

Ross' Precision Health & Fitness Newsletter

Issue #11 – 6/1/2007 – Improving Neurological Patterns

Welcome to the June edition of my newsletter. I hope you enjoyed the last newsletter, because this issue also focuses on the neurological aspect of exercise. Actually this issue is a continuation of the previous one, so I will forgo the usual long introduction and jump right into the next part of the article. Of course, to get the most out of part 2, it is a good idea to read part 1 (issue 10), so please read the last newsletter if you have not done so already. Now, on with the article.

Featured Article

Mental Focus & Concentration During Resistance Training

Part 2

Part 1 served as an introduction to the neurological aspect of exercise and explained the importance of having correct neurological patterns of muscular activation. Now it's time to go one step further and look at how you can apply this information to benefit the way you look and feel.

If thinking about your muscles while exercising is new to you or you are having trouble determining what muscles you are using, just do your best. Feeling and controlling specific muscles may be difficult or frustrating at first, but with continued practice you will become much more in tune with your muscles and your results will improve as well.

With respect to neurological patterns, there are essentially two things you must do to improve a neurological pattern or movement. First, as discussed in part 1, you must concentrate while performing exercises and focus on the muscles you are using. The other requirement is to understand how your muscles and joints should ideally be performing during the exercise so you can identify incorrect neurological patterns.

As with many other aspects of health and fitness, putting forth effort and having good intentions is important, but it does not ensure a positive outcome. To illustrate this point, just think about the number of people who try to lose fat compared to the ones who actually succeed. While it is true some people simply do not try hard enough, many truly do not know what they should do and they end up unknowingly sabotaging their efforts by following the wrong nutrition or exercise program.

One thing to keep in mind however is improving neurological patterns is a more challenging concept to understand for most people than losing fat. The average person has some idea about what they should do lose fat, but knowing what specific muscles to use or what order they should contract during an exercise is not commonly understood. Therefore this article will focus on describing proper neurological patterns and explaining how to identify and correct faulty ones.

I also want to point out that technically every different movement will have a different neurological pattern. For example, performing a bench press with a long bar (barbell) will have a different neurological pattern than performing a bench press with one dumbbell in each hand. On the plus side, when a muscle activation pattern improves in one exercise, some improvement will often carry over to similar exercises as well.

For this reason, instead of focusing on specific exercises, I will focus on the interaction between muscles during important basic movements, such as pulling an object towards your body or bending at the waist (lifting an object from the floor). I chose to focus on these types of movements, because they are movements that everyone performs plus they are commonly associated with poor neurological patterns. So without further ado, here is the first movement pattern.

Basic Movement Pattern 1: Bending From the Waist

Bending over is one of the most commonly performed movements and it involves a combination of lower and upper body muscles. The most prominent muscles involved are those of the low back, abdominals, and hamstrings/glutes, and upper back. Ideally this movement should be accomplished through a cooperative effort between these muscle groups, but many people rely on one or two of the groups to do all the work.

This coordinated muscular effort is not necessary if you are just relaxing and bending over (stretching), because there is relatively little stress on your lumbar spine. However, when bending over and picking up any type of weight (dumbbell, groceries, child, pet, etc.), using the correct muscles is very important if you want to maintain or improve low back stability and health.

When lifting a weight, the abdominals, upper back, and hamstrings/glutes must all contract to help the low back muscles and stabilize and protect the spine. Unfortunately, in many cases this does not occur and one of the muscle groups, usually the low back, is forced to work too hard. As you probably know by now, this excessive muscular strain will lead to chronic overuse of the low back muscles, resulting in pain and/or injury.

In the context of neurological patterns, relaxing other muscles while relying on the low back to do the work is a common faulty neurological recruitment pattern. It is also one of the most problematic neurological issues due to its negative impact on low back health. Now that this problem has been identified, the next step is for you to determine if you have correct muscle function and a good neurological pattern when you bend at the waist.

The best place to start is by performing a simple test that involves picking up a light weight (less than 10 pounds). First, put the item on the ground, then get in a relaxed standing position and pick it up. **Note:** Make sure you do not have your knees locked or you will put unnecessary pressure on your knees and low back. Also, be sure not to think too hard and just pick up the item the way you naturally would. This will give you the most accurate information about your neurological pattern and muscle activity.

Next, pick up the same item from the floor again, but this time ask yourself what your abdominal muscles were doing while you are lifting the weight. You can repeat this multiple times if you are not sure, but try not to consciously increase the contraction of your abdominals or change how you pick up the item in any other way. Also, if you are not feeling much at all, you may need to increase the weight of the item.

While this is a relatively simple test, it will provide some very important information about how your muscles work. Most people experience one of four different results from this test and each result has different implications for your neurological pattern and low back health. Only one of the results reflects a healthy movement pattern, while the other three all imply that some improvement is needed. For now, let's take a look at the problematic results.

Result 1: Your abdominal muscles are not contracting at all and you feel your low back most. This is a very common result as well as a definite sign of a faulty neurological pattern. To ensure good low back health, there must be a simultaneous contraction of the lower abdominal and low back muscles. When this occurs, these muscles work together to create a continuous band of muscle tension that wraps around your entire waist, which provides stability to the lumbar spine.

When the lower abdominal muscles are not contracting, this band of muscle will not be complete and your spine will not be as protected. Then the low back muscles will work harder to make up for the lack of abdominal tension, which greatly increases their chances of chronic overuse or acute/spontaneous injury when lifting or supporting heavy weight.

