

# CORE STRENGTHENING and TRUNK STABILIZATION

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## LOW BACK PAIN

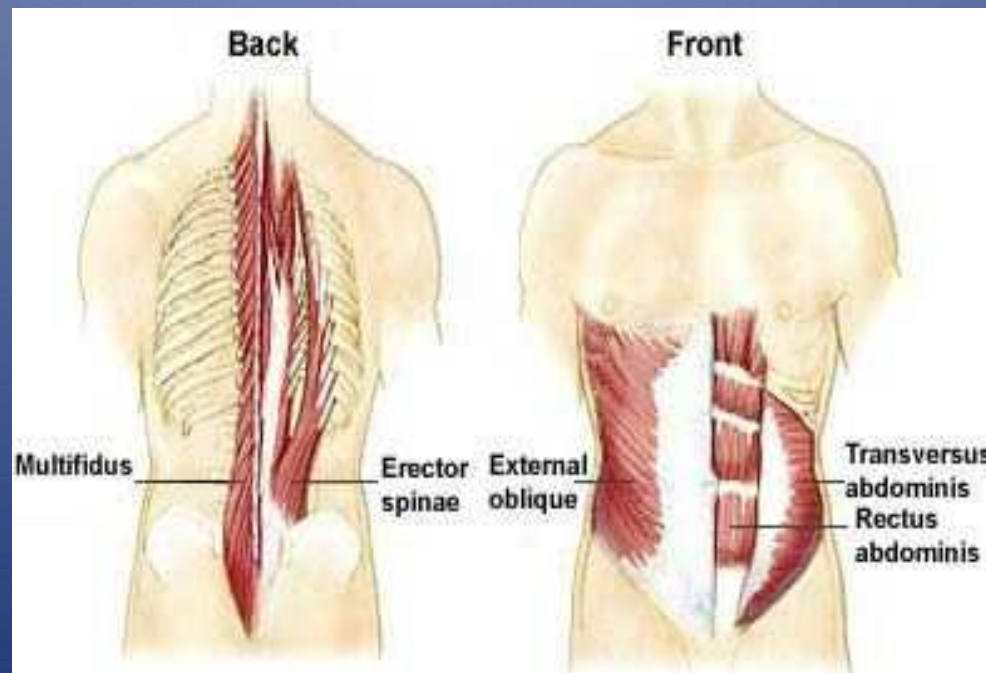
Why does my back hurt?

-As we progress through life we rely heavily on our backs to support us. Our bone strength, muscle elasticity and strength will decrease. The discs that cushion our spine begin to lose fluid and flexibility, which decreases their ability to take pressure off the vertebrae.

