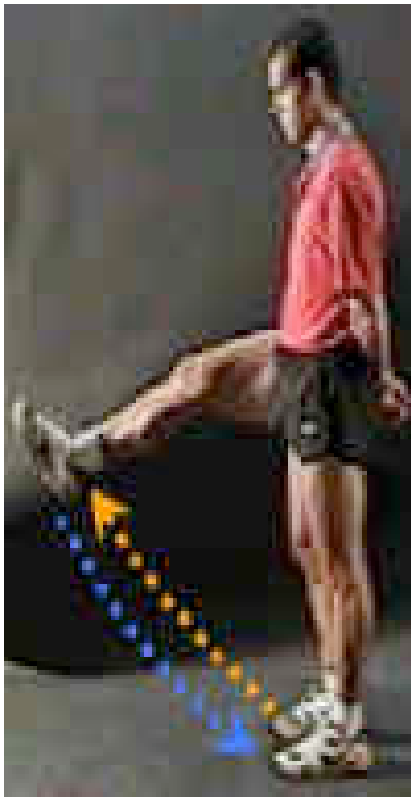


# Exercises for the Spine

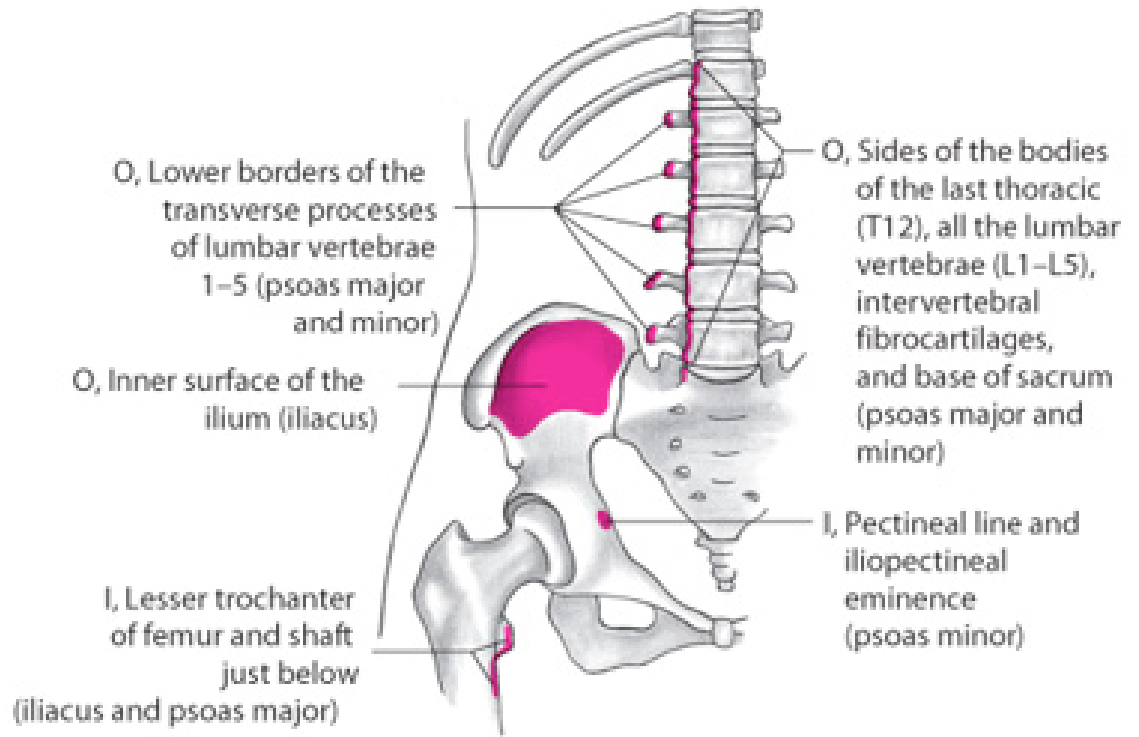
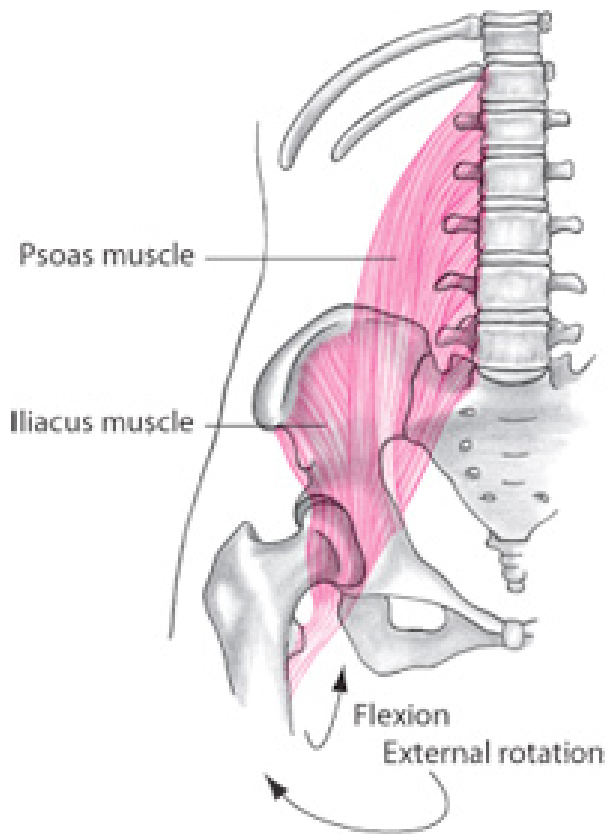


