

Voice and Upper Airway

Paediatric Airway and Head & Neck Research Lab

Evan Propst, Nikolaus Wolter, Robert Harrison, Karen Gordon, Alex Osborn, Jennifer Wolter, Jonathan Wasserman, Thomas Looi, George Yousuf, Blake Papsin

The Paediatric Airway and Head & Neck Research Laboratory at the Hospital for Sick Children has been involved in a variety of projects involving the pediatric airway, head and neck, ranging from basic science to educational research. This work is supported by the Gnat and Bastable-Potts Chair in Paediatric Otolaryngology (held by Blake Papsin), Restracom, and funding from the Stronach, Paris, Choi and Lo families. Building on previous work aimed at improving outcomes in pediatric thyroid carcinoma (i.e. recurrent laryngeal nerve monitoring during thyroid surgery reported last year), our group recently investigated the patterns and predictors of metastatic spread to the neck in pediatric thyroid carcinoma, which was published in the journal *The Laryngoscope*. The goal of this study was to help predict which lymph nodes are affected in pediatric thyroid cancer in order to achieve a more complete surgery. To better understand the behaviour of pediatric thyroid cancer and how it differs in children compared with adults, our team has been investigating total and microRNA-based diagnostics for pre- and post-operative treatment stratification of children and adolescents with thyroid masses and thyroid carcinoma. Preliminary work was supported by a Harry Barberian Scholarship Award. I am proud to report that our group was recently awarded a large amount of funding from the Garron Family Cancer Centre for this promising study, with Jonathan Wasserman of Endocrinology as Principal Investigator and Jennifer Wolter as head Research Associate.

Ashley Deonarain, an outstanding graduate of the University of Toronto, Department of Engineering, successfully defended her Master's thesis showing

that the high fidelity synthetic neck and airway model created in our laboratory and CIGITI was as valid as using a live porcine model for teaching tracheostomy and open airway surgical procedures (thyroid ala and costal cartilage graft laryngotracheoplasty). This work was extremely well received when presented at the International Conference of the IEEE Engineering in Medicine and Biology Society in Berlin, Germany, and the Society for Ear Nose and Throat Advances in Children (SENTAC) in San Diego, California. This model was also used to train 51 otolaryngology-head & neck surgery trainees in a hands-on course coordinated by SENTAC and Endo Days. Competency-based assessment tools have since been published in the *The Laryngoscope* for tracheostomy and esophagoscopy, in association with our previous fellow Erynne Faucett, by surveying 65 expert pediatric otolaryngologists from around the world using a Delphi process to be able to standardize education for these procedures for trainees in the future. We also created a laminated poster of the airway with photos of common anomalies, oriented as you would see it during rigid bronchoscopy, that has been distributed free of charge to thousands of people around the world. Please contact us if you would like a poster to hang in your operating room or clinic.

We have also been investigating the molecular development of lymphatic malformations, seeking to understand the molecular targets of sirolimus in lymphatic endothelial cells to gain new insights into how these lesions form and regress. Jennifer Wolter, Alex Osborn and Nik Wolter, have done a tremendous job studying intracellular junctions, lymphangiogenesis, and the AKT pathway in normal lymphatic tissue and have successfully grown human lymphatic malformation cells. The lab's impressive novel discovery that SHP-2 inhibitors prevent the growth of lymphatic malformations and act synergistically with sirolimus was presented by

Jennifer Wolter at the International Society for the Study of Vascular Anomalies (ISSVA) in Vancouver. Our new departmental tissue bank has recently obtained REB approval and will allow us to expand the research we are conducting to investigate a myriad of other diseases affecting children with otolaryngological conditions.

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Jennifer Anderson & R. Jun Lin

Voice and laryngology research at St. Michael's Hospital has been developing a wider collaborative network within our local academic environment as well as with national and international investigators largely due to the increased effort by Dr. Jun Lin and the other team members.

Despite the COVID-19 pandemic induced changes to clinical and academic practices, the voice research team including trainees, speech language pathologists and laryngologists were productive with several new grants and five research publications. The voice research team has also presented at various national and international meetings. This includes the Congress of European Society of Otolaryngology, Fall Voice Conference (United States), American Academy of HNS and the International Association of Phonosurgery.

Several other podium presentations by trainees and faculty have been delayed due to COVID-19 and will be included in next year's annual report.

Research Grants

- 2019 November
Co-investigators: Anderson J, Lin, RJ
St. Michael's Hospital Alternate Funding Plan: Innovation Grant
Comparison of Blue light and KTP laser treatment for RRP in adult ambulatory population. \$12,000
- 2020 April
Dr. Jun Lin: Principal Investigator
Surgical Protective Barriers for AGMP in the Head & Neck Region for SARS-CoV2 and Similar Respiratory Pathogens, SMH Alternate Funding Plan, \$25,000.
- 2020 May
Dr. Jun Lin: Principal Investigator, Dr. Jennifer Anderson Co-investigator
Comparison of Transcriptomic Changes in Idiopathic Subglottic Stenosis & Normal respiratory Mucosa Using High Throughput RNA Sequencing.
American Laryngological Association. \$10,000 USD.

Publications

- Townsley R, Anderson J, Yiannakis C. Awake transnasal laryngeal and pharyngeal biopsy in the unседated patient. 2020 March/April, Vol. 29, No. 1 ENT and Audiology April 2020 Vol 29 No 1, p 1-4
- Anderson JA and Al Ali, M. The Role of steroid injection for vocal fold lesions in professional voice users. J Otolaryngology HNS 2020 49:50 p1-7. <http://doi.org/10.1186/s40463-020-00434-5>
- R. Jun Lin, MD, FRCSC, MSc; Vladimir Iakovlev, MD, FRCPC, FCAP; Catherine Streutker, MD, MSc, FRCPC; Daniel Lee, MD; Mohammed Al-Ali, MBBS, FRCSC; Jennifer Anderson, MD, MSc, FRCSC. Blue Light Laser Results in Less Vocal Fold Scarring Compared to KTP Laser in Normal Rat Vocal Folds. Laryngoscope. June 2020 DOI: 10.1002/lary.28892.
- Lin RJ, Robinson LR. Laryngeal Electromyography: Present and Future IN: Current Otorhinolaryngology Reports. Neurology, 3-10. AJ McWhorter & L Adkins, Springer. 2020, June 3.
- Lin RJ, TW. Hormonal replacement therapy is associated with a higher speaking fundamental frequency in postmenopausal women with normal BMI – as systemic review and meta-analysis. JAMA Otolaryngol. Head Neck Surg. (Accepted for publication on Jun 13, 2020)

6. Pain Evaluation during In Office KTP laser. Dr Douglas Jones, Dr J Anderson, J Lin, T Davids. Submitted J Otolaryngol

Ongoing Projects

1. Outcomes of voice feminization training: a comparison of group and individual therapy modules. Dr. Jennifer Anderson, Dr Jun Lin, Gwen Merrick MHSc SLP.
2. Outcome after Tracheostomy in COVID+ ICU patients: St. Michael's Hospital Experience. Dr. Fahad Aldhahri and Dr. Jennifer Anderson (trainee led project).
3. Development and assessment of laryngeal pathology atlas for resident education (Drs. Jun Lin, Jennifer Anderson and Grace Yi) Trainee project.
4. Developing an objective structured assessment of technical skills (OSATS) in microlaryngoscopy. Dr. Jun Lin.
5. Laryngoscopic and stroboscopic signs in diagnosis of presbylarynx (Dr. Jun Lin, collaborator).