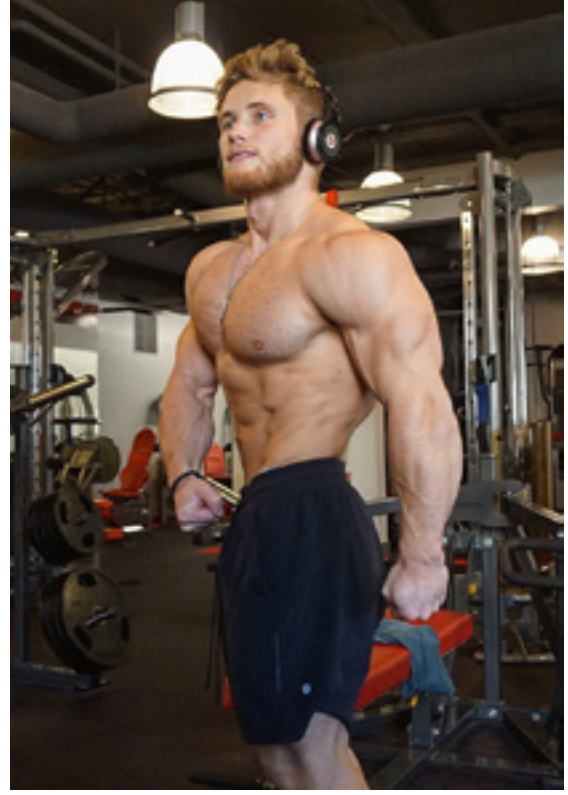
INTERVIEW:

Jeff Nippard



You've been in the bodybuilding/powerlifting game for some time now. But at one point you were on track to become a dentist – making it as far as two years into that program before leaving it. What was the turning point at which you decided to dive completely into bodybuilding?

There probably wasn't one "turning point" per se that sparked the decision, but rather a careful and rational analysis of what I really wanted to do with my short time on this planet. I remember spending one day in the clinic where I was scraping plaque off a young woman's teeth for four hours and found myself thinking, "with all the talents and passions I have, there has to be a more fruitful way to spend my time here on Earth." I realized that the average person will spend about 80,000 hours "working" at their job and when I really thought about it I knew dentistry wasn't something I wanted to spend 80,000 hours of my life doing. Even though I didn't hate it, I just wasn't passionate about it in the same way I am for fitness, bodybuilding and other sciences.

A basic understanding of the "sunk costs fallacy" was of utility in my decision making as well: the 2-year schooling investment couldn't rationally justify a 40-year career on its own.

What aspects of the fitness field has kept your interest for so long?

No doubt a lot of it has to do with the fact that I am skilled at it - it's something that I feel comes easily to me. Competitive bodybuilding, like other sports I've practiced, is enjoyable. I like the idea of perfecting one's own body and gleaning all of the mental fortitude that can accompany that pursuit. But unlike the other sports I've participated in, bodybuilding also has a close tie to my passions for science and outreach. It's very intrinsically rewarding for me to communicate science, especially exercise science, nutrition, and related fields. Fitness has also allowed me to experience a lifestyle as an entrepreneur in a way that I feel is unique. I don't think I'll ever lose interest!

One of the issues entrepreneurs in the fitness industry may deal with is sponsorships. How do you go about selecting which companies you agree to sign on with?

I think most importantly you need to choose a sponsor (or sponsors) whose products or services are in line with your own values, opinions, style, etc. You need to actually like what it is they are doing. Secondly, you should look for a sponsorship agreement that will be mutually beneficial. It seems to me that some athletes accept sponsorships just so they can say they're sponsored. I think people would be

wise to wait until an offer comes that all parties can benefit from. That means joining a company that will help you achieve your goals and help you grow in the process of promoting their stuff. A company needs to know your real value and then reward you for it.

For new guys getting into the bodybuilding scene, it can be hard for them to gauge what they should expect in terms of muscle growth. If both their nutrition and training programs are on point, what range of muscle mass gain can a novice expect in the first year? How about someone who has been casually training for a while but is looking to up their game?

It's tough for anyone to gauge how much muscle they can realistically add – not just new guys! I think some data would be enlightening here. A study out of Baylor University had 20 untrained men gain 12 lbs of lean body mass on average following a 4-day upper/lower split for 10 weeks (Willoughby et al., 2007). That evens out to roughly 1 lb per week of muscle gain. I actually think some new lifters can aim for more than this, especially when you consider that the subjects in the present study were instructed not to change their normal dietary habits for the course of the trial. It seems plausible that having them eat in a caloric surplus would've netted greater muscle gain. My personal thoughts are that beginners can realistically aim to bulk up about 1 lb per week for the first 6 months. After that, I like to go with Lyle McDonald's general recommendation that guys are doing very well to see 0.5 lbs of gain per week. Sometime after 3 to 10 years of training, the returns begin to diminish as one approaches one's genetic ceiling for muscle mass. At that point, I tend to emphasize making increases in gym performance by adding weight to the bar (or machine) and accepting a slower rate of weight gain (as slow as 0-1 lbs per month when bulking).

