# EXERCISE PROTOCOL

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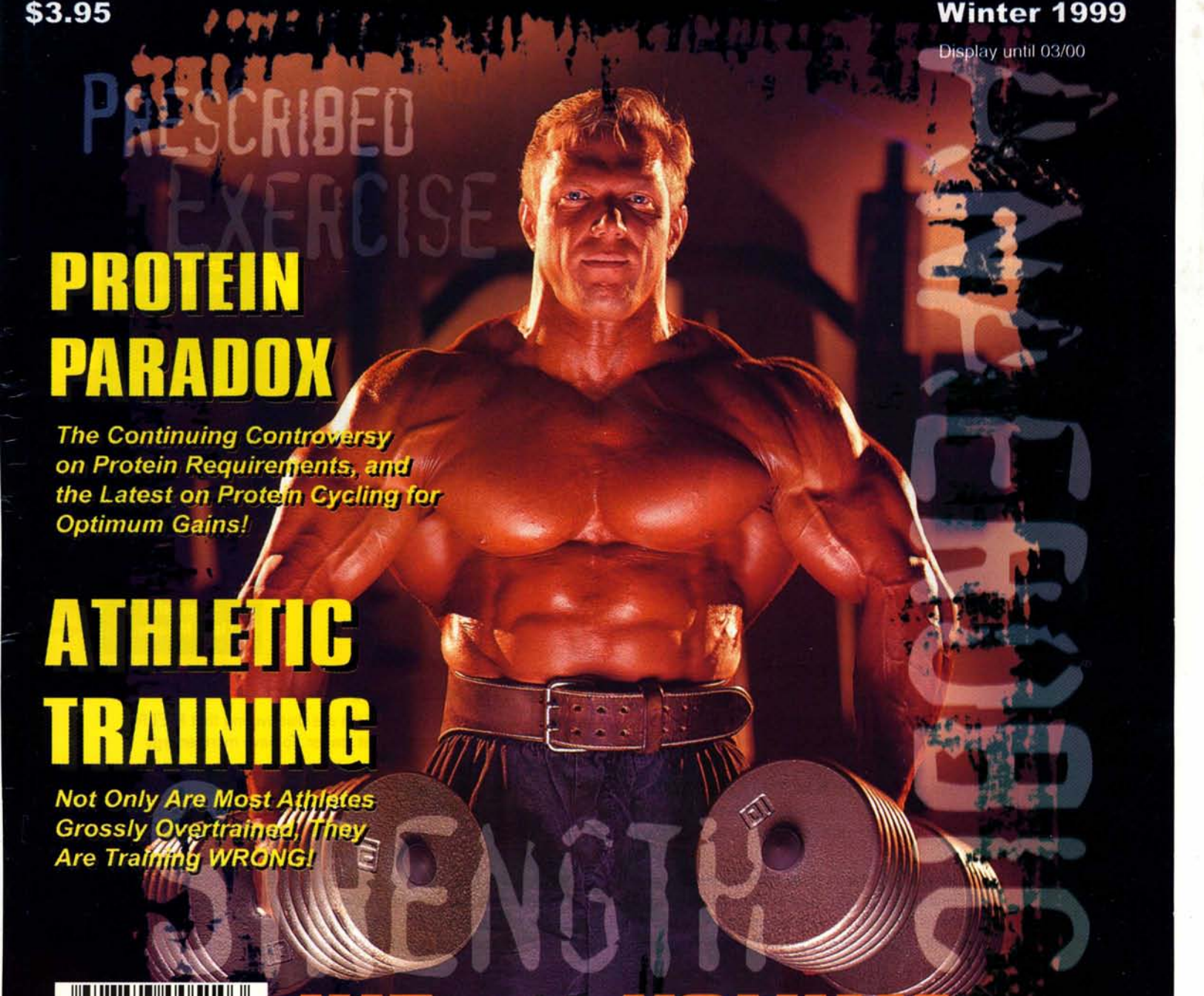

## PROTEIN PARADOX

*The Continuing Controversy on Protein Requirements, and the Latest on Protein Cycling for Optimum Gains!*

