Prince of Wales Otorhinolaryngology Head and Neck Research Group

Annual Report 2019

Prince of Wales ORL Head and Neck Research Group Annual Report 2019

The Prince of Wales ORL Head and Neck Research Group was formed in February 2017 and comprises a heterogeneous group interested in participating, promoting and partaking in research in the area of Otolaryngology and Head and Neck Surgery.

The group comprises of doctors from the Department of Otolaryngology/ Head and Neck Surgery, Department of Radiation Oncology, nurses, speech therapists and medical students.

Meetings are held monthly in an informal setting aimed at promoting a supportive environment to discuss new ideas pertaining to research in the area of Otolaryngology and Head and Neck Surgery, ongoing projects and collaborations.

This year has seen an increasing focus on collaborative research in the area of translational medicine in Otolaryngology/Head and Neck Surgery strengthening ties with the University of New South Wales Department of Biomedical Engineering, University of Sydney Department of Engineering and more recently the University of Technology Sydney Department of Artificial Intelligence and Computer Science:

The group is chaired by Professor Thomas Havas, and key group members are:

Dr Ian Jacobson FRACS (OHNS)
Dr Sim Choroomi FRACS (OHNS)
Dr Catherine Meller FRACS (OHNS)
Dr Catherine Banks FRACS (OHNS)
Dr Julia Crawford FRACS (OHNS)
Dr Wenchang Wong FRANZCR
Professor Sokrates Dokos (PhD) of Faculty of Engineering, University of New South Wales
Dr Ravjit Singh, Unaccredited Registrar Prince of Wales Hospital 2019
Dr Anders Sideris, Head and Neck Cancer Foundation Research Fellow 2019
Dr Richard Tjojohno
Dr Andrew Lange
Dr Jordan Fuzi
Dr Alon Taylor
Dr Tim Holmes
Dr Ben Cumming
Dr Luke O'Neill
Cassie Dow

Will Karantanis
Yvette Coles
Rachelle Robinson and Molly Barnhart from the Department of Speech Therapy
Paula Gunner, Clinical Nurse Consultant in Otolaryngology Head and Neck Surgery

The research produced by this group demonstrates great breadth, from bench top basic scientific work to bedside clinical work. This has been demonstrated by a number of local and international presentations by members of the group and publications in esteemed peer reviewed journals.

Research Fellow Report 2019

It has been an exciting year to hold the Research Fellow position for the Prince of Wales ORL HN Research Group. The activity of the group has really picked up with an increasing focus on collaborative biomedical and translational projects with potential real life applications in Otolaryngology/ Head and Neck Surgery. The philosophy of this group has been to identify key areas of clinical need and focus research on innovative solutions to these clinical problems. A key part of this has been increasing collaboration with the University of New South Wales department of Biomedical Engineering, a relationship that is thriving with the help of Professor Sokrates Dokos.

This year saw a number of new Masters projects take off by clinical members of the group; I have had the privilege to work on a technological solution to the need for a robust method of sustained release topical therapies in ENT. Additionally, a number of Masters students have been in collaboration with the group through the departments of Biomedical Engineering at UNSW, namely a group of students developing a patient specific 3D printed mandibular reconstruction method, and at the University of Sydney Department of Mechanical engineering, mechanically testing freshly harvested nasal cartilage as a preliminary step in the development of tissue engineering cartilage grafts for use in nasal reconstructive surgery. Additionally, the group is entering the space of Artificial Intelligence and its ever-evolving use in healthcare through collaborations with the Department of Computer Science at the University of Technology Sydney.

In addition, international collaborations have taken off with ties being made to esteemed institutions around the world including Massachusetts Eye and Ear Hospital, Harvard Medical School through the return of Dr Catherine Banks from her fellowship in Boston, Mayo Clinic Rochester, and the Food and Biology Lab in Palmerston North, New Zealand.

The launch of the Head and Neck Cancer Foundation has put much wind in the sails of the group. Their generous work has allowed my position as Research Fellow to be funded for the first time since the inception of the role. The group is now seeking its first Head and Neck Cancer Foundation funded PhD student to join the group in 2020.

Overall, I am proud of what the group has achieved in the past 12 months and look forward to the progress we make in the next year. I'd like to thank Professor Havas and senior members of the group for their support and mentorship of myself and other members of the group and the board members of the Head and Neck Cancer Foundation for making such a fruitful year in academic research possible.

