SAFE LIFTING
Protecting Your Back

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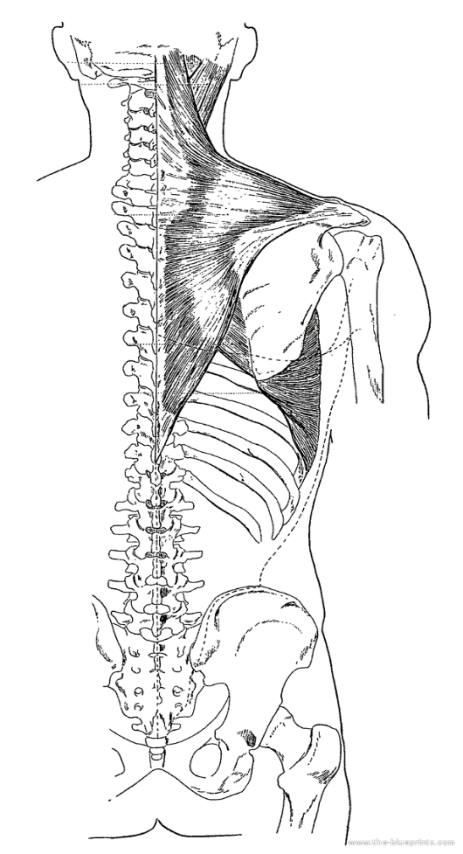
Back Injury

- 60 % of all adults experience back pain
- Most frequent cause of activity limitation in individuals under 45 years
- Third leading cause in individuals between 45-64 years

Back Injury and Lifting

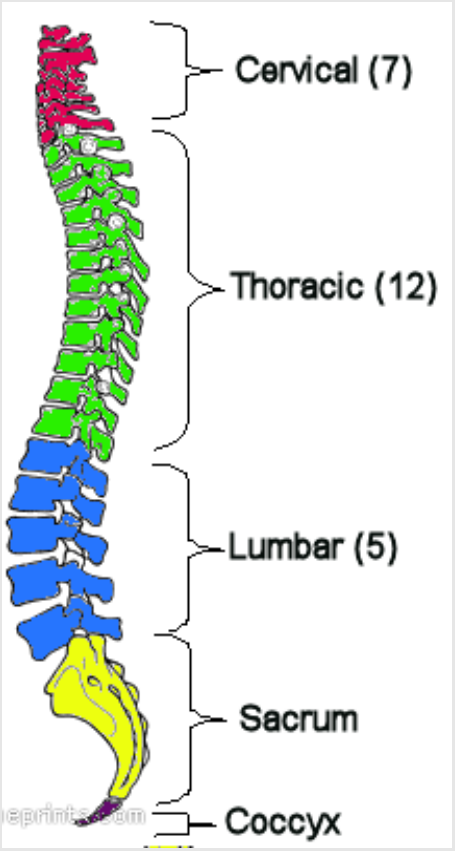
- 65% of industrial workers report low back pain symptoms during their career
- 25% of reported work injuries - age 15-54 years
- 20 % of lost work days due to back injury

Anatomy

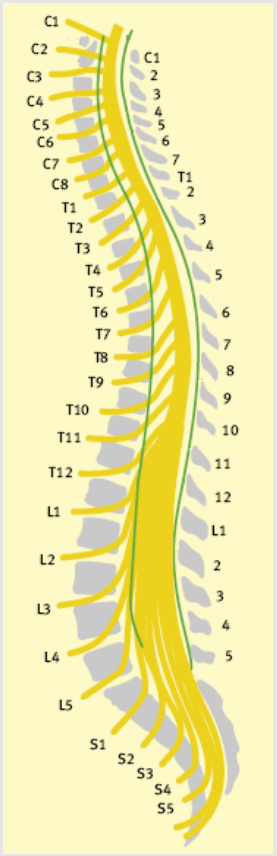


A healthy back relies on your skeletal system, soft tissue system and your nervous system to function properly.

Spinal Column

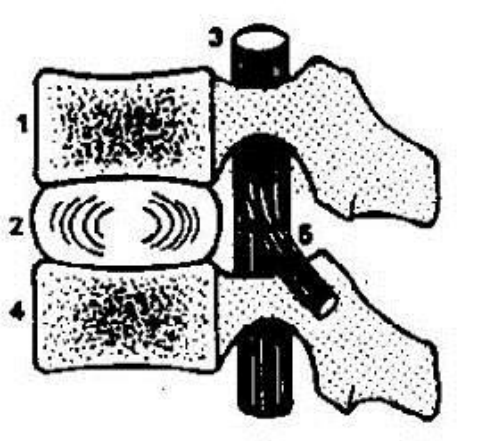


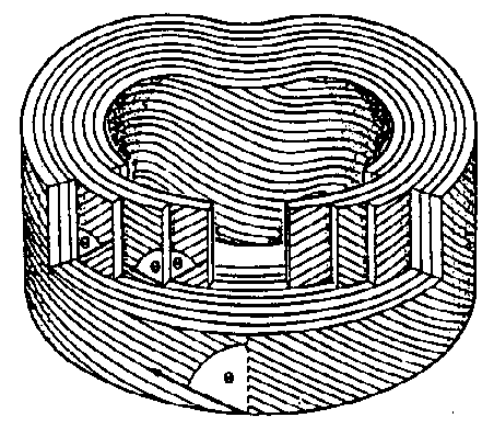
- Vertebrae
- Protection
- Support
- Muscle Attachment
- Movement



