Preserving or increasing muscle mass (e.g., weight training, using weight or increasing skeletal muscle mass and strength) has been shown to stimulate muscle protein synthesis and is also consumed. Dairy foods are the richest source of leucine. This protein in particular is the most critical for muscle protein synthesis.

CONCLUSION

The emerging beneficial role of dairy protein in preserving or increasing muscle mass in physically active adults provides another important reason (i.e., beyond the well-recognized benefits for bone health) to consume three daily servings of dairy foods, as recommended by the 2005 Dietary Guidelines for Americans.

REFERENCES

11. предостережение: Необходимо обратить внимание на то, что эти данные могут быть обновлены.

ACKNOWLEDGMENTS

National Dairy Council, assured responsibility for the composition and content of this article. The journal is committed to maintaining high standards of quality and ethics in the publication of scientific research.

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SUMMARY

In recent years, considerable research has focused on protein intake in maintaining or increasing muscle mass and improving body composition (increasing muscle mass and decreasing body fat). This is particularly important for physically active people as a means to improve performance and for older adults to help prevent sarcopenia (age-related skeletal muscle wasting). Both resistance exercise (e.g., weight training, using machines and resistance bands [weightlifting]) and aerobic exercise (e.g., running, jogging, and cycling) are also important in forming and maintaining muscle mass as well as in being able or equally effective in improving body composition. Emerging evidence shows that dairy protein has beneficial effects on body composition.

Dairy protein intake promotes muscle hypertrophy (i.e., increase in muscle fiber size), but not gain in muscle mass is only possible if an adequate intake of high-quality protein is also consumed. Dairy foods are an excellent source of the highest-quality protein (88% casein and 20% whey) and are rich in essential amino acids that humans require for growth and development in proportions that are similar to muscle tissue.

Additional research is needed to clarify dairy protein benefits for physically active adults and in helping to prevent sarcopenia. However, findings to date provide a reason to consume three daily servings of dairy foods, as recommended by the 2005 Dietary Guidelines for Americans.
Muscle protein degradation after resistance exercise may participate in resistance exercise compared to non-exercising control subjects (2,3,11,12). This function can be limited by maintaining physical activity, increasing their intake of protein, consuming a diet rich in protein, and taking supplements containing sarcopenia in older adults.

The Recommended Dietary Allowance (RDA) for dietary protein for adults aged 19 years and older is 0.8 grams per kilogram body weight (10). Eight grams of protein is generally recommended for sedentary adults (11). The AMDR (adequate intake to minimum dietary requirement) for dietary protein for older adults is 0.8 grams per kilogram body weight, which is less than the RDA (10). This difference is due to the amino acid composition of the protein consumed. Dairy proteins, particularly whey and casein, may be better protein sources for persons with compromised muscle mass, such as older adults (41).

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Muscle protein degradation after resistance exercise may positively influence muscle protein synthesis and result in an ultimately positive physiological performance (1). This DietPon provides an overview of protein intake and the influence of protein or essential amino acids on muscle protein synthesis and degradation. Protein intake is a critical component of resistance exercise. The recommended dietary allowance (RDA) for daily protein intake is based on the amount required to maintain body mass and promote growth in children and adolescents (2,3). Protein intake is particularly important for athletes involved in resistance exercise (e.g., weight lifting) who are trying to increase muscle mass (4). In addition to differences in protein intake, the type or source of protein consumed is also important. Not only the amount of protein but also the quality of protein consumed can influence the results from resistance exercise (2,3,11,12).

Muscle hypertrophy occurs when protein undergoes constant change and remains so until protein is consumed in negative protein balance, albeit less than that occurring within skeletal muscle during exercise (3). The negative protein balance increases, resulting in a positive net protein balance (i.e., lean body mass gain). Exercise training is known to potentially increase muscle mass and strength (1,4). In addition to differences in protein intake or essential amino acid requirements, dietary protein intake and physical activity may influence muscle protein synthesis and degradation. Several studies have shown that dietary protein intake and physical activity affect muscle mass (5-8). Furthermore, muscle protein synthesis increases and is faster than the rate of protein degradation in response to resistance exercise (9,10). The researchers (42) speculated that muscle mass influence is likely due to the muscle fiber type shifts that occur during the training period, with the greatest increase seen in the muscle fibers that participate in resistance exercise.

Adequate intake of high-quality protein combined with resistance exercise can increase muscle mass and promote the loss of fat mass (i.e., improve body composition).

Dairy foods are a source of high-quality protein and whey which provide all the essential amino acids required for independently synthesizing muscle.

Muscle protein synthesis increases and is faster than that occurring within skeletal muscle during exercise (3). The negative protein balance increases, resulting in a positive net protein balance (i.e., lean body mass gain). Exercise training is known to potentially increase muscle mass and strength (1,4). In addition to differences in protein intake or essential amino acid requirements, dietary protein intake and physical activity may influence muscle protein synthesis and degradation. Several studies have shown that dietary protein intake and physical activity affect muscle mass (5-8). Furthermore, muscle protein synthesis increases and is faster than the rate of protein degradation in response to resistance exercise (9,10). The researchers (42) speculated that muscle mass influence is likely due to the muscle fiber type shifts that occur during the training period, with the greatest increase seen in the muscle fibers that participate in resistance exercise. Participants in the muscle group gained nearly 40% more muscle mass than the soy protein group (1.6 pounds vs. 1.2 pounds). The soy group gained nearly 30% more muscle mass than the carbohydrate only group (0.4 pounds). Muscle mass gains in the placebo group were not significant (0.1 pounds). The researchers (42) speculated that muscle mass influence is likely due to the muscle fiber type shifts that occur during the training period, with the greatest increase seen in the muscle fibers that participate in resistance exercise.
muscle protein degradation after resistance exercise may positively influence muscle mass. All proteins are not created equal, and the type or source of protein consumed is influenced by external factors such as the time frame between meals, muscle protein synthesis and ultimately physical performance (1.6).

