PPE and Potential MSD's

Occupational Health Clinics for Ontario Workers Inc.

Centres de santé des travailleurs (ses) de l'Ontario Inc.

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Defining PPE

Personal Protective Equipment (PPE) are tools that will protect the user against health and safety risks at work. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. PPE should be selected considering the type of hazard and the degree of protection required by the task in question.

Selecting the proper PPE is very important in order to reduce the risk of musculoskeletal disorders.

Work Gloves

Benefits

- Protects from the cold
- Protection from sharp or rigid materials
- Skin protection from chemicals and allergens

Risks

- Reduces strength and increases effort in power and pinch grips
- Reduces manual dexterity and tactile sensations
- Reduces performance (especially in cold environments)

Work Gloves – Sizing

- Small Gloves:
  - Decreases blood flow to the fingertips, eventually leading to pain, numbness, and muscle fatigue
  - Constrains finger and hand movements
  - Increase perspiration

- Large Gloves:
  - Contains extra material that can get in the way, and fingers tend to slide around inside the gloves
  - Impairs fine motor performance and manual dexterity.
  - Strength is decreased so more effort is needed to complete a task

Work Gloves – Manual Dexterity

Manual dexterity is the ability to make coordinated hand and **finger** movements to grasp and manipulate objects.

- When you have less manual dexterity:
  - More strength is required to complete the task
  - Decreased performance

Work Gloves – Tactile Sensation

A Lack of sensory feedback results in:

- More strength required to complete a task
- Increased effort in power and pinch grasp tasks

An increase in finger spacing:

- Reduce maximum grip force
- Will increase forearm muscle activation during gripping task

Work Gloves – Cold Environments

- In cold weather:
  - Performance is decreased when the skin temperature falls below 24 degrees Celsius
  - Hand dexterity is impeded
  - Mitts can hold more body temperature than gloves

Work Gloves – Recommendations

1. MEASURE
   - Measure your hand with a tailor's tape. Measure around the hand just below the knuckles and fingers, but above the thumb.
   - Measure your dominant hand, as it is generally a bit larger.
   - Consult the size chart and purchase appropriate glove

2. CONSIDER TASK AND EXPOSURES
   - Temperature
   - Chemicals
   - Sharps
   - Tools used (slippery tools require textured gloves)
   - Dexterity

Work Gloves – Recommendations

- Gloves with rubber palm increases friction between the object and the glove surface (less grip strength required)

- Gloves with textures fingertips provide sensory feedback for improved manual tasks via textile sensation