Of course, all of the above will massively depend on genetic factors. Even when on the exact same diet and training protocol, some folks can gain up to 4x as much muscle mass as others over a 12-week period, according to one study (Davidsen et al., 2011). So you'll have to assess ***your*** results based on ***your own*** changes from baseline, rather than pooled averages or someone whose physique you admire.

If someone's muscle growth has stalled (or, at least, they think it has stalled) what coaching/troubleshooting tips do you have for people in this situation? (Other than having a meltdown and crying into their whey protein shake – always a valid option).

If someone is stalled, it's often due to either nutrition or training factors. If it's related to nutrition, it's likely either because of insufficient caloric intake or protein intake to support further increases in muscle mass. Generally speaking, the rate of gain will be faster when protein is supplemented in the diet, as shown by Willoughby et al.. And while it's still up for debate exactly how much is optimal, protein expert Dr. Stu Phillips recommends 1.6-1.8g/kg per day when in a surplus as being "optimal" for growth. I would contend that intakes lower than this could be responsible for stalled muscle growth.

A stall could also be due to training detriments. In my experience, this can just as often be due to psychological factors as physiological ones. If trainees are either bored with their program or running a program they find unenjoyable, it can lead to major adherence issues. I think running a program one enjoys can, in some cases, trump all other acute training variables. Apart from training mentality, a stall in performance can be attributed to either "doing too much" or "doing too little". If you're feeling tired, burnt out, and generally poorly recovered, you're probably doing too much and would benefit from a deload. Generally, a 1-2 week period with a 50-75% reduction in set volume and a slight reduction in intensity (reducing the RPE by 1-2 units) will do the trick in my experience.

Conversely, if you're feeling stagnant but recovered and capable of doing more, then you may not be doing

enough for progress. Sometimes, this necessitates an increase in training volume, but often can be due to a simple lack of training intensity. As Willoughby et al. put it in his 2007 paper "training to failure might allow advanced lifters to break through training plateaus when incorporated periodically into short-term micro-cycles." Sometimes you might just need to take your foot off the gas while others you need to press harder. If you listen to your body carefully, you should be able to find the answer.

Has there ever been a time in your training career where you felt that a particular supplement really helped you out? How has your approach to supplement use evolved over your career?

Honestly, not really. If I were to put two supplements at the top of my list of most influential, they would be whey protein and caffeine. When I was competing as a student, whey was especially convenient as a protein source throughout the day and caffeine provided the energy boost needed to get through evening training sessions. Other than that, I attribute most of my results to genetics, training, nutrition and consistency far above supplementation.

My approach to supplement use hasn't changed much, but I've become a little more minimalistic over time as I've become more educated. I still like to use pre-formulated pre-workout products that taste good and that I think I notice an increase in vascularity from. This has always been a staple for my workouts. Creatine is another supplement I've always consistently used, but in the absence of a more controlled intervention, it's tough for me to say for sure whether or not it's been profoundly effective for me.

Bodybuilders have a reputation for participating in some very peculiar activates in the days leading up to their competitions. Such as manipulating water and sodium intake. Can you briefly discuss these practices and if/when they may be advantageous during peak-week?

