

TRANSCUTANEOUS OXIMETRY USED TO ASSESS AND MONITOR PATIENT OUTCOMES: TISSUE OXYGENATION

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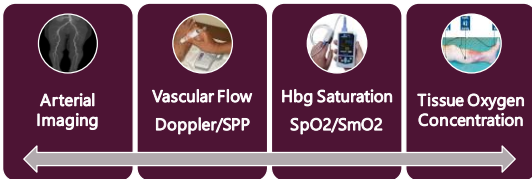
OVERVIEW

Transcutaneous Oxygen Pressure- (TCPO2) is a noninvasive test that directly measures the oxygen level of tissue beneath the skin. Because oxygen is carried to tissues by blood flow in the arteries, TCPO2 is an indirect measure of blood flow.



TCPO2 can help determine if there is enough oxygen in the tissue to perform basic functions required

ARTERIAL IMAGING ASSESSMENTS: TCPO2



SPO2 AND SMO2 MEASURE THE AMOUNT OF HEMOGLOBIN (HGB) O2 SATURATION; WHILE TCPO2 MEASURES O2 CONCENTRATION

TCO2 Tissue Capillaries O2 Conc	SpO2 Small Arteries Hgb Sat	SmO2 Venous Hgb Sat
Measures current created by O2-base reaction with solution.	Sensors pulse red and infrared light wavelength (610-700nm); 600nm deoxygenated Hgb absorbs oxygenated Hgb reflects.	

TCPO2 MEASURES THE AMOUNT OF OXYGEN RELEASED FROM THE TISSUE; WHILE SKIN PERFUSION PRESSURE (SPP) MEASURES FLOW

TCO2 Tissue Capillaries O2 Conc	SPP Small Arteries Flow
Probe heats for vasodilation; O2 migrates across skin and membrane to be measured.	Measures RBC Flow through capillary bed. Flow occurs when tourniquet is released.

CONDUCTING TCPO2 TESTS: APPLYING THE PROBES

<p>Set the patient up, reclining in a comfortable room, with little distraction, comfortable loose clothing.</p> <ol style="list-style-type: none"> Shave hair and clean with alcohol. Fix ring to flat area, away from any superficial vessels, callous, bony prominences or plantar aspect or heavy edema. Apply 3-5 drops of contact liquid well. Apply the probe and keep the fluid intact. Turn probe 1/4 turn clockwise to secure. 		

COMPLETING A FULL TCPO2 TEST

Typical procedure

- Baseline: 15-20 min
- Leg Raise: 5 min
- Post Leg Raise: 5 min
- Mask O2 100% Challenge

Provocation

Take a Photo to be able to ensure repeat studies assess the same area.

INTERPRETING DATA: REFERENCE LEADS

Chest Leads: Chest leads have been used as a "centralized reference". A relative perfusion index (RPI) was generated as a fraction of the limb TCPO2 divided by the chest TCPO2. While still present in international literature, it is not typically used in US.

Limb Leads: Limb leads are sometimes used for comparison. Leads are placed on the opposite extremity or in an alternate location (same or different angiosome) from the initial lead.

Reference Leads should be evaluated to understand the significance underlying local disease that may affect their usefulness.

INTERPRETING THE DATA: BASELINE ASSESSMENTS

Reference Values:


- Normal: 50-70 mmHg
- Impaired Wound Healing: <40 mmHg
- Critical Limb Ischemia: <30 mmHg

Barriers to Diffusion:

- Callous
- Glabrous Skin (Palms/Soles)
- Hyperkeratotic Plaques

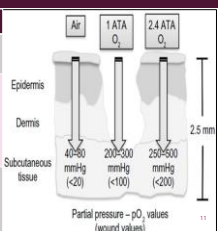
Normal values represent the amount of oxygen available in the tissue and the ability of that oxygen to diffuse across barriers at the skin margin.

INTERPRETING THE DATA: PROVOCATIVE TESTS

Provocation	Basis for Test	Finding	Discussion
	Evaluate significance of peripheral arterial occlusive vascular disease (PAOD)	Compared to baseline- TcPO2 drops > 10 mmHg or > 20% baseline.	Significant occlusive disease shows decreased perfusion with leg elevation
Leg Tilt Up (Elevation- 30 degrees)		Compared to baseline the TcPO2 changes < 10mmHg or < 20% baseline.	Occlusive disease does not show significant decreased perfusion with leg elevation

HYPERBARIC OXYGEN CHALLENGE

Challenge	Discussion
Room Air Baseline	Edema or inflammation may have lowered the values.
Mask Oxygen (100% O2) 15L/min Tight Fit	Challenge should demonstrate the ability to raise oxygen to 100 mmHg or 100% for baseline. Demonstrate ability to respond. Screen HBO eligibility.
1.0 ATA O2	Challenges at the pressure intended for treatment to achieve acceptable oxygen levels of 200 mmHg
2.4 ATA O2	



PRACTICAL APPLICATION OF TCPO2 IN CLINICAL USAGE

Factors Influencing Low TCPO2 Values:

- Peripheral Arterial Disease (PAD)
- Endothelial Dysfunction (capillary disease)
- Edema (O2 diffusion)
- Infection/Inflammation (O2 consumption)

Available oxygen should be sufficient to meet the metabolic needs of the tissue. Collagen requires at least 10 mmHg for peptide assembly and at least 20 mmHg for release from endoplasmic reticulum. Inflammation and infection consume oxygen that must be replaced to ensure tissue repair.