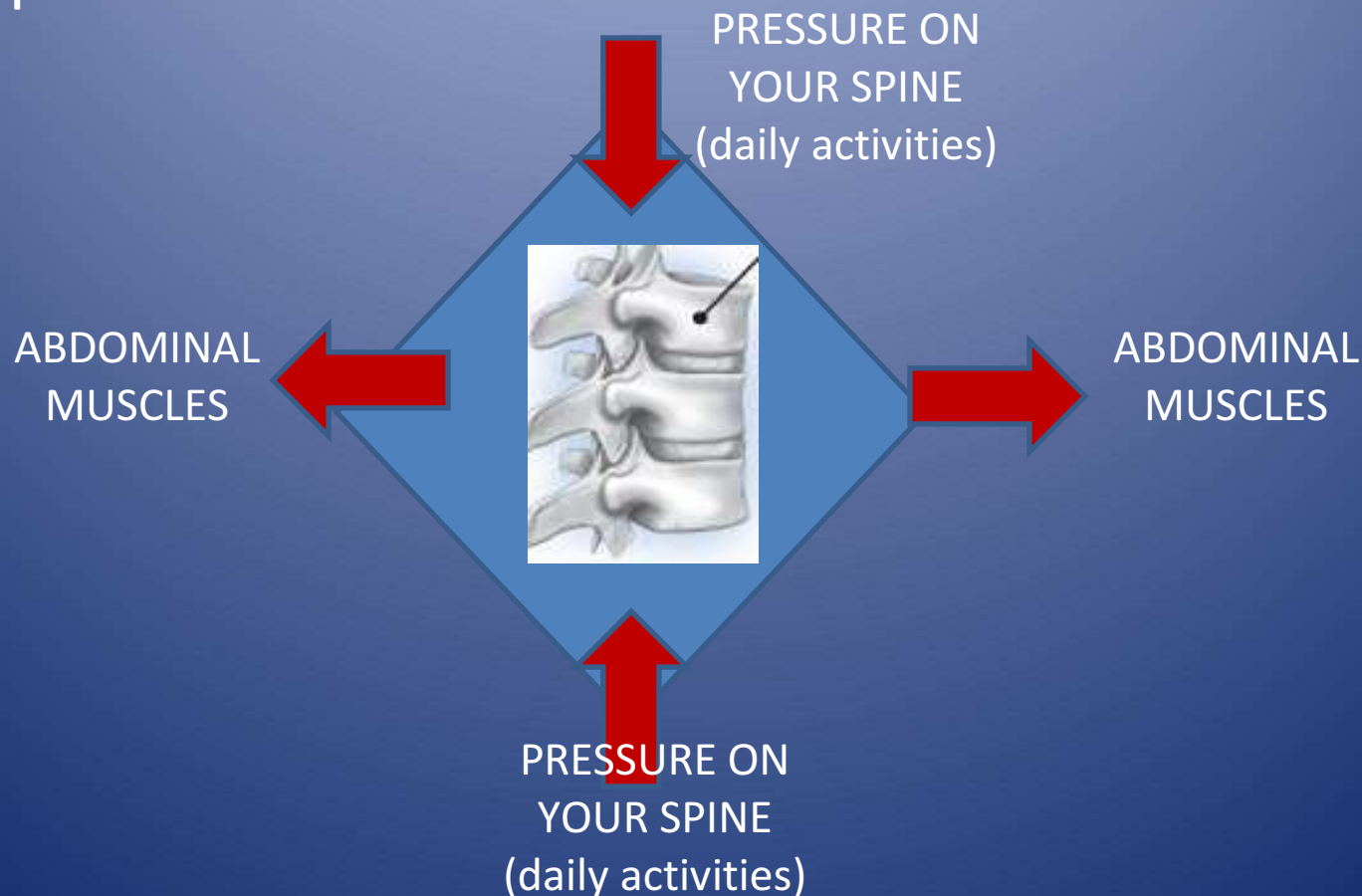
-- Pain can occur from an imbalance of abdominal weakness from faulty posture or strain resulting from surgery or obesity. Other causes may include stress, for instance when someone lifts something too heavy or overstretches, causing a sprain, strain, or spasm in one of the muscles or ligaments in the back. If the spine becomes overly strained or compressed, a disc may rupture or bulge outward. This rupture may put pressure on one of the nerves. When these nerve roots become compressed or irritated, back pain results.



An important factor to predisposing back pain is the length of your muscles. The low back muscles, particularly the erector spinae are short and numerous and attached to bony segments. The abdominal muscles, however, are long with fascial attachments without bony support. As you contract your abdominal muscles, the fascial band that supports the trunk tightens and relieves tension off the spine. It is the body's back brace and support system for the spine.



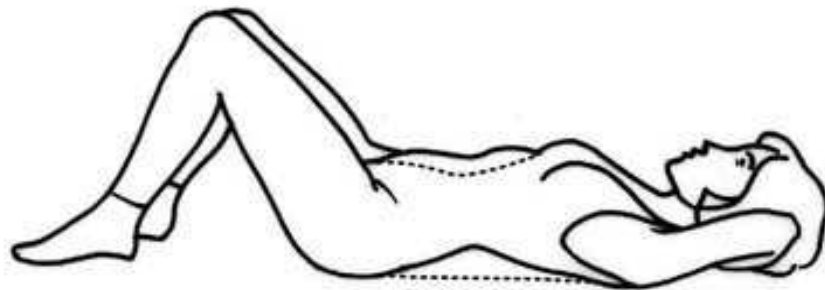
When the abdominal muscles are not engaged, the back muscles are the point of stress which puts undo pressure on your spine. As tension and contractility increases in your abdominal region, the pressure on the spine decreases.



# A NEUTRAL SPINE POSITION

The initial phase of stabilization training begins with isolated muscle contractions. Stabilization training is initiated with the patient being instructed in the *neutral spine position*. The neutral spine position is where the spine is in ideal alignment and is found by envisioning the face of a clock on the abdomen, with 12:00 at the belly button and 6:00 at the pubic bone. The pelvis is then alternately tilted so that 12:00 rocks toward the floor and then 6:00 rocks toward the floor. This is done repeatedly 10 times in each direction gently and slowly. The neutral position within that range is the point where you identify is the most comfortable. This position is emphasized and should be maintained for all movements performed during stabilization activities as well as all daily activities.

