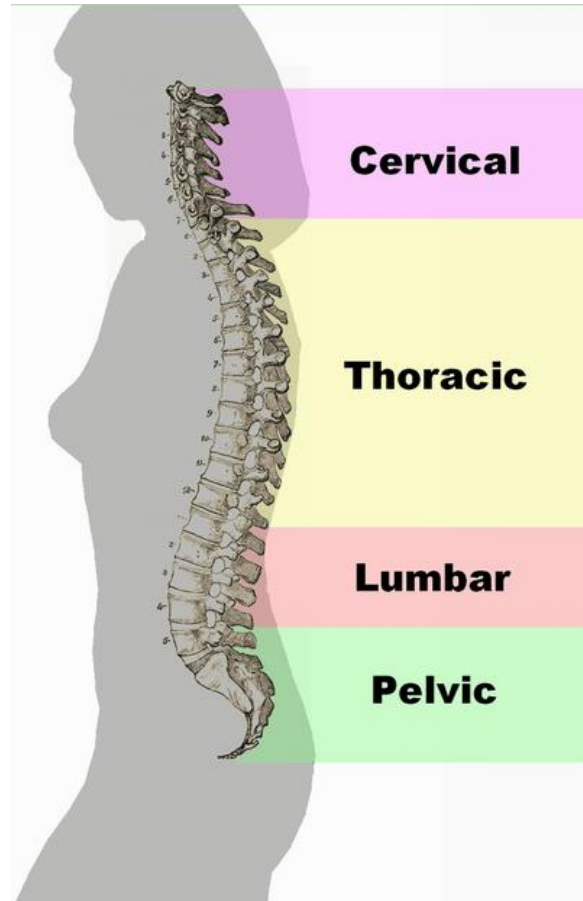


# Neutral Pain-Free Spine Position

Ancillary to any of the exercises discussed in the **BASE** protocol is an understanding of the “Neutral Pain-Free Spine Position.” The Neutral Pain-Free Spine Position is the foundation for trunk stabilization.

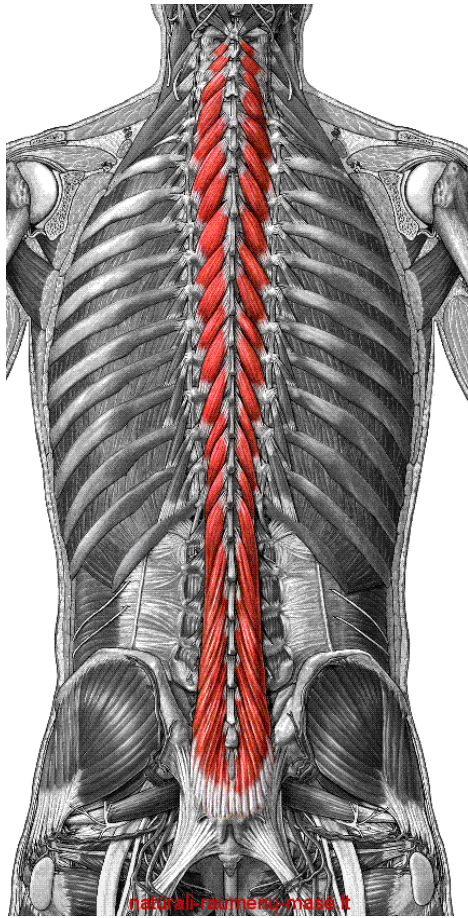
A neutral spine is a posture that demonstrates the three natural curves that are found in a healthy spine. **(Figure 1)** A pain-free spine is a posture where pain is not present in the spine. Therefore, a Neutral Pain-Free Spine Position would be a posture that demonstrates the cervical, thoracic, and lumbar curvature of the spine (to the best of your ability) while not actively causing any pain. This posture is not only necessary for the practice of each of the exercises utilized in the **BASE protocol**, but also for everyday life. The purpose of maintaining good spine posture is to improve “spinal proprioception.” Basically, this is being aware of your spine as it relates to the rest of your body. Just as you have an awareness of your arms as you move them around your body, so too should