# Hip Flexion

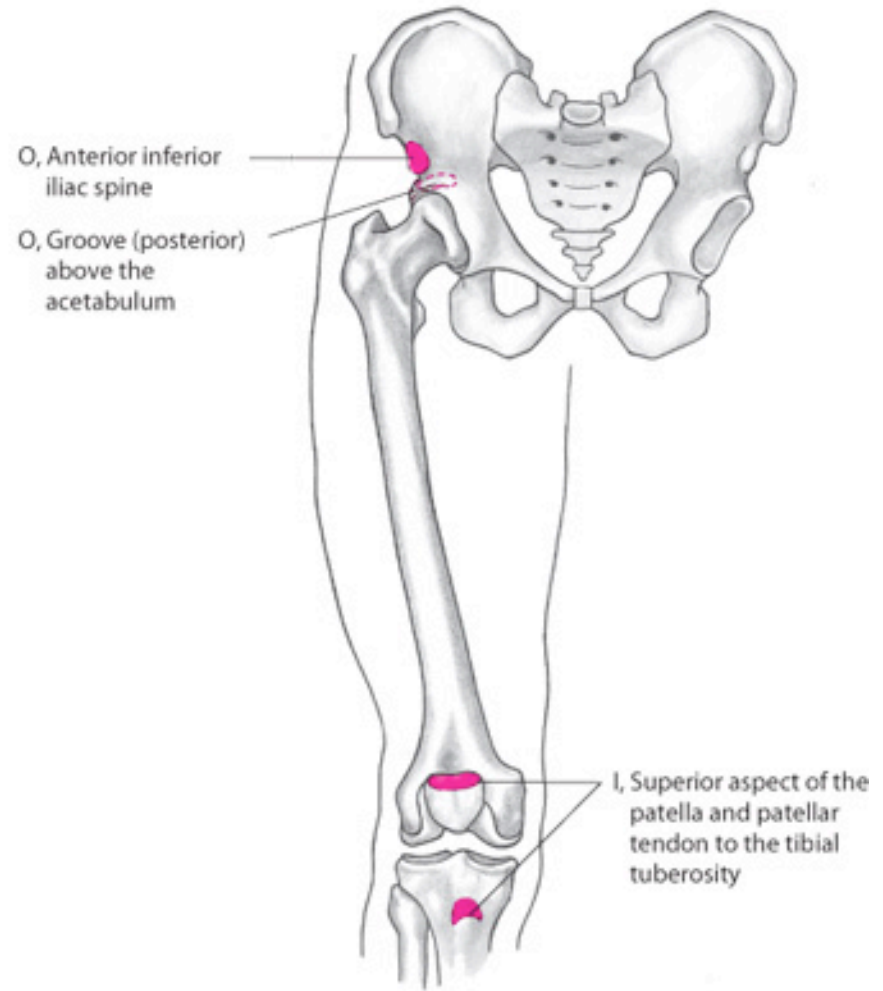
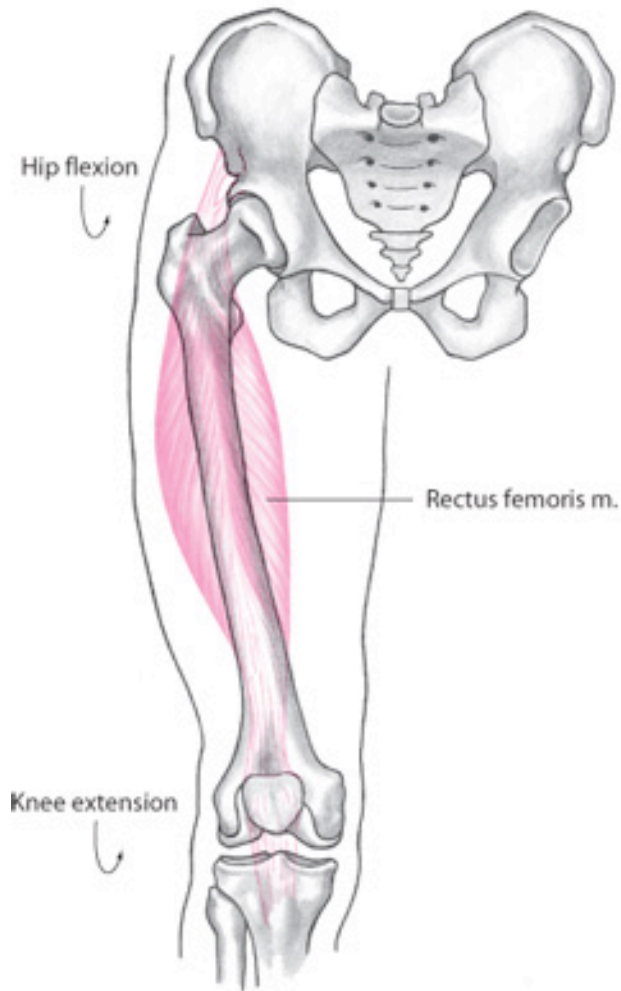


Flexion  
A

# Iliopsoas



# Rectus femoris



# Abdominal Exercises

- Effective abdominal exercises emphasize lumbar flexion of the abdominal muscles
- Hip flexor muscles (e.g. iliopsoas) can also perform lumbar flexion

# Abdominal Exercises

- Flexing the knees neutralizes the hip flexor muscles
- Stabilizing the feet increases the involvement of the hip flexors and decreases the involvement of the abdominal muscles



# Crunches



# Abdominal Exercises

- Rectus Abdominis and the obliques contract only if lumbar flexion occurs.
- With no lumbar flexion, Rectus Abdominis and the obliques will only isometrically contract to stabilize the pelvis and waist.
- It may be necessary to completely flex the hips before lumbar flexion is possible





