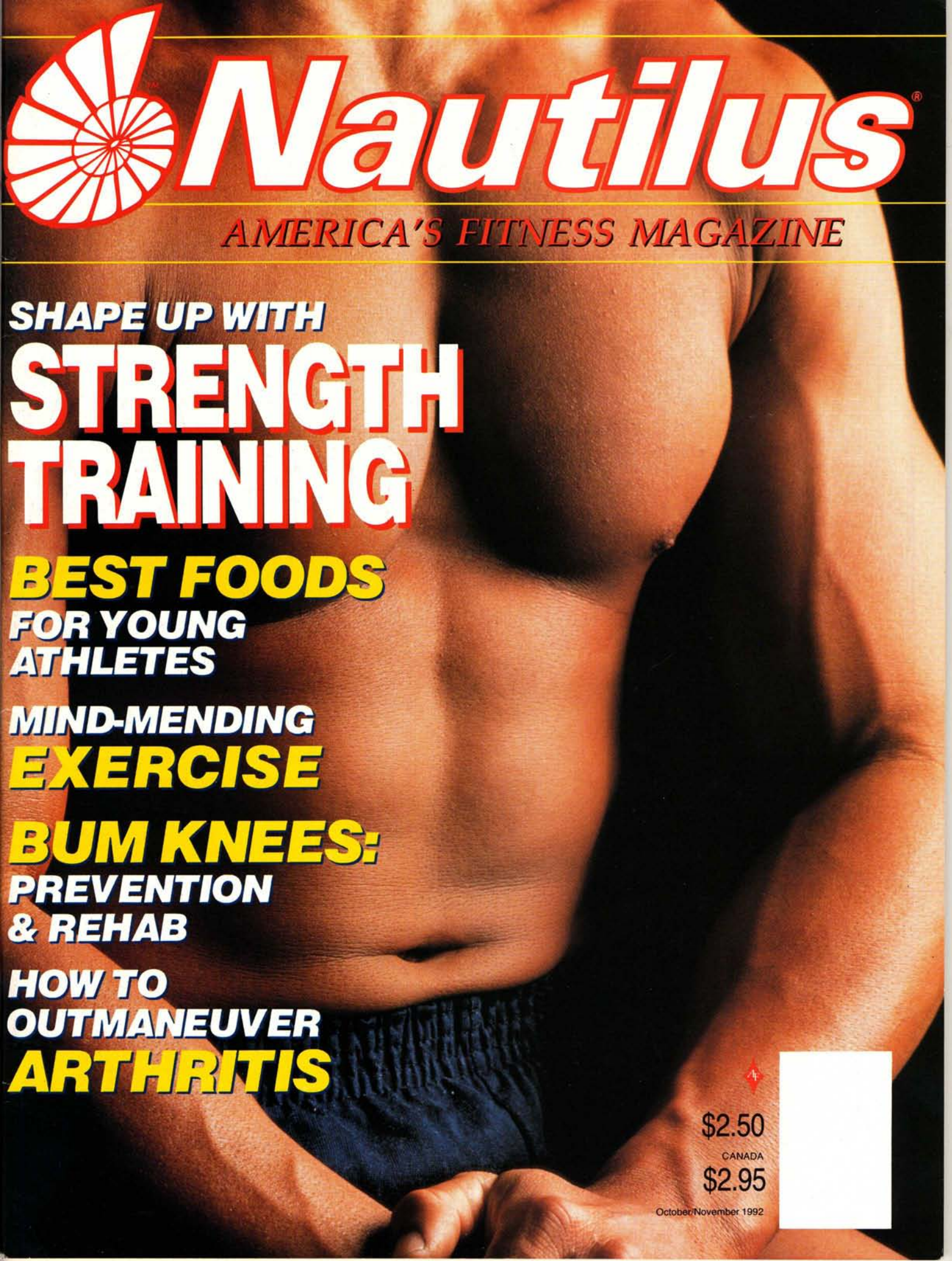
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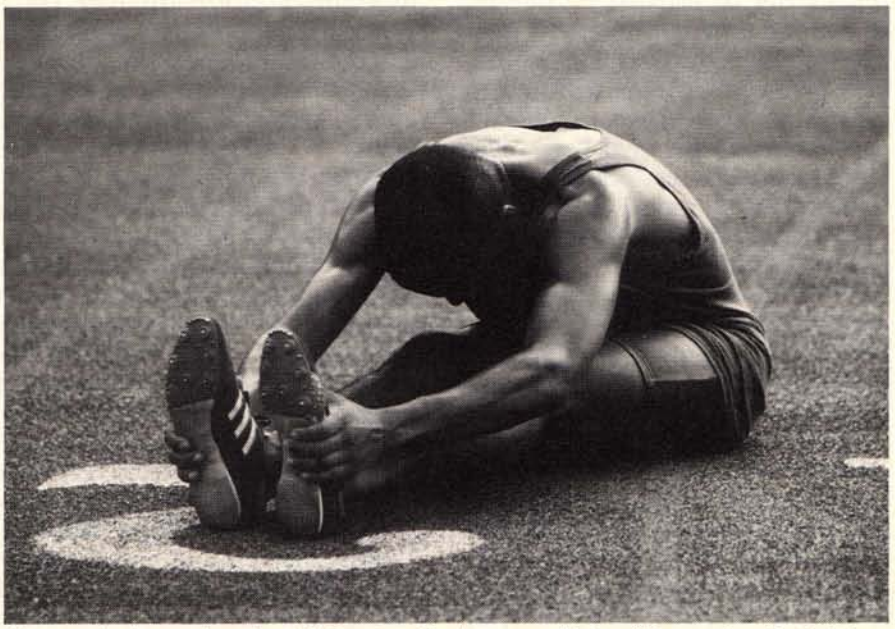
Maximize your strength by isolating and preexercising certain muscles

