The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

PROJECT TITLE	**DEVELOPING NOVEL METABOLIC IMAGING METHODS TO LOCALISE EPILEPTOGENIC TISSUE**
PROJECT CODE	**UQIDAR 00129**
PROJECT DESCRIPTION	Metabolic changes have been observed in various brain disorders and could be used as biomarkers for diagnosis and prognosis. Epilepsy is a common neurological diseases affecting about 1% Australian and globally. About 30% of patients resistant to medication and may be candidates for surgical resection. Conventionally glucose hypometabolism measured by positron emission tomography (PET) has been used to locate the epileptic focus for surgery. However, the sensitivity and specificity is not very high, partly due to the poor spatial resolution of PET and the lack of other metabolic information. Recently, new magnetic resonance imaging (MRI) techniques such as Chemical Exchange Saturation Transfer (CEST) have emerged as sensitive and versatile ways for mapping neurochemical changes, including glucose, glutamate and lactate. Previously we demonstrated the feasibility of imaging glucose metabolism and glutamate distribution in vivo. This project aims to further develop CEST-MRI for high-resolution mapping of metabolic changes in the brain and to apply it to determine the metabolic changes and locate the epileptic foci of the temporal lobe epilepsy patients. We plan to develop new image acquisition protocols and analytical methods for specific quantification of glutamate and glucose using the metabolic modelling developed in IITD and conduct experiments on the ultrahigh field 7T MRI at UQ. The results are expect to improve our understanding of cerebral metabolic changes in epilepsy and the localisation of epileptic foci.
PROJECT OUTCOMES	1. Establish new imaging methods for mapping metabolic changes in the brain. 2. Determine the brain metabolic changes in epilepsy patients. 3. Improve the localisation of epileptic foci.
ADVISORY TEAM	**Professor David Reutens** https://cai.centre.uq.edu.au/ d.reutens@uq.edu.au Centre for Advanced Imaging The University of Queensland **Assistant Professor Anup Singh** http://cbme.iitd.ac.in/content/dr-anup-singh Anup.Singh@cbme.iitd.ac.in Department of Biomedical Engineering Indian Institute of Technology Delhi **Associate Professor Kai-Hsiang Chuang**, Queensland Brain Insitute, UQ
TYPE OF STUDENT	Applications are open to i/a students who meet eligibility criteria. note: i-students must have own scholarship to apply (CSIR, UCG-NET, etc)
DISCIPLINE BACKGROUND OF STUDENT	Ideally, this project requires students with a background in biomedical engineering, physics chemistry, neuroscience.

IDEAL CANDIDATE	Essential capabilities:
	• Data analytical skills,
	• programming language (eg, C/C++ or Matlab)
	Desirable capabilities:
	• Experience with image processing,
	Expected qualifications (courses, degrees, etc):
	• Bachelor/Master/MPhil of Science, Engineering, Biology, or Medicine
APPLICATION PROCESS	Apply online by the due date: https://www.uqidar.org/students/how-to-apply/