The Endocannabinoid System and Eating Disorders

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Eating disorders include a range of chronic and disabling related pathological illnesses that are characterized by unusual eating habits, and by abnormal attitudes and perceptions toward body shape image. The psychological and biological factors underlying eating disorders are complex and not yet completely understood. The endocannabinoid system is unanimously documented to participate in both the homeostatic and the hedonic regulation of eating behaviour through central and peripheral mechanisms (Di Marzo and Matias, 2005). CB1 receptors are widely expressed in several brain areas involved in the control of feeding and body weight (Herkenham et al., 1990). In recent years, several reports have led to hypothesise a link between a defect in the endocannabinoid system and eating disorders. For example, a polymorphism of the CNR1 gene (encoding human CB1 receptors) is thought to contribute to the vulnerability to Anorexia Nervosa (AN) (Siegfried et al., 2004). Moreover, women with AN or Binge Eating Disorders (BED) have elevated plasma levels of anandamide (AEA) (Monteleone et al., 2005), which could affect the rewarding aspect of eating that is altered in these patients (Monteleone et al., 2008). Animal models can be very useful for the study of some behavioural features of eating disorders, and are of great help for better understanding the underlying neurobiology and pathophysiology (Casper et al., 2008). Limited research has been done with regard to the effect of manipulation of the endocannabinoid system in animal models of eating disorders. Using the 'activity-based anorexia' (ABA) animal model of AN, in which animals are food restricted with ad libitum access to a running wheel, Verty et al. showed the effectiveness of ?9-tetrahydrocannabinol (THC) in rescuing animals from the great body weight loss associated with the development of AN, thus improving the survival rate. In line with this, we have found that THC transiently reduces wheel-running activity and body weight loss in ABA rats that relapse to AN after a recovery phase (unpublished data). Binge eating is the main criterion for the diagnosis of BED and a hallmark of Bulimia Nervosa, and several paradigms have been developed to study binge eating behaviour in animals. In our recent study, we showed that the CB1 receptors inverse agonist/antagonist rimonabant dose-dependently reduces binge eating behaviour induced in female rats by providing limited access to an optional source of fat dietary (margarine) (Scherma et al., 2013). In addition, we also showed that chronic treatment with rimonabant induces a selective long-lasting effect on binge-intake of margarine that does not develop tolerance, and produces a significant and persistence reduction of body weight. Taken together, all this clinical and preclinical investigations suggest that therapeutic strategies based on drugs that modulate the endocannabinoid system signalling might be useful in the treatment of eating disorders.

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