Research 2019

Academic Journal Publications:

Cumming B, Sideris A, Holmes T, Jacobson I, Havas T, *Orbital Exenteration: Tumour Diversity and Survival Outcomes in a Tertiary Referral Centre*, Australian Journal of Otolaryngology, September 2019

Dow C, Sideris A, Singh R, Giles M, Banks C, Meller C, Choroomi S, Havas T, *A non-inferiority trial: Safety and efficacy of 1:1000 vs. 1:10,000 topical adrenaline in sino-nasal surgery*, American Journal of Rhinology and Allergy, Preliminarily accepted for publication August 2019.

Sideris A, Holmes T, Cumming B, Havas T *A systematic review and meta-analysis of predictors of airway intervention in adult epiglottitis*, Accepted for publication in The Laryngoscope, May 2019.

Holmes, T. R., Cumming, B. D., Sideris, A. W., Lee, J. W., Briggs, N. E., & Havas, T. E. (2019). *Multidisciplinary Tracheotomy Teams: An Analysis of Patient Outcomes and Resource Allocation*. Ear, Nose and Throat Journal, 98(4), 232-237.

Singh R, Smee R, Havas T, *The Role of Neck Dissection in High Grade Salivary Gland Carcinomas*, Submitted to *Head and Neck*, currently under review.

Banks C, Grayson JW, Woodworth, BA. *Frontal Sinus CSF leaks – a change in the paradigm.* Current Opinion in Otolaryngology and Head and Neck Surgery. (Pending 2019)

Thompson H, Banks C, Woodworth, BA. *A Review of Pre-Clinical Data on Antibiotic Eluting Sinus Stents*. Investigative Laryngoscope. (Pending)

Book Chapters

Banks C, Woodworth, B, *Cystic Fibrosis and Chronic Rhinosinusitis: Interventions on the horizon*. David Gudis and Rod Schlosser, The Unified Airway: Rhinologic and Respiratory Disorders. Springer. In Press 2020.

Oral and Poster Presentations:

Fuzi J, Sideris A, Wong W, Jacobson I, Havas T, *Desmoid Tumours of the Head and Neck: A Survival Analysis in the Adult and Paediatric Population*, Australia New Zealand Head and

Neck Cancer Society Annual Scientific Meeting, Accepted for Poster Presentation, Adelaide, 19-21 September 2019.

Sideris A, Singh R, Wong W, Jacobson I, Havas T, *Spindle Cell Carcinoma of the Head and Neck: A Retrospective Survival Analysis*, Australia New Zealand Head and Neck Cancer Society Annual Scientific Meeting, Accepted for Poster Presentation, Adelaide, 19-21 September 2019.

Lange A, Taylor A, Sideris A, Wong W, Jacobson I, Havas T, *Funding Implications for Coding Errors in Complex Head and Neck Surgery*, Australian New Zealand Head and Neck Cancer Society Annual Scientific Meeting, Accepted for Poster Presentation, Adelaide, 19-21 September 2019.

Sideris A Holmes T, Cumming B, Havas T, *A systematic review and meta-analysis of predictors of airway intervention in adult epiglottitis*, 2nd European Conference on Otolaryngology, Singapore, May 2019.

Sideris A, Rao A, Jacobson I, Gallagher R, Smee R, Havas T, *Salivary Gland Acinic Cell Carcinoma: A Retrospective Cohort Study in the Adult and Paediatric Population*, Prince of Wales Hospital, Sydney Children's Hospital, St Vincent's Hospital. 2nd European Conference on Otolaryngology, Singapore, May 2019.

Dow C, Sideris A, Singh R, Giles M, Banks C, Meller C, Choroomi S, Havas T, *A non-inferiority trial: Safety and efficacy of 1:1000 vs. 1:10,000 topical adrenaline in sino-nasal surgery*, 2nd European Conference on Otolaryngology, Singapore, May 2019.

Dow C, Sideris A, Singh R, Giles M, Banks C, Meller C, Choroomi S, Havas T, *A non-inferiority trial: Safety and efficacy of 1:1000 vs. 1:10,000 topical adrenaline in sino-nasal surgery*, Australian Society of Otolaryngologists and Head and Neck Surgeons Annual Scientific Meeting, Brisbane, 2019.

