TCS/21/03 - Early detection of Alzheimer's disease with glucoCEST MRI: a proof of concept study

Alzheimer's disease (AD) is the most common type of dementia. Patients experience increasing problems with memory, speaking, thinking, and other activities of daily living. Most available treatments aim at controlling symptoms at early stage rather than providing a cure. Therefore, early diagnosis of AD is important. A strong indicator of AD is the low ability of brain cells to use glucose. Currently, the low concentration of glucose in a brain with AD can be measured by injecting radioactive glucose and imaging the brain with positron emission tomography (PET). However, PET both exposes patients to ionising radiation and is expensive for routine use to diagnose AD.

A recently developed method, called Chemical Exchange Saturation Transfer (CEST), can image brain glucose using magnetic resonance imaging (MRI). MRI has no radiation exposure risk to patients. We will study, for the first time, if CEST can detect differences in glucose concentration between patients with AD and normal volunteers of similar age. This study will set the foundation for future research to examine the clinical utility of this method for detecting AD very early.
MRI is safe, less costly and more widely available, therefore CEST MRI has the potential to replace PET for assessing brain glucose in patients with AD symptoms or screening those genetically at risk.