GET SPECIFIC

BY MATT BRZYCKI



After experiencing a prolonged period of no strength gains, many athletes will try preexhaustion training, a high-intensity technique.

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Essentially, there are two types of exercise movements: primary and compound. A primary movement (also known as a simple or single joint movement) involves a range of motion around only one joint. The advantage of a primary movement is that it usually isolates a muscle. A good example is a Leg Extension in which the lower leg rotates around the knee joint thereby isolating the quadriceps muscle located on the front thigh.

On the other hand, a secondary movement (also known as a compound or multiple joint movement) involves ranges of motion around more than one joint. For instance, during a Lat Pulldown on the Torso Arm machine, there is rotation around both the shoulder and the elbow joints—you are using your upper back (or "lats") to rotate your upper arm around your shoulder joint and your biceps to bend your arm at the elbow joint. You are also using your forearm flexors to maintain your grip on the bar. Compound exercises are advantageous because you can work relatively large amounts of muscle mass in one movement.

The Weak Link

There's an old saying that a chain is only as strong as its weakest link. That adage also applies to multiple joint movements. Indeed, compound movements have a distinct disadvantage because they generally have a "weak link." When a person fatigues in an exercise it is because the smaller, weaker muscle runs out of juice. This happens well before the larger and stronger muscle has received a sufficient work load. In an exercise like a lat pulldown, your biceps are the smaller muscle and, therefore, will fatigue long before your upper back. In fact, your grip strength may be the first to go! Whenever you perform a compound movement for your upper back, such as a Torso Arm or a Compound Row, you will quickly notice that your biceps and forearms received much more work than your upper back. So, the biceps and forearms get a pretty good workout but the lats—which you are really trying to exercise—get very little work load.

As a rule of thumb, your arms are the weak link when performing compound movements for your upper body. Likewise, your legs are the weak link when performing compound movements for your gluteals (i.e., the hips and buttocks). Because of the existence of these weak links in compound movements, the potential for your development of the larger, more powerful muscle structures is limited. The question is: How can you avoid this problem?