Pickford R, Sideris A, Thomson K, Havas T, Walsh WR, *Quantitative LC-MS/MS in the development of novel polymer devices providing controlled sustained release of local anaesthetic agents to the surgical wound in the treatment of postoperative surgical pain*, Australia New Zealand Society for Mass Spectometry Annual Scientific Meeting, January 2019.

Sideris A, Rao A, Jacobson I, Gallagher R, Smee R, Havas T, *Salivary Gland Acinic Cell Carcinoma: A Retrospective Cohort Study in the Adult and Paediatric Population*, Prince of Wales Hospital, Sydney Children's Hospital, St Vincent's Hospital. Poster Presentation at Australian Society of Otolaryngologists and Head and Neck Surgeons Annual Scientific Meeting, March 9-11 2018.

Rao A, Sideris A, Jacobson I, Gallagher R, Smee R, Havas T, *Acinic Cell Carcinoma of the Parotid Gland: A Retrospective Cohort Study*, Prince of Wales Hospital, Sydney Children's Hospital, St Vincent's Hospital. Podium presentation at Australia New Zealand Head and Neck Cancer Society (ANZHNCS) July 26-28 2018.

Sideris A, Holmes T, Cumming B, Havas T, *The Re-Emergence of Adult Epiglottitis: A Systematic Review of the Literature*. Poster presentation at Australia Society of Otolaryngologists and Head and Neck Surgeons Annual Scientific Meeting, March 9-11 2018.

Cumming B, Sideris A, Holmes T, Havas T, *Retrospective Review of Orbital Exenteration at Prince of Wales Hospital.* Poster presentation at Australian Society of Otolaryngologists and Head and Neck Surgeons Annual Scientific Meeting, March 9-11 2018

Holmes T, Cumming B, Sideris A, Gunner P, Havas T, *The Implementation of a Multidisciplinary Tracheostomy Clinical Round at Prince of Wales Hospital: An Audit of its Effectiveness.* Poster presentation at Australian Society of Otolaryngologists and Head and Neck Surgeons Annual Scientific Meeting, March 9-11 2018

Banks C, Choroomi S, Fairhall J, Harvey R, Sacks, R Bleier B. *Development and Feasibility of a Cadaveric Endoscopic Skull Base Tumour Model*. Submitted ASOHNS 2020

CG Banks, Q Husain, R Sacks, Suzanne Freitag, BS Bleier. *Development of a Modular Cadaveric Endoscopic Orbital Surgical Model*, Australian and New Zealand Rhinological Society – Melbourne

Awards

Best Presentation – Australian and New Zealand Rhinological Society – Melbourne, *Development of a Modular Cadaveric Endoscopic Orbital Surgical Model*, CG Banks, Q Husain, R Sacks, Suzanne Freitag, BS Bleier.

Ongoing Projects

Academic Stream

The prevalence of HPV in healthy tonsillar tissue within an unvaccinated paediatric population (Singh/Jacobson)

Current data illustrates no cases of vertical transmission HPV from mother to child in a cohort of 70 children.

Systematic review of non-antibiotic anti-biofilm therapies in ENT. (Taylor/ Sideris/ Banks/ Havas)

This project examines the current evidence for non-antibiotic anti biofilm therapies to help us better understand how to address the newly discovered entity in rhinosinusitis.

Funding Implications of Coding Inaccuracies in Complex Head and Neck Surgery (Lange/ Taylor/ Sideris/ Jacobson)

This project, conducted in conjunction with the Department of Clinical Coding at Prince of Wales Hospital, revealed approximately $60 000 in lost funding opportunities in complex Head and Neck Cancer Surgery. This will prompt the development of an operation report proforma to maximize funding to the Head and Neck unit at Prince of Wales Hospital.

Idiopathic Subglottic Stenosis: A Retrospective Review of Management Strategies and Outcomes (Prabhakar/ Sideris/ Stewart / Jacobson)

This project examines our institutional experience with the management of idiopathic subglottic stenosis at Prince of Wales Hospital as a comparison to other published data from international cohorts.

The Role of Pepsin in Laryngopharyngeal Reflux (Fuzi/ Singh/ Havas)

This project examines the role of pepsin in the propagation of laryngopharyngeal reflux in those with clinical evidence of this disease, challenging the long held assumption that LPR is caused by acidity of gastric secretions.

Development and Feasibility of an Cadaveric Endoscopic Skull Base Tumour Model (Banks C/ Choroomi S/ Fairhall J/ Bleier B)

This project examines the feasibility of a novel cadaveric endoscopic skull base tumour model.