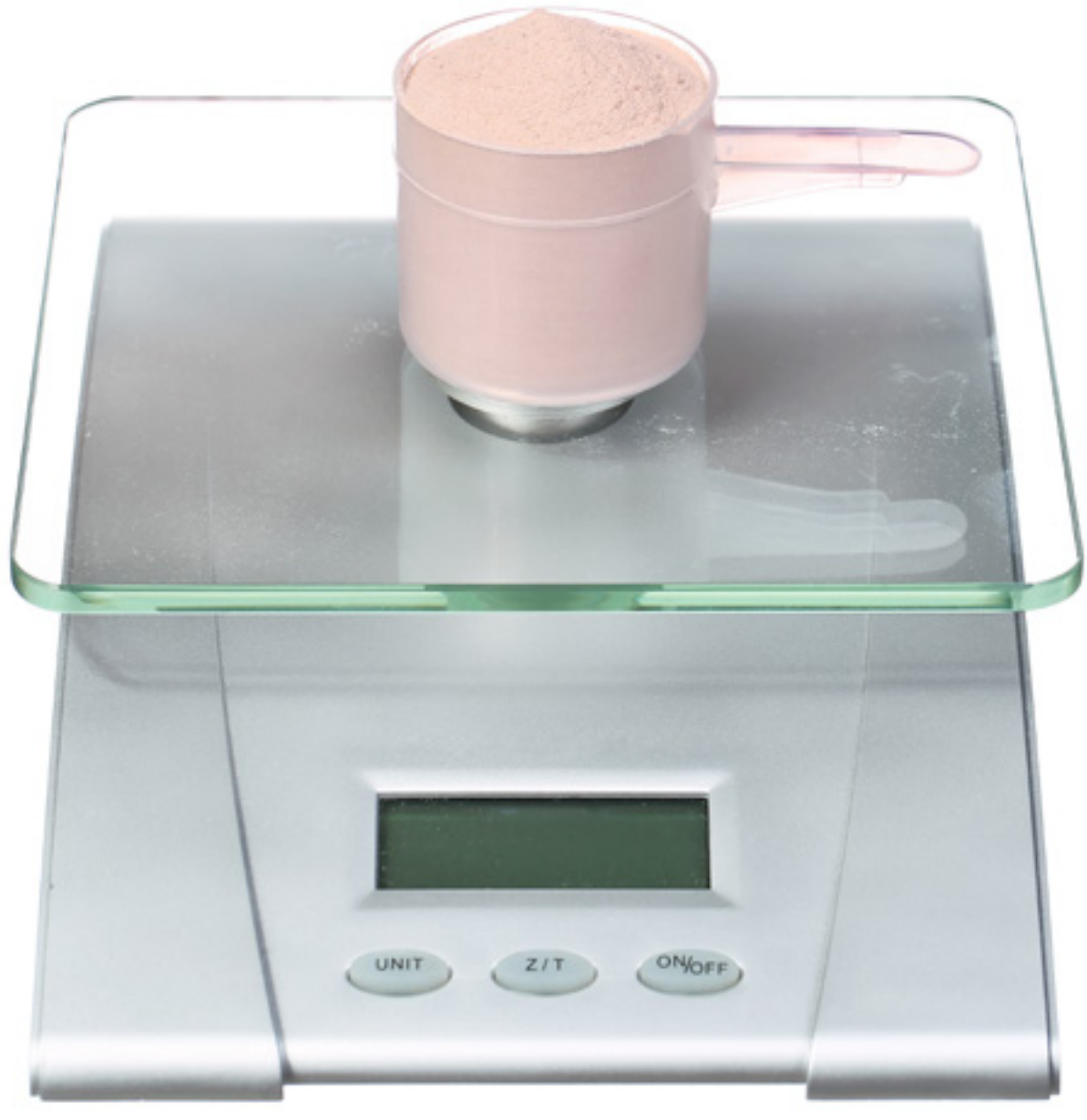
When you consider the things that really affect one's appearance, like genetics and training age, the effect of typical acute changes that accompany peak week pale in comparison. Given the variables you can manipulate, my top things to focus on during peak week and show day would be: mental calamity, stage colour, posing and overall presentation. These are things that can make a massive difference in one's success on stage.

For the acute nutrition and training variables, I employ what I would consider to be a fairly kosher peak week protocol: bodybuilders and figure competitors increase carbs, reduce training volume, and keep water consistent with an acute sodium increase over the 12-24 hours leading to the stage. For bikini clients, much is the same, but depending on the organization, I may not carb load as heavily. I rarely will play around with water and sodium and generally keep it consistent for all of peak week, moderately increasing sodium intake in conjunction with the carb load to assist with absorption and improve vascularity. ◆

Jeff Nippard is a natural professional bodybuilder and and competitive Powerlifter. Through his informative and entertaining YouTube channel, Instagram, and Podcast Jeff aims to share the knowledge he has gathered through university education and field experience with others who are passionate about bodybuilding, powerlifting and the science behind building muscle, losing fat and getting healthier.

Should one gram per pound be the new RDA for bodybuilders?