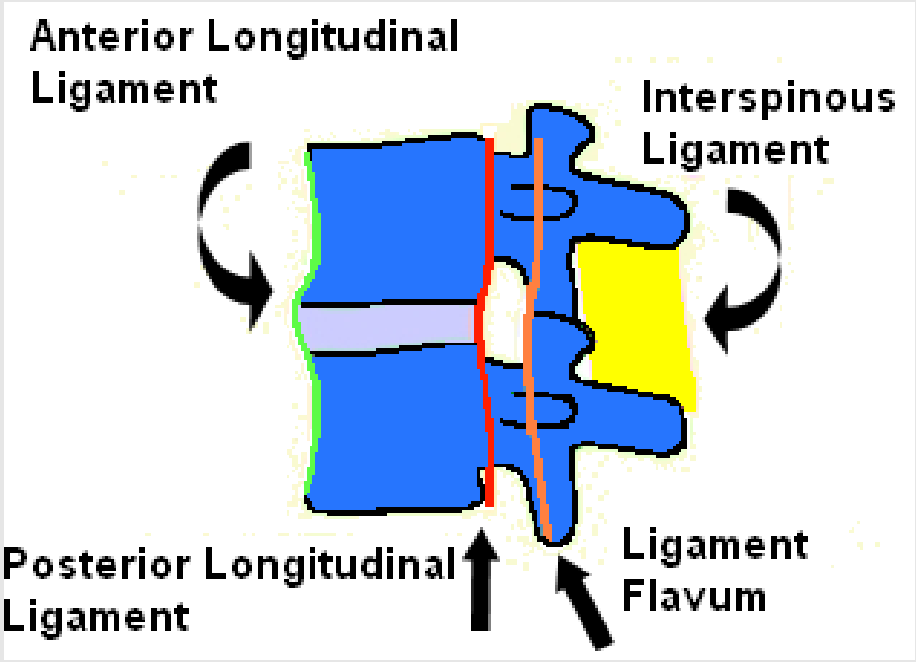
Intervertebral Discs

- "Shock" absorber
- Permit movement
- Composition
  - Annulus - outer layer
  - Nucleus – gelatinous fluid filled center
- Aging
  - Deterioration begins in 30's
  - Decreased fluid and size
  - Decreased function





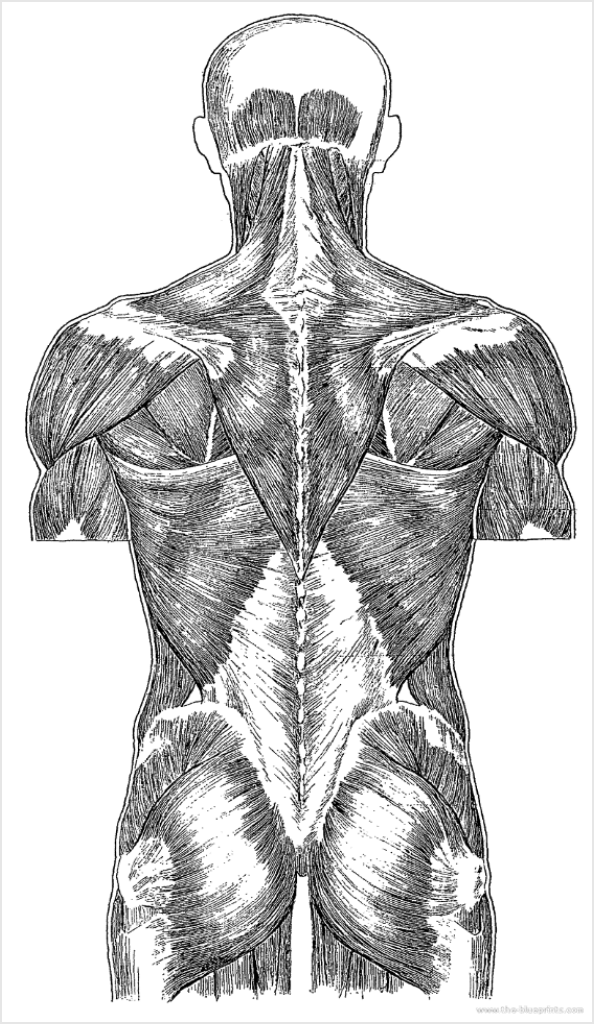
Vertebral Ligaments



- Tough elastic fibers
- Connect vertebrae as one structure
- Prevents excessive movement
- Helps stabilize spinal column

Musculature – Low Back

- Provide stabilization
- Maintains vertebral alignment
- Allows voluntary movement
- Small in relation to leg musculature
- Lower force production in relation to leg musculature

