International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	OPTIMAL DAILY PROTEIN INTAKE IN ATHLETES DURING MUSCLE MASS GAIN, FAT LOSS, AND BODY RECOMPOSITION: A LITERATURE REVIEW
DOI	https://doi.org/10.31435/ijitss.3(51).2026.6323
RECEIVED	22 May 2026
ACCEPTED	16 August 2026
PUBLISHED	24 August 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

OPTIMAL DAILY PROTEIN INTAKE IN ATHLETES DURING MUSCLE MASS GAIN, FAT LOSS, AND BODY RECOMPOSITION: A LITERATURE REVIEW

Krystian Kaczmarek *(Corresponding Author, Email: krystiankaczmarek1995@gmail.com)*
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0003-6026-1608

Wiktoria Zawada
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0007-5871-2640

Zofia Jadwiga Leszczyńska
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0009-4584-1130

Vladyslav Romaniuk
Prof. S. T. Dąbrowski Hospital in Puszczykowo S.A., 11 Józefa Ignacego Kraszewskiego Street, 62-040 Puszczykowo, Poland
ORCID ID: 0009-0002-9674-4188

Urszula Szuleta
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0004-1795-7439

Agnieszka Benecka
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0004-9295-7471

Jakub Pietrończyk
University Clinical Hospital in Poznań, Przybyszewskiego 49, 60-355 Poznań, Poland
ORCID ID: 0009-0006-6566-7537

Alicja Benecka
Prof. S. T. Dąbrowski Hospital in Puszczykowo S.A., 11 Józefa Ignacego Kraszewskiego Street, 62-040 Puszczykowo, Poland
ORCID ID: 0009-0000-5110-8028

Maria Dąbrowska
Medical University of Lodz, Aleja T. Kościuszki 4, 90-419 Łódź, Poland
ORCID ID: 0009-0005-6115-0701

Zuzanna Wieczorek
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0005-9952-780X

Iga Tartas
J. Strus City Multispecialty Hospital, Szwajcarska 3, 61-285 Poznań, Poland
ORCID ID: 0009-0007-5602-2259

Natalia Prankiewicz
University Centre of Dentistry and Specialized Medicine, Bukowska 70, 60-812 Poznań, Poland
ORCID ID: 0009-0007-5865-7063

ABSTRACT

Dietary protein plays a key role in training adaptations and body composition regulation, yet recommendations regarding optimal daily protein intake remain inconsistent. The aim of this review was to evaluate current evidence on optimal daily protein intake in athletes and resistance-trained individuals, with particular focus on increasing muscle mass, reducing fat mass, and body recomposition. The review was based on original studies, crossover trials, systematic reviews, meta-analyses, and expert position statements published within the last 15 years and available in PubMed. Studies assessing protein intake under conditions of energy balance, caloric surplus, and energy deficit were included, as well as publications addressing the distribution of protein intake throughout the day, protein source quality, and the long-term safety of high-protein diets. Available data indicate that protein intake should be tailored to the body composition goal. During muscle mass building, approximately 1.6–2.2 g/kg body mass/day appears sufficient to support hypertrophic adaptations and increase lean body mass. Higher intake usually does not provide clear additional anabolic benefits. During fat mass reduction, 1.8–2.4 g/kg body mass/day may more effectively limit muscle mass loss, maintain exercise capacity, and promote favorable body composition changes. For body recomposition, the range of 1.6–2.4 g/kg body mass/day appears most justified, particularly when combined with resistance training and controlled energy intake. Very high protein intake (>3 g/kg body mass/day) may additionally support fat mass reduction and improvement in body composition, but usually does not lead to distinctly greater muscle gains than moderately high intake. Protein intake in athletes should therefore be individualized according to the body composition goal and dietary energy conditions.

