

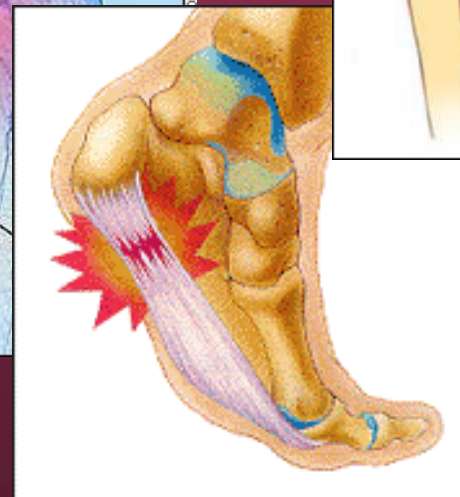
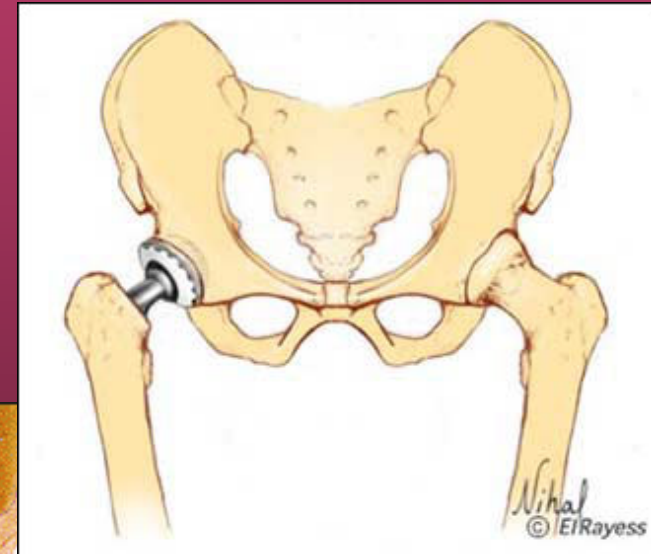
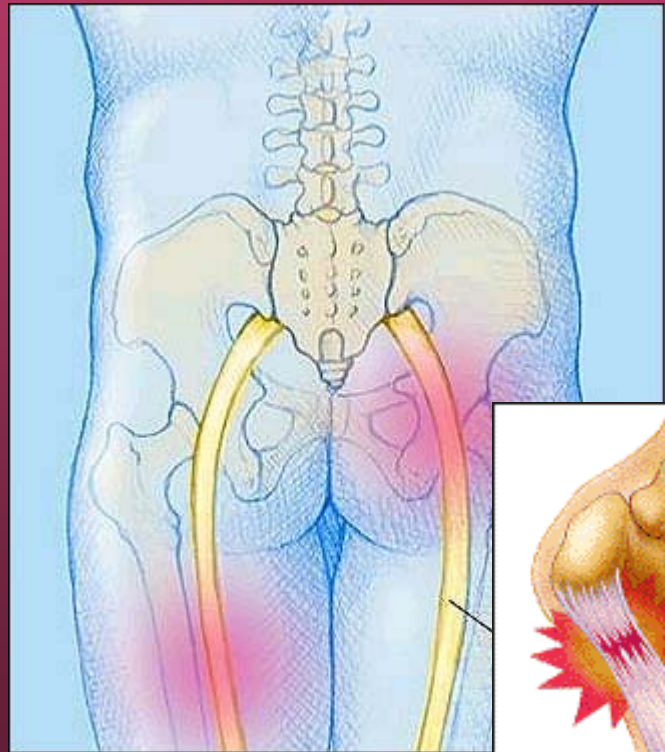
Anatomy and Common Injury Conditions

... And What to Do About It!!

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The Back & Lower Extremity Injuries

The Back and Lower Extremity Injuries:

1. The Lumbar Spine:
 - Sprains/Strains
 - Disc Injuries
 - Sciatica: A Real Pain in the Butt!
2. Sprains of the Knee
3. Sprains of the Ankle
4. Sacroiliac Dysfunction
5. Patellofemoral Syndrome
6. Achilles Tendonitis
7. Plantar Fasciitis
8. Back Braces, Knee Braces and Orthotics – The Good, The Bad and The Ugly

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The Lumbar Spine

→ Introduction:

- Back pain in the lower back or low back pain is a common concern, affecting up to 90% of the population at some point in their lifetime. Up to 50% will have more than one episode.
- Low back pain is not a specific disease. Rather, it is a symptom that may occur from a variety of different processes. In up to 85% of people with low back pain, despite a thorough medical examination, no specific cause of the pain can be identified.

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The Lumbar Spine

- The spine is composed of:
 - Discs
 - Ligaments
 - Muscles
 - Spinal Cord

- The spine is designed to:
 - Protect the spinal cord
 - Allow the body to bend
 - Allow stability and upright standing

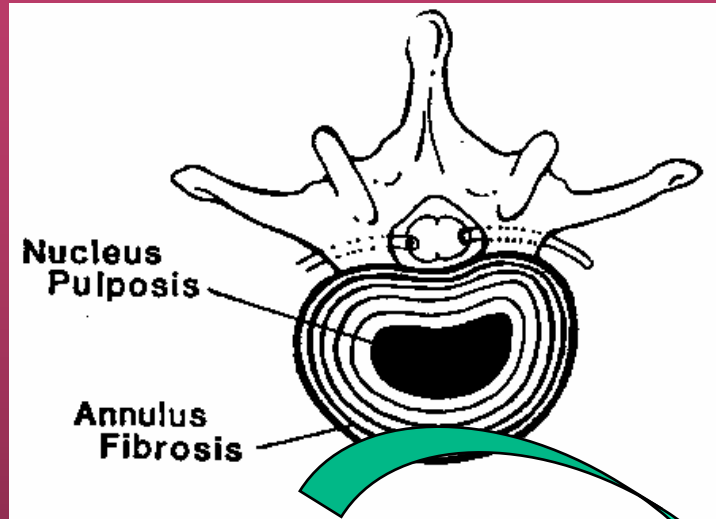
Discs



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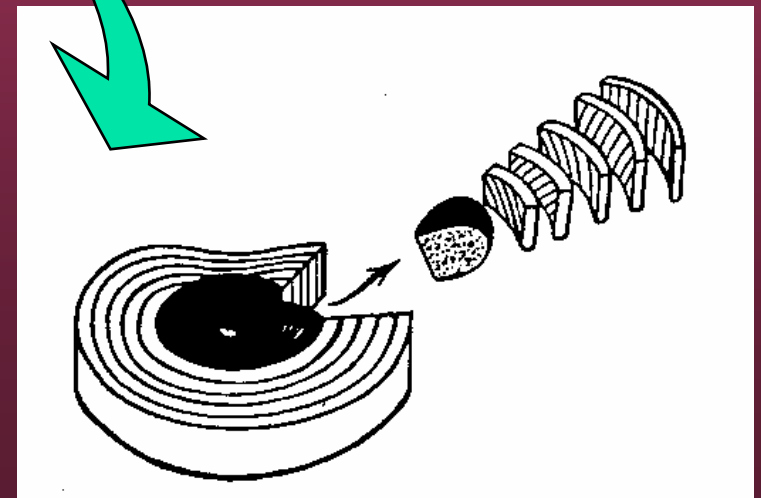
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- Discs
- shock absorbers
- outer ring of criss-crossed fibres similar to a radial tire

- middle of disc is fluid filled which dries out as we age
- Acts as a ball-bearing





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Sprains / Strains of the Back

- Sprains are injuries to ligaments, caused by sudden violent contraction, sudden torsion, severe direct blows, or a forceful straightening from a crouched position.
- Practical Examples: objects falling, catching a box while twisting



Sprains / Strains of the Back

- Strains are defined as tears, either partial or complete, of the muscle-tendon unit. Muscle strains and tears most frequently result from violent muscular contraction during an excessively forceful muscular stretch
- Practical Examples: picking up a heavy object, pulling a cart, reaching for a heavy object overhead.

