©Journal of Sports Science and Medicine (2009) **8,** 150-151
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**Letter to editor**

# History may be the best guide for determining the athlete's dietary protein needs

**Dear Editor-in-chief**

I was encouraged to read Dr. Longo and colleagues' Letter to the Editor entitled "The best athletes in ancient Rome were vegetarian!"(Longo et al., 2008). These writers ask that we rethink the issue of what is an optimal dietary protein content for athletes by considering the diets that sustained the ancient gladiators of Rome. Historical evidence shows that humans of ancient times performed at intense levels while consuming 78% of their diets' as plant protein (Kanz and Grosschmidt, 2007). This anthropological fact, and some recent laboratory evidence, argues against the need to increase the protein RDA for athletes from 0.8 g of protein per kilogram of body weight per day to 1.2 to 1.4 g per kilogram per day (ACSM, 2000). Our research group found that amino acids make a small contribution (2 - 3% of total) to endurance energy needs (Lamont et al, 1999) and that athlete's have similar oxidation rates if corrections are made for oxygen consumption and fat-free body mass. Others report that a short-term training program of 38-days reduces amino acid use during exercise and down-regulates a critical enzyme in the oxidative pathway in order to spare this nutrient (McKenzie et al., 2000)

Yet sport nutritionists and physiologists continue to recommend an increased protein RDA for this group. If one does a Google search using the words exercise and protein you would literally get millions of citations recommending the athlete to increase their protein intake. One reason for this continued recommendation, I believe, is that the laboratory procedure used to justify an increased protein RDA (field-based nitrogen balance measurements) has many methodological shortcomings that are not recognized by the sports science community (Lamont, 2008). The problems with this technique are so great that its scientific fidelity has been questioned (Lamont, 2008). And as Longo and colleagues have highlighted (2008) the Institute of Medicine concluded that the evidence for increasing the RDA in active individuals is not compelling (Washington, 2002). All of these facts speak to the argument that many have "jumped the gun" in recommending that athlete's increase their protein intake. The ancient (and modern) evidence indicates that we need to recalibrate our dietary protein recommendations for this group. This argument is compelling when we consider that protein and amino acid supplements are among the highest nutritional supplements consumed (Lawrence and Kirby, 2002).

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## References

ACSM, ADA, and Dietitians of Canada. (2000) Nutrition and athletic performance for adults. *Medicine and Science in Sports & Exercise* **12,** 1543 – 1556.

Kanz F. and Grosschmidt K. (2007) Roman Gladiators – The osseous evidence. *Presented at Seventy-Sixth Annual Meeting of the American Association of Physical Anthropologists, Philadelphia, Pennsylvania,* March 28-31.

Lamont, L.S., McCullough A.J. and Kalhan S.C. (1999) Comparison of leucine kinetics in endurance-trained and sedentary humans. *Journal of Applied Physiology* ***86,*** 320-325.

Lamont L.S. (2008) The dietary protein needs of the female athlete. *Medicine and Science in Sports & Exercise* **40**, 588-589.

Lawrence M., Kirby D. (2002) Nutrition and sports supplements: Fact or fiction. *Journal of Clinical Gastroenterology* **35**, 299-306.

Longo, U.G., Spieza F., Maffuli N., and Vincenzo D. (2008) The best athletes in ancient Rome were vegetarian! *Journal of Sports Science and Medicine* **7,** 565.

McKenzie, S., Phillips S.M., Carter S.L. Lowther S., Gibala M.J. and Tarnopolsky M.A. (2000) Endurance exercise training attenuates leucine oxidation and BCOAD activation during exercise in humans. *Amican Journal of Physiology: Endocrinology Metabolism* **278,** E580-E587.

Washington, D.C. (2002) *Food and Nutrition Board, Institute of Medicine. Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids.* National Academy Press.

## Response of the authors

We appreciate Dr. Lamont's comments on the need to recalibrate dietary protein recommendations for athletes. Protein requirements for experienced athletes have been the subject of a long and ongoing scientific debate. For strength-trained individuals to maintain a positive nitrogen balance, it is suggested that they need to consume a protein intake of 1.6 to 1.8 $g \cdot kg^{-1} \cdot day^{-1}$ (American Dietetic Association et al., 2000). Half of American collegiate athletes use nutritional supplements, with protein supplementation being one of the most commonly used (Schenk and Costley, 2002).

High protein intake in daily diet using protein supplementation is widely used to gain muscle mass and strength among athletes and coaches.

It is commonly believed that high intensity training increases protein requirements. The concept that if more proteins are available to the exercising muscle, greater protein muscular synthesis occurs is diffuse in recreational and competitive athletes. This so widely accepted belief of protein supplementation and consequently high protein intake increases sport performances does not seem to be supported by scientific data.

Sport magazines are full of articles in which the authors explains how to made the highest amount of protein and in the same pages we can find out protein supplementation sponsors and pictures of "hardcore" bodybuilders. We can therefore speculate about the origin of

Received: 10 February 2008 / Accepted: 10 February 2009 / Published (online): 01 March 2009

the huge diffusion of the "protein supplementation culture": it is possible that behind it there are just the economic interests of commercial producers, but other reasons are also possible.

Protein supplementation indeed could be 'psychological doping' for athletes, so that this could be the fertile soil on which protein supplementation business may grow up.

