*Ex Vivo* Electrochemical Platform for Antidepressant Screening

Already the leading cause of world-wide disability, the post-COVID era is set to see depression skyrocket. Diagnosis and treatment of depression, based on questionnaires often fail. Selective serotonin reuptake inhibitors (SSRIs) are some of the most prescribed medicines globally but have side effects and type and dosage are often established *via* trial-and-error. A further, and alarming, problem is the lack of reliable pre-clinical screening tools forcing pharmaceutical companies to tone down antidepressant drug discovery. These issues persist because the community has not formed consensus on a pathophysiological basis of depression. This, to more accurately diagnose and treat depression, we must better define the chemical basis of this illness in humans. A critical step towards this goal is to identify and measure depression biomarkers in human models and assess their response to potential antidepressants. In prior *in vivo* work with fast scan cyclic voltammetry (FSCV) we identified serotonin to be a potential biomarker of depression and antidepressant activity in mice and here we take the first steps to translate these findings to humans in *ex vivo* models. We present the first, human-derived, immune-competent cerebral spheroids on a chip to measure serotonin transmission in response to antidepressants. Predictive AI models will be generated to predict individual treatment strategies based on biomarker responses to antidepressants. This work will provide the first prototype of personalised treatment platforms for depression, holding potential for upscaling towards a high throughput drug screening system to fundamentally re-invigorate antidepressant discovery.