## ATHLETIC TRAINING

*Not Only Are Most Athletes Grossly Overtrained, They Are Training WRONG!*

## HIT vs. VOLUME

*Logical Analysis of Myths and Misconceptions*

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# Expert Opinion

Richard A. Winett, Ph.D. • Brian D. Johnston • Matt Brzycki
Ken Mannie • Greg Bradley-Popovich, MS, MS

**It has been stated over the years by many 'authorities' that isolation exercises are only good for 'polishing' off a muscle for 'detail', that they will not build muscle mass. What are your views on this statement, and what potential value do you think isolation exercises have in a strength and mass building program?**

## RICHARD A. WINETT, PH.D.

If you can overload a muscle with an exercise, it's an effective exercise. If for whatever reason you can't overload a muscle with an exercise, it's not an effective exercise.

One of the beauties of weight training is that it is possible to put your musculoskeletal system through a wide range of motions using both compound movements that involve a number of muscle groups working together and isolation movements that primarily target one muscle group. It's pretty clear with isolation movements, you can really target a muscle group and not worry whether or not other muscle groups are really doing most of the work. So, there is really no such thing as polishing or finishing movements.

Part of this idea of polishing or finishing movements comes from the magazines and bodybuilding trenches where a couple of myths prevail. The first myth is that you need to do many movements for each body part, so given that approach, some movements seem to be literally thrown in at the end to "finish" and are just done with less effort. From this volume perspective, the more you do the better. There's no notion of the minimal stimulus required for a given body part, i.e., probably one progressive set of a compound movement and one set of an isolation movement for most body parts. The other myth is that if a person does certain finishing movements, then they will be able to sculpture their physique in any way they want to look. So, you want a terrific "high chest" like Steve Reeves, well finish off your chest routine with incline presses and flyes. High calves? No problem. Finish off your calf routine with several sets of donkey calf raises where you especially stretch downward as much as possible. Obviously, this too isn't true and countless hours have been spent by countless people trying to rework their genetic make-up. It can't be done.

## BRIAN D. JOHNSTON

Allow me to address this by using an example. The primary function of the pectorals is to adduct the humerus, or bring the arm bones in toward the midline of the body. This is best exemplified with the pec deck or dumbbell flye exercise. In order to develop the pectorals, you need to execute this function. When performing a compound movement, such as the bench press, the pectorals do adduct the upper arms for about one-half to three-quarters of the range of motion, then the triceps complete most of the final part of the movement via elbow joint extension. Consequently, a set of pec decks can be and are probably more beneficial than a set of bench presses for building pec mass due to a more constant tension throughout the full range of motion. It may then be argued that this cannot be since the pec deck may only allow 100 pounds of resistance, for example, whereas the bench press may allow 150 pounds. However, if the function of the pectorals is arm adduction, and they can only handle 100 pounds in isolation and during their intended function, it should be apparent that the other 50 pounds in the bench press is being lifted by other muscle groups, i.e., the shoulders and triceps.

This is not to say that you shouldn't perform nothing but isolation exercises. Doing so would require 8-10 exercises, as opposed to 3-4 exercises that would tax the entire body, which would greatly increase the inroads into your recovery ability. You should only include isolation exercises where applicable. For example, consider if your pectorals consisted of a high ratio of slow twitch (endurance) fibers, whereas your triceps consisted of a high ratio of fast twitch (quick to fatigue) fibers -- I trained two individuals who had this genetic combination. Neither person could fully develop their pectorals with only presses or dips since their triceps fatigued in under 50 seconds with about 80% of their one repetition maximum (a typical 'bodybuilding' weight), whereas their pectorals were barely taxed. To work around this problem, I had them pre-exhaust with machine flyes for a 50-60 second load time, followed immediately with 30-40 seconds of very heavy pressing. Their slow twitch pecs received an ideal load time and volume (since slow twitch responds better to more sets than fast twitch), the triceps moved some heavy weight, and their pecs finally grew as they were not held hostage to the quick fatiguing triceps.