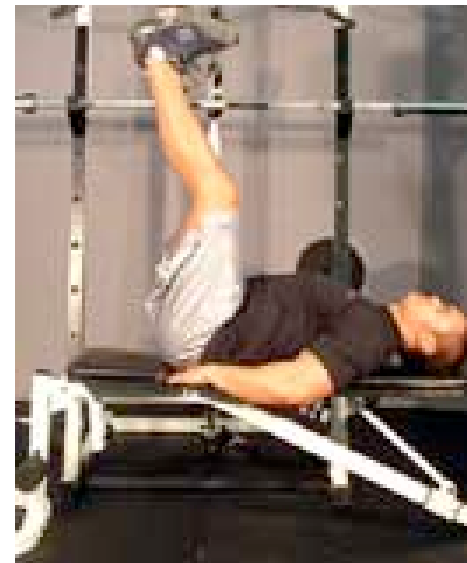
# Leg Pull or Reverse Crunch

- Action: Hip flexion and Lumbar flexion
- Muscles: Lower (?) rectus abdominis , obliques, and hip flexors



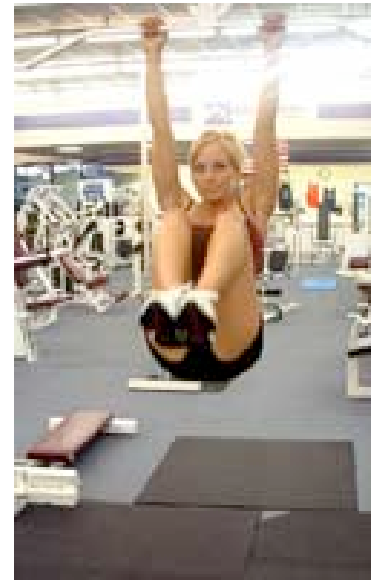
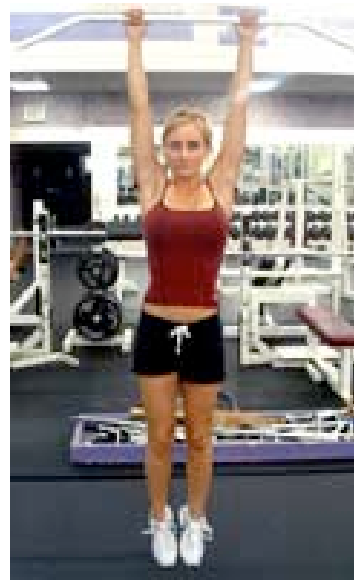
# Leg Raises

- Action: mostly hip flexion
- Muscles: First, hip flexors then as the hips are raised off the ground, the rectus abdominis becomes more involved



# Leg Raise

- Muscles: First, hip flexors. As the upper leg passes horizontal, rectus abdominis becomes more involved



# Abdominal Exercises

- Muscles: Obliques (rectus abdominis and hip flexors)
- Notice her right external oblique - rotation to the opposite side
- Her left internal oblique - rotation to the same side



# Sit-Ups

- Muscles: Rectus abdominis (obliques and hip flexors)
- Note: Flexing the lumbar region emphasizes the rectus abdominis only at the beginning
- The last half of a sit-up emphasizes hip flexor muscles and puts stress on the lumbar vertebrae



# Incline Sit-ups



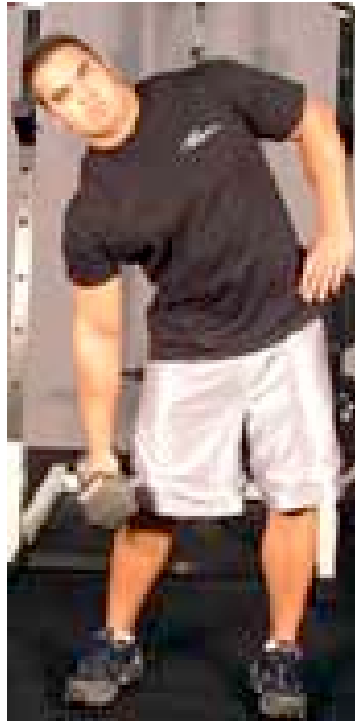
- Increased resistance
- Greater stress to lumbar vertebrae?

# Side Bends



- Action?
- Lateral Flexion
- Muscles:
- Quadratus Lumborum, Rectus Abdominis, External Oblique, Internal Oblique, and Erector spinae

