



# Posture

## & Low Back Pain

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**Awareness!!!!**

**Practice!!!!**

**Consistency!!!!**

**Prevention!!!!**



# Objectives:

1. Statistics of Low Back pain!
2. Anatomy & Physiology of Spine!
3. Define Posture!
4. Natural Posture vs. Poor Posture
5. Interventions for Low Back Pain!
6. Ergonomics: Prevention & Maintenance!

# Statistics of Low Back Pain (Shankman)

- Primary Cause of Disability & injury in Middle-Aged working class resulting in millions of lost work days a year
- \$50 billion in healthcare costs a Year
- 2<sup>nd</sup> leading cause of Physician visits in US
- Prevalence is close to Common Cold
- "An estimated 75-85 percent of Americans will experience back pain at some time in their life. Most cases are mechanical in nature, meaning the pain is not due to a serious medical condition such as inflammatory arthritis or fracture, instead the pain is a product of poor posture and improper movement."

Back Pain: Prevention and Treatment. (n.d.). Retrieved May 31, 2015, from <http://fitness.mercola.com/sites/fitness/archive/2013/03/29/back-pain-treatment.aspx>

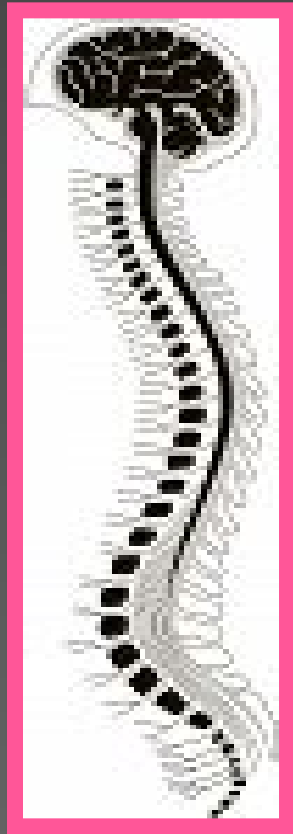
# Anatomy & Physiology of Spine:

Bony & Non-bony Structures that make up normal spinal curves that define Posture

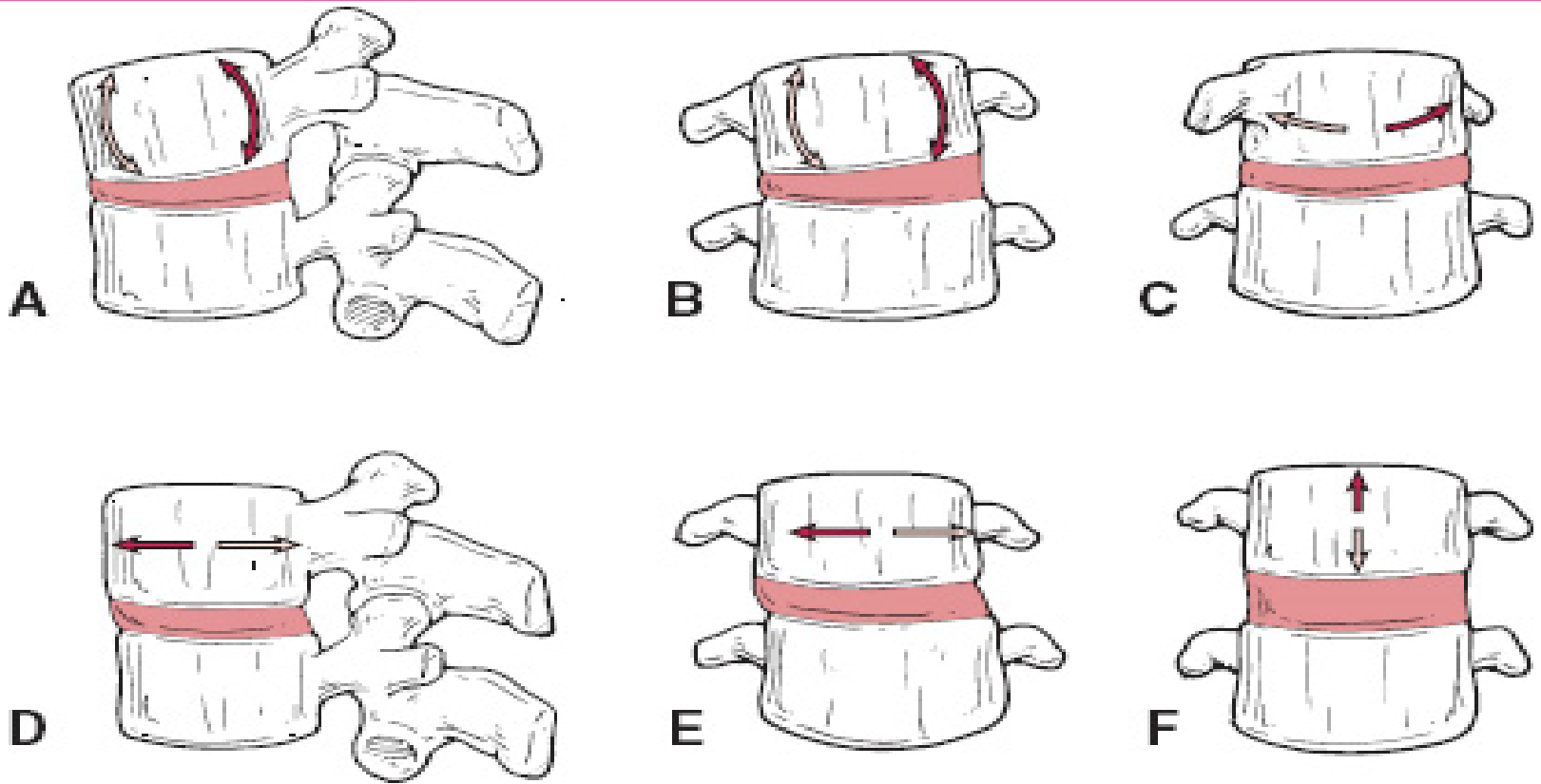
- Curves: 10 times more strength vs. a Straight Back (Lippert)  
Absorb shock  
Balance Center of Gravity

**\*Avoid Diminishing or Exaggerating these Curves\***

- 33 bony (osseous) Structures:  
Vertebrae (Shock absorption & Spinal Cord Protection)
- 23 Non bony (non osseous) Structures:  
Intervertebral discs (Equal Stress & Shock Absorption)  
Annulus & Nucleus Pulposus  
ligaments



# Motion of Spine effects Nucleus Direction of Movement



A: Flexion/Extension

B: Lateral Flexion/Side Bending

C: Rotation

D: Anterior/Posterior Shear

E: Lateral Shear

F: Distraction/Compression

# "Slipped Disk" (HNP Herniated Nucleus Pulposus) & Back Pain!

**Disk Protrusion/bulging:** nucleus bulges against annulus

**Disk Extrusion/herniated:** nucleus broken through annulus  
but confined by Posterior Longitudinal Ligament

**\*L4 & L5 Most commonly affected in Low Back\***

## "Sciatica/Pinched Nerve" (Radiculopathy)

Mechanical Compression or inflammation of a nerve root  
that causes neurologic symptoms in the lower extremities  
change in reflexes, strength loss or sensory loss

### Causes:

Bone Spurs or large disk protrusion

### Symptoms:

pain, numbness, tingling, weakness, burning or  
paresthesia

Robin McKenzie.....

