

**British Orthopaedic Research Society/Bone Joint Research (BORS/BJR)
Travelling Fellows Blog 2016**

The 2016 BORS/BJR Travelling Fellows group was made up of three orthopaedic surgeons and three bio-engineers: Iain Murray (Edinburgh), Sarah Johnson-Lynn (Newcastle), Paul Hindle (Edinburgh), Wayne Ayre (Cardiff), Alasdair MacLeod (Bath) and Harry Hothi (Stanmore). The group met for the first time in the Giraffe Café within Terminal 5 of Heathrow airport ahead of a four week adventure to visit academic and clinical centres in Hong-Kong, China, Australia and Singapore in a trip generously supported by the Bone and Joint Research Journal (BJR).

The Chinese University of Hong Kong: 19-20th September

Arriving into Hong Kong we were all immediately dazzled by the heat and the enormous scale of the buildings, which were tightly squeezed into the small administrative region. Our first visit as BORS international travelling fellows would be to the Department of Orthopaedics and Traumatology at the Chinese University of Hong Kong. Professor Ling Qin, the Director of the Musculoskeletal Research Laboratory located at the Prince of Wales Hospital, kindly gave us a tour of the world-class research facilities. The laboratories comprised of advanced and specialized equipment such as: micro computed-tomography for bone imaging; high resolution ultrasound machines for imaging of soft tissues; *in vivo* imaging systems for tracking fluorescent and bio-luminescent signals in animals; gait analysis laboratories for both humans and animals; universal materials testing machines for biomechanical studies; 3D printers; and molecular biology facilities. The department setup was impressive, encompassing multiple disciplines in one building and maintaining a strong translational theme.



In the afternoon, a seminar was held to welcome the BORS fellows along with visiting lecturers from the University of Southern Denmark (Prof Overgaard, Prof Ding) and the Skaane University Hospital (Dr Rogmark). The BORS fellows presented some of their research, which was followed by the faculty from the Department of Orthopaedics and Traumatology. Prof Jack Cheng gave an overview of the department, and several presentations were delivered from the faculty covering scoliosis (Prof Wayne Lee), computer assisted surgery (Dr Ning Tang), biomaterials (Prof Ling Qin), musculoskeletal ageing (Prof Louis Cheung), stem cell research (Prof Gang Li) and sports medicine (Prof Patrick Yung). The number of publications submitted annually and the success rate of the department in securing research funding were particularly impressive.



The evening was concluded with a formal Chinese banquet consisting of 11 traditional courses, which included bird's nest soup and abalone (an acquired taste but an experience nonetheless).

The following day we were given the opportunity to explore Hong Kong. We started by taking a train to the peak, which gave us stunning views overlooking the city skyline.



After taking the world's longest escalator and having lunch in the bustling central business district, we jumped on the metro (MTR) and headed towards the giant Buddha statue on Langtau Island. After a 30-minute cable car ride high above the mountains, we arrived at the statue, which was much bigger than expected. In the evening, we concluded our first trip to Hong Kong in an ideal manner - above a high-rise rooftop bar with amazing views of Hong Kong skyline.

**International Combined Meeting of the Orthopaedic Research Societies
Xi'an, China: 21st - 26th September**

Our second stop was the ancient city of Xi'an to attend the International Combined meeting of Orthopaedic Research Societies (iCORS) meeting hosted by Prof. Zhuojing Luo and Prof. Gang Li of the Chinese Orthopaedic Research Society.



On Thursday, there was a dedicated British Orthopaedic Research workshop, where all of the fellows presented their work relating to joint replacement including: potential preventative treatments, improving the performance of surgical interventions, the effect of implant coatings and their influence on the biological environment surrounding implants during their lifetime, and finally what we can learn from implant retrievals. Later that day, the opening ceremony was particularly memorable with a humorous choice of 'epic star wars' music for the change overs between speakers and well-deserved awards for the most prominent individuals from the respective countries' orthopaedic research groups. Prof Allen Goodship, Prof Bruce Caterson and Prof Hamish Simpson were all inducted as Fellows of ICORS. The gala dinner in the evening gave us our first taste of China introducing us to an array of flavours we didn't even know existed alongside the wonderful conference dinner entertainment.

Throughout the ICORS meeting, there were a wide range of fascinating talks including the Osteoarthritis Diagnosis and Treatment workshop on Friday, which I particularly enjoyed. On Friday evening, the faculty dinner was another incredible culinary spread with unusual dinner entertainment including a woman balancing a very large number of sticks on her head.

