



Orange County
Fire Authority

Core Back Safety Seminar

It is important to have Abs that look good, but more important to have Abs that work good!





Orange County
Fire Authority

Course Objectives

- Identify costs of back injury to employee and employer
- Identify causes of back injuries
- Identify anatomical parts of CORE and function
- Identify Core movement patterns
- Demonstrate and practice CORE strengthening and stabilization techniques
- Identify and review proper lifting techniques



Orange County
Fire Authority

Can Back Injuries Affect You?



Back Injuries

- One million workers suffer from back injuries each year.
- Back injuries account for 1 out of every 5 work place injuries
- Four out of every five back injuries are lower back injuries
- Back Injuries and Illnesses cost the nation 20 to 50 Billion a year



Orange County
Fire Authority

Back Injuries

- Leading Cause of Disability (30-45 Years old)
- Most Expensive Health Care Problem

Human Health Services



Back Injury Examples

- Firefighter felt right lower back pain while trying to move 400 LB+ full arrest patient from floor.
- Firefighter strained back while bending over to pick up clothing in a dresser drawer. Felt pain to lower back while standing up straight and twisting.
- FF/PM removed drug box and EKG monitor from medic van. While turning away from van felt a muscular type pain in the lumbar area of back.
- Lower back, right after turning off a sheared hydrant with a street key , my low back started to hurt.



Back Injury Examples

- Back pain when stepping into ambulance over equipment on floor, standard van.
- While stepping out of the shower bent over to pick up towel and pulled back
- Stepped off Fire Engine and felt a twinge and soreness in lower



Balance

- You must have balance between agonist and antagonist
- Imbalance between muscles puts uneven force on weaker muscle
- Not having muscle balance puts a greater load on tendons and ligaments
- Having your body out of balance is like having the front end of your car out of alignment!



Orange County
Fire Authority

Causes of Back Injuries

- Imbalance of Muscles
- Posture
- Body Mechanics/Work Habits
- Loss of **Flexibility**
- Stressful Living
- Poor conditioning

Trauma vs. Cumulative



Movement Patterns

- Repetition is the mother of skill
 - We must work proper movement patterns
 - Retrain muscles
 - Retrain neurological pathways
 - To improve muscular strength you have to isolate muscles, once you isolate you must integrate.
 - You must target the right muscles for the job.
You wouldn't do a squat if you wanted to work your bicep.



Orange County
Fire Authority

Core Anatomy



Spinal Muscles

- Movement controlled by muscles contracting and relaxing.
- Rope-like ligaments join bone ends to support and strengthen joints and prevent abnormal movements
- Interwoven sheath of muscle and ligaments across abdomen and lower back provide support. For this reason, it is important to keep them in good condition.



Parts of the Core

- Rectus Abdominis
- Internal Obliques
- External Obliques
- Transverse Abdominis
- Multifidus
- Erector Spinae
- Quadratus Lumborum
- Iliacus
- Psoas



Abdominal Wall

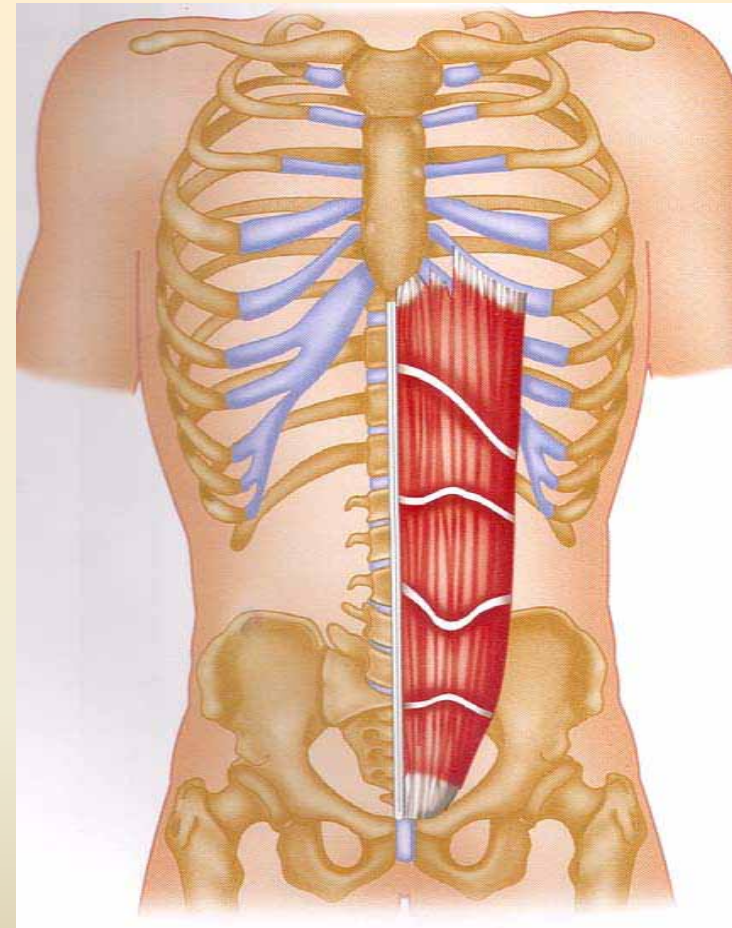
- Hold Abdominal contents
- Stabilizes back
- Moves body on all three planes of movement.
 - Sagittal
 - Frontal
 - Transverse





