Summary Rick Hursel

Targeting overweight and obesity is essential since excessive weight has become a major health problem in the 21st century. The presentation focuses on triggers for increasing energy expenditure such as green tea and caffeine, which may be able to promote weight loss or prevent excessive weight gain, separately or synergistically.

First, the impact of green tea on body weight regulation will be reviewed, addressing the short-term effects, long-term effects and mechanisms of action. Ingredients for obesity management including caffeine and different teas such as green, white and oolong tea increased on average energy expenditure with 4-5% and fat oxidation with 10-16% and they may counteract the decrease in metabolic rate that is present during weight loss. A daily increase in thermogenesis of approximately 300-400 kJ can eventually lead to substantial weight loss.

Second, two meta-analyses will be discussed; one of these evaluated short-term effects of catechin-caffeine mixtures on energy expenditure and fat oxidation and the other meta-analysis evaluated long-term effect of catechin-caffeine mixtures on body-weight loss and weight maintenance. Different outcomes of the effect of catechin-caffeine mixtures have been reported in studies with subjects differing in ethnicity and habitual caffeine intake. Therefore, these meta-analyses elucidated whether a catechin-caffeine mixture indeed plays a role in body-weight regulation. A catechin-caffeine mixture and caffeine-only treatment showed a stimulating effect on energy expenditure and a catechin-caffeine mixture also showed a stimulating effect on fat oxidation compared with placebo. 24h energy expenditure and fat oxidation were increased on average with 0.5kJ/mg and 0.02g/mg for catechin-caffeine mixtures and 0.4kJ/mg and 0.01g/mg for the caffeine-only treatment. It was also shown that catechin-caffeine mixtures have a positive effect on weight loss and on weight maintenance. Catechins significantly promoted body-weight loss or prevented weight gain after weight loss with approximately 1.3 kilogram. Moreover, it also showed that habitual caffeine intake and ethnicity, due to different COMT polymorphisms, might be moderators.

Third, catechin-caffeine mixtures and protein separately were able to increase diet-induced thermogenesis. Hence, a combination of both was examined to study the acute effect of milk-protein on green tea induced thermogenic effect of food, as well as on the long-term effect where its contribution to weight maintenance after weight loss was assessed. In the short-term, consumption of milk-protein inhibited the effect of green tea on diet-induced thermogenesis. In the long-term, catechin-caffeine mixture, as well as a high-protein diet improved weight-maintenance independently, via multiple pathways such as thermogenesis, fat oxidation, sparing fat free mass, and for the high-protein diet through satiety. Nevertheless, a possible synergistic effect failed to appear, most presumably by formations of protein-polyphenol complexes that reduce the absorption.

Prevention of weight gain after weight loss and during weight maintenance, can be achieved when certain metabolic targets such as sustained satiety, sustained energy expenditure, sparing of fat free mass are stimulated, together resulting in a high energy inefficiency. These requirements need to be fulfilled despite being in negative energy balance, since successful weight loss or weight maintenance depends on the combination of the three.