KEYWORDS

Protein Intake, Athletes, Body Recomposition, Muscle Mass Gain, Fat Loss, Nutrition

CITATION

Krystian Kaczmarek, Wiktoria Zawada, Zofia Jadwiga Leszczyńska, Vladyslav Romaniuk, Urszula Szuleta, Agnieszka Benecka, Jakub Pietrończyk, Alicja Benecka, Maria Dąbrowska, Zuzanna Wieczorek, Iga Tartas, Natalia Prankiewicz. (2026) Optimal Daily Protein Intake in Athletes During Muscle Mass Gain, Fat Loss, and Body Recomposition: a Literature Review. *International Journal of Innovative Technologies in Social Science*. 3(51). doi: 10.31435/ijitss.3(51).2026.6323

Introduction

Protein is a fundamental macronutrient essential for the proper functioning of the human body. It performs a structural role, participates in the synthesis of enzymes, hormones, transport proteins, and components of the immune system, and also plays an important role in maintaining homeostasis, tissue regeneration, and remodeling of body structures. It is of particular importance in relation to skeletal muscles, as it underpins the processes of repair, renewal, and adaptation to exercise that occur in response to physiological loading (Elango et al., 2010; Humayun et al., 2007; Rand et al., 2003; Trumbo et al., 2002).

In healthy individuals who do not engage in regular physical activity, recommended protein intake is primarily intended to prevent deficiency and maintain nitrogen balance. Classical nutritional standards define the basic requirement at approximately 0.8 g/kg body weight/day, although some more recent analyses suggest that actual metabolic needs may be slightly higher in certain populations. Not only the total amount of protein consumed during the day is important, but also its quality, digestibility, essential amino acid content, particularly leucine, and the way in which protein intake is distributed throughout the day (Elango et al., 2010; Humayun et al., 2007; Rand et al., 2003; Trumbo et al., 2002; Weiler et al., 2023).

In physically active individuals and athletes, protein requirements are higher due to increased whole-body protein turnover, the need for post-exercise recovery, and the support of training adaptations. Contemporary expert position stands and interventional studies indicate that the traditional ranges recommended for the general population may be insufficient during periods aimed at improving body composition. This applies particularly to muscle mass gain, fat loss, and body recomposition, in which adequate protein intake constitutes one of the key elements of nutritional strategy (Aragon et al., 2017; Campbell et al., 2007; Hector & Phillips, 2018; Helms et al., 2014; Phillips & Van Loon, 2011; Thomas et al., 2016).

Despite the growing number of studies, it has still not been clearly established what daily protein intake is optimal depending on physique-related goals and energy conditions. The rationale for the use of very high protein doses, the importance of energy balance, and the role of protein distribution throughout the day all remain subjects of discussion. Therefore, the aim of this review is to provide a structured presentation of the current evidence regarding optimal daily protein intake in athletes and resistance-trained individuals, with particular emphasis on muscle mass gain, fat loss, and body recomposition (Antonio et al., 2024; Aragon et al., 2017; Gomaa et al., 2022; Hector & Phillips, 2018; Hiroux et al., 2022; Longland et al., 2016).

Muscle mass gain

During periods focused on increasing muscle mass, adequate protein intake represents one of the basic elements supporting hypertrophic adaptations and increases in lean body mass. Previous studies indicate that in physically active and resistance-trained individuals, protein intake clearly exceeding the level recommended for the general population promotes greater stimulation of muscle protein synthesis and improves the effects of resistance training (Campbell et al., 2007; Cermak et al., 2012; Phillips & Van Loon, 2011).

Available data suggest that under conditions of a positive or at least neutral energy balance, optimal protein intake during a muscle gain phase falls within the range of approximately 1.6–2.2 g/kg body weight/day. Within this range, the most favorable conditions for supporting muscular hypertrophy are observed, whereas further increases in protein intake above this level rarely lead to clearly greater gains in lean body mass (Antonio et al., 2014; Antonio et al., 2015; Bagheri et al., 2023; Cermak et al., 2012; Phillips & Van Loon, 2011).

Interventional studies conducted in resistance-trained individuals have shown that very high protein intake may be well tolerated; however, no clear additional benefits have been demonstrated compared with a moderately high intake. In some studies, greater protein intake was associated rather with a more favorable effect on fat loss than with a significantly greater increase in muscle mass. This suggests that once a certain threshold is exceeded, further increases in protein intake do not translate into proportionally greater hypertrophic effects (Antonio et al., 2014; Antonio et al., 2015; Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016).