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Sprains / Strains of the Back

→ Causes:

- Muscular imbalances or weaknesses of abdominal and posterior spinal muscles may constitute a risk factor to sustain an injury.
- ** Aging work force, “beer bellies” **
- Preexisting structural deformities, such as scoliosis, spondylolysis, or spinal fusions, may predispose a worker injury. Preexisting injuries make workers more vulnerable to sustain reinjury of the same area.

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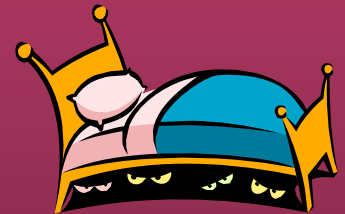
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Sprains / Strains of the Back

→ Management:

- Ice for 48 hours after injury
- Physiotherapy
- Bed Rest is NOT recommended



→ Return to Work / Practical Applications

- Symptoms usually decrease after 3 days and should subside between 1-6 weeks
- Lifting may be restricted for initial week, however, movement should be encouraged.
- Sprains / Strains should not cause lengthy absences from work.



Sprains / Strains of the Back

- Low lifting tasks should be reintroduced gradually (over 3-6 weeks depending on severity)
- Most (90%) lumbosacral injuries have been reported to subside within 6 weeks irrespective of treatment.
- The remaining 10% may develop into chronic lumbosacral pain without treatment.

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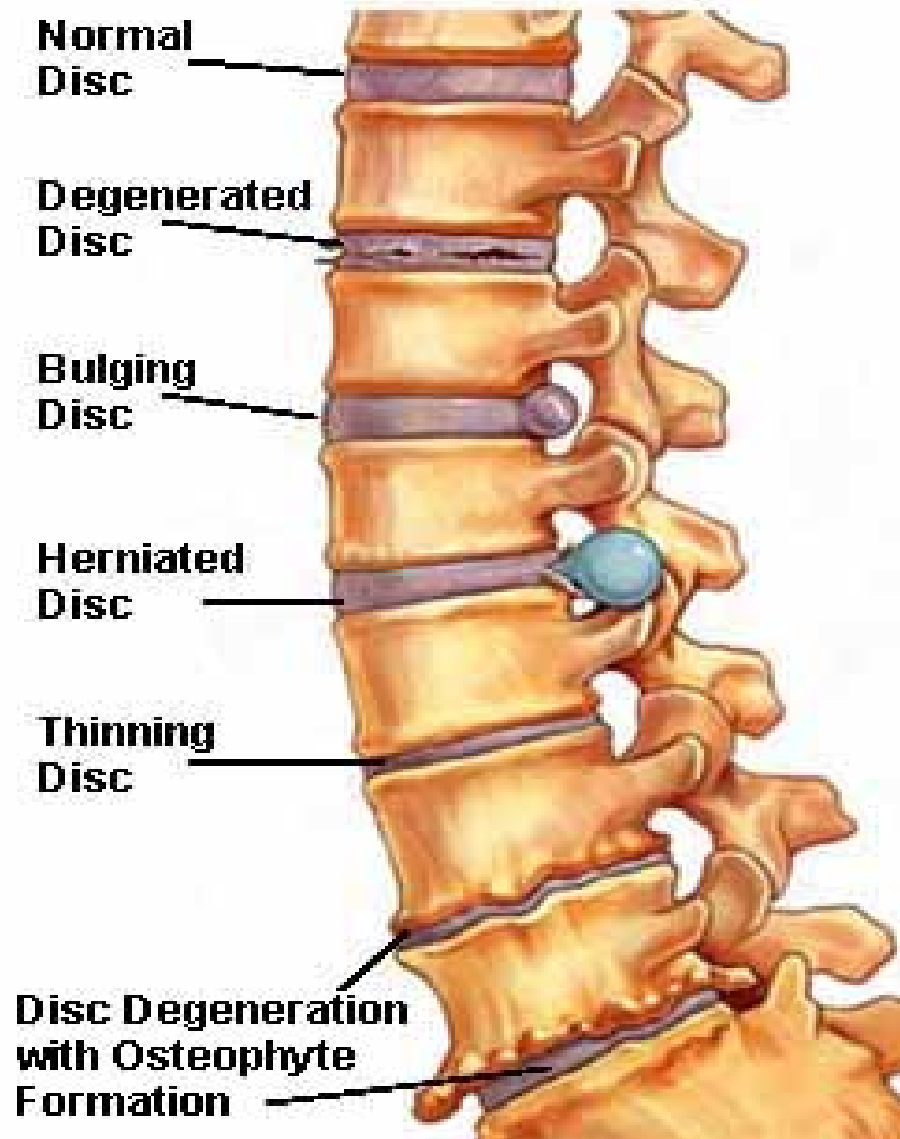
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Lumbar Disc Injuries

- Most common cause of low back pain!
- 1. Degeneration Disc Disease
- 2. Disc Protrusion (Disc Bulge)
- 3. Disc Herniation

Examples of Disc Problems





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Lumbar Disc Injuries

- Many individuals walk around with asymptomatic disc bulges and it's not until an MRI or CT scan when it is identified.
- Most common is a disc bulge causing nerve irritation or impingement. (This is often termed a **radiculopathy**)



Disc Injuries

→ Common Presentation:

