

## ***The (Dr. Matthew) Walker Texas Rangers III***

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### ***1. Background on the project itself***

Our objective is to develop a smart-shunt design for hydrocephalus treatment that detects and communicates intracranial pressure changes of 3-5 mmHg by measuring the pressure both inside the shunt and at the tip of the shunt inside the third ventricle.

### ***2. Discussion of achievements since last reporting.***

This week we have received both the shunt tubing (catheter) and saline solution from Dr. Feldman, putting us one step closer to developing a phantom and beginning to test whichever sensing mechanism(s) we choose.

Opsens, the manufacturer for fiber optic sensors, has responded to our inquiry and requested further specifications to recommend a sensor that would work in our application. We took the cross-sectional area of the catheter openings, both the main lumen and proximal holes, and have sent these specifications to Opsens. We mentioned that a U-shaped fiber would be ideal for use with the catheter so that a sensor could be inserted into the proximal end. A hole would be cut into the this end, with the sensor placed inside the tip, and a U-shaped fiber wrapping around and then travelling along the outside of the catheter (this is our current, preliminary design for a fiber optic method).

By taking the measurements of the catheter tip, openings, and luminal area, this allows us to further refine our search for commercially available strain gauges or membranous pressure sensors, and we expect to begin ordering as soon as next week.

In order to avoid the issue of heat generation with fiber optics, we have decided that our mechanism could take some “x” amount of readings a day instead of continuous monitoring, thereby providing us with adequate physiological information without potential danger.

**3. *Discussion of problems that have arisen.***

In the past week we have reached out to both the Physics Department at NJIT, which specializes in flexible membrane pressure sensors, and a BioMEMS laboratory at LSU specializing in thin-film metal strain gauges. As of now, we have not received word from NJIT, and LSU responded saying the problem at hand and their technology are both much too advanced for a senior design project. We have been unable to reach consensus on the pressure measuring mechanism to move forward with as different methods have their own pros and cons.

**4. *Discussion of work that lies ahead***

We plan on investigating several specifications of the strain gauge approach, including their integrity over time, the surface area required to obtain accurate measurements, and ideal sampling rate. We have contacted FISO Technologies about their fiber optic pressure sensor and transducer to determine if it is something feasible for our design project. We also plan on further investigating the natural rises and declines in ICP throughout the day to get a better understanding of what our measurements would look like.

**5. *Assessment of meeting the objectives in the proposed schedule and budget***

N/A