ISOLATION VS. COMPOUND

## MATT BRZYCKI

Isolation exercises are also referred to as "primary," "single-joint" or, in a more 90ish lingo, "open chain" movements. Regardless of the designation, this type of movement involves a range of motion (ROM) around only one joint. There are also exercises which are referred to as "compound," "multiple-joint" or, the 90's version, "closed chain" movements. This type of movements has a ROM around more than one joint. Over the years, there has been considerable debate over which type of movement produces better results.

Because multiple-joint movements influence more than one joint, they generally effect a larger amount of muscle mass than single-joint movements. From this standpoint, multiple-joint movements are more efficient in that a person can train more muscle mass in one exercise. However, multiple-joint movements have a drawback in that one muscle is a "weak link" which limits the demands that can be placed on the larger target muscle. With single-joint movements, the target muscle receives the brunt of the workload.

It's also argued that there's no need to do isolation exercises for, say, the hamstrings since that muscle receives stimulation during multiple-joint movements for the hips such as a squat or leg press. While the hamstrings are certainly involved in those movements, their ROM does not approach that of an isolation exercise such as a leg curl.

For these reasons, I think that isolation movements are valuable in a program designed to increase muscular size and strength.

## KEN MANNIE

While I have no argument with the overall importance and effectiveness of compound/multijoint strength movements in strength and morphological enhancements, I do have a problem with those who advocate this approach with the concomitant elimination of isolation/single joint movements. There are several reasons for this:

1) Compound movements, while initially enveloping a large portion of the involved musculature, may only take a limited amount of this tissue through a productive range of motion.

2) There exist individual differences in firing capabilities of certain muscles due to inefficient sensory motor patterns, past injury problems, and a host of other neuromuscular anomalies. The net effect of any one or more of these issues could prevent maximum development in all of the musculature purportedly stimulated in any given compound movement.

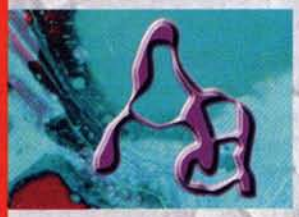
3) The prime movers of any specific multi-joint action usually perform the brunt of the work (unless these fibers are inhibited by any one of the aforementioned deficiencies), thus, at least in my opinion, the weak link(s) need to be stimulated with isolation movements -- at least on an occassional basis.

## GREG BRADLEY-POPOVICH, MS, MS

Presently, there are two popular complementary explanations for exercise-induced muscle growth: the ATP Deficit Theory and a microtrauma theory (both explained thoroughly in the book Rational Strength Training ). Thus, any exercise that creates great energy demands and places substantial mechanical stress on a given muscle or group of muscles would be expected to elicit a growth response. The bottom line is this: if you properly overload a muscle, it will respond. In fact, there are some arguments that suggest isolation exercises may be superior for increasing muscle mass in certain situations.

For example, if fiber-type specific training indeed is necessary for optimal progress, then isolation exercises may be indicated for a heterogeneous (mixed-type) muscle group. For instance, if the triceps and pecs have different fatigue characteristics in a given person, then it may be best to train those muscles with isolation exercises since the bench press would not ideally stimulate both of these muscles. Isolation exercises are also indicated in certain situations when "weak links" are encountered. Using the same muscles for the next example, if the triceps always limit your performance on the bench press, then why not train the pecs with an isolation exercise so they are intensely stressed?

Simply put, ANY resistance exercise will stimulate muscle growth provided that the resistance is challenging and the time under tension is sufficient. It is ironic the authorities who claim isolation exercises don't build mass are the same who recommend performing arm bicep curls (an isolation exercise) to build the biceps. I do encourage individuals to use large, compound (non-isolation, multi-joint) movements when there are no blatant weak links or fiber-type discrepancies because compound movements are more time efficient.



**Do protein requirements for someone training high-intensity differ -- from what the muscle magazines suggest (e.g., approx. 2.0 g/kg) -- since HITers train less frequently, have more healing time, and can get a greater net amount of protein between workouts than those who train higher volume?**

## RICHARD A. WINETT, PH.D.

It does appear to be true that hard training athletes require more protein than people who are inactive. However, the entire fixation with counting protein grams consumed as if it is some magic potent is a mistake in several ways.