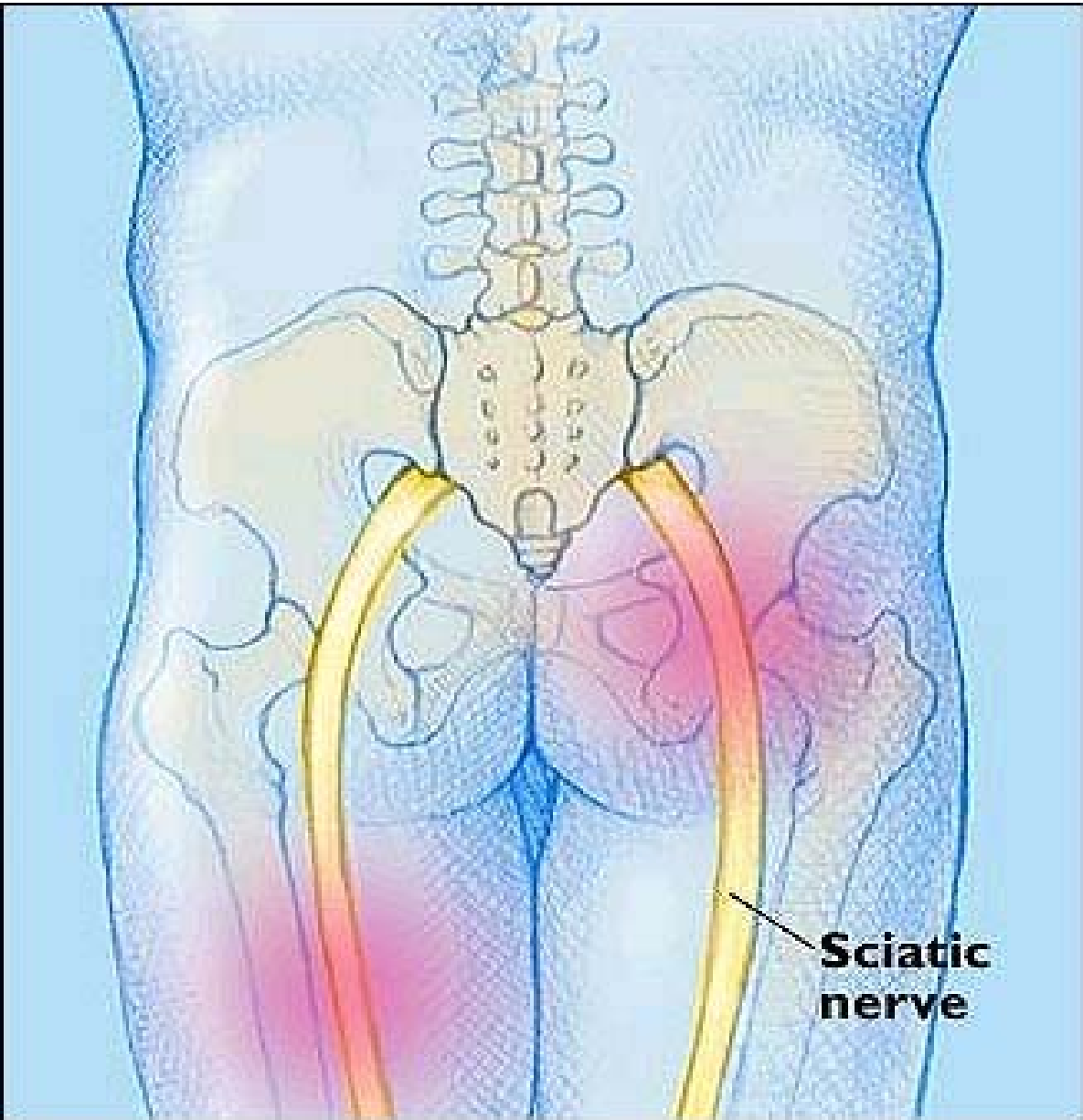
- Employees who suffer a discal injury often performed a flexion and/or rotation movement just prior to symptoms. They may not have the ability to stand up or must use their hands on their thighs to rise to standing position.
- Extension causes pinching and sharp pain. They may also be listed to one side.
- Often they explain their pain as sharp, achy with radiation down into buttocks or legs. (a general term for this is SCIATICA)

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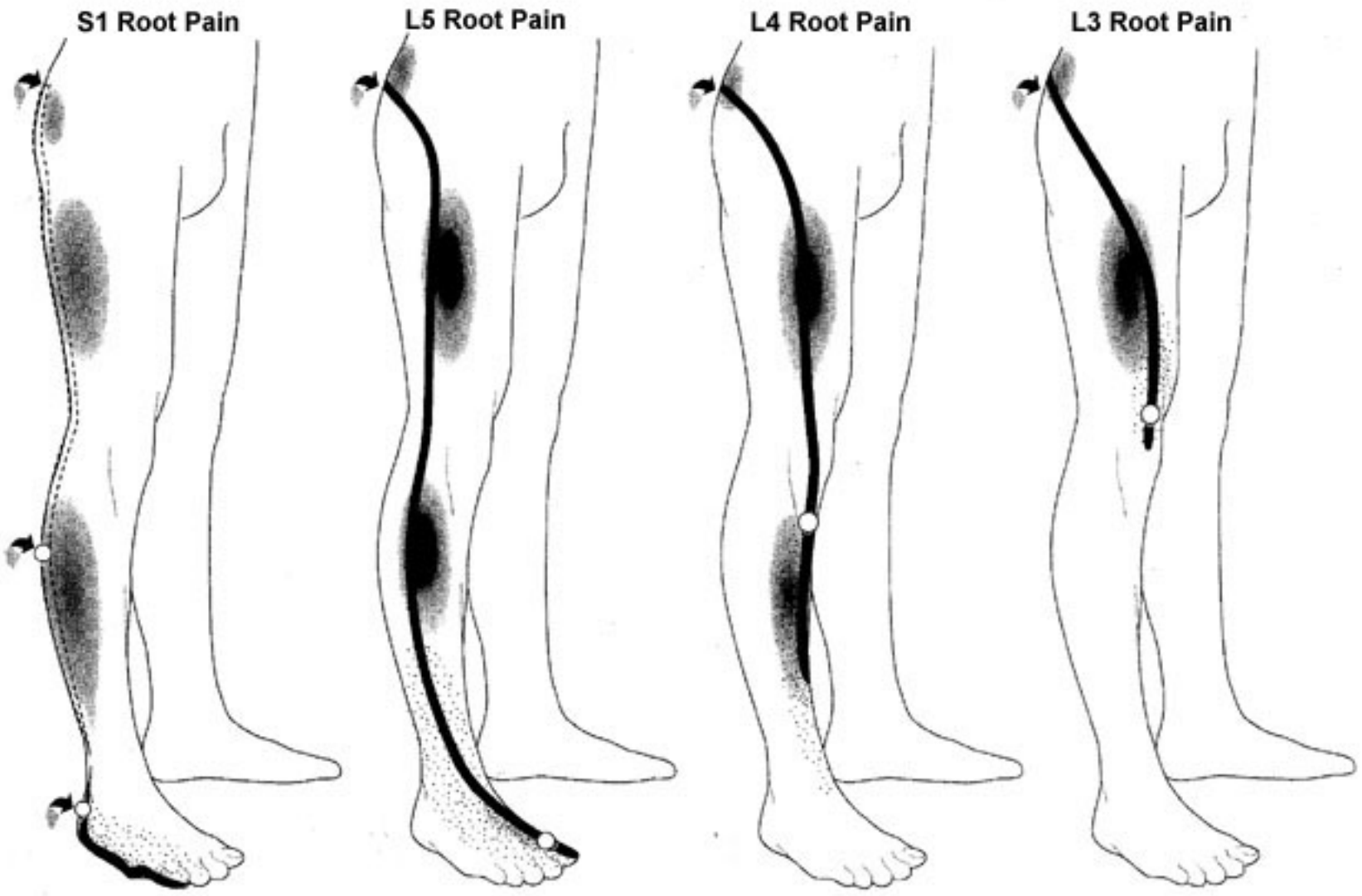
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Sciatica



(COURTESY MAYO CLINIC HEALTH ORISIS)



Radiculopathies



Disc Injuries

→ Management:

- 4-6 weeks of conservative physical therapy, modalities (ice, heat, ultrasound)
- Progressive strengthening program to work on core abdominal strength.
- Surgery recommended only after at least 12 weeks of treatment, usually if pain is unremitting and continues to radiate into leg.

