King’s College London Health Schools Studentships project call 2014

**Project outlines**

Deadline: **Wednesday 31 October 2014**

**Division:**
Centre of Human and Aerospace Physiological Sciences

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**Project description (max 500 words)**

One of the most common impairments contributing to stroke disability is balance deficits\(^1\), which lead to falls\(^2-5\), reduced outdoor mobility and quality of life.\(^2\) Currently the National Clinical Guideline for Stroke\(^6\) recommends that patients with significant balance deficits should be offered intensive, progressive balance rehabilitation. However, current exercise programmes tend to focus on static balance training and/or strengthening exercises, which often lack the therapeutic challenges required to restore the dynamic balance reactions needed for real life. There is clearly a need to understand the nature of deficits contributing to balance problems after stroke in order to develop more appropriate strategies to optimise long term function.

Balance control requires, in addition to adequate motor control, the integration of visual, vestibular and somatosensory inputs. A commonly identified alteration in sensorimotor integration in patients with balance dysfunction is visual dependence (VisD), an over reliance on visual inputs for postural and perceptual responses. Individuals experiencing VisD report symptoms of dizziness, disorientation, and/or unsteadiness in situations involving visual-vestibular conflict (e.g. crowded environment).\(^7\) Studies have identified VisD and deficits in sensory organisation as main contributors to balance problems in patients with chronic stroke.\(^8-12\) However, it is unknown whether specific CNS areas are more likely to lead to increased VisD when damaged by stroke, although it is well acknowledged that the human cortex has sections specialised in the processing of vestibular and visual motion stimuli and multisensory interaction areas, involved in spatial orientation and balance control.

Contemporary stroke rehabilitation includes balance exercises focussed on the improvement of muscle strength, gait oriented training, and static and dynamic balance. Moderate evidence exists to suggest these strategies improve balance performance, but is unclear whether these improvements translate to improved functional mobility and falls reduction.\(^5,13\) Recently, multisensory balance rehabilitation programmes focusing on sensorimotor integration have been published with early results showing improvements in balance performance\(^13-15\), gait velocity\(^13,14\) and quality of life.\(^5\) However, the impact on VisD and indoor-outdoor mobility function has not been reported. Furthermore, no studies have incorporated exposure to optokinetic stimuli which is critical for improving VisD, at both a perceptual and postural level in healthy controls\(^16\) and associated symptoms in patients with peripheral vestibular disorders.\(^17,18\) It is hypothesised that this intervention may potentially contribute to the restoration of somatosensory integration in people with stroke when combined with multisensory training by reducing (i.e. improving) reliance on visual inputs and promoting the use of appropriate sensory stimuli (vision, vestibular, proprioception) according to environmental and task demands.

The **aims and objectives** of this project are to firstly, using a case controlled study design, a) compare the prevalence of VisD between people with stroke and an age-matched healthy population and b) determine the link between stroke lesion site and visual dependence. Secondly, using a single
blind randomised controlled trial design, to determine if multisensory balance rehabilitation incorporating optokinetic stimulation will provide greater improvements in functional indoor and outdoor mobility, balance confidence, quality of life, and VisD in patients with chronic stroke, particularly in those with VisD compared to those without.

References


Does this project fall within the EPSRC research themes? YES
Does this project meet one or more of the MRC strategic aims? YES
If yes to either of the above, does this project have the potential to be a CASE award? NO

Please indicate the type of programme
4 years