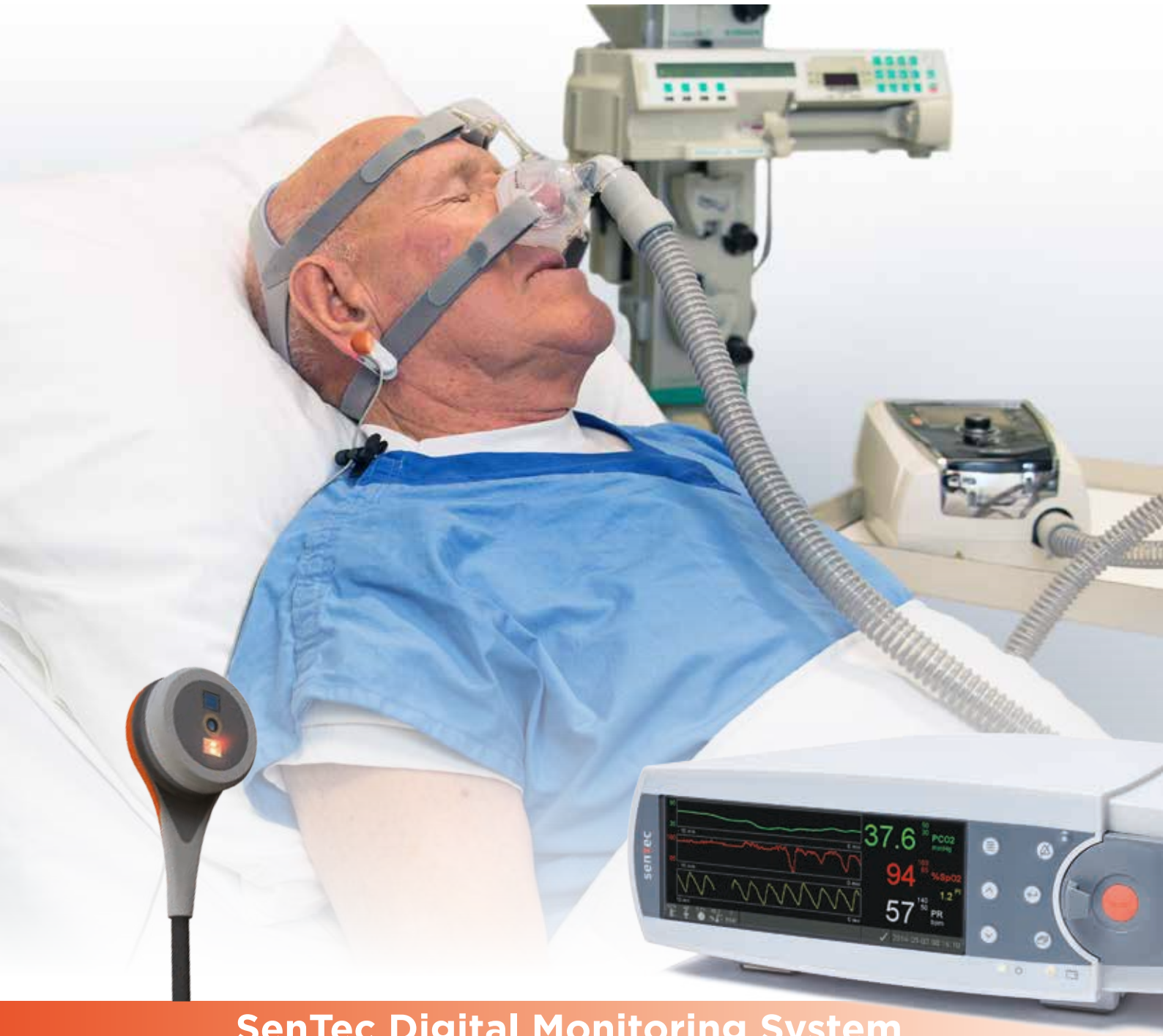
sentec

Digital Transcutaneous
Blood Gas Monitoring



SenTec Digital Monitoring System

Transcutaneous PCO2 monitoring of patients with chronic respiratory failure

PCO2 | SpO2 | PR

Continuous | Noninvasive | Accurate | Safe | Easy to Use

tcPCO2 is essential for monitoring changes in alveolar ventilation

tcPCO2 monitoring is essential for the diagnosis and therapy guidance of chronic respiratory failure

Patients with chronic respiratory failure (CRF) suffer from hypoxemic (type 1) or hypercapnic (type 2) failure. The combination and monitoring of SpO2 and tcPCO2 enables a distinction to be made between the two failure types and has become the standard in the diagnosis and treatment of respiratory failure[1].

tcPCO2 overcomes the disadvantages of arterial blood gas analysis

ABG analysis is painful and invasive, it only provides a snapshot of the ventilatory status, and it lacks information regarding the dynamic evolution of alveolar ventilation. Transcutaneous CO2 (tcPCO2) monitoring with SenTec is an effective way of providing continuous, noninvasive monitoring of changes in alveolar ventilation (see figure 1) [12].