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Disc Injuries

→ Practical Applications:

- If employee only has central low back pain that doesn't radiate (i.e. not a radiculopathy) return to work will be quicker.
- Plan on providing employee with tasks that allow frequent changes in position from seated to standing.
- Lifting light loads (i.e. <15lbs) may be acceptable if employee uses proper body mechanics and core stability exercises.
- Remember occasional lifting means up to 33% of each hour (or 19.8 minutes) (2.64 hours)



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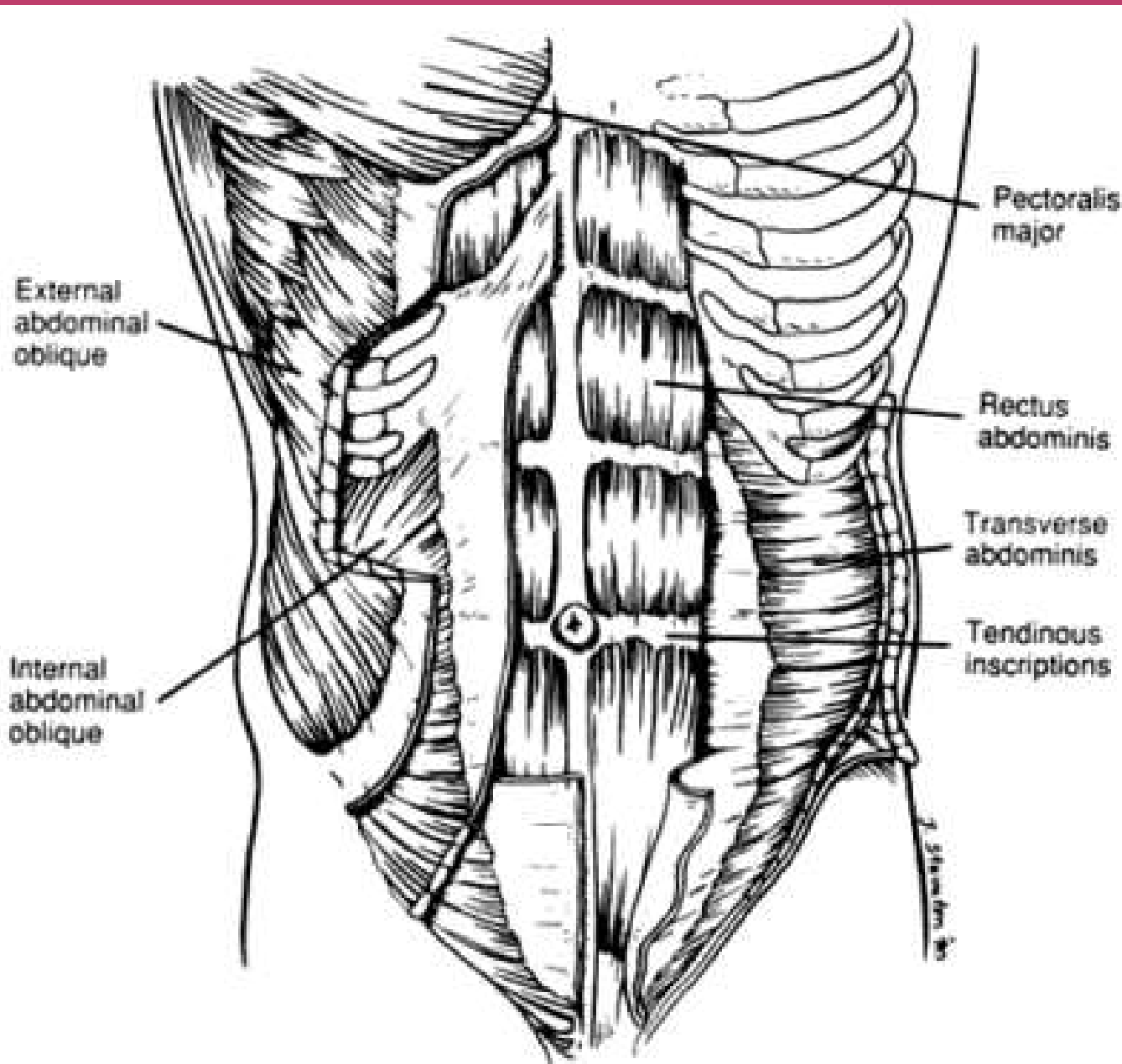
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Disc Injuries

→ Practical Applications

- Recovery may take between 2 – 12 weeks.
- After 12 weeks injury has become chronic.
- Rehabilitation via a progressive abdominal strengthening program is imperative.





Abdominal Strengthening and the Lower Back

1. Place hand on belly-button
2. “Tuck” belly-button up and under rib cage.
3. Hold for 8-10 seconds.
4. Repeat but place other hand on lower back. Can you feel your back muscles contracting?

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Disc Injuries

→ Prevention:

- Implement wellness programs aimed at strengthening lower abdominals
- Education and ergonomic interventions to prevent flexed/rotated positions when lifting.
- Back education/lifting programs

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Sprains of the Knee

- Knee pain is the most common musculoskeletal complaint that brings people to their doctor.
- The knee joint involves 3 bones.
- The femur comprises the top portion of the joint.
- One of the bones in the lower leg (or calf area), the tibia, provides the bottom portion of the joint.
- The kneecap or patella rides along the front of the femur.
- The remaining bone in the calf, the fibula, is not involved in the knee joint but is close to the outer portion of the joint.

Knee Ligaments

- The knee includes 4 important ligaments, all 4 of which connect the femur to the tibia:

The anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) provide front and back (anterior and posterior) and rotational stability to the knee.

The medial collateral ligament (MCL) and lateral collateral ligament (LCL) located along the inner (medial) and outer (lateral) sides of the knee provide medial and lateral stability to the knee.

Femur (thigh bone)

Patella (knee cap)

Posterior cruciate ligament (PCL)

Anterior cruciate ligament (ACL)

Medial collateral ligament (MCL)

Lateral collateral ligament (LCL)

Tibia

Fibula





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ACL Injuries

- ACL = Anterior Cruciate Ligament
- Causes:
- These injuries are most often a result of low-velocity, noncontact, deceleration injuries and contact injuries with a rotational component.
- Think: Stopping and turning, twisting, slipping on water on floor



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ACL Injuries

- The importance of the ACL has been emphasized in athletes who require stability in running, cutting, and kicking.
- The ACL-deficient knee also has been linked to an increased rate of degenerative changes and meniscal injuries. For these reasons approximately 60,000-75,000 ACL reconstructions are performed annually in the United States.



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Rehabilitation

Physical Therapy: strengthening of the quadriceps and hamstrings, as well as ROM exercises. Performance of ROM helps reduce the amount of swelling and regain motion and strength.

Surgery:

- the expected long-term success rate of ACL reconstruction is between 75-95%!
- Expect 6 weeks of recovery and possibly time off work post surgery if job requires standing, walking, carrying or lifting activities.



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Maintenance

- Braces: employee may be required to wear a fitted brace when walking
- Discomfort upon return to work is expected and a return to work program consisting of graduated standing and walking tasks over 3-6 weeks is recommended.