Venturing to Muslim quarter on Saturday was an experience to remember with a seemingly unending number of street food stalls and carcasses dangling from lamp posts. This was the perfect setting to meet up with some of our hosts in Adelaide – Prof. Gerald Atkins and Dr. Egon Perilli - what better way to get to know each other than squatting and having a beer in the street?



On our last day we visited the amazing terracotta warriors, where we were honoured to meet and shake the hand of the man who unearthed the largest burial site ever discovered. Afterwards we had a traditional Chinese lunch – complete with elegant robes and strange hats. Our guide really brought the tour to life with her insights into political tensions and the respective Chinese and western cultural differences. She also gave us some creative historical accounts and showed us the set for the ‘best show in china’ at the Xian Huaqing Hot Springs – a brilliant end to our memorable experiences in China.



The University of Hong Kong: 27th September

On our second, shorter trip to Hong Kong we were taken to the University of Hong Kong’s Robert Black student accommodation, in the heart of the university campus, reviving some nostalgia of our younger university days. The following morning we were taken to the Department of Orthopaedics and Traumatology at the University of Hong Kong, where our friendly host, Regina, greeted us. After a brief conversation with Prof William Lu (head of the research department), we were given a presentation introducing us to the department, its research themes and some of the interesting work being carried out. The BORS fellows all presented their work, which was followed by in depth discussions with the local researchers. The hosts also gave overviews of their research interested, which was focused predominantly on spinal orthopaedics, covering topics such as: surface EMG for rehabilitation (Dr Yong Hu); intervertebral disc biology (Dr Victor Leung); methods for quantifying vasculature in the spine (Dr Uruj Zehra); microRNAs in stem cell differentiation (Dr Kelvin Sin Chi Cheung); and the use of chitosan nanofiber scaffolds for neural regeneration (Dr Graham Shea).

Shortly after our presentations we were given a tour of the laboratory facilities. The facilities consisted of numerous tissue culture laboratories, molecular biology labs and mechanical testing suites, all integrated within a hospital department. Although the visit was short, there was a clear integration between clinical staff and researchers at the department, which was reflected strongly in their translational and clinically focused research. Following the laboratory tour, we were taken for lunch at a training restaurant high above the city (VTC Pokfulam). Although not affiliated with the university itself, the restaurant served as a teaching environment for students undergoing hospitality training. Similar to our previous visit, a 10-12 course meal was served around a revolving dinner table, which was a fun way to interact with all the local academics and surgeons. This was a great way to end our final visit to Hong Kong and left us looking forward to the Australian leg of the journey.

Adelaide: 27th Sept – 1st Oct

Adelaide was our first city on the Australian leg of our fellowship; we arrived at 5am to news that the state was expecting its worst storm for 50 years! We were greeted by Fellow Peter Smitham (BORS Travelling Fellow 2014 now working in Adelaide) who kindly invited all 6 of us to have breakfast at his home, after which we went directly to the weekly orthopaedic departmental meeting at the Royal Adelaide Hospital. Here we were given a taste of the post-op X-ray review sessions and two of our group presented their research talks to the team.

The heavy rain meant that our plans of cuddling koalas and feeding kangaroos had to be postponed but we were instead treated to a fantastic afternoon of dinner and wine tasting at the Penfolds Magill Estate.



This was followed by a 5-hour state-wide power cut which resulted in a competitive game of candle lit monopoly at Peter's house!

The next day we were given tours of the labs at University of Adelaide which included discussions with Prof Gerald Atkins and his research team at the Bone Cell Biology Group and an opportunity to learn about the work of Dr Dominic Thewlis in his gait lab.

In the afternoon we walked past the Adelaide Oval stadium to visit the incredible new building of the South Australian Health & Medical Research Institute (SAHMRI). We were shown around the open plan offices and given a behind the scenes look at the Australian National Joint Registry by manager Cindy Turner; this included early access to the latest annual report by the AOANJRR.



We were then invited to present our research projects at the latest meeting of the Adelaide Bone Group. The offering of good wine at the meeting certainly encouraged lively presentations and discussions with the audience.... a model for the UK perhaps!

Our final day in Adelaide was centred around a visit to see Prof Mark Taylor and his Biomedical Engineering team at Flinders University. This began with a breakfast meeting with clinicians and engineers which involved a talk by Dr Saulo Martelli about the role of computational models in human musculoskeletal mechanics at Flinders. Following this we toured some of the Medical Device Research Institute (MDRI) which included seeing the purpose built facilities for cadaver training for surgeons, separate gait lab and a unique 6 degrees-of-freedom Hexapod biomechanical testing system.

Lastly we were given an interesting overview of the leading research being carried out by Dr Egon Perilli in the field of medical imaging techniques, and in particular those involving novel micro-CT methods for bone and human tissue samples.