# Derangement Syndrome

## Peripheralization & Centralization

### Peripheralization: (Radiculopathy)

Symptoms are experienced further down the leg

### Centralization:

Radiating pain referred from the spine and referred distally, is made to move away from the periphery and toward the mid-line of the spine

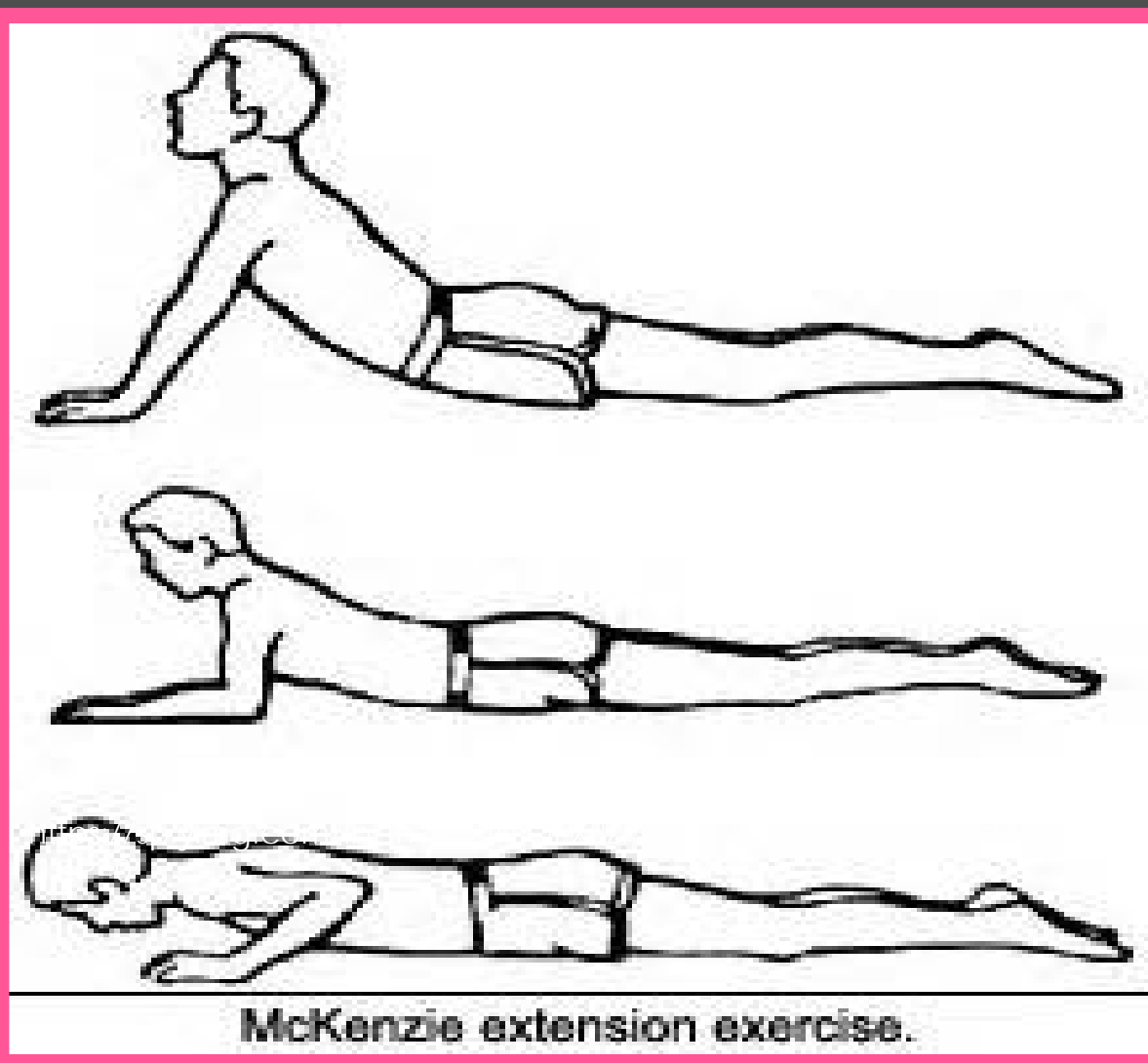
Robin McKenzie  
Technique New  
Zealand PT (1960's):

