Each human lives in constant symbiosis with complex microbal communities in the gut and on the skin, collectively known as the human microbiome. The human microbiome consists of bacterial, fungi and parasitic worms and is thought to play an important role for the health of the human host. Recent research has demonstrated that there is a link between the gut microbiome and the central nervous system, and that the changes in gut microbiome are able to alter mental well-being, and even have a potential impact on neurodegenerative diseases. It has been shown that the administration of bacterial diet, such as bacteria naturally occurring in the gut or in yogurt cultures, results in changes in brain neuro-chemistry responsible for mood control. This suggests a potential therapeutic role for bacterial diet in depression and anxiety disorders. This study will focus on application of magnetic resonance imaging (MRI) for tracking neuro-chemical and neuro-anatomical changes associated with bacterial exposure in animal models.
This study has two aims. Our first aim is to test newly developed MRI techniques to quantify changes in neuro-chemicals following four weeks of a probiotic diet in rats. The levels of four neuro-chemicals will be assessed in-vivo on a weekly basis. The data will be compared to and validated by ex-vivo histopathological assessment of neuro-chemicals. Moreover, we will also monitor changes in volumes of brain structures following a bacterial diet. Our second goal is to use an animal model of depression in rats and monitor neuro-chemical, anatomical and behavioral changes in animals undergoing bacterial therapy using techniques developed for aim 1.
The methods developed will provide an accurate assessment of neuro-chemicals in animal models of depression and could be used in the testing of various treatments of neurological and psychological disorders.