

# Using Natural Lung VCO<sub>2</sub> changes to predict Lung Recovery and ECMO Weaning Success

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

## Background

VV extracorporeal membrane-lung oxygenation (ECMO) is usually performed with high blood and gas flows to have the chance to put the natural lungs at rest and be ventilated as kindly as possible. Assessing the readiness of the lungs to endure and accept again work of breathing is of vital importance in order to know when ECMO is no more needed. At the present moment there is no shared consensus among centers regarding the management of these patients so we tried to objectively produce and validate a physiological approach to the management of VV ECMO weaning.

## Methods

14 hemodynamically stable VV ECMO patients with respiratory failure were tested when put in pressure support ventilation with a stepwise reduction of the ECMO gas flow (gas flow was reduced by a 33% of its original value until zeroed). Criteria of success were RR  $30 \leq$  breaths per minute, pH  $\geq 7,25$ ,  $paO_2 \geq 60$  mmHg,  $paCO_2 \leq 80$  mmHg and esophageal pressure swings  $\leq 15$  cmH<sub>2</sub>O.

## Results

Measurement of total VCO<sub>2</sub> and its natural lung and membrane lung components were recorded during weaning attempts as shown in figure 1. With each step reduction natural lung VCO<sub>2</sub> increased more in the group that underwent successful weaning maintaining protective esophageal pressure swings according to our protocol (see fig. 2). At the end mean natural lung VCO<sub>2</sub> were  $324,62 \pm 154,83$  in the weaning success group and  $197,07 \pm 115,14$  in the weaning failure group ( $p=0,00021$ ).

## Conclusion

Monitoring of changes in natural lung VCO<sub>2</sub> and esophageal pressure swings during modification of ECMO gas flow represents a physiological way to assess lung recovery and capacity to accept again its gas exchange function without incurring in unsafe stress and strain due to excessive respiratory drive.



