Protein Paranoia: What Is There to Fear?

Dr. Greg Bradley-Popovich

What's all the hubbub, bub?

Numerous reviews of scientific research on protein needs of various athletes have concluded that high-protein diets are appropriate and beneficial, particularly for those interested in building muscle. A high-protein diet, for our purpose, is one that supplies greater than the recommended dietary allowance (RDA) of 0.8g protein per kg bodyweight per day. Reviews of past research have estimated that athletes generally require 1.2g up to 1.8g protein per kg bodyweight per day (Lemon, 1995; Lemon, 1998). However, much debate continues regarding the possible health risks associated with a diet high in protein. Issues such as increased calcium excretion, increased saturated fat consumption, and renal damage are at the forefront of such controversy. In this article, I address these concerns and show how much of this protein paranoia has grown out of misinterpretation and misapplication of dietary research.

A high-protein diet will make you pee your bones out!

Protein and the minerals calcium and phosphorous have a complex relationship. The net effect of protein alone is to cause calcium loss in urine. The net effect of phosphorous is to decrease urinary losses of calcium in order to increase calcium retention.

The belief that increased dietary protein results in a disturbance of calcium balance arises at least partly from studies that administered isolated proteins missing their natural phosphorus while keeping dietary calcium and phosphorus constant. Such was the case with a study by Anand and Linkswiler (1974) that tested calcium retention against diets containing 47g, 95g, and 142gprotein per day , with the protein above 47g per day being supplied as protein isolates. They found that the extra protein significantly increased urinary calcium excretion. That could be interpreted as peeing away your bones. Similarly, Allen, Oddoye, and Margen (1979) tested a diet containing 75g protein daily versus 225g protein daily while attempting to hold phosphorus intake constant. They, too, concluded that the high-protein diet increased calcium excretion, also showing that maximum calcium excretion occurs within 3Ð5 days of beginning a high-protein diet and remains elevated for at least 3 months. A minimum of eight other studies were conducted in a similar fashion, keeping calcium and phosphorus intakes constant across various protein intake levels (Hegsted, Schutte, Zemel, & Linkswiler, 1981). Again, whizzing away bones!

In contrast to the above findings, another study raised protein and phosphorous consumption proportionately. Protein intakes were 50g versus 150g per day. No significant disturbances to calcium balance were documented (Hegsted, etal.). It is noteworthy that, to this point, all previously cited studies allowed only 500mg calcium/day (<40% of the 1989 RDA). A more recent study showed calcium losses are minimized when an increase in meat protein is accompanied by an increase in the phosphorus naturally present in the meat. This study also tested a high-protein group including dairy products to bring the calcium ingestion from 590mg per day to 1370mg per day , which resulted in a highly positive calcium balance. In simple terms, the high-protein diet containing plenty of calcium in dairy products actually built bone. Dairy products are helpful not just because of their calcium content, but because lactose may enhance calcium absorption (National Academy of Sciences National Research Council, 1989), if this pesky sugar doesn't give you the trots and make you gassy.

Epidemiological studies, which look for associations within large numbers of people, have failed to show a negative impact of high amounts of dietary protein on bone. Two studies, one on fracture rate and another on bone mass, showed no adverse effects of protein on bone (Arnaud‡& Sanchez, 1996).

Regarding calcium losses and protein ingestion, the National Research Council, which formulates the RDAs, states, "Urinary calcium excretion increases with increased protein intake if phosphorus intake is constant. If phosphorus intake increases with protein intake, as it does in U.S. diets, the effect of protein is minimized. It has been suggested, but not demonstrated, that a habitual high intake of protein might contribute to osteoporosis. This seems unlikely based on present evidence, at least for the range of intake for most people in the United States" (National Academy of Sciences National Research Council, 1989, p. 72).

The National Academy of Sciences National Research Council (1989, p. 178) further expounds on the relationship of phosphorus and protein intakes to calcium status: "The level of protein and phosphorus can affect the metabolism of and requirement for, calcium, primarily as a result of their opposing effects on urinary calcium... An increase in protein intake... results in an increase in urinary calcium excretion. In contrast, an increase in phosphorus intake... causes urinary calcium to decrease. Because of the opposing effects of protein and phosphorus on urinary calcium and calcium retention, a simultaneous increase in the intake of both, a pattern characterized by milk, eggs, and meat ingestion, has but little effect on calcium balance at recommended levels of calcium intake."

In consideration of the resistance training enthusiast, even many protein supplements for strength-trained persons are fortified with 25-100% of the RDA of phosphorus and 25-160% of the RDA for calcium. It must also be considered that resistance training itself is a strong stimulus for bone mineralization (Burr, 1997; Conroy & Earle, 1994). Indeed, a very recent study comparing body builders with other athletes did not find an increase in calcium excretion in bodybuilders even though the body builders consumed nearly 50% more protein and more calcium than the other athletes (Poortmans & Dellalieux, 2000). In view of this mass of evidence, it is unlikely that increased protein consumption will have negative effects on calcium retention in individuals engaged in resistance training who consume the majority of protein as meats, eggs, dairy products, and even fortified whole-protein supplements. Much to the contrary, there is evidence to suggest that your bones will become stronger on a high-protein diet combined with resistance exercise.

A high-protein diet will clog your arteries!