As awareness of the neutral position is demonstrated, isolated transversus abdominus contraction is then initiated. This muscle is trained by simply pulling your navel into your spine, and/or exhaling thoroughly, while maintaining the neutral spine position.





# Progressive Exercise Program

To begin this program and follow it correctly you must consult with your doctor to see if you are safe to begin exercises. Physical Therapy is a great start, as it allows a safe environment with exercises that are appropriate for each individual. Therapy will include stretches, strengthening and education on proper positioning and posture. This exercise program is designed to guide a patient through a progressive regimen of safe and effective therapeutic exercises to relieve back pain. However, the exercises provided will not relieve all symptoms of back pain, aerobic exercise and proper stretching must also be used.



## Lumbar stabilization protocol and Test

Exercise	Level I	Level II	Level III	Level IV	Level V
<b>Partial Sit-Ups</b> <i>Forwards &amp; Diagonal</i>	3 x 10 each	2 x 20 each	3 x 30 each 2.5#	3 x 30 each 5#	3 x 50 each 5#
<b>Dying Bug</b>	2 minutes Slow Pace One foot on ground	2 minutes Moderate pace Heel Taps	3 minutes Moderate pace Heel Taps	5 minutes Moderate pace 3# arms, legs	10 minutes Moderate pace 5# arms, legs
<b>Bridge</b> <i>On Floor</i>	3 minutes Both feet on floor Hold 10 seconds	3 minutes Alternating legs Hold 10 seconds	4 minutes Alternating legs Hold 10 seconds	5 minutes Alternating legs Hold 10 seconds	7 minutes Alternating legs Hold 10 seconds
<b>Superman</b> <i>Prone Extension</i>	2 minutes Alternate Arms/ opposite leg	2 minutes Arms/legs up Elbows bent	3 minutes Arms/legs up Elbows bent 2# legs	4 minutes Arms/legs up 3# legs	5 minutes Arms/legs up 5# legs
<b>Quadruped</b> <i>Alternating Arms/Legs</i>	2 minutes Slow Reps	2 minutes Hold 15 seconds	3 minutes Hold 15 seconds 5# legs	4 minutes Hold 15 seconds 3# arm, 5# legs	5 minutes Hold 30 seconds 3# arms, 5# legs
<b>Wall Squat</b> <i>90 Degrees Back Flat, No Hands</i>	1 minute hold	1.5 minute hold	2 minute hold	3 minute hold	5 minute hold
<b>Lunges</b> <i>Alternating Legs</i>	1 minute Slow reps Partial Dips Slow transition	2 minutes 5 second hold Partial Dips Moderate transition	3 minutes 15 second hold 90 Degrees Quick transition	3 minutes 15 second hold 90 Degrees Quick transition 3# arms	5 minutes 15 second hold 90 Degrees Quick transition 5# arms
<b>Prone Plank</b> <i>On Forearms</i>	30 seconds	1 minutes	2 minutes	3 minutes	5 minutes



## Trunk Stabilization Progression

	A	B	C	D	E	F	G
Introduction							
1	Pelvic Tilts	Bridges	Straight Leg Raise	Basic Crunch	Sidelying Abduction	Overhead Flexion	Single leg Bridge with knee bent
2	Heel walks	Dead Bugs	Advanced SLR	Quadrapped arm flexion	Single leg bridge with strait leg	Quadrapped unilateral leg extension	Swiss ball bridge
Beginner							
3	Planks (phase I)	Quadrapped arm flexion and leg extension	Swiss Ball leg Curls	Swiss Ball Wall Squats	Swiss Ball Marching	Side Planks (phase I)	High Kneeling Overhead Flexion
4	Pike (phase I)	High Kneeling Diagonals	Planks (phase II)	Swiss ball leg raises	Side Planks (Phase 2)	Swiss Ball Outs (phase I)	Swiss Ball alternating leg/arm marching
Intermediate							
5	Swiss Ball Marching with arm and hip flexion	Supine Swiss Ball Balancing	Pikes (Phase II)	Swiss Ball Wall Sits	Swiss Ball Unilateral Arm Flexion	Swiss Ball Planks (Phase I)	Swiss Ball Crunches
6	Phase III Pikes	Planks (Phase III)	Swiss Ball Planks (Phase II)	Swiss Ball Balance w/ unilateral leg lift	Single Leg Wall Squats	Swiss unilateral leg curl	Swiss Ball Planks (Phase III)
Advanced							
7	Single leg wall sit with Swiss Ball	Supine Swiss Ball unilateral arm/leg flexion	Pikes (Phase IV)	Side Planks (phase III)	Planks (Phase IV)	Swiss Ball Roll outs (Phase II)	Side Planks (phase IV)

## Progression of Exercises and Phases:

(for instance when you add 2A you will drop 1A, add 2B drop 1B and so forth until all phases have been progressed through)

# Posterior Pelvic Tilts (1A)



Draw belly button inwards toward spine and rotate hips backwards as your back flattens. Keep back flat against surface.

