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The real value of protein

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A typical problem for athletes is that they lack the stored energy required for quality training. A contributor to this problem is the common misconception that protein is a good primary fuel source for strength training, muscle building and intense exercise.

It's difficult to find a body builder who doesn't rely on some form of protein or amino-acid supplement, and attributes their success to these products. These athletes in particular consume much more protein than they need.

Because this higher-than-necessary consumption of protein can offset the intake of other essential energy nutrients (carbohydrates), it's not surprising that many athletes struggle with low energy during a workout.

All nutrients (carbs, protein, fat) get converted to energy in the form of adenosine triphosphate (ATP), but each nutrient has unique properties that determine how it gets converted to energy.

It's important to clear up the misconception that protein is a ready source of energy, and uncover the real value of protein: recovery.

Carbohydrates: Efficient energy

Carbohydrate is the main nutrient that fuels moderate to high-intensity exercise. Fat fuels low-intensity exercise for long durations. Once stored carbohydrate is used up, glycogen depletion occurs -- more commonly known as "hitting the wall" or "bonking."

During exercise, this can be avoided by simply replenishing carbohydrate stores (eating easily-digestible carbohydrates during exercise that lasts more than 90 minutes). But glycogen depletion can also occur after several days of limited carbohydrate intake -- it's like going into your workout on an empty tank of fuel.

Limiting carbohydrate intake forces the body to rely on fat metabolism for energy production, which is far less efficient and will limit performance. The main function of protein is to maintain and repair body tissues and isn't normally used to power muscle activity. But if carbs and fat aren't available, then the body will rely on protein as a last resort in order to satisfy energy requirements.

Protein balance and overload

Dietary protein is comprised of building blocks called amino acids. Once dietary protein is broken down into amino acids, they join together to synthesize the particular protein the body needs such as hair, nails, hormones, enzymes and muscles. The liver is the central processing unit of protein, monitoring the needs of the body and synthesizing the particular proteins from the amino acids.

The by-product of protein synthesis is nitrogen in the form of ammonia (NH_3), which is converted to urea by the liver and extracted from the body by the kidneys in urine.

The consumption of too much protein has a negative impact. As ammonia builds up it's removed as urea, which

offsets the pH balance of blood causing an acidic environment. The kidneys have to work overtime, using fluids to flush the nitrogenous ammonia from the blood in order to stabilize pH. This process increases the risk of dehydration. Excess dietary protein has also been shown to cause an excretion of calcium in the urine. Both dehydration and loss of calcium are detrimental to athletic performance.

Furthermore, too much protein upsets macro-nutrient balance, displacing the intake of carbohydrates and fat and causing the body to rely protein as a fuel. While protein can supply energy, it wastes valuable resources and results in a number of undesirable effects.

Nitrogen balance is reflective of the dietary intake of protein being balanced by the excretion of urea wastes. If nitrogen excretion is greater than the nitrogen content (protein) of the diet, one is said to be in negative nitrogen balance. This usually is indicated by the breakdown of muscle tissue.

If the nitrogen excretion is less than the content of the diet, a positive nitrogen balance is achieved and is indicated by the formation of protein. The resulting tissue formation, as such, allows repair and recovery from exercise.

Pre-workout protein recommendations

In general, a low-fiber, low-fat combination is recommended as a pre-workout fuel source because it's digested more quickly and thus reduces the risk of gastrointestinal distress. A small amount of protein combined with carbohydrate is fine before a workout, but too much protein isn't recommended.

Protein digestion is much slower than carbohydrate, so a protein-only meal may not be fully digested, causing water to be rapidly absorbed into the intestinal track. This increases the risk of gastrointestinal distress during exercise, so it's important to avoid a large protein meal several hours pre-exercise.

Protein for recovery

Research has shown that some protein consumed with carbohydrates shortly before and after exercise does help the body recover faster by initiating muscle repair and growth. Adding protein to a recovery meal *doesn't* enhance the muscle's ability to store energy, but it *does* stimulate the muscles to rebuild. Relatively small amounts of protein are required for muscle repair. Therefore, athletes should consume a combination of carbohydrates and protein post-exercise.

Carbohydrates are used to refill the muscles with fuel, while protein is used to help build and repair muscle tissue. Within the scientific community, the optimal ratio of carbohydrates to protein in the recovery process is still debated.

Based on experience and experimentation, most endurance athletes find a ratio of 3:1 carbohydrate to protein works best. This is a general recommendation, so athletes should be aware of their individual differences; a little more or a little less might work optimally for each individual.

Nutrient recovery guidelines

A generalized equation can be used to determine recovery requirements. Most athletes need to consume .5 grams of carbohydrate per pound of body weight every two hours for six to eight hours after a workout. Therefore, if you're consuming 240 calories (60g) of carbohydrate after a workout, with the generalized ratio of 3:1 (carbs to protein), 80 calories (20g) of protein should also be consumed.

Here's an example of the calculation for a 150-pound athlete:

1. Multiply .5 grams of carbohydrate x 150 lbs. = 75 grams of carbohydrate needed for recovery.
2. Multiply 75 grams x 4 (the number of calories in a gram of carbohydrate) = 300 calories of carbohydrate.

3. If the recovery ratio of carbohydrate/protein is 3:1, then you need 100 calories of protein per 300 calories of carbohydrate. (100 calories divided by 4 (4 calories per gram) = 25 grams of protein).

Athletes often rely on liquid mixes for recovery. Carbohydrate-to-protein ratios are often formulated in the pre-made mixes for optimal recovery. Creating individualized recovery drinks requires experimentation with different types of carbohydrate and protein to determine which combination works best for you.

If you prefer to refuel with solid food, here are some healthy options:

- Half of a whole wheat bagel with 1/4 cup cottage cheese or a tablespoon of peanut butter
- Yogurt smoothie, berries and a tablespoon of protein powder
- Medium sweet potato and two egg whites
- Small turkey sandwich on whole wheat bread
- Bran cereal with skim milk and a few nuts
- Protein bars (many specially formulated with optimal carbs and protein)

Ilana Katz has a master's degree in dietetics with an emphasis in sports nutrition. She enjoys working with athletes of all levels, and specializes in body composition and weight management specific to individual needs. She participates in many endurance and team events in order to relate personally to her clientele. Ilana is The Sport Factory's head nutritionist, has worked with many local celebrities, and is the founder of the nutrition program IndiFITualize. Listen to Ilana on the Bert *radio show (Q100) as well as* Dave FM *in Atlanta.*