

Competition preparation temporarily lowers resting energy expenditure in physique athletes

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A study conducted at the Faculty of Sport and Health Sciences at the University of Jyväskylä (Finland) found that the reduction in resting

energy expenditure of physique athletes during their preparation for competitions was due, at the least, to reduced energy intake as well as to lower levels of thyroid hormone T3 and lower resting heart rate. These changes were restored within five months. There was little difference between the sexes.

As they prepare for competitions, physique athletes aim to reduce body fat while maintaining [muscle mass](#). This can affect the athlete's [energy expenditure](#) at rest, that is, their resting metabolic rate, and the amount of hormones that regulate hunger.

In a study conducted at the University of Jyväskylä's Faculty of Sport and Health Sciences, male and female physique athletes were thoroughly tested before and after a five-month [competition](#) diet and about five months after competition. The [control group](#) consisted of physique athletes who did not pursue [weight loss](#) or prepare for competitions.

According to the researchers, the weight loss achieved with the competition diet was the result of the fitness athletes' reduced energy intake and increased aerobic exercise.

"The competition diet temporarily reduced the physique athletes' resting energy expenditure," says Ville Isola from the Faculty of Sport and Health Sciences, who is working on his dissertation on fitness and physique sports. "The change was greater than what could be predicted from the reduction in body weight and fat or lean mass alone, in which case it can be referred to as adaptive thermogenesis.

"Resting energy expenditure consists of essential body functions, such as the functions of muscles and organs including the brain and liver. So the body adapts to the energy deficit caused by weight loss by reducing the body's resting energy expenditure, which can further complicate weight loss for fitness athletes."

Resting energy expenditure was reduced in both men and women, and no differences were found between the sexes. According to the research team, the decrease in resting energy expenditure was presumably due, at the least, to reduced [energy intake](#) as well as to lower levels of thyroid hormone T3 and lower resting heart rate. All these changes were restored within five months.

However, a temporary decrease in resting energy expenditure can make it difficult for a fitness athlete to compete. Isola and senior researchers Juha Ahtiainen and Juha Hulmi in the research team point out that this type of long-term and large-scale weight loss is rarely pursued in other sports.

The study also found that, for both sexes, the competitors' [body fat](#) mass and subcutaneous fat thickness decreased while following the competition diet, but the decrease in lean mass was greater for men than for women. Lean mass is calculated by subtracting fat mass from total [body weight](#).

"However, the fitness athletes were able to maintain their muscle size during weight loss, which may be partly explained by their relatively high levels of strength training and protein intake," Isola suggests.

This is the first large-scale study of competition diets in fitness sports or weight loss studies in normal-weight men and women in general. The sub-report of the study was carried out as a collaboration between the Faculty of Sport and Health Sciences at the University of Jyväskylä and the University of Helsinki. The subjects were young Finnish men and women who were pursuing [weight](#) loss for the Finnish Fitness Sport Association's fitness world championships or participating as a control group.

The results of the study have been published in the international journal

Applied Physiology, Nutrition and Metabolism.

More information: Ville Isola et al, Weight loss induces changes in adaptive thermogenesis in female and male physique athletes, *Applied Physiology, Nutrition, and Metabolism* (2023). [DOI: 10.1139/apnm-2022-0372](https://doi.org/10.1139/apnm-2022-0372)

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