Nautilus History 101

To answer this question, let's turn back the hands of time to 1948. That's when the first Nautilus machine, a prototype Pullover model, was built on a front porch in Tulsa, Oklahoma. It wasn't until late 1970—after 27 different models—that a Nautilus machine was actually sold to a customer (a Miami attorney). However, it was the original prototype that provided the initial spark for a revolution—not only in the design and function of future equipment for resistance exercise but also in the way in which equipment was used for training. Previously, all conventional forms of exercise for the lats mainly consisted of chinning, rowing, and various pulldown movements. When doing these movements, the resistance was applied to the hands and was filtered through the weaker muscles of the arms. The development of the Nautilus Pullover machine overcame the shortcomings of the conventional exercises because it applied the resistance directly to the backs of the upper arms—not the hands—thereby allowing the lifter to isolate the lats throughout a very large range of motion. For the first time, a lifter could train the muscles of the upper back without being limited by the strength of the biceps and forearms.

Matt Brzycki is the Strength Coach, Health Fitness Coordinator, and Nautilus Director at Princeton University. He has authored more than 60 articles on strength and fitness. His book, A Practical Approach to Strength Training, is in its second edition.

Preexhaustion

But how does this concept fit in with solving the limitations of a compound movement? The problem associated with compound movements can be avoided by utilizing the Preexhaustion Principle, a training technique that was first popularized by Nautilus more than twenty years ago. The Preexhaustion Principle employs what has been called a "double set": one primary movement followed quickly by a secondary movement. With the Preexhaustion Principle, the idea is to "preexhaust" the muscles you are trying to work by first performing a single joint exercise. In effect, this will bypass the weak link. The first exercise is followed quickly by a second exercise to bring into play other surrounding muscles which provide assistance to work the prefatigued muscle to a point beyond its normal state of exhaustion. For instance, let's suppose that you intend to exercise your lats using the Preexhaustion Principle. The first thing you'd do is perform a single joint exercise, such as the Super Pullover, to prefatigue your lats. As soon as possible following the completion of that exercise, you'd perform a multiple joint movement, like the Compound Row. That second set uses your arms to assist your prefatigued lats to work to a degree of exhaustion that would normally be impossible.

It should be noted that for maximum results, the second exercise should come as soon as possible following the completion of the first exercise. Too much time between the first and second exercises will allow the prefatigued muscle to gradually recover some of its original level of strength. If the muscle recovers too much, then you're back to where you started with the weak link still being the limiting factor.

With that in mind, in the early 1970s Nautilus developed several "compound machines," which were actually two machines combined into one frame. The Compound machines included the Combination Pullover/Torso Arm, Combination Behind Neck/Torso Arm, Compound Leg, Double Chest, Double Shoulder, and Double Back. Essentially, each of these machines housed one primary movement to preexhaust a major muscle and one secondary movement to further fatigue that muscle using either the arms or the legs for assistance.

Unfortunately, these machines were not practical for use in most commercial settings. Since only one person could use the machine at a time, an individual was tying up two stations. And, if two or three individuals took turns on the machine for several sets apiece, it meant that no one else in the club could use the equipment for extended periods of time. This problem was solved by separating the machines into two individual pieces. For example, the Double Shoulder became the Lateral Raise and the Overhead Press. The lone survivor of this historic generation of revolutionary equipment is the Double Chest machine.

The Leg Press, a secondary movement for Hip Abduction, Leg Curl, and Leg Extension, exercises the lower body as no barbell can.

Practical Applications

Even though compound machines are no longer in existence, the Nautilus Next Generation equipment line has numerous possibilities for devising your own double sets. The following is a brief guide of those options for prefatiguing your major muscle groups:

Gluteals. In an exercise such as a Leg Press, a person fatigues the quadriceps. So, a Leg Press is a great exercise for developing the front thigh but it is a relatively poor exercise for developing the gluteals. However, the "glutes" can first be prefatigued on the Hip Abduction machine. Then, if you quickly follow this exercise with the Leg Press, you can use your fresh quadricep and hamstring muscles to fatigue the glutes to a greater degree than would otherwise be possible.

