Comparison of Supplemental Protein vs Dietary Proteins in Resistance Training

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Today’s society is beginning to show an increased interest in making health and fitness a priority in daily life. Especially among athletes and frequent gym users, the goal is to become the strongest, fastest, and best conditioned. Resistance training regimens are beginning to replace hours spent on the track or elliptical. However, these experienced athletes and trainees seem to think that resistance training alone will not be enough to attain their goals. Protein and other amino acids are being implemented into every day diets to help provide the extra building blocks that aid the growth of muscles and other important body tissues. Protein is one of the six essential nutrients needed for the body, and is found in many different sources of food. To be able to build up more muscle than is already used in daily life, a person needs to make sure they have a balanced protein intake. This is especially important when one is participating in resistance training. Resistance training is defined as a voluntary muscle contraction while providing a greater force than daily tasks. Common examples of resistance training exercises include: squats, bench press, burpees, and planks. The goal of resistance training is to build muscle and help burn more calories using body weight or free weights that are found in a gym. Resistance exercises boost the amount of calories burned, and can result in fat loss if properly creating a calorie deficit, or burning more calories than you take in (Ballor et al. 1988). This type of training also provides adaptations in the muscle and nervous systems resulting in greater muscular strength.

Those who participate in resistance training with intention to increase their muscle mass may choose to incorporate supplemental proteins, such as Whey protein, in with their everyday diet. Although, protein supplementation can aid in increased muscle growth, it is important to consider that the amount of protein needed in the body for optimal performance. Performance varies
for each individual based on age, frequency of exercise, intensity of exercise, and many other factors. The relationship between recommended intake and resistance exercise is becoming a popular topic for research. Although there are many variables to be considered when analyzing this relationship, it is a growing interest among researchers in the sports and health field in attempt to gain a better understanding of how protein can affect athletic performance, as well as personal resistance training.

**LITERATURE REVIEW**

As protein intake and resistance training become a topic of interest, the question arises: is dietary protein enough, or as beneficial as supplemental protein? According to the Institute of Medicine, the recommended daily allowance for the average sedentary person is 0.8 kilograms per kilogram of body weight (Coleman, 2007). Although the intake to training ratio varies per individual, researchers agree that in general, protein aids in muscle growth. Many studies that examine the relationship between the amount and type of protein intake alongside muscle growth involve analyzing muscle samples. Studies will use a muscle biopsy to analyze such relationships. A muscle biopsy is performed using a biopsy needle, extracting a small amount of muscle tissue, and analyzing it underneath a microscope (Andersen et al. 2005).

Muscle biopsies were generally taken prior to training as well as post training to be able to analyze the effects that the different treatments had on subjects (Andersen et al, 2005). Another common technique was to standardize diets given to the subjects. Clear results were displayed in groups who were given strict well rounded diets with emphasis on extra or supplemental proteins; however, others expressed their findings through the effects of muscle gains with high protein diets in comparison to high carbohydrate diets (Layman et al. 2005). Researchers were also consistent in administering similar resistance training regimens. Each study examined changes in major muscle groups such as the leg, and chest muscles. Common pre- and post-protocol exercises within these muscle
groups included leg press and bench press performed at a one repetition max (1RM) (Tipton et al., n.d).

1RM is the maximum amount of weight a subject can lift in one maximal contraction. Results common among researchers suggest that an increase in muscle growth and exercise performance was seen similarly in men and women when a protein supplementation was combined with amino acid supplements (Antonio et al. 2001; Colker et al. 2000; Kerksick et al. 2006; Layman et al. 2005). Minor increases in muscular growth and performance were shown in cases where supplemental proteins including: whey protein, soy protein, and bovine colostrum were given to the subjects without additional amino acid supplementation (Antonia et al. 2001; Colker et al. 2000). Research methods and results have a lot in common in supporting the idea that protein diets have a significant effect on muscular growth and performance. Experiments with both male and female subjects show similar results with a general increase in muscular gains, but had minor differences in regards to age, frequency, and intensity of exercise. The main theme that remains constant within this field of research is that protein plays a key role in building and maintaining muscle tissue.

DIETARY PROTEINS

Protein is an essential nutrient needed for optimal health and physical performance. It forms the structure of body tissues and hormones which maintain metabolism and in some cases can be used as an energy source. A protein is made up of a complex chemical structure containing carbon, hydrogen, oxygen and also nitrogen. All of these elements combine together to make an amino acid. Amino acids are the building blocks of protein. There are twenty amino acids; however, six of them are essential to the body (arginine, cysteine, glycine, glutamine, proline and tyrosine), meaning they cannot be synthesized by the body, so they must be implemented into one's diet. Different varieties of dietary protein sources vary in composition and nutritional value, and also
provide the ability to support growth, maintenance, and repair. There are two types of proteins, incomplete or low-quality proteins, and complete or high-quality proteins. A complete protein is a food that contains the nine essential amino acids that support both life and growth. Whereas, an incomplete protein has fewer than nine essential amino acids, and are not able to support both life and growth.

Proteins can be found in plant products as well as animal products. Dairy and meat groups are the main sources of protein from animal products, and are considered high-quality proteins. Fruits, vegetables, and grains are protein products, but are lower in protein value. Starch products, such as, beans and peas contain higher values of protein (Table 1).