Work Gloves – Recommendations

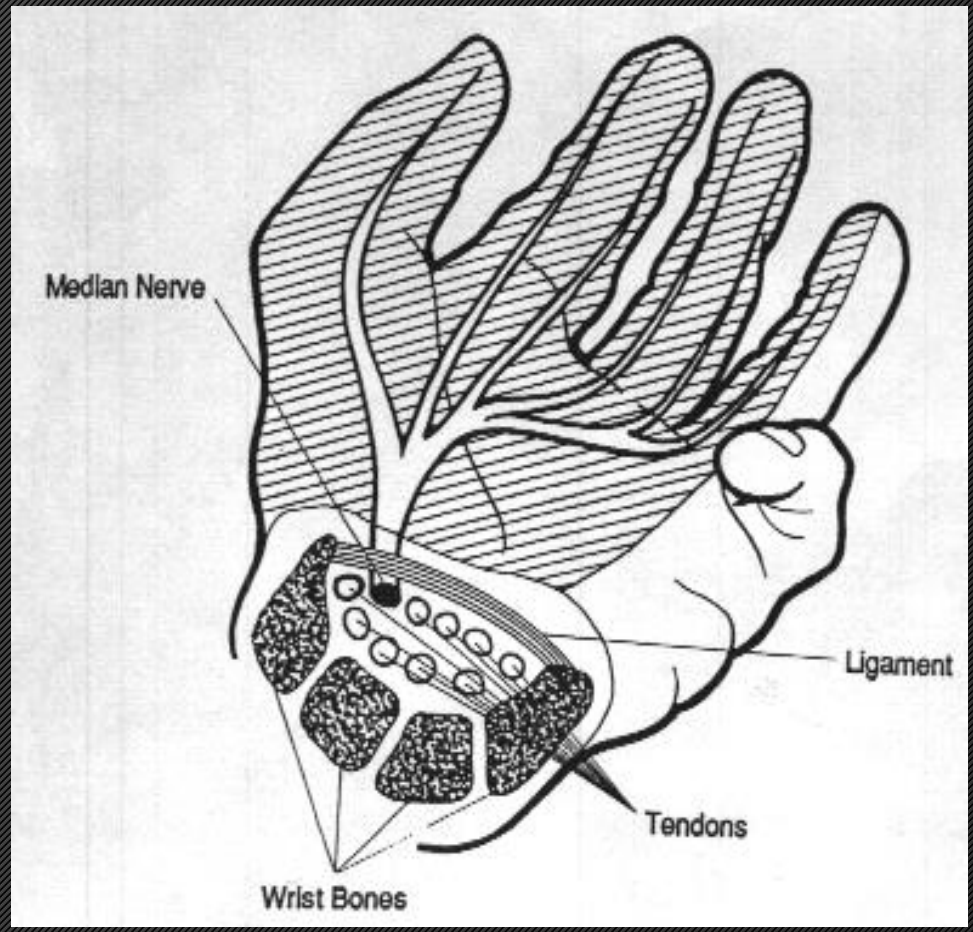
When Working in the Cold:

- A multilayer approach is desirable:
  - When dexterity is not required, wear both mittens and gloves. When dexterity is needed, remove the mittens and perform task with the first layer of thinner gloves.

- A four-compartment configuration with individual compartments for each of the first three—thumb, index, and middle—digits and a fourth compartment for the fourth and fifth digits) appeared most promising in terms of protection and dexterity.