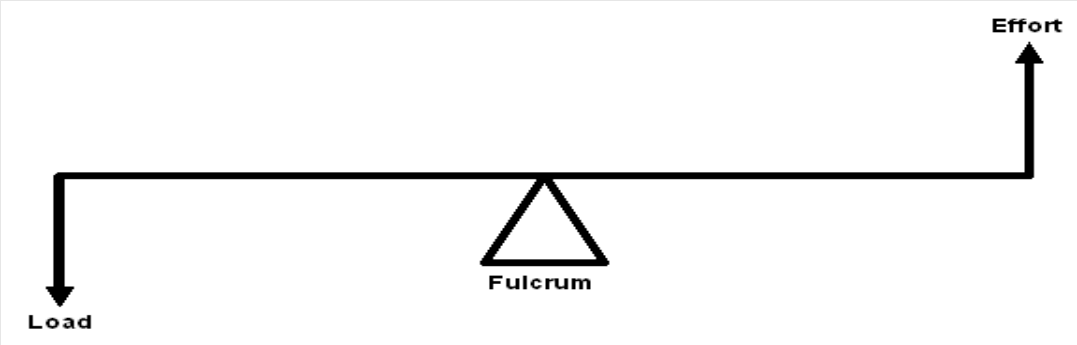


Musculature - Abdominals

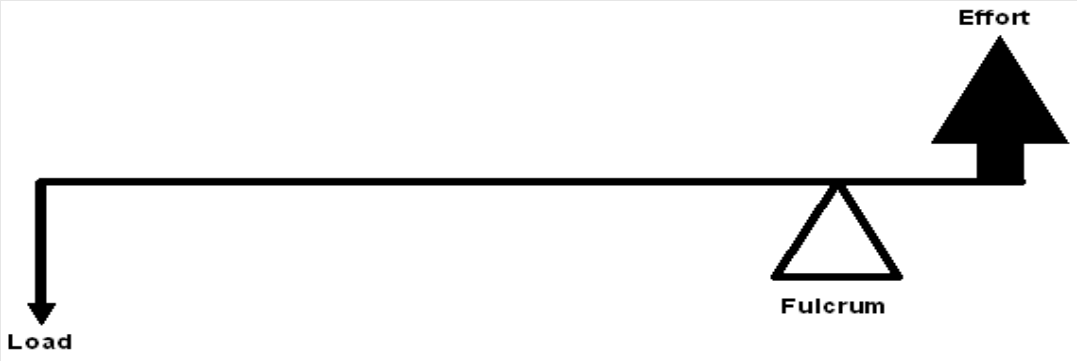
- Provide stabilization
- Maintain vertebral alignment
- Allows voluntary movement
- Support abdominal contents
- Decreased strength due to
  - Poor posture
  - Poor physical conditioning
  - Poor posterior chain flexibility

Biomechanics - Levers

- Fulcrum in the center - effort force equals load force

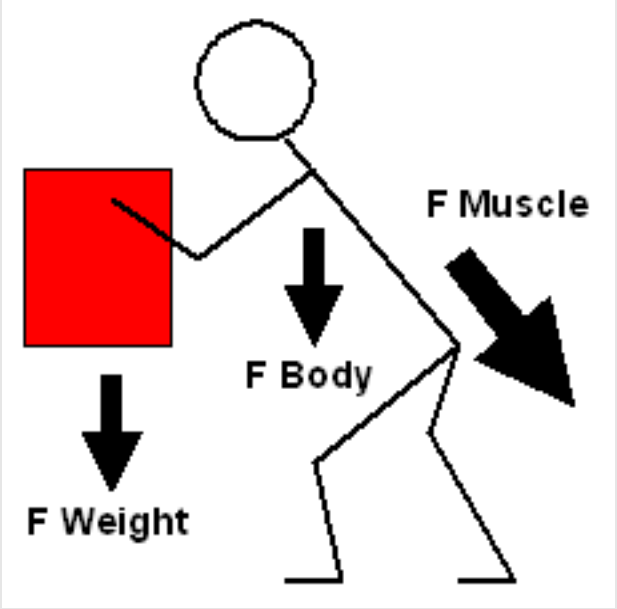


- Increase distance of load force, increase effort force required



Biomechanics - Lower Back

- Load force = object lifted
- Effort force = torso musculature
- Torso (back and abdominals) = fulcrum



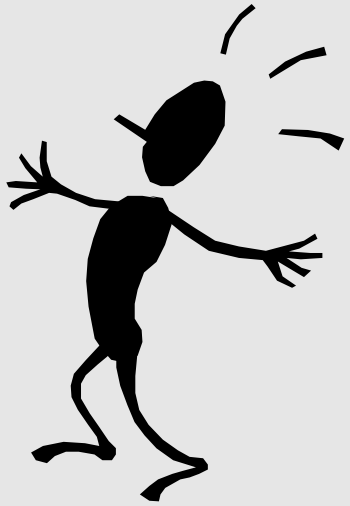
- Increased horizontal distance from fulcrum (torso) to the load (object lifted) = increased effort force required (torso muscle)
- Result = increased stress placed on the muscles and joints of the low back

Injury Risk Factors

In order to prevent an injury, you need to know what may be causing it!

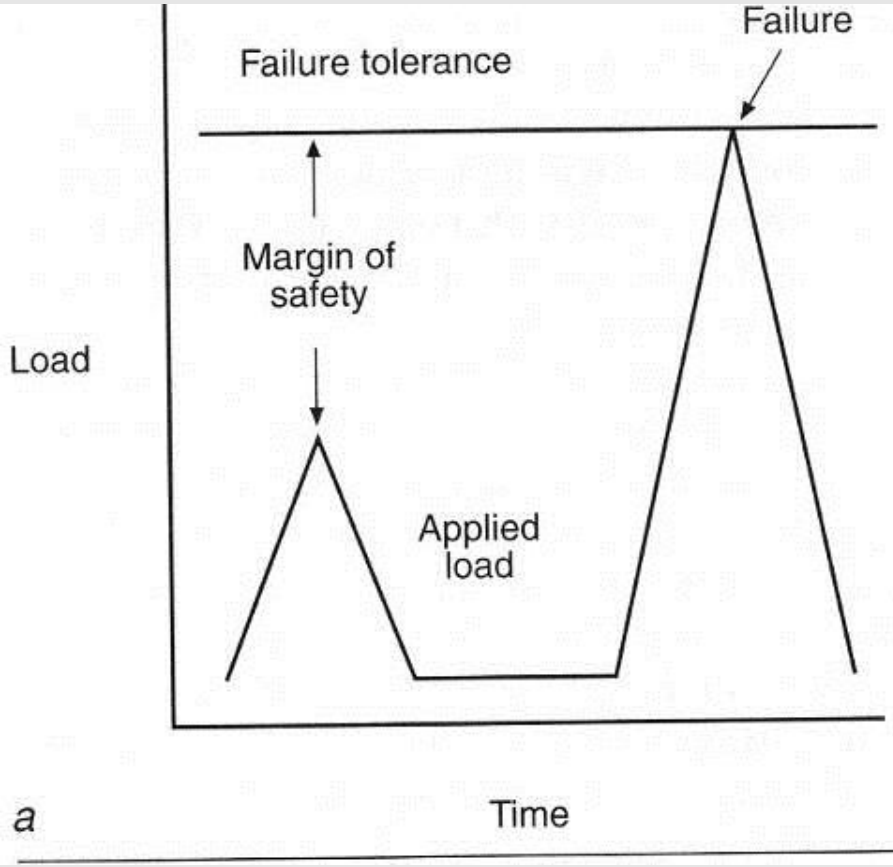
The "BIG 3"