**Figure 1**

you have an awareness of your spine and back muscles as they support your trunk in everyday activities. Becoming mindful of your spine posture and maintaining a neutral, pain free position should be an intense area of focus as you begin your recovery. Improved spinal proprioception is associated with decreased back pain. With patience and discipline you will eventually maintain good spinal posture automatically. The primary muscles involved in maintaining a pain-free neutral spine are the **multifidi**, which is a muscle that spans down the entire length of the spine on both sides of the

vertebrae. The multifidi (highlighted in red in **Figure 2**) are deep muscles, meaning they lie beneath other back muscles such as the erector spinae. Due to their stiffness and stability, the multifidi are responsible for supporting each vertebra and minimizes the degeneration at each joint.

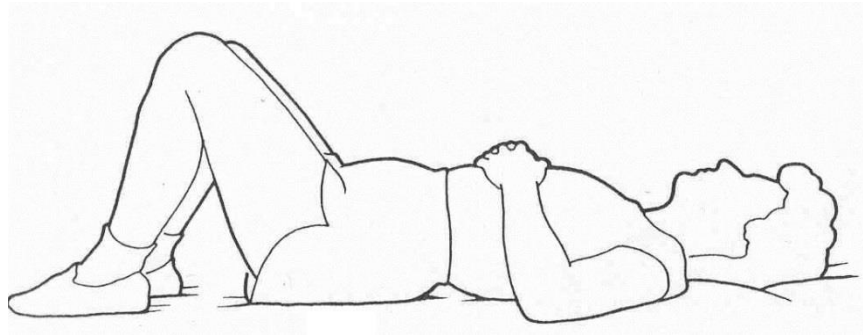


A major advantage of minimally invasive surgery is the sparing of the multifidi muscles. These innovative techniques are associated with less operative blood loss, less postoperative pain, and increased return of function.

**Figure 2**

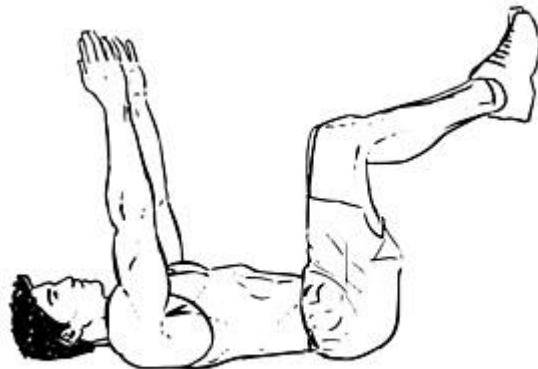
# Dead Bug Exercise

The dead bug is a good introductory exercise to practice maintaining a pain-free neutral spine. The starting position for the dead bug is lying down on the flat of your back (the anatomical supine position) with your knees bent and your feet flat on the floor. From this position it's necessary to achieve a pain-free neutral spine. It's important to not exaggerate the flatness of your back or force your spine into a particular position. **Figure 1** shows the proper starting position for the dead bug exercise.



**Figure 1**

From this neutral position, an examiner will place his/her hand underneath the lumbar spine, which can be seen as the gap between the floor and the subject in Figure 1. The subject will then apply a very moderate amount of pressure on the examiner's hand. The contraction in the core and trunk muscles used to apply this pressure should be maintained throughout all of the dead bug exercises.