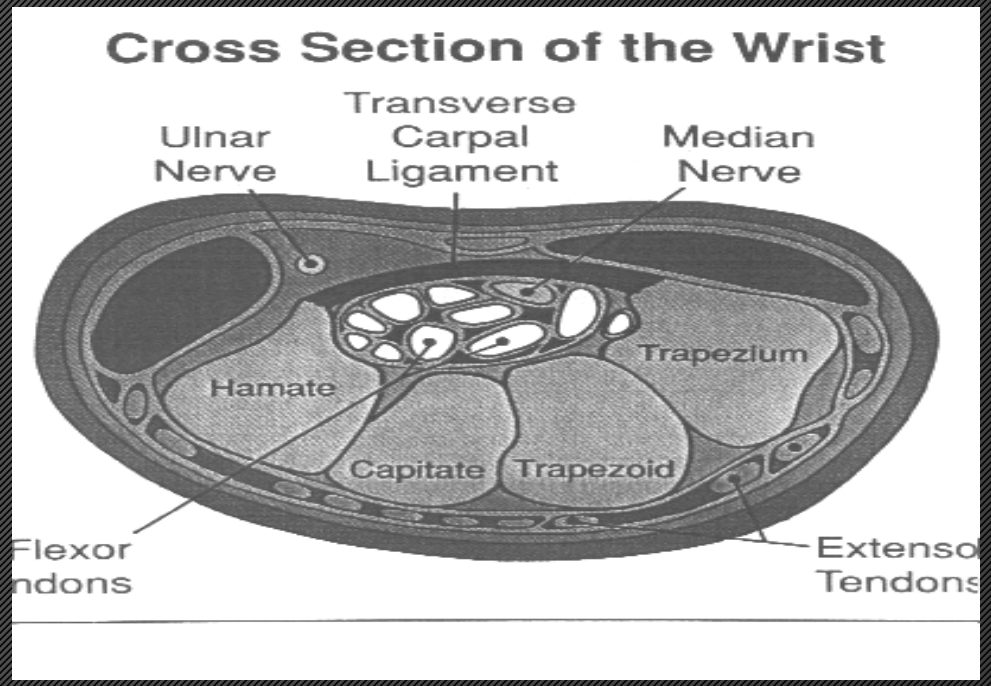
Carpal Tunnel Syndrome

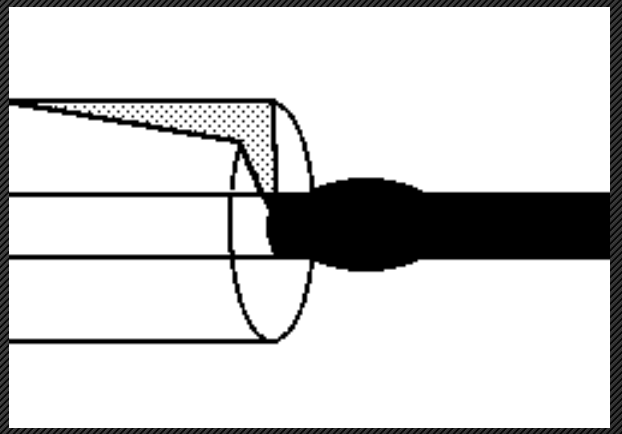
- SYMPTOMS
  - tingling/numbness
  - reduced grip strength
- RISK FACTORS
  - non neutral postures
  - repetition
  - excessive force
  - vibration