# Side Bends



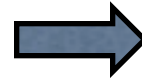
Action: lateral flexion to his left



- Muscle?
- Transverse abdominis



# Lower Back



- Action?
- Lumbar extension
- Muscles:
- Erector spinae

# Lower Back



# Lower Back



Illustrations: © 1998.Terry Boles

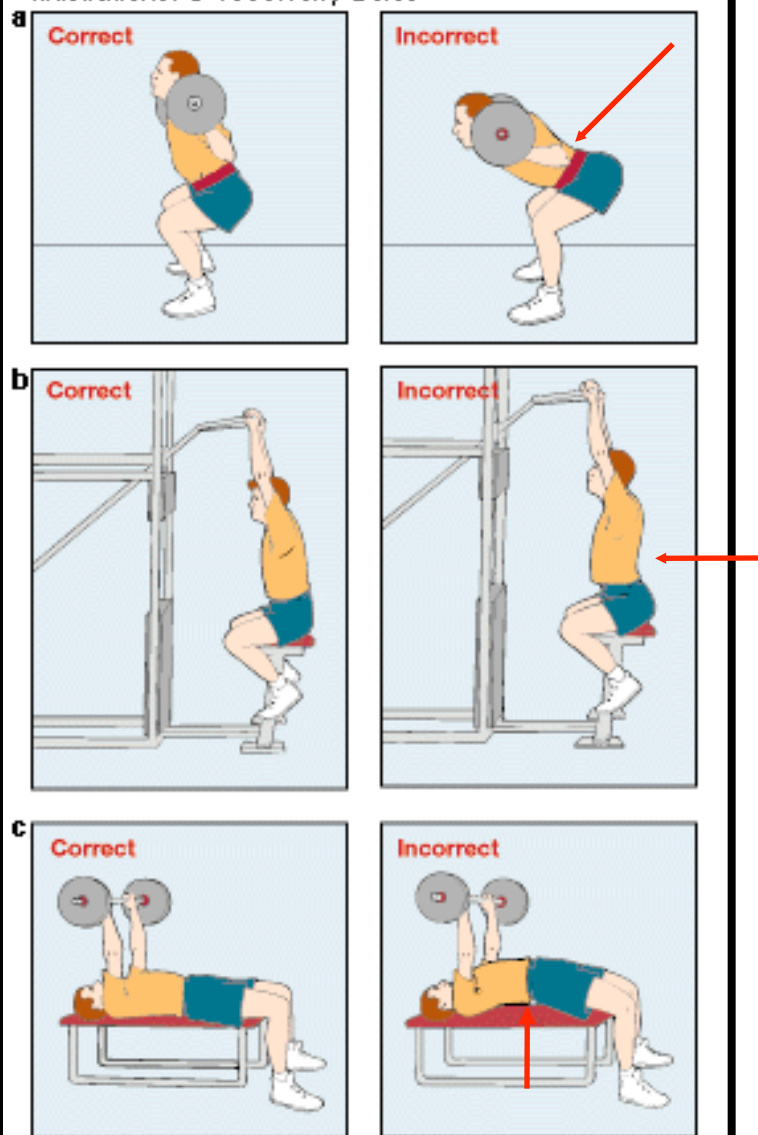
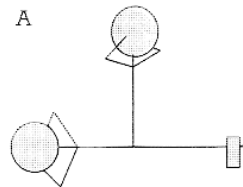
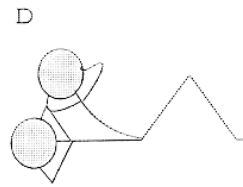


Figure 2. Spondylolysis, a fracture or stress reaction of the pars interarticularis, can occur because of improper technique during weight lifting. Patients should avoid hyperextending the lumbar spine during squats (a), military (deltoid) presses (b), and bench presses (c).

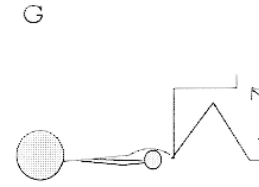
- No one type of abdominal exercise is best.



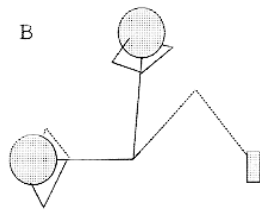
*STRAIGHT-LEG SIT-UP*



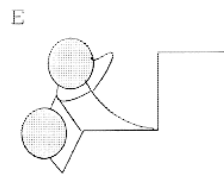
*CSTF CURL-UP (FEET FREE)*



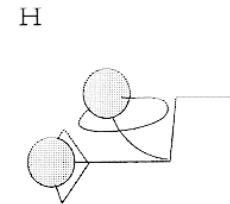
*BENT-LEG RAISE*



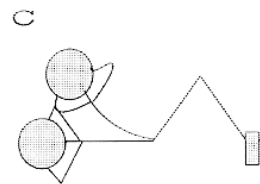
*BENT-LEG SIT-UP*



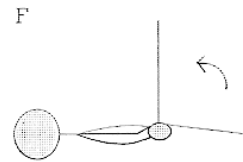
*QUARTER SIT-UP*



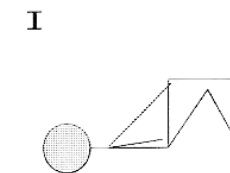
*DYNAMIC CROSS-KNEE CURL-UP*



*CSTF CURL-UP (FEET FIXED)*



*STRAIGHT-LEG RAISE*



*STATIC CROSS-KNEE CURL-UP*

Are abdominal exercises  
*effective* in losing body fat  
around the waist?