The link between a high-protein diet and saturated fat consumption is not without support, at least in the sloths who comprise the majority of our sedentary society. However, studies on the dietary habits of recreational and competitive resistance trainees have repeatedly shown very low total fat and saturated fat consumption (Kleiner, Bazzarre & Ainsworth, 1994; Vega & Jackson, 1996). In addition, body building-type exercise has been shown to positively affect blood lipid parameters with short-term (Wallace, Moffatt, Haymes, & Green, 1991) and long-term programs (Elliot, Goldberg, Kuehl, & Catlin, 1987; Goldberg, Elliot, Schutz, & Kloster, 1984; Ullrich, Reid, & Yeater, 1987). These positive effects, however, are not seen in trainees who abuse anabolic-androgenic steroids (Hurley et al., 1984). As long as a steroid-free resistance trainee makes an effort to maintain a moderate intake of saturated fat by opting for lean meats and reduced-fat dairy products, high-protein diets are not an artery-clogging health risk.

A high-protein diet will make your kidneys explode!

Possible negative effects of a high-protein diet on renal function were speculated by Brenner et al. (1982). This team proposed that narrowing of the little blood vessels in the kidney, which is commonly part of the aging process, is accelerated by excess protein intake. Realize that Brenner and colleagues deemed this possible risk "acceptable" within healthy individuals. The National Research Council indicates that there is no human study supportive of excess protein leading to this medical condition (National Academy of Sciences National Research Council, 1989).

A diet with excess protein and a high-protein diet, as referred to in this article, must be distinguished. A diet with excess protein is just that: a diet with protein beyond needs that must be degraded and its resultant waste products excreted in the urine. A high-protein diet for the resistance trainee, on the other hand, should provide enough protein to maintain muscle mass and a little extra for growth. Hence, a high-protein diet in a

strength-trained individual is not necessarily an excessive-protein diet and would not impose any additional load on the renal system. And, I propose than even a modestly excessive protein diet may be more wasteful than it is lethal. As support for this opinion, I offer you the study by Poortmans and Dellalieux (2000) which shows that even though body builders normally overconsumed protein beyond that necessary to increase a marker of lean body mass, body builders showed no evidence of harmful effects on several markers of kidney function despite this excessive protein intake averaging 250% of the RDA. It is no surprise, then, that the other group of athletes observed in this study, who consumed a more moderate 170% of the RDA, were not found to have compromised kidney function either. The authors conclude, "...Up to 2.8 [grams protein per kg bodyweight per day], we cannot detect any serious harmful effects from high dietary protein intake."

Go ahead, eat that protein!

Based on research conducted with healthy individuals and even body builders specifically, there seems to be no basis for fear of supra-physiological protein consumption in healthy persons (Di Pasquale, 1997; Lemon, 1994). In fact, at least one animal study has shown a beneficial effect of high-protein diets on renal function (Sterck, Ritskes-Hoitinga, & Beynen, 1992). The National Research Council supports these views on safety, writing, "Habitual intakes of protein in the United States are substantially above the requirement, and although there is no firm evidence that these intake levels are harmful, it has been deemed prudent to maintain an upper bound of no more than twice the RDA for protein" [about1.6g per kg per day] (National Academy of Sciences National Research Council, 1989, pp. 72-73).

It is well-documented that the vast majority of Americans, especially certain athletes, already consume protein in amounts greatly surpassing the conventional recommendations (Lemon & Proctor, 1991; Munro, 1964; Vega & Jackson). In fact, many physically active people, particularly body builders, consume an abundance of high-quality protein (Vega & Jackson), which would actually decrease physiological stress because there is less waste product generated. Another hole in the argument that high-protein ingestion is dangerous is that if this practice caused kidney problems, then most Americans would develop kidney disease because of our nation's general overconsumption of protein. So, if the average, typically sedentary, American consumes 2-3 times the RDA of protein but does not develop kidney disease, why would we think that active persons consuming generally healthier diets with higher quality protein would be at risk for kidney stress?

How did protein paranoia originate?

We already saw how early concerns regarding protein and calcium can be attributed to studies that failed to include enough calcium or phosphorous in the high-protein diets. Additionally, some of the fear concerning protein intakes above the RDA may stem from the fact that protein in the diet can markedly affect the filtration rate at the kidney. For example, doubling protein intake from the RDA increases the rate of kidney filtration by almost 90% (Baines, 1986). Even a single high-protein feeding can elevate the filtration rate by 20% or more for several hours (Baines). Nevertheless, there is no evidence to suggest that these increases in kidney filtration rate lead to a compromise in kidney function. Another possible source of protein paranoia revolves around patients with kidney disease who must consume low-protein diets. This is called context switching, and to try to generalize from one special population (e.g., those with kidney disease) to another, markedly different population (e.g., healthy, active persons) is not scientific. My perspective on the relative safety of high-protein diets for athletes and other physically active persons is supported by recognized experts on the subject of protein in sports nutrition (Lemon, 1998).

Conclusion

In addition to being important for maintaining or increasing lean body mass, high-protein diets for healthy, physically active people appear to be safe. As you can see, those ultra-conservative nutritionists who caution against consuming protein above the RDA amount for fear of harm are apparently unaware of the position of the very agency that develops the RDAs. These misinformed parrots simply repeat outdated research or unsubstantiated opinions to perpetuate their protein paranoia. For those who proclaim that high-or even excessive-protein consumption in healthy, active humans may lead to a number of medical complications, I ask one question: Where's the proof?

About the Author

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