Indicator Amino Acid–Derived Estimate of Dietary Protein Requirement for Male Bodybuilders on a Nontraining Day Is Several-Fold Greater than the Current Recommended Dietary Allowance



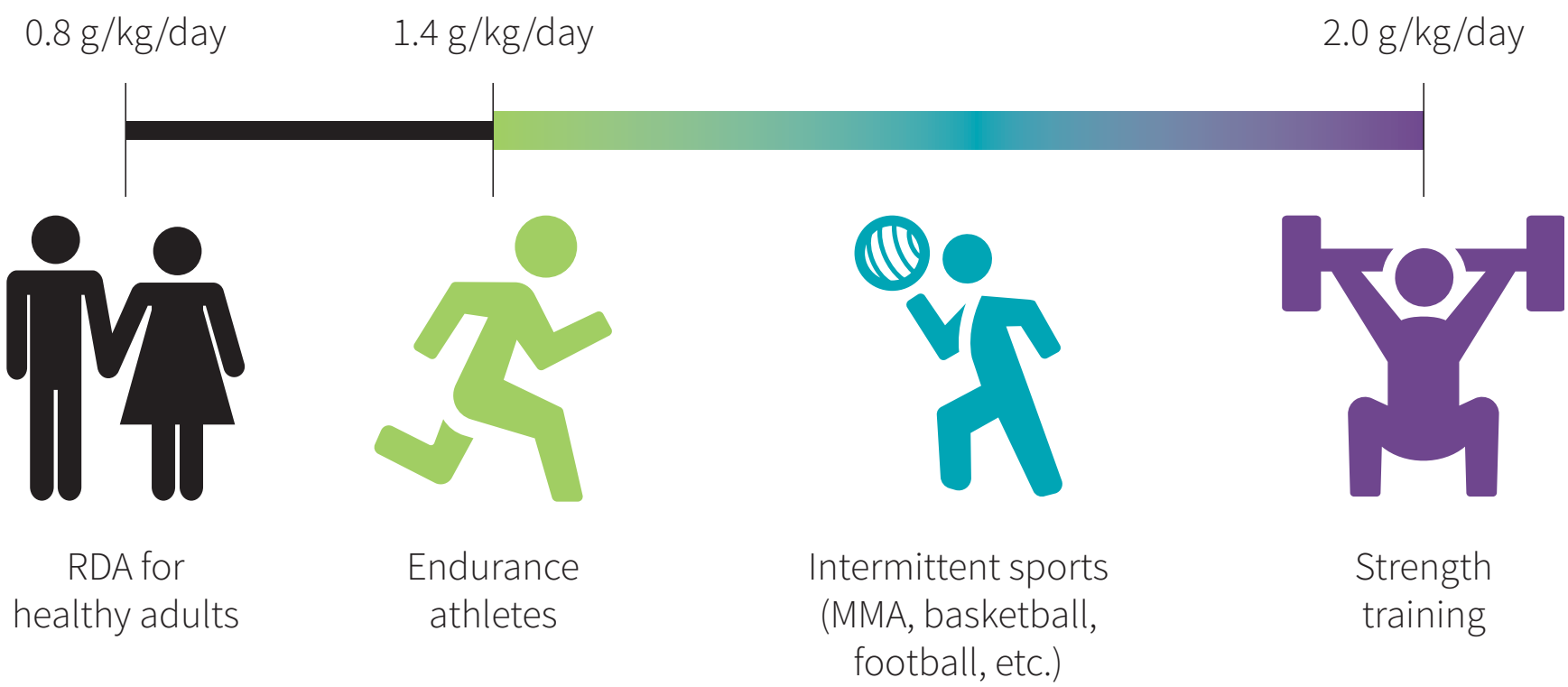
Introduction

How much dietary protein does a bodybuilder require? Several organizations, such as the American College of Sports Medicine and the International Society of Sports Nutrition (shown in Figure 1), have recommended that physically active adults consume between 1.2-1.4 and 2.0 grams of protein per kilogram of bodyweight per day to allow for recovery from training and to promote the growth and maintenance of lean body mass. However, these recommendations are based primarily on studies that involve recreationally active or formerly untrained adults with normal amounts of lean body mass. Extending these recommendations to a resistance-trained bodybuilder looking to maximize lean body mass may not be appropriate.

Several studies have attempted to identify the minimal protein requirements of elite bodybuilders, novice bodybuilders, and strength-trained athletes. Using the nitrogen balance method, which attempts to determine protein requirements by measuring nitrogen intake and excretion, these studies suggested that protein requirements upwards of 1.4 grams per kilogram of bodyweight. However, the nitrogen balance method has several limitations, such as the way in which the data is analyzed (linear fits used for nonlinear data), inaccurate estimations of nitrogen intake and excretion, and the one to two week adaptation period required before protein intake measurements can be taken.

