The Role of Protein and Carbohydrates in Gaining Body Mass

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Introduction:

From athletes to everyday people, men to women, many people around the world are actively involved in some form of resistance training in order to improve their body mass and muscle strength and development. ñResistance training is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in strength, tone, mass, and/or endurance. The external resistance can be dumbbells, rubber exercise tubing, your own body weight, bricks, bottles of water, or any other object that causes the muscles to contractò (Richard Weil, 2014). Not only must a person regularly engage in exercise, but they must consume the right amount of macronutrients to promote their development as well. This chapter will focus on the protein and carbohydrate requirements for individuals who are attempting to gain mass and muscle strength. Topics covered will include protein synthesis and requirements, and carbohydrates and recommended intakes.

Protein:

Protein is the most important macronutrient when it comes to gaining mass through resistance training. Muscle is mostly made up of protein and water, so in order to gain muscle mass, consuming the right amount of protein is an absolute requirement. In addition to this, ñthe rates

of muscle protein degradation and synthesis increase in response to high intensity resistance exerciseò (Lambert, 2004). This section of the chapter will explore protein in depth and explain why it is needed by the body and how it used for promoting muscle development.

Protein Synthesis:

Proteins in our bodies are always being made or ñsynthesizedò and they are also at the same time being used up. This process of proteins simultaneously being created and then having the body get rid of them is a protein turnover system known as protein synthesis. Our bodies use this turnover system to maintain a healthy balance of useful proteins and get rid of damaged ones. In an individual who is partaking in skeletal muscle resistance training, this protein turnover is the general basis for how skeletal muscle grows in response to the level training. Amino acids are also a part of this protein turnover system, as they are the result of the breakdown of proteins.

Protein Synthesis Illustration:

Figure 1 and Figure 2 on page three illustrate the process of skeletal muscle protein turnover, also incorporating the presence of amino acids being formed by the breakdown of proteins in the system. Figure 3 is a graphical representation of the positive and negative net muscle protein turnover under certain conditions. It can be noted from the graph that a more positive protein synthesis occurs when protein is ingested in addition to an individual having performed physical activity (resistance training).

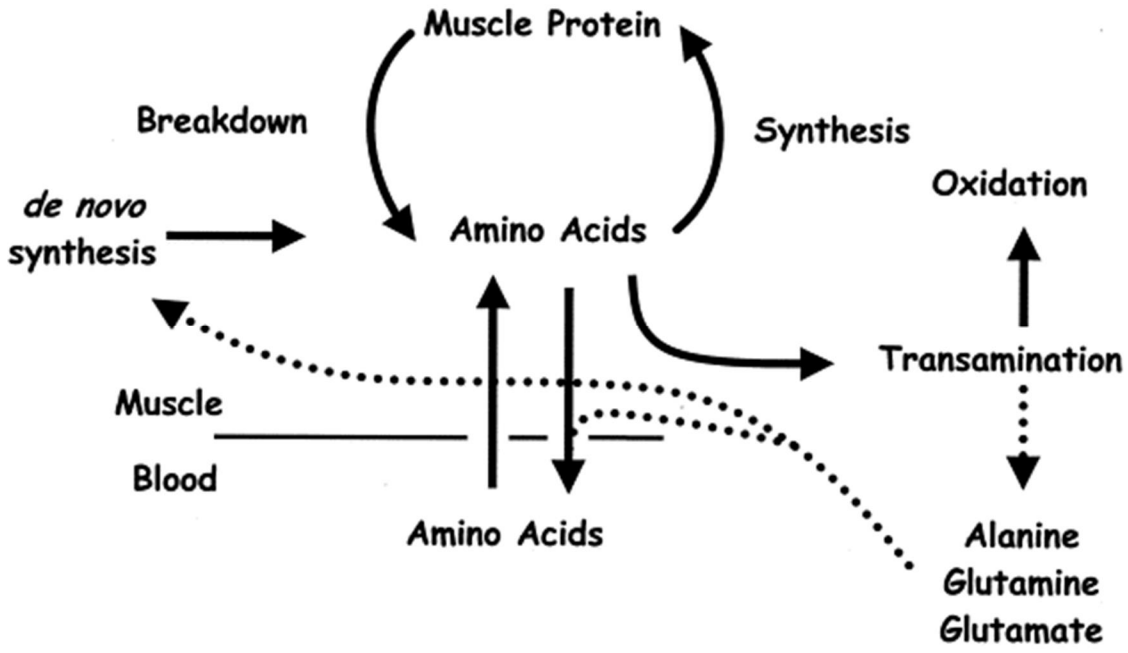

Figure1: (Philips, 2004).