During a muscle gain phase, high protein intake alone is not sufficient if it is not accompanied by appropriate energy availability and a properly programmed resistance training regimen. Energy surplus, adequate training volume, and regular muscular stimulation remain key conditions for effective muscle mass gain, whereas protein plays a supportive role and enables an optimal adaptive response (Antonio et al., 2015; Garthe et al., 2011; Phillips & Van Loon, 2011; Thomas et al., 2016).

Fat loss

During periods of fat loss, adequate protein intake plays a particularly important role because an energy deficit increases the risk of losing lean body mass and contributes to impaired exercise capacity. Under such conditions, higher protein intake may help preserve muscle mass, enhance satiety, and promote more favorable changes in body composition (Hiroux et al., 2022; Longland et al., 2016; Mettler et al., 2010; Pasiakos et al., 2013).

The literature indicates that during a negative energy balance, protein intake should be higher than during a muscle gain phase. In most publications, the most justified range lies between 1.8 and 2.4 g/kg body weight/day, although in some situations these values may be even higher, especially in individuals with low body fat levels or under a deeper energy deficit (Hector & Phillips, 2018; Helms et al., 2014; Mettler et al., 2010; Ogilvie et al., 2022; Pasiakos et al., 2013).

Interventional studies have shown that higher protein intake during body mass reduction more effectively limits the loss of lean body mass compared with diets containing a moderate or low amount of protein. Additionally, greater fat loss and better maintenance of exercise capacity have been observed, particularly in physically active and resistance-trained individuals. This suggests that adequately high protein intake is an important component of protecting muscle mass under conditions of energy deficit (Hiroux et al., 2022; Longland et al., 2016; Mettler et al., 2010; Ogilvie et al., 2022; Pasiakos et al., 2013).

The magnitude of the energy deficit is also important. The greater the reduction in energy intake, the greater the risk of muscle mass loss, which justifies shifting protein intake toward the upper end of the recommended range. In resistance-trained individuals using a more aggressive fat loss strategy, higher protein intake may therefore be particularly beneficial for maintaining training quality, recovery, and the preservation of lean body mass (Hector & Phillips, 2018; Helms et al., 2014; Mettler et al., 2010; Pasiakos et al., 2013).

Body recomposition

Body recomposition refers to the simultaneous reduction of fat mass and the maintenance or increase of muscle mass. It is a more complex goal than fat loss or muscle gain alone because it requires the combination of processes that, in metabolic practice, often occur under different energy conditions (Hector & Phillips, 2018; Longland et al., 2016; Nunes et al., 2022).

Available studies indicate that under conditions of body recomposition, adequate protein intake is of particular importance for the protection of lean body mass and the support of training adaptations. The range most commonly considered justified is approximately 1.6–2.4 g/kg body weight/day, especially when body recomposition is conducted alongside regular resistance training (Bagheri et al., 2023; Hector & Phillips, 2018; Longland et al., 2016; Nunes et al., 2022).

Achieving body recomposition appears to be most realistic in beginners, individuals returning to training after a break, and those with a higher initial body fat level. In these groups, appropriately selected training and protein intake may promote simultaneous improvement in body composition, even without a clear energy surplus. In more highly trained individuals, achieving such an effect tends to be more difficult and usually requires better control of both energy intake and total protein intake (Garthe et al., 2011; Longland et al., 2016; Nunes et al., 2022).

Available data also suggest that, under conditions of body recomposition, the benefits of higher protein intake arise mainly from better protection of muscle mass and enhanced recovery rather than from a clearly faster rate of muscle gain. For this reason, appropriately high protein intake should be regarded as one of the basic elements of a nutritional strategy aimed at improving body composition (Bagheri et al., 2023; Hector & Phillips, 2018; Nunes et al., 2022).