Rectus Abdominis

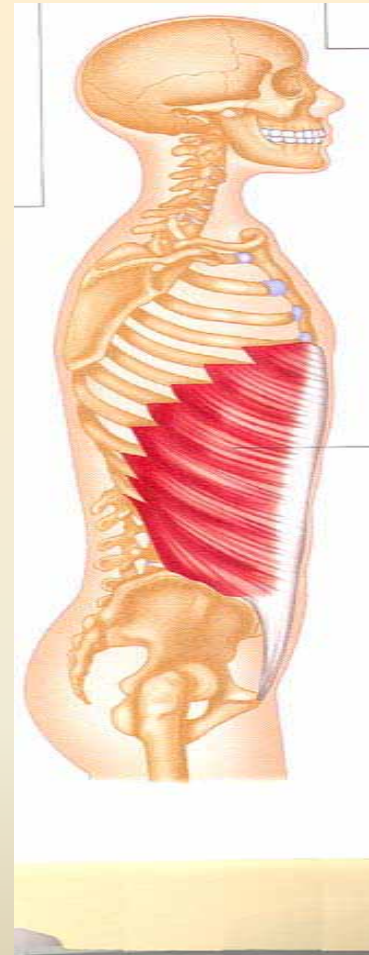
- Insertion
 - Xiphoid process and 5th, 6th and 7th costal cartilage
- Origin
 - Pubic Crest and Symphysis
- Action
 - Flexes trunk if pelvis is fixed
 - Lifts and posteriorly rotates the pelvis if trunk is fixed
 - Increases intra-abdominal pressure
 - Stabilizes pelvis while walking
 - Assists in forced expiration





External Obliques

- Insertion
 - Anterior half of Iliac crest to linea alba
- Origin
 - Lower eight ribs
- Action
 - Compresses Abdomen
 - Contraction of one side alone bends the trunk laterally to that side and rotates it to the opposite side
 - Bends trunk forward through bilateral stimulation





Internal Obliques

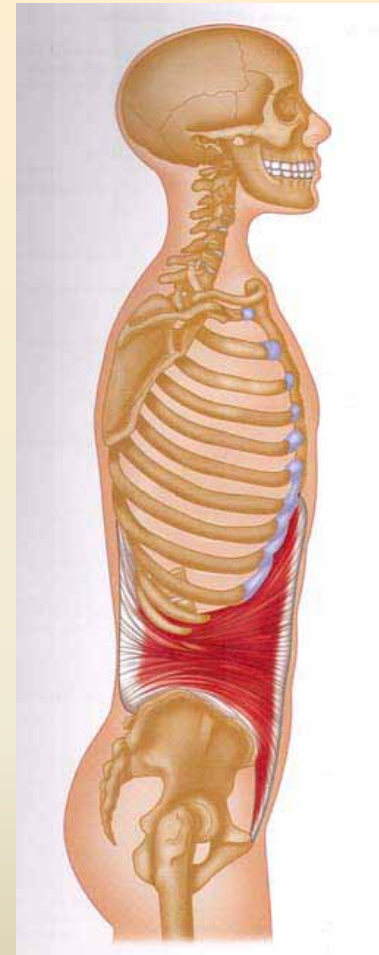
- Insertion
 - ribs 9-12 and the aponeurosis
- Origin
 - Iliac crest lateral two thirds of inguinal ligament and thoracolumbar fascia
- Action
 - Contraction of one side alone bends the trunk laterally to that side and rotates it to the opposite side
 - Ipsilateral rotator when the pelvis is anchored
 - Contra lateral rotator when the trunk is anchored





Transverse Abdominis

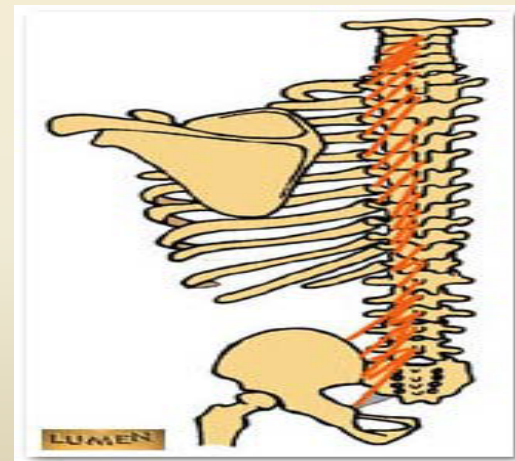
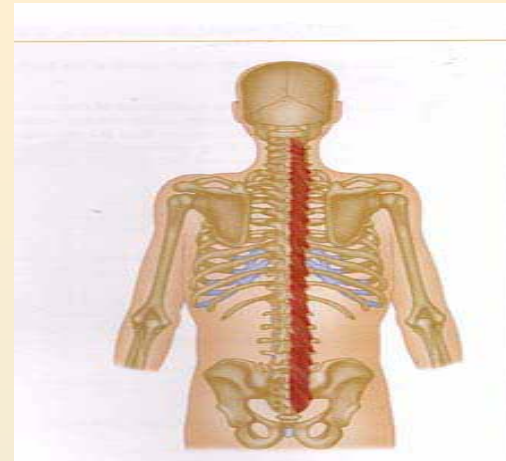
- Insertion
 - aponeurosis
- Origin
 - Internal surface of ribs 7-12, thoraco lumbar fascia and Iliac crest
- Action
 - Increases intra-abdominal pressure that creates an extension force of in the flexed position.
 - Stabilizer of the lumbar spine
- Innervation
 - The TA, Multifidus and Pelvic floor are on the same neurological loop. They work together.





