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Letter to the editor

Response to: resistance exercise in lean older adults: mind the gap in energy intake

Dear Editor-in-Chief:

Dalle *et al.* suggested that the beneficial muscular adaptations detected following Icelandic yogurt (IY) consumption and resistance training (RT) in healthy untrained older males[1] are due to an overall increase in energy intake. They base their hypothesis on the fact that total energy intake at the end of the study was significantly higher in the IY group (+3·2 % (57 kcal) *v.* +0·7 % (12 kcal) in the placebo group) and that there was a significant decrease in body mass in the placebo group (-0·7 kg), suggesting that IY consumption prevented an exercise-induced energy deficit. Although we do not disagree that an increased energy intake (energy balance) is an important factor in the improvement and maintenance of muscular adaptations in response to RT in lean older adults, we feel it is very likely that our noted muscular adaptations were not primarily due to this factor and would like to highlight some supporting rationale.

The increased daily energy intake in the IY group resulted nearly completely from an elevation in protein intake. Therefore, the increase in total available dietary proteins to be used as the building block for muscle tissue may partially explain the greater increase in lean mass following IY supplementation. Other crucial components in the maximisation of muscular accretion include protein timing and post-exercise protein dose; this is relevant to our outcomes as IY was consumed immediately following RT (known to elevate muscle protein synthetic response). Additionally, the post-RT yogurt consumption provided a protein intake of ~0·29 g/kg of body mass, which falls within the recommendations by the Academy of Nutrition and Dietetics, Dietitians of Canada and the American College of Sports Medicine of 0·25 to 0·3 g/kg of body mass in the early recovery phase (0 to 2 h after exercise) to maximise muscular adaptations[2]. It is also worth mentioning that protein source is another component involved in lean mass accretion. The IY supplement contained both whey and casein proteins. Whey proteins are rapidly absorbed and result in a transient surge in essential amino acid availability for muscle protein synthesis[3,4], while casein proteins are absorbed in a slower rate resulting in prolonged hyperaminoacidaemia, possibly extending the duration and capacity to augment muscle protein synthesis[3]. Therefore, it is possible that IY both rapidly stimulated and prolong muscle protein synthesis following RT sessions leading to greater muscular alterations over time. Summing up, it is highly likely that several factors such as daily protein intake, post-RT protein dose, source and timing mediated the RT muscular adaptations observed in the IY group compared with placebo.

We would also like to point out recent evidence indicating that an increased energy intake might not always be required to achieve and maximise muscular gains associated with RT in older adults. Nilsson *et al.*[5] showed that a large increase in energetic intake (+21 % (387 kcal)) in their placebo group resulted in no gains in lean mass despite increases in body mass and BMI after 12 weeks of RT in older adults. In the same study, the intervention group consumed a protein-based 5-ingredient supplement that showed improvements in lean mass despite an insignificant decrease in energetic intake (-2 % (37 kcal))[5]. Of note, the intervention group in the study by Nilsson *et al.* had a post-intervention energy intake of ~22 kcal/kg per d which was below that of the placebo group (~27 kcal/kg per d) and the recommended energy intake of approximately 30 kcal/kg per d in older adults[5,6]. This evidence is in contrast to the hypothesis proposed by Dalle *et al.* that a smaller gap between post-intervention total energy intake compared with the recommended threshold may have played a role in the positive muscular adaptations experienced after IY consumption in our investigation.

From a practical standpoint, the argument by Dalle *et al.* that the yogurt supplement prevented an exercise-induced energy deficit is questionable. This is because there was a between-group difference in daily energy intake of 83 kcal at the end of the study and a significant interaction for the change in body mass (+1 kg in the IY *v.* − 0·7 kg in the placebo group). Consequently, it is not very likely that an extra 83 kcal of energy intake per day in the IY group both prevented the energy deficit (-0·7 kg) and caused body mass gains of 1 kg (a difference of ~1·7 kg) over an 8-week period. Moreover, it can be argued that the decrease in body mass in our placebo group might not necessarily reflect an exercise-induced energy deficit, to begin with. It is problematic to assume this without knowing energetic expenditure during our RT sessions and non-exercise activity levels (we did not measure these components). In fact, there are numerous other factors (dietary and physiological) not assessed in our investigation that might have influenced the decrease in body mass in our placebo group. It may also be worth noting that although not statistically significant, participants in the placebo group had a slightly higher body (~1 kg) and lean (˜0·7 kg) mass than those of the IY group at baseline, which would translate to slightly higher energetic expenditure at rest and during activities (both exercise and non-exercise) at least in the first few weeks of our study. Therefore, a total higher

Abbreviations: IY, Icelandic yogurt; RT, resistance training.

energetic expenditure (without changes in total energetic intake) may have at least partially influenced the body mass decreases in the placebo group during the study period. As researchers, we recognise that it is very hard to control many participants over an 8-week period. Therefore, we acknowledge that the lack of measurement of exercise energetic expenditure and records for non-exercise activity levels should be considered as part of our limitations.

Dalle *et al.* also cited hazard ratios of all-cause mortality by BMI, making the point that a BMI in the overweight category can be protective in older adults (the so-called 'Obesity paradox). While BMI as a measure has plentiful critiques, in older adults, it can be particularly confounding to use BMI in isolation, where lower BMI's are seen in frailty-induced losses of muscle mass and lifelong smokers. Srikanthan *et al.*[7] suggest that muscle mass is inversely associated with mortality risk, independent of body mass, and thus muscle mass index (sometimes fat-free mass index, or FFMi) forms a greater predictor of longevity than BMI. Indeed, 'leanness induced by healthy lifestyles'[8] may need to be considered as a separate category than weight loss via other means.

With respect to the author's recommendation to include an iso-energetic placebo supplement and assess satiety, appetite and total energy expenditure, we agree that those could be beneficial; however, our study was not designed to examine the effects of energy intake, but rather those of post-RT IY muscular adaptations in older males.

In summary, we believe that protein source, timing and dose were the primary factors leading to the enhanced muscle adaptations in our study. Nonetheless, future work should build upon our findings and limitations as well as the recommendations by Dalle *et al.* to design a study specifically aimed at assessing the effects of energy intake on muscular and body composition adaptations to RT in lean older adults. Lastly, we would like to thank our colleagues for their interest and thoughtful discussion.

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