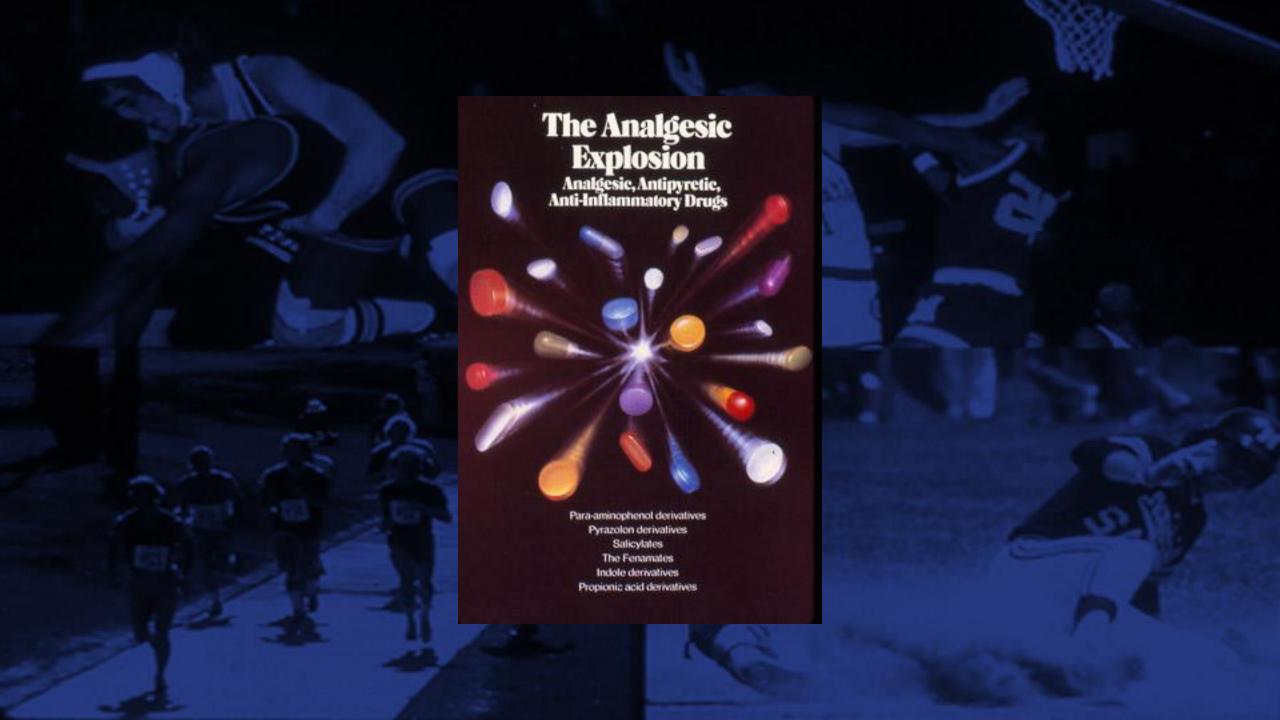
Soft tissue inflammation

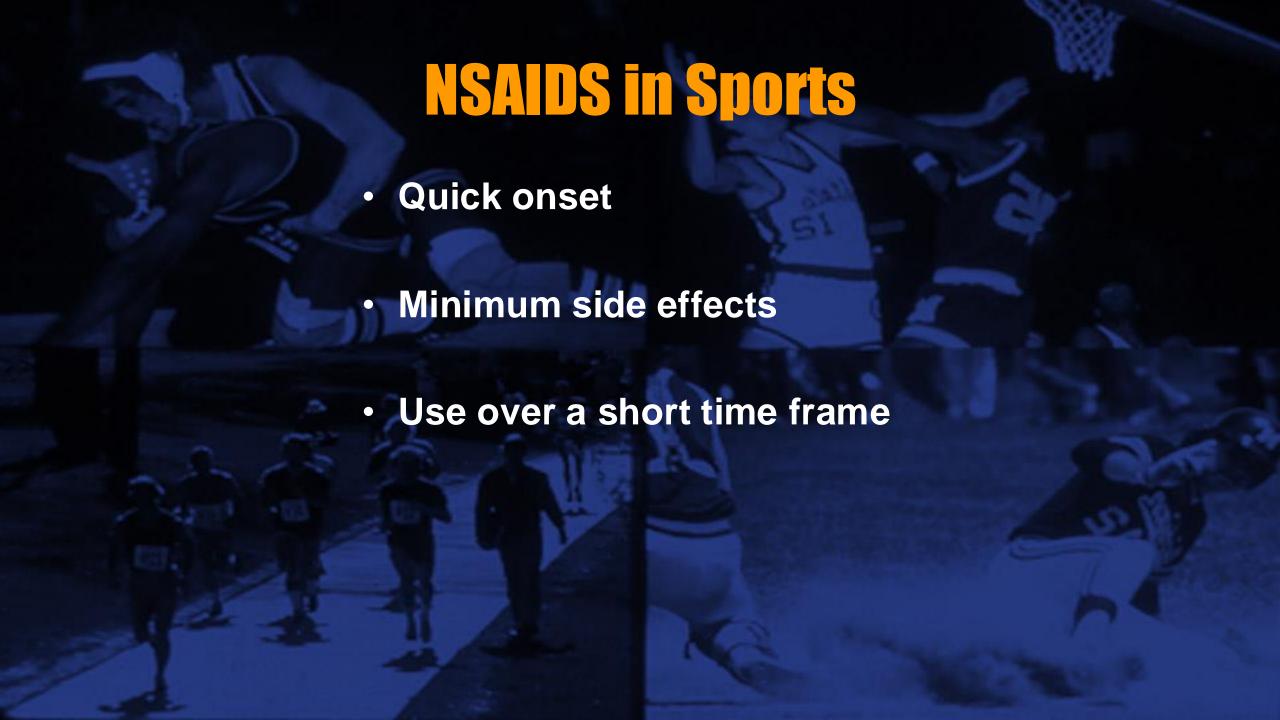
Hard tissue inflammation

## Musculoskeletal Overuse Injuries: Treatment Summary

#### Grade

- 1 ± lce
- 2 Ice ↓ Regimen 10-25%
- 3 Ice Initial 5-7 day "rest" period w/concurrent NSAID ↓ Regimen 25-75%
- 4 Ice
  Rest from exercise
  NSAID





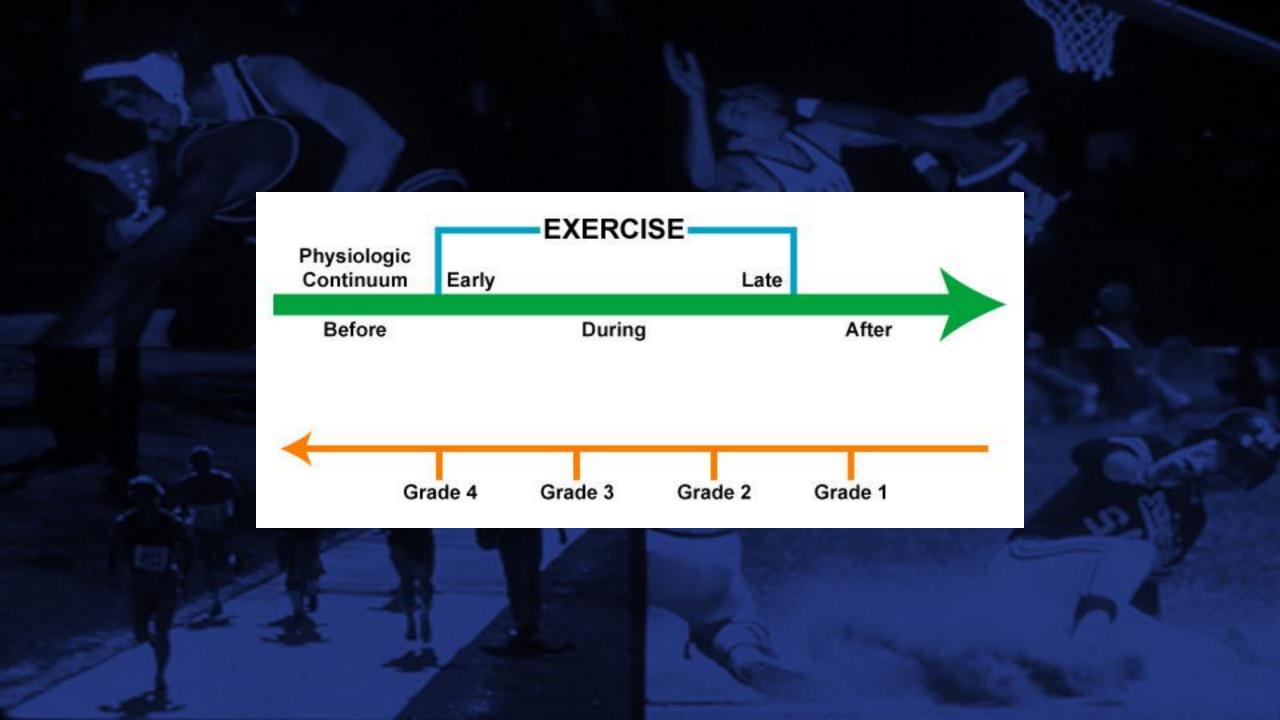


## Rehabilitation — Low-intensity Training Guidelines

Pain and swelling during exercise → stop

**↓ Regimen 25%** 

- Pain and swelling after exercise → No ↑ in regimen
- No pain or swelling after exercise → ↑ regimen 25%



## Healing

Minor Injury > Collagen Turnover

Major Injury >
Inelastic Scar Information

**Exercise – The "Great Unmasker"** 

## Prevention of overuse injury

- Philosophy of athlete
- Training regimen
- Environment
- Biomechanical problems
- Athlete education





## **Take Home Points**

Pain onset: activity

Injury spectrum

Ice, relative rest

Analgesics – not indicated for return to competition

Immobilization – not indicated

## **Take Home Points**

- Early ROM, activity form follows function
- Guidelines not meant to be dogma
- Focus: cause not treatment