Searching for Symmetry

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In the human body, nothing is perfectly symmetrical. Many people have a leg that is longer than the other or maybe one bicep that is stronger than the other.

For athletes, such body imbalances can be problematic. They can lead to less-than-optimal output in strength, flexibility, and coordination that may have negative effects on performance. They can also eventually lead to injuries. Conversely, obtaining muscular balance allows the body to move more efficiently, display more strength, and reduce injury.

Most athletes, however, do not know they have a muscle imbalance until an injury results. At that point it can be time consuming and frustrating to rehabilitate, rebalance, and relearn movements in order to return to previous levels of performance.

A better path is to test for imbalances before they become a problem, and develop training protocols that focus on body balance. To do this, it's important to understand the nuances of unilateral balance, imbalances within the limb, and sport-specific balance.

Unilateral Balance

For a variety of reasons the dominant form of strength training seems to be bilateral exercises such as the bench press, squat, barbell curls, and so forth. While these are valuable movements, the negative is that they can help hide or even worsen a body imbalance.

In my experience, many athletes lack the flexibility, strength, coordination, and technique to do bilateral exercises correctly. When the weight on the bar is light, there is not usually a problem. But, as weight is added to the bar, the stronger, more flexible, or more coordinated limb tends to take on a greater role in the exercise and the body twists, turns, bends, or strains to get the weight up and complete the exercise.

These movements are repeated workout after workout, and the result is a furthering of the original imbalance or the creation of a new imbalance. At some point, the imbalanced muscle or scar tissue that may be formed by the incorrect actions opens the athlete up to potential injuries.

It is also important to develop unilateral balance for enhanced performance on the field of play. As explained by strength and conditioning coaches Peter Twist, MPE, CSCS, and Dusan Benicky, MS, in the Strength and Conditioning Journal (Vol. 18.5, 1996), imbalances can lead to poor reaction when sudden movements are required. In their example, if a defenseman in ice hockey has an imbalance between his two legs, he tends to favor the dominant leg by putting more body weight on it. When a forward on the opposing team tries to get around the defenseman to the weaker side, the defenseman must first un-weight the strong leg, shift to the weaker leg, and then push off in that direction to intercept the forward. This brief delay may be all the forward needs to elude the defenseman.

According to Charles Poliquin, MS, in The Poliquin Principals, studies have also shown that neural drive is maximized to a higher degree when using unilateral training than with bilateral training. Another advantage of unilateral training is the stimulus it provides to a host of stabilizer muscles. In most cases, the degree of the stabilizing effect has a direct effect on the ability of the prime movers to execute heavy movements.

For these reasons, it's critical to focus on unilateral strength and balance before moving to bilateral exercises, which go a long way to correcting imperfections within training. Using dumbbells, kettlebells, or other single-limb exercises can provide a wide variety of movements, enhance stabilizer development, and rebalance potential problem areas while developing a high level of strength.

It is also important to locate any bilateral imbalances. The best way is to test common actions that may show a discrepancy. (Table One, below, outlines some common tests.) When testing specific actions it is important to get as much feedback as possible to make an informed decision. Use mirrors, coaches, training partners, or a video recorder to view the test. The goal of testing is to ensure that there is less than a five percent variance in strength between limbs and where the imbalance, if any, is located.

Within the Limb

Imbalances within a single limb (such as between the biceps and triceps or biceps and forearm flexors) can also have a negative impact on performance. Genetic flaws, motor recruitment patterns, technique of the exercise or movement, or previous injuries may potentially cause imbalances. As with other forms of imbalances, the stronger muscle or muscles tend to do a higher portion of the work compared with the weaker muscles, which further exaggerates the strength differences.

For example, with one of my clients, his forearm flexors were very strong and his biceps were much weaker. I found this out by using a curling exercise that tested his strength with and without the use of his forearm flexors. Training for this client then became a matter of trying to minimize the involvement of the forearms within movements involving the biceps so that these muscles would have a chance to develop and re-balance accordingly with the stronger forearms.

The difficulty with imbalances within the limb is that they can be tough to detect until an injury occurs. Oftentimes people will not have any pain in the weaker part of the limb and are still able to make progress with strength training.