Factors modifying the effectiveness of protein intake: distribution throughout the day and source quality

Total daily protein intake remains the most important factor determining the effectiveness of a nutritional strategy. However, the distribution of protein intake throughout the day and the quality of selected protein sources are also of considerable importance. The literature indicates that an even distribution of protein intake across several meals may promote stimulation of muscle protein synthesis compared with an uneven intake pattern, especially when most of the protein is consumed in a single meal (Campbell et al., 2007; Hector & Phillips, 2018; Phillips & Van Loon, 2011; Weiler et al., 2023).

An intake of approximately 0.25–0.40 g protein/kg body weight per meal is most commonly recommended, usually every 3–4 hours, which helps maintain a regular availability of amino acids and supports recovery and adaptive processes. Protein intake in the peri-workout period may also be relevant; however, available data suggest that when total daily protein intake is sufficiently high, the role of timing itself is smaller than previously assumed (Campbell et al., 2007; Phillips & Van Loon, 2011; Weiler et al., 2023).

Another important issue is the quality of protein sources. Proteins characterized by good digestibility and a high content of essential amino acids, especially leucine, appear to support muscle protein synthesis more effectively. This mainly concerns animal-based sources such as whey, dairy products, eggs, and meat. A properly planned diet based on plant sources may also meet protein requirements, provided that the lower content of some amino acids and their reduced digestibility are taken into account (Campbell et al., 2007; Phillips & Van Loon, 2011; Thomas et al., 2016; Weiler et al., 2023).

This means that, when evaluating optimal daily protein intake, one should not rely solely on its total amount. The distribution of protein intake throughout the day and the selection of protein sources are also important. These factors may influence the efficiency of protein utilization during muscle gain, fat loss, and body recomposition (Campbell et al., 2007; Hector & Phillips, 2018; Phillips & Van Loon, 2011; Weiler et al., 2023).

Safety of high-protein diets

The safety of high-protein diets remains one of the most frequently discussed issues in the context of sports nutrition. Concerns primarily relate to the potential adverse effects of excessive protein intake on kidney function, liver function, water-electrolyte balance, and bone metabolism. Available data nevertheless indicate that in healthy, physically active individuals, higher protein intake, including intake exceeding 2.0 g/kg body weight/day, is generally well tolerated (Antonio et al., 2014; Antonio et al., 2015; Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024).

Studies conducted in resistance-trained individuals have not shown that high-protein diets used for periods ranging from several weeks to one year lead to significant deterioration in kidney or liver function. There is also no clear evidence of an adverse effect of such protein intake on bone mineral density in healthy individuals (Antonio et al., 2014; Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024).

Doubts concerning the safety of such diets often arise from extrapolating observations from clinical populations with pre-existing impairment of the above-mentioned organs to healthy individuals. It should be emphasized that in individuals with pre-existing kidney disease, liver disease, or other metabolic disorders, high protein intake may require individualized assessment and greater caution. In athlete populations without significant health burdens, current data do not confirm that a high-protein diet per se constitutes a risk factor for kidney or liver damage (Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024; Franzke et al., 2025).

Adequate hydration and overall diet quality are also important elements. High protein intake should not be considered in isolation from total energy intake, fluid consumption, and the intake of other nutrients. Available data indicate that, in the context of a properly balanced diet and the absence of clinical contraindications, the use of high protein intake in healthy athletes may be regarded as a relatively safe strategy. Monitoring of basic laboratory parameters remains justified in individuals following such strategies over a longer period of time (Antonio et al., 2015; Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024).

Conclusions

Based on the conducted literature review, it can be concluded that optimal daily protein intake in physically active individuals and athletes should be tailored to the training goal and energy conditions. During a muscle gain phase, the most justified range appears to be approximately 1.6–2.2 g/kg body weight/day, whereas under conditions of fat loss and body recomposition, an intake of 1.8–2.4 g/kg body weight/day may be more beneficial (Antonio et al., 2014; Antonio et al., 2015; Bagheri et al., 2023; Cermak et al., 2012; Hector & Phillips, 2018; Helms et al., 2014; Hiroux et al., 2022; Longland et al., 2016; Mettler et al., 2010; Ogilvie et al., 2022; Pasiakos et al., 2013; Phillips & Van Loon, 2011).