Force
Repetition
Posture

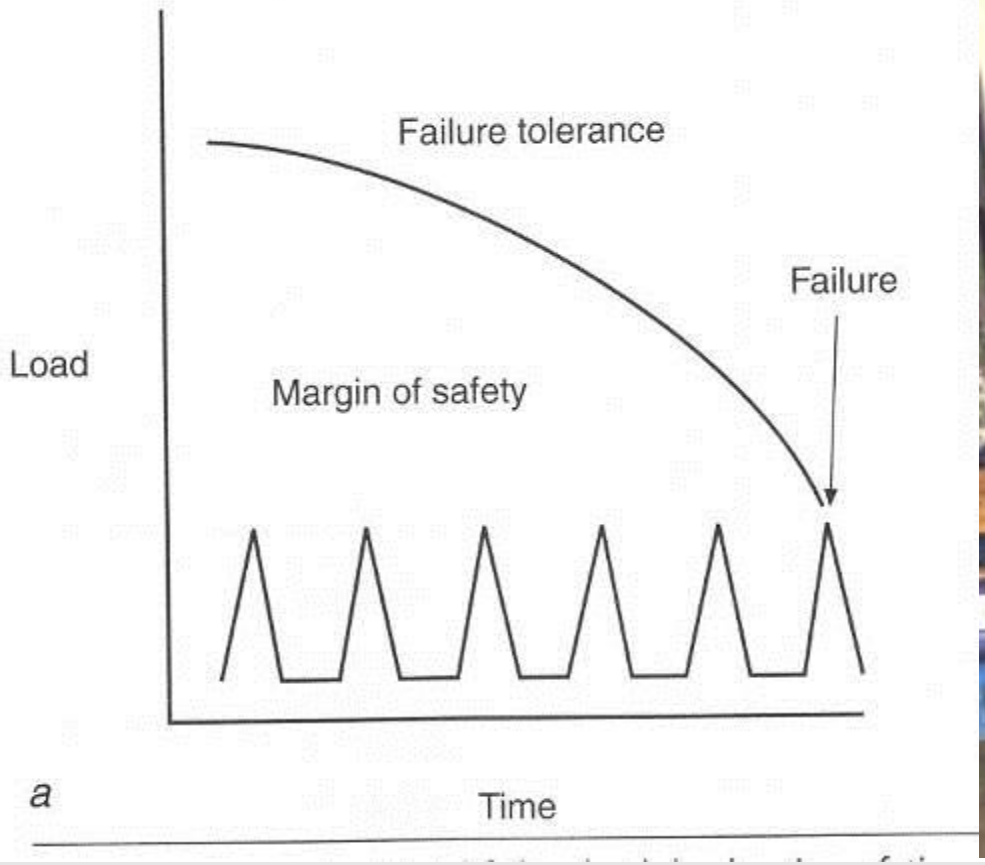


Increased Force = Injury

Single high load

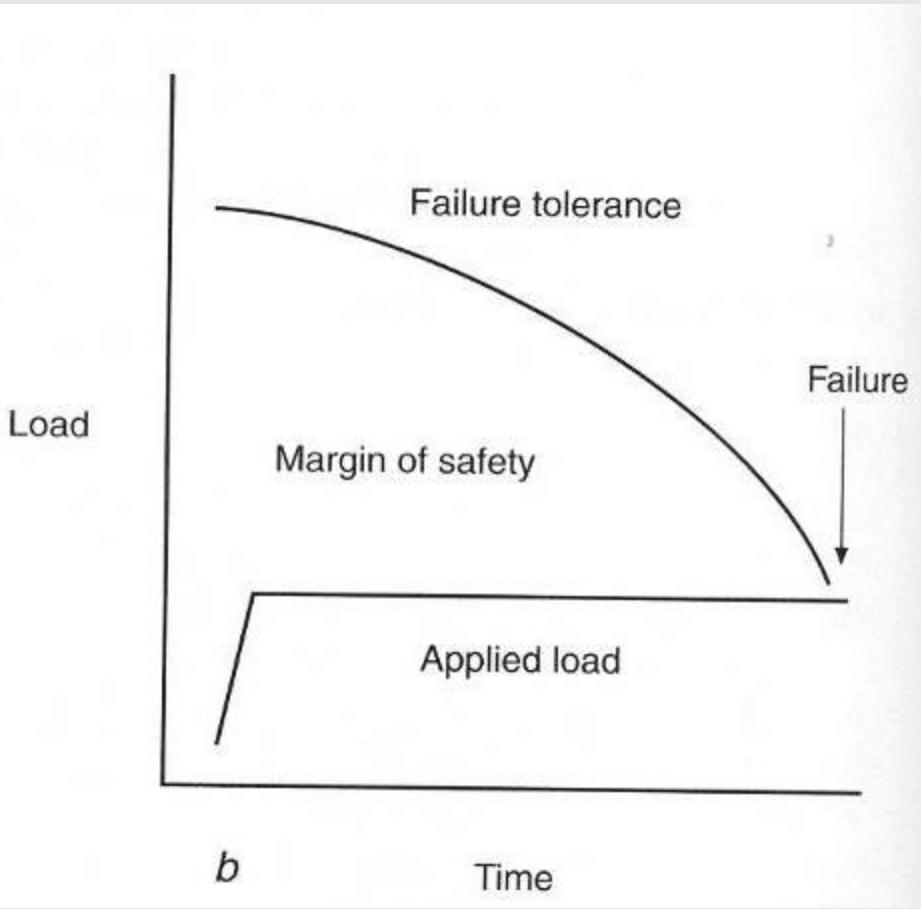


Increased Repetition = Injury



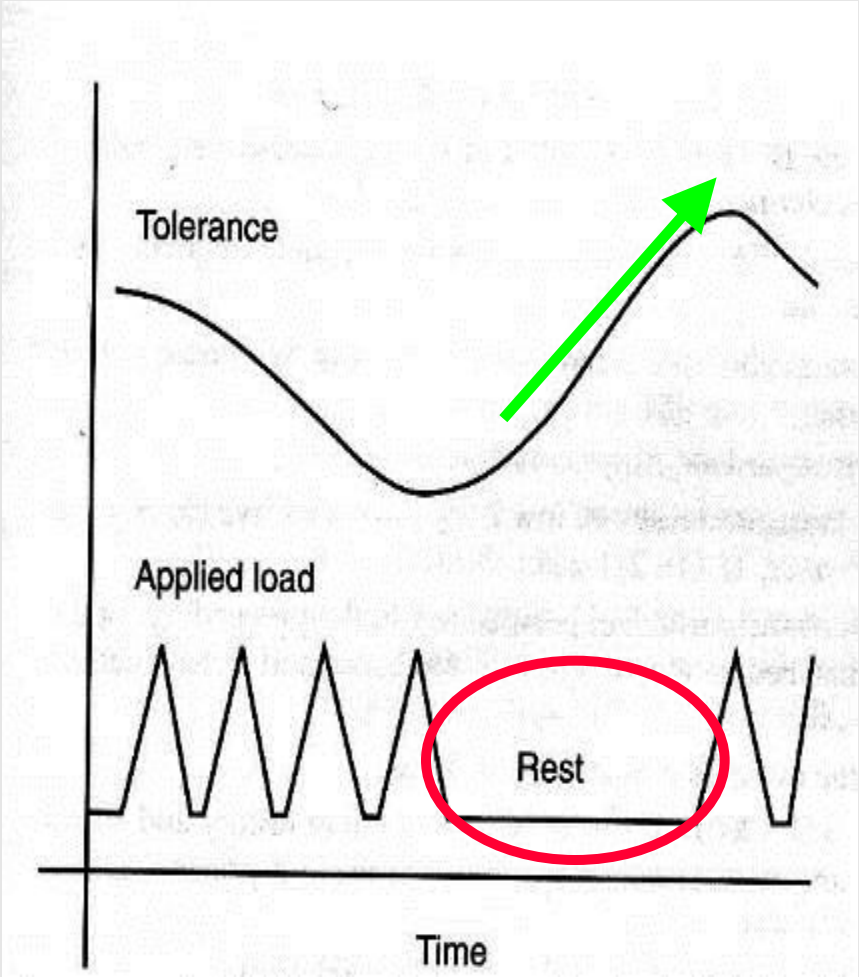
Awkward Posture = Injury

Prolonged without relief



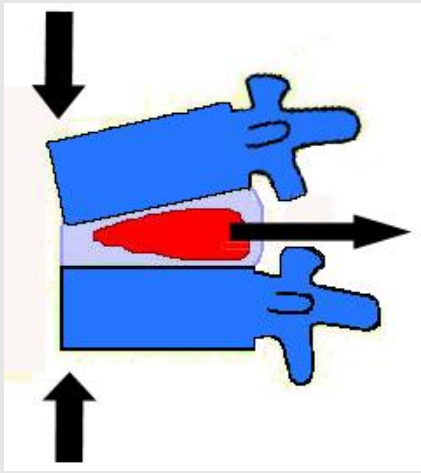
Rest Increases Tolerance

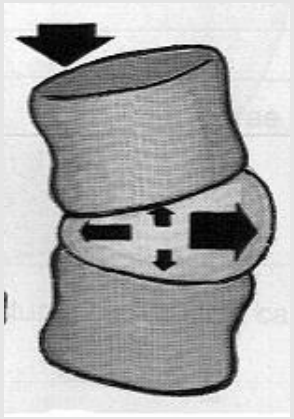
- Loading = micro-trauma = slight injury to tissues
- Rest = recovery = increased tolerance
- Limited rest = limited recovery = increased injury