**No!**

## **FTC Charges Three Top-selling Electronic Abdominal Exercise Belts with Making False Claims (2002)**

### ***Alleges Electronic Abdominal Gadgets Won't Provide Six-Pack Abs***

***"Now you can get rock hard abs with no sweat"***

***"Lose 4 Inches in 30 Days Guaranteed"***

***"30% More Effective Than Normal Exercise"***

***"10 Minutes = 600 Sit-Ups"***

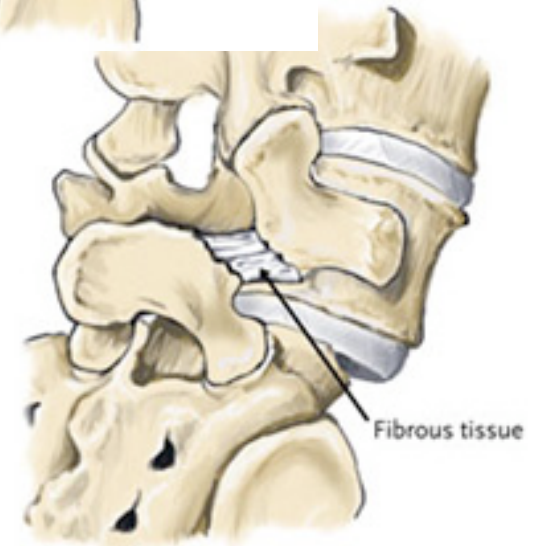
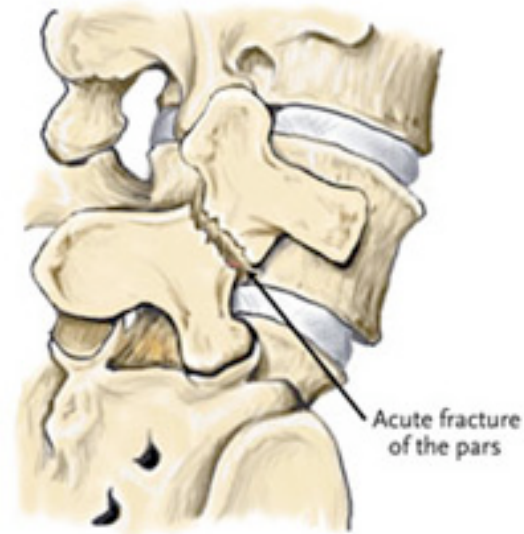
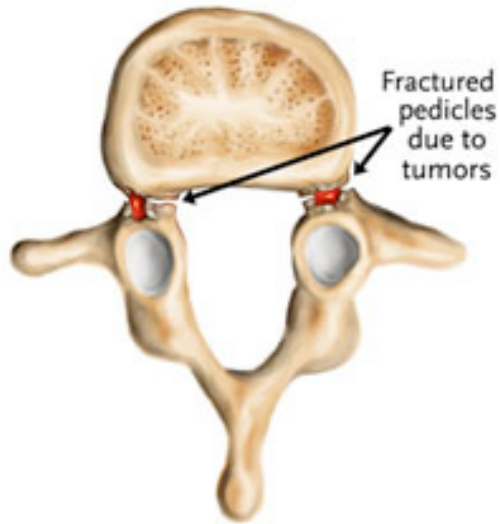
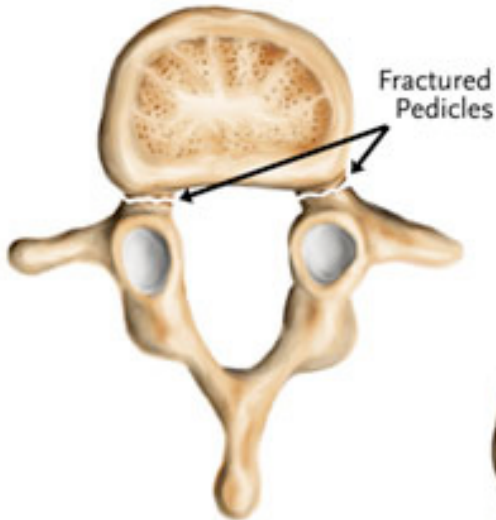
These are the types of claims the Federal Trade Commission has challenged in complaints filed in federal district courts against three widely advertised electronic abdominal exercise belts - AB Energizer, AbTronic, and Fast Abs. The FTC alleges that the marketers of the devices, which use electronic muscle stimulation (EMS), have falsely advertised that users will get "six pack" or "washboard" abs without exercise." For years, marketers of diet and exercise products have been preying on overweight, out-of-shape consumers by hawking false hope in a pill, false hope in a bottle, and, now, in a belt," said FTC Chairman Timothy J. Muris. "Unfortunately, there are no magic pills, potions, or pulsators for losing weight and getting into shape. The only winning combination is changing your diet and exercise."



# Lower Back Injuries

- Lumbar region is most susceptible to chronic injuries
- Due to weak abdominal muscles and tight hamstrings

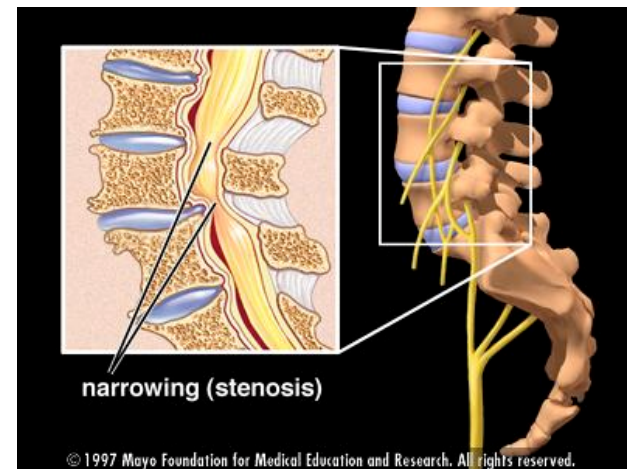
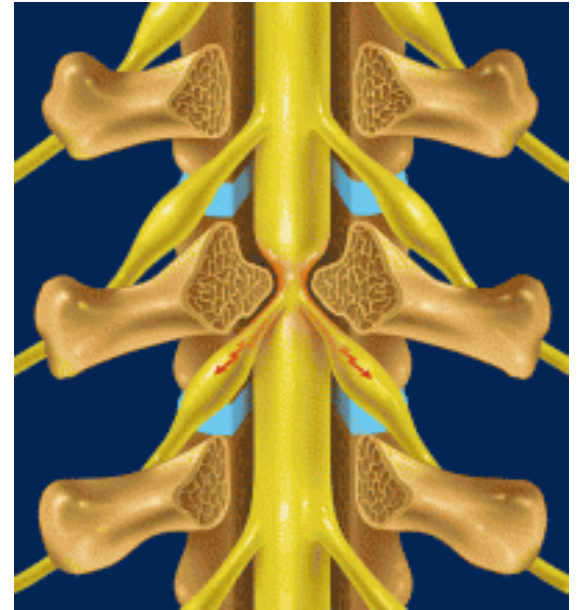
# Spondylolysis