We should admit that the ability to achieve adequate protein intake for many collegiate athletes is compromised from inadequate nutrition attributed to low caloric intake, poor food choices, and irregular meals (Cole, 2005; Hinton, 2004), and this could be another reason why these athletes have to rely on protein supplementation to ingest their daily requirement of proteins.

Studies examining the effect of protein supplementation on strength enhancement are limited and results have been inconclusive. Although some investigators have shown augmented strength gains from protein supplementation (Bird et al., 2006), others have reported no effects (Chromiak et al., 2004; Rankin et al., 2004). However, these studies have generally used untrained or recreationally trained individuals.

A recent study (Hoffman, 2007) evaluates the effect of protein supplementation on athletic performance and hormonal changes in 21 experienced collegiate strength/power athletes participating in a 12-week resistance training program. Although protein supplementation appeared to augment lower body strength development, similar upper body strength, anaerobic power and lean tissue changes do not provide clear evidence in supporting the efficacy of a 12-week protein supplementation period in experienced resistance trained athletes.

Kraemer et al. (1998) reported no differences in training volume or intensity in experienced resistance-trained men during several days of protein supplementation.

In 2001, the American Heart Association published a statement on dietary protein and weight reduction and suggested that individuals following such a diet may be at potential risk for metabolic, cardiac, renal, bone and liver diseases (St. Jeor et al., 2001).

Charles Darwin remarked: "The most extraordinary workers I ever saw, the labourers in the mines of Chile, live exclusively on vegetable food, including many seeds of leguminous plants."

Vegetable proteins, when combined to provide for all of the essential amino acids, provide an excellent source for protein, considering that they will likely result in a reduction in the intake of saturated fat and cholesterol. Vegetable sources of protein also provide numerous other nutrients such as phytochemicals and fiber that are also highly regarded in the diet (Hoffman, 2004)

Considering the paucity of studies examining protein supplementation in experienced athletes for long period of time, further studies are warranted to examine the optimal protein intake for the health of athletes, and to ameliorate sport performance.

Finally, we can consider that, for the modern sportsman, the hunger for gaining "hardcore" muscles becomes as pointless as it would have been for a Roman legionnaire or for a gladiator.

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## References

American Dietetic Association, Dietitians of Canada and the American College of Sports Medicine. (2000) Position stand: Nutrition and athletic performance. *Medicine & Science in Sports & Exercise* **32**, 2130-2145.

Schenk, T.L. and Costley, C.D. (2002) When food becomes a drug: Nonanabolic nutritional supplement use in athletics. *American Journal of Sports Medicine* **30**, 907-916.

Cole, C.R., Salvaterra, G.F., Davis, J.E., Borja, M.E., Powell, L.M., Dubbs, E.C. and Bordi, P.L. (2005) Evaluation of dietary practices of National Collegiate Athletic Association Division I football players. *Journal of Strength and Conditioning Research* **19**, 490-494

Hinton, P.S., Sanford, T.C., Davidson, M.M., Yakushko, O.F. and Beck, N.C. (2004) Nutrient intakes and dietary behaviors of male and female collegiate athletes. *International Journal of Sport Nutrition and Exercise Metabolism* **14,** 389-405

Bird, S.P., Tarpenning, K.M. and Marino, F.E. (2006) Independent and combined effects of liquid carbohydrate/essential amino acid ingestion on hormonal and muscular adaptations following resistance training in untrained men. *European Journal of Applied Physiology* **97**, 225-238.

Chromiak, J.A., Smedley, B., Carpenter, W., Brown, R., Koh, Y.S., Lamberth, J.G., Joe, L.A., Abadie, B.R. and Altorfer, G. (2004) Effect of a 10-week strength training program and recovery drink on body composition, muscular strength and endurance, and anaerobic power and capacity. *Nutrition* **20**, 420-427

Rankin, J.W., Goldman, L.P., Puglisi, M.J., Nickols-Richardson, S.M., Earthman, C.P. and Gwazdauskas, F.C. (2004) Effect of postexercise supplement consumption on adaptations to resistance training. *Journal of the American College of Nutrition* **23**, 322-330.

Hoffman J.R., Ratamess N.A., Kang J., Falvo M.J. and Faigenbaum A.D. Effects of protein supplementation on muscular performance and resting hormonal changes in college football players *Journal of Sports Science and Medicine* (2007) 6, 85-92

Kraemer, W.J., Volek, J.S., Bush, J.A., Putukian, M. and Sebastianelli, W.J. (1998) Hormonal responses to consecutive days of heavy resistance exercise with or without nutritional supplementation. *Journal of Applied Physiology* **85**, 1544-1555.

St. Jeor, S.T., Howard, B.V., Prewitt, E., Bovee, V., Bazzarre, T. and Eckel, R.H. (2001) A statement for healthcare professionals from the nutrition committee of the council on nutrition, physical activity, and metabolism of the American Heart Association. *Circulation* **104**, 1869-1874.

Hoffman J.R. and Falvo M.J. Protein – which is the best? International Society of Sports Nutrition Symposium, June 18-19, 2005, Las Vegas NV, USA - Symposium - Macronutrient Utilization During Exercise: Implications For Performance And Supplementation. *Journal of Sports Science and Medicine* (2004) 3, 118-130.