What Happens When We lift?

- Fatigue of unconditioned musculature
- Uneven pressure placed on disc – movement of nucleus against annular fibers
- High force, awkward posture, high repetition = increase stress





Back Degeneration

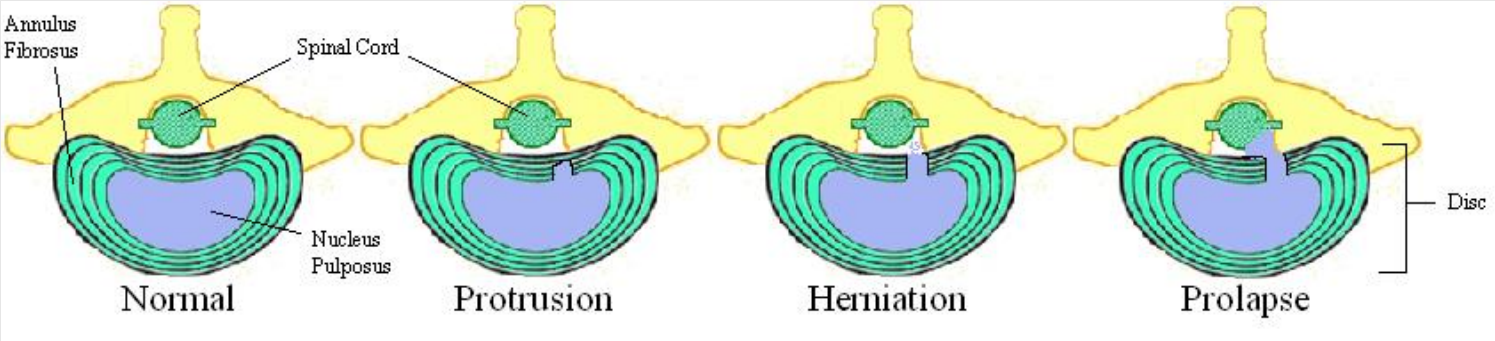
- Wearing of Intervertebral Discs (IVD)
- Increased with aging
- Can result from chronic loading of tissues
- Loading = unnatural postures (away from neutral), force exerted and duration/frequency of time spent in unnatural postures