Extension Exercises  
Help Centralize  
patients Pain



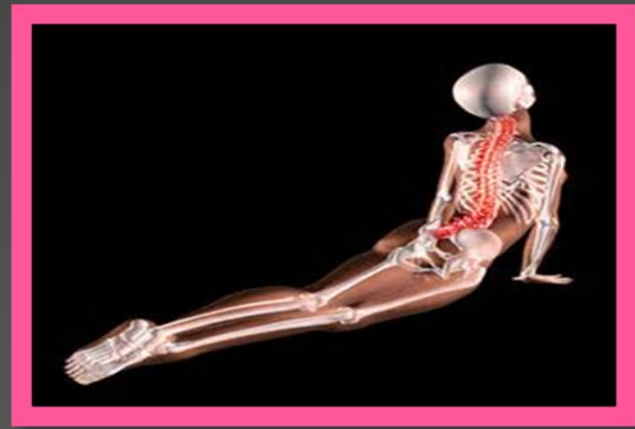


## Extension Exercise 10 minutes a day



# McKenzie Technique Goals

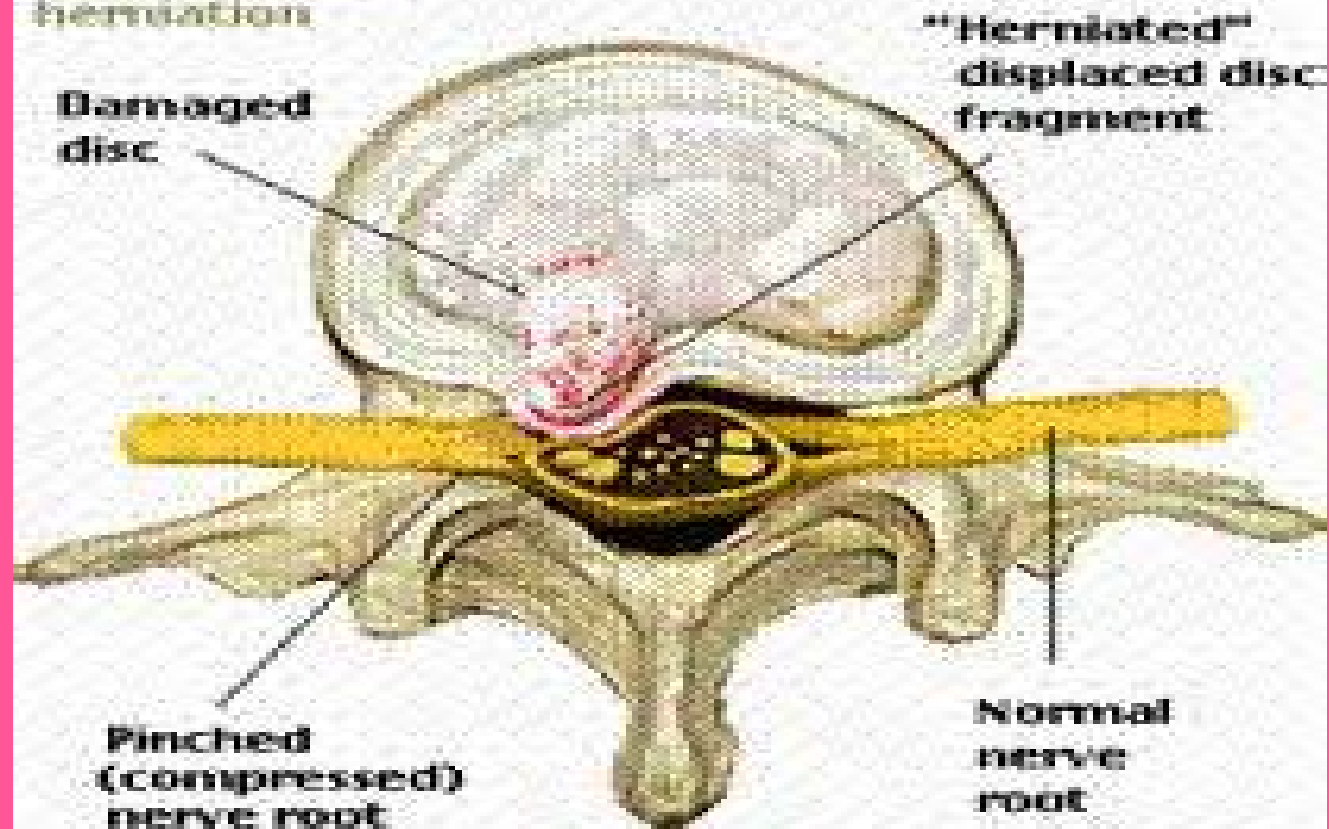
- Reduce pain quickly
- Return to normal functioning
- Re-emphasize lumbar spinal curve
- Minimize the risk of recurring pain & number of return visits to spine specialist
- Self-Sufficiency



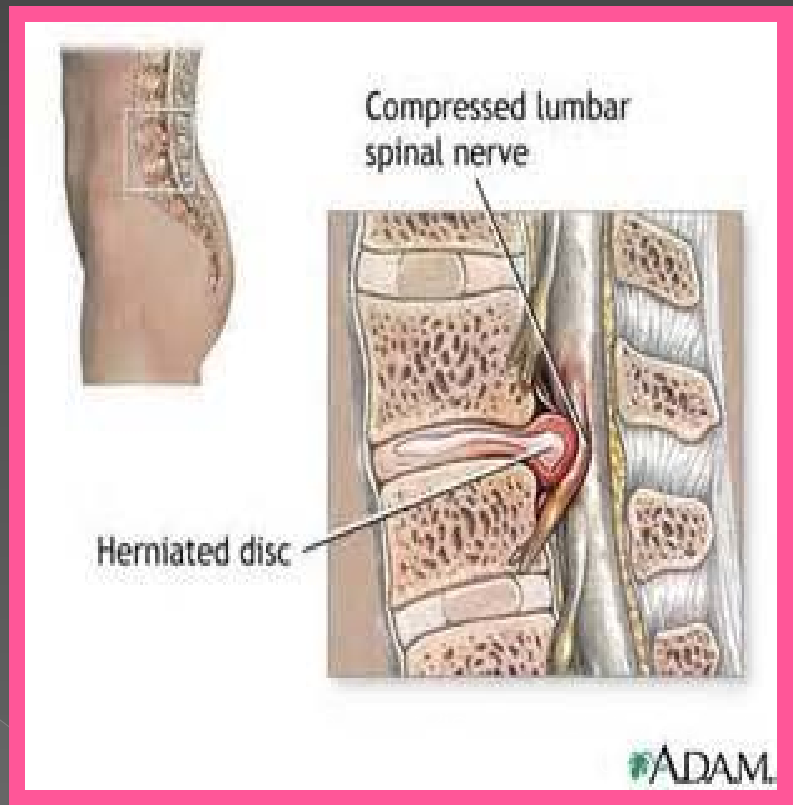
The long-term goal of the McKenzie Method is to teach patients suffering from neck pain and/or back pain how to treat themselves and manage their own pain for life using exercise and other strategies

# Herniated disc

Top view after  
herniation



# Too much postural flexion causing posterior Extrusion of NP resulting in Low Back Pain



Need Good  
Posture & Strong  
Flexible Muscles  
to Support  
Your Spine

Muscular Stability.....