Available studies do not clearly confirm that routinely exceeding these values leads to significantly greater increases in muscle mass. Very high protein intake may contribute to improvements in body composition, especially under conditions of energy deficit (Antonio et al., 2014; Antonio et al., 2015; Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024; Bagheri et al., 2023; Hector & Phillips, 2018).

The effectiveness of achieving a given physique-related goal is determined not only by total daily protein intake but also by the distribution of protein intake throughout the day and the quality of protein sources. An even distribution of protein across several meals and the selection of products with a high content of essential amino acids may contribute to more efficient utilization of protein in recovery and adaptive processes (Campbell et al., 2007; Hector & Phillips, 2018; Phillips & Van Loon, 2011; Thomas et al., 2016; Weiler et al., 2023).

In healthy, physically active individuals, the use of high-protein diets appears to be generally safe; however, in those with pre-existing impairment of kidney function, liver function, or other metabolic disorders, individualized clinical assessment is required. Further studies involving women, endurance athletes, and long-term interventions are needed to more precisely determine optimal protein intake in different trained populations (Antonio, Ellerbroek, Silver, Vargas, & Peacock, 2016; Antonio, Ellerbroek, Silver, Vargas, Tamayo, et al., 2016; Antonio et al., 2024; Franzke et al., 2025; Garthe et al., 2011; Hector & Phillips, 2018).

Author's contribution:
Conceptualization: Krystian Kaczmarek, Wiktoria Zawada, Zofia Jadwiga Leszczyńska
Methodology: Iga Tartas, Natalia Prankiewicz
Investigation: Alicja Benecka, Agnieszka Benecka
Software: Jakub Pietrończyk, Maria Dąbrowska
Check: Vladyslav Romaniuk, Urszula Szuleta
Formal analysis: Zuzanna Wieczorek, Zofia Jadwiga Leszczyńska
Resources: Krystian Kaczmarek
Data curation: Wiktoria Zawada, Jakub Pietrończyk, Maria Dąbrowska
Writing- rough preparation: Krystian Kaczmarek, Wiktoria Zawada, Zofia Jadwiga Leszczyńska, Vladyslav Romaniuk, Maria Dąbrowska, Urszula Szuleta, Agnieszka Benecka, Jakub Pietrończyk, Alicja Benecka, Zuzanna Wieczorek, Iga Tartas, Natalia Prankiewicz
Supervision: Krystian Kaczmarek

All authors have read and agreed with the published version of the manuscript.
Funding Statement: The study did not receive special funding.
Conflict of Interest Statement: No conflicts of interest to declare.
Declaration of the use of generative AI and AI-assisted technologies in the writing process: In preparing this work, the authors used ChatGPT for the purpose to improve language and readability, text formatting and basic data analysis. After using this tool/service, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

