Executive Summary

Project Title: 3D Brain Model for Neuro-Endoscopic Teaching and Practice

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Endoscopic third ventriculostomy (ETV) is a procedure to relieve pressure in the ventricles due to build-up of Cerebrospinal Fluid (CSF). A realistic surgical model is required to sufficiently train medical students so that patients are not subject to inexperienced surgeons. A surgical simulator called the S.I.M.O.N.T. is currently our biggest competitor on the market and can simulate ETV.

The Simont is a custom-built surgical simulator created using a synthetic rubber and is designed to train surgeons perform various procedures. The Simont currently costs at least $3000 for a basic model. Our model offers various advantages compared to the Simont.

Firstly, our design is targeted at ETV and has certain unique features, including a ballistics gel entry to allow medical students to practice the correct entry angle of the endoscope. Our design incorporates a third ventricle floor, which is crucial. The process of puncturing and stretching the ventricle floor is the entire purpose of the surgery and requires extensive practice. Our model allows the practice of these key elements of the surgery due to its specificity.

Secondly, our model is designed to be disposable and easily reproducible to allow multiple practices, allowing medical students the opportunity to perform the entire surgery until they are confident and well-trained.

Thirdly, our design is constructed out of ballistics gel and polymer clay, which is relatively cheap. The initial cost of making the ventricular system is $30, including labor costs. Subsequently, ballistics gel models can be produced at $10 per model. Our model can therefore be produced and marketed at a significantly lower price compared to other models.

The unique features of our design include the ballistics gel assembly system, the 1-lateral ventricle feature, and the mineral oil. All these features serve to simplify the production process and

costs of the model without any reduction in its ability to simulate surgery conditions. We simplified the ventricular system and formulated a method to create hollow ventricle spaces using a solid ventricle system out of ballistics gel.

A model is crucial to effectively teach and train medical students to perform ETV. Our design is simple, cheap, and easily reproducible. It allows the surgeon to practice inserting the endoscope, navigating through the system, and finally puncturing the third ventricular floor. The process is similar to the actual procedure and trains medical students to properly perform ETV. The final device includes a durable skull, a disposable insert containing the ventricular spaces, and fluid imitating CSF.

Medical students and surgeons practiced ETV on our model using endoscopes and determined the design sufficiently meets the client's requirements for an accurate surgical simulator.