Multifidus

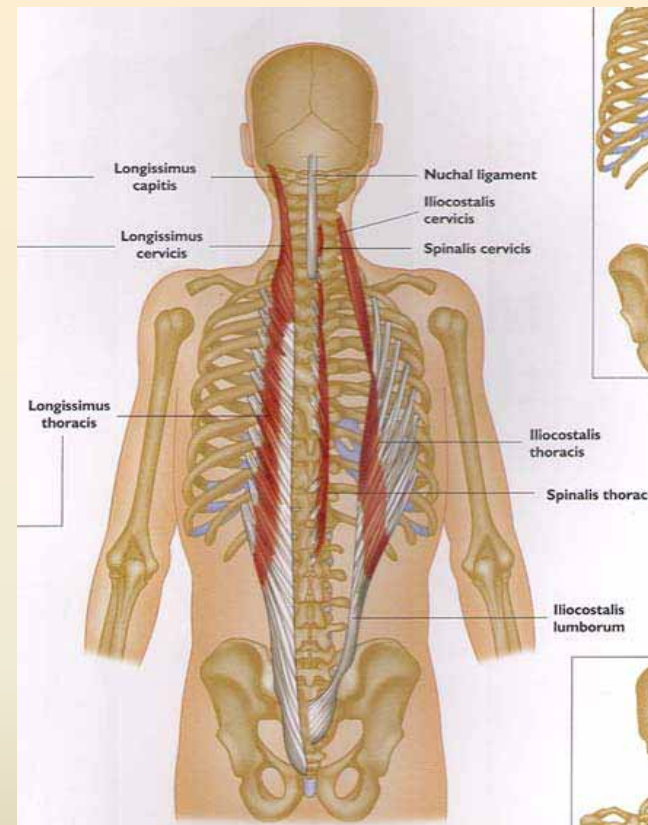
- Insertion
 - First to fourth vertebrae above origin
- Origin
 - Posterior aspect of sacrum, transverse processes of lumbar and thoracic region and articular processes of cervical region
- Action
 - Protect vertebral joints from movements produced from more powerful prime movers
 - Spinal stabilization during standing, sitting and rotation.
 - Extension, lateral flexion and rotation of vertebrae





Erector Spinae

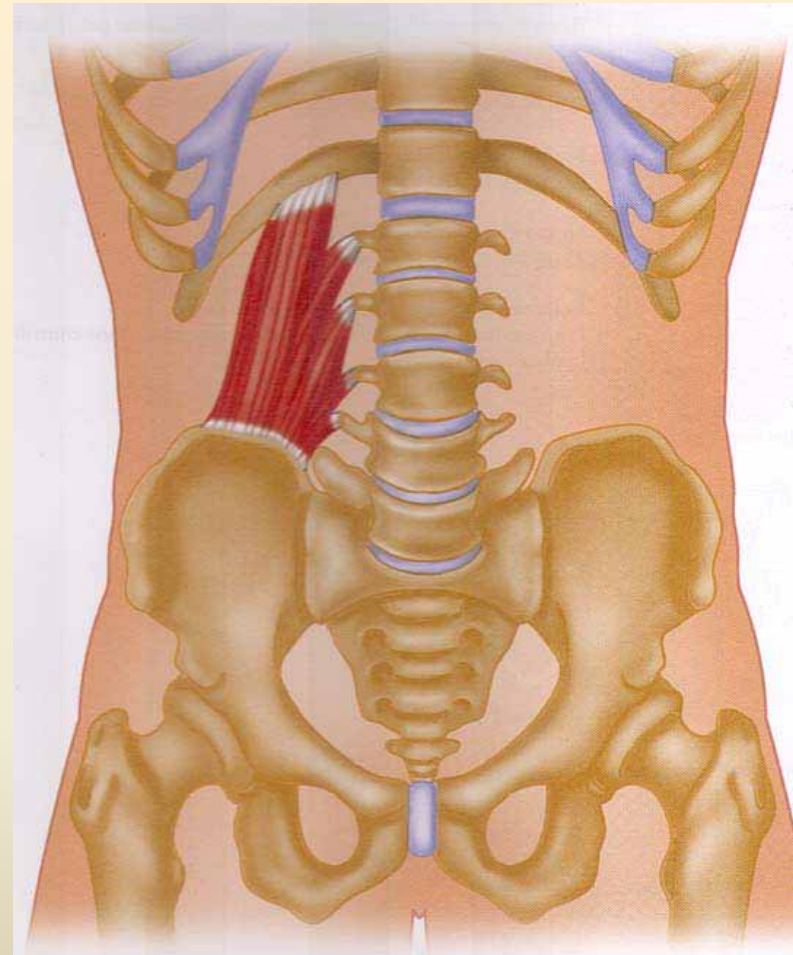
- Insertion
 - Ribs, transverse process of the vertebrae and occipital bone
- Origin
 - Slips of muscle arising from the sacrum, iliac crest, vertebrae and ribs
- Action
 - Extends and laterally flexes spine





Quadratus Lumborum

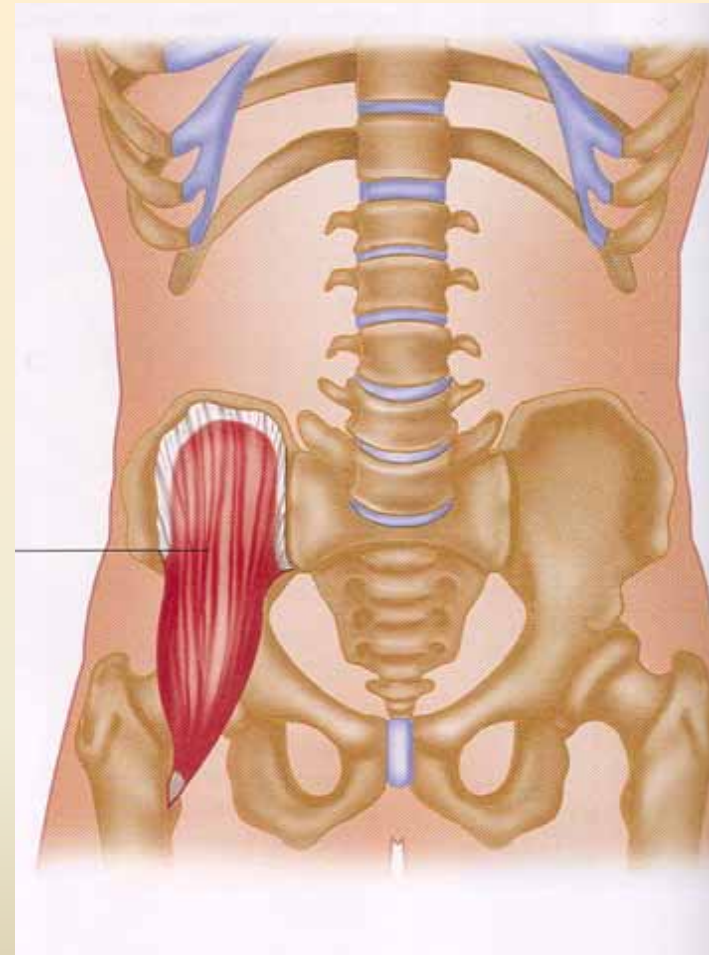
- Insertion
 - Twelfth rib and transverse process of lumbar vertebrae
- Origin
 - Iliac Crest
- Action
 - Assists the erector spinae in trunk extension
 - Assists abdominals with flexion movements