The lack of lower abdominal contraction may or may not be the only problem that needs to be corrected before good low back health is achieved, but it is the primary issue that must be addressed. From a neurological standpoint, this result means your brain no longer considers the lower abdominals important or useful lumbar spine stabilizers.

Result 2: Your upper abdominal muscles (upper rectus abdominus) are working, lower abdominals (transverse abdominus) are relaxed, and you may or may not feel your low back most. This result is better than result 1 in terms of low back health, but it's still a sign of a faulty neurological recruitment pattern and it may even take more time to correct this problem than the one described in the first result.

In this case, your body is trying to create lumbar stability by simultaneously contracting abdominal and back muscles, but it is using the wrong abdominal muscles. The good news is that if the rectus abdominus is strong enough it can provide enough stability to protect or at least decrease the stress on your spine. However, the rectus abdominus is not nearly as efficient as the transverse abdominus when it comes to stabilizing the spine. Plus this additional work will eventually cause the muscle to become chronically fatigued and overworked.

From a neurological standpoint, the first result only required one neurological change while this one requires two. The body still has to learn to activate the lower abdominals, but it must also learn to stop activating the upper abdominals as the primary stabilizer. The upper abdominals should be a secondary spinal stabilizer, but they should only activate during times when the external forces are too high for lower abdominals to stabilize on their own.

Result 3: Your lower abdominals are working, upper abdominals may or may not be working, and you feel your low back most. This is another negative result, but is different from the previous ones, because it is an indication of muscle weakness and not necessarily a faulty neurological pattern.

When the lower abdominals are contracting and the majority of the tension is still felt in the low back, it means the lower abdominals are too weak to carry out the stabilization required for the given task. There will always be a load heavy enough to overwhelm the abdominals, but if this happens under light loads, it means the abdominals must become stronger or low back health will deteriorate sooner than later.

In this situation, the first step is to perform exercises that isolate the lower abdominals, specifically the transverse abdominus, to build up the strength and endurance of the muscle. After strength has significantly improved, focus should shift to performing exercises that involve the simultaneous contraction of the lower abdominal and back muscles. This will teach the muscles to work together to further improve spinal stability.

Result 4: Your lower abdominals are working, upper abdominals may or may not be working, and there is less tension on your low back than your abdominal muscles. This is the ideal result and it indicates a neurological recruitment pattern without major problems and at least some basic strength in the primary lumbar spine stabilizers.

However even with this positive preliminary result there may still be minor neurological recruitment problems. The most common problem is the simultaneous contraction of the upper and lower abs, especially under light loads. As stated above, the upper abdominals should only contract when the lower abdominals are overwhelmed and need extra help to stabilize the spine.

If this occurs, additional time should be spent performing exercises that isolate the lower abdominals. This will help your brain separate lower abdominal contractions from upper abdominal ones. After some practice you will be much better at contracting your lower abdominals while keeping your upper ones relaxed. Plus, this improved abdominal control will result in a stronger muscle contraction in your lower abdominals when you focus on using them.

The Next Step: When you are confident that you have a good neurological recruitment pattern, you can take this test further by completing additional trials with increasing weight. During this process, increase the weight by small amounts (5 or 10 pounds) each

time and stop when you reach a weight that overwhelms your abdominal muscles (increased back stress) or a changes your muscle recruitment pattern.

The heaviest weight used during a successful trial represents the amount of stabilization strength your muscles have while bending from the waist. In other words, when using the same muscles and form, you can pick up similar items of that weight or less, without putting unwanted stress on your low back. However, this does not mean picking up anything that weight or less will always be healthy, because stabilization strength is affected by numerous factors.

For example, if you are fatigued, you will not be able to correctly stabilize as much weight as if your muscles are rested. In addition, lifting an object that is difficult to hold will require more stabilization strength than lifting a barbell of the same weight. Also, the path and distance the object travels will affect stabilization strength. Larger distances and more complicated movement patterns (twisting, overhead lifting, etc.) will all increase stabilization demands and decrease the amount of weight you can safely lift.

Role of the Upper Back Muscles: Earlier I stated that the upper back muscles were also involved in stabilizing the lumbar spine, but they work more indirectly. Simply put, the more rounded your upper back is while bending from the waist, the more stress will be put on your low back muscles. Regardless of your result from the item lifting test, excess rounding in your upper back means there is one additional thing to correct.

These muscles, particularly the muscles that bring your shoulder blades closer together (scapular retractors) are generally not as strong as they should be, which will make it difficult to keep your upper back flat when lifting a weight. The first step in strengthening these muscles is simply to practice squeezing your shoulder blades together while keeping your neck and shoulders as relaxed as possible. Then you can progress to performing similar movements with cables, dumbbells, or other resistance.

Ending Note: There is no particular amount of weight you should strive to lift with proper stabilization, but you should at least be able to accomplish all of your normal daily tasks without feeling excess low back stress or pain. In any case, improving the strength and neurological control of the muscles that stabilize your lumbar spine will improve long-term back health and decrease your chances of developing serious back problems.

WRAP UP:

Believe it or not, this was originally intended to be a one part article, but as I wrote, I realized that would never happen. Actually writing this particular issue showed me why relatively so little information is written about applied neurological training. These issues are complicated enough when discussing them in person where feedback can be given at the time of performance, but trying to explain them through writing alone is a whole other challenge.

There are so many different compensations the human body can make during any given movement that it is impossible to cover every neurological pattern variation or muscle activation sequence. As a result, I chose to focus on the issues that are simultaneously most important and problematic.

In the next newsletter I will apply a similar approach as I continue with part 3 of this article, which will focus on neurological pattern problems in the upper body muscles.

Take care and have a great month,

Ross