

Targeted Project / AY 2026 -2027

Understanding the contribution of the gut brain axis to mental health and visceral pain

Project Reference: TRG-PD-DB26

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Main BBSRC strategic theme: Bioscience for an integrated understanding of health

Secondary BBSRC strategic theme: n/a

Project outline:

Anxiety and depression is commonly found across multiple epidemiological studies in different continents in people with chronic abdominal pain conditions such as irritable bowel syndrome (IBS). This is perhaps not surprising given most people experience altered gut sensation and motility commonly referred to as “butterflies in the stomach” when exposed to acute stressor such as public speaking.

Although originally considered to be solely a consequence of top-down changes linked to activation of the hypothalamic pituitary axis (HPA) and corticotrophin releasing factor (CRF) release. More recent data points to bottom-up influences linked to the gut brain axis which not only promote abdominal pain but may also precipitate the development of anxiety and depression through the production of pro-nociceptive and pro-anxiogenic mediators and signalling pathways. These changes have been linked to negative early life stress and dysbiosis of the gut microbiome resulting in altered bacterial metabolite production, innate immunity, epithelial barrier function and sensory nerve signalling. Hypotheses substantiated by recent work demonstrating increased anxiety in mice following bacterial metabolite (isovalerate) (or chemogenetic) evoked release of 5-HT from enterochromaffin cells. In addition to work showing visceral hypersensitivity only develops in germ free mice following transfer of the faecal microbiome from people co-morbid for IBS and anxiety/depression.

Consequently, the goal of this studentship is to explore the mediators and mechanisms contributing to the development of altered gut-brain signalling, dysbiosis and behavioural correlates of anxiety and depression in animals exposed to negative early life stress.