This concluded our tour of Adelaide and we began preparing for our next city stop – Melbourne!

Melbourne: 1st October – 4th October

Arrived mid-morning in Melbourne on Saturday to find the weather an improvement on the storm in Adelaide. Catherine Ngan, a PhD student from the University of Melbourne, gave up her time to meet us at the airport for the trip to our apartments near St Vincent’s hospital. As we had a free afternoon, and all of Melbourne was occupied with the Aussie rules football final (which the local team won), the more active amongst us took a run down to the Royal Botanical gardens and saw their ornamental lake and collection of local plants.

Prof. Choong picked us up from the apartments that evening and made us a fantastic BBQ meal at his home, joined by his family and students Dominic and Catherine.

Prof. Choong and Dominic drove us all to Healesville Sanctuary on Sunday morning. This was a zoo just for Australian animals and we were all excited to check koalas, kangaroos, wallabies, wombats, possums and Tasmanian devils off our list of Australian ‘must sees’. Perhaps the highlight of the Sanctuary trip was the (very) close encounters at the live bird show.



On Monday, we began at the St Vincent’s hospital x-ray meeting and presented our talks then had some time to talk informally with the surgeons before excellent talks by Dr Claudia Di Bello, on 3D printing of cells with a handheld pen for cartilage regeneration and Catherine Ngan on engineering muscle and neuromuscular junctions to interact with robotic prostheses.

The afternoon began with a great tour of the emergency department at the Royal Melbourne Hospital with Prof. Pirpiris (including the helipad, which even the local surgeons are not usually allowed on!)

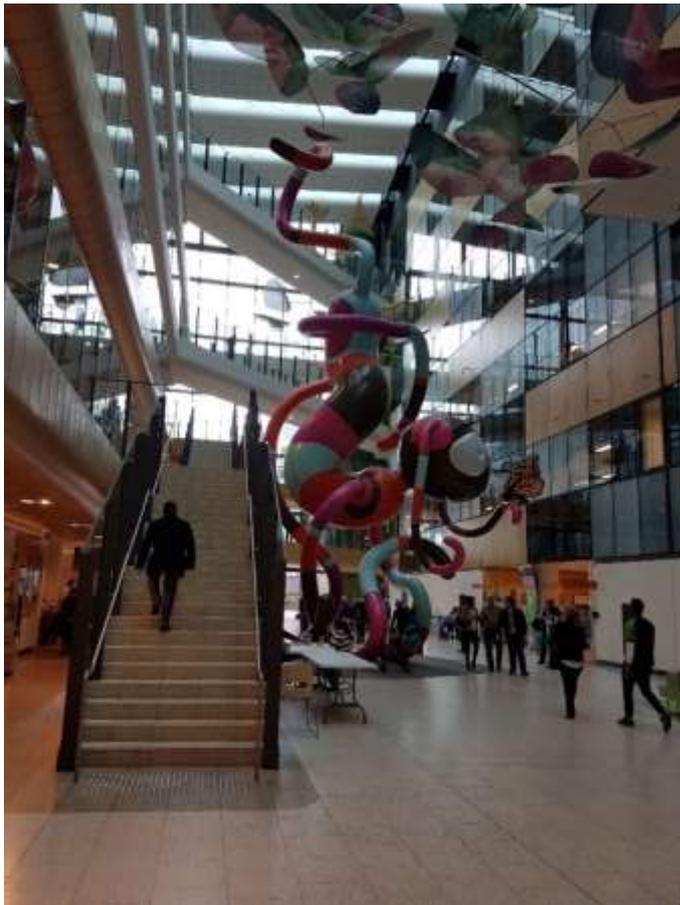


We then met with the department head and the hospital CEO, before giving some different presentations to the local orthopaedic registrars and fellows.

A fantastic dinner was hosted by Prof. Choong at the Melbourne club and we were joined by Prof. De Stieger and Prof. Pirpiris. The evening was completed by taking in some of the finest views of Melbourne by night.



Tuesday began with a tour of the private non-profit Epworth Hospital by Prof De Stieger. He arranged for us to spend the morning with some of the surgeons. Sarah had a very interesting time observing Prof. Pirpiris doing a total hip replacement through an anterior approach, which she had not had the chance to see in the UK. Iain met with Sports Surgeons Prof. Julian Feller and Mr Brian Devitt and toured the impressive OrthoSport Victoria Clinical and Research Facility within Epworth. In the afternoon, we all visited the Royal Children's Hospital, with a tour of the modern clinical facilities by Dr Leo Donnan, talks on complex gait analysis by Prof Kerr Graham, and a tour of the stem cell laboratory by Prof. John Bateman focussing on their work on disease models using induced pluripotent stem cells.