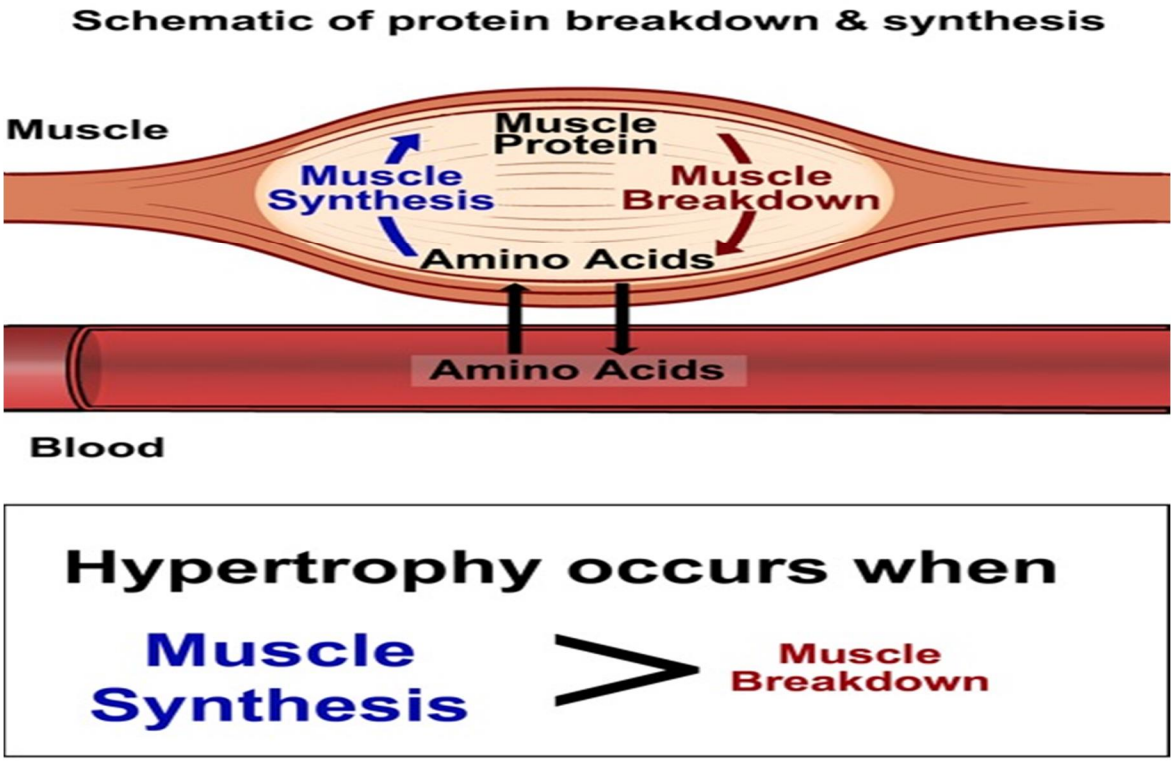

Figure2: (Ryan Andrews, 2014).

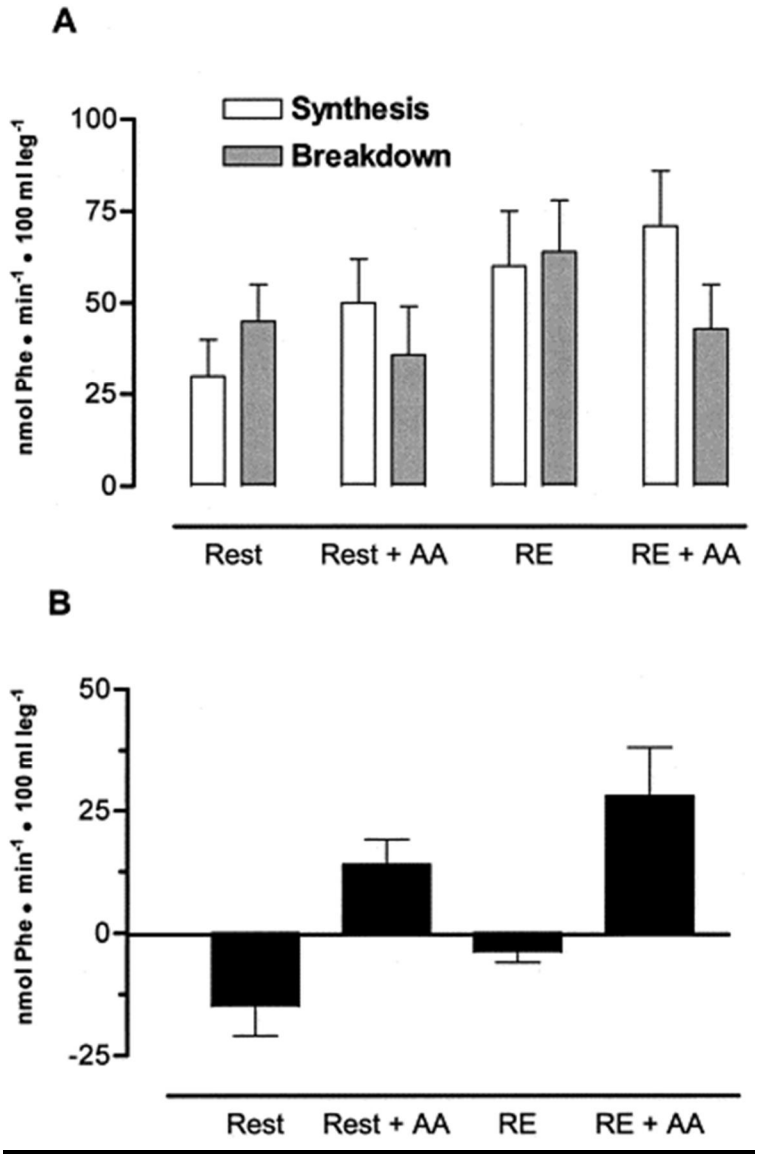

Figure3: (Philips, 2004).