Iliacus

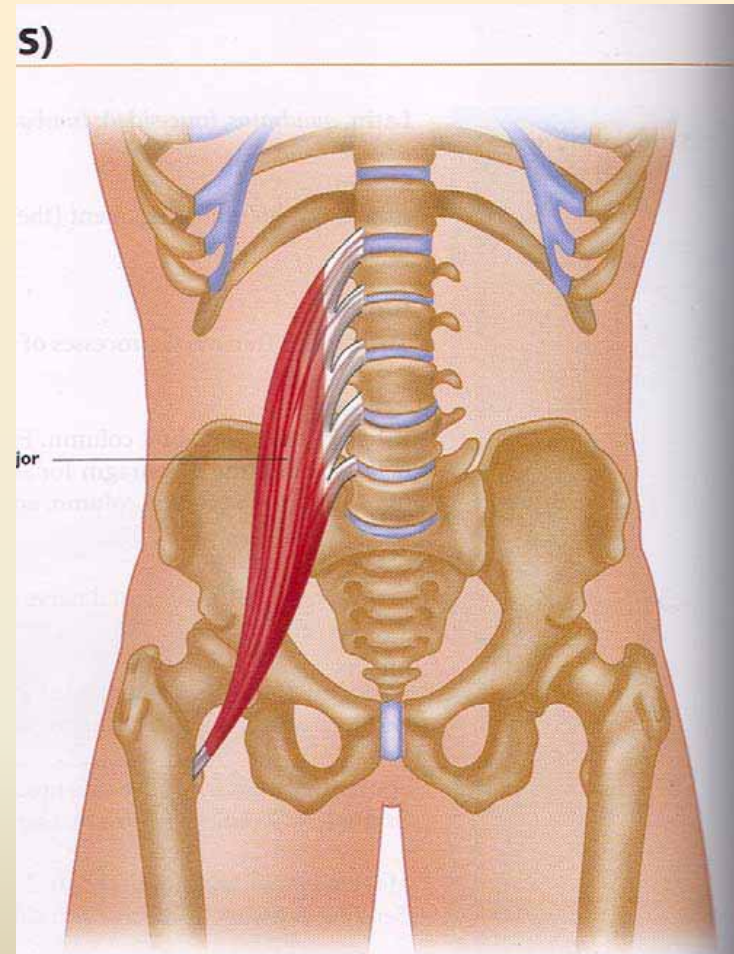
- Insertion
 - Lesser trochanter of the femur
- Origin
 - Top 2/3 of Iliac fossa
- Action
 - Main flexor of hip joint
 - Flexes and laterally rotates thigh
 - Flexes the trunk






Psoas Major

- Insertion
 - Lesser trochanter of the femur
- Origin
 - Transverse process of all lumbar spine
- Action
 - Flexes trunk when feet are anchored
 - Flexes hip when trunk is anchored
 - Minor spinal stabilization when trunk in rotation
 - Assists in medial rotation



Core Workout



Orange County
Fire Authority

Phase I



Muscle Stability Patterns

- In order to have a strong CORE you must divide muscles into three groups
 - Local stability muscles
 - Global stability muscles
 - Global mobility muscles



Core Movements

- The Core is responsible for:
 - Flexion of Abdomen/Eccentric and Concentric?
 - Extension of Back
 - Lateral Flexion
 - Rotation
 - Rotation and Flexion at the same time
 - Flexion of Hips



Orange County
Fire Authority

Draw In's



Lying Draw In (knees up)

- Lie supine with knees up
- Raise head (to relax the Rectus abdominis)
- Attempt to pull the belly button through the spine then pull diaphragm up (like taking a deep breath)
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

Lying Draw In (legs straight)

- Lie supine
- Raise head (to relax the rectus abdominis)
- Attempt to pull the belly button through the spine, then pull diaphragm up
- Remember to breathe while doing each repetition
- Pull the abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