# Lumbar Muscles: Dynamic Stability

When the center of gravity falls outside the base of support, either the structure falls or some force must act to keep the structure upright. (Kisner 415)

**Trunk Muscles** = Force of Stability “Personal Corset”

Anterior muscles:

Transverse Abdominals, Rectus Abdominis,  
External Oblique, Internal Oblique

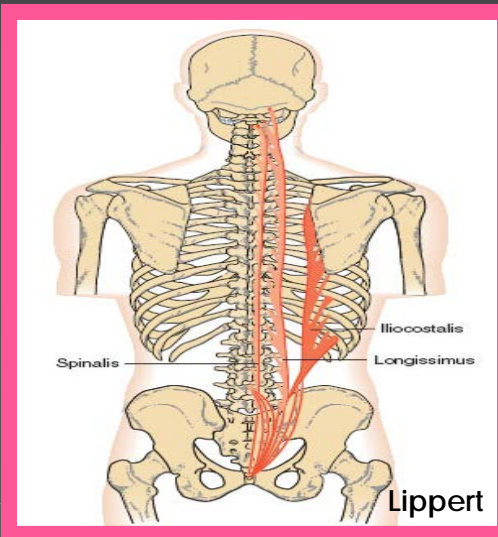
Dorsal (Back) muscles: (Back Extension, Lateral Bend and Rotation)

Superficial: Erector Spinae Spinalis, Iliocostalis, Longissimus

Deep: Transversospinalis Semispinalis, Rotatores, & Multifidus

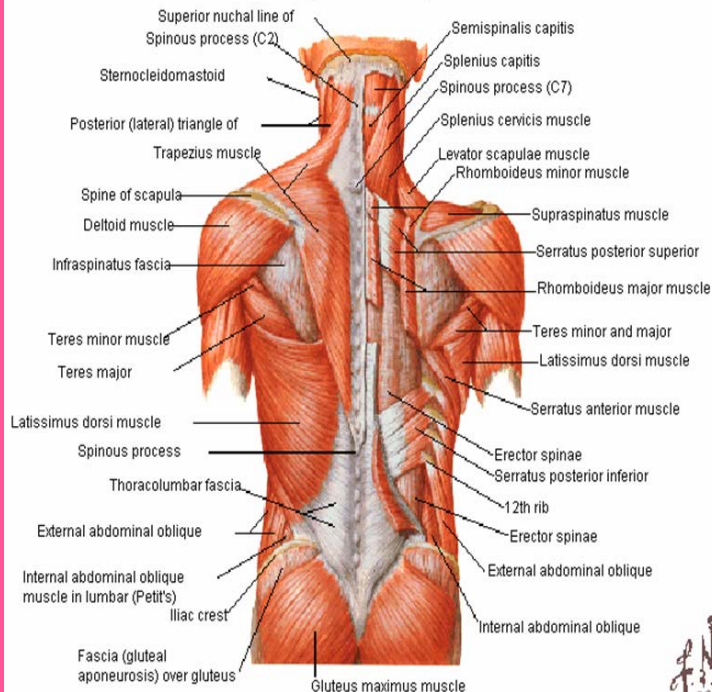
Imbalances (Too tight / Too Weak)..... cause [uneven] forces on the spine & affect posture. (Kisner 423)

# Trunk Muscles of Stability

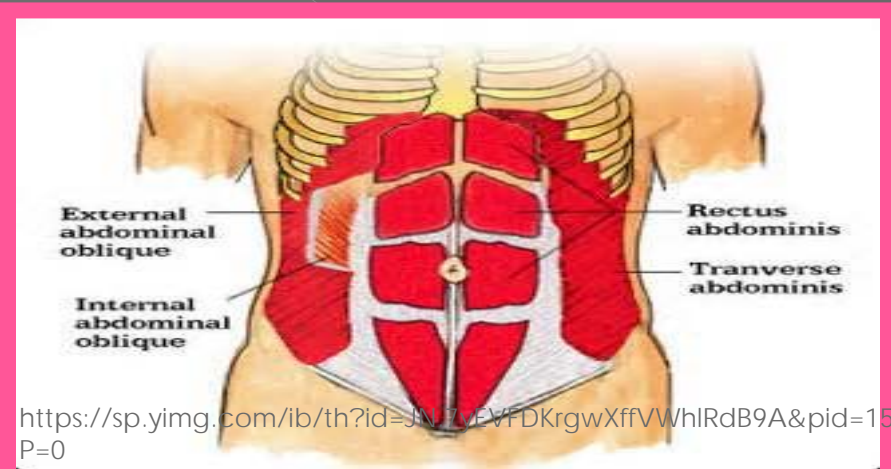


Snapped with HyperSnap-DX  
<http://www.hyperionics.com>

## Muscles of Back Superficial Layers



**TrA & Multifidus - "Basic  
Functional Unit of a Movement Skill"**  
(Richardson & Jull)  
**Activates PRIOR to UE & LE Limb Motion**  
**Often Atrophied with LB Pain!**



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# Muscular Injury (Shankman)

Sudden violent muscular contractions or awkward repetitive poor posture ( causes Micro damage) while.....

- Attempting to lift heavy object
- Combined Lumbar Extension & Rotation (Torque)

Objective #3 Posture.....

# Definition of Posture?

Posture is alignment of the body parts whether upright, sitting, or lying down & is described by the positions of the joints and body segments in terms of the balance between the muscles crossing the joints!!! (Kisner)





# Principles of good body mechanics

- Avoid stress to the trunk
- Maintain spinal curves by

Maintaining good posture;

Whether Vacuuming the floor,  
Raking Leaves, or Picking up a Box  
from the Floor. (Lippert 336)



Pain a Guide.....

Don't Wait Till You're in Pain.....

Effects of Poor Posture.....

# Effects of Poor Posture

- **Poor Posture / Postural Pain Syndrome / Postural Dysfunction**
  - Strain Muscles & Ligaments = Injury
  - Limited Lung Expansion = less energy & O<sub>2</sub> to your cells
  - Bulging Disc = Compress Nerves
  - Back & Neck pain (Headaches)
  - **Several Different Postures lead to many Different Body Aches & Pains!!!**

Causes of Poor Posture.....

# Causes of Poor Posture

- ◉ Habit
- ◉ Poor Muscle Tone / Sedentary Lifestyle
- ◉ Disease
- ◉ Previous Injuries / Surgeries
- ◉ Stress
- ◉ Fatigue

# Natural Posture:

- Head over shoulders
- Chin parallel
- Gentle forward curve in neck
- Shoulders level & not slumped
- Backward curve in upper back
- curve in lower back
- **Goal** = avoid exaggerating or diminishing these curves
- **Self-Check** = Hand in lower back