# BRIDGES (1B)



Perform Posterior pelvic tilt and lift hips off surface keeping both feet and head on surface. Hold position for 3 seconds.

# Straight Leg Raises (1C)



Lie on your back while maintaining a flat back and abdominals contracted.

Lift one leg 6 inches off surface and hold for 3 seconds.

# BASIC CRUNCH (1D)



Perform posterior pelvic tilt. Then reach straight to ceiling lifting shoulders off surface. Hold for 3 seconds. Keep head looking up. \*DO NOT CURL NECK FORWARD\*



# Side lying: Abduction (1E)



Lie on your side and bend both legs straight,  
Slowly lift top leg off of lower leg 6 inches from bottom leg.  
Hold for 2 seconds.

\*\*\* Shoulders, Hips and Feet should all be in straight line\*\*\*



# Overhead Flexion (1F)



Starting position: Obtain a 5-10lb weight and hold with both hands directly above chest.

Motion: Bring the weight slowly overhead until you cannot keep your back flat and abdominals contracted. Hold this position for 2 seconds then return to starting position.

# SINGLE LEG BRIDGE with Knee Bent (1G)



Perform previous bridge and bring one leg up with knee bent to 90 degrees. Hold for 3 seconds and repeat with opposite leg.

# HEEL WALKS (2A)



POSITION 1: Perform a bridge while on heels.



POSITION 2: Keeping a bridge position, slowly walk heels as far as possible without hips rotating sideways. Hold at end position for 3 seconds and walk heels back slowly.

# DEAD BUGS (2B)



Starting position: The opposite arm is touching the opposite knee. While the other extremities are fully straight.

Motion: Bring left arm to right knee while the other arm/leg are straight. Alternate sides.

Keep a 3 minute clock and stop clock when you cannot hold your back down firmly on the surface. Restart timer when ready.



# Advanced Straight Leg Raises (2C)



Lie on your back while maintaining a flat back and abdominals contracted.

Bend one leg up toward chest and keep hip and knee at 90 degree angles.

Lift opposite leg 6 inches off surface and hold for 3 seconds.

# Phase 1: Quadruped Unilateral Arm Flexion (2D)



Go onto hands and knees without arching your back.  
Stabilize your hips by contracting abdominals and rotating hips into posterior pelvic tilt position. (see exercise 1)  
Lift one arm out in front without arching your back.



# SINGLE LEG BRIDGE with Straight Leg (2E)



Perform a bridge. Then raise one leg straight out and hold for 3 seconds. Repeat with opposite leg.

## Phase II: Quadruped Unilateral leg Extension (2F)



Go onto hands and knees without arching your back.  
Stabilize your hips by contracting abdominals and rotating hips into posterior pelvic tilt position. (see exercise 1)  
Lift one up and kick behind you, keep leg straight without arching your back, or letting your torso twist.

# Swiss Ball Bridges (2G)



Lie on your back with both feet on the Swiss Ball. Contract abdominals. Perform posterior pelvic tilt and lift hips off surface. Hold position for 3 seconds. Repeat 10x

# Planks (Phase I) (3A)



Get into kneeling position and go onto elbows. Keeping abdominals tight. Position your back /buttocks so that both are in a straight line. Hold for 30seconds. Repeat 3 times.

## Phase III: Quadruped Unilateral Arm flexion and Leg Extension (3B)



Go onto hands and knees without arching your back.  
Stabilize your hips by contracting abdominals and rotating hips into posterior pelvic tilt position. (see exercise 1)  
Lift one arm out in front and opposite leg behind you without arching your back, or letting your torso twist.



# Swiss Ball Bilateral Leg Curls (3C)



Lie on your back with both feet on the Swiss Ball. Contract abdominals. Perform posterior pelvic tilt and lift hips off surface. Pull ball towards your buttocks and hold for 2 seconds and push ball outward. Repeat 15x.