A multinational review of the use of Patient Reported Outcome Measures in Rhinology (Banks C/ Ting F/ Choroomi S/ Husain Q/ Sacks R/ Psaltis A/ Douglas R/ Hopkins C/ Gray S)

This project examines multinational data on the use of patient reported outcome measures in Rhinology.

Biomedical and Translational Stream

3D Printing implantable jaw allografts for insertion in patients undergoing mandibulectomy (Singh/Dokos/Havas)

The group's first collaborative project with UNSW Biomedical Engineering saw a group of students design and engineer a patient specific 3D printed mandibular prosthesis from a real life mandibulectomy case. The devices were specifically engineered to fit the specified oncological cut out and withstand normal mandibular forces of chewing, implementing muscle attachment point and channels for insertion of brachytherapy catheters. This work was presented to us at our September meeting with great success. Preliminary contact has been made with the Mayo Clinic in Rochester, Minnesota to facilitate an in vivo animal study to test the method.

Development of a Biopolymeric Drug Delivery Device for Use in Otolaryngology/ Head and Neck Surgery (Sideris/Havas)

The 2019 Research Fellow, Dr Anders Sideris, has made significant progress with the development of an absorbable drug delivery technology for use in Head and Neck Surgery. In vitro data illustrates an extended release profile of up to 5 days of bioavailable drugs from the polymeric delivery system. This technology will be tested in November 2019 in a validated in vivo porcine model to assess the biocompatibility, adhesion, safety and degradation characteristics in conjunction with the UNSW Surgical and Orthopaedic Research Laboratories. It is with the hope that successful animal data can take us one step closer to a human application of this technology with broad applications from rhinopharmacological sustained release of intranasal medications, to postoperative localized deliver of antineoplastic agents in head and neck surgery, to delivery of growth factors to wounds.

Histological and Biomechanical Investigation of Cartilage Autografts in Nasal Reconstructive Surgery (Sideris/ Coles/ Choroomi/ Meller/ Banks/ Marcells /Havas)

Biobanking of human nasal cartilage is in full swing. We have been collecting nasal septal and rib cartilage fresh from nasal surgeries at Prince of Wales Hospital and in conjunction with the department of Mechanical Engineering at the University of Sydney and the Engineering at UNSW we have been able to define for the first time normative data on the tensile properties of nasal cartilage and have been able to assess the effects of demographics, sex and comorbidities on this. The next step in this project will involve design of 3D printed constructs for integration of cartilage cell culture in vitro with a view to personalising cartilage to the mechanical properties of a patient specific population.

Optical Coherence Tomography in Laryngeal Surgery (Singh/ Stewart/ Jacobson/ Havas)

This project is an industry collaboration in which the use of optical coherence tomography and con-vivo microscopy will be preliminarily validated in an ex vivo porcine model to assess its usefulness as an intraoperative tissue and oncological margin assessment tool. The proposed benefits of this technology include saved operating time, increased accuracy of oncological margin assessment and a reduced reliance on human interpretation of tissue histopathology with the integration of artificial intelligence to interpret the data output from the device. This project is being undertaken as a Masters of Biomedical Engineering at UNSW by 2020 Head and Neck Foundation Registrar Dr Ravjit Singh.

Proposed PhD Project – 3D Printing of Temporal Bone and Lateral Base of Skull Models as a Surgical Training Model

This is a collaborative project between UNSW Engineering and the POW ORL HN Research Group, the aim of which is to develop a drillable 3D printed temporal bone model for educational purposes for the ENT trainee. This has been proposed as a potential PhD project under the faculty of UNSW Engineering for a Biomedical Engineering student and will involve the use of Micro-CT data from scans of disarticulated temporal bones being reconstructed into accurate 3D computer models.

These 3D computer models will then be 3D printed and a feasibility study undertaken to assess the surgical experience, anatomy and feasibility of such a model whereby an experienced senior otologist blinded to the original specimen anatomy and CT images will drill this bone and feedback will be provided for further development of this model to make it realistic and informative for the training surgeons.

Artificial Intelligence in Decision Making in Complex Head and Neck Cancer Surgery

This is a new collaborative project between UTS School of Computer Science and the POW ORL HN Research Group, the aim of which will be to develop a machine learning model to predict optimal treatment recommendations based on patient and disease characteristics and best evidence from the literature on Head and Neck cancer treatment.