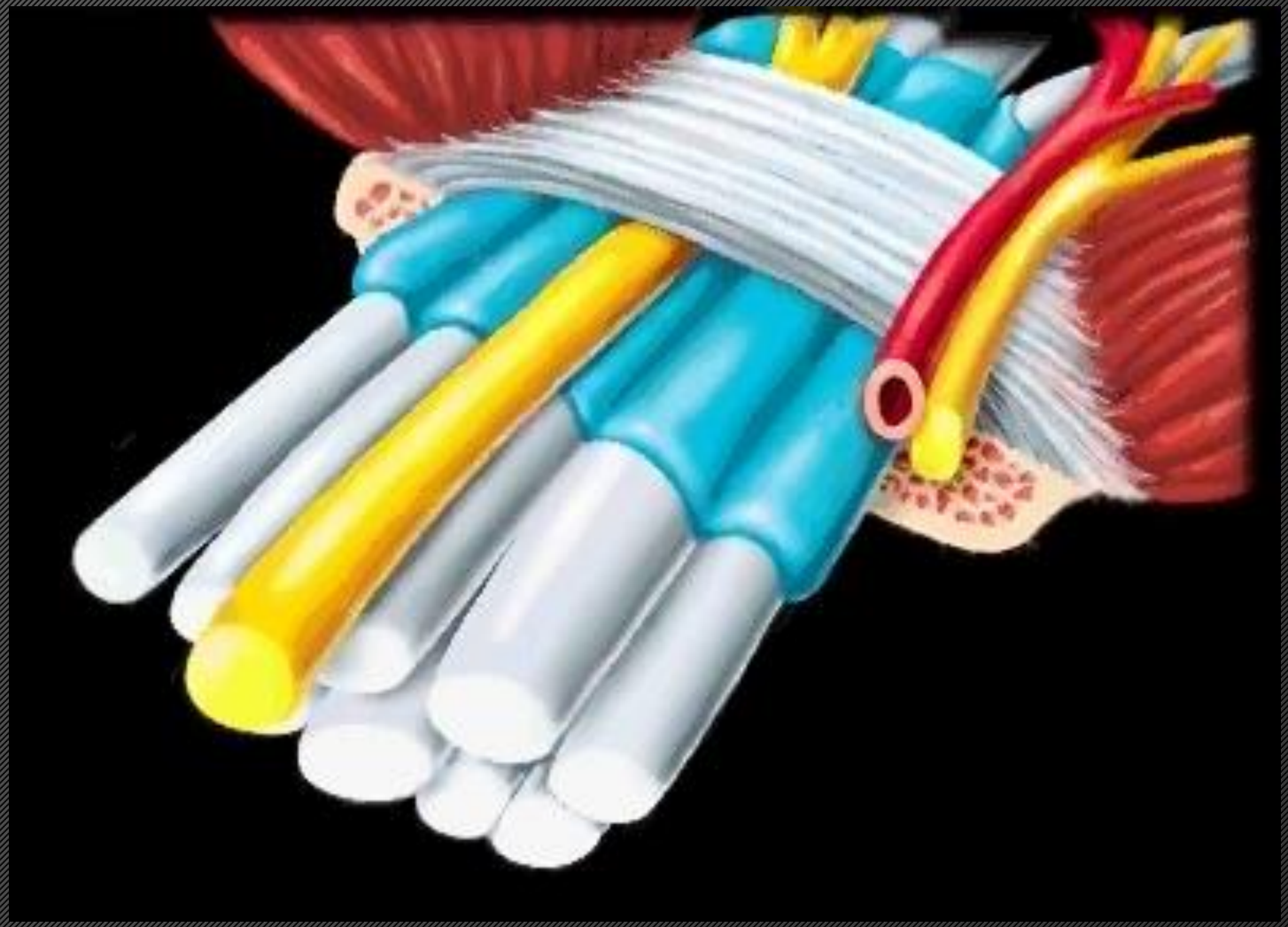
Wrist Anatomy

- wrist is bound by bones and ligaments
- this limited space contributes to the effects of CTS





Wrist Anatomy



Causes Related to PPE

- Pinch gripping
- Vibration

Workboots

A Composite Toe Workboot:

- made of non-metal materials:
  - Kevlar
  - Carbon fiber
  - Plastic
  - Fiberglass

A Steel Toe Workboot:

- contain a piece of steel in the toe area of the boot for immense protection

Work Boots - Composite

Composite Safety Toe Boots

- Benefits
  - Comfortable
  - Warmer during cold periods
  - Lighter
  - Significantly better electrical resistance than steel toe
  - Convenient for passing through metal detectors

- Risks
  - Less strong and durable
  - Expensive

Work Boots - Steel

Steel Safety Toe Boots

- Benefits
  - More cost-effective
  - Stronger and offers more protection
  - Shatter proof
  - Widely known and accepted in the workplace

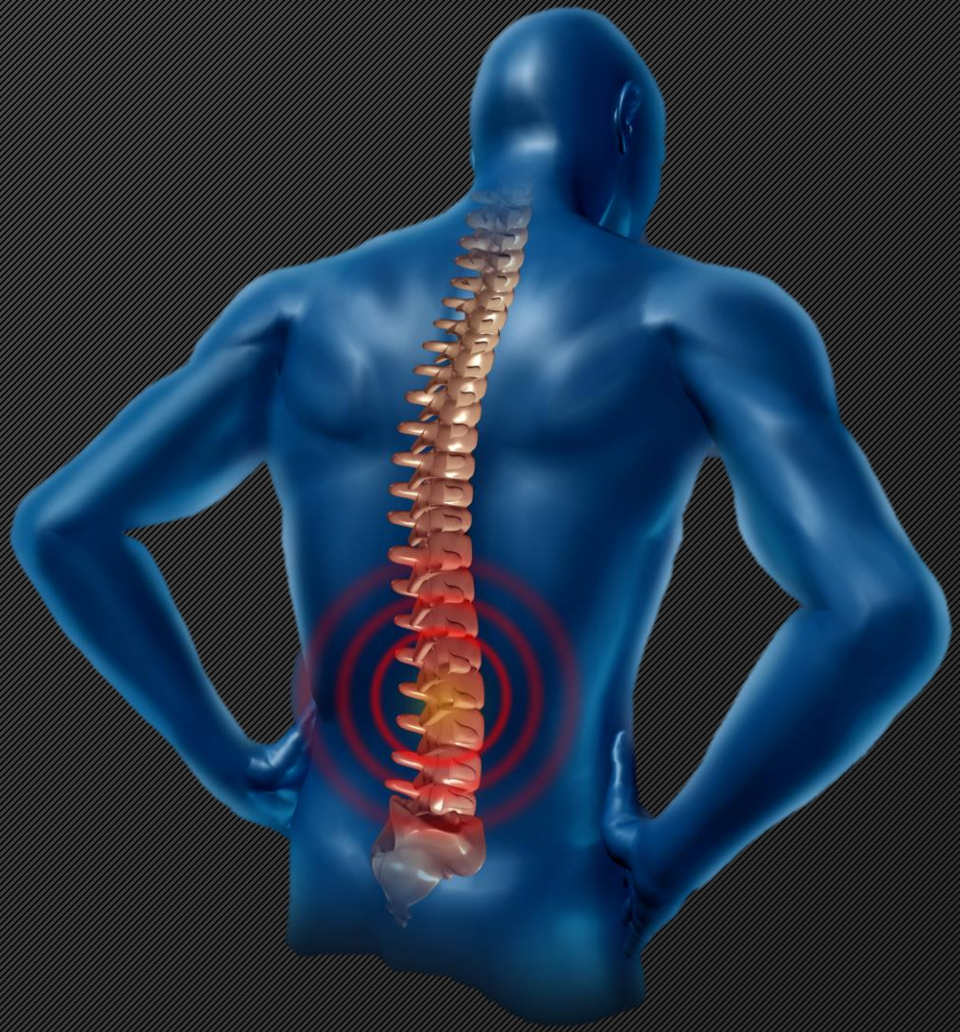
- Risks
  - Makes your feet colder, faster
  - Heavy weight

