

Project Details	
Project Code	MRC23NMHBr Atan
Title	An investigation of how medical interventions to lower intracranial pressure influence cerebrospinal fluid dynamics, cerebral vasculature and eating behaviour and their impact on headache, vision, and quality of life
Research Theme	Neuroscience and Mental Health
Summary	Raised intracranial pressure (ICP) can be sight-threatening. Caused by increased brain, blood or cerebrospinal fluid (CSF) volumes, raised ICP impairs vision from optic nerve swelling. In this cross-disciplinary project, we will use state-of-the-art imaging, clinical, psychological, and behavioural tools to assess medical treatments of raised ICP and their impacts on CSF dynamics, cerebral vasculature, headache, vision, quality of life and eating behaviour.
Description	<p>Papilloedema is defined as optic nerve swelling caused by intracranial hypertension. Although it can be the first sign of life-threatening diseases like brain tumours and hydrocephalus, most cases are idiopathic with no obvious structural abnormalities identified by standard neuroimaging. The main morbidities of idiopathic intracranial hypertension (IIH) are headaches and vision loss from papilloedema, leading to UK healthcare and economic costs exceeding £50million per year. Obesity is the main modifiable risk factor since IIH prevalence is 10.9 per 100000 of the general UK population and 8-9 times higher among obese women. Due to the strong association with obesity, the medical management of IIH normally involves weight loss and/or carbonic anhydrase inhibitors like acetazolamide (ACZ) that theoretically inhibit CSF production. Further, ACZ has other effects that could help IIH management: 1. ACZ is weakly anorexogenic and impairs the taste of carbonated drinks like beer and soda; hence, ACZ could influence eating behaviour to promote weight loss; 2. ACZ is known to vasodilate cerebral vasculature, potentially increasing cerebral venous outflow and lowering intracranial pressure (ICP). Surprisingly, very little is published on how ACZ actually works and its efficacy in lowering ICP to support its widespread use in IIH. Indeed, clinical trials that have directly compared patients managed by weight loss alone versus ACZ have shown those who lose weight have better visual outcomes. As ICP is determined by brain, blood and cerebrospinal fluid (CSF) volumes, the aim of this cross-disciplinary project is to use state-of-the-art imaging, clinical and behavioural tools to find out how ACZ influences eating behaviour, CSF dynamics and cerebral vasculature to affect papilloedema (a non-invasive biomarker of ICP), vision, headaches, and quality of life (QOL). IIH patients on ACZ will be compared with patients managed by weight loss alone. The fundamental research question is: how does ACZ affect ICP in comparison to weight loss? We are conducting pilot work (with ethical approval) to compare the symptoms, QOL, eating behaviour, food recall, food choice and taste preferences of IIH patients compared with healthy people matched for body mass index (BMI) using a battery of online tools. The student will review the results of this ongoing pilot work together with feedback from participants and our PPI group. Additionally, they will conduct a systematic review of the medical management of IIH, including dietary and drug interventions, and any</p>

	<p>neuroimaging evidence that shows their mechanisms of action on ICP. They will enroll in courses/webinars on the interpretation and analysis of neuroimaging data. Based on their findings, the student will revise the study protocol as needed. Specific objectives are: a. To measure change in 1. papilloedema 2. vision 3. headaches 4. QOL of IIH patients after medical intervention (ACZ or weight loss) b. To correlate differences in: 1. eating behaviour 2. taste 3. nutrition 4. CSF dynamics and 5. cerebral vessel calibre with measurements in objective a This project involves collaborations in academic research and the NHS across GW4: 1. we have set up an IIH network for participant identification that includes Bristol, Cardiff, Exeter, Taunton, Truro; 2. we will be using state-of-the-art neuroimaging (phase contrast, arterial spin labelling, fMRI at CUBRIC), optic nerve imaging and clinical health data including QOL &amp; headache questionnaires (Clinical Research Unit, Bristol Eye Hospital), neuropsychology tests of response inhibition (Exeter Life Sciences) and online tools to assess eating behaviour, food choice, taste, nutrition (Bristol BRC Diet &amp; Physical Activity theme). We anticipate this research will lead to novel insights into how the brain's fluid dynamics and function are affected by drugs like ACZ and weight loss with wider implications for obesity management and research.</p>
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