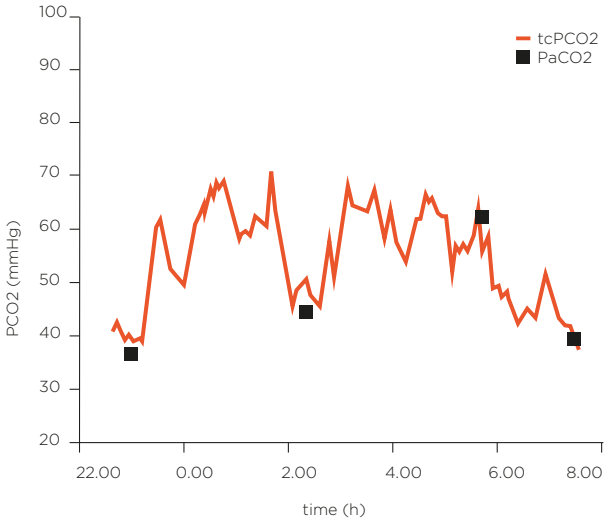


Figure 1: Nocturnal fluctuation of PCO2 shows the importance of continuous CO2 monitoring (tcPO2 with orange line) compared to the snapshot information of PaCO2 (black boxes)[5].

tcPCO2 is more accurate in COPD

End-tidal CO2 (etCO2) monitoring has its limits for patients with chronic respiratory failure due to ventilation-perfusion (V/Q) mismatch, mask and oral leakage (see figure 3). Moreover, end-tidal monitoring underestimates PaCO2 (particularly in COPD patients) and is therefore not suitable for weaning patients (see figure 2)[12].

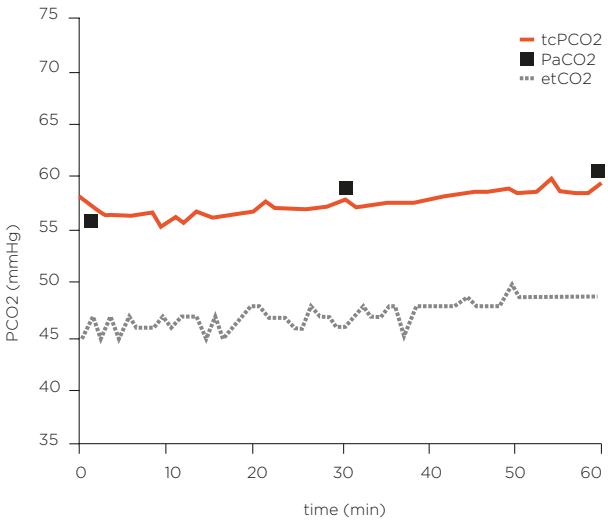


Figure 2: Patient with COPD. tcPCO2 (orange line) gives a more accurate result compared with ABG analysis (black boxes) than etCO2 (dashed grey line)[12].

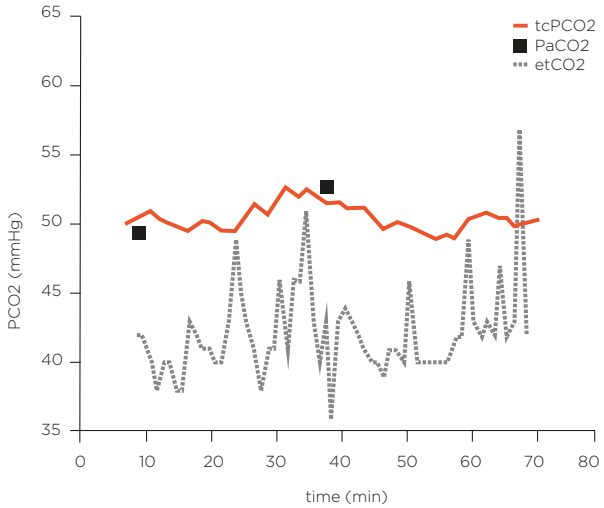


Figure 3: tcPCO2 (orange line), etCO2 (dashed grey line) and PaCO2 (black boxes) from patient with invasive ventilation during weaning[2].

tcPCO2 is essential for titration of noninvasive ventilation

Noninvasive Ventilation (NIV)
Continuous, overnight monitoring of tcPCO2 is essential for assessing nocturnal hypoventilation and screening for nocturnal hypercapnia, and allows to optimize NIV settings in patients with CRF.