Workplace Standing

Workplace Standing

- Workers exposed to prolonged walking or standing may contribute to MSD problems in the lower extremities such as:
  - lower back problems
  - plantar fasciitis
  - Tendonitis
  - cumulative muscle fatigue
  - varicose veins.

  Feet and ankle discomfort are also a problem.



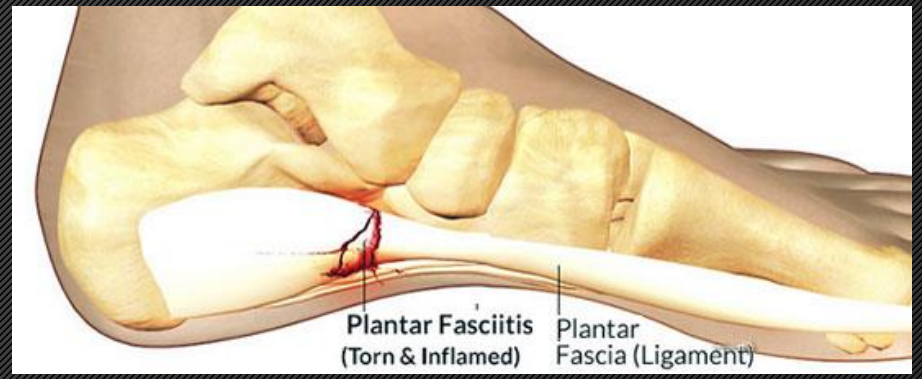
PPE – Lower Limbs

Beyond simple fatigue and discomfort, more serious health effects can result from working on your feet. Some of these are:

- Low back pain
- Painful feet and other foot problems
- Plantar fasciitis and heel spurs
- Orthopaedic changes in the feet
- Restricted blood flow (from standing only)
- Swelling in the feet and legs
- Varicose veins
- Increased chance of arthritis in the knees and hips