The last point is especially important, considering that athletes' bodies can adapt to lower protein intakes over that adaption period. Isotope tracer studies have suggested that there are four stages of protein metabolism: deficiency, accommodation, adaptation, and excess. Nitrogen balance studies may show that people are in nitrogen balance at lower intakes of dietary protein because the body adapts to this lower amount by downregulating physiologically relevant pathways, like muscle protein synthesis and immune function. However, for a bodybuilder interested in maximizing muscle growth, this accommodation is not beneficial. Rather, the focus should be on conditions when both optimal growth and immune function are present.

Figure 1: The International Society of Sports Nutrition's take on recommended protein intake



Reference: Campbell et al. J Int Soc Sport Nutr. 2007 Sep.

The Indicator Amino Acid Oxidation (IAAO) technique is a method for determining protein requirements that overcomes many of the shortcomings of nitrogen balance studies. For instance, only a minimal adaptation period is required before testing of protein requirements. The IAAO method is based on the concept that when one essential amino acid is deficient for protein synthesis, then all other essential amino acids, including the "indicator" amino acid, will be oxidized for energy because protein cannot be readily stored like carbohydrate or fat (see figure 1 of ERD #19, Volume 1, *How much protein does grandpa really need?*). Dietary amino acids must be incorporated into bodily tissues via protein synthesis or oxidized for energy and excreted from the body.

The study under review used the IAAO technique to determine the protein requirements of young male bodybuilders. This is the first study to use the IAAO technique in this population, and will provide important information for helping to establish protein recommendations for bodybuilders while avoiding the shortcomings of nitrogen balance assessments.

Protein requirements of physically active adults remains a controversial area of research due to the widespread differences in people who are regularly active. Bodybuilders are one such population and have limited data available. Several studies have attempted to determine the protein requirements of bodybuilders using the nitrogen balance method, but nitrogen balance measurements have notable limitations. The purpose of the study at hand was to determine the protein requirements of bodybuilders using a method that overcomes many of the shortcomings of nitrogen balance research, called the Indicator Amino Acid Oxidation (IAAO) technique.

Who and what was studied?

Eight healthy young men (average age of 22.5 years) were recruited from a university campus. All the participants had at least three years of resistance training experience and were currently strength training four or more days per week with minimal aerobic exercise (less than 20 minutes per week). Additionally, the participants had to be relatively weight stable, with less than four kilograms (10 pounds) of weight gain or loss in the past six months, and never having used anabolic steroids.

To ensure that the participants were near their theoretical maximum muscular potential, each had their fat-free mass index (FFMI; same as BMI but uses fat-free mass instead of body weight) calculated and compared to published values of Mr. USA winners during the pre-steroid era of 1939-1959. Only those participants within 10% of the muscularity of past Mr. USA winners were selected. On average, the eight male bodybuilders participating in this study had a FFMI of 24 (96% that of past Mr. USA bodybuilders).

The participants underwent several three-day test periods separated by at least one week. Each occasion consisted of a two-day adaptation period followed by the IAAO study day. During the adaptation days, the participants were provided with a maintenance diet supplying 1.5 grams of protein per kilogram of bodyweight, in order to be consistent with past nitrogen balance research in bodybuilders. During the IAAO test day, the participants were randomly assigned to receive a test protein intake ranging from 0.1 to 3.5 grams per kilogram, consumed as eight hourly meals after a 12-hour overnight fast. Importantly, testing days occurred on non-training days and at least 48 hours after a training session, since resistance training is known to increase muscle protein synthesis rates for up to two days after training.

A small group of eight young, experienced male bodybuilders consumed 0.1 to 3.5 grams of protein per kilogram of bodyweight across several IAAO test days to determine their protein requirements. Testing was performed on non-training days, at least 48 hours after the last training session.

What were the findings?