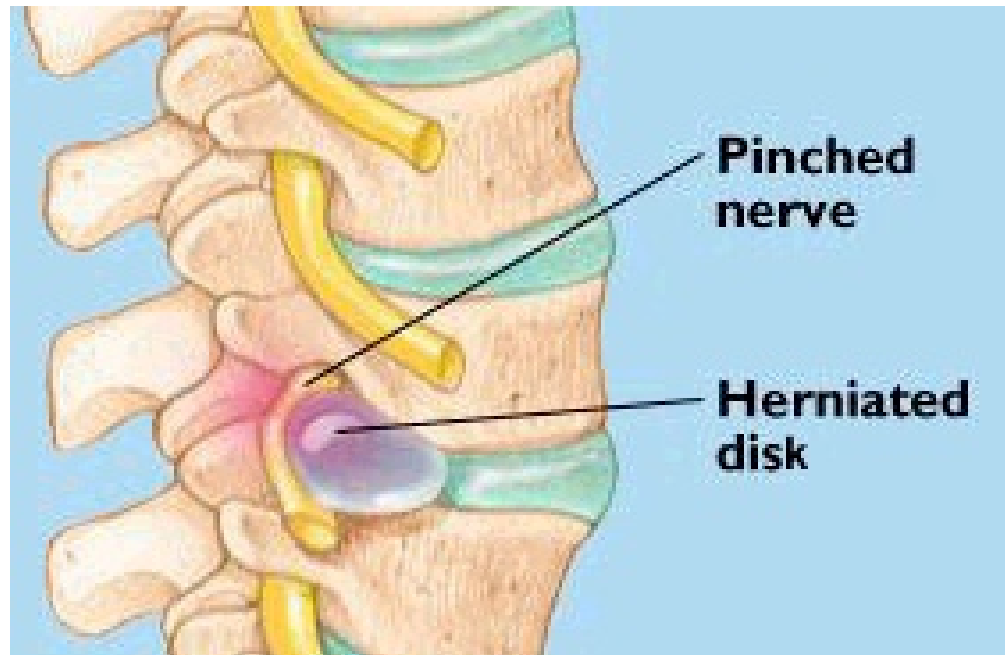
Fracture near the transverse process

# Spinal Stenosis

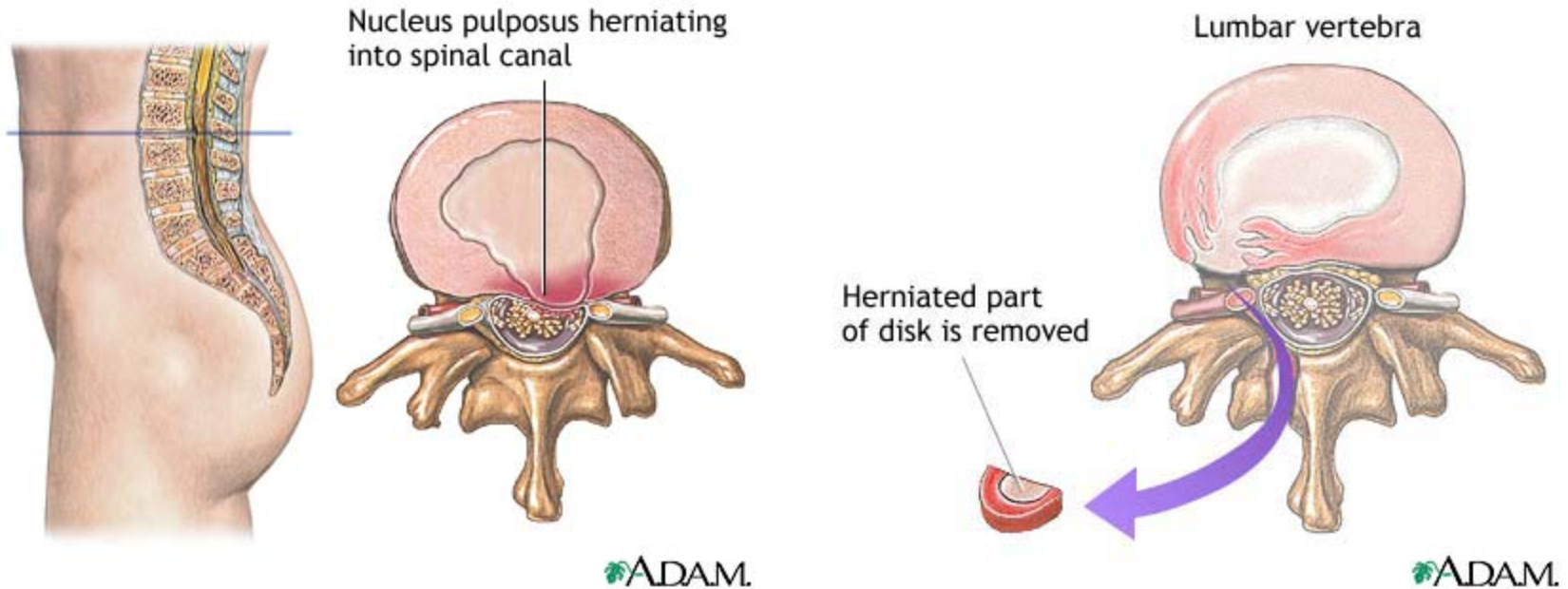
- In spinal stenosis, the vertebral foramen narrows and pinches the spinal cord and nerves.