# Wall Squats (3D)



Stand upright with center of the ball on your low back. Walk both feet outward and put both feet flat on ground. Squat to a 45-90 degree angle with arms straight out. Squat up/down driving pressure through your heels. **DO NOT LET YOUR KNEES GO OVER YOUR TOES WHEN SQUATTING.**

# Swiss Ball Marching (3E)



Sitting on Swiss ball. Keeping an upright posture and both feet flat on the floor. Lift one leg 6 inches off of surface and hold for 2 seconds. Repeat on opposite side. Start with 30seconds and progress to 2 minutes before next phase.



# Side Planks (Phase I) (3F)



Go onto side with knees slightly bent. Go onto elbow, keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift hips off surface and hold for 30seconds. Work up to a minute, before progressing to next phase.

# High Kneeling Overhead Flexion (3G)



Get into kneeling position with a 5lb dumbbell. Keeping abdominals tight. Raise weight overhead without arching back . Stop when you feel like you are arching your low back.

# Phase I Pike (4A)



Sit upright with legs out and arms by your side  
Bring knees up so they are bent and lift up off surface with feet  
about 6 inches off surface.  
Lean back slightly without rolling backwards. Hold for  
10seconds

# High – Kneeling Diagonals (4B)



Get into kneeling position with a 5lb dumbbell at right side of waist. Keeping abdominals tight. Raise weight in a diagonal pattern without arching back . Stop when you feel like you are arching your low back. Repeat to opposite side.



## Planks (Phase II) (4C)



Get onto toes and forearms. Keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Hold for 30seconds.

# Swiss Ball Leg Raises (4D)



Lie on your back with both feet on the Swiss Ball. Contract abdominals. Perform posterior pelvic tilt and lift hips off surface. Alternate lifting each leg at a time 6 -10 inches off the ball. Hold position for 3 seconds. Repeat 10x on each leg.

# Side Planks (Phase II) (4E)



Go onto side with both legs straight and one on top of each other. Go onto elbow, keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift hips off surface and hold for 30seconds. Work up to a minute, before progressing to next phase.

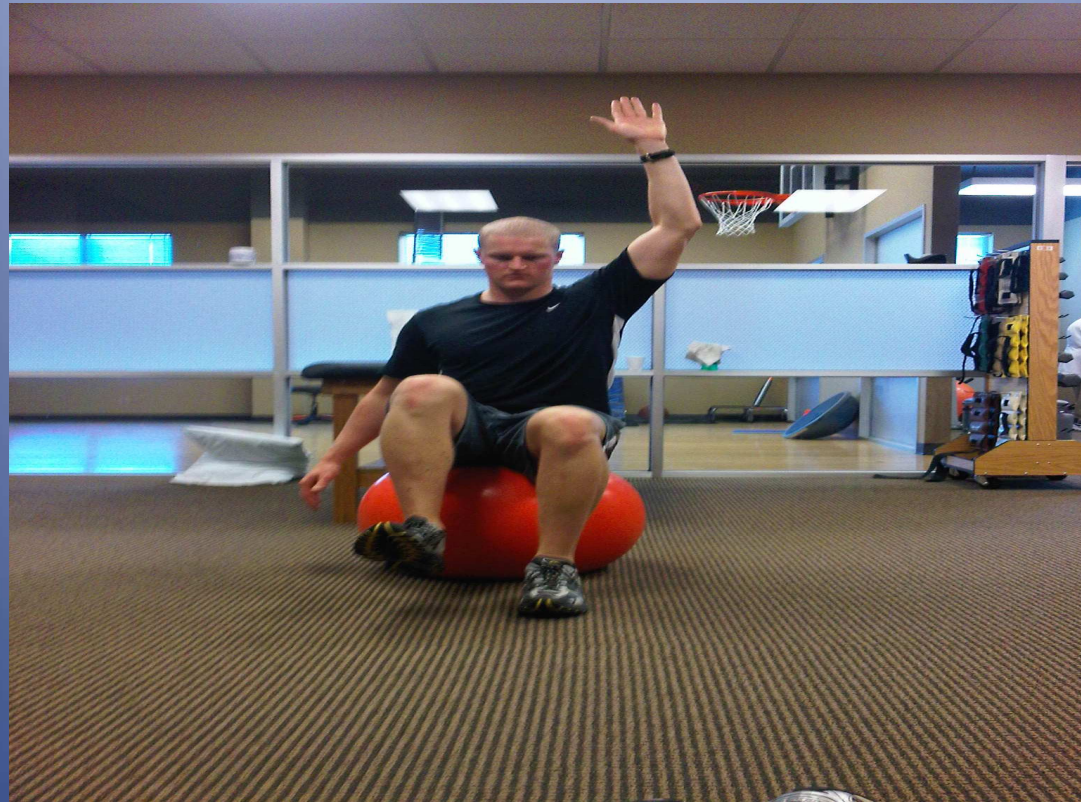
# Swiss Ball Roll Outs (Phase I) (4F)



Go onto your knees with both feet off of surface. Put both forearms onto Swiss ball. Keeping abdominals tight and a neutral spine position. Roll ball out as far as you can without arching your low back. You should be onto your elbows at end-range of exercise. Hold for 3 seconds. Roll ball slowly back without moving hips and repeat 15x.