To explain in large part its role in maintaining muscle mass, dairy foods are an excellent source of high-quality protein. In the average American diet, dairy protein is one of the best sources of leucine, a branched chain amino acid shown to independently stimulate muscle protein synthesis.

The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8). The Acceptable Macronutrient Distribution Range (AMDR) for protein is 10 to 35% of total calories for adults over 10 years of age (8).


Dairy proteins and prevention of sarcopenia

Both strength training and an adequate intake of high-quality protein help to preserve muscle tissue during aging. (2,4,13) Insufficient protein intake in older adults can lead to low muscle mass, a core process in sarcopenia (2,4,13). Although the amount of protein to prevent or offset the progression of sarcopenia has not yet been established (10), recent findings suggest that protein intakes modestly above the present RDA of 0.8g/kg body weight (i.e., 1g/kg body weight) or higher enhance muscle mass in older adults who regularly perform resistance exercise (2,31,32). Protein intake in older adults who do not perform resistance exercise was associated with better preservation of muscle mass compared to protein intake in sedentary older adults. (20) Additional support for the role of protein in maintaining muscle mass comes from dietary surveys of healthy recreational body builders, whey protein isolate was shown to improve energy expenditure (20). Another investigation found that protein along with resistance exercise resulted in a greater increase in muscle mass compared to a carbohydrate only beverage in eight healthy resistance-trained (80 kg body mass, a core process in sarcopenia) young men (51). In a 12-week, double-blind study of 15 recreationally body building, whey protein isolate was shown to improve body composition (i.e., increase lean body mass). (20) These findings support the notion that consuming whey protein isolate may help to slow the loss of muscle that is associated with aging. 

STUDIES REPORTED A MODERATELY INCREASED PROTEIN INTAKE

Studies report that whey protein is most effective in augmenting the effects of resistance exercise when consumed within an hour or so before or after exercise (67,71). 

CONCLUSION

The emerging beneficial role of dairy proteins in preserving or increasing muscle mass in physically active adults provides another important reason (i.e., beyond the well-recognized benefits for bone) to consider three daily servings of dairy foods, as recommended by the 2005 Dietary Guidelines for Americans (2).
studies report that whey protein is most beneficial in men (22). A recent investigation demonstrated a greater increase in lean body mass and muscle strength following 10 weeks of resistance training and intake of 20 g protein (14 g whey and casein protein) free amino acids consumed one hour before and after exercise compared to a carbohydrate placebo (52).

Another investigation found that consuming a breakfast meal with a small amount of whey protein (15 g) with carbohydrate (21 g) following an exercise bout resulted in a greater increase in muscle protein synthesis compared to a carbohydrate-only breakfast in eight healthy, resistance-trained (highly fit) young men (51). In a 12-week, double-blind study of 15 recreational body builders, whey protein isolate was shown to improve body composition (i.e., increase lean body mass and decrease body fat) compared to a control group (21), indicating that whey protein may improve body composition in physically active individuals. However, this was achieved with equivalent protein consumption (21). Additional support for the benefits of whey protein (with or without creatine) on body composition, muscle fiber size, and muscle strength was provided by findings from a subsequent study in 26 resistance-trained men (22).

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Dairy Proteins and Preservation of Sarcopenia

Both strength training and an adequate intake of high-quality protein help to preserve muscle tissue during aging (22,24-35). Insufficient protein intake in older adults can lead to the loss of muscle, a core process in sarcopenia (23,34-35). Although the optimal amount of protein to prevent or offset the progression of sarcopenia has not yet been established (50), research findings suggest that protein intake might modestly above the present RDA of 0.8 g/kg body weight (i.e., 1 g/kg body weight for older adults who regularly perform resistance exercise) (2,3,32). Protein intake in older adults has been shown to reduce sarcopenia (2,3,54,55). Although the optimal amount of protein to prevent or offset the progression of sarcopenia has not yet been established (50), research findings suggest that protein intake might improve muscle protein synthesis compared to a carbohydrate placebo (52). A recent investigation demonstrated a greater increase in lean body mass and muscle strength following 10 weeks of resistance training and intake of 20 g protein (14 g whey and casein protein) free amino acids consumed one hour before and after exercise compared to a carbohydrate placebo (52).

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The emerging beneficial role of dairy protein in preserving and improving body composition (increasing muscle mass and decreasing body fat) is particularly important for physically active older adults to maintain physical performance and for older adults to help prevent sarcopenia (age-related muscle wasting). Both resistance exercise (i.e., weight training, using weights, machines and resistance (band workouts) along with adequate protein ingestion (defined by the Acceptable Macronutrient Distribution Range, AMDR) of 10 to 35% of total energy) are strategies to maintain and build muscle in older adults. Exercise is an effective way to improve body building (muscle mass) and may be more effective in improving body composition (muscle mass) than just dieting. Research has demonstrated that dairy protein has beneficial effects on body composition.

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