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By:

Posted on: 10/14/2011

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Building muscle is important to more than just athletes. Weekend warriors, the elderly, children and even those trying to drop a few pounds benefit from additional muscle mass. This article looks at the optimal nutrition profile for building muscles and the types of ingredients that can feed the need.

### **Who needs to build muscle?**

When it comes to building muscle, many people think of athletes, who rely on their muscle function, mass and strength to perform. However, muscle is important for everyone throughout the lifespan. According to Doug Paddon-Jones, associate professor, Department of Nutrition and Metabolism, The University of Texas Medical Branch, Galveston, TX: "The need to build and repair muscle mass affects all adults and doesn't change dramatically with age. Therefore, it is important to establish good eating habits early on." In addition to athletic performance, muscle is vital for engaging in activities of daily living, it serves as an amino-acid reservoir to help maintain protein synthesis during times of need (fasting, critical illness), increases resting energy expenditure, thereby playing a role in weight management, and plays a key role in the prevention of sarcopenia and the frailty that accompanies this disease (*The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 1995; 505–508; *American Journal of Clinical Nutrition*, 2006; 84:475-482). Muscle also is responsible for the largest voluntary load on bone tissue, a process essential to bone modeling and remodeling. By stimulating bone formation in individuals during their bone-building years and helping attenuate bone loss, muscle helps decrease one's risk of developing osteoporosis and can help slow the progression of the disease (*Journal of Bone and Mineral Research*, 1997; 12:1–9).

### **Protein and amino-acid requirements**

As indicated in the Dietary Reference Intakes, the RDA of 0.8 grams of good quality protein per kg bodyweight per day covers protein requirements, including a minimal protein intake to cover any losses. However, studies show we need more protein to build muscle mass (*Journal of the International Society of Sports Nutrition*, 2007; 4:8). Therefore, according to Stuart Phillips, professor and associate chair of graduate studies, Department of Kinesiology, McMaster University, Hamilton, Ontario, "The more important question to ask is whether there is an optimal or advantageous protein intake, and in that case I'd say yes, and it's likely in the range of 1.2 to 1.7 grams/kg per day; any more is not better and simply doesn't confer any further advantage."

In addition to consuming an optimal amount of protein each day, the distribution and quality of protein consumed is important. "The RDA isn't optimal and may be somewhat misleading because it doesn't address how we distribute protein across the day," according to Paddon-Jones. "Ideally, we should provide a meal-driven protein recommendation based on a moderate amount of protein, approximately 25 to 30 grams, three times per day to maximize the potential for muscle growth and repair." More than 30 grams of protein in a meal does not further enhance muscle-protein synthesis in healthy young and elderly individuals (*Journal of the American Dietetic Association*, 2009; 109:1,582-1,586). Consuming protein throughout the day is also beneficial for dieters because it enhances satiety and minimizes muscle-mass loss during weight loss (*The*

*Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, July 27, 2011).

In addition to consuming protein at each main meal, it is also critical to consume protein within 30 to 45 minutes before and/or less than two hours after resistance training in the young, and less than one hour after exercise in the elderly. Exercise, particularly weight or resistance training, increases both muscle growth and muscle breakdown. For muscle growth to exceed muscle breakdown, a dose of 10 grams of essential amino acids (the amount in approximately 25 grams of whey or casein, or 20 grams of egg protein) is necessary (*Journal of the American College of Nutrition*, 2009; 28:343-354).

And finally, protein quality is important. The quality of a protein reflects its ability to provide the nitrogen and amino-acid requirements for growth, maintenance and repair. Protein quality is therefore determined by its digestibility and amino-acid composition. "Whey protein appears to enjoy a position of superiority in terms of being the optimal protein for building muscle mass," says Phillips. "This is likely because of its high leucine and other branched-chain amino-acid content, as well as the rapid digestibility of the protein. This results in a rapid aminoacidemia/leucinemia, and this appears to be critical for stimulating new muscle-protein synthesis."

In addition, "eggs, some protein powders and Greek yogurt are also excellent choices for adding protein to breakfast—a meal that is often protein-poor for a number of Americans," notes Paddon-Jones.

### **Additional nutrients that aid muscle-building**

Though efforts to build muscle have largely focused on protein intake, according to Paddon-Jones, "it's not just about the protein, but instead a healthy diet that includes a variety of nutrient-rich foods. It's no secret. By eating a varied, healthy diet, you get many other important nutrients (omega-3 fatty acids, for example) that help build a solid nutrition framework to allow you to work, play, exercise and live well."

In addition to protein, creatine stands out as an effective ergogenic aid for muscle-building. "The mechanism behind this compound appears to be related more to the increased work capacity it allows, and this eventually translates into more muscle mass," notes Phillips. In addition to creatine, "vitamin D may have a potential link, but that is much more likely to be true in people with compromised vitamin D status," he says.

Building muscle is essential for good health throughout the lifespan and requires a sufficient daily intake of high-quality protein distributed evenly throughout the day, in addition to a pre- or post-workout dose of protein rich in essential amino acids. Though protein is the most important aspect of nutrition for building muscle, creatine enhances the rate of ATP resynthesis during short duration, intense exercise, increasing work capacity and therefore muscle strength over time.

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