**Figure 2**

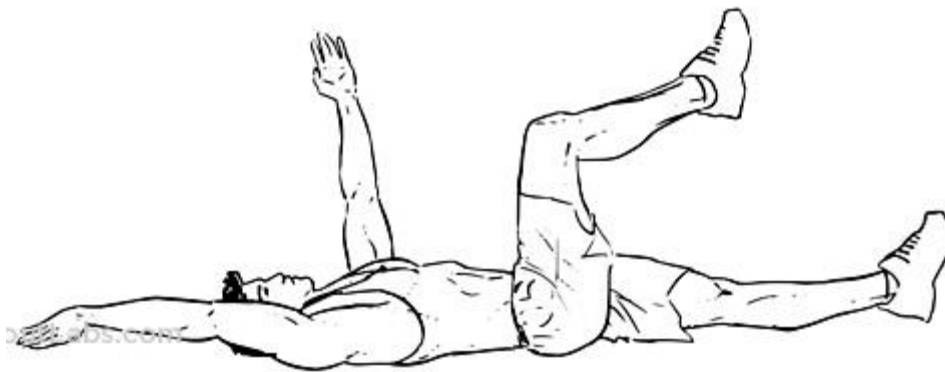
From this starting position a myriad of exercises can be performed. BASE focuses on a few specific dead bug derivatives: marching, leg extensions, and weighted leg extensions. Marching consists of starting in the neutral position and then raising a bent leg up, so that the bottom of

your foot faces directly away from your body and your leg makes a 90 degree angle with your thigh.

As you move up the BASE levels the marching is eventually replaced with dead bug leg extensions, which are slightly more demanding. Dead bug leg extensions begin

with both legs off the ground, knees bent at 90 degrees, and your arms directly above you.

**Figure 2** shows the proper starting position for dead



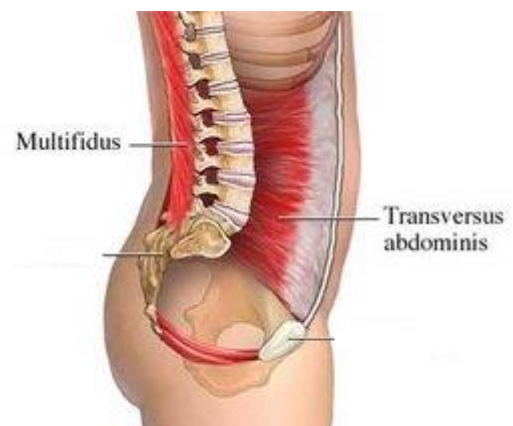
bug leg extensions.

Once you've

**Figure 3**

achieved the starting position, you extend one leg as far as you can reach without touching the ground, while the opposite-side arm stretches out past your head. **Figure 3** shows the proper position to aim for. Throughout the BASE levels you will increase the difficulty by both adding weight and by increasing time.

The dead bug exercises have been indicated by medical researchers to specifically assist in the stabilization of the spine. In addition to training the multifidi muscles (see Figure 3 in the Neutral Pain-Free Spine Position section) dead bug exercises train the transverse abdominals (**Figure 4**), the diaphragm, and the pelvic floor. All of these muscles are involved in stabilizing the spine, and therefore are important muscles to train for a healthy spine.

