Summary of Proposal

Minimally invasive ear surgery, by operating through the ear canal is a new technique that reduces pain, scarring and length of hospital stay for the patient and this, in turn, reduces cost to the hospital. Traditional, microscope-guided surgery requires an external incision behind the ear, whereas this technique (transcanal endoscopic ear surgery or TEES) employs an endoscope, which is a tube that is inserted into the ear canal that has a camera, light and lens to allow the surgeon to visualize the operating field while performing surgery. Even though this approach is beneficial to the patient, the technique has not been widely adopted by ear surgeons due to the steep learning curve and the need to operate single-handedly, while the non-dominant hand stabilizes the endoscope throughout the procedure.

In order to increase the adoption of this technique, this study will conduct a needs analysis and time flow study. The needs analysis will consist of a survey which will be sent to expert ear surgeons globally, to identify the specific needs that surgeons require to adopt TEES in order to inspire future innovation of tools to address these needs. The time flow study will measure the performance of current tools by timing the duration of surgery. This will identify the steps, during surgery, that take longer to perform and where new tools can be designed to perform these steps more efficiently. As well, virtual models of ear anatomy with the endoscope will be developed to guide the design of future instruments. These three aims combined will identify the limitations of TEES and thereby aim to inspire development of new surgical instruments and training models to increase the use of TEES.

The research team has already designed an initial instrument that was based on new experimental instruments for brain surgery. This study will be used to test the effectiveness of the new tool as well as provide a basis upon which tools can be designed. As well, this decribes a collaboration between brain and ear surgery tool development. Thus, new tools can be applicable in brain, nose, spinal and knee surgery.