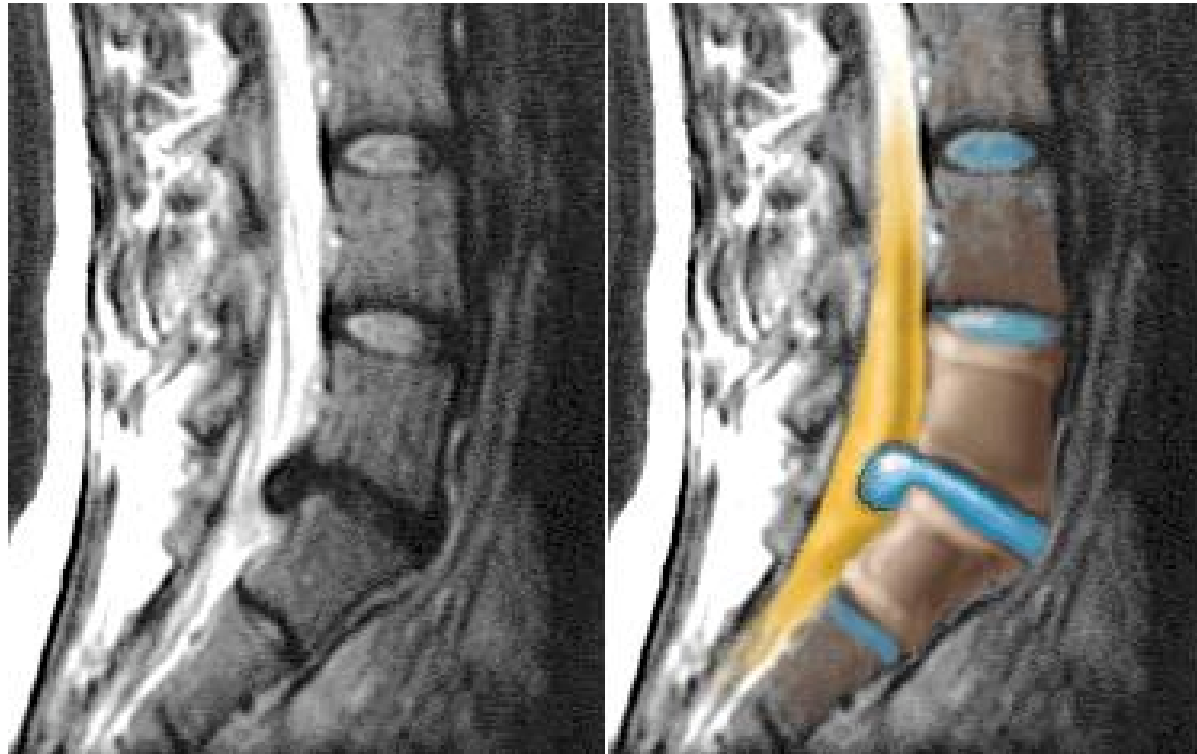
# Herniated Disk



# Herniated Disks

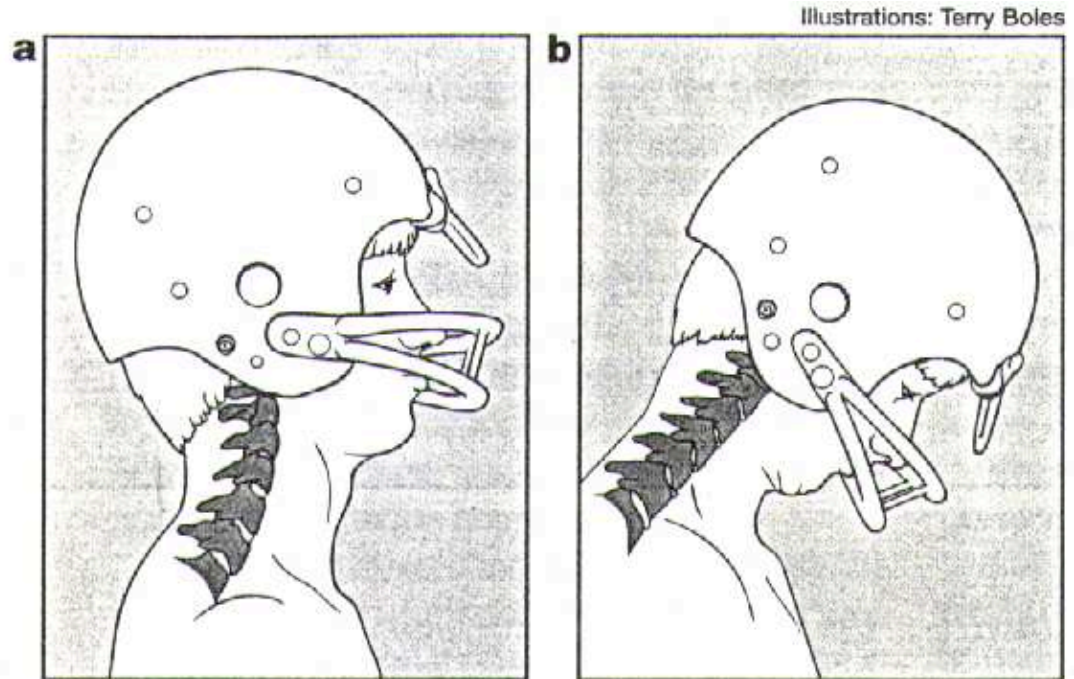


# Herniated Disks



# Neck Injuries

- Axial loading
  - natural curve is removed
  - load or force
  - compression of vertebrae



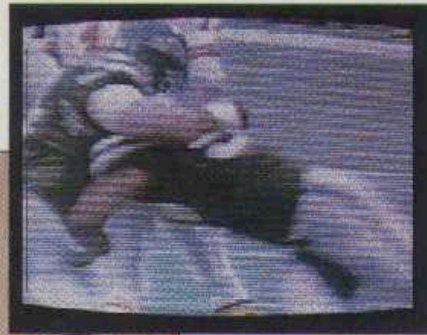
*Figure 1. When the head is held upright (a), the cervical spine shows its natural lordosis. At approximately 30° of flexion (b), however, the lordosis is straightened, converting the spine into a column.*



# Axial Loading

u thundered  
way freight  
he quarter-  
ightly—just  
eadfirst into

Miami Project to Cure  
Paralysis. "A bad bruise  
of only one or two inches  
is enough to leave you  
paralyzed."