The best method to evaluate balance within the limb is to isolate the various muscles and compare that strength to the whole movement. For instance, when testing the upper arms, use a curling action and record the weight that can be lifted in a complete movement. Then isolate the biceps by bending the forearms backwards throughout the lift (called a Zottman curl), and vary the hand positions using a neutral and then pronated grip to determine the strength variance when other muscle groups are involved. Take note of the differences in strength using the varying techniques.

A certain amount of difference in strength is acceptable, but when the differences between hand positions or when muscles are isolated are more than 20 percent it is time to use corrective measures. (Table Two, below, outlines some tests for within-the-limb balance.) Once you identify the area that is weaker you can focus more attention on correcting this problem.

Sport-Specific Balance

Athletes are perhaps more prone to imbalances than the general training public. The repetitive movements in athletics such as the golf swing, hockey shot, swimming stroke, and running stride create the potential for what is called a repetitive stress syndrome or pattern overload. These muscles are stressed over and over, perhaps thousands of times in a similar manner, and can create an imbalance compared to the other side of the body. The weakened state of the antagonist muscle or muscle group compared with the much stronger agonist or prime mover predisposes the athlete to injury.

The goal for all athletic actions is to improve performance, so the prime movers have to be developed in a sport-specific manor. However, when creating training programs, in order to avoid imbalances, the movements have to be analyzed to determine the best course of training for the antagonist muscle or muscles as well.

In the throwing action, for instance, the external rotators are called upon much less than the prime movers of the abdominals, chest, and shoulders, but they still need to be strong enough to decelerate the arm and thus prevent injury. Another example is ice hockey for which many conditioning programs fail to rebalance the abductors and adductors that are under-developed from skating. When looking at sport actions, try to determine what the antagonist muscle or muscles are that need to be worked and spend time bringing them up to an acceptable level.

The difficult task is to figure out what an acceptable level of balanced strength is, as it depends on a number of variables. Unfortunately, there are no hard and fast rules to govern the balance within the body for maximal sport performance and injury prevention. In some actions, such as lateral movements, it has been shown that the best extensor-to-flexor ratio in the upper legs is between 75 to 97 percent. In studies with top Canadian sprinters, the hamstring-to-quad strength was up to 125 percent.

Poliquin has developed a set of scores for certain upper-body lifts and how they should compare to one another. He states that comparing pulling actions (both horizontal and vertical), biceps curls, reverse curls, shoulder presses, and external rotations to the close grip bench press on a percentage basis will help to achieve muscle ratios that will allow for athletes to compete at a maximal level with the lowest incidence of injuries.

For most sports, however, the most prudent plan is to develop the antagonist muscles that do not get a significant amount of training from sport activities. Achieving a ratio where the antagonist muscles are two to three times the strength of the prime movers will help to ensure balanced and injury-free movements.

In sports that include a rotational component (such as golf, baseball, racquet sports, hockey), also look to balance the body by spending time strengthening the same type of actions on the opposite side of the body. In the golf swing, for instance, if the golfer hits left handed, the right side of the body should be developed with strength-training exercises similar to the sport action. In addition, a certain amount of sport practice on the right side (perhaps with a right-handed golf swing or right-handed medicine ball toss) should be performed. The weaker side may never achieve a similar performance state as the dominant side, but by using similar sporting actions on the non-dominant side, the goal of reducing potential imbalances can be met.

Developing appropriate resistant training programs after a complete evaluation and assessment can be very beneficial for people wishing to train injury free for any length of time. There are many training hazards that can have a negative impact on performance, and it becomes critical to reduce those potential problem areas in order to achieve an optimal performance state. Understanding the importance of balanced strength in the body is a key factor in this process.

Table One: Unilateral Tests

The following are samples of unilateral testing exercises:

Overhead Squat (one handed with dumbbell): Test each side maximally and compare the movements of the knees, hips, shoulder girdle, upper body, and depth of squat. Movements should look identical on the right and left sides.

Push Jerks (one handed with dumbbell): Test each side and compare the shoulder girdle, ease of lift, maximal weight handled on each side, upper-body lean, and hip action.