Ankle Sprains

→ Ankle sprains occur frequently, create many complications and have a prognosis of re-injury and chronic ankle laxity

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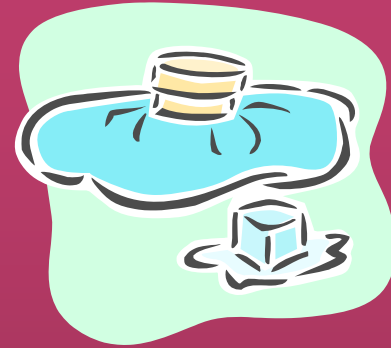
Causes

- Inherent weakness in ankle joint, tight tissue structures.
- Poor muscle tone, poor balance sense (proprioception)
- ★ → Inadequate training or inexperience with physical training.
- Industrial accidents / Slips, Trips and Falls
- Obesity

Ankle Sprains

- Usual mechanism of injury is inversion action (toes point inwards) with swelling and pain on outside (lateral) ankle.
- An individual with an ankle sprain can almost always walk on the foot carefully with pain. The ability to walk on the foot usually excludes a fracture and indicates that a sprain has been experienced in an individual with normal local sensation.

Ankle Sprains



→ Practical Implications:

- If employee injures ankle and can weightbear, the likelihood of fracture is low.
- Most ankle sprains heal spontaneously with immediate ice applied locally, elevation for the first 24 hours after injury.
- The use of an ankle brace as long as symptoms persist is recommended. Many immobilization devices are comfortable and conform to the ankle with air cushion pads (eg, air cast).



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Ankle Sprains

- This immobilization **that allows movement** is recommended until healing has taken place (3-6 weeks) because the collagen fibers heal the fastest and orientate along the lines of force where protected movement occurs.
- Early movement also helps in decreasing swelling and the danger of fibrosis that normally develops in chronic swelling.

Bracing / Immobilization

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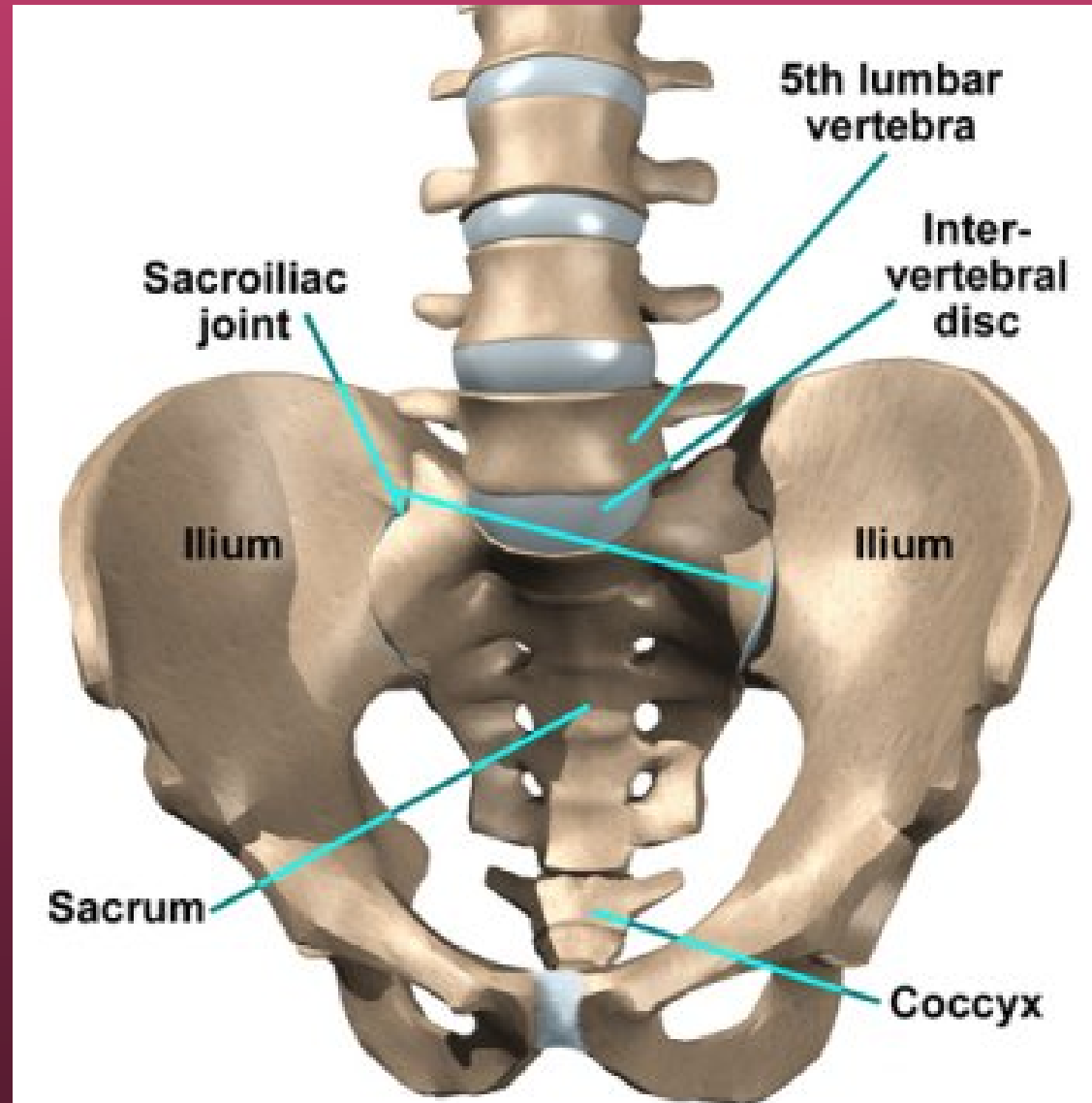
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Sacroiliac Joint

- While still somewhat controversial, the sacroiliac joint (SIJ) is generally accepted as a major focus of back pain.