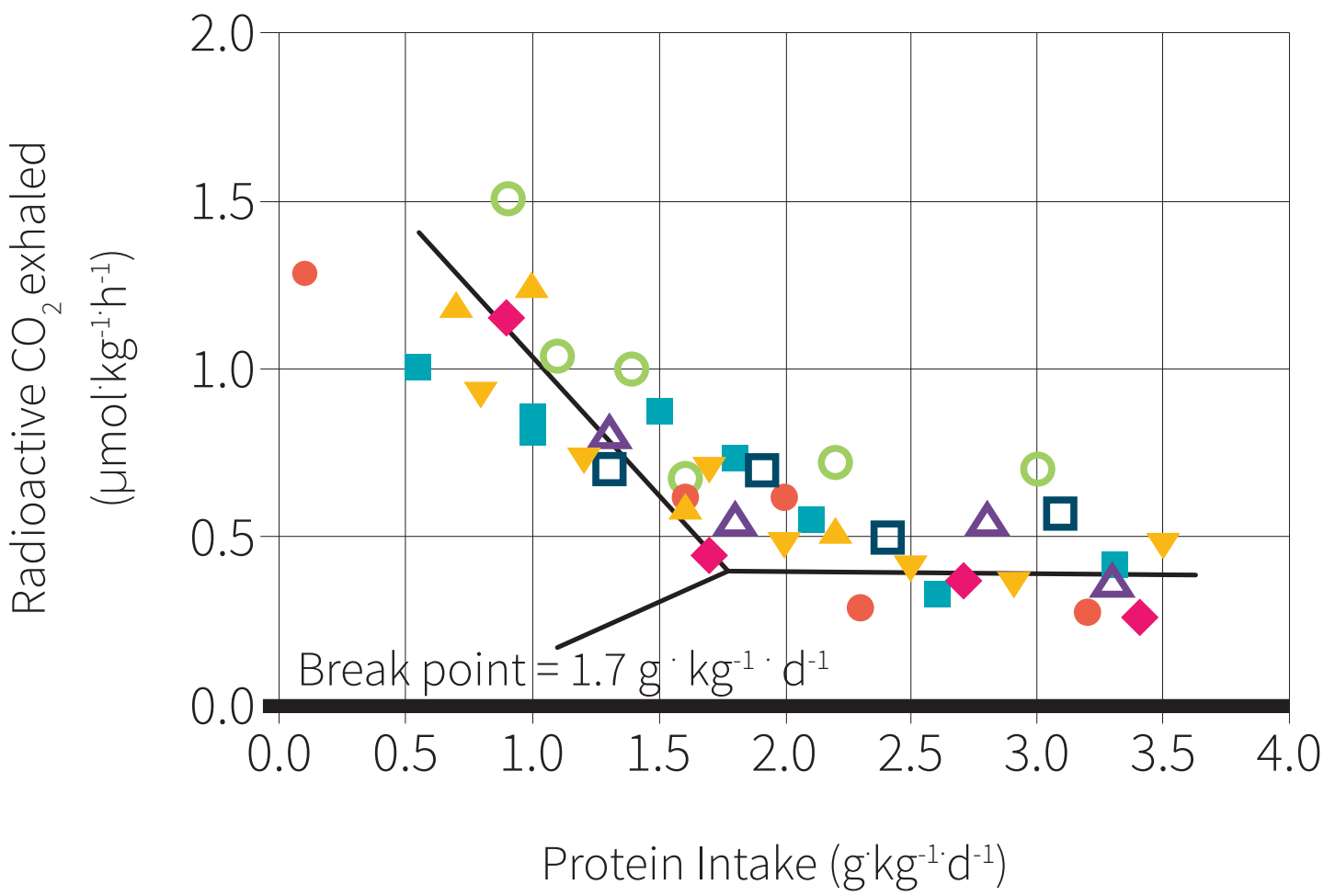
Figure 2 summarizes the study findings. Protein oxidation declined with increasing protein intake up to an average intake of 1.7 grams of protein per kilogram of bodyweight, at which point it plateaued. This suggests that the average dietary protein requirement for the study sample was 1.7 grams of protein per kilogram of body weight per day. The 95% confidence interval ranged from 1.2 to 2.2 grams per kilogram, indicating that there was a lot of variability in the bodybuilders' specific protein needs. Using lean body mass rather than body weight, the average protein requirement and upper end of the confidence interval become 2.0 and 2.5 grams per kilogram.

What does the study really tell us?

The study under review suggests that the daily protein requirement that would cover the needs of young and experienced bodybuilders is likely to be between 1.2 and 2.2 grams of protein per kilogram of bodyweight per day, with the participants of this study averaging 1.7 grams per kilogram. From these statistics, the authors then infer that almost all experienced bodybuilders would have their protein requirements satisfied by eating 2.2 grams per kilogram. This could be in error, though, as this seems to be based on their reported 95% confidence interval, which may not be the correct way to get at this number when it comes to inferential statistics.

There are many important qualifiers of this study that cannot be overlooked when extending its findings to other populations, including strength-trained athletes.

Figure 2: Main results from this study



The participants training for a minimum of four days per week, for about an hour each day, but the specifics of their training routines were not provided. It is common for bodybuilders to use split routines with a focus on relatively higher repetition zones (6-12 repetitions per set is recommended to maximize muscle growth). It remains unknown how the training variables (frequency, intensity, and volume) influence protein requirements.