Nasal High-Flow Oxygen Therapy
The V-Sign™ Sensor allows to monitor the reduction of PCO2 and stabilization of SpO2 during nasal high-flow oxygen therapy (NHF).

Functional Assessment
Reliable estimation of the PaCO2 during the 6-minute walk test (SMWT) provides information on the severity of respiratory pump failure in COPD patients[11].

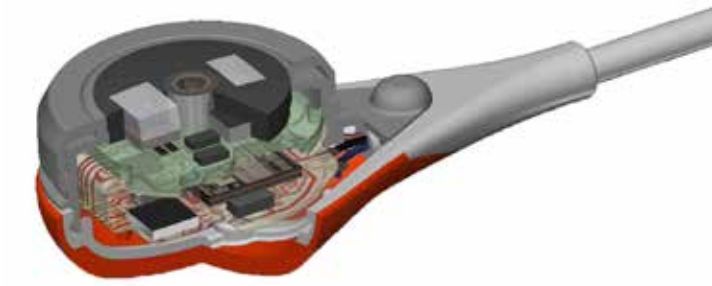
Outpatient Monitoring
Outpatient monitoring reduces the number of medical examinations performed in clinics, thereby reducing costs. Under clinical supervision, the SenTec monitoring system enables detection of nocturnal hypercapnia in the patient's home and indicates the patient's response to NIV.

Prolonged Weaning
The SenTec Digital Monitor can be used to continuously monitor spontaneous breathing trials (SBT) in prolonged weaning. SenTec's continuous trans-cutaneous monitoring system helps to immediately detect early changes in PaCO2. This enables a rapid response to increasing exhaustion of the respiratory muscles and adjustment of the NIV setting[13].

Accurate and reliable

Cutting edge digital technology
The digital SenTec V-Sign™ Sensor is a Stow-Severinghaus-type PCO2 sensor combined with 2-wavelength reflectance pulse oximetry. The highly integrated digital sensor head comprises a micro pH-electrode and an optical oximetry unit. All data is digitized in the sensor head, allowing the transmission of robust, low-noise signals to the monitor. Each sensor's sensitivity and calibration data is individually stored in the sensor head during manufacturing. Automatic sensor calibration ensures that the system is "Ready for use" when needed and allows for a long measuring time of up to 12 hours.

Triple parameters
The V-Sign™ Sensor provides continuous, noninvasive measurement of tcPCO2, SpO2 and pulse rate (PR). Information about the pulsation index is also available.



Excellent accuracy
SenTec's sophisticated algorithms ensure a high degree of accuracy and minimal technical drift[6]. Prashant N. Chhajed et al.[7] demonstrated in an accuracy study with 40 patients an R^2 of 0.91 compared to the ABG analysis (see figure 4 and 5). Schwarz et al.[12] showed a mean difference of the PtcCO2 compared to PaCO2 of just -0.7 mmHg.

Reliability
SenTec's unique artefact detection algorithm ensures that only reliable data is displayed.

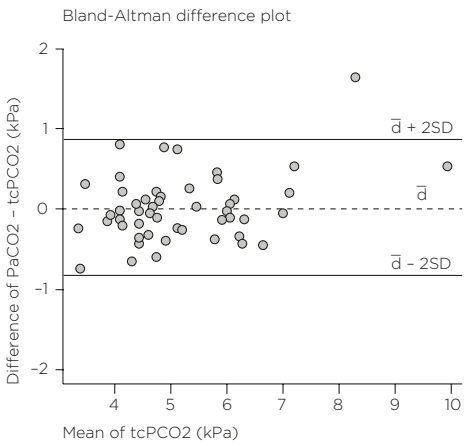


Figure 4: Measurements were compared using a Bland-Altman plot. It displays the mean bias (dashed line) and the limit of agreement (solid lines)[7].

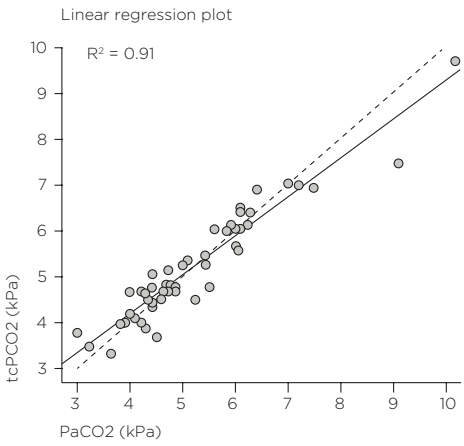


Figure 5: Measurements were compared using the linear regression plot. It displays the line of best fit (solid line) and the identity line (dashed line)[7].