Sydney: 5th October – 10th October

Sydney was the third and final Australian City to visit as part of the BORS travelling fellowship. Here we visited both of Sydneys' so called 'Group of 8' leading Australian Universities: The University of New South Wales (UNSW) and Sydney University.

On Thursday the 6th of October we were hosted by Professor Bill Walsh at his impressive Surgical and Orthopaedic Research Laboratories (SORL) based within the Prince of Wales Hospital in Southern Sydney. We attended the Orthopaedic Department Trauma and Elective X-Ray review meeting and while the surgeons spent the morning in theatre, Harry, Wayne and Alastair spent time learning about the engineering research activities and projects ongoing within the SORL. Paul and Iain enjoyed seeing some arthroscopic knee cases with Dr Dave Broe, while Sarah spent an enjoyable and

informative morning in theatre with Dr David Lunz, observing a complex hindfoot reconstruction for severe pes planus.



Prof Walsh leads his lab group in 'crossfit' gym session every Thursday and Paul and Iain joined in to gain an authentic experience of life within the lab. The whole group felt that these gym sessions were helpful from a team building perspective, while also giving the researchers a much needed 'break' from the lab.



In the afternoon the group spent time in the SORL laboratory with Professor Walsh and the senior researchers including Matt Pelletier and William Parr. The engineers enjoyed presentations and a discussion and debate about finite element analysis in spinal implants, while the clinicians observed an experiment involving knee kinematic assessment using the KneeKG system.

On Friday the BORS fellows spent the day with Professor Chris Little at the Raymond Purves Bone and Joint Research Labs at the Kolling Institute of Medical Research based in the Royal Northshore Hospital in Sydney. The new laboratory facilities boast impressive views across Sydney and are linked to the Clinical Hospital Departments by a link bridge facilitating collaboration and 'cross-talk' between researchers and clinicians. Professor Little is a world leader in small and large animal models of osteoarthritis and cartilage injury, with his work greatly facilitated by a state of the art animal facility within the campus.



Having presented our work to researchers from both the Orthopaedic and Rheumatology Departments we enjoyed visiting Dr Elizabeth Clarke's Biomechanics laboratory where we were able to observe an ongoing experiment exploring the mechanical properties of suture materials used in the repair of rotator cuff tendons. We enjoyed hearing about ongoing PhD projects in this area and entered in lively discussion about modelling ligament behavior. The day was completed with a relaxed discussion about Brexit over a beer!

We then enjoyed a few days away from Orthopaedics: Wayne spent the weekend surfing in Brisbane, Harry flew briefly to New Zealand to visit Family, Iain and Paul enjoyed visiting Manly and Sarah and Alastair saw Humpback Whales on a boat trip.

On Monday we returned to Professor Walsh's Lab at the University of New South Wales where we spent time in the lab hearing about ongoing projects and collaborations that the SORL team current have ongoing. All the fellows were hugely impressed by the facilities within the SORL lab and the vast number of projects completed by the group each year. Professor Walsh has within his own laboratory custom made histology, molecular biology and surgical suites and has 3D printing, Electron Microscopy and microCT facilities at close hand. To finish the day Professor Walsh took us for a swim at his local surfing spot at Marouba – setting for the famous surfing film 'Bra Boys'.



Singapore: 12-14th October

Having left Australia we moved on to Singapore where we were hosted by the National University Hospital. We were accommodated at the local halls of residence and were looked after by Dr. Lim Chin Tat. Our first morning we were welcomed to the departmental meeting and listened to a talk by their visiting professor, Deborah Eastwood, who was visiting for the Singaporean Orthopaedic Association annual scientific meeting. We then met with Professor James Hui and had a round table discussion about his particular field of research, cartilage regeneration. Following this we got to attend some elective and trauma operating. That evening we were hosted at a local 'all you can eat' by the department head, Professor Wilson Wang, as well as previous Edinburgh trainee and fellow Yuhan Chee and Ruben Manohara.



The following day we were hosted by Professor Yeow of the National University of Singapore. As well as getting to discuss their collaborations with the orthopaedic surgeons we were able to present to a group of academics from the biomechanics department. Following a stimulating session we were given a tour of their nanotechnology, robotics, tissue engineering and gait laboratories. Unfortunately we were unable to attend the Singapore Orthopaedic Association meeting but did have a chance to go to the Singapore night zoo where we were able to see a variety of animals up close including lions, tigers, rhinos, elephants and hyenas. The final day of the fellowship gave us the opportunity to experience some of Singapore including the fantastic Gardens by the Bay, the views from the Marina Sands hotel, the botanical gardens as well as tasting the local delicacy, freshly cooked chilli crab.