This is the first study to assess the protein requirements of bodybuilders using the IAAO technique, precluding direct comparisons to other research. Additionally, the participants were all young men with a significant amount of lean body mass (averaged a FFMI that was 96% that of past Mr. USA bodybuilders from the pre-steroid era) and at least three years of consistent strength training experience. So these findings may not apply to women or people with less muscle mass and training experience. Finally, important training variables may have influenced protein requirements at the time of study, such as the frequency, volume, and intensity of the participants' training sessions.

Two previous nitrogen balance studies involving bodybuilders with less than one year and more than three years worth of experience suggested that protein requirements were 1.4 and 0.8 grams per kilogram, respectively. This difference could be attributed, at least in part, to a greater rate of muscle mass gain in novices compared to the more experienced bodybuilders. However, this would not explain the difference with the study under review, since both the previous nitrogen balance study and the study at hand involved bodybuilders with at least three years of training experience. Rather, this difference may relate to the stages of protein metabolism discussed in the introduction. Namely, the nitrogen balance study resulted in an accommodation to the lower protein intake while the current study did not.

Evidence for this latter possibility comes from randomized controlled trials showing superior gains in lean body mass with a protein intake around the requirement observed in the study under review. For instance, a meta-analysis found that supplementing a baseline diet containing 1.2 grams per kilogram with an additional 50 grams of protein per day (on average) led to significantly greater increases in lean body mass and skeletal muscle growth than consuming less protein. Moreover, when stratified for training status, resistance-trained groups were shown to have greater increases in their lean body mass (+0.98 kilograms) with a higher protein diet than their untrained counterparts (+0.75 kilograms).

Finally, it is important to note that this study tested protein requirements at rest, when muscle protein synthesis would presumably be uninfluenced by a previous resistance training session. Consequently, protein requirements on a training day could be different than requirements on non-training days because of an increased protein need to repair damaged muscle tissue, something that warrants further investigation. Consistent with this idea, research in rats showed that IAAO-determined protein requirements were greater following an endurance training session than at rest.

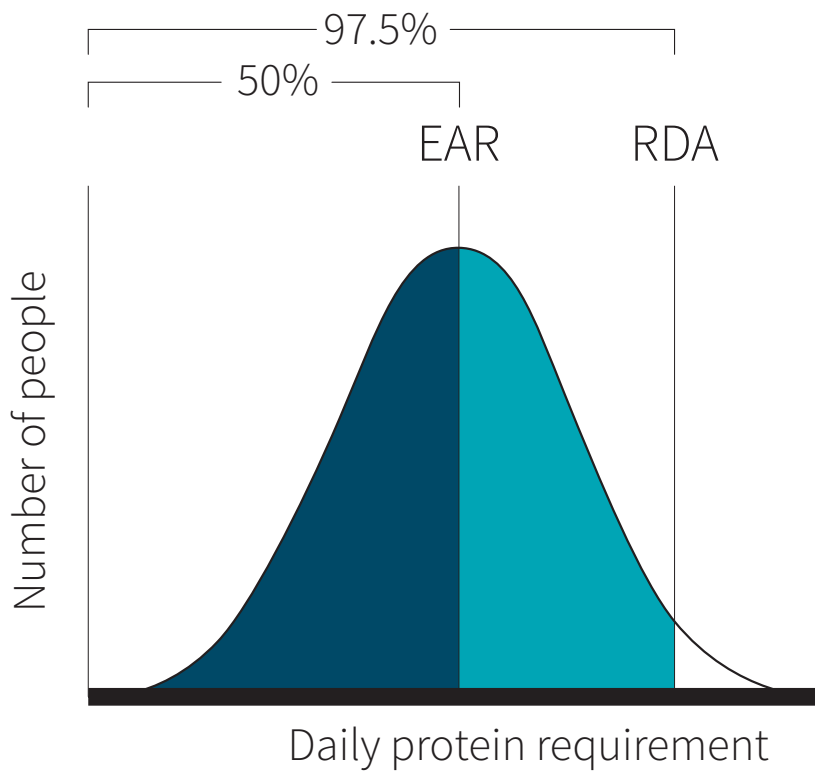
The study under review suggests that young, male, experienced, highly muscular bodybuilders require an average of 1.7 grams of protein per kilogram of bodyweight per day on non-training days, separated from workout sessions by at least 48 hours. The participant characteristics and timing of the testing procedures are important qualifiers that may influence protein requirements and therefore cannot be overlooked when attempting to extend these findings to other populations.

