Presented By:

Muscle Growth – It's a Matter of Simple Mathematics
Jacob Wilson, BS. (hons), MS., CSCS

All Rights Reserved – Reproducing any part of this document is prohibited without consent from its author.

As a scientist I realize the value of controlling the training and nutritional environment. In fact, when designing a study I spend hours on end contemplating how to isolate the effects of a treatment on a specific outcome (e.g. the effects of eating essential amino acids pre workout on muscle growth). My specialty concerns the effects of whole proteins; their building blocks the amino acids, and certain molecules that amino acids are converted to (e.g. HMB) on muscle tissue growth (Wilson & Wilson, 2006). This approach has many advantages as it allows me to make sound predictions as to whether an individual will ultimately gain muscle or lose it during a given training and dietary program. From this perspective I am here today to talk to you about one of the most critical and yet painfully simplistic predictive equations known concerning muscle growth!

> Equation 1.0 Muscle Protein Balance = Protein Synthesis (the building of muscle) – Protein Degradation (the breakdown of muscle)

In short the equation is centered on Muscle Protein balance. When you are building more proteins (protein synthesis) than you are breaking down (protein degradation) you are in a 'positive ' protein balance, meaning ultimately you are 'gaining muscle / size.' What does this all mean!? It means that you can increase muscle by using training and dietary techniques that either (A) increase protein synthesis or (B) lower protein breakdown. Ultimately interventions which combine anabolic (protein synthesis) and anticatabolic (anti-protein breakdown) techniques will have the most success. We begin our discussion with nutrition critical for stimulating protein synthesis:

Enhancing Protein Synthesis through Diet Combined with Exercise

There are numerous factors when eating which stimulate protein synthesis. In fact they are probably too many to count. The real question is, what should you, the athlete focus his or her attention on. It turns out that science indicates that over 80 % of protein synthesis in eating occurs through proteins contained in the meal (Rennie et al., 2002). What is really interesting though is that through numerous experiments the scientific community has been able to isolate exactly what critical part of the protein is responsible for protein synthesis. In short, there are 20 amino acids, but 9 of these amino acids your body cannot make. Hence we call them "essential amino acids." What is fascinating is that it is only the 9 essential amino acids which stimulate muscle growth. This means that an athlete will want to supplement their diet with these valuable nutrients, particularly pre workout. I say pre workout because exercise increases blood flow to muscle tissue. If that blood is chalk full of essential amino acids they will be delivered to muscle tissue at a much greater rate. The optimal combination of Essential amino acids can be found in Champion Nutrition's Essential Amino Acid product "Amino Shooter".

Aside from post exercise, athletes will want to raise protein synthesis frequently throughout the day. What we currently know is that after you eat, amino acids peak in the blood at about 30-60 minutes after, and raise protein synthesis for approximately 2-3 hours (Wilson & Wilson, 2006). After this the individual will lower protein synthesis. Therefore athletes are advised to consume a high quality protein source or essential amino acid supplement at least every 2-3 hours daily.

Decreasing Protein Degradation through Diet

While amino acids are critical in protein synthesis, they are not the main nutrients responsible for directly inhibiting the breakdown of proteins. Instead, the hormone insulin is (Koopman et al.2005). When you eat carbohydrates they are digested in the stomach and small intestine to individual sugar molecules known as glucose or in layman's terms "blood sugar." Rising levels of blood glucose trigger an organ known as the pancreas to release insulin, which then signals muscle tissue to take in both glucose and amino acids. On top of this, insulin also signals the muscle to stop breaking down proteins! For this reason, protein shake formulations would benefit from adding at least a small amount of carbohydrates to their mixture in order to not only stimulate protein synthesis, but also stop the breakdown of muscle tissue. Based on this science, Champion Nutrition is going to be releasing a new product called pure whey FUSION, comprised of 20 grams of essential amino acid rich whey protein and 10 grams of slow digesting sustainable carbohydrates. A sample meal plan may be as follows

Meals	**Rationales**
Meal 1 – 6:00 in the morning Oatmeal and Egg Whites	Stop the breakdown of proteins after fasting and restimulate protein synthesis
7:00 – Essential Amino Acid Shooter, and glutamine. 7:30 Begin workout	Raise EAA levels right before the increase in blood flow of exercise
Meal 2 - Post Workout Nutrition - 2 servings of PURE whey Fusion	To increase positive protein balance and replenish energy stores.
Meal 3 – 11:30 - Normal Meal – Turkey Sandwich	Whole food source of protein for a more sustained release of amino acids and energy
Meal 4 – 2:00 to 2:30 – PURE whey Fusion	Sustain positive protein balance
Meal 5 – 4:30 – Mixed protein sources from various meats	Meal 2 rationale
Supplement – 6:00 – Essential amino acids and glutamine to maintain protein synthesis.	A caloric efficient way to maintain protein balance
Meal 6 - 8:00 – Brown Rice, and lean chicken	Meal 2 rationale
Meal 7 - 10:30 – Cottage cheese, broccoli, glutamine – Lower overnight protein degradation	Cottage cheese is slowly digested and thus will sustain an individual for longer into the night

Tilting the protein balance scale in favor of muscle growth is perhaps the most critical factor for resistance trained athletes. With a clear understanding of these principles you virtually guarantee optimized growth!

References

Wilson, J. and G.J. Wilson. Contemporary issues in protein requirements and consumption for resistance trained athletes. Journal of the International Society of Sports Nutrition. 3(1):7-27, 2006.

Rennie MJ, Bohe J, Wolfe RR. Latency, duration and dose response relationships of amino acid effects on human muscle protein synthesis. J Nutr. 2002 Oct;132(10):3225S-7S.

Koopman R, Wagenmakers AJ, Manders RJ, Zorenc AH, Senden JM, Gorselink M, Keizer HA, van Loon LJ. Combined ingestion of protein and free leucine with carbohydrate increases postexercise muscle protein synthesis in vivo in male subjects. Am J Physiol Endocrinol Metab. 2005 Apr;288(4):E645-53. Epub 2004 Nov 23.