Effects of weight loss and insulin resistance on brain reward area activity

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Type-2 diabetes mellitus (T2D) is one of the fastest growing chronic diseases worldwide and related to the global increase in the prevalence of obesity. The PREVIEW-project (EU 7th Framework Programme, grant agreement no. 312057) has been initiated to identify the most effective lifestyle-components (diet and physical activity) in the prevention of T2D.

Overweight and obesity are important risk factors for the development of T2D and different brain responses to food related stimuli were observed between lean and obese individuals. More specifically, imaging studies show an increased activation in brain regions associated with reward in response to food stimuli as well as diminished signaling in regions associated with inhibitory control.

One of the hormones important for the short and long-term regulation of energy intake is insulin with receptors being present in homeostatic, but also reward based areas of food intake regulation. Disturbed insulin signaling and/or reception might be one of the contributors to dys-regulated food intake.

In this PREVIEW sub-study we investigated the effects of weight loss and reduction of fasting insulin levels and insulin resistance on the activation of different brain regions associated with food intake in prediabetic overweight and obese individuals (n=40; m/f: 23/17; age: 53.6±11.25 y; baseline BMI: 32.2±3.38 kg/m\textsuperscript{2}). FMRI (3Tesla) scanning was applied before and after following an 8-week low energy diet. Brain response was assessed after visual stimulation with food and non-food images in a fasted state. Images were presented in a block design, including three high-energy food blocks, three low-energy food blocks and three non-food blocks. Blocks were shown in random order.

After 8 weeks on the low energy diet, weight loss in this subgroup was 11.62±3.62 kg, and reduction in BMI was 3.83±1.00 kg/m\textsuperscript{2}. Possible relationships between changes in HOMA-IR and changes in brain signaling for reward will be presented at the BFLS.