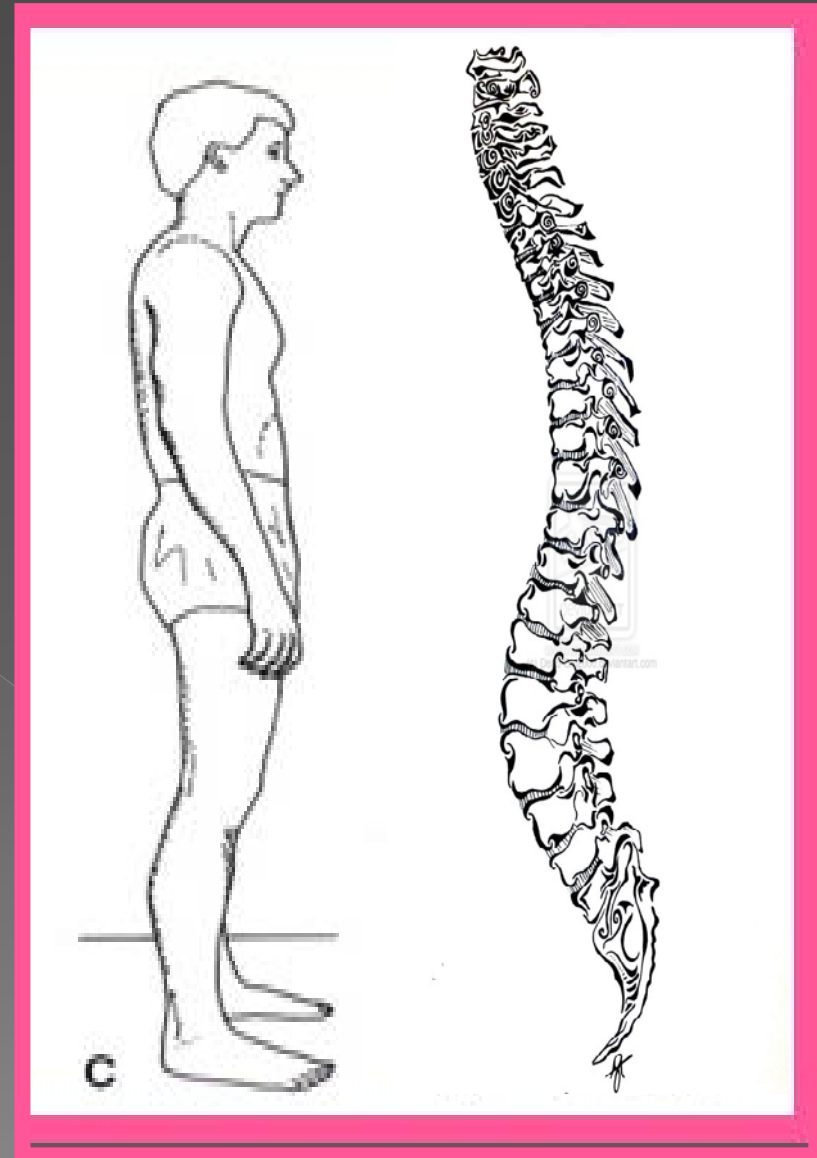
Vs. Poor Posture.....

# Poor Posture Effects of Low Back Pain

## Flat Low Back Posture

Continued Slouching in Sitting Positions & Overemphasis on Flexion Exercises

- Tight Abdominals & Hip Extensors
- Weak Lumbar Extensor
- Stress to Posterior Longitudinal Lig.
- Reduced Lumbar Shock Absorbency & Posterior NP Protrusion



# Interventions: What can be done for Low Back Pain!

- Self-awareness = Think Tall!!!!!!
  - Medical & Physical Therapy
  - Strengthen & Stretch
  - Ergonomics  
(minimize stress on the LB)
- 
- Driving, Sitting, Sleeping, & Standing Positions
  - Practice Proper Lifting Techniques



# Medical Interventions vs. Physical Therapy

## Epidural Steroid Injection

temporary (not intended for curative) relief of pain and reduction of inflammation

## Surgery (Laminotomy or discectomy)

30% of patients may have significant back pain at follow up (Shankman)

**4-10 weeks:** Meds & Stabilization Ex. = Both Pain Free LB

## 10+ Weeks:

Multifidus 14% smaller w/ Meds **BUT** Restored w/ Stabilization ex.

## 1 Year:

84% LB Pain Recurrence w/ meds **BUT** only 30% Recurrence w/ Ex. (Hides, Richardson, Jull. Spine 1996)

Pt Interventions.....

# Physical Therapy Interventions: Stay Active! (Shankman) for Acute & Chronic LB Pain!!!!

## Physical Therapy Evaluation Important

- Manual Therapy (Acute & Chronic)
- Lumbar Stabilization Exercises (Chronic)

## Stretching:

Hip Flexors

Hamstrings

Quads

Back





# Strengthening:

- Lumbar Stabilization Muscles
- Back Muscle
  - Multifidi/Extensors/TrA
  - Hamstrings & Gluteals



Proper exercises.....

# Proper Exercise: Pain/Disability Reduction

Back Pain: Prevention and Treatment. (n.d.). Retrieved May 31, 2015, from <http://fitness.mercola.com/sites/fitness/archive/2013/03/29/back-pain-treatment.aspx>

Pain for 2-3 wks. having no peripheralization:  
50% reduction in Disability in 1-2 weeks

Chronic LB pain  
50% reduction in disability in 8 wks.

Research has shown...  
appropriate exercise program will allow for less pain  
and disability for up to 6 months  
(Shankman 331)

Obj. #6 Proper Lifting Techniques &  
Ergonomics.....

# Prevention: Lifting Techniques (Shankman)

## 5 L's (Load, Lever, Lordosis, Legs, and Lungs)

Load:

Proper weight for individual

Lever:

Object as close to the body as possible throughout lift

Lordosis:

Lower back curve maintained throughout lift

Legs:

Use legs NOT back

Lungs:

Exhale during lift



# Proper Lifting Techniques

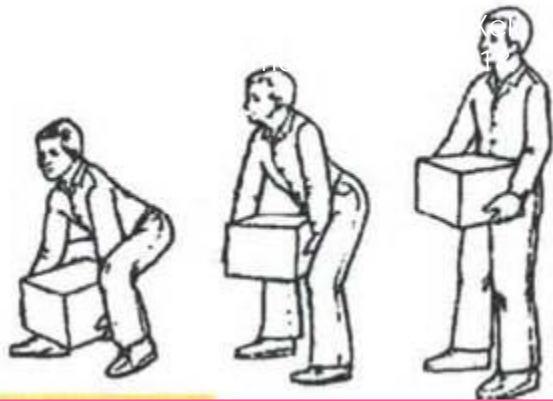


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Golfer's lift

Center of Gravity  
Over Base of  
Support  
& when you  
don't.....



