Theme: Applied physiology; PET and MR imaging

Amygdala's reactivity to food labels and contextual decision-making in Type 1 Diabetes Mellitus: a fMRI study

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Abstract:
Given the challenges of maintaining successful metabolic control, patients with Type 1 Diabetes Mellitus (T1DM) frequently make food-related decisions that impact on that metabolic control and overall disease progression. However, the neural processes driving these decisions, particularly regarding emotion processing regions, are not fully understood. This study investigated amygdala involvement in such decisions, focusing on differences between T1DM patients and healthy controls, and evaluating how food risk categories and health warning labels influence neural responses. A cohort of forty subjects, including 20 healthy controls (Mage= 33,61y; SD=8,69y; F/M ratio=12/8) and 20 T1DM patients (Mage= 34,41y; SD=10,42y; F/M ratio=9/11) participated in a fMRI study (3T MAGNETOM Prisma Fit, 64ch head/neck coil, Siemens Healthineers). The functional paradigm included three food risk conditions: healthy food (low-risk food without a label (LR_noL)), unhealthy food (high-risk food without a label (HR_noL)), and unhealthy food with a label showing dietary-related health problems (high-risk food with a label (HR_L)). All participants provided informed consent and completed MRI safety screening. Results showed significant bilateral amygdala activation for contrasts [LR_noL] > [HR_noL] and [HR_L] > [HR_noL]. In food risk conditions comparisons, LR_noL and HR_noL conditions showed significant differences ($t < 4.661$, $\rho c < 0.003$). Considering the contrast related to health warning label, HR_L vs. HR_noL also showed significant differences ($t < 3.320$, $pc = 0.006$). There were no significant group differences in any of these regions of interest (ROIs) ($p > 0.05$). The amygdala exhibited varying responses to different food risk categories and contrast type, suggesting it processes the affective value of food stimuli based on arousal and valence. These findings highlight the amygdala's role in food-related decision-making, particularly in relation to the perceived risk and health implications of food consumption.

Keywords: Type 1 Diabetes Mellitus; decision-making; amygdala