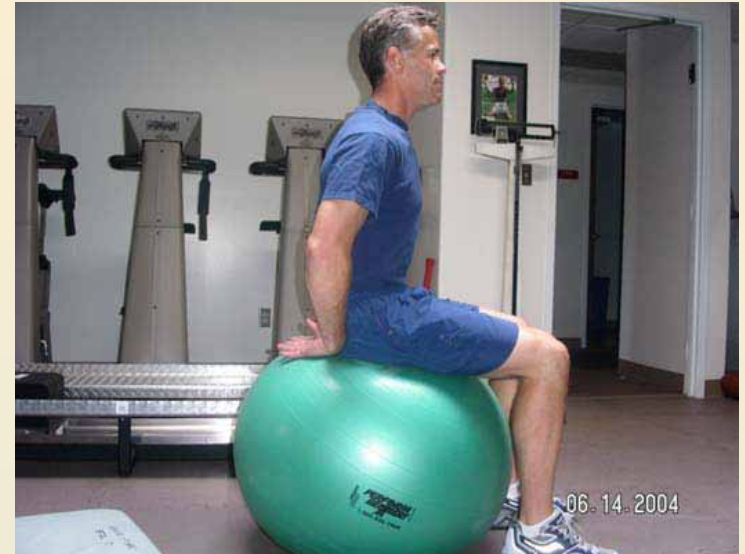
Integrated Draw In



Orange County
Fire Authority

Sitting Draw In

- While sitting on Physio Ball attempt to pull the belly button through the spine then pull diaphragm up (like taking a deep breath)
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

Butterfly Draw In

- Lie supine with knees up
- Raise head (to relax the rectus abdominis)
- Attempt to pull the belly button through the spine, then pull diaphragm up
- Pushing the knees out and pulling the knees in
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

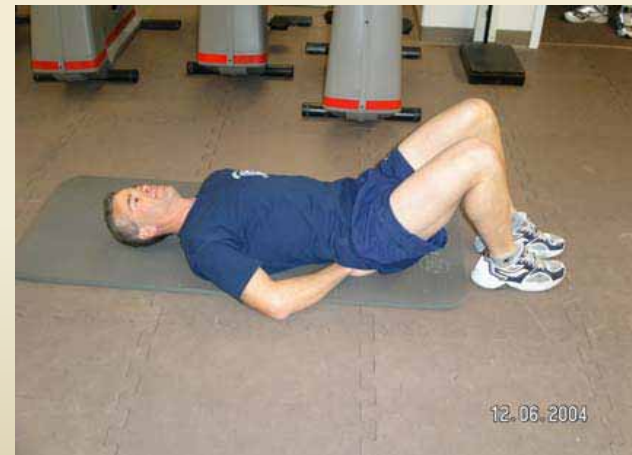
Flexion Lower Abs



Orange County
Fire Authority

Alternating Leg Pulls-Knee Ups

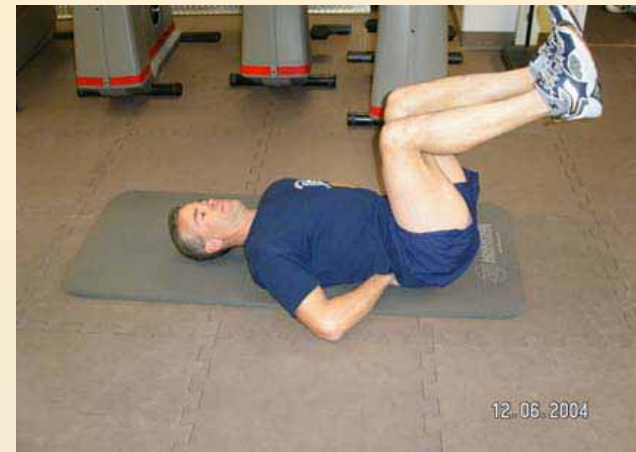
- Lie supine with knees up, place hands in the small of your back (Bio feedback tool)
- Attempt to pull the belly button through the spine, then pull diaphragm up
- Raise one leg until the knee is pointed to the ceiling or until you feel your lower back touch your fingers
- Lower the leg to the floor without arching your back, if your back begins to arch STOP and return your leg to the starting position.
- Repeat the exercise for the other side
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Double Leg Pulls-Knees Up

- Lie supine with knees up, place hands in the small of your back (Bio feedback tool)
- Attempt to pull the belly button through the spine, then pull diaphragm up
- Raise both legs until the knees are pointed to the ceiling or until you feel your lower back touch your fingers
- Lower the leg to the floor without arching your back, if your back begins to arch STOP and return your leg to the starting position.
- Repeat the exercise for the other side
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

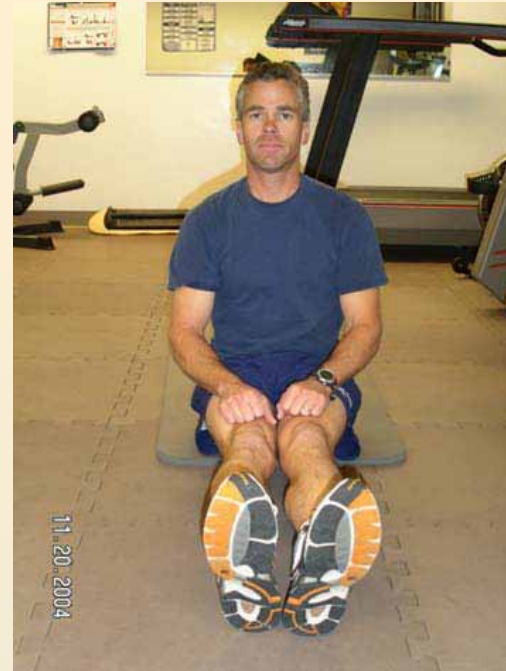
Rotation



Orange County
Fire Authority

Sitting Trunk Twist

- Draw In
- Sit with feet straight in front of you, toes up, head forward and elbows at your sides at a 45 degree angle
- Rotate torso to the side until you reach full range of motion DO NOT TWIST OR TORQUE TORSO PAST NORMAL RANGE OF MOTION
- Rotate torso back to center and repeat to opposite side
- Remember to breathe while doing each repetition





Lying Trunk Twist

- Draw In
- Lie supine on the floor with knees up and feet flat on the floor
- Twist your bent legs to the right until they reach the floor or until F.R.O.M is reached, then repeat cycle to the left
- Remember to breathe while doing each repetition