<table>
<thead>
<tr>
<th>Food</th>
<th>Amount</th>
<th>Protein (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>1 cup</td>
<td>8</td>
</tr>
<tr>
<td>Cheese</td>
<td>1 oz</td>
<td>7</td>
</tr>
<tr>
<td>Eggs</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>1 oz</td>
<td>8</td>
</tr>
<tr>
<td>Broccoli</td>
<td>½ cup</td>
<td>2</td>
</tr>
<tr>
<td>Banana</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The recommend dietary protein intake varies from the different stages of life from infancy to late adolescence. As an infant and young child, protein intake is at a high demand and begins to level off at an adequate amount. The RDA for protein is based upon the body weight and age. For a person who is involved in resistance training, an increase of 1.5 to 1.8 grams of protein per kilogram of body weight is recommended to help aid in increased muscle mass.

**TYPES OF SUPPLEMENTAL PROTEINS**

There are many different kinds of proteins that consumers use. Although many people stick to dietary proteins, or protein sources found in foods, some opt for protein supplements as a meal replacement or post-
workout source. Three common protein supplements include whey protein, bovine colostrum, and soy protein, which come in powder form. Protein supplements taken after resistance exercise have been shown to increase muscle growth by improving protein oxidation, as well as increase essential amino acid levels in the blood (Natural Standard, 2014). However, each protein supplement has its own characteristics on how it affects growth and body composition.

**Whey Protein**

According to the National Dairy Council, whey protein is a product of cheese production. After enzymes that help produce curds are added to the milk, there is a liquid protein substance left behind, known to consumers as whey.

The whey is then pasteurized and made into a powder, which is then used to make protein products such as sports drinks and energy bars (NDC, 2014). Whey protein is commonly found in a powder that is mixed with water or milk. A whey protein shake can be beneficial in muscle growth and repair if taken less than thirty minutes after a workout (NDC, 2014). Along with recovery and maintaining lean muscle, whey protein supplements are also beneficial in curbing hunger. This comes from the high level of protein which helps the consumer feel fuller longer (NDC, 2014).

**Bovine Colostrum**

Bovine Colostrum is a substance found in the breast of mammals that is similar to a milky fluid (WebMD, 2014). Most people use this product to obtain lean muscle and to increase overall athletic performance, usually after high-intensity training or performance.
Taking bovine colostrum is thought to help people boost their immune system, repair nerve damage and gastrointestinal integrity (PubMed, 2014). Taking this supplement can also increase defense against diarrhea, especially in children. Bovine is typically taken by mouth as a pill or powder.

**Soy Protein**

Soy Protein is produced from soybeans and is typically found in common foods such as salad dressings, meats, and pastas (Wikipedia, 2014). Soy protein has become increasingly popular as it has been replacing casein protein in the athletic realm as a cheaper protein supplement. People have been known to take this product to help lower cardiac levels, which would be beneficial for people who perform exercise activity (PubMed, 2014).

Soy Protein is extracted from soybeans and then turned into powder form when taken by supplement.

**CASE STUDIES**

We interviewed a twenty one year old female measuring at a height five feet seven inches with a body weight of sixty four kilograms. A typical three course meal for this female includes: five to seven eggs whites for breakfast, four ounces of tilapia, or chicken, and half a cup of rice and zucchini for lunch, and four ounces of tilapia or chicken and half a sweet potato and asparagus for dinner. Her pre-workout meal is a four ounce piece of chicken and half a cup of rice. She then also has a post-workout meal which contains one cup of egg whites and half a cup of oats. She does use protein shake supplements after lifting as well as branch chained amino acids to help with her bodybuilding preparation. After one month of her dietary protein and supplemental protein intakes during resistance training, she has gained lean muscle and has lost fat.

We also interviewed a twenty nine year old male measuring at a height of five feet ten inches and has a body weight of eighty nine kilograms. He has a smaller portion meal six to eight times a day instead of three large meals throughout the day. The meals vary from chicken, rice, oatmeal, eggs, bagels, cereal, and other
foods. He eats fats and proteins during the day, and does not consume any carbs until after 5:00 p.m.

He does not have any specific foods that are consumed before or after a training session besides carbohydrate intake after 5:00 p.m. He uses whey protein supplements once a day, which is normally consumed during supper and branched-chained amino acids as well as creatine, which is consumed in the morning. These supplements are taken for his bodybuilding preparation. After one month of dietary and supplemental protein intakes during resistance training, he has gained lean muscle mass.

**CONCLUSION**

Protein is an essential nutrient in the body that is utilized for many functions. The percent of protein intake varies for each individual, and can be determined through DRI standards. Protein and its building blocks, amino acids, are key in helping build, maintain, and repair skeletal muscle. Although protein requirements can be met while consuming foods rich in protein, such as lean meats and dairy, some opt for additional protein supplements to boost muscular gains. Resistance training is becoming a very popular way to build and increase muscle mass, tone, and lose fat. As previously stated, the recommended protein intake for a sedentary adult is 0.8 kilograms per kilogram of body weight. An increase in protein intake of 1.2 to 1.8 grams for every kilogram of body weight will be beneficial to resistance trainers. Studies show, that increased protein intake, paired with resistance training; result in muscular gains and improved muscular performance. Incorporating a combination of dietary protein, supplemental proteins, and amino acids help attain an individual’s recommended protein intake, and is significantly beneficial for gaining muscle.
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