

An Integrated Fiber Optic Sensor Umbilical Catheter for Blood Gas Monitoring in Neonates [LAB0140]

Background

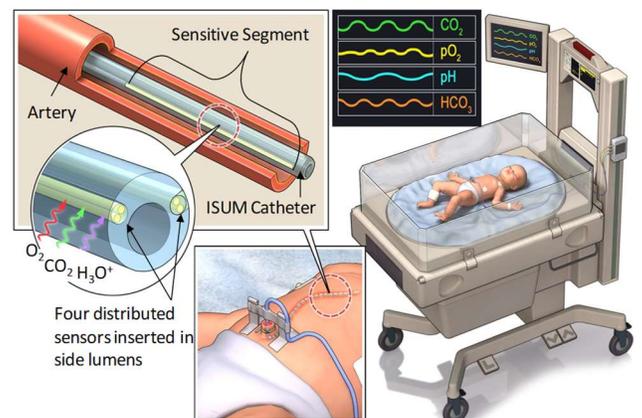
- The World Health Organization estimates that 15 million babies are born preterm every year.
- The monitoring of arterial blood gases is essential for managing the health of all sick infants but is especially important for premature babies since any delay in care can be fatal.
- The current standard of care includes intermittent blood sampling to monitor gas levels, which **does not provide comprehensive data on which to base treatment decisions**.
- Further, repeated and painful blood sampling results in **significant blood loss and may have long-term adverse developmental consequences**.
- Despite the urgent need for continuous blood gas monitoring for neonates, there is no commercially available device that provides such information in a safe, non-invasive way.

Innovation

- Dr. Virender Rehan, a Lundquist Institute investigator and the Director of the Neonatal Intensive Care Unit at the Harbor-UCLA Medical Center, has developed an **Integrated Fiber Optic Sensor Umbilical (ISUM) catheter that provides constant, real-time blood gas monitoring for neonates and infants**.
- The sensors are integrated into the catheter walls, allowing for **continuous, non-invasive blood gas measurements**.
- Measured parameters include the partial pressure of oxygen, the partial pressure of carbon dioxide, bicarbonate, pH, and temperature.
- The gas sensors gather data over large areas, thus reducing or eliminating probe placement or movement artifacts in the collected data.
- **The device can be inserted in the same manner as catheters commonly used for intravascular catheterization**, such as umbilical artery catheterization, and does not require a blood draw.
- Rather than the amplitude measurements used in previously commercialized sensor systems, ISUM uses emission lifetime measurements which provide more stable, reliable measurements and does not require calibration.
- Dual O₂ sensor and data fusion eliminate the “wall effect,” which is when point sensors in the artery show frequent and unpredictable drops in partial pressure of oxygen due to contact with the arterial wall.
- A working prototype is available.

Advantages

- Non-invasive
- Accurate
- Provides continuous and comprehensive data



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- Safe for neonates and infants
- Reduction of blood loss in infants
- The sensor and catheter are an integrated unit
- Compatible with routine intravascular catheterization
- Reduced cost – highly repeatable sensor elements can be produced in large batches

Applications

- Non-invasive, continuous blood gas monitoring for neonates and infants
- Can be used in other intensive care settings

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IP Status

- PCT Application PCT/US2017/044219 filed July 27, 2017
 - National Stage Application US 16/321,798 – pending