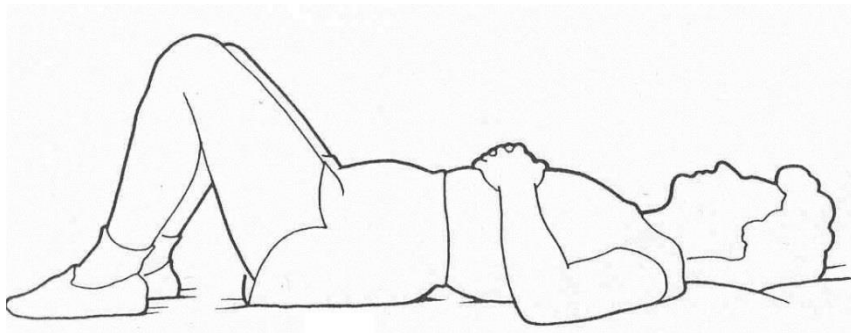


**Figure 4**

## Partial Sit-Ups

Sit-ups are easily one of the most recognizable abdominal exercises, and for good reason. Partial sit-ups in particular target the rectus abdominis, hip flexors and oblique muscles. All of these muscles are critical for spine stabilization, so sit-ups are an excellent exercise to become familiar with. Muhammad Ali once said “I don’t count my sit-ups. I only start counting when it starts hurting, when I feel pain, that’s when I start counting, because that’s when it really counts.” Although BASE will not hold you to the same standard that Ali held himself, it does demand that you perform the sit-up exercises with a similar drive and enthusiasm. There are plenty of sit-up derivatives that can increase or decrease the intensity of the exercise, so no matter what your experience level is there is a corresponding sit-up exercise for you to perform.

As with most spine stabilization exercises, the starting position for partial sit-ups is the neutral pain free spine position, seen once again in **Figure 1**. Make sure you have



planted your feet firmly on the ground and mentally prepare yourself to contract your abdominal muscles. It may be useful to gently contract your abdominal muscles without actually

moving your body just to familiarize yourself with the task at hand. Once you have found a comfortable, pain free position and you feel mentally aware of the muscles you are about to train, cross your arms across your chest and contract your abdominals to lift your shoulders off of the ground. **Figure 2** shows the motion you should make. Try to hold your shoulders off the ground for different lengths of time with the goal of performing 30 repetitions at this length of time. To increase the intensity of this exercise, weight can be held on the chest, the number of repetitions can be increased, and the amount of time each repetition takes can be increased. As long as you are remaining in the pain free spine position feel free to cautiously increase the intensity of this exercise.

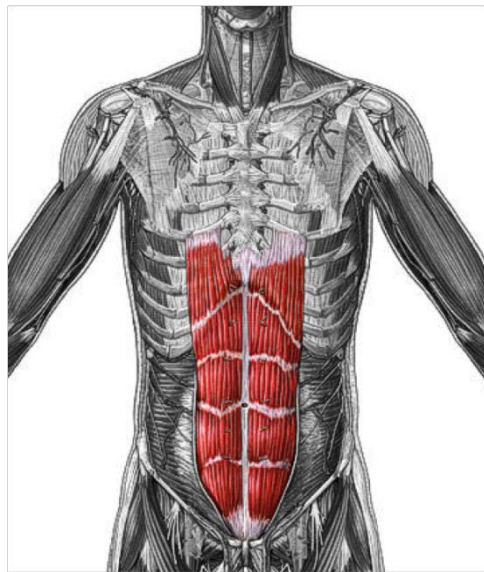
If you begin to feel unexpected pain in the neutral position, decrease the weight, the length of the repetition, the number of repetitions, or consider stopping the exercise altogether. The key here is to “listen” to your body and adjust the exercise before you injure yourself. As with every exercise in the BASE program, personal awareness of your own body is going to be your best guide throughout your recovery. Mindlessly going through the motions for each exercise can lead to injury. Be mindful of your entire body for every repetition.



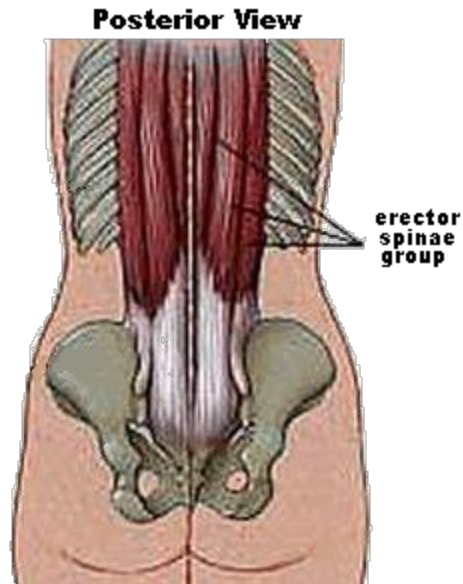
If you are confident and comfortable with this method of performing sit-ups, you can begin to incorporate twists into your repetitions. This targets the oblique muscles more directly. Instead of having your arms across your chest, hold them behind your head and twist as you lift your shoulders off the ground, so your elbow touches the opposite-side knee.