In most developed countries, we are currently dealing with a growing epidemic of overweight and obesity. Simply put, most people and that includes people who train with weights have become more inactive in their daily life and consume too many calories. Given the typical dietary patterns in developed countries, most people eat a great deal of protein. Thus, "protein requirements" are almost a moot point. What a lot of people need to focus on, and again that includes people who weight train, is not overeating.

The first real requirement is eating a healthy diet that is lower in fat, particularly saturated fat, and rich in grains, cereals, and fruits and vegetables and lower fat sources of protein. One exception to the idea of lower fat diets is following a more Mediterranean diet (high in fresh fruit and vegetables, breads, cereals, legumes, fish, and canola and olive oils and low in meat and dairy products). Perhaps, of most importance, is following a healthy diet that you like and is adaptable to your lifestyle. It does seem worthwhile to eat frequently, perhaps up to six small meals a day. This not only means you have a constant source of energy, but also that you never really get hungry and start eating whatever is around. Eating six small healthy meals a day takes some planning, but really not that much. It's also easy to see that if you're eating that frequently, there's not much question that you will have enough protein. One caveat here, though. I do not believe there's any scientific data necessarily showing major benefits from more frequent eating. If this style of eating doesn't fit a person's preferences and life style, it probably does not matter if they eat less frequently or simply eat the traditional three meals a day.

The most important element after developing a healthy eating plan is simply calories. If you are eating more calories then is required to maintain your weight, you'll gain weight. If you are training hard, some of that weight gain will be muscle. If you simply just slightly lower your caloric intake below a maintenance level and/or slightly increase activity, you will lose weight. If you're training hard, most of the weight loss will be fat and you will retain most of your muscle mass.

Purely to make a buck, muscle magazines have forever tried to convince their readers that they required a pantry full of supplements to possibly make any gains. Now with even more supplements on the market, many articles (actually infomercials) now feature people who seemingly no longer eat real food but an array of supplements and meal replacements. This is more than sinister. No one needs to spend hundreds of dollars a month on supplements to gain strength and muscle. In fact, the "magic supplement" is simply good food.

## BRIAN D. JOHNSTON

If you compare a high-intensity approach to a volume approach one is higher in effort, whereas the other is longer in duration. Stress, and the effects it has on the body, is measured by both intensity and duration. Consequently, it appears as though a HIT approach could demand as much protein as someone training with a volume approach. The problem is, how do you define HIT or volume? Someone performing 1-2 sets in a session to muscular failure might consider another person doing 8-10 sets as a volume trainee. However, that person may consider himself a HIT trainee since he performs a full body workout with those 8-10 sets to muscular failure, while his friend performs up to 20 sets in a workout. This is one major problem in deciding the differences in protein requirements among strength athletes -- that protocols vary from one individual to another and requirements could likewise alter significantly.

More generally, there are three stages in an iron athlete's career that I find increases the need for protein, which could include supplementation if food intake is sub-optimum. The first is during the initial 6-8 months of training, when progress is greatest, and there are dramatic increases in muscle mass. The second stage is during the use of anabolic steroids, when growth, once again, accelerates and protein uptake enhances. The third stage/time is during dieting, particularly for bodybuilders during pre-competition, when total calories significantly reduce. Dieting does not actually increase the need for protein, but the use of supplementation helps to contribute protein in a low calorie manner.

# PROTEIN REQUIREMENTS

## MATT BRZYCKI

This is an extremely thought-provoking question. In terms of protein intake, the literature seems clear in two regards:

(1) strength-training (and endurance-training) athletes require greater protein intake than the RDA of 0.8 g/kg/day (as much as 2.0 g/kg/day); and (2) the greater protein need is usually met as long as the caloric intake is adequate. However, research studies concerning protein intake have the subjects use a traditional program characterized by high-frequency, high-volume, megamultiple-set workouts. The muscle rags also encourage these workouts—even suggesting multiple workouts per day. Contrast these practices with those of HITers who train with far less frequency and volume. This allows greater recovery and less likelihood of overtraining. Because of these decreased physiological and metabolic demands, there's probably less "damage" to the system. In terms of protein utilization, there's probably less need to "repair" muscle tissue.