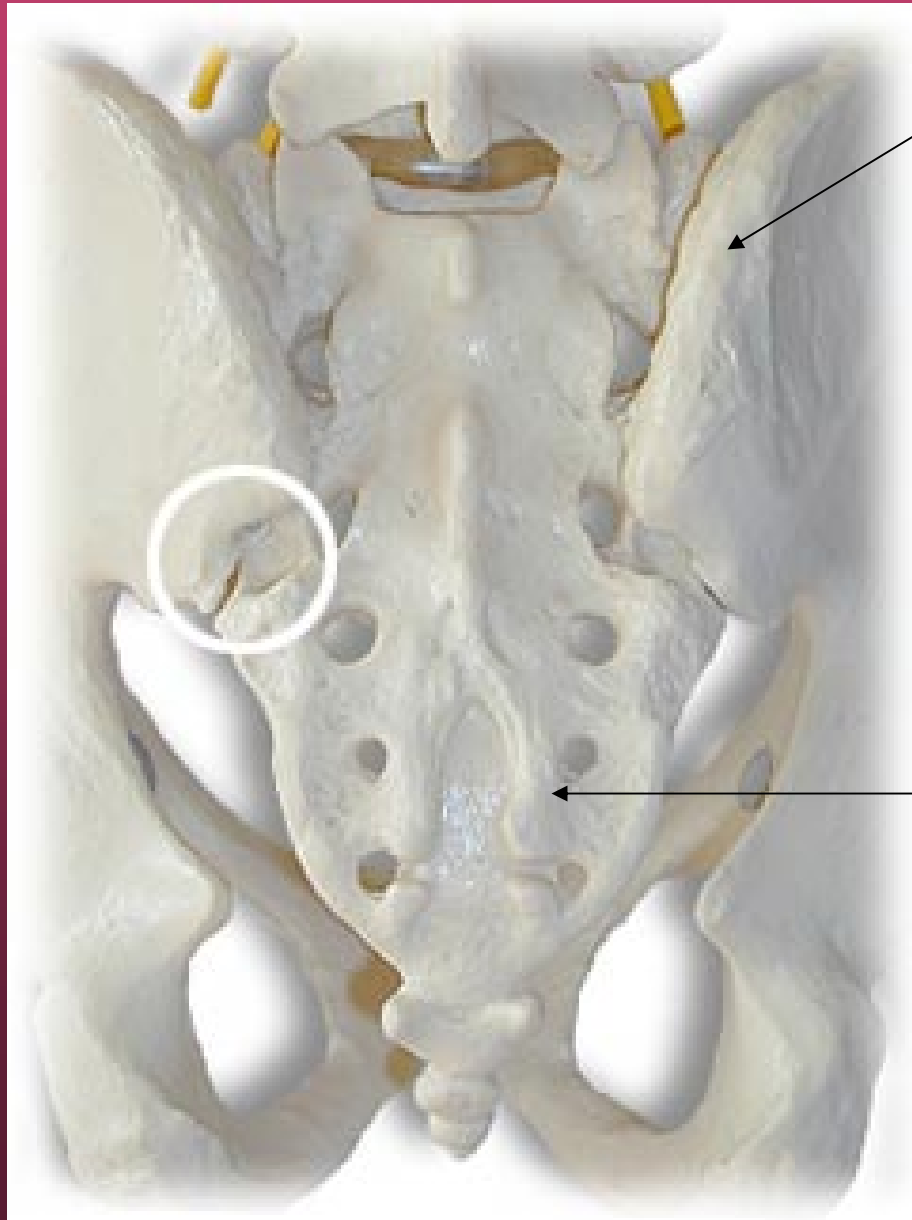
The Sacroiliac Joint



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Ilium

Sacrum



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Sacroiliac Dysfunction

- Unlike most other joints, the SI joint is not designed for much motion. In fact, it is common for the SI joint to become stiff and actually "lock" as we age. This might explain why manipulation and mobilization techniques have proven to be useful in physical therapy for SI joint syndrome.
- Often worker will present with much of the same signs and symptoms as a low back strain or even disc injury as SI joint pain may radiate down the buttock.



Sacroiliac Joint Dysfunction

→ Causes:

- Repetitive loading of the SI joint (lifting and twisting)
- Fall on the buttocks or injury to the pelvis
- Sitting for long periods with legs crossed
- Women are at risk for developing SI joint problems later in life due to childbirth and ligamentous laxity.

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Sacroiliac Joint Dysfunction

→ Management

- Physical therapy to mobilize the joint or possibly stabilize joint if it is too mobile.
- Surgical intervention only in rare cases

→ Sacroiliac injury has an excellent prognosis for full recovery with most studies suggesting 80% significantly improve within 2 weeks

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Sacroiliac Joint Dysfunction

→ Practical Applications:

- Return to Work: Much like low back injuries, each case should be approached depending on severity of symptoms. Adjustments for sit-stand and decreased flexion/rotation activities for at least 2 weeks.
- Prevention: Education, pre-work stretching and footwear.

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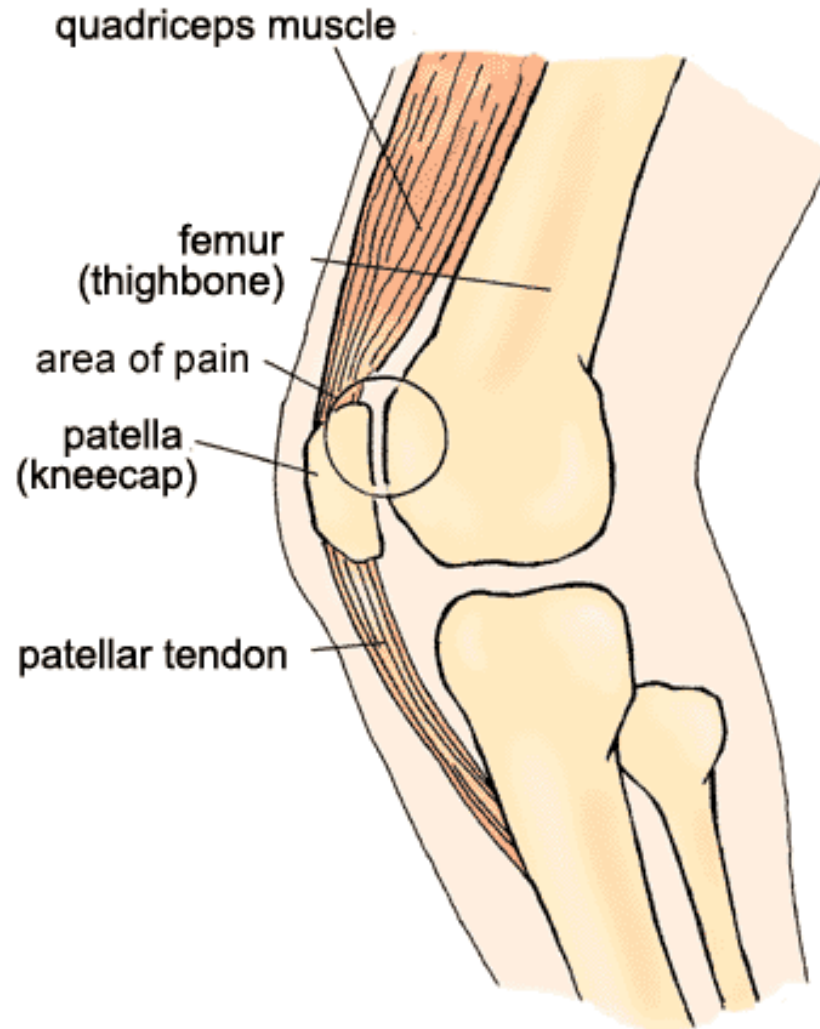
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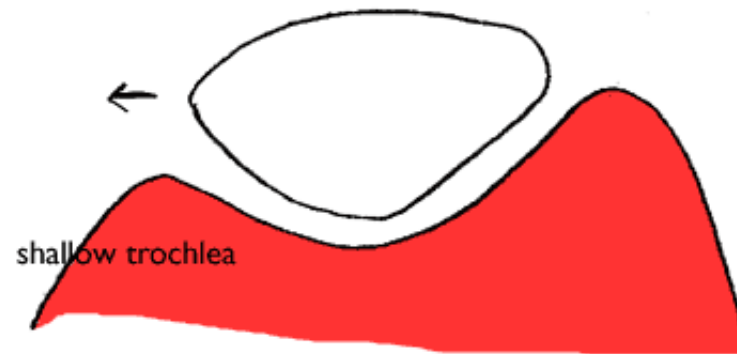
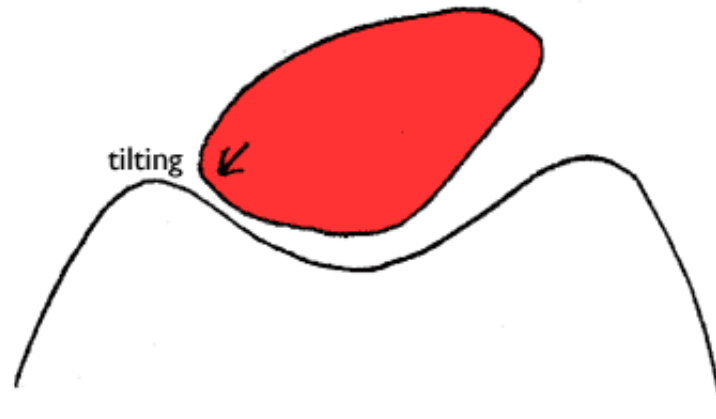
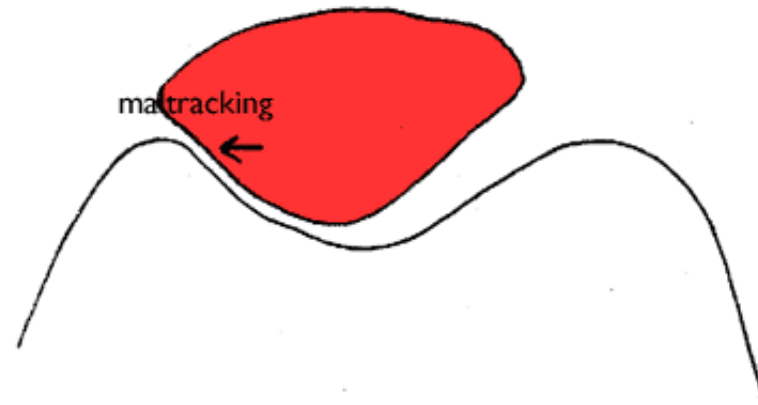
Patellofemoral Syndrome