# Bridging

The bridging exercise is extremely useful for targeting the erector spinae and the rectus abdominis muscles, both of which are called upon for spine stabilization. These muscles are highlighted below.

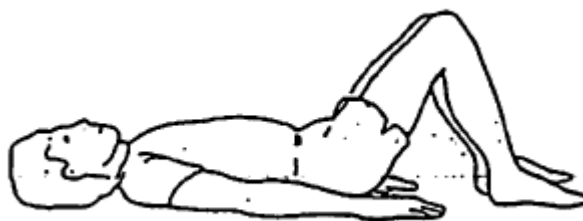


Rectus abdominis



As with dead bug and partial situps, bridging exercises begin in the pain free neutral spine position. Make sure your arms are going down the sides of your body with your palms facing down and plant your feet on the ground with your knees in the air, as seen in **Figure 1**. Try to visualize your own rectus abdominis and erector spinae muscles as you prepare for the bridging exercise. Lightly contract these muscles to get a feel for them.

**Figure 1**



Once you feel comfortable to begin the bridging exercises gently raise your hips off the ground so they are approximately 3 inches off the ground, as seen in **Figure 2**. Hold your hips up in this position for 10 seconds, and then gently lower your hips back onto the ground. Be sure not to move too fast as you complete this motion; this process should be slow, fluid, and controlled. Force yourself to concentrate on your body and visualize the contractions of your erector spinae and rectus abdominis muscles as they work to keep you in this stable position. Once you feel comfortable holding your hips 3 inches off the ground, the next step is to raise your hips even higher. Gently raise your hips as high as you can, so that there is a straight line from your chest all the way up to your



knees, as seen in **Figure 3**. It's important that you do not raise your hips past the point when your body begins to form a straight line. If you notice that you are arching your back then you've gone too far and gently return your body to a straight line. You are responsible for not over-straining your back, so always exercise very cautiously. Your goal at all times is to maintain a painless, neutral spine. If you ever feel you are compromising this good posture to complete an exercise it is imperative to perform an easier version of the exercise or to stop altogether.

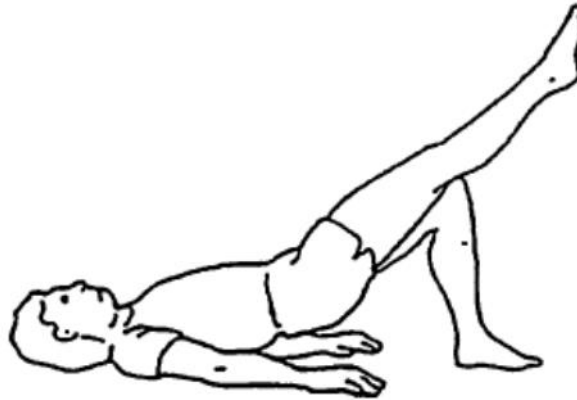


On the other hand, if you find yourself to be performing the bridging exercise without pain or struggle, then there are multiple derivatives of this exercise to increase the difficulty. One of the simplest ways to increase the difficulty is to hold a weight over your hips as you perform the exercise. The benefits of this are two-fold: you increase the weight of your midsection so your muscles have to work harder to hold yourself at the same height, and secondly by lifting your arms off the ground you decrease the

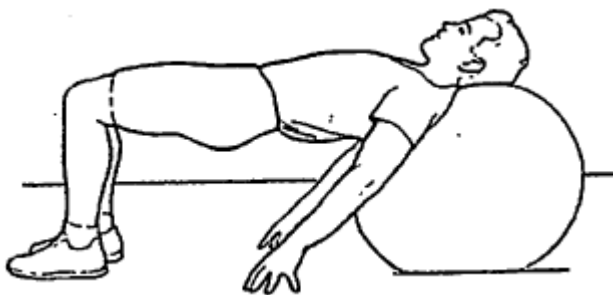


surface area contact that your body has with the floor, which means that you will have to balance to keep your hips off the ground, which further activates your stabilizing muscles.

