



Paediatric Spine Research Group Newsletter

October 2013

The QUT/Mater Paediatric Spine Research Group (PSRG) was formed in 2002 to conduct clinically driven, high quality research into spinal deformities and disorders.

Paediatric Spine Research Group now located in Mater Research Hub!

The PSRG staff and students have moved into the recently refurbished Research Hub on Level 2 of Aubigny Place at the Mater. Aubigny Place started out as the Mater Private Hospital in 1910 after the Sisters of Mercy purchased a 10 acre dairy farm at South Brisbane in 1893. This dairy farm, now known as Mater Hill, is the current home of the Mater Mothers, Adult and Children's Hospitals. Levels 1 and 2 of Aubigny Place housed patients, while the 3rd and top floor served as the Sister's Convent until 1926 when the first of many additions to the building were made. It was renamed Aubigny Place in 1995 in recognition of the first Mater Hospital which operated out of a large home called "Aubigny" at North Quay in Brisbane. The PSRG office is located in what was the Chapel of the original hospital, complete with beautiful stained glass windows, one level directly above the spectacular main entrance (see below).



Above: Aubigny Place, Mater Health Services, Brisbane, Australia.

New PSRG Research Masters Candidate & International Fellow

Dr Simon Parfitt (left) commenced his Research Masters project this year titled "*Semi-constrained growing rods with and without apical staples for juvenile scoliosis correction.*" This work will be an extension of the previous Masters candidate's project. Growing rods in children with severe and progressive spinal deformity aim to halt progression and provide some correction of the deformities whilst allowing the spine, ribcage and lungs to continue growing with the child. Modern semi-constrained systems appear to



reduce the incidence of common complications such as rod breakage and auto-fusion of spinal segments. Dr Parfitt's study will conduct biomechanical tests on immature porcine spines (as a model for young human spines) using growing rods in addition to staples inserted at the

apex of the scoliosis which will be clinically applicable to patients with juvenile scoliosis. The effect of the addition of the apical staples to the growing rods on spine biomechanics will be examined.

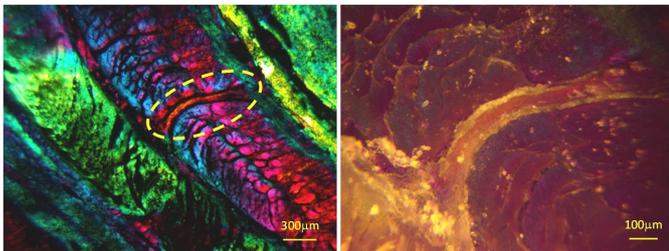
We also welcome Dr Andrew Cook, a British trained Orthopaedic Surgeon, as our 2013-14 visiting Spinal Fellow. He attended Oxford University followed by time at Imperial College School of Medicine. He joined the Cambridge Training Rotation in 2007 and gained his Ortho Specialist qualification in 2012. He has worked with two of our previous PSRG Spinal Fellows, John Crawford at Cambridge and just prior to arriving in Australia, worked with Lennel Lutchman at Norwich, UK. His interests outside of work include skiing, triathlons, rugby and entertaining his children. He is married to Laura and together they have three young children, Imogen (4 years), Sam (2 years) and Ellie (6 months).



While he is continuing his spinal surgical training in Brisbane, he will also be involved in research projects with the PSRG. Andy will perform a hospital cost analysis of anterior spinal deformity correction surgery as well as reviewing the long term surveillance of children with spinal deformities. As part of this we will be examining patient satisfaction a minimum of four years after deformity correction surgery. The patients will be evaluated in the broad areas of function/activity, self-image/appearance, mental health, pain and satisfaction with their spinal deformity management. Previous PSRG work (*Spine* 31(21) 2006) using the Scoliosis Research Society's validated quality of life questionnaire, reported outcomes before surgery and at intervals of 2 months, six months, one year and two years after surgery for a group of 83 patients. A more recent PSRG paper (*Spine* 35(26) 2010) evaluated the relationship between deformity correction and patient satisfaction responses after thoracoscopic scoliosis surgery in a series of 100 patients.