NBC SPORTS

## Danger Ahead

When tackler hits with head down, spine compresses, then buckles at point near impact, fracturing cervical vertebra.



### Catastrophe

Burst spinal sheath  
bruises soft tissue

## Playing It Safe

Tackling with head up allows neck muscle to absorb shock, and normal curvature of spine is maintained.

BLUMRICH—NEWSWEEK

is no clear proof th

All players wear  
many wear neck r  
whiplash injuries.  
it's the way the g  
fault. "The cause  
technique," insists  
met, no device that  
spine from catastro

who plays, every c  
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At New York's I  
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taking out the key  
Dr. Patrick O'Lea  
titanium plates to  
cervical column. I

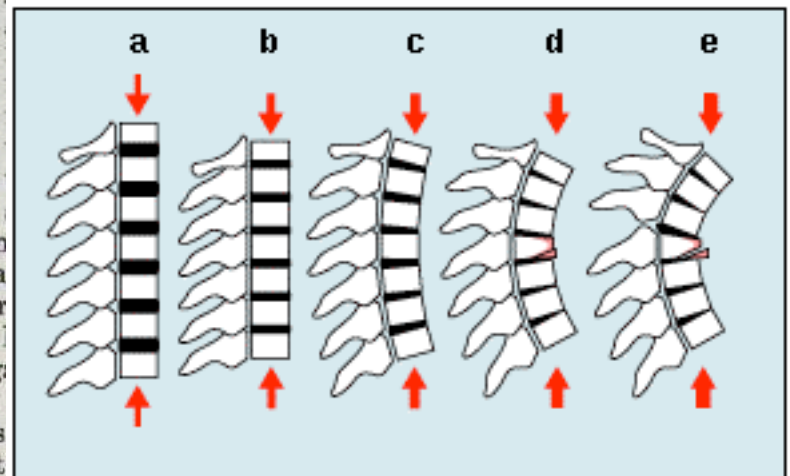
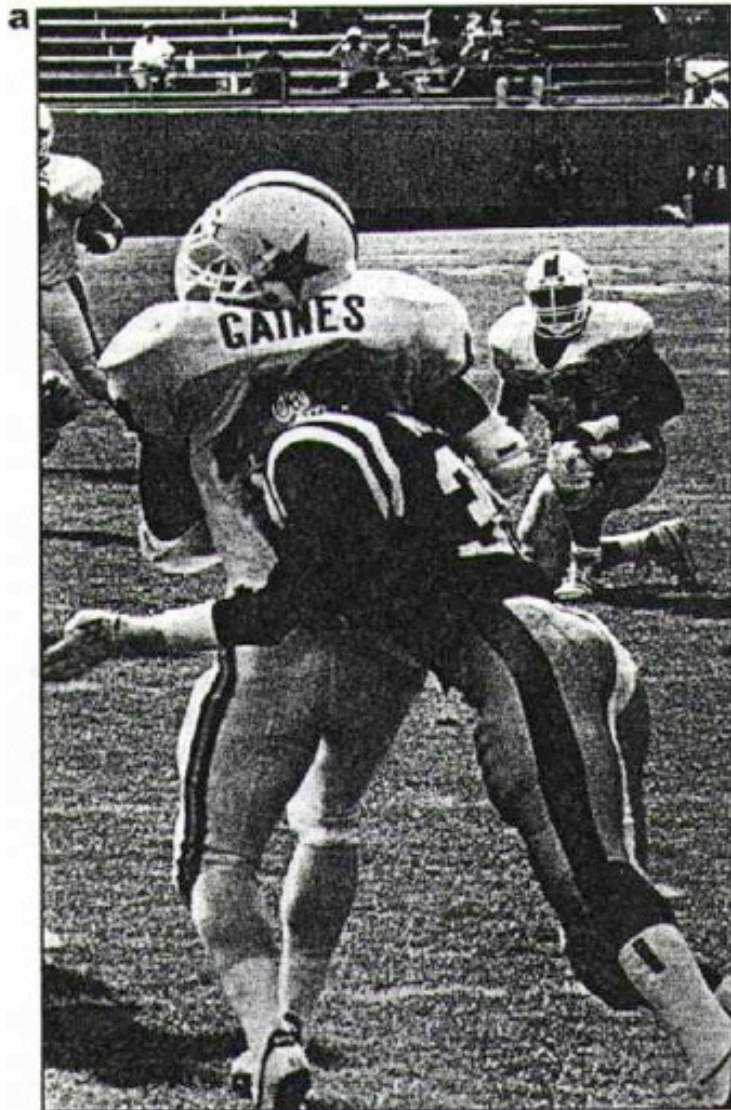


Figure 11. Spear tackler's spine involves loss of normal cervical lordosis. When subjected to an axial loading force, the straightened cervical spine behaves like a segmented column. The force first compresses the intervertebral discs (a and b). As maximum compression is reached, the spine flexes and buckles (c) with resulting fracture, subluxation, or dislocation (d and e). The combination of spear tackler's spine and head-first tackling is extremely dangerous.





**Figure 3.** A college defensive back (dark jersey) is shown ramming an opposing ball carrier with his head, resulting in severe axial loading of his cervical spine. The defensive player suffered fractures of C-4, C-5, and C-6 and was rendered quadriplegic. The injury occurred October 28, 1989.