Orange County
Fire Authority

Flexion

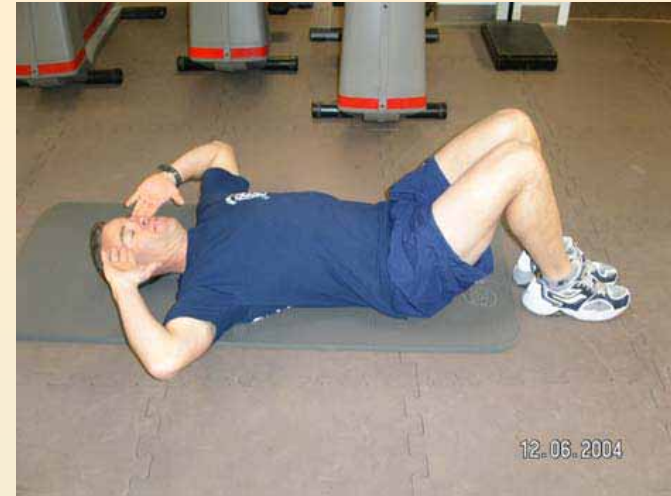
Upper Abs



Orange County
Fire Authority

Draw In Crunch

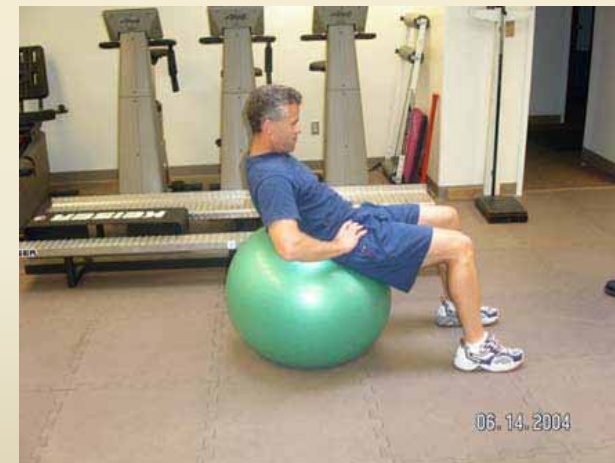
- Draw in
- Lay supine with knees up
- Gently place hands on ears (do not pull on back of head)
- Place tongue on roof of mouth
- Curl up from the head one vertebra at a time until Rectus Abdominis is fully contracted.
- Slowly reverse the curl ending with neck and head
- Remember to breathe while doing each repetition





Ball Crunch

- Lay supine on ball with head resting on ball
- Place tongue on roof of mouth
- Roll your hips and chest up from the head trying to move one vertebra at a time until Rectus Abdominis is fully contracted.
- Slowly reverse the curl ending with neck and head
- Remember to breathe while doing each repetition





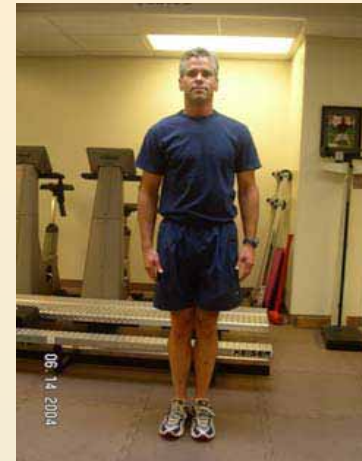
Orange County
Fire Authority

Lateral Flexion



Side Bends

- Stand up with head, chest, toes forward and hands at side
- Maintaining a neutral spine
- Reach down leg while maintaining contact with legs **DO NOT FORCE PAST NORMAL RANGE OF MOTION**, repeat on opposite side





Orange County
Fire Authority

Hip Flexors

Glute Bridge (thrust and hold)



Orange County
Fire Authority

- Lay supine on the floor, with your knees bent at 90 degrees and feet flat on the floor
- Attempt to pull the bellybutton through the spine, then pull diaphragm up
- Bridge your hips towards the ceiling by firing your glutes and hold
- Only shoulders and heels remain on the ground
- Lower hips toward the floor without touching the floor and repeat
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

Glute Bridge March

- Lay supine on the floor, with your knees bent at 90 degrees and feet flat on the floor
- Attempt to pull the bellybutton through the spine, then pull diaphragm up
- Bridge your hips towards the ceiling by firing your glutes and hold
- Only shoulders and heels remain on the ground
- March one leg at a time while maintaining horizontal hip stability
- Lower hips toward the floor
- Remember to breathe while doing each repetition
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

Extension



Superman Lower

- Attempt to pull the bellybutton through the spine, then pull diaphragm up
- Lay prone on the floor with arms in the overhead position
- Raise the lower body in an isometric contraction while activating the Glutes and hold
- Maintain a neutral spine
- Lower to the floor and repeat
- Remember to breathe while doing each repetition
- Pull the TA further in with each repetition





Orange County
Fire Authority

Superman Upper

- Attempt to pull the bellybutton through the spine, then pull diaphragm up
- Lay prone on the floor with arms in the overhead position
- Raise the upper body in an isometric contraction and hold
- Maintain a neutral spine
- Lower to the floor and repeat
- Remember to breathe while doing each repetition
- Pull the TA further in with each repetition





