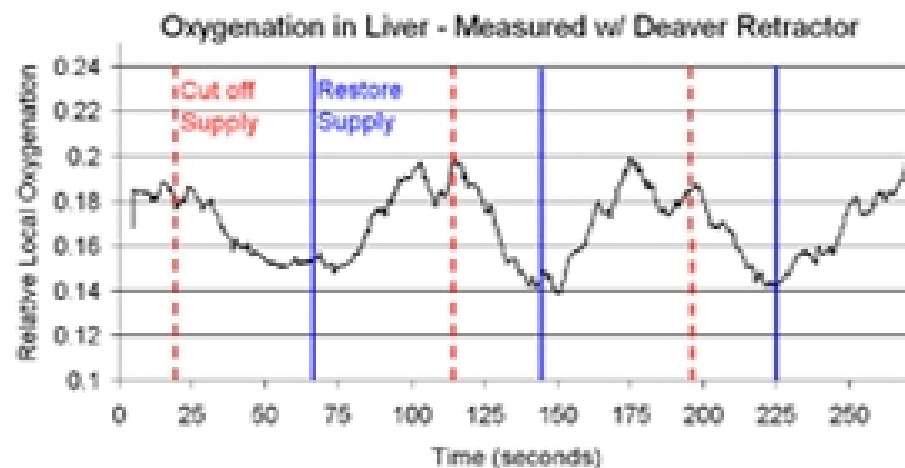


**ISCHEMIA SENSING SURGICAL INSTRUMENTS** Jason M Zand MD, Gregory S Fischer MS, Eric J Hanly MD, Samuel P Shih MD, Michael R Marohn MD, Russell H Taylor PhD, Mark A Talamini MD, Department of Surgery, Johns Hopkins Medical Institutions, Baltimore-MD, USA; Johns Hopkins University - CISST ERC, Baltimore-MD, USA

Surgical techniques rely heavily on adequate visualization of target anatomy. In laparoscopic and robotically assisted laparoscopic surgery, the operative anatomy is removed from the surgeon's direct vision. In addition, the general view of the operative field is often obscure. As a result, peripheral anatomy is out of view. Manipulation of this peripheral anatomy may lead to ischemia, infarction, and mechanical disruption. The primary goal of the technology described is to minimize unnecessary damage to manipulated anatomy through the incorporation of biofeedback sensors into surgical instruments.

We have created "Ischemia Sensing Surgical Instruments" by adapting and incorporating real-time pulse oximetry techniques into the working surfaces of operative instruments. These instruments provide real-time tissue oxygenation data.

In preliminary experiments, we monitored porcine hepatic oxygenation during retraction while performing the Pringle maneuver. Results demonstrated a correlation between our measurements and the manipulation of the porta hepatis.



Future endeavors aim to develop a system for alerting the operative team to impending tissue damage through sensory substitution. In addition, we envision the system to extend directly into robotically controlled instruments in order to enhance the human - machine interface.