The big picture

The United States and Canadian governments base their nutrition recommendations on the Dietary

Reference Intake (DRI) values established by the Health and Medicine Division of the National Academy of Medicine (formerly known as the Institute of Medicine). The two most frequently relied upon DRIs are shown in Figure 3, the Estimated Average Requirement (EAR) and the Recommended Daily Allowance (RDA). The former represents the amount of a nutrient needed to meet the requirement of half of the population, while the latter represents an intake level that is sufficient to meet the nutrient requirement of 97-98% of the population. Both values are determined for a specific sex (male/female) and life-stage (categories of age plus pregnancy and lactation).

Figure 3: The EAR and RDA



The current EAR and RDA for protein are 0.66 and 0.8 grams of protein per kilogram of bodyweight per day, respectively, for both men and women, and are based on nitrogen balance studies. Additionally, based exclusively on one nitrogen balance study in older adults beginning a resistance training routine and the previously discussed study in novice bodybuilders, the Health and Medicine Division concluded that "*no additional dietary protein is suggested for healthy adults undertaking resistance or endurance exercise*" (pg. 661).

An abundance of studies in resistance training populations have suggested that the recommendations put forth by the Health and Medicine Division are not evidence-based and greatly underestimate protein requirements of this population. Notwithstanding the limitations of the study at hand, it too suggests that resistance-trained people require substantially more protein than the 0.8 grams per kilogram RDA. Rather, the RDA should be at least 2.2 grams per kilogram (1.0 gram per pound or more).

Past research using the IAAO technique has also suggested that the protein RDA for healthy young men, older men, and older women should be greater than it is currently, around 1.2 grams per kilogram. ERD #19, Volume 1, *How much protein does grandpa really need?* discussed the study involving older men. Certainly, the protein RDA should be revisited for a variety of populations, especially considering research utilizing the IAAO technique. Even the Health and Medicine Division acknowledges that "*on theoretical grounds, this method has advantages over other methods for estimating amino acid requirements, and is the chosen method for estimated amino acids requirements where data are available*" (pg. 619).

The protein RDA for adults of all ages and activity levels is 0.8 grams of protein per kilogram of bodyweight. Several IAAO studies have suggested that this intake level for protein is not sufficient for everyone, instead supporting a requirement of 1.2 grams per kilogram for sedentary adults and at least 2.2 grams per kilogram for bodybuilders.

Frequently Asked Questions

Do protein requirements change during a diet?

Even when dieting, eating 2.2 grams of protein per kilogram of bodyweight should be sufficient for most athletes unless they are working toward extreme lean-

ness, like weight-category athletes and bodybuilders preparing for a show. Under these circumstances, there may be an advantage to eating more protein. One review of dieting athletes suggested that eating 2.3 to 3.1 grams of protein per kilogram of lean body mass was the most consistently protective intake range against losses of muscle mass, and this range was recommended for natural bodybuilding contest preparation.

Will eating this much protein harm my kidneys or bones? No to both. A meta-analysis in adults without established kidney disease suggests that eating more dietary protein causes an increase in GFR, serum urea, and urinary calcium excretion. However, it does not cause an increase in urinary albumin excretion, which is the most sensitive marker of kidney damage. These changes can be interpreted as normal physiological adaptive mechanisms induced by eating more protein. This conclusion is shared by the World Health Organization in their official report on protein when they state that "*the most widely quoted potential problems [of a high-protein diet] relate to renal function and damage, but as discussed above the evidence for such claims in otherwise healthy individuals does not stand up to scrutiny*" (pg. 231).

As for bones, it is well documented that eating more protein results in an increase in urinary calcium excretion (see above meta-analysis). However, the excretion of calcium is only one piece of the puzzle, and randomized controlled trials have shown that eating more protein has no effect on whole-body calcium balance, probably because higher protein diets increase the absorption of dietary calcium to compensate for any losses. Furthermore, a meta-analysis of protein supplementation studies showed a small but significant benefit of increased protein intake on bone mineral density, possibly due to direct insulin-like growth factor-1 (IGF-1)-mediated anabolic influences on bone tissue.

What should I know?

Protein requirements for experienced bodybuilders, and possibly resistance-trained athletes in general, are likely to be greater than currently indicated by the RDA. The study at hand used the IAAO technique to determine protein requirements and found that, on average, the eight young, male bodybuilder participants required about 1.7 grams of protein per kilogram of bodyweight per day, with the corresponding "new" RDA being 2.2 grams per kilogram (1.0 gram per pound) or perhaps even more. Importantly, this finding was on a rest day separated by at least 48 hours from a previous training session, so protein requirements on training days may be different. The current study findings are supported by controlled trials showing greater muscle growth with protein intakes around the 1.7 to 2.2 gram per kilogram range, as compared to lower intakes. ◆

IMHO, IAAO should be used more often. Discuss protein requirements in trained athletes at the ERD Facebook forum.