Orange County
Fire Authority

Stabilization



Elbow Bridge on Knees

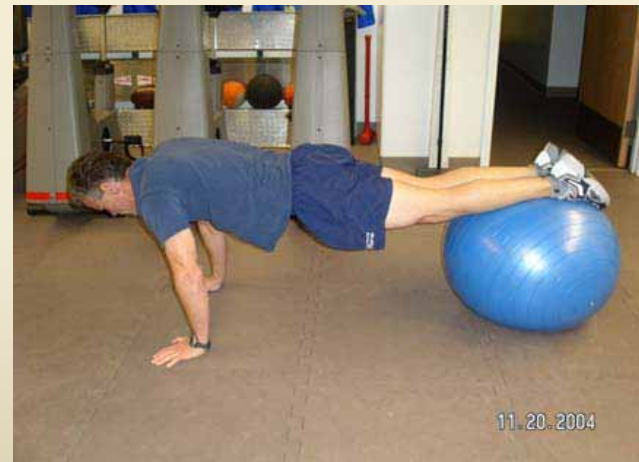
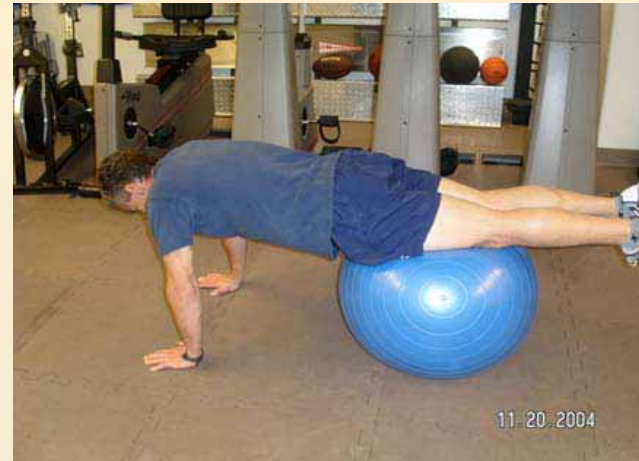
- Lay face down in a prone push up position
- Forearms resting on the floor
- Elbows are under your shoulders bent at 90 degrees
- Maintain a neutral spine
- Remember to breathe while doing each stabilization
- Pull the TA further in with each repetition





Push Up Bridge

- Get in push up position with hips on the ball, roll out on ball to increase difficulty while maintaining a neutral spine
- Remember to breathe while doing each repetition
- Pull the TA further in with each repetition





Orange County
Fire Authority

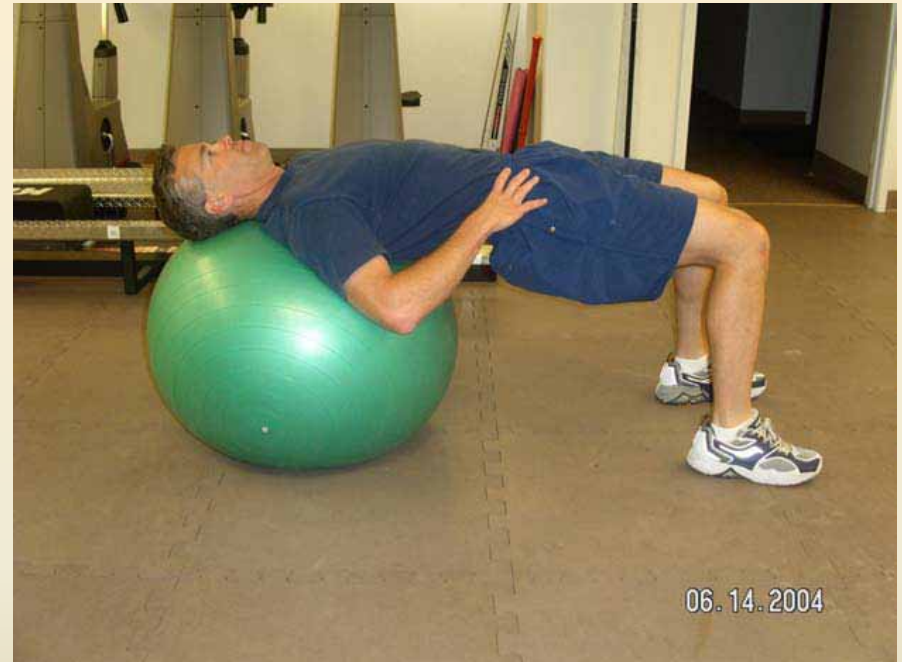
Balance



Orange County
Fire Authority

Back Bridge

- Lay supine with the ball between your shoulder blades, hips fully extended and knees bent at 90 degrees
- Attempt to pull the bellybutton through the spine, then pull diaphragm up
- Attempt to keep a straight line between your knees and your shoulders
- Remember to breathe while stabilizing
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis

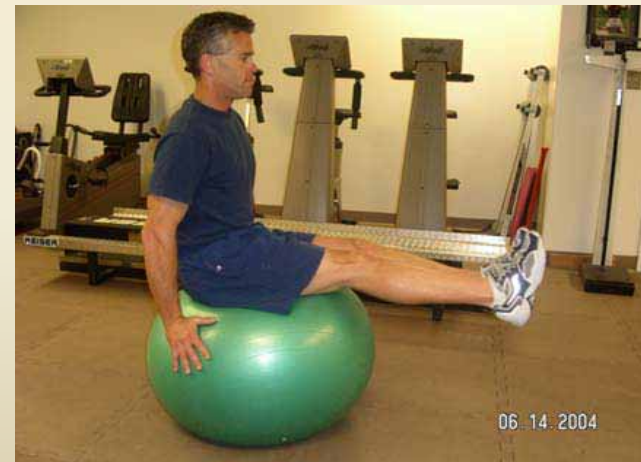
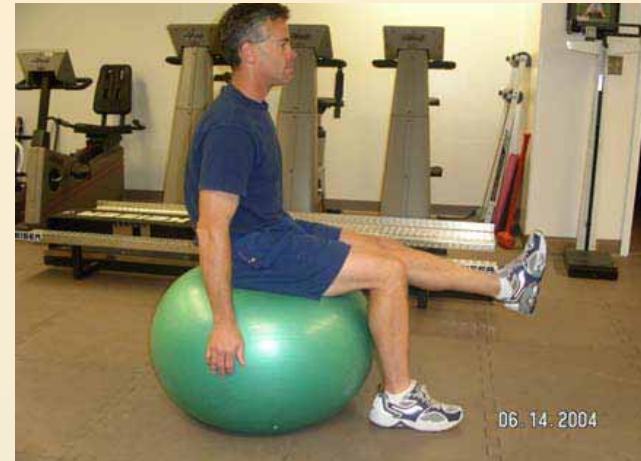