# Swiss Ball Alternating Arm/Leg Marching (4G)



Sitting on Swiss ball. Keeping an upright posture and both feet flat on the floor. Lift one leg 6 inches off of surface and bring opposite arm straight overhead and hold for 2 seconds. Repeat on opposite side. Start with 30 seconds and progress to 2 minutes before next phase.



# Swiss Ball Marching w/ bilateral Arm, Hip Flexion (5A)



Sitting on Swiss ball. Keeping an upright posture and both feet flat on the floor. Lift one leg 6 inches off of surface and bring both arms straight overhead and hold for 2 seconds. Repeat on opposite side. Start with 30seconds and progress to 2 minutes before next phase.

# Swiss Ball Supine Balancing (5B)



Lie on the Swiss ball with your low back on the center of the ball keeping hips off ball. Bring both arms straight to ceiling. Hold this position for 1minute before moving to next step. DO NOT LET HIPS DROP, keep them level .

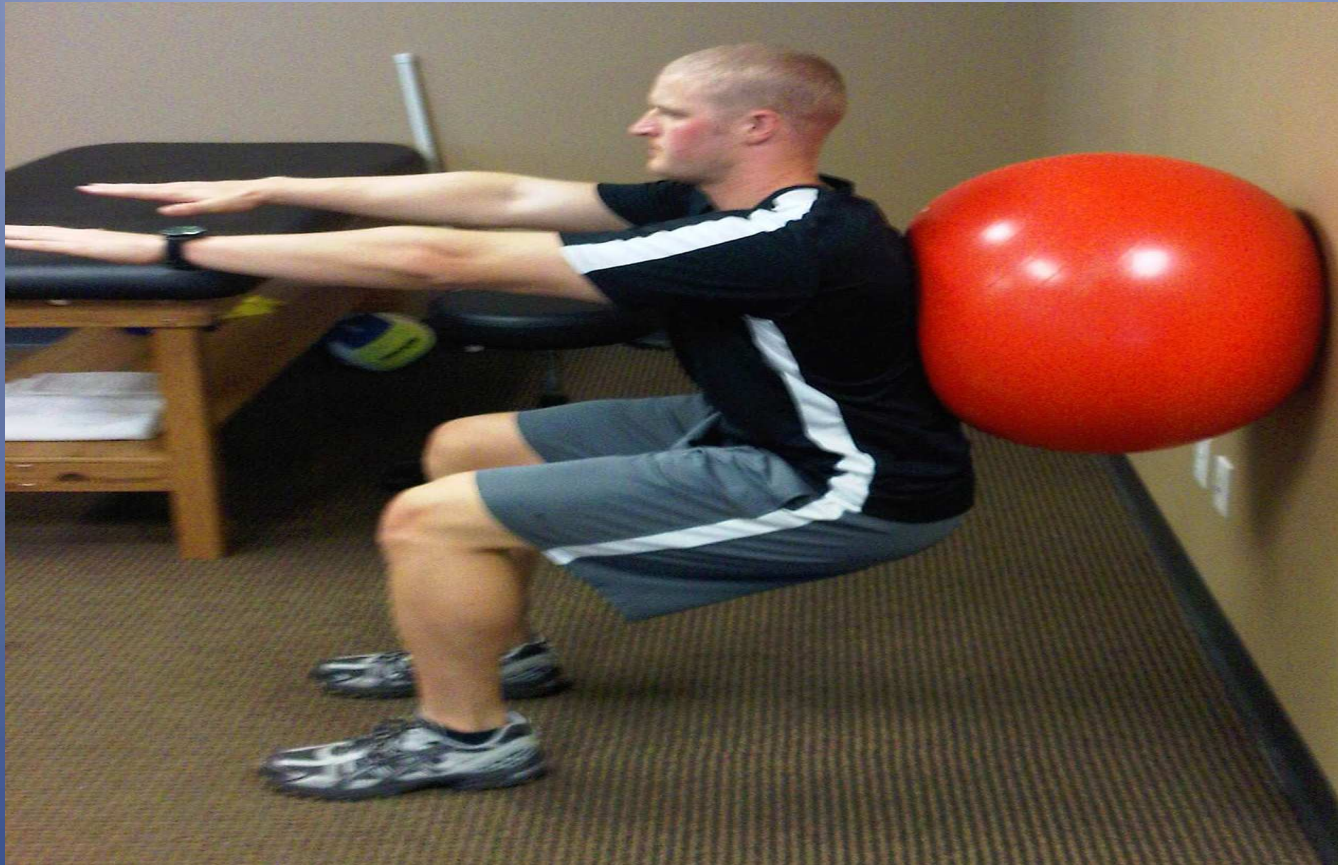
## Phase II Pikes (5C)