Summary of Protein Synthesis:

If a person eats protein right after a single session of training, muscle protein synthesis rates increase by a substantial amount and last for a longer period of time than in a normal muscle protein synthesis bodily function. Normal muscle protein synthesis could be related to anything in a normal personôs routine of creating and breaking down ingested protein. An example of this would be eating a steak dinner, and then having the protein undergo synthesis. Muscle protein

synthesis is the key factor behind gaining muscle mass through resistance training, so if a person is able to increase the rate at which it is happening and can make it happen for a longer period of time, then they are on the fast track to experiencing an increase in muscle growth and development. The rest of this section will explore more on how individuals should go about consuming the amount of protein their bodies will need in order to achieve their goals. .

Protein Requirements:

Now that we know the general idea of how protein synthesis is used to promote muscle growth, we now need to find out how much protein a person actively involved in resistance training actually needs to consume in order to get any results. Research suggests that 1.4- 2.0 grams per kilogram of body weight per day of protein is needed for physically active people. ñIn contrast, the US recommended daily allowance (RDA) for protein is 0.8 g/kg/dò (Antonio, 2014). The average amount of protein consumed by a fully grown American is 91 grams per day, which is roughly equal to 1 gram per kilogram of body weight per day of protein (Antonio, 2014). So, the typical American adult eats a little bit more than the recommended daily allowance; however, this amount of consumption is still less than the recommended adequate amount for athletes or active people in general who are involved in physically active resistance training.

Protein Need Case Study:

So letôs use an example. Bobby is an active 20 year old male who wants to gain body mass. He currently weighs 75 kilograms. In order for him to promote an increase in body mass, he would have to at a minimum consume 1.4 grams of protein per kilogram of body weight per day, putting him at roughly 105 grams of protein per day. This is according to research by Antonio,

2014. He could obtain this protein by taking protein supplements, or he could ingest enough protein in his diet by eating foods with good protein content such as meat or cheese. The amount of mass he would actually gain is entirely dependent on other factors like the duration and intensity of his daily exercise, as well as the amount of other foods and total calories he is consuming throughout each day, but he would have to at least consume this much protein per day to help promote himself to gain body mass. In addition the amount and type of protein consumed by a person, the time at which a person eats protein has also been determined to play a big role in regulating muscle growth after a period of resistance training. After a person is done exercising, he/she will have a positive net protein balance if he/she eats something with protein or a protein supplement immediately following the period of exercise. As a result of this, it is recommended that a person consume 20ï 25 grams of a protein immediately after the period of exercise (Van Loon, 2014).

Carbohydrate:

The ideal carbohydrate intake for people trying to gain body mass is not a clearly defined value, but enough research exists to at the very least form some general guidelines for carbohydrate consumption. ñGlycogen is the major energy substrate for high-intensity exercise that includes resistance trainingò (Lambert, 2004). The body relies greatly upon muscle glycogen when undergoing resistance training, so if a personôs muscle-glycogen levels were low, you could assume that that would impair their high intensity exercise performance i.e. resistance exercise performance. So the name of the game when talking about carbohydrates and gaining body (muscle) mass, is to have the right amount of muscle glycogen levels in your body enough so

that muscle growth and development is supported. Research has shown that even one training session at the gym can reduce muscle glycogen stores anywhere from 24-40%. So this now begs the question, how many carbohydrates should a person consume in order to have the proper muscle glycogen levels to support muscle growth and development?

Recommended Carbohydrate Intake:

Research suggests that bodybuilders who are trying to gain substantial muscle growth or increased body mass should consume about 5-6 grams of carbohydrates per kilogram of body weight per day (Slater, 2011). Now, not everyone who is trying to gain muscle mass and strength wants to do so on the level of a bodybuilder, but a fair amount of intake should still be present, somewhere slightly below the levels of 5-6 grams depending on the individual.

Conclusion:

It seems to be clear that protein and carbohydrates play a major role in determining a personôs ability to gain body mass or muscular strength. In this chapter protein synthesis, protein requirements, carbohydrates, and carbohydrate requirements were discussed. Clearly a lot more research needs to be conducted to support the extent of the influence of carbohydrates and protein, however this chapter provided a basic understanding of what is currently known about these two macrominerals and their effect on gaining body mass.

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