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Impact of endurance exercise training on adipocyte miRNA expression in overweight men

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Adipocytes are major regulators of metabolism and dysregulated adipocyte function in obesity is linked to the metabolic syndrome. Endurance-exercise training improves adipocyte function; however, the molecular mechanisms that regulate the chronic adaptive responses are incompletely described. microRNAs (miRNAs) influence adipocyte differentiation and metabolism, yet their role in exercise-induced adipocyte phenotypes is unknown. We used next generation sequencing (NGS) to profile miRNA expression of adipocytes isolated from subcutaneous abdominal (ABD) and gluteofemoral (GF) adipose tissue of overweight men before and after six weeks of endurance-exercise training. Differentially expressed miRNAs were over-expressed or silenced in 3T3-L1 adipocytes and lipid metabolism examined. NGS identified 526 miRNAs in adipocytes and there were no statistical differences in miRNA expression when comparing the pre- and post-training samples for both ABD and GF adipocytes. miR-10b expression was increased in ABD compared with GF, while miR-204, miR-3613 and miR-4532 were more highly expressed in GF compared with ABD adipocytes. Blocking miR-10b in adipocytes suppressed β-adrenergic lipolysis but had a minor effect on lipid metabolism in general. Unlike their critical role in adipogenesis, stable changes in miRNA expression do not play a prominent role in the regulation of adipocyte function in response to endurance-exercise training.

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CNS reward pathways and anorexia nervosa (AN) — Insights from a rat model

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Patients suffering anorexia nervosa (AN) become anhedonic; unable or unwilling to derive normal pleasures and tend to avoid rewarding outcomes, most profoundly in food intake. Conversely, obesity is a condition that may be potentiated by excessive reward seeking and enhanced motivation for the rewarding properties of food. The activity-based anorexia (ABA) model allows investigation of the underlying neurobiology of AN, especially because it displays many characteristics in common with the human condition, including anhedonia. We aim to exploit this model to highlight the importance of CNS reward in the maintenance of body weight. We hypothesise that increasing the neuronal activity of circuits with predicted involvement in the anhedonia/reward pathways of ABA will prevent associated weight loss.

Female rats ($n = 24$; 6 weeks old) underwent separate bilateral stereotaxic injections of canine adenovirus-2-Cre (CAV-2-Cre) and activating DREADDs [AAV-hSyn-DIO-hM3D(Gq)-mCherry] into the NAcc (shell) and the VTA, respectively. DREADDs reorient in the presence of retrogradely-transported Cre and systemic clozapine-n-oxide (CNO) administration causes mCherry-labelled cells to depolarise with temporal and anatomical specificity. The ABA protocol involves free access to running wheels and time-limited (90 min) access to food, with daily i.p. injections of CNO or saline (control) at the onset of the feeding period.

CNO activates DREADD-expressing, VTA neurons as evidenced by colocalisation with elevated levels of Fos protein, a marker of neuronal activation. Importantly, excitation of this pathway with CNO attenuates the rapid weight loss associated with ABA with a profound effect on survival [$\chi^2(1) = 8.14$, $p = 0.004$]. Activation also increases food anticipatory activity (FAA) and decreases basal running