Practical and time-saving features

The Smart Calmem
As the calibration data is stored in the sensor head, the sensor can be disconnected for up to 30 minutes without the need for recalibration.

Long continuous measurement periods
Due to the stability of the sensor, calibration intervals can range up to 12 h

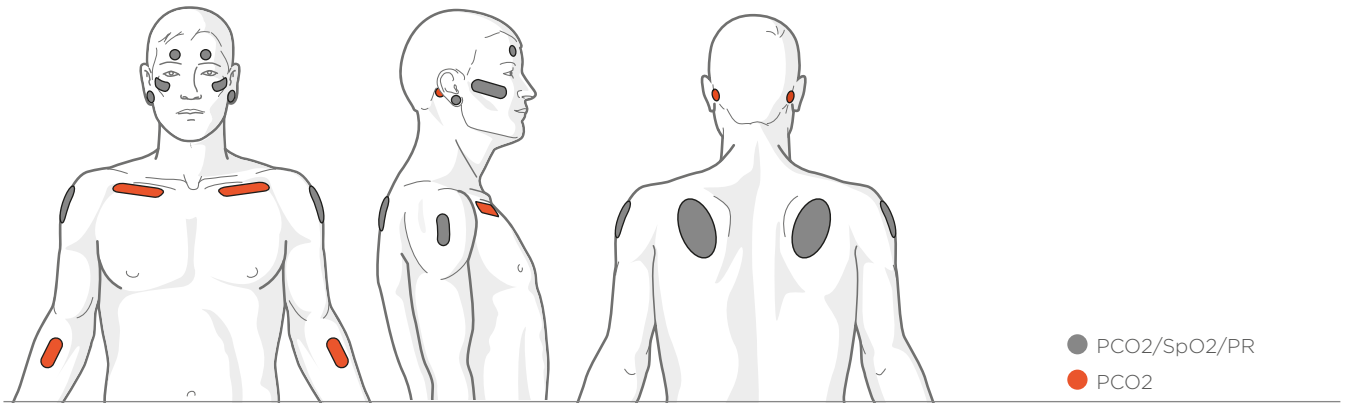
Retrospective Drift Correction
In overnight sleep studies the technical drift (typically less than 0.5 % per hour) can be eliminated using the V-STATS™ software.

Portability and transportability
The monitor can be mounted on roll stands or infusion stands and has a battery life of up to ten hours, which allows continuous patient monitoring during intra-hospital transport or in situations when no AC power is available.

Tracking changes in therapy
The monitor allows a baseline and markers to be set just before a patient's therapy changes. The impact on the patient's ventilation and oxygenation can be assessed objectively and easily.

Easy to use

Choose from multiple validated measurement sites



Safe and gentle sensor application

Multi-Site Attachment Ring
Single-use ring for the attachment of SenTec transcutaneous sensors to various measurement sites.

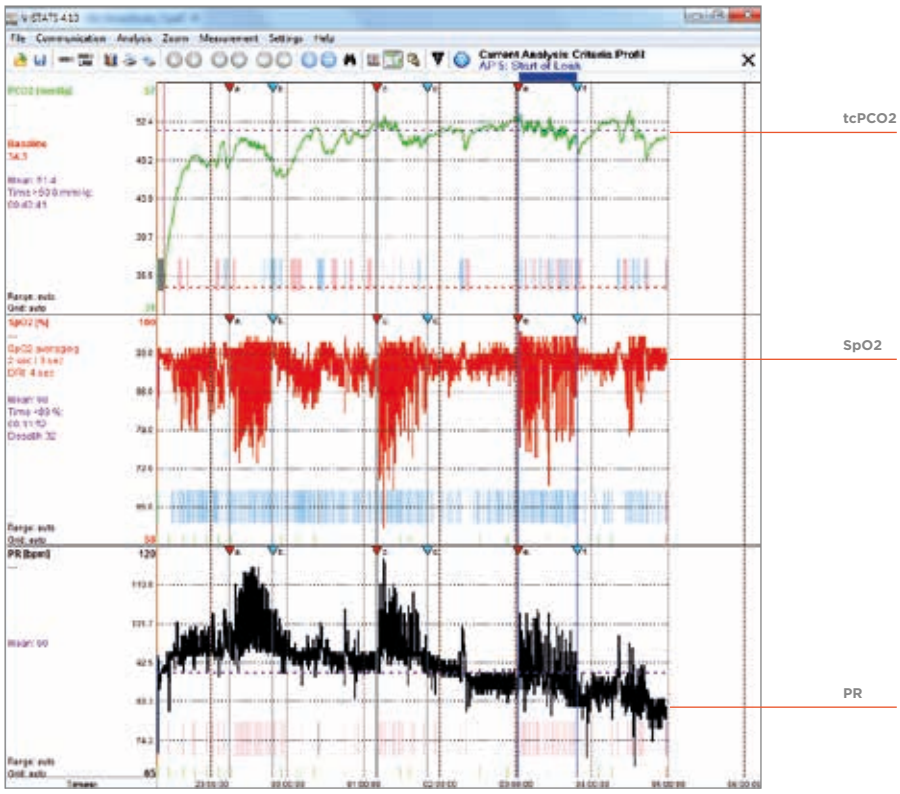
Ear Clip
A great solution for overnight monitoring in sleep labs as well as long-term use. Attached to the ear lobe, the sensor doesn't disturb sleep and is suitable for patients wearing masks.

