

# Child Health Research CIO

CHILD HEALTH RESEARCH CHARITABLE INCORPORATED ORGANISATION (CHR CIO) PROGRESS FORM -  
VACATION STUDENTS

Student's <u>name</u> :	Matthew Lee
Academic Programme:	Developmental Neurosciences
Project <u>title(s)</u> :	Quantifying the effect of activity on muscle microstructure using diffusion MRI

## 1. Lay Summary:

### What are you trying to do in this studentship?

The aim of this project is to quantifiably determine how physical activity affects calf muscle microstructure in healthy volunteers, which will inform imaging protocols in patients with Duchenne Muscular Dystrophy (DMD). Magnetic Resonance Imaging (MRI) protocols focussing on the diffusion of water in the calf muscle before and after a specific exercise regime will be acquired. These measurements allow us to characterise the microstructure of the tissue. The processing and subsequent statistical evaluation of this data will inform the effect of this exercise on the common image measurements used in diffusion MRI (or diffusion tensor imaging (DTI)). Through this project, I aim to gain personal research experience in a to research department, to better understand research as a career path.

### Why is this research important?

Duchenne Muscular Dystrophy (DMD) is a genetic muscle-wasting condition that affects 1 in 3600 young males. Clinical diagnosis of DMD is quite straightforward, however being able to quantifiably characterise the effects of muscle deterioration presents more of a challenge. The current gold-standard procedure, muscle biopsy, is invasive and highly localised. Because of this, the efficacy of diffusion MRI (a MRI contrast mechanism for assessing tissue microstructure parameters, conventionally for neuroimaging purposes) with regards to muscle microstructure, is a subject of research.

Due to muscle deterioration in DMD, it is clinically important to understand whether physical activity before scanning influences scan data. Some previous studies have shown that there are significant effects, but the intensity of physical activities performed/lengths of time employed in these studies are not applicable to those likely experienced by young DMD patients re-scan.

## 2. Value of your Experience

Through this studentship, I have gained first-hand experience of research, from both working on the project and the daily environment around the Developmental Imaging and Biophysics section. Through this project, I have gained an understanding of MRI and diffusion MRI fundamentals which was in much greater depth than what I had been exposed to through my degree in biomedical engineering. This was in conjunction with actually seeing scans being taken for all the data, including being scanned myself.

I have become comfortable with various programs used for medical image processing something I particularly enjoyed was the freedom to which I could explore how to process the data after initial guidance.

Research-specific skills that I have begun to grasp include: what to look for when reading papers i.e. how to properly evaluate the quality and usefulness of other papers when conducting a literature search; research ethics and accuracy i.e. in terms of volunteer consent, MRI safety and how to evaluate results statistically without bias; presenting skills i.e. through having to informally present my findings to my supervisors and also attending seminars; and how to publish i.e. the concepts of pre-print servers, posters and paper write-up.

All of these experiences and skills have been very valuable to me and I will continue to use what I have learnt from these insights in the future.