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Stoop Lift

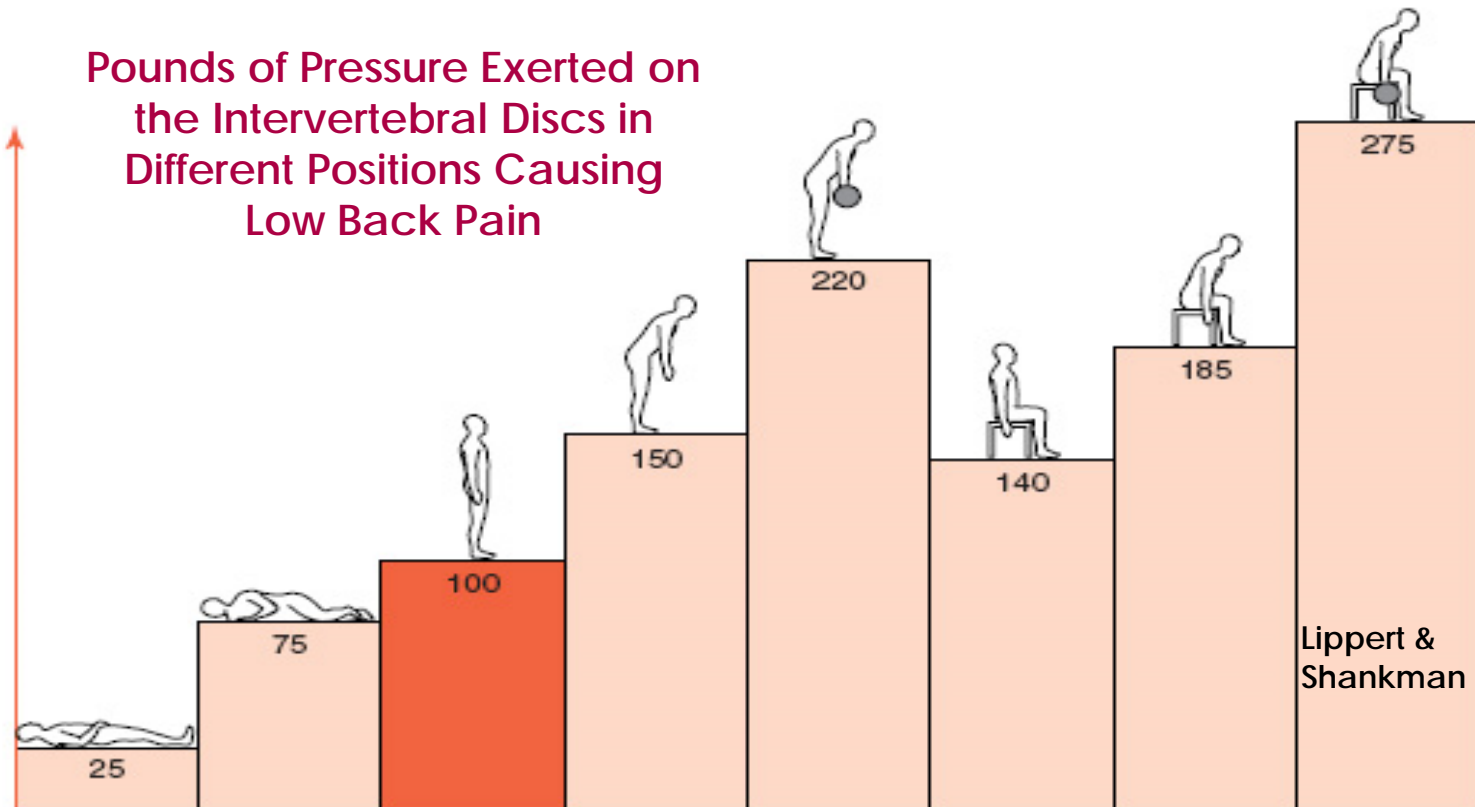
Golfers Lift

Power Lift

Deep Squat Lift

Half Kneeling Lift

**Pounds of Pressure Exerted on  
the Intervertebral Discs in  
Different Positions Causing  
Low Back Pain**



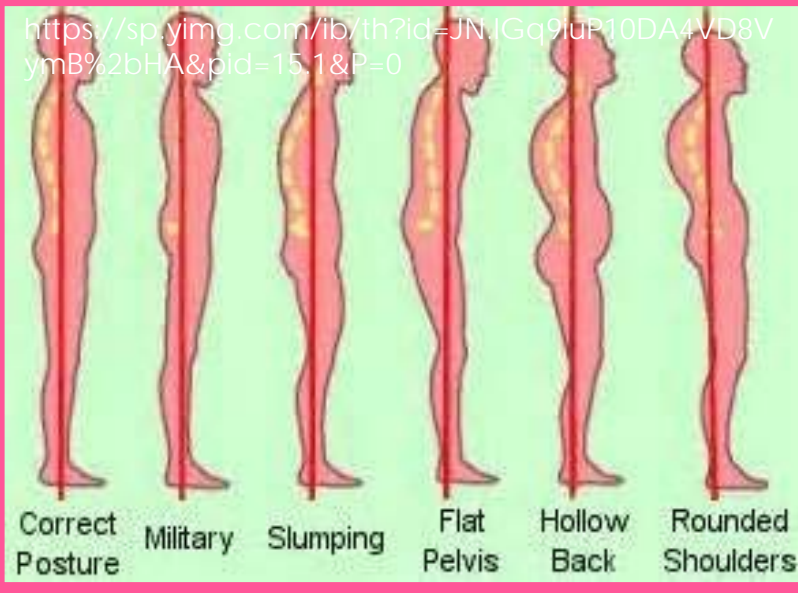
Rationale for protective postures, lifting protocols, and appropriate body mechanics, as well as prescribed exercises for specific lumbar spine conditions!!!! (Shankman 325)

Tips in Standing & Sitting.....