Degeneration of the IVD

- Annular rings become brittle and loose strength
- Fluid inside the disc exerts pressure on the fibrous sheath causing it to expand into the spinal canal
- Fluid then exerts pressure onto spinal nerves
- 3 stages of degeneration

Stages of IVD Degeneration

- Protrusion - fluid inside disc stretches fibers
- Herniation - rupture of fibers, fluid expelled into area of weak fibers
- Prolapse – complete rupture of fibers, fluid migrates into vertebral canal



Lifting Technique is Essential

Principles of Lifting

B ack Straight

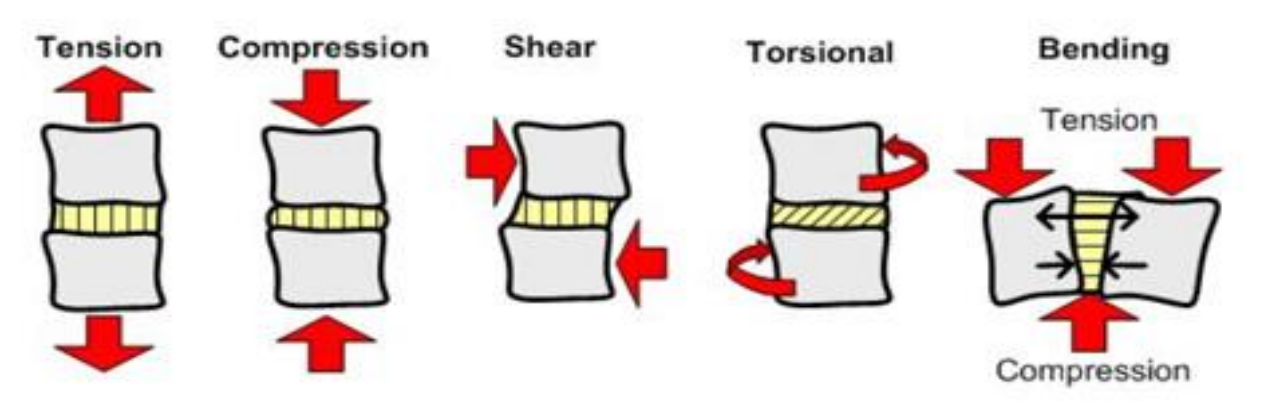
A void Twisting

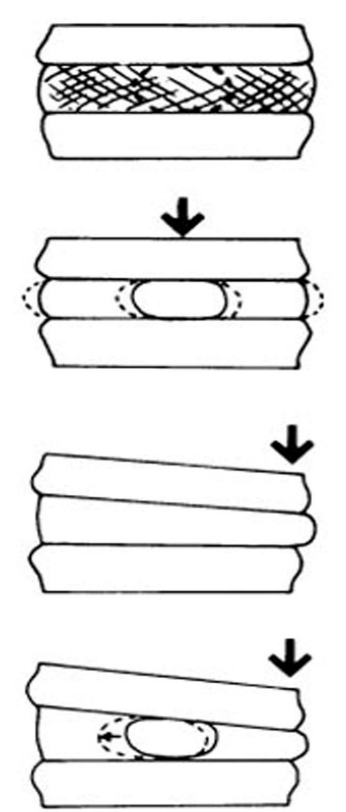
C lose to Body

K eep Smooth

Back Straight - Neutral Spine

- Aligns torso
- Maintains spine's natural curves
- Keeps torso moving smoothly

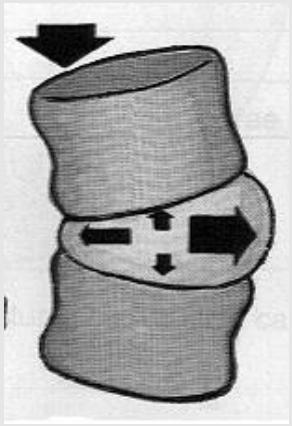


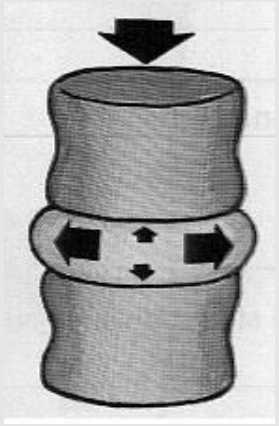


Back Straight - Posture

- Neutral posture is important

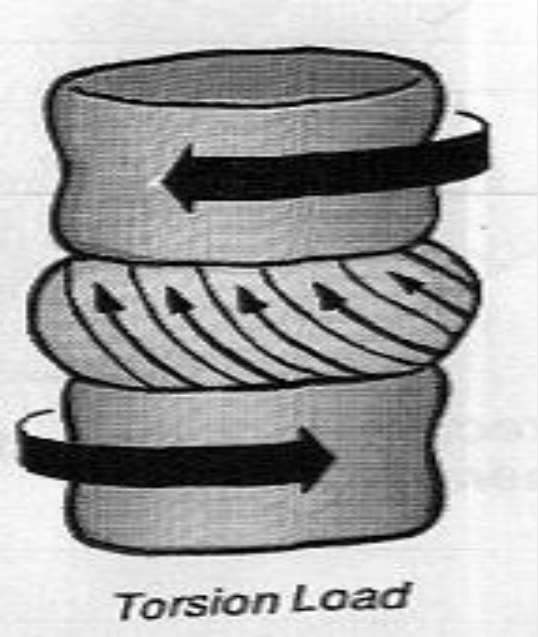
- Strong and balanced torso muscles





Avoid Twisting

- Twisting
  - Weakens discs
  - Facet joints – pain, inflammation
- Pivot, move feet.

