Tissue Oximeter

Nursing In-Service
Clinical Use

- For post-operative flap monitoring
- T.Ox Measures Tissue Oxygen saturation (StO$_2$) noninvasively
- Provides continuous monitoring
- Detects compromises in tissue viability before obvious clinical signs
Tissue Oximeter

- Displays StO₂ trends over time
- StO₂ updates every four seconds
- Trending graphs are displayed
- Touch screen interface
- Signal Quality indicator lets you know sensor is placed correctly
How it Works

- Near-infrared light from sensor penetrates tissue
- Measures mixture of arterial, capillary and venous blood in the tissue directly under the sensor head and sends data to the T.Ox console
- T.Ox calculates Tissue Oxygen Saturation (StO$_2$) and displays real time readings:
  - StO$_2$ 76%
  - Signal Quality 97
T.Ox Disposable Sensor

- Emitters
- Detectors
- Cable
- Adhesive Pad
Tissue Oximeter
Tissue Oximeter

- A/C Cord Wrap
- A/C Cord Connector
- Nurse Call Alarm Output
- Variable Diameter Pole Mount
Roll Stand

Variable Diameter Pole Mount
Power On

- Keep A/C cord plugged in during use

- A/C power button on back of unit should be in the ON (I) position at all times

- Battery supplies up to 30 minutes of operation and is for use during patient transport only

- ALWAYS start the system on A/C power, not on battery power
Attach Sensors

- Remove dust cover
- Align green arrows, do not force
- Turn ring until it snaps securely into place
Turn On / Start Monitoring

• Press **On/Standby** button
• Main screen will appear
• Press on the upper right corner of console
• Red turns to green when monitoring begins
• indicates continuous monitoring is on
Main Screen Views

Dual Channel

- Monitor two sites, for example in a bilateral breast reconstruction

Single Channel

- Main screen view when using a one-channel T.Ox or T.Ox DUAL with one sensor
- A single full-screen view is displayed
Main Screen – Dual Mode

Wi-Fi “On” Indicator remote monitoring enabled

Channel 1 Screen

Channel 2 Screen

StO$_2$ Ch1

StO$_2$ Ch2

Signal Quality = 91

Signal Quality = 97

91

97

73%

7%
What are Typical Numbers?

- StO\textsubscript{2} readings vary, most will be in the range of 55-90%.
- Baseline StO\textsubscript{2} values are set by the physician in the OR.
- Baselines will vary based on patient and anatomy.
- Post-op readings monitor StO\textsubscript{2} continuously over time.
- Physician will set parameters for you to call
  - StO\textsubscript{2} Lower Alarm Limits (e.g. 30% – 35%)
  - StO\textsubscript{2} Drop Rate Alarm (e.g. 20)
- Consistent StO\textsubscript{2} measurements below 35% could indicate a problem and the surgeon should be called.
How do Pulse and Tissue Oximeters Differ?

• They measure different parameters
  – Pulse oximeters measure arterial $O_2$ saturation in the whole body to assess systemic circulation
  – Tissue oximeters measure local $StO_2$ saturation at the microcirculatory level to assess tissue viability

• They work differently
  – Pulse oximeters require a pulse and rely on pulsing blood versus all other blood
  – Tissue oximeters don’t require a pulse, instead they use reflected light from any tissue
Sensor Placement

• All six apertures on the sensor face should make complete but gentle skin contact.

• Sensor should be placed on soft tissue at least 5mm thick and without major blood vessels, bone or hematoma directly under probe.

• If any of the apertures are contaminated by blood, fluid or skin marking pen cleanse patient’s tissue and sensor tip with alcohol wipe.

• If any of these problems has occurred the Signal Quality indicators on the monitor will display dashes instead of an StO$_2$ reading.
Signal Quality

- Measures the quality of the signal the sensor is receiving
- Signal Quality of 80-100% is acceptable
- If Signal Quality falls below 80% dashes are displayed instead of an StO₂ reading and an alarm sounds
If the monitor continues to display dashes despite all efforts to improve probe-skin contact and to clear any contamination, user should consider this a warning of possible hypoxic tissue and the surgeon should be notified immediately.
Setting Alarms & Sound

- On the Main screen, press SET ALARMS button to the right of the StO₂ graph for desired channel.
- Alarm Set screen appears.
- **Set Low StO₂ Alarm**: Press CLEAR to erase current setting. Use buttons on touch screen to enter desired low StO₂ alarm level.
- **Set Drop Rate Alarm**:
  - Select the Drop Rate “Sound On” box.
  - Press CLEAR to erase current setting.
  - Use buttons on touch screen to enter drop rate alarm level (default 20%). If drop rate is exceeded more than 30 minutes alarm will sound.
- Press DONE.
- Repeat for Channel 2 if in use.

Turn OFF High Alarm
To adjust loudness of alarm press Change Sound Settings
Temporarily Stop Monitoring

- Press “Ch1 Sampling” and “Ch2 Sampling” button on the upper right corner of the console screen

- When paused, green light changes to red
- The word **Paused** will appear in the red in the bar at bottom of screen
Resume Monitoring

• **IMPORTANT!** TO RESUME MONITORING touch the red “Ch1 Paused” button once

![Ch1 Paused](image1) → ![Ch1 Sampling](image2)

• Button will turn to green and show “Ch1 Sampling” which indicates continuous monitoring
To Disconnect/Reconnect Sensor to Console

**DISCONNECT** the sensor from the console by turning the attachment ring counterclockwise. **DO NOT PULL.**

**RECONNECT** the sensor to the console by lining up the green arrows. Press down and turn the ring clockwise until you feel it engage with a click.

**CAUTION !** Pulling off the sensor can damage the console and sensor.
Saving Data

When T.Ox is disconnected for any reason, save data

- Pause machine by pressing turns to
- Press the button at the top of the screen
- Press SAVE button when prompted, and save by entering the patient’s last name, the date, and ‘R’ or ‘L’ if using T.Ox to monitor a bilateral breast reconstruction, depending on where the sensor is attached. (example: smith02192008L)
- Press the button at the bottom right of screen
- To resume monitoring after ambulating, reattach sensor to console and press START
Reviewing Saved Data Files

• On the Control Bar, press the Open button

• A list of file names will appear

• Scroll down until the desired file is highlighted, then press Done to display the file in review mode
Sensor Removal & Disposal

- Once patient is discontinued from monitoring, CAREFULLY UNSCREW sensors using ring

- **DO NOT PULL** or BREAK OFF

- Reattach dust covers

- Dispose of sensors in accordance with your institution’s biohazardous material disposal guidelines
Turning Off & Storing Console

• Press and hold the **On/Standby** Button located on the bottom, right front of console for 3 seconds

• Return console, A/C power cord and Nurse Call cable (if installed) to Operating Room
  – Ensure console remains **plugged in at all times** to keep charging
  – Console must re-charge for 3 hours if discharged completely
Additional Screens

• Review Screen
• Magnify StO$_2$ Screen
• View Numerics Screen
Review Screen
Magnify StO$_2$ Screen

Channel 1 Screen

Channel 2 Screen
View Numerics Screen

Channel 1 Screen

Channel 2 Screen

Channel 1: Patch AS 5mm x 5mm  StO2 (%)  Channel 2: Patch AS 5mm x 5mm  StO2 (%)

76%  76%
76  76
74  74

ViOptix
Enables Early Intervention to Improve Patient Outcomes

Objective Data • Early Detection • Clinical Confidence

Assessing Tissue Viability with StO₂
Thank You!