It should be noted that when protein is consumed in excess of need, it is converted to fat or glucose rather than for additional protein synthesis. In terms of gaining muscle mass, most authorities believe that an increased caloric consumption is more important than an increased protein intake. Further, they believe that a reasonable goal of increasing one pound of muscle mass per week can be obtained from the intake of an additional 500 calories per day.

## KEN MANNIE

While the current RDA for protein is .8 g/kg/day, there is research (Lemon et al., 1992 and Tarnopolsky et al., 1992) suggesting that young and middle-aged strength athletes need about 1.6 to 1.7 g/kg/day, or 200% to 212% of the current RDA. Current research does not support a protein intake above 2 g/kg/day.

Here at Michigan State University, we place more emphasis on total caloric intake, as we can be relatively assured of adequate protein intake if the athletes are meeting their energy expenditure needs. The average person consumes 1.2 to 1.4 of g/kg/day of protein (Lemon, 1998) anyway, so there is little need to lose any sleep over that issue. However, when carbohydrate stores are low, amino acid oxidation increases, thus making the importance of carb intake vital to the protein sparing effect. This is holds a significant impact for the athletes we train, as high intensity strength training is but one of the many physical stresses they must contend with at any given time of the year. Energy and recovery requisites are obviously much more eminent for elite athletes than for individuals who have a notably less regimented training schedule.

We recommend that our athletes consume 20 calories per pound/bw/day. The approximate macronutrient breakdown of these calories is 60% carb, 15% protein, and 25% fat. You will find, however, that most athletes (especially males) consume much more that 15% protein on a daily basis.

References:

Lemon, P.W., et al. (1992), Protein Requirements and Muscle Mass/Strength Changes During Intensive Training in Novice Bodybuilders, Journal of Applied Physiology, 73:767-75.

Lemon, P.W. (1998), Effects of Exercise on Dietary Protein Requirements, International Journal of Sports Nutrition, 8:426-47.

Tarnopolsky, M.A. (1992), Evaluation of Protein Requirements for Strength Trained Athletes, Journal of Applied Physiology, 73:1986-95.

## GREG BRADLEY-POPOVICH, MS, MS

In my own statistical analysis of the effects of resistance training on protein needs (as assessed by nitrogen balance), there was no significant interaction between total training time and nitrogen balance (Bradley-Popovich, G., Nomani, Z., and Stout, J. Protein requirements for optimal nitrogen retention in resistance-trained individuals. Submitted for peer-reviewed publication). In layman's terms, it appears that training duration does not positively or negatively influence protein requirements for optimal muscle mass increases. This makes sense given some other facts.

First, in the vast majority of studies, multiple sets have neither proven inferior nor superior to single sets regarding lean body mass increases or strength. Thus, there should be no reason that more protein is required of either high-volume or low-volume trainees if increases in lean body mass are the same. Second, it is well-established that protein does not contribute considerably to the energy needs of athletes except for extreme endurance athletes. So, although high-volume trainees may expend more energy during a training session, only a few grams of protein may be catabolized to meet energy demands. Third, the net amount of protein consumed between workouts probably does not affect protein needs because consuming tons of protein will not upregulate the rate at which muscle protein synthesis occurs. Despite what additional tissue damage a high-volume trainee may inflict, the body is very efficient at recycling degraded proteins.

To paraphrase, I do not believe there is sufficient evidence to conclude that low-volume and high-volume trainees have greatly different protein requirements for optimal muscle mass increase. For more detailed info and to find out why an "optimal" protein intake may not exist, refer to my series of articles entitled "The Protein Paradox" in the spring '99, summer '99, and current issue of Exercise Protocol.

**Do you have a topic for discussion? Drop us a line at logic@i-a-r-t.com**