**Doctoral Training Alliance (DTA) Applied Biosciences for Health studentships starting in the academic year 2017/18**

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| **Director of Studies:** Dr Mary Cramp For an informal discussion about the studentship, please email Mary.Cramp@uwe.ac.uk  |
| **Other members of the proposed supervisory team:** Prof Shea Palmerand Dr Lindsay Smith |
| **Title:** Biomechanical analysis of persistent changes in gait mechanics after Total Hip Replacement surgery and the effects of gait retraining. |
| **Project Abstract:**Total Hip Replacement (THR) is a common surgical procedure used as a primary treatment to address the problems associated with hip osteoarthritis. The number of THRs has increased by a third in the past decade and, in 2014/15, 89,288 THR procedures were undertaken in England and Wales. The demand for THR likely to increase further with the growth in the ageing population and the prevalence of obesity. THR is successful for reducing pain and improving function, mobility and quality of life overall. However, while there are improvements in gait after THR, biomechanical studies have shown that there are persistent changes in biomechanical markers of the movement pattern of the affected joint and other lower limb joints; and that gait mechanics do not return to normal after THR. Altered gait mechanics are thought to impact on joint health and the need for further joint replacements. Therefore, it is a problem that needs to be addressed to improve gait outcomes after THR and reduce the personal impact and financial implications for health services of further treatment.The aim of this project is to develop low cost treatment solutions for persistent altered gait mechanics after THR based on biomechanical study of gait. Currently, exercise and gait retraining programmes are included as part of early rehabilitation after THR surgery and improve physical function. There have been few studies of later rehabilitation to address persistent problems after THR, but the studies that have been completed are of low quality and have focused on supervised or unsupervised exercise programmes to improve muscle strength and gait speed. Specific gait retraining to improve gait mechanics has yet to be explored. There are various technological and non-technological options for gait retraining such as inertial sensor technologies and instructional training; it needs to be established whether application of these options will alter gait biomechanics after THR. The project will focus on patients at least 1 year post THR surgery, as improvements in gait and function have been previously observed up to 9 to 12 months post-surgery. It will provide proof of concept and a basis for future interventions to address persistent gait changes after THR. The specific aims are to: 1. Identify the biomechanical markers of altered gait mechanics that persist beyond 12 months after THR.
2. Evaluate the immediate and short-term biomechanical effects of gait retraining options.
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