Another adjustment to increase the intensity of the exercise is to extend one leg once you are in the full-bridge position, as seen in **Figure 4**. Hold your leg extended for 10 seconds before lowering it back down. You can then lower your hips to complete the bridge before repeating the exercise with your other leg. This exercise can be made even more difficult by wearing ankle weights.

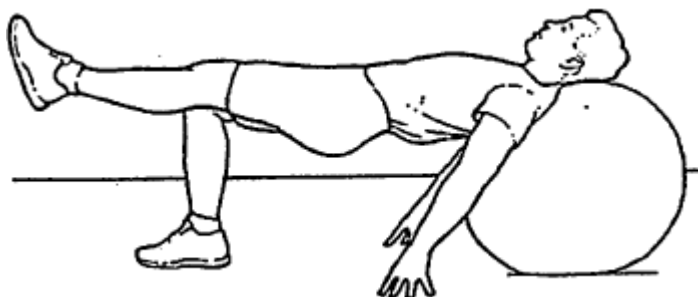


Finally, the most difficult bridging exercise requires the use of an inflatable yoga ball. Try to contact the ball with only your neck and shoulders, as seen in **Figure 5**. Your body should be straight and parallel with the ground, while your knees should be bent at a 90 degree angle. You can plant your hands on the ground to support yourself



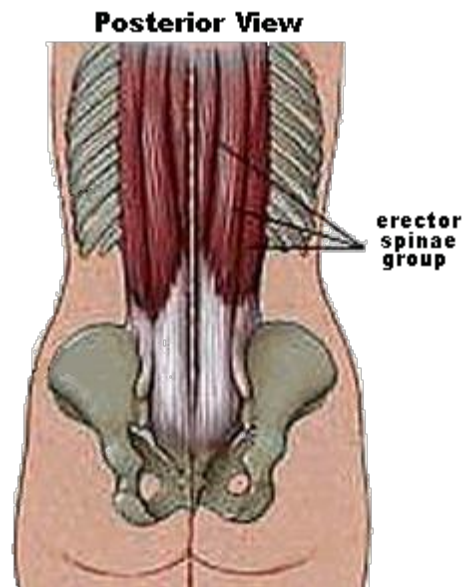
or you can cross them across your chest to make it slightly more difficult. Once you have attained this posture while maintaining a neutral, pain-free spine you can begin to extend your legs directly in front of you, as shown in **Figure 6**. Hold your foot in this

position for approximately 10 seconds before returning it to the ground. Once again, ankle weights can be worn to increase the difficulty of this task.



# Prone Exercises

Prone ground exercises (also known as “Superman” exercises) are another great way to target the erector spinae muscles, which are essential for back stabilization. Once again, the erector spinae muscles are highlighted in the picture below.



As the name implies, prone exercises are started in the prone position rather than the supine position. However, this doesn't mean that you abandon the neutral pain-free spine position. Begin the exercise by lying on your belly with your arms stretched ahead of you. It may be beneficial to place a pillow under your trunk for comfort, as seen in **Figure 1**.



**Figure 1**

From this position it is necessary to tighten your trunk so your back is in the same neutral, pain-free position as if you were starting from your back. Remember that a pain-free neutral spine is achievable from any position. Your long-term goal is to

maintain this neutral pain-free position all the time. Once you have achieved this position, hold it for 10 seconds and then relax. For each subsequent prone exercise you will want to make sure you maintain this position before moving any of your limbs.

The next prone exercise for you to attempt is raising each of your arms, one at a time. Keeping your arm perfectly straight ahead of you, raise your palm about 5 inches off the ground. Hold this position for 10 second before returning your arm to the ground, and then repeat the exercise with the other arm. Do not forget to contract your trunk muscles into the pain-free neutral spine position before raising your arms. **Figure 2** shows this exercise.



