Functional Near-infrared Spectroscopy as a Monitor of Anesthetic Depth

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Clinicians Need:

Advanced monitoring techniques to ensure proper anesthetic levels during surgical procedures

Oversedation	Undersedation
• Delayed and unpredictable wakeups • Prolonged recovery • Increased mortality • Less patient satisfaction • Higher Delirium	• Agitation and fear • Paralytic Intraoperative awareness • Recollection of surgical procedure

- Over 20 million general anesthesia procedures in USA alone, 26,000 cases of intraoperative awareness per year
- 56 percent result in PTSD
- Over 30% report moderate to severe pain
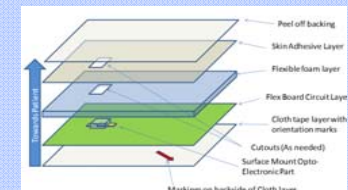
A Novel Method:

Current monitoring techniques rely on indirect electrical Potentials or make no claim Regarding anesthetic depth.

Advantages of Proposed NIRS System
- Measures OxyHb and DeoxyHb
- as determinants of hemodynamic changes
- Potential to detect the direct effects of anesthetic agents
- Better prediction lead time
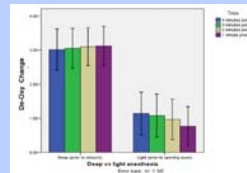- Portable, safe, simple setup and use

What's Next?

50 patient study currently under IRB review Patients undergoing general anesthesia during gastrointestinal surgery fNIR data recorded alongside routine physiological data but Anesthesiologist will be blinded to derived hemodynamics fNIR application-specific sensor under development will be assessed

Envisioned Product Streamlined channel selection based on study results Light-weight adhesive sensor designed to address OR conditions and comfort Prototype user interface with real-time signal quality classification. New system will be evaluated and fine-tuned with anesthesiologist input
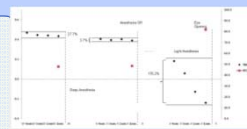

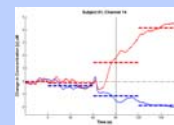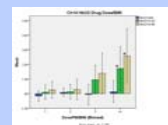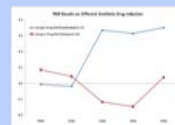## To Objectively Determine Depth of Anesthesia:

26 patient study initial study (2009) DeoxyHb displays low rate of change in deep anesthesia Rate of change increases during emergence

42 patient sedation study (2012) Observed individuals during routine colonoscopy at outpatient clinic Recorded along side standard physiological markers Found dose-dependent responses to propofol doses as detected by fNIR
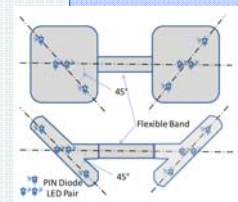
31 patient study follow-up study (2010) Confirmed low rate of change during anesthesia and large variability just before eye-opening Preliminary fNIR response to different anesthetics was studied

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