- Syndrome characterized by dysfunction between the patella and the femur.
- Common in our population, especially in employees that are also active physically outside of work.

Patellofemoral Pain Syndrome (Runner's Knee)



Side view of knee





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Patellofemoral Syndrome

- Employees with patellofemoral pain syndrome have anterior knee pain that typically occurs with activity and often worsens when they are descending steps or hills.
- It can also be triggered by prolonged sitting.
- One or both knees can be affected.
- Employee may describe clicking, crunching or even sometimes a “locking” of the knee (although this is more indicative of a knee meniscal injury)



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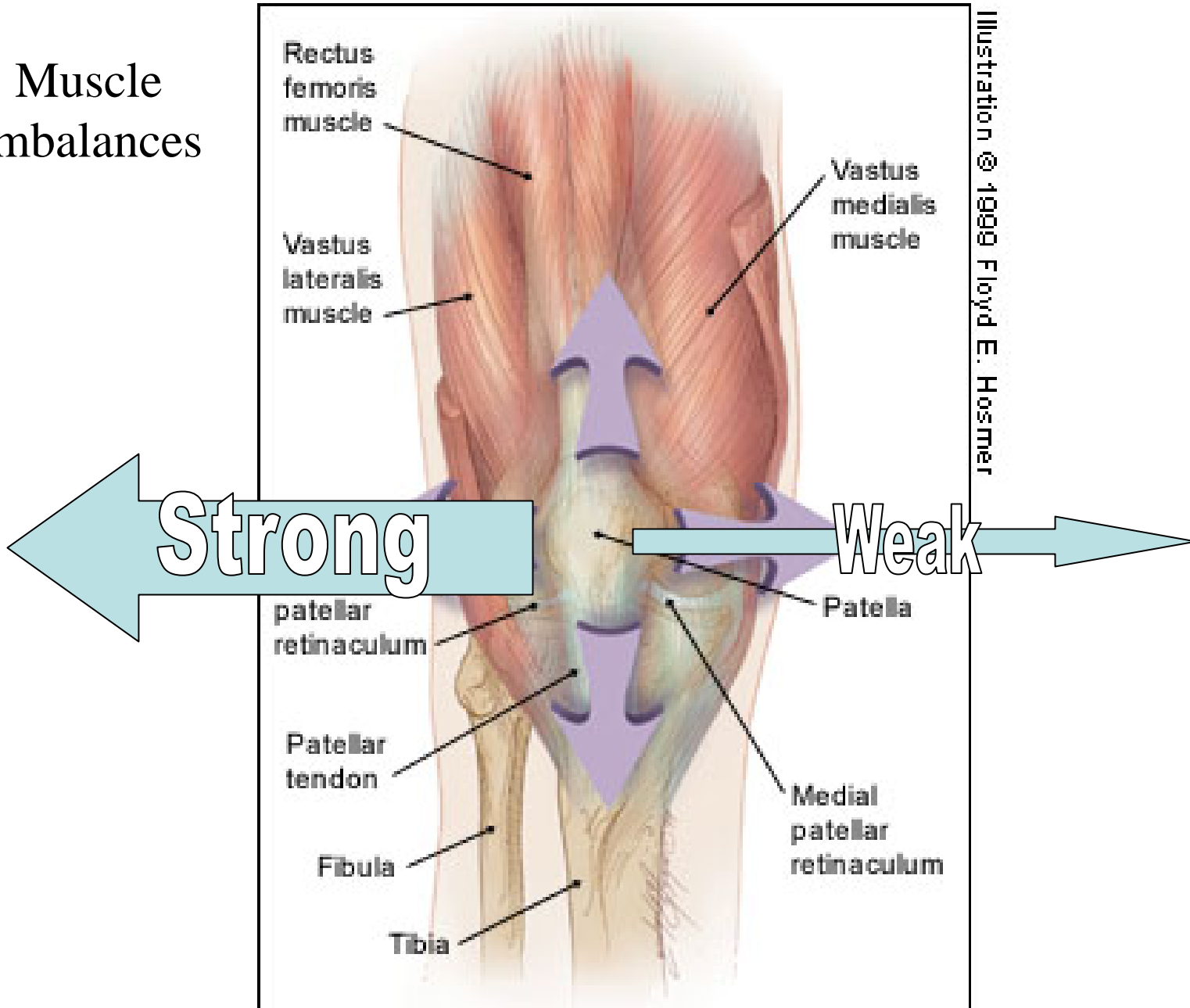
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Patellofemoral Syndrome

→ Causes:

1. Overuse and overload of knee. Steps, hills and uneven terrain irritate this injury. Prolonged sitting can also place pressure on patella on femur (“movie goers sign”)
2. Muscle Imbalances between the strong outer quadriceps muscle and the weaker inner quadriceps muscle causing a patellar tracking problem.
3. Excessive Foot Pronation

Muscle Imbalances





Excessive pronation or “Flat Feet” causes increased stress on the patellofemoral mechanism

Pronation



Patellofemoral Syndrome

→ Management:

- If an acute flare-up, consider initial rest from exacerbating activities, stairs, walking on uneven terrain
- Consider change in footwear
- Many employees work with PFS every day so return to work should be quick.
- Ice if swelling, physical therapy if therapy has not yet addressed this injury
- Physical therapy involves resolving the muscle imbalances