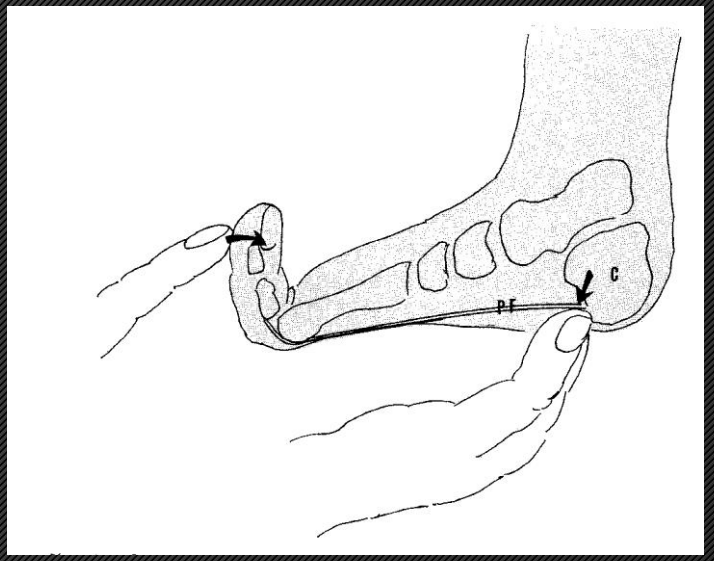
Plantar Fasciitis

- Most common cause of heel pain → Inflammation of the plantar fascia
- Plantar Fascia
  - Ligament that connects your heal bone to your toes
  - Supports the arch of the foot and acts as a shock-absorber
- Cause
  - Standing/Walking/Running
  - Different surface
  - Shoes
  - Overweight
  - Overuse



Signs and Symptoms

- Sharp pain upon initial standing improving with a few steps then worsening with weight bearing[3]
- Tenderness when palpating med. tubercle of calcaneus and/or arch area
- Dull, achy and constant pain after periods of rest throughout day

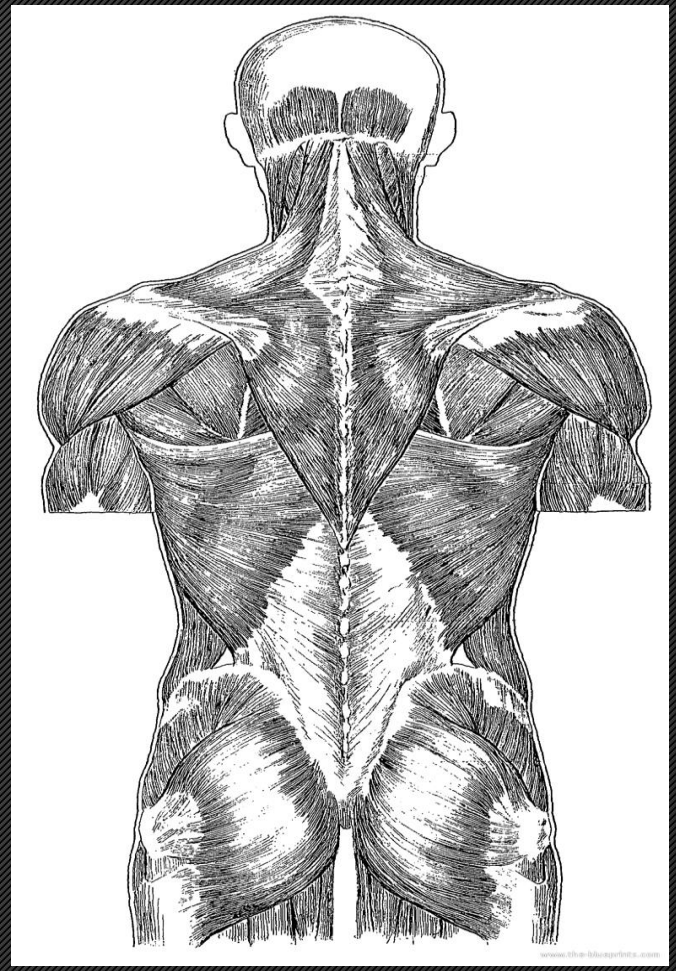


Persons Prone to Plantar Fasciitis

- **Anatomical**-low arch, high arch, obesity, unequal leg length, fat-pad atrophy
- **Biomechanical**-tight achilles tendon, weak plantar flexors, excessive pronation
- **Environmental**-trauma, increase in activity, hard surfaces, barefoot, poor footwear, prolong wt. bearing, inadequate stretching