Staysite™ Adhesive
Additional adhesive film to improve fixation of Multi-Site Attachment Ring in challenging settings.

Valuable insights with V-STATS™

Making treatment decisions based on data analysis

V-STATS™ software enables users to download trend data from the internal memory of the monitor and display it on the PC screen for further analysis, reporting, and generation of a printable report. Data download is possible via serial or LAN interface.



Broad connectivity

Polygraphic (PG) and polysomnography (PSG) systems
Various ready-made adapter cables and interfaces are available to connect the SenTec Digital Monitor to the most common PG or PSG systems, including innovative wireless solutions with Nox Medical.

Connectivity to patient monitoring systems and electronic medical record systems (EMR)
Monitored data from the SenTec Digital Monitor can be transferred to selected
- patient monitoring systems
- electronic medical record systems

For a complete overview please refer for the following link: https://www.sentec.com/products/sentec-device-connectivity/

Patient Monitoring Systems (PMS)

Patient Data Management Systems (PDMS)

Polysomnographic and Polygraphic Systems (PG/PSG)

Ventilator

Clinically validated

Over 100 clinical studies have been conducted with the SenTec Digital Monitoring System

https://www.sentec.com/ful/application-areas/clinical-studies/

Pneumology

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2 **Storre J, Dellweg D** Monitoring des Beatmungspatienten – Monitoring of Patients Receiving Mechanical Ventilation, Pneumologie 2014, DOI: http://dx.doi.org/10.1055/s-0034-1365742

3 **Mehta A, Chhajed P** Cutaneous Capnography, in Jindal SK, Textbook of Pulmonary and Critical Care Medicine, Vol. 2, 2011, p. 1841–1850

Optimization of NIV treatment

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Sleep, NIV

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6 **Storre JH, Magnet FS, Dreher M, Windisch W** Transcutaneous monitoring as a replacement for arterial PCO2 monitoring during nocturnal non-invasive ventilation, Respiratory Medicine 2011, 105(1), 143–150

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Spot measurement

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Emergency department, NIV

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Functional Assessment

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11 **Andrianopoulos V, Vanfleteren LE, Jarosch I, Gloeckl R, Schneeberger T, Wouters EF, Spruit MA, Kenn K**: Transcutaneous carbon-dioxide partial pressure trends during six-minute walk test in patients with very severe COPD. Respir Physiol Neurobiol 2016, 233:52-59.

Weaning

12 **Schwarz, S.B.; Windisch, W.; Magnet, F.S.; Schmoor, C.; Karagiannidis, C.; Callegari, J.; Huttmann, S.E.; Storre, J.H** Continuous non-invasive PCO2 monitoring in weaning patients: Transcutaneous is advantageous over end-tidal PCO2, Respirology (Carlton, Vic.), 2017, DOI

13 **Douglas C Johnson, Salma Batool, Ronald Dalbec RRT.** Transcutaneous carbon dioxide pressure monitoring in a specialized weaning unit. Respir Care. 2008; 53(8):1042-7.

14 **Fricke K, Tatkov S, Domanski U, Franke KJ, Nilius G, Schneider H:** Nasal high flow reduces hypercapnia by clearance of anatomical dead space in a COPD patient. Respiratory medicine case reports 2016, 19:115-117.

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