News from Clayton Adam in Paris

Clayton's work at Laboratoire de Biomecanique, Arts et Metiers ParisTech on the European Union 7th framework Marie Curie project "DiscSim: Multiscale biomechanical modeling and simulation of the intervertebral disc" has led to the development of a novel imaging technique to explore the microstructure of the IV disc. This work was recently presented at the 2013 Eurospine conference (Oct 2-4 Liverpool, UK) and uses multimodal polarized light microscopy to differentiate between collagen and elastic fibre networks in the disc. The images below show a translamellar cross-bridge, where the colours in the transmitted polarized light image on the left provide information on the alignment of the collagen in the outer annulus of the disc, and the reflected polarized light image on the right (at higher magnification) shows that the cross-bridge is comprised of an inner collagenous core surrounded by an elastic fibre sheath. The microstructural imaging being developed will be used to define multiscale biomechanical models of disc function in health and disease.



The Spine Society of Australia 24th Annual Scientific Meeting, Perth, 2013.

In April the PSRG was again represented strongly at this key Australian Spine meeting with four podium presentations. Congratulations go to our Queensland X-Ray Masters Fellow, Dr Mostyn Yong, who won the Rob Johnston Award (pictured below with Prof Mark Pearcy and Maree Izatt). This award is given for the Best Presentation by a Trainee. Our three other presenters were; Qld X-Ray Clinical Masters Fellow Dr Nabeel Sunni, PhD Student Bethany Keenan and our previous Spinal Fellow Dr Eric Huang.



The four presentations including the prize winner were:

1. *Biological performance of a polycaprolactone-based scaffold plus BMP-2 in an ovine thoracic interbody fusion model.* *Yong, Woodruff, Askin, Labrom, Hutmacher, Adam.

2. *The effect of testing protocol on immature bovine thoracic spine segment stiffness.* *Sunni, Askin, Labrom, Izatt, Pearcy, Adam.
3. *Segmental torso masses and coronal plane joint torques in the adolescent scoliotic spine.* *Keenan, Izatt, Askin, Labrom, Pettet, Pearcy, Adam.
4. *Inter-vertebral rotational deformity after endoscopic anterior scoliosis correction may contribute to rib hump recurrence after two years.* *Huang, Askin, Labrom, Adam, Izatt, Pearcy.

Visiting student from University of Stuttgart, The Netherlands

Tille Ruppe, a PhD student in the final year of her research at the Univ. of Stuttgart, visited the PSRG in April this year. The focus of Tille's PhD Research is to develop a biomechanical model of the lumbar spine which simulates the forces applied to the spine by the spinal muscles which are responsible for the movement of the spine during daily activities. In the near future, we hope to further enhance our own PSRG spine computer models to simulate not only the patient's spinal bones and ligaments, but also their spinal muscles. We invited Tille to visit PSRG researchers to discuss a collaborative project integrating her Lab's spine-muscle model with our existing patient-specific spinal modelling technology. Tille's time with us was extremely productive and we look forward to further developing this collaboration through joint publications and grant applications in the future.



PSRG Publications in 2013!

The PSRG is pleased to announce that we have had four scientific journal papers published so far, with a further six currently undergoing the international peer review process.

1. **Yong MR, Saifzadeh S, Askin GN, Labrom RD, Hutmacher DW, Adam CJ.** Biological performance of a polycaprolactone-based scaffold plus recombinant human morphogenetic protein-2 in an ovine thoracic interbody fusion model. Accepted *European Spine Journal* Oct, 2013.
2. **Little JP, Adam CJ.** Geometric sensitivity of patient-specific finite element models of the thoracolumbar spine and ribcage to variability in user-selected anatomical landmarks. Accepted *Computer Method Biomechanics & Biomed Engineering* Sept 2013.
3. **Little JP, Izatt MT, Labrom RD, Askin GN, Adam CJ.** An FE investigation simulating intra-operative corrective forces applied to correct scoliosis deformity. *Scoliosis* 8:9. May 2013
4. **Yong MR, Saifzadeh S, Askin GN, Labrom RD, Hutmacher DW, Adam CJ.** Establishment and characterisation of an open mini-thoracotomy surgical approach to an ovine thoracic spine fusion model. *Tissue Engineering Part C: Methods*. April 2013

Any questions or want to know more?

Paediatric Spine Research Group
Old University of Technology and Mater Research,
Brisbane, Australia, 4101

Email: spineresearch@mater.org.au