Sit upright with legs out and arms by your side.  
Bring legs up so they are straight and lift up off surface with feet about 6 inches above surface.  
Lean back slightly without rolling backwards. Hold for 10seconds



# Wall Sits (5D)



Stand upright with center of the ball on your low back. Walk both feet outward and keep feet flat. Squat to a 45-90 degree angle with arms straight out and hold for 20-30 seconds. DO NOT LET YOUR KNEES GO OVER YOUR TOES WHEN SQUATTING.

# Swiss Ball Unilateral Arm Flexion (5E)



Lie on the Swiss ball with your low back on the center of the ball keeping hips off ball. Bring one arm overhead and hold for 3 seconds. Repeat on each side. Keep hips straight. DO NOT LET HIPS DROP, keep them level . Perform for 1 minute.

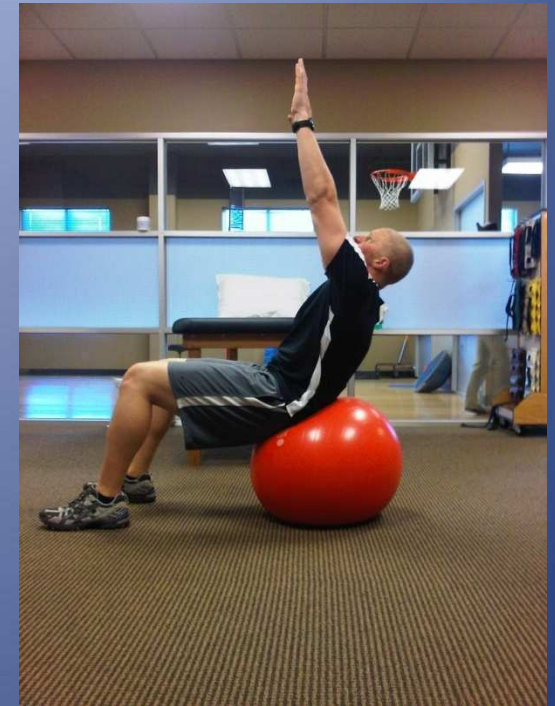


# Swiss Ball Planks (Phase I) (5F)



Go onto your toes while lifting hips/back off surface. Put both forearms onto Swiss ball. Keeping abdominals tight and holding a neutral spine position. Hold for 20 seconds. Work up to a minute until proceeding to next phase.

# Swiss Ball Crunches (5G)



1. Lie on the ball with your low back on the center of the ball. Keep arms straight to the ceiling. Keep eyes toward ceiling also.
2. Using your abdominals, reach for the ceiling coming into a  $\frac{1}{2}$  sitting position with back straight and abdominals tight.

## Phase III Pikes (6A)



Sit upright with legs out, arms up overhead and knees bent. Bring knees up so they are bent and lift off of surface with feet about 6 inches of surface. Lean back slightly without rolling backwards. Hold for 10seconds

## Planks (Phase III) (6B)



Get onto toes and forearms. Keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift one leg 6 inches of table without moving hips. Hold for 3 seconds and switch to other leg.



# Swiss Ball Planks (Phase II) (6C)



Go onto your toes while lifting hips/back off surface. Put both forearms onto Swiss ball. Keeping abdominals tight and holding a neutral spine position. Bring one knee towards your chest and hold for 3 seconds. Repeat on opposite side. Perform 10x on each leg.



# Swiss Ball Balance w/ Unilateral Leg Lifts (6D)



Lie on the Swiss ball with your low back on the center of the ball keeping hips off ball. Bring both arms straight to ceiling. Lift one leg off surface 6 inches and hold for 3 seconds. Repeat on each side. Keep hips straight. DO NOT LET HIPS DROP, keep them level . Perform for 1 minute.