**Figure 2**

The next prone exercise is essentially the same thing, except this time you raise your legs off the ground instead of your arms. This is demonstrated in **Figure 3**.



**Figure 3**

Now you can begin to combine the previous 2 exercises. Raise a leg and the opposite-side arm at the same time. **Figure 4** is an example of this exercise.



**Figure 4**

The next exercise requires you to now lift both arms off the ground at the same time, as shown in **Figure 5**. Keep your legs on the ground as you complete this exercise.



**Figure 5**

The next exercise requires you to lift both legs off the ground. Keep your arms on the ground as you complete this exercise. Refer to **Figure 6**.



**Figure 6**

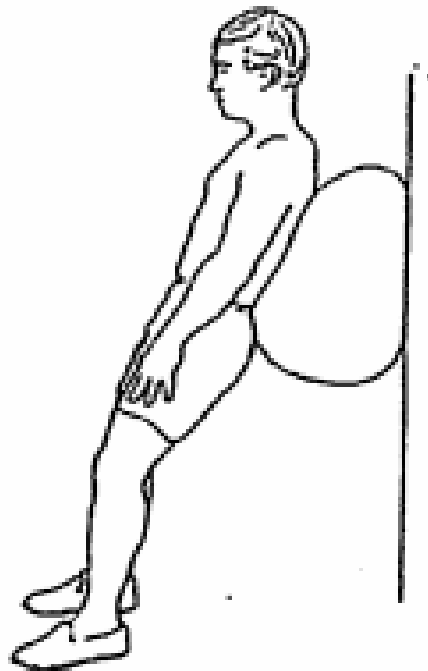
The final exercise consists of raising all your limbs off the ground at once. Hold your limbs up for 10 seconds, and then gently return them to the ground. **Figure 7** shows this exercise.



**Figure 7**

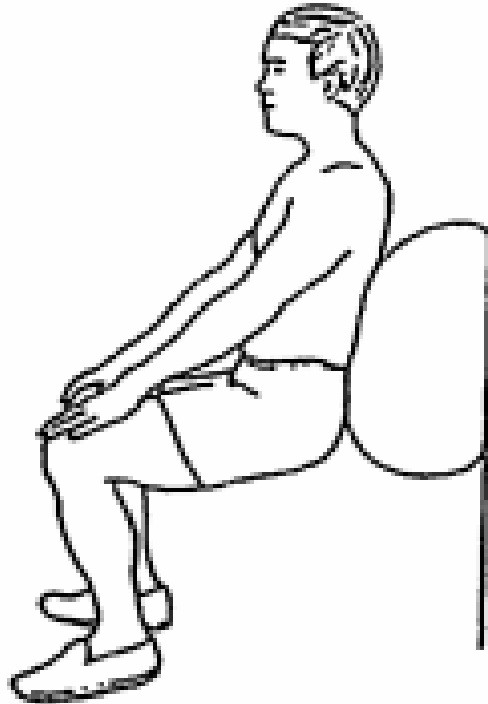
## **Wall Squats**

A Wall Squat is the final BASE exercise for strengthening dynamic core. The starting position for a wall squat is having your back flush against the wall, with your feet firmly planted on the floor a few feet from the wall. This can also be performed with an exercise ball, as seen in **Figure 1**. Using an exercise ball may be useful for some people, as it makes the transition into the squat an easier motion.



**Figure 1**

From this position, you will then bend your knees until they are approximately a 90 degree angle, sliding your back down the wall. Hold this squatting position, as seen in **Figure 2**, for 20 seconds before returning to the starting position.



**Figure 2**

Be sure to keep your spine in a pain-free and neutral position throughout this process. If you begin to feel unstable, or you experience significant pain, do not resume the exercise.

Try to attempt this 20 second hold for 10 repetitions. To increase the difficulty, increase the time of the hold and the number of the repetitions.