

Information

Neuroplasticity in anorexia nervosa - a longitudinal study of remission and chronicity

Title of the project: Good and bad outcomes in anorexia nervosa – investigation of brain connectivity and of connectivity-modulating hormones

Summary of the research plan

Anorexia nervosa (AN) is a highly distinctive serious mental illness, having one of the highest mortality rates among psychiatric disorders. AN is characterised by pathological starving and an intense fear of gaining weight. However, gaining weight is the core aim of the therapeutic interventions in AN together with different therapeutic methods that aim at changing beliefs and behaviours regarding food and food-related cues to achieve a stable positive somatic and psychic situation. The disorder is difficult to treat, so that illness trajectories, regardless of the type of therapy applied, often take a chronic and disabling course. Indeed, in about 50% of patients, the course of the illness is unfavourable. To allow tailored treatment and reduce the percentage of chronic illness courses, it is crucial to investigate neurobiological such factors associated with “good” and “bad” courses, respectively. To date, there are no biological predictors for the treatment outcome of AN. The present study is longitudinal and designed to investigate the main trajectories of illness course. In 80 patients with acute and severe AN, multimodal magnetic resonance imaging as well as blood sampling and psychometric testing is applied during weight gain therapy and at a 1-year follow-up time point. Forty healthy women will serve as control group. The first goal of the project is to investigate how the patterns of structural and functional connectivity alterations in the acute phase of AN change and how they can be associated with a positive or negative outcome. This will be done with a special focus on reward- and learning-related areas in the brain. Leptin, a hormone secreted by adipocytes, has a major role in regulating energy balance by decreasing food intake. Lower levels of leptin are found in patients with acute AN compared to healthy subjects. Leptin levels increase during weight gain therapy. Hypoleptinemia in AN could impact neural mechanisms in the brain reward system and could reinforce hyperactivity as well as restrictive dieting behaviour. The relationship between weight gain, leptin levels, and neural connectivity is unclear. Therefore, a second goal of the project is to examine the modulating impact of blood leptin on the brain in subjects with a favourable and unfavourable course of illness by directly linking it to the identified connectivity alterations. The third goal is to determine biological predictors for the two groups of illness course. Using machine learning approaches, neural and blood-derived predictors will be analysed to assign individuals based on their neural and blood-related profiles correctly or incorrectly to the group to which the individual belongs to. The identification of differential neural correlates of illness-promoting and illness-reducing mechanisms including their affectation through leptin has the potential to contribute to a deep understanding of AN and the identification of biological predictors might have important implications for the therapy of AN.