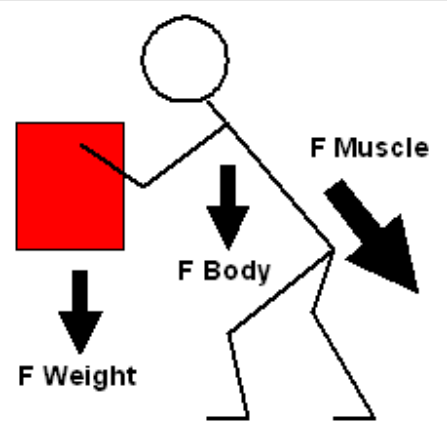


Close to Body

- Remember Biomechanics?
- Torso = fulcrum
- Muscle force must counterbalance weight of object lifted

Muscle Force = distance x load

- ⇑ distance from body = ⇑ stress on the back.



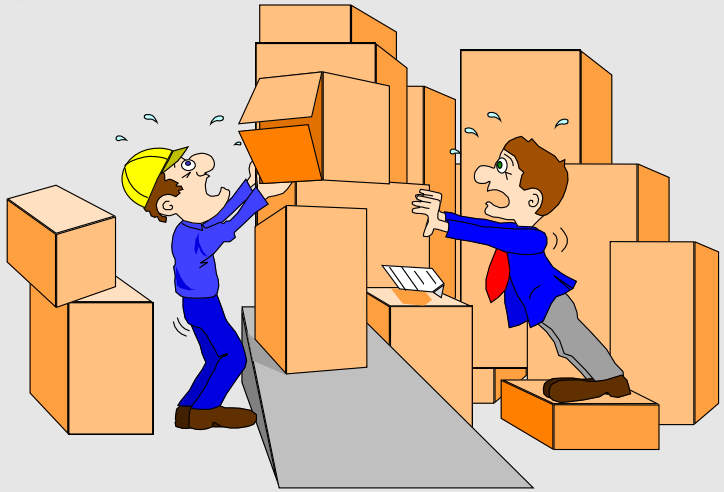
Keep Smooth

- Quick, explosive movement (jerking)
  - Increases stress on the discs
  - Increases stress on muscles
  - Create numerous safety hazards
- Controlled continuous movement
  - Allows sequential muscle activation
  - Uniform stress upon body
- Partner lifts
  - Communicate and co-ordinate

Lifting is Affected by…

Object Weight

Object Size



Grip

Asymmetry

Vertical Location

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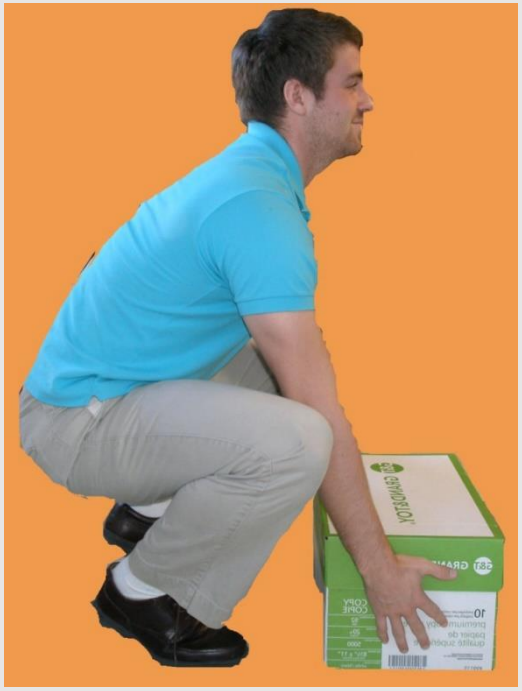
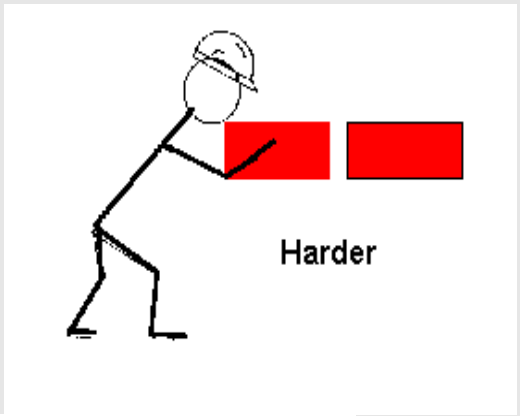
Object Weight

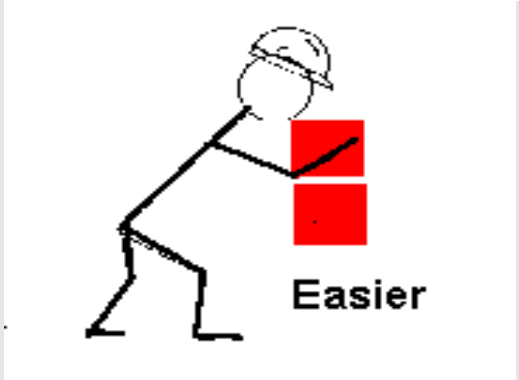
- Heavier Loads
  - Increased difficulty
  - Increased probability of poor technique
  - Increased probability of jerking
  - Increased probability of injury
- Help yourself
  - Test weight
  - Utilize lifting aid
  - Get help - partner