Pistols (one-leg squats): Test the depth of the squat, maximum number of repetitions performed or maximal amount of weight for one rep, deviation from optimal form, and flexibility in the lower leg and hip.

One-Arm Bench Press: Test each side maximally and compare ease of lift, deviation from the optimal path of the dumbbell, speed of the movement, range of motion, and angles of the elbows.

One-Arm Rows: Test each side maximally and compare ease of lift, path of the dumbbell, speed of the movement, and range of motion.

One-Arm Pull-Downs (one handed, pronated grip to the side): Test each side maximally, and compare the range of motion, weight handled, and deviations from an optimal path of resistance.

One-Arm Biceps Curl, Hammer Curls, Calf Raises, and Romanian Deadlifts: Test each side maximally and compare the weight lifted, movement of the dumbbell, speed of the lift, deviation from an optimal lifting path, and range of motion.

External Rotations of Knee: Sit on a flat bench, bring a knee up so it is bent at 90 degrees. Place the elbow of the same side of the body on the knee, and bend so the forearm is vertical. Internally rotate the arm toward your belly button, and return to the vertical position. Test the weight lifted for 10 repetitions for good form, range of motion, and speed of contraction.

Saxon Side Bend: Take two 10-pound dumbbells, press them straight overhead, and then straight to each side as far as possible. Test the range of motion, difficulty of the lift, and deviation from a straight side bend.

Turkish Get-Up: Start lying down with a weight extended vertically (straight arm). Without bending the arm and keeping the arm vertical, stand up. Test for either repetitions or a maximal weight.

Shot Put: Test the distance thrown (after skill acquisition) on both sides.

Standing Medicine-Ball Throws: Test rotational power development on both sides of the body.

Table Two: Within-Limb Tests

The following are samples of within-the-limb testing exercises:

• Compare one-arm biceps curls to one-arm hammer curls and conduct one-arm Zottman curls to test for arm balance. Results should be within 20 percent for each lift.

• Compare maximal front squats to maximal back squats to test for knee joint balance. Front squat should be 85 percent of back squat.

• Compare biceps curls to triceps dips to test upper-arm balance Results should be 40-50 percent of max dip.

• Compare dorsi flexion to calf raises (using the Dynamic Axial Resistance Device). Results should be 8 to 15 percent of max calf raise.

• Compare hip flexors to hip extensors on multi-hip machine. Results should be close to 50 percent or more.

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A former nationally ranked athlete in both cross country skiing and triathlon, Coach Pollitt brings a wealth of experience to clients he coaches. He holds a degree in Physical Education from the University of Manitoba and is a graduate of the Olympic Academy of Canada. David is certified with distinction from the National Strength and Conditioning Association and from the Canadian Society for Exercise Physiology. David has professional coaching certifications in weightlifting (both in Canada & the USA), intermediate levels in hockey and track & field, and is a master coach in cross country skiing. He has had internships at the Calgary Olympic Development Association High Altitude Camp and with the Canadian National Ski Team Development Centre. Throughout the years Coach Pollitt has won several awards such as the 3M Coaching Award for work with minor hockey in Canada and he was part of the Eastern College Coaching Staff of the Year (for work with Duquesne University). His client list ranges from all varieties of athletes from amateur to the professional ranks. He has worked with Duquesne University, The Banff Hockey Academy, The Canmore Eagles, along with a number of corporate clients such as Taco Bell and TAB Answer Network. His companies DP Hockey, OP Coaching and Optimal Performance all work with a number of clients in the pursuit of improving conditioning and sport performance. David has submitted his original research and ideas with articles in popular journals and magazines as Training and Conditioning, the *Strength and Conditioning Journal*, and the *Performance Training Journal*. David serves as the assistant editor for the *Performance Training Journal*, and is a peer reviewer for the *Strength and Conditioning Journal*. His first book on conditioning for junior hockey players will be published in early 2007 and he is working with Angelo Maggio of Magic Hockey and Clint Hazen from ProKinetics on a goaltender development manual and DVD. David's state of the art training facility is set to launch in mid 2007 in southern California.