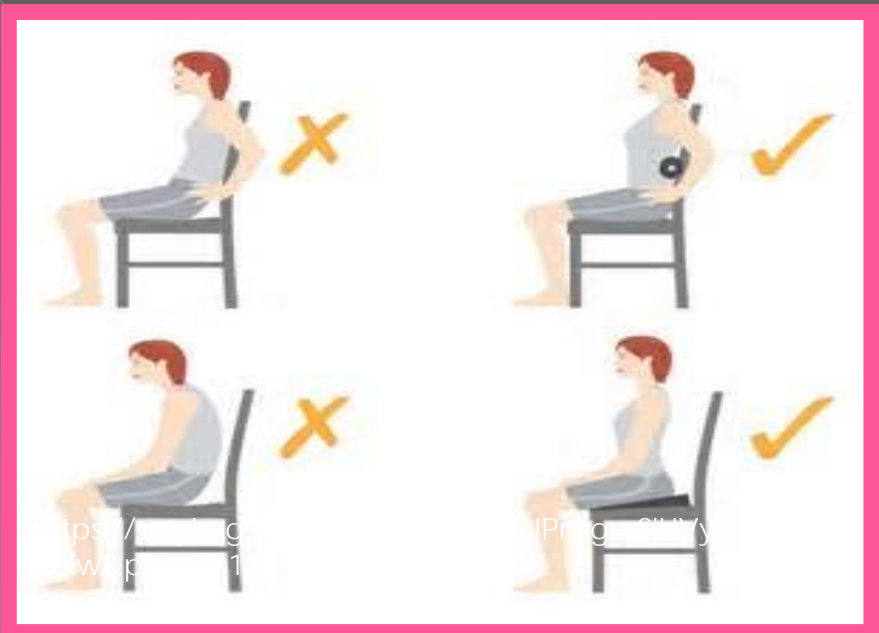
# Standing & Sitting

- Don't stand Too Long in One Position
- Shift Weight Side to Side evenly Without Favoring One Side
- .....
- Sit With Shoulders Against Back of Chair
- Sit With Chest Lifted & Upper Back Straight

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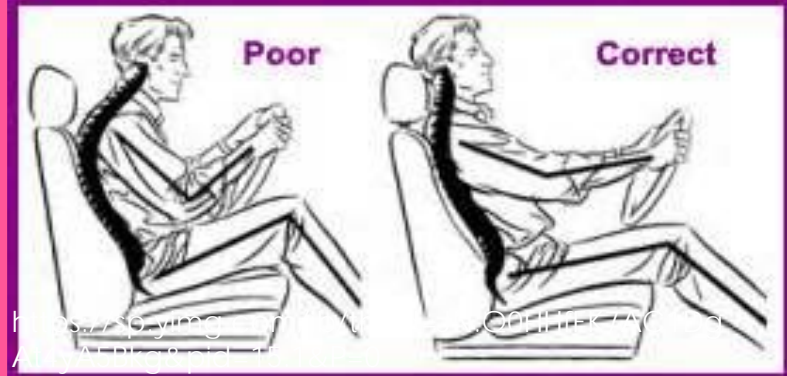
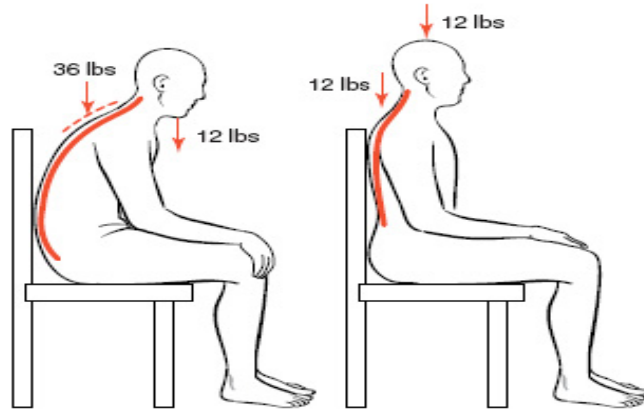


- Chair Close to Desk So You Don't Lean Over
- Sit With a Small Lumbar Roll
- Sit With Feet Flat To Avoid Excessive Lumbar Lordosis & Anterior Incline
- Get Up and Walk Around Every 20-30 Minutes

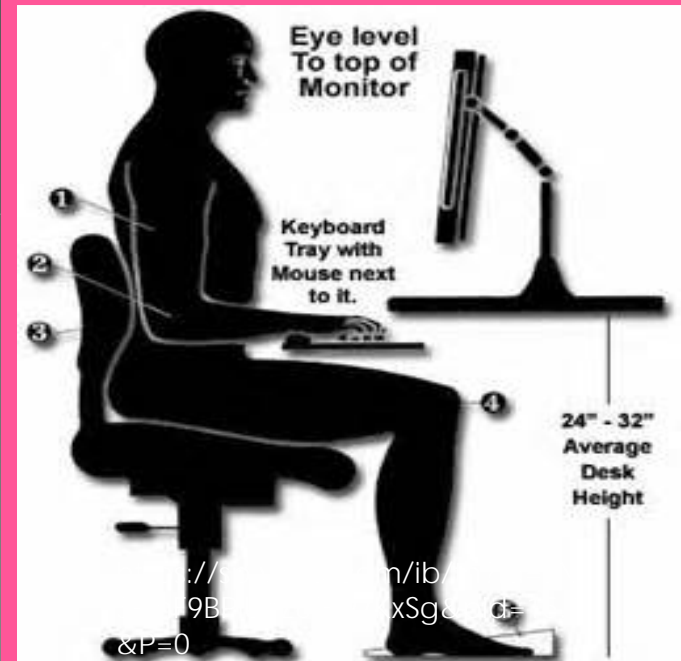
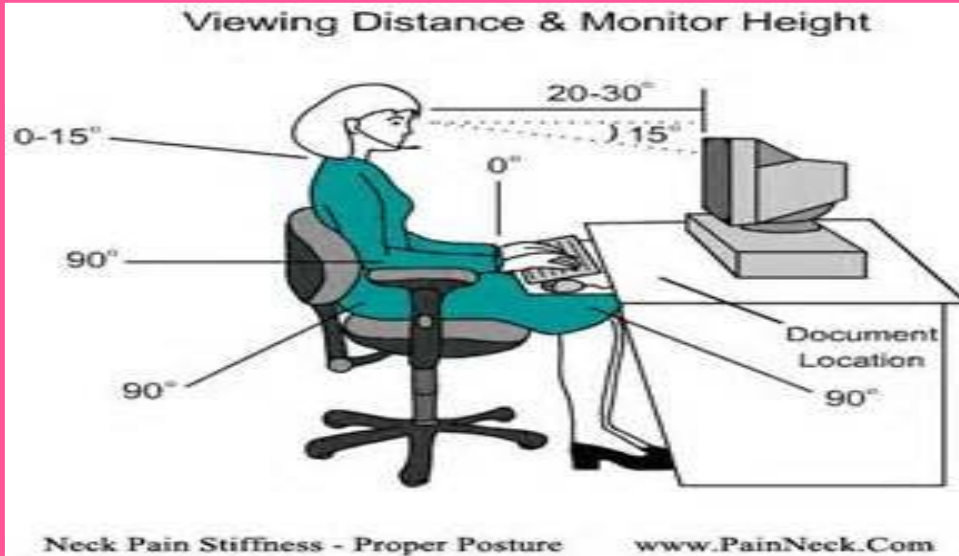




We spend an average of 56 hours a week sitting (WHM)



Stop Every Couple of Hours to Stretch & Walk Around



Ergonomic Chair.....