Hamstrings. The Leg Curl is the primary exercise used to isolate the "hams" on the back of the thigh. Performing a Leg Press soon after completion of the Leg Curl uses the glutes and the quadriceps to allow you to further exhaust the hamstrings.

Quadriceps. The primary movement that is best for isolating the "quads" is the Leg Extension. Once again, the Leg Press can be used as a secondary movement. In this case, the glutes and hamstrings are used to exercise the prefatigued quadriceps.

Chest. The best movements for providing direct resistance to the pectoral muscles of the chest are the Arm Cross (a.k.a. the Men's Chest and the Women's Chest) and the 10-Degree and 50-Degree Chest. (Actually, these primary movements also work the anterior deltoid located on the front part of the shoulder.) After prefatiguing the chest region with one of the aforementioned primary movements, you can further exhaust the "pecs" by doing any of the numerous multiple joint movements that are available with the Next Generation equipment such as the Bench Press, Decline Press, Incline Press, Seated Dip, or Dip (on the Multi-Exerciser machine). Performing one of these secondary movements soon after completion of a primary movement uses the triceps to further exhaust the pectoral area.

Back. The lats can be effectively isolated with the Behind Neck, Rowing Back, and Super Pullover machines. Involving your fresh bicep muscle during a secondary movement like Chins (on the Multi-Exerciser machine or the new Weight-Assisted Chin/Dip machine), the Compound Row, or a Lat Pulldown on the Torso Arm machine immediately after any of the primary movements will allow you to exercise your lats in a highly efficient manner.

Shoulders. The Next Generation equipment includes two machines that exercise different parts of your shoulder without using your triceps: the Lateral Raise and the Reverse Pullover. The Lateral Raise is great for hitting the middle deltoid found on the side of the shoulder (along with a little bit of the trapezius at the base of your neck). The Reverse Pullover is a unique piece of equipment that allows you to directly exercise the anterior deltoid over an incredible range of motion. A double set for the shoulders would include either of these exercises followed quickly by the Overhead Press. The Overhead Press uses the triceps to assist you in exercising your prefatigued deltoids.

Biceps. The Bicep Curl on the Multi-Biceps machine is the best exercise for isolating the bicep muscle. Located on the front part of the upper arm, the bicep is used to flex the lower arm around the elbow joint. Performing a multiple joint movement such as Chins, a Compound Row, or a Lat Pulldown on the Torso Arm machine soon after doing the Bicep Curl uses your lats to allow you to exhaust your biceps even further.

Triceps. The tricep is found on the back of the upper arm and is used to extend the lower arm around the elbow joint. The primary movement that is best for exercising the triceps is the Tricep Extension performed on the Multi-Triceps machine. The Bench Press, Decline Press, Incline Press, Overhead Press, Seated Dip, or Dip (on the Multi-Exerciser machine or the new Weight-Assisted Chin/Dip machine) can be used as a secondary movement. In this manner, the chest and/or the anterior deltoid are used to exercise the prefatigued triceps.

Remember, the limiting factor in multiple joint movements is the smaller, weaker muscle structures. However, the disadvantage can be turned into an advantage by first prefatiguing a muscle with a single joint movement and then using surrounding muscles for assistance. In this way, you'll maximize your muscular development in a safe, efficient manner.

SUMMARY OF PREEXHAUSTION OPTIONS

Body Part	Primary Movement	Secondary Movement
Gluteals	Hip Abduction	Leg Press
Hamstrings	Leg Curl	Leg Press
Quadriceps	Leg Extension	Leg Press
Chest	Arm Cross 10-Degree Chest 50-Degree Chest	Bench Press Decline Press Incline Press Seated Dip Dip*
Back	Behind Neck Rowing Back Super Pullover	Chin* Compound Row Torso Arm
Shoulders	Lateral Raise Reverse Pullover	Overhead Press
Biceps	Multi-Biceps	Chin* Compound Row Torso Arm
Triceps	Multi-Triceps	Bench Press Decline Press Incline Press Overhead Press Seated Dip Dip*

*perform on the Multi-Exerciser machine or the new Weight-Assisted Chin/Dip machine