

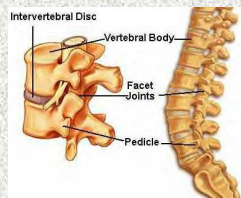
Dental Clinic Ergonomics Musculoskeletal Physiology and Cumulative Trauma

LAB OREGON
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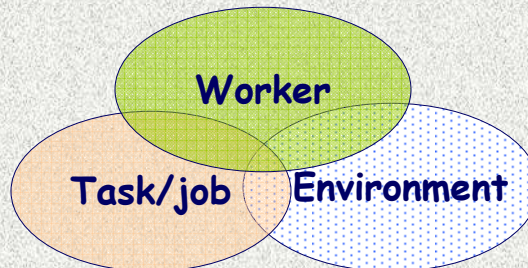
Today's Workshop

Will:

- Review anatomy/physiology
- Review risk factors
- Discuss cumulative trauma
- Introduce neutral spine
- Hierarchy of solutions



What is Ergonomics?



The goal of ergonomics is to design the job to fit the worker
NOT make the worker fit the job.

Risk Factors for Musculoskeletal Disorders

- Excessive force
- Awkward and/or prolonged postures
- Repetition
- Direct Pressure
- Vibration
- Noise
- Work organization
- Combinations of factors



Spinal Architecture

Vertebral bodies

- shock absorbing
- load bearing

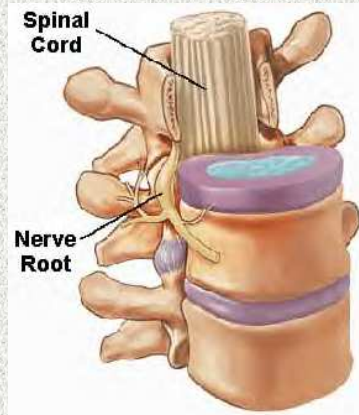
Posterior elements

- protection

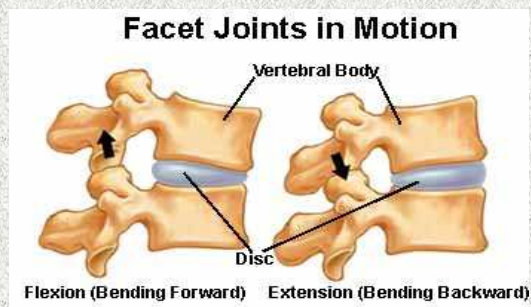
Discs

- shock absorbers
- facilitate motion

Spinal nerves

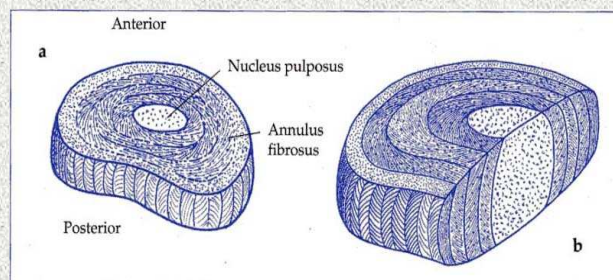


Vertebral Movement



Disc Hydration

- There is a diurnal variation of hydration
- Most hydrated after upon rising in am
- Associated with feeling stiff in morning
- ↑s stress on discs by 300% and ligaments by 80%

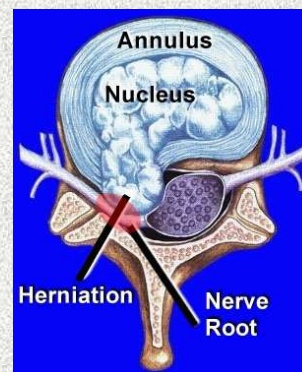


Disc Herniations

• Disc damage is frequently the result of cumulative, repetitive trauma

• Outer disc fibers repeatedly tear and heal as a result of repetitive overloading

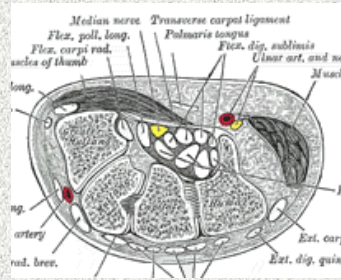
• The disc weakens overtime (years) leading to herniation of the nucleus, causing back and leg pain, and numbness



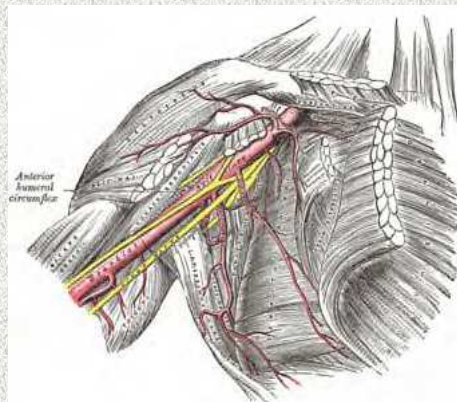
Wrist



bones form tunnel
where nerves and blood
vessels flow into hand



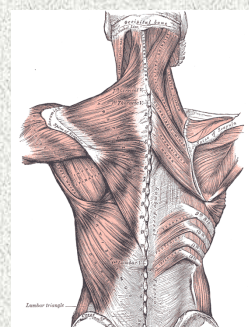
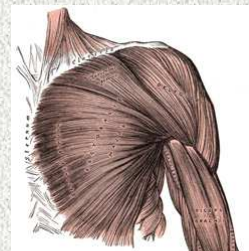
Shoulder



Nerves and blood
vessels flow under
shoulder muscles
and can be pinched
or inflamed

Muscle Symmetry

- Opposing muscles should have **equal tone** and **symmetry**
- Overuse and/or underuse can lead to impaired function
- Some consistent patterns:
 - Certain muscles tend towards tightness
 - Others towards inhibition (weakness)



Balance & Symmetry

Stretch muscles that tend towards **tightness**

- Upper trapezius
- Levator scapulae
- Pectoralis-major/minor
- Lumbar erectors
- Ilio-psoas
- Hamstrings

Strengthen muscles that tend towards **weakness**

- Abdominals
- Gluteus-min/max/med
- Rhomboids/Lower trapezius
- Scalenes

How do Injuries Occur?