# Ergonomics:

(Equipment designed to help with discomfort)

## Kneeling stool reduces disk pressure

(Lippert 335)



Standing to work because this uses more muscle activity & burns about 20% more calories than sitting (Cuergo) (Use Ergonomic Foot Stool)



1/3 of our life is spent lying in  
bed, on the couch, or on the  
floor



Recommended position for Low  
Back Pain

Awareness!!!!

Practice!!!!

Consistency!!!!

Prevention!!!!



Helpful Websites for the Everyday Person

(<http://www.osha.gov/SLTC/ergonomics/>)

(<http://ergo.human.cornell.edu/>)

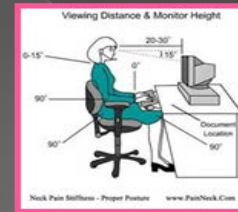
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## References Continued



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# Posture & Low Back Pain

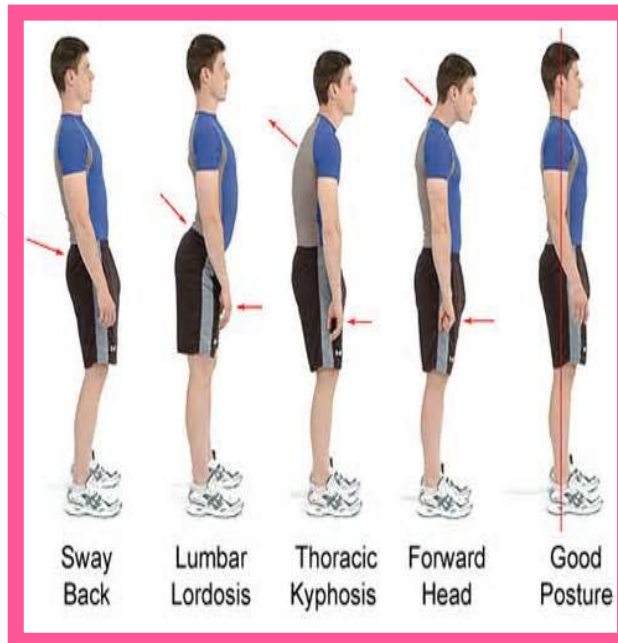
**75-85% of People experience Low Back Pain & Most of it is due to Poor Posture!!!!**

Most principles of good body mechanics involve avoiding stress to the trunk and maintaining the spinal curves, which involve maintaining good posture; Whether Vacuuming the floor, Raking Leaves, or Picking up a Box from the Floor!!!!  
(Lippert 336)

**Proper Lifting Techniques Help Avoid Low Back pain!!**

## Natural Standing Posture

- Slight Hollow in lower back
- Gentle forward curve in neck
- Backward curve in upper back
- Goal = avoid exaggerating or diminishing these curves
- Don't stand Too Long in One Position
- Shift Weight Side to Side evenly Without Favoring One Side



## Functional Ergonomics

Sites to Visit for More/Recent Information

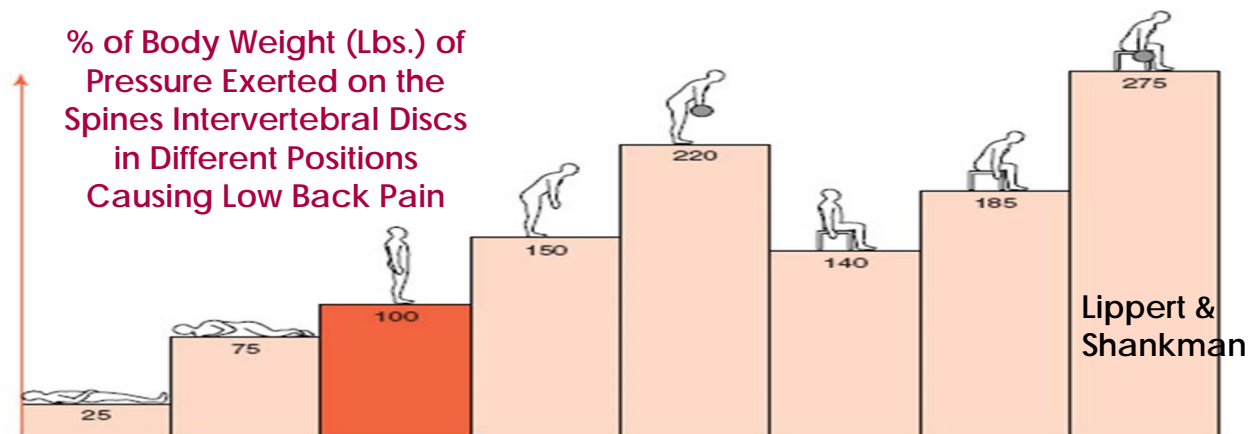
<http://www.osha.gov/SLTC/ergonomics/>

<http://ergo.human.cornell.edu/>

**Don't wait till you're in Pain to Correct Your Posture!!!!**



% of Body Weight (Lbs.) of Pressure Exerted on the Spines Intervertebral Discs in Different Positions Causing Low Back Pain



Kneeling Stool posture reduces disk pressure in low back!!!!!! (Lippert 335)

## Proper Sitting Posture

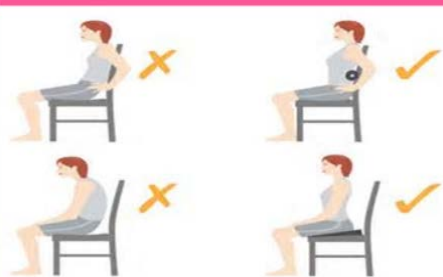
- Sit With Shoulders Against Back of Chair
- Sit With Chest Lifted & Upper Back Straight
- Chair Close to Desk So You Don't Lean Over
- Sit With a Small Lumbar Roll
- Sit With Feet Flat & with an Anteriorly Tilted Seat to Avoid Excessive Lumbar Lordosis
- Get Up and Walk Around Every 20-30 Minutes

Awareness!!!!

Practice!!!!

Consistency!!!!

Prevention!!!!



Patients can expect to receive 50% reduction in disability with appropriate exercise program as well as reduced pain for up to 6 months!!!!!! Stay Active!!!!



Most people have a forward posture causing great stress on the spine's Nucleus Pulposus Resulting in Low Back & Peripheral Pain!!!!!!

Extension Exercises (McKenzie Technique) helps to reduce the stress on the Disks & Peripheral Nerves by Stretching the Anterior Ligaments and Muscles to Aid in Low Back Pain!!!!!!