Object Size - Horizontal Location

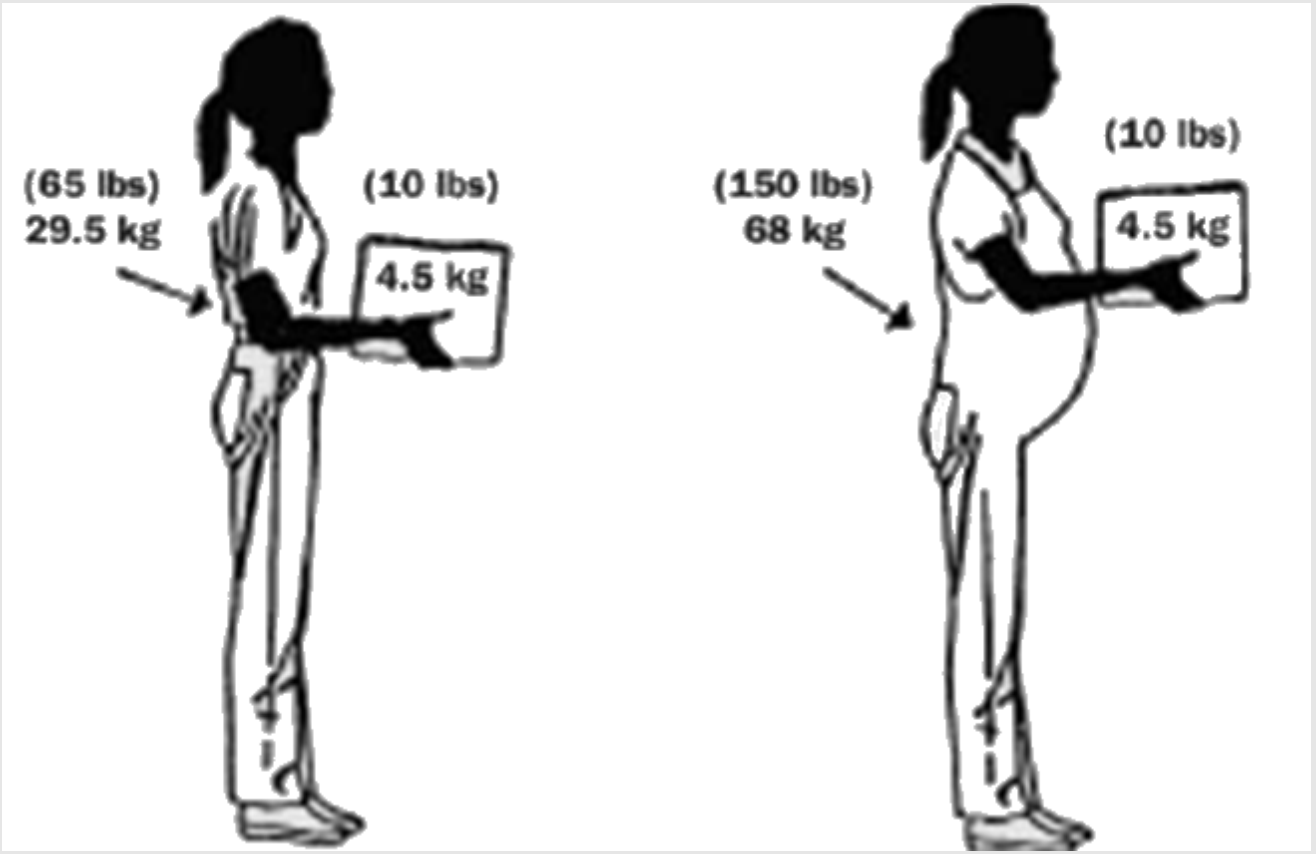
- Remember Biomechanics?
  - Increased horizontal distance from fulcrum (torso) to the load (object lifted) = increased effort force required (torso muscle)
- Dimensions of object may
  - Increase difficulty
  - Increase force required
  - Decrease grip
- Decrease horizontal distance





Body Shape

May affect horizontal distance



Grip

- Poor coupling (grip) increases the risk of injury
- Tools Available
  - Can Claw
  - Gorilla Gripper
  - Lifting Straps

Vertical Location

- Increased Vertical Travel Distance
  - Increased difficulty
  - Increased reaching
  - Increased probability of injury
  - Decreased safety

- Help yourself
  - Avoid above shoulder height
  - Store objects between knuckle and chest level
  - Minimize vertical distance

Asymmetrical Loading

- Unbalanced Loads
  - Create awkward posture – twist, lean
  - Unbalanced force production
  - Increased stress on muscles, discs
  - Increased probability of injury
- Help yourself
  - Avoid single handed carry
  - Balance load
  - Utilize lifting aid
  - Get help - partner

Planning

Object to be lifted

- Location
  - Current
  - Future
- Weight
  - Lifting aid
  - Partner
- Size
- Shape –unbalanced?
- Grip

Prepare Yourself

- Footing
  - Surface
  - Footwear
  - Shoulder width
- Physically ready
  - Warm up
  - Conditioning

Lift Preparation

- Object close to the body
- Test weight
- Feet shoulder width apart
- Bend knees
- Back in neutral posture
- Head and neck neutral
- Tighten torso musculature

The Lift

- Maintain normal breathing
- Lift with legs
- Maintain neutral torso posture

Carrying Loads

- Minimize if possible
- Move feet -do not twist
- Use an Aid
  - Wheelbarrow
  - Dolly
  - Cart
- Dolly Use
  - Push not pull
  - Knees bent
  - Neutral posture

Back Care

- Regular exercise
  - Provides nourishment to muscles and discs
  - Helps decrease degenerative changes associated with aging
  - Flexibility, aerobic, strength
- Strengthen muscles equally
  - Balance between back and abdominal muscles provide optimal stabilization

Warm Up

- Prior to any physical activity
  - Prepares body for physical activity
  - Warm muscles perform more efficiently
  - Warm muscles less likely to injure
- Following sustained inactivity
  - Sleep – vulnerable upon waking
  - Sitting - vehicle, desk, couch, etc.
- Full body activity
  - Low intensity – increase heart rate
  - Minimal time – 3-8 minutes
  - Specific flexibility

Summary

THINK, PLAN, THINK

- Think before every lift
- Plan the entire lift
- Design lifting tasks to minimize physical stress
- Warm-up-stretch before lifting
- Use “good” lifting technique
- **B**ack straight **A**void twisting **C**lose to body **K**eep smooth

Summary

PLAN, THINK, PLAN

- Do not attempt to lift loads heavier than what YOU feel YOU can safely lift
- Use lifting aids or partner
- Do not lift and twist - TURN YOUR FEET
- Avoid lifts above shoulder height
- Push rather than pull a load
- Develop a healthy lifestyle (exercise)

Thank you for your attention

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If you have any questions about ergonomics or any other occupational health concern contact OHCOW at:

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Write: OHCOW
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