REFERENCES

1. Antonio, J., Ellerbroek, A., Silver, T., Orris, S., Scheiner, M., Gonzalez, A., & Peacock, C. A. (2015). A high protein diet (3.4 g/kg/d) combined with a heavy resistance training program improves body composition in healthy trained men and women: A follow-up investigation. *Journal of the International Society of Sports Nutrition, 12*, Article 39. https://doi.org/10.1186/s12970-015-0100-0
2. Antonio, J., Ellerbroek, A., Silver, T., Vargas, L., & Peacock, C. (2016). The effects of a high protein diet on indices of health and body composition: A crossover trial in resistance-trained men. *Journal of the International Society of Sports Nutrition, 13*(1), Article 3. https://doi.org/10.1186/s12970-016-0114-2
3. Antonio, J., Ellerbroek, A., Silver, T., Vargas, L., Tamayo, A., Buehn, R., & Peacock, C. A. (2016). A high protein diet has no harmful effects: A one-year crossover study in resistance-trained males. *Journal of Nutrition and Metabolism, 2016*, Article 9104792. https://doi.org/10.1155/2016/9104792
4. Antonio, J., Evans, C., Ferrando, A. A., Stout, J. R., Antonio, B., Cintineo, H. P., Harty, P., Arent, S. M., Candow, D. G., Forbes, S. C., Kerksick, C. M., Pereira, F., Gonzalez, D., & Kreider, R. B. (2024). Common questions and misconceptions about protein supplementation: What does the scientific evidence really show? *Journal of the International Society of Sports Nutrition, 21*(1), Article 2341903. https://doi.org/10.1080/15502783.2024.2341903
5. Antonio, J., Peacock, C. A., Ellerbroek, A., Fromhoff, B., & Silver, T. (2014). The effects of consuming a high protein diet (4.4 g/kg/d) on body composition in resistance-trained individuals. *Journal of the International Society of Sports Nutrition, 11*, Article 19. https://doi.org/10.1186/1550-2783-11-19
6. Aragon, A. A., Schoenfeld, B. J., Wildman, R., Kleiner, S., VanDusseldorp, T., Taylor, L., Earnest, C. P., Arciero, P. J., Wilborn, C., Kalman, D. S., Stout, J. R., Willoughby, D. S., Campbell, B., Arent, S. M., Bannock, L., Smith-Ryan, A. E., & Antonio, J. (2017). International Society of Sports Nutrition position stand: Diets and body composition. *Journal of the International Society of Sports Nutrition, 14*, Article 16. https://doi.org/10.1186/s12970-017-0174-y
7. Bagheri, R., Kargarfard, M., Sadeghi, R., Scott, D., & Camera, D. M. (2023). Effects of 16 weeks of two different high-protein diets with either resistance or concurrent training on body composition, muscular strength and performance, and markers of liver and kidney function in resistance-trained males. *Journal of the International Society of Sports Nutrition, 20*(1), Article 2236053. https://doi.org/10.1080/15502783.2023.2236053
8. Campbell, B., Kreider, R. B., Ziegenfuss, T., La Bounty, P., Roberts, M., Burke, D., Landis, J., Lopez, H., & Antonio, J. (2007). International Society of Sports Nutrition position stand: Protein and exercise. *Journal of the International Society of Sports Nutrition, 4*, Article 8. https://doi.org/10.1186/1550-2783-4-8
9. Cermak, N. M., Res, P. T., de Groot, L. C. P. G. M., Saris, W. H. M., & van Loon, L. J. C. (2012). Protein supplementation augments the adaptive response of skeletal muscle to resistance-type exercise training: A meta-analysis. *The American Journal of Clinical Nutrition, 96*(6), 1454–1464. https://doi.org/10.3945/ajcn.112.037556

