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Physical activity and protein requirement

Körperliche Aktivität und Proteinbedarf

Physical activity is not only related to muscle contraction, but also exerts its influence on all organs of an organism and causes some perturbations in the metabolic pathways. Although carbohydrate and fat are the main energy substrates for muscular work, the importance and the role of protein breakdown, amino acid oxidation and optimum dietary protein intake for the physically active remain as yet unclear. In several countries, including Poland, recommended dietary protein allowances for workers performing every day activities ranging from moderate to heavy intensity are still higher by about 30-70% compared with recommendation for people who lead a sedentary lifestyle.

In studies conducted in rats, we found an increase not only in the level of plasma urea, but also in the autolytic activity of cathepsin D in all tissues brought about by systematic physical training on a treadmill. On the other hand, physical activity did not affect nitrogen balance. However, nitrogen digestibility decreased in control rats compared to their trained counterparts. This was a result of better and efficient utilization of digested protein by trained rats. In other series of studies we have found that rats maintained on a high-protein diet are characterized by a higher activity of iodinated peroxidase in the thyroid as well as higher plasma level of thyroxine and reverse triiodothyronine and lower activity of iodothyronine deiodinase in the liver and lower concentration of triiodothyronine in peripheral blood compared to rats maintained on a low protein diet. Exercise training conducted at a moderate intensity over a period of 7 weeks on a treadmill did not result in any change in the activity of iodothyronine deiodinase in the liver of rats analysed 24 hours after the last bout of exercise. However, the exercise protocol decreased the activity of thyroid peroxidase as well as the concentration of plasma thyroxine (in rats maintained on a high-protein diet) and also caused a decrease in the concentration of triiodothyronine in animals fed low protein diet.

In experiments carried out in rats and young adult men, we have found that higher protein level in the diet increased the rate of resting metabolic rate and the energy cost of physical activity, but did not improve the overall performance of participants (strength and quickness of stroke in students participating in karate exercises and tournaments did not change) and also failed to increase VO_2 max in rowers.

In other studies, we have observed that systematic exercise training did not influence the incorporation of dietary ^{15}N, nor its disappearance from particular tissues in rats.

To sum up,. we are persuaded to conclude that exercise training per se does not increase protein requirements in humans. So recommended dietary protein allowances in my country Poland needs to be changed.

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