Orange County
Fire Authority

Sitting on Physio Ball

- Sit on ball with feet forward on the ground and legs bent at a 90 degree angle
- Raise one foot off the ground while maintaining balance on the ball
- Once balance has been achieved raise both feet off the ground
- Remember to breathe with each stabilization
- Pull the Abdomen further in with each repetition
- Activate the Transverse Abdominis without firing the Rectus Abdominis





Orange County
Fire Authority

For More Information Contact

The WEFIT Office at:

at

(714) 573-6836



Orange County
Fire Authority

Proper Lifting Technique



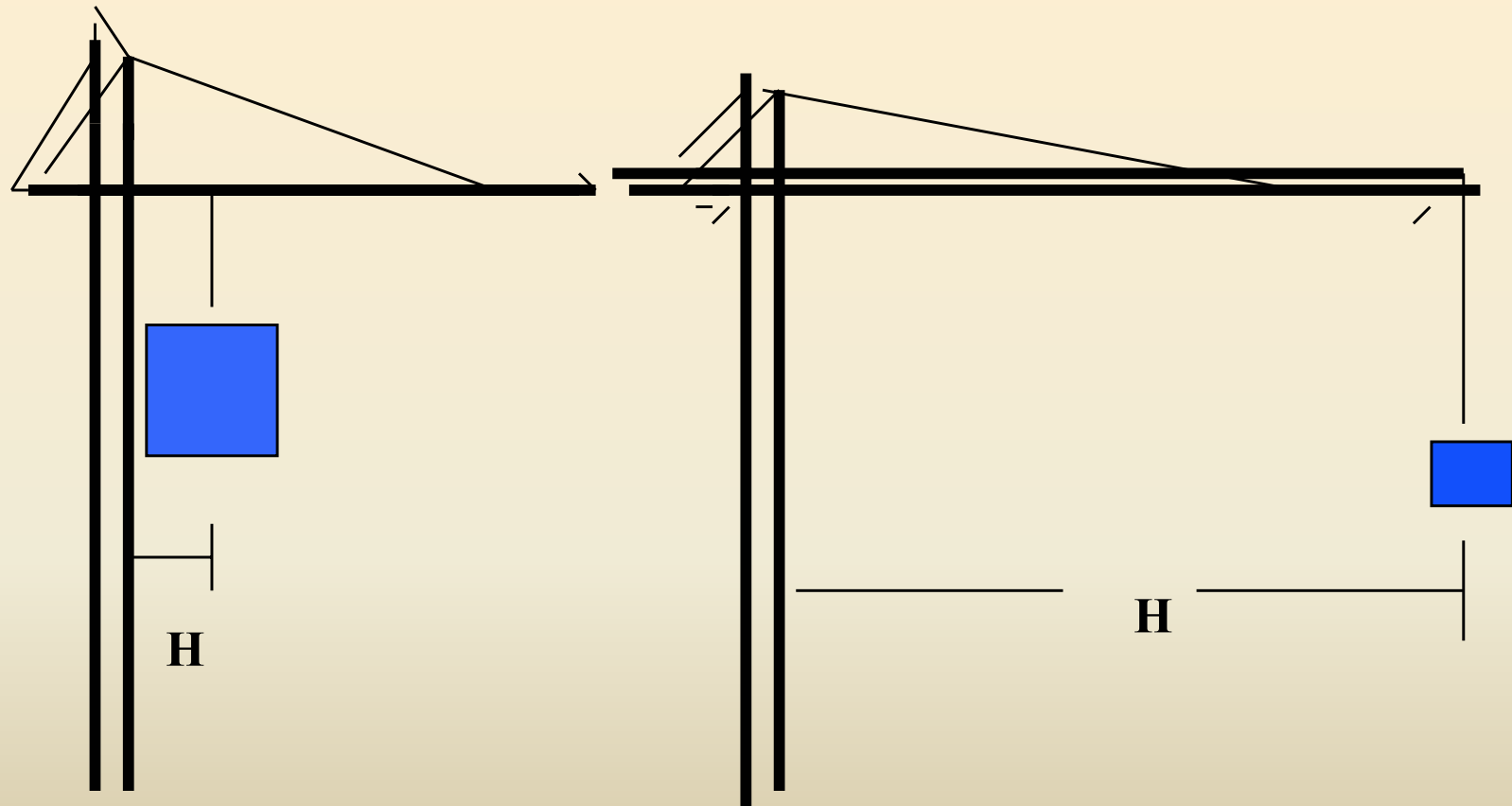
Proper Lifting

- Plan your move
 - Size up the load and make sure your path is clear, plan ahead
 - Get help as needed. More is better
 - Use a wide, balanced stance with one foot slightly ahead of the other.
- Prepare for lift
 - Get as close to the load as possible.
 - Tighten your stomach muscles as the lift (activate the Transverses Abdominis)
- Lifting
 - When lifting, keep your lower back in its normal arched position
 - Pick up your feet and pivot to turn. Don't twist your back.
 - Lower the load slowly bending at the legs not the back, maintaining the curve in your lower back.

Lifting

Orange County
Fire Authority

- H = The horizontal distance
- When H is increased, the crane's capacity to lift the load is decreased.
 - u This is true with our bodies as well
 - u It is *critical* to lift and carry the load as close as possible





Orange County
Fire Authority

Proper Lifting

- There is one final important rule: "**THINK BEFORE YOU LIFT**"
- **Awareness is key**