10. Elango, R., Humayun, M. A., Ball, R. O., & Pencharz, P. B. (2010). Evidence that protein requirements have been significantly underestimated. *Current Opinion in Clinical Nutrition and Metabolic Care, 13*(1), 52–57. https://doi.org/10.1097/MCO.0b013e32833370f0
11. Franzke, B., Maierhofer, R., & Putz, P. (2025). Protein intake, physical performance and body composition in master athletes: A short scoping review. *Nutrients, 17*(3), Article 498. https://doi.org/10.3390/nu17030498
12. Garthe, I., Raastad, T., Refsnes, P. E., Koivisto, A., & Sundgot-Borgen, J. (2011). Effect of two different weight-loss rates on body composition and strength and power-related performance in elite athletes. *International Journal of Sport Nutrition and Exercise Metabolism, 21*(2), 97–104. https://doi.org/10.1123/ijsnem.21.2.97
13. Gomaa, M. A. E., Allam, M. G., Haridi, A. A. I. M., Eliwa, A.-E. M., & Darwish, A. M. G. (2022). High-protein concentrated pro-yogurt (Pro-WPI) enriched with whey protein isolate improved athletic anemia and performance in a placebo-controlled study. *Frontiers in Nutrition, 8*, Article 788446. https://doi.org/10.3389/fnut.2021.788446
14. Hector, A. J., & Phillips, S. M. (2018). Protein recommendations for weight loss in elite athletes: A focus on body composition and performance. *International Journal of Sport Nutrition and Exercise Metabolism, 28*(2), 170–177. https://doi.org/10.1123/ijsnem.2017-0273
15. Helms, E. R., Aragon, A. A., & Fitschen, P. J. (2014). Evidence-based recommendations for natural bodybuilding contest preparation: Nutrition and supplementation. *Journal of the International Society of Sports Nutrition, 11*, Article 20. https://doi.org/10.1186/1550-2783-11-20
16. Hiroux, C., Schouten, M., de Glisezinski, I., Simon, C., Crampes, F., Hespel, P., & Koppo, K. (2022). Effect of increased protein intake and exogenous ketosis on body composition, energy expenditure and exercise capacity during a hypocaloric diet in recreational female athletes. *Frontiers in Physiology, 13*, Article 1063956. https://doi.org/10.3389/fphys.2022.1063956
17. Humayun, M. A., Elango, R., Ball, R. O., & Pencharz, P. B. (2007). Reevaluation of the protein requirement in young men with the indicator amino acid oxidation technique. *The American Journal of Clinical Nutrition, 86*(4), 995–1002. https://doi.org/10.1093/ajcn/86.4.995
18. Longland, T. M., Oikawa, S. Y., Mitchell, C. J., Devries, M. C., & Phillips, S. M. (2016). Higher compared with lower dietary protein during an energy deficit combined with intense exercise promotes greater lean mass gain and fat mass loss: A randomized trial. *The American Journal of Clinical Nutrition, 103*(3), 738–746. https://doi.org/10.3945/ajcn.115.119339
19. Mettler, S., Mitchell, N., & Tipton, K. D. (2010). Increased protein intake reduces lean body mass loss during weight loss in athletes. *Medicine & Science in Sports & Exercise, 42*(2), 326–337. https://doi.org/10.1249/MSS.0b013e3181b2ef8e
20. Nunes, E. A., Colenso-Semple, L., McKellar, S. R., Yau, T., Ali, M. U., Fitzpatrick-Lewis, D., Sherifali, D., Gaudichon, C., Tomé, D., Atherton, P. J., Camprubi Robles, M., Naranjo-Modad, S., Braun, M., Landi, F., & Phillips, S. M. (2022). Systematic review and meta-analysis of protein intake to support muscle mass and function in healthy adults. *Scientific Reports, 12*, Article 14340. https://doi.org/10.1038/s41598-022-18632-2
21. Ogilvie, A. R., Schlussel, Y., Sukumar, D., Meng, L., & Shapses, S. A. (2022). Higher protein intake during caloric restriction improves diet quality and attenuates loss of lean body mass. *Obesity, 30*(7), 1411–1419. https://doi.org/10.1002/oby.23428
22. Pasiakos, S. M., Cao, J. J., Margolis, L. M., Sauter, E. R., Whigham, L. D., McClung, J. P., Rood, J. C., Carbone, J. W., Combs, G. F., Jr., & Young, A. J. (2013). Effects of high-protein diets on fat-free mass and muscle protein synthesis following weight loss: A randomized controlled trial. *The FASEB Journal, 27*(9), 3837–3847. https://doi.org/10.1096/fj.13-230227
23. Phillips, S. M., & Van Loon, L. J. C. (2011). Dietary protein for athletes: From requirements to optimum adaptation. *Journal of Sports Sciences, 29*(Suppl. 1), S29–S38. https://doi.org/10.1080/02640414.2011.619204
24. Rand, W. M., Pellett, P. L., & Young, V. R. (2003). Meta-analysis of nitrogen balance studies for estimating protein requirements in healthy adults. *The American Journal of Clinical Nutrition, 77*(1), 109–127. https://doi.org/10.1093/ajcn/77.1.109
25. Thomas, D. T., Erdman, K. A., & Burke, L. M. (2016). Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and athletic performance. *Journal of the Academy of Nutrition and Dietetics, 116*(3), 501–528. https://doi.org/10.1016/j.jand.2015.12.006
26. Trumbo, P., Schlicker, S., Yates, A. A., & Poos, M. (2002). Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids. *Journal of the American Dietetic Association, 102*(11), 1621–1630. https://doi.org/10.1016/S0002-8223(02)90346-9
27. Weiler, M., Hertzler, S. R., & Dvoretskiy, S. (2023). Is it time to reconsider the U.S. recommendations for dietary protein and amino acid intake? *Nutrients, 15*(4), Article 838.