



Curtin University



Faculty of Health Sciences

2020 Australian Government Research Training Program Scholarships

Strategic Project Profile

PROJECT TITLE: Virtual reality optic flow for assessment of subconcussion and return to play following concussion

FIELD OF RESEARCH CODE: TBA

PROJECT SYNOPSIS: Historically, full recovery from sports related concussion has been assumed. In the last decade concussion research has become a public health priority as evidence for the long term cognitive, mental and sensorimotor health consequences of a history of repeated concussion in sports has accumulated. Identification of readiness to return to sports following a concussion is important for the prognosis and management of the injury. Side line assessments of concussion exist (e.g. SCAT5 tool) however the sensitivity is not sufficient for addressing the effects of subconcussion and determining readiness for return to play, but may be improved with VR assessment. The balance component of the SCAT 5 assessment is static, whereas VR Optic Flow based postural assessment offers a dynamic stimulus that relies on effective sensorimotor integration to perform adequately. Optic flow describes the pattern of light across the eye that provides information about relative motion between the observer and the external environment. Preliminary evidence suggests that VR based optic flow assessments are more sensitive than static tests in detecting the effects of concussion on balance (<https://www.researchgate.net/lab/W-Geoffrey-Wright-Lab>). Hence the identification of a VR optic flow induced

postural stability biomarker for return to sport after a concussion and subsequent development of a tool for assessment of subconcussion would be valuable.

Biomarkers of concussion are being sought in electroencephalography, blood samples and postural control. Combining information across these three sources of information is likely to increase our understanding of appropriate time frames for healing after concussion and effects of subconcussion. Additionally, understanding how brain function and response to optic flow interact to induce postural changes will increase our fundamental understanding of how humans interact with their environment, especially when brain function may be compromised. Investigations in the area of subconcussion are lacking and yet it is critical that coaches, physicians and participants understand the effects of repetitive non-injurious head knocks on brain function.

The aim of this project is to investigate the relationship between blood, brain, and VR optic flow induced postural stability biomarkers of sports related concussion for returning to sport safely and subconcussion injuries. The first part of the project will use electroencephalography, non-invasive brain stimulation, blood sample profiling and VR postural assessment to characterise the timecourse to recovery after concussion and explore the effects of subconcussion in athletes who are at risk of, or who have experienced brain trauma as part of their sport. The second part of the project will explore the development of a VR optic flow induced postural stability tool that can be used to assess balance for return to play following a concussion. The student will explore the utility of a postural tool to augment current assessments and pilot the effectiveness of the tool.

The ability to characterise recovery from concussion and subconcussion in sports athletes using a sensitive postural assessment will increase the understanding of brain function and sensorimotor control. To identify concussion and subconcussion in sports athletes in the field provides the capacity to protect athletes from further injury and may lead to the development of more effective early intervention and management.

WHAT MINIMAL ATTRIBUTES AND SKILLS EXPECTED BY THE CANDIDATE BE COMPETITIVE:

Honours (Honours I or 2A) or Master's degree in relevant field.

Ability to master a range of technical skills appropriate to neuroscience

Students are advised to contact the Project Lead listed below prior to submission of their scholarship application to discuss their suitability to be involved in this strategic project.

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