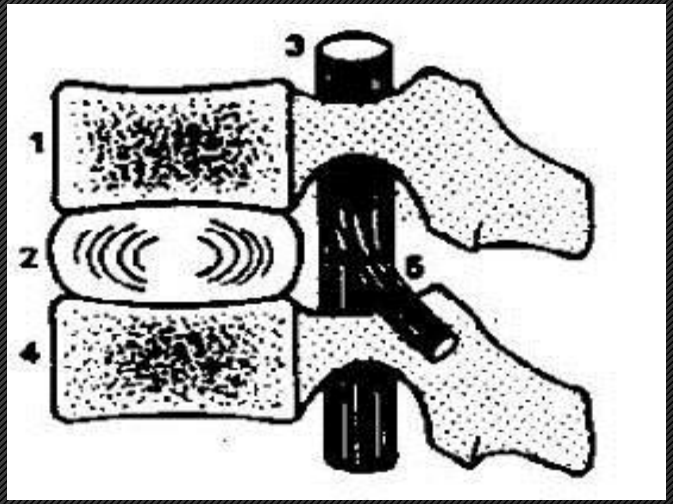
Lower Back Pain

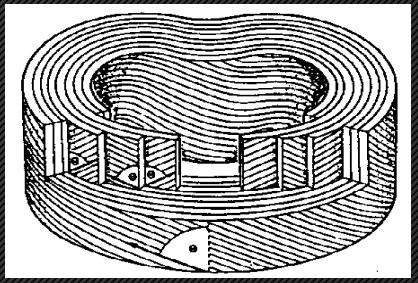
- Back Muscles
  - Provide movement
  - Provide stabilization
  - Under voluntary control
  - Keep vertebrae aligned
  - Short and less powerful than leg muscles.
  - Two layers: superficial and deep.



Intervertebral Discs

- Intervertebral discs are the "shock" absorber between the vertebrae
  - The outer layer is the annulus
  - The inner layer is the nucleus
- Ligaments and muscles
  - control movement and
  - support the spine

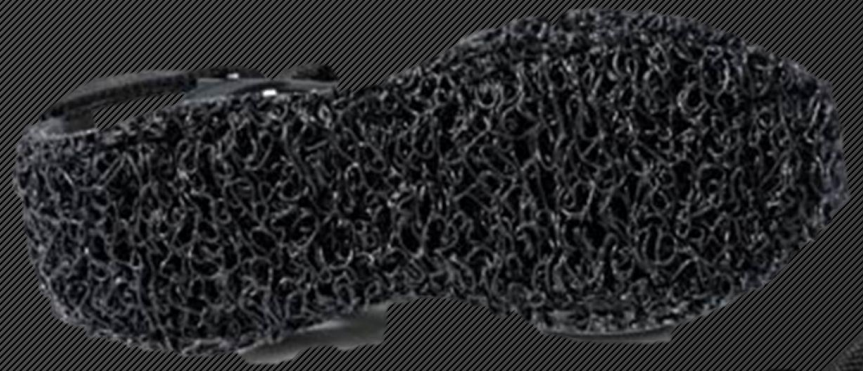




Causes of Low Back Pain Related to Boots

- Prolonged standing
- Walking
- Hard floors
- Heavy boots
- Loss of traction

Ergomates



Ergomates

What Are Ergomates?

- Same effect as anti-fatigue mats
- Used while being mobile
- Anti-slip property

Anti Fatigue Mat

- Designed to reduce fatigue and muscle loading when standing for long periods of time on hard surfaces
- The problem with anti-fatigue mats is that they are designed for static work

Ergomates

Research Suggests:

- Ergomates improve loading rate and centre of pressure differences which may affect muscle contraction in the kinetic chain therefore increasing comfort.
- Ergomates have some protective aspects against musculoskeletal disorders by reducing the loading rate during heel strike, thus reducing impact shock.
- Ergomates are beneficial for preventing MSD's.
- Reduces Fatigue
- Reduces slipping

Ergomates - Recommendations

- Ergomates should be used when:
  - Exposed to prolonged standing and walking
  - Repetition, force or vibration are present
  - Standing on hard floors such as tiles or concrete

For More Information Contact your Local OHCOW Clinic

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