International Collaborations

The Role of Microbiome in Allergic Rhinitis and Malignancy of the Aerodigestive Tract (Karantanis/ Singh/ Sideris/ Banks/ Havas)

This project is being taken on as an ILP project by Will Karantanis in 2020. In this project we will assess the normal and abnormal nasal micro biome in those with allergic rhinitis. Additionally, a second wind of this study will look to define to normal laryngeal micro biome and examine a relationship between micro biome, the development of laryngeal malignancy and changes in laryngeal micro biome in those that are acid suppressed. The microbial RNA sequencing is being undertaken with an international collaborator in Auckland, New Zealand.

The Role of Masseter Muscle Activation in Smile (Fuzi/ Meller)

Dr Jordan Fuzi will begin his Masters degree examining the role of masseter muscle activation in normal smile, a key piece of information that will help us better select patients for masseter facial reanimation. This is a collaboration with the Massachusetts Eye and Ear Hospital in Boston, US.

Database Initiatives

Facial Nerve Clinic Database

This year we have established the first prospective database tracking clinical outcomes in patients with facial nerve disorders, including postoperative outcomes, cost analysis, mental health scores and patient satisfaction scores. The planned implementation of electronic pre visit questionnaires for patients to fill out prior to their clinic visit is designed to save time and optimise data collection through a fully integrated online cloud based system.

Transoral Robotic Head and Neck Surgery Database

This year we have established the first fully integrated cloud based prospective database tracking clinical outcomes in patients undergoing TORS under Dr Julia Crawford – a new addition to the department at Prince of Wales Hospital. The planned implementation of electronic pre visit questionnaires for patients to fill out prior to their clinic visit is designed to save time and optimise data collection through a fully integrated online cloud based system.

Head and Neck Cancer Foundation and Funding Initiatives

This year saw the launch of the Head and Neck Cancer Foundation, an initiative founded to fund world-class research into Head and Neck Surgery. The foundation has been able to raise approximately $190 000 in funds thanks to a number of fundraising initiatives including:

- The first Head and Neck Cancer Gala Dinner
- Critics Choice McGuigan Wine Campaign
- City 2 Surf Head and Neck Cancer Foundation Team Campaign

The kind donations and fundraising efforts by key members of the board of directors have made it possible for the 2019 Research Fellow Dr Anders Sideris to receive a $50, 000 research grant as a salary for the year.

There has been significant press interest in the launch of the foundation, multiple members of the foundation could be seen in the Daily Telegraph social column the day following the successful launch of the foundation as well as after the first Gala Dinner. Additionally, a story on current research fellow Dr Anders Sideris was featured in the Daily Telegraph on July 28, 2019.

DOCTOR GRANTED FELLOWSHIP TO RESEARCH CANCERS OF HEAD, NECK, EAR NOSE AND THROAT

28 July 2019 | Annette Sharp | The Sunday Telegraph

One of the most challenging and under-funded areas of cancer research is about to get a massive boost thanks to a top young Sydney doctor and a medical foundation.

Dr Anders Sideris will spend 12 months researching his passion — cancers of the head and neck, ear, nose and throat — after being granted a fellowship from the newly established Head and Neck Foundation in conjunction with the Prince of Wales Hospital. "Head and neck cancer is underfunded and the outcomes, compared to other cancers, are poor and not much progress has been made in the area for the past, say 30 years," Dr Sideris said. "I studied medicine at the University of Newcastle where I became interested in head and neck cancer during the two years of my internship and residency. "I was exposed to different types of surgery — everything from vascular surgery to general surgery to plastic surgery — and ear, nose throat, head and neck surgery — and head and neck stuck out because it's one of the most challenging. Operating on this cancer is challenging — and it's an area of real need."

Head and Neck Cancer Foundation Press Publications 2020

1. John Fordham launches Head and Neck Foundation after cancer fight, John Fordham, The Sunday Telegraph, March 31, 2019

2. Ben Fordham interviews his own dad for a great cause, 28/03/2019, 2GB RADIO

3. John Fordham opens up on career highlights and health battle, 13/06/2019, Sky News Australia

4. John Fordham gives us an even better reason to love wine, 28/03/2019, Alan Jones, 2GB RADIO.

5. Critic's Choice wine raising money for Head and Neck Cancer Foundation, John Lewis Newcastle Herald, March 27 2019 - 6:00AM

6. Headstart to Cancer Research. Daily Telegraph, July 28 2019.