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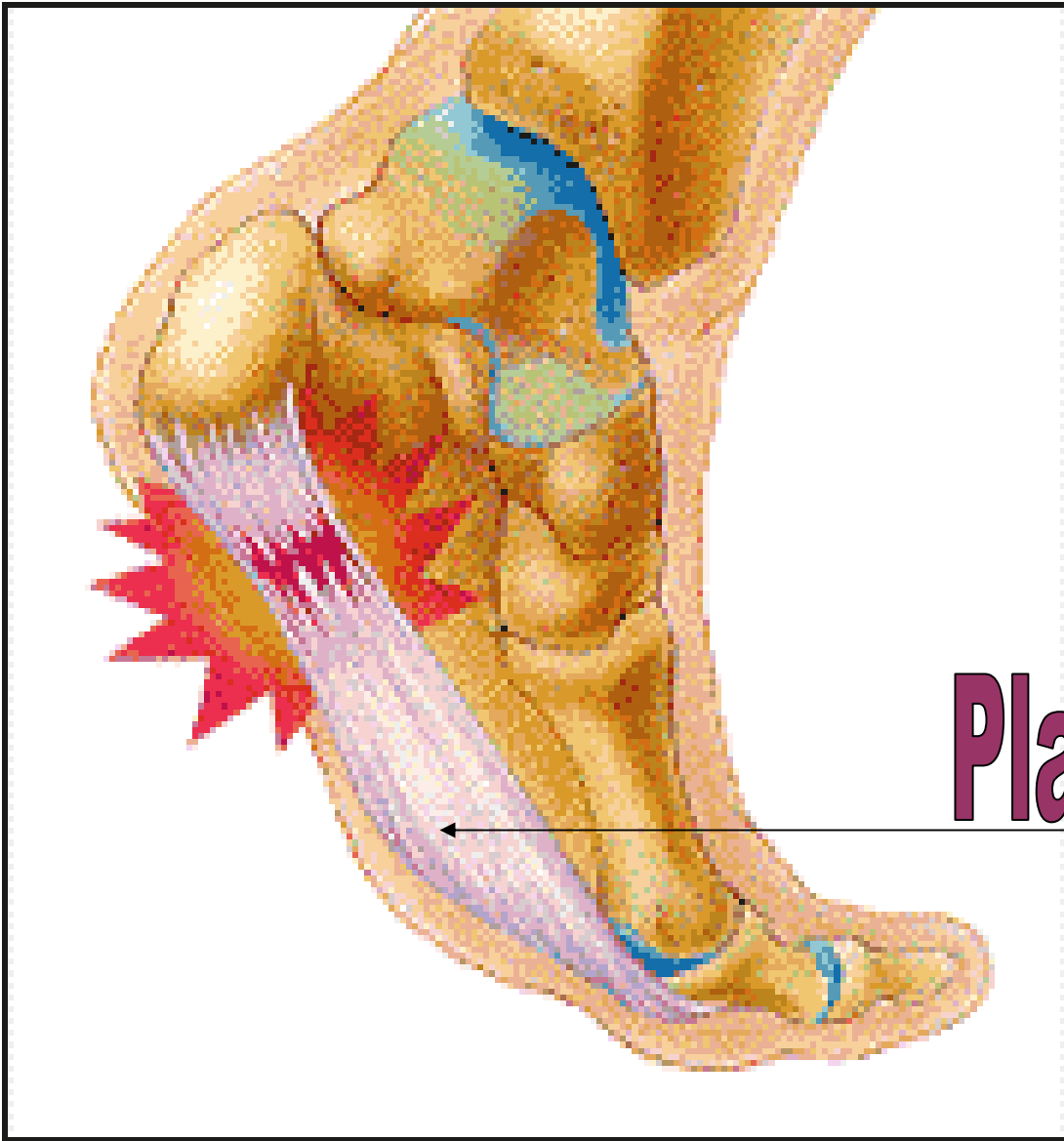
Patellofemoral Syndrome

→ Practical Applications:

- Reduce walking and standing demands for initial week to allow for inflammation to subside.
- Use of a patellar stabilizing brace or taping is may be effective for reducing pain while working. Brace should be taken off at breaks and when at home to allow muscles to work. **Should not** be a substitute for appropriate strengthening exercises.
- Supportive insoles or orthotics may also be beneficial

Plantar Fasciitis

- The plantar fascia is a band of connective tissue on the plantar surface of the heel that plays a large role in maintaining the normal architecture of one's foot.
- Overuse and excessive loads on the plantar fascia causes an irritation and inflammation.



Plantar Fascia

Plantar Fasciitis

- Employee may complain of:
 - Heel pain
 - Burning or itching along sole of foot
 - Recurring foot pain that is especially painful or irritated first thing in the **morning** or after prolonged sitting
- Causes:
 - Recent increase in walking, standing
 - Change in footwear
 - Increase in sporting activities (walking, running)
 - Flattening of arches (Pronation)



Plantar Fasciitis

→ Management:

- “Tennis Ball” or “Soup Can” rolls before standing up in the morning to warm up the plantar fascia. (one minute)
- Frequent forefoot and calf stretches throughout the work day
- Physical therapy may include ultrasound, frictions, acupuncture
- Taping is often a very effective way of managing this syndrome.

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Plantar Fasciitis

→ Practical Applications

- Plantar fasciitis should not be a cause of lost time
- Allow frequent changes from sitting to standing
- When sitting, ensure entire foot is supported and not stressing toes (i.e. not on a bench or bar)
- Consider supportive insoles / orthotics

Plantar Fasciitis

→ Prevention

- Education: appropriate footwear and how to manage plantar fasciitis (i.e. self massage, frictions, tennis ball exercises)
- Pre-work stretching program for ankle and calf muscles
- Use of insoles/orthotics/anti-fatigue matting.

Two Important Calf Stretches



1. Keep back knee straight and hold for 15 seconds
(For gastrocs)
2. Bend back knee slightly and hold for another 15 seconds.
(For soleus)



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Braces and Orthotics

- Braces are useful when used appropriately (elbow, wrist, knee, ankle)
- Employee should be educated on their use by his/her treating practitioner (PT/Chiropractor/Doctor)
- Remember that braces limit movement to allow function – therefore using braces at rest defeats the purpose!
- Just like medication, employee must wean off use of a brace as they recover. It should never be used as a substitute for a strengthening rehabilitation program.



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Orthotics

- The use of orthotics to treat lower extremity and lower back pain is controversial
- Definitive diagnosis of “flat-feet” or pes planus often results in prescription of orthotics with good results.
- Like braces, orthotics allow for support but also contribute to weakness. Orthotics should also be supplemented with an appropriate strengthening regime.



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Final thoughts...

- Lower back injuries must be addressed quickly – movement must be encouraged and modifications / ergonomic adaptations should be researched.
- Sacroiliac injuries may mimic low back dysfunction.
- Knee and Ankle Injuries may require bracing and changes in weight bearing status.
- Lower extremity injuries can be prevented with pre-work stretching program and ample education



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Prevention/Solutions

- Short and long term solutions may be:
 - ✓ Developing early intervention management programs
 - ✓ Pre-Work stretching programs
 - ✓ Educational Sessions with Health Professionals
 - ✓ Musculoskeletal Screening for potential injuries
 - ✓ Ergonomic Assessments