The LICOX® System

Brain Tissue Oxygen Monitoring System

Product Presentation
What is the LICOX® system?

• Measures interstitial brain tissue oxygenation ($P_{bt}O_2$) in mmHg and brain temperature (°C)
• Probe inserted approximately 35mm below the dura into the white matter of the brain
• $P_{bt}O_2$ used in conjunction with current ICP/CPP monitoring methods
Who needs the LICOX® system?

- Patients at risk for developing cerebral hypoxia or ischemia
- Head trauma patients
- Aneurysm patients
- Subarachnoid hemorrhage patients
- Stroke patients

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When is the LICOX® system placed?

- Within the first 24-48 hours of injury
  - The sooner cerebral hypoxia is detected, the better secondary injury can be prevented
- Generally, when an ICP catheter is required, a LICOX® probe should be considered
How is the LICOX® system placed?

- Can be either *bolted* or *tunneled*
- Can be placed independently or with an ICP catheter
- Requires minimal additional effort
- Does not need to be zeroed prior to placement, SMART card is included with each O₂ probe with all calibration data
- Monitor need not be present when placing in the OR
Where is the LICOX® system placed?

• Placement is up to clinical discretion

• The idea is to prevent SECONDARY injury by ensuring living tissue is receiving adequate oxygen

• LICOX® probe can be placed in either the injured side or non-injured side of brain

• Should not be placed directly into a lesion
What are the probe options?

• BOLTED
  ➢ Double Lumen – Camino® ICP channel and LICOX® PMO catheter channel (IP2P)

• TUNNELED
  ➢ Licox® PMO combined oxygen and temperature catheter (IT2)

• Probe kits come with required drill bits and other accessories
How accurate are the probes?

**Oxygen Accuracy:**
- $P_{btO_2}$ 0-20 mmHg  accuracy is ± 2 mmHg
- $P_{btO_2}$ 21-50 mmHg  accuracy is ± 10%
- $P_{btO_2}$ 51-150 mmHg  accuracy is ± 13%

**Temperature Accuracy:** ± 0.2 °C
What about the nursing staff?

- Simple monitor set-up and use
- The monitor displays a digital oxygen and temperature reading
- Alarms are managed through a connection to the bedside monitor
What is a “normal” reading?

- Normal: 25-35 mmHg
- Risk of death increases
  - < 15 mmHg for 30 minutes
  - < 10 mmHg for 10 minutes
- $P_{bt}\text{O}_2 < 5\text{ mmHg}$
  - high mortality
- $P_{bt}\text{O}_2 \leq 2\text{mmHg}$ - neuronal death$^1$

How is patient outcome affected?

- It's been found:
  - Head injured patients who undergo aggressive therapy to maintain ICP/CPP at normal levels still experience periods of severe brain hypoxia\(^1\)
  - Interventions previously thought to improve tissue oxygenation may improve ICP and CPP but actually decrease P\(_{bt}\)O\(_2\)\(^2\)

How is patient outcome affected?

- The $P_{bt}O_2$ number can provide:
  - Notification of hypoxic episodes
  - Independent predictors of unfavorable outcome and death

- Treatments to maintain $P_{bt}O_2$ correspond to more favorable patient outcomes

Is the LICOX® system cost-efficient?

• Added costs the Licox® system are justified by significantly improved outcomes

• Implementation of new protocols using $P_{btO_2}$
  – Improve patient care
  – Better utilize resources
  – Probable reduction of
    • Ventilator days
    • ICU days
    • Overall hospital days

How is the LICOX® system different than a Jugular Venous Bulb?

• Jugular bulb oximetry, SjvO₂, measures oxygen saturation of venous blood
  – Measures global oxygen reduction
  – Cannot identify regional cerebral ischemia
  – may lead to secondary injury¹,²


How is LICOX® different than a Jugular Venous Bulb?

- SjvO₂ measurements are shown to be unreliable
  - Good quality data are only obtained about 50% of the placement time¹,²,³
  - SjvO₂ is difficult to use in children due to small vein size⁴

A few institutions that have published clinical studies with the LICOX® systems:

• Mission Hospital
  – Mission Viejo, CA

• Harborview
  – Seattle, WA

• Creighton University
  – Omaha, NE

• University of Pennsylvania Hospital
  – Philadelphia, PA
Thank you for your time!

Please contact us anytime should you have any further questions.
References