# Single Leg Wall Squats (6E)



Stand upright with center of the ball on your low back. Walk both feet outward and put one leg out off the ground. Squat to a 45-90 degree angle with arms straight out. DO NOT LET YOUR KNEES GO OVER YOUR TOES WHEN SQUATTING.

# Swiss Ball Unilateral Leg Curl (6F)



Lie on your back with both feet on the Swiss Ball. Contract abdominals. Perform posterior pelvic tilt and lift hips off surface. Pull ball towards your buttocks with one leg and hold for 2 seconds and push ball outward. Alternate with other leg. Repeat 10x on each leg.



# Swiss Ball Planks (Phase III) (6G)



Go onto your toes while lifting hips/back off surface. Put both forearms onto Swiss ball. Keeping abdominals tight and holding a neutral spine position. Lift one leg 6 inches off of surface hold for 3 seconds. Repeat on opposite side. Perform 10x on each leg. DO NOT LET low back arch or hips drop.



# Single Leg Wall Sits (7A)



Stand upright with center of the ball on your low back. Walk both feet outward and put one leg out off the ground. Squat to a 45-90 degree angle with arms straight out and hold for 20-30seconds. DO NOT LET YOUR KNEES GO OVER YOUR TOES WHEN SQUATTING.

# Swiss Ball Unilateral Arm/Leg Flexion (7B)



Lie on the Swiss ball with your low back on the center of the ball keeping hips off ball. Bring one arm overhead and lift opposite leg off ground. Keep hips straight. DO NOT LET HIPS DROP, keep them level .

## Phase IV Pikes (7C)



Sit upright with legs out

Bring legs up so they are straight and lift off of surface with feet about 6 inches of surface.

Lean back slightly without rolling backwards. Hold for 10seconds



## Side Planks (Phase III) (7D)



Go onto side with both legs straight and one on top of each other. Go onto elbow, keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift hips off surface and lift top leg even with your trunk. Repeat 10x on each side..

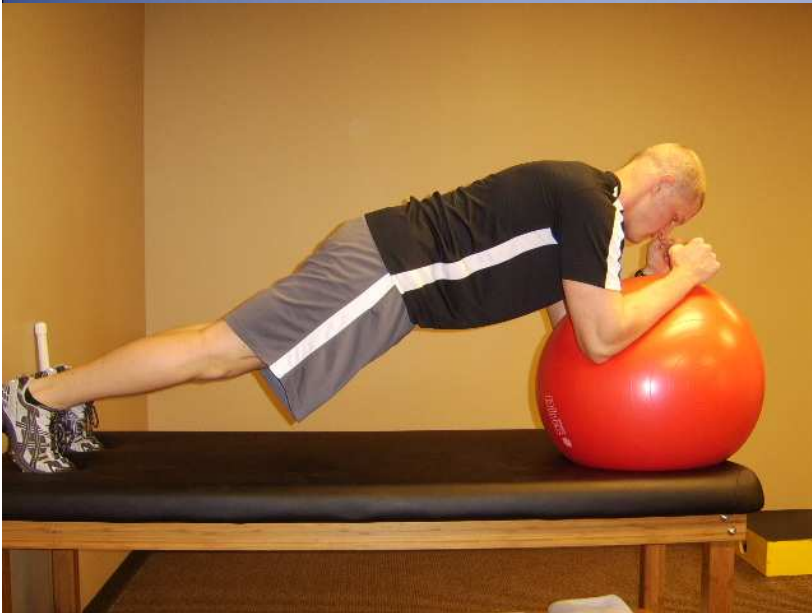


# Planks (Phase IV) (7E)



Get onto toes and forearms. Keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift one leg off surface 6 inches and raise opposite leg out in front of you without rotating hips. Hold for 3 seconds and repeat on opposite side.

# Swiss Ball Roll Outs (Phase II) (7F)



Go onto your toes while lifting hips/back off surface. Put both forearms onto Swiss ball. Keeping abdominals tight and a neutral spine position. Roll ball out as far as you can without arching your low back. You should be onto your elbows at end-range of exercise. Hold for 3 seconds. Roll ball slowly back without dropping hips/trunk and repeat 10x.

# Side Planks (Phase IV) (7G)



Go onto side with both legs straight and one on top of each other. Go onto elbow, keeping abdominals tight. Keep buttocks/back in straight line without arching low back or dropping hips. Lift hips off surface and maintain steady position. Bring top arm down towards surface while rotating just your upper trunk and head. DO NOT rotate at your hips/low back.