Acute injuries

- Happen *immediately*
- Can become chronic
- Re-injury possible



Chronic injuries

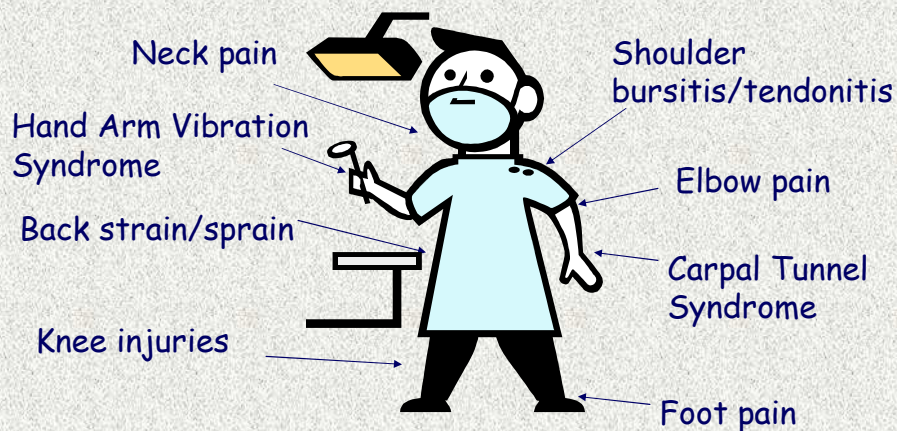
- Pain or symptoms lasting more than a month



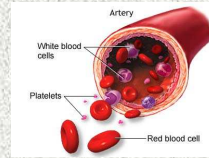
Cumulative trauma

- Happens *over time*

Examples of Chronic Injuries



Tissue Repair



- Takes 3 days to several weeks for tissues to repair
- Scar tissue is fibrotic - not same as the original tissue
 - Chaotic = strong
 - Reduced elasticity
- When tissues continually disrupted due to over use repair is never complete
- *Adhesions* form
- A chronic inflammatory cycle is created

Cumulative Trauma Cycle



Effect of Repetition

Repetitive motions are movements repeated over time that eventually damage tissues.

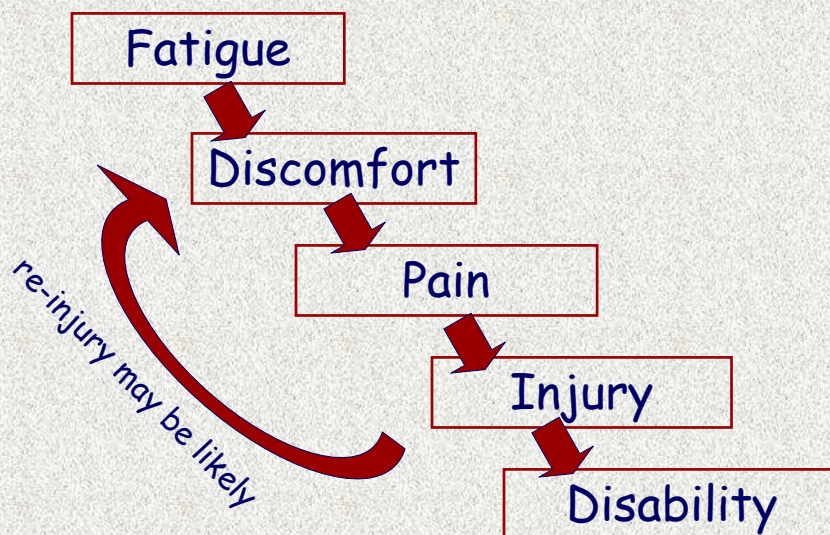
- These can be frequently repeated motions occurring over a short period of time, say months

time  injury

- Or they can be less frequent but repeated over a long time, say years

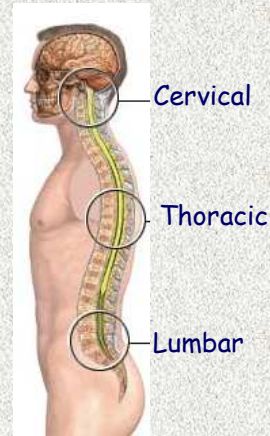
time  injury

Break the Injury Cycle



Neutral Spine Posture

- 3 Curves make your spine strong
- It is important to **maintain these curves** when moving, bending and lifting
- Loss of these curves means back is less stable and more prone to injury



Ergonomic Solutions to Decrease Injury Risk

effectiveness

Personal control

- | | | |
|---|-------------------------------|---|
| ● | Substitution or Elimination | ● |
| ● | Equipment or Engineering | ● |
| ● | Job organization | ● |
| ● | Personal protective equipment | ● |
| ● | Biomechanics | ● |

Conclusions

- Cumulative trauma occurs over time and may not result in an injury for many years
- Repetition a key factor
- Cumulative trauma and chronic injuries can be disabling
- Maintaining **Neutral spine** is key to body mechanics
- Some solutions more effective (equipment), but difficult to implement
- Some solutions less effective but more readily available (body mechanics)

Questions?

Thank you