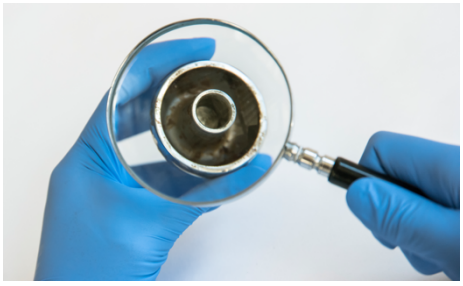
Project Title: PhD studentship in orthopaedic implant technology

Primary Supervisor: Prof Alister Hart

Secondary Supervisor: Dr Harry Hothi

Research Site: London Implant Retrieval Centre,
University College London,
Royal National Orthopaedic Hospital, Stanmore, UK.

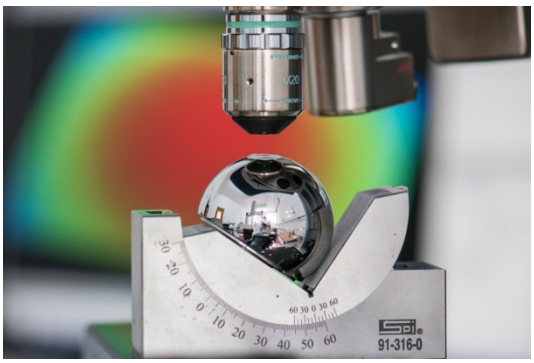


Funding: Fully funded (stipend and fees) 3-year project.

Contact: a.hart@ucl.ac.uk or h.hothi@ucl.ac.uk

Summary

Come and join the exciting area of bioengineering research to help innovate orthopaedic implant technology. This fully funded studentship will enable you to work in the leading implant retrieval research group, at the largest university in Europe which is ranked 1st for Bioengineering. You will use state-of-the-art measurement technology and work with leading orthopaedic surgeons to develop novel analysis methods. This project will directly impact surgeons, patients and implant manufacturers.



Background

The recall of the DePuy ASR hip replacement devices is the largest in the history of orthopaedics, having impacted more than 96,000 patients. The ASR-XL total hip replacement and ASR hip resurfacing designs were recalled in 2010 and there has been much speculation about the reasons for failure, with an emphasis on the role of the acetabular cup design. However, 6 years following the recall, the surgical, implant and patient (SIP) factors associated with the higher revision rates are still poorly understood.

This PhD project marks the culmination of a 5-year worldwide retrieval programme run independently by the London Implant Retrieval Centre (LIRC) which has seen the collection and analysis of 6,000 failed ASR components. A large subset of these have been collected

together with very detailed and complete clinical and imaging data for each patient. This offers a unique opportunity to untangle the SIP factors influencing failure and identify differences between the stemmed and resurfacing design of this hip. In particular, this project will investigate the role of damage at the junction between the femoral stem and head in the total hip replacements.

Aim

The overarching aim of this project is to understand why the ASR hip design had a higher revision rate than any other contemporary hip replacement design.

To answer this, the following research questions will be considered:

1. How does the volume of metal lost from the bearing and taper junction surfaces of these hips compare with hips of other similar designs?
2. What are the surgical, implant and patient factors associated with increased material loss at the bearing and taper surfaces?
3. Does the tapered head-stem junction explain differences in revision rates between the ASR-XL and ASR resurfacing?

Impact of Project

The results of this project will (1) directly impact the management of patients still implanted with these hips, (2) inform clinical decision making with hips of other similar designs, (3) help separate out surgeon error from implant design in failed cases and (4) influence changes in future hip component designs by manufacturers.

Track Record

The LIRC is based on site at the Royal National Orthopaedic Hospital (RNOH) and is leading research in understanding failure in orthopaedic implants. Since 2007, the centre has collected over 6,000 spine, hip and knee components from 25 countries, published 70 papers in peer-reviewed journals with 150 co-authors and been cited more than 1,000 times. The RNOH is the largest orthopaedic hospital in the UK with over 1,500 NHS and UCL staff working together. UCL

There are 300 hip and knee revision procedures performed annually here and 20% of all UK orthopaedic surgeons will have some form of training here. It houses the largest spinal injuries centre in Europe and a £25 million academic centre is planned to open in early 2018.

The successful candidate will join a highly motivated team in the Biomedical Engineering hub, consisting of over 20 PhD students and post-doctoral researchers supported by 2 professors, 2

senior lecturers, 2 lecturers and 3 senior technicians. All research students have access to training and personal development opportunities offered by UCL across a wide range of campuses. The student will interact and build working relationships with other engineers, scientists, orthopaedic surgeons and other clinicians.