Session Appareil Respiratoire

Predicting spontaneous breathing trial failure assessing respiratory-relatedcortical activation in mechanically ventilated patients

Christophe Rault [1, 2], Arnaud W. Thille [1, 3], Quentin Héraud [1], Stéphanie Ragot [1], Rémi Coudroy [1, 3],
Jean-Pierre Frat [1, 3], Xavier Drouot [1, 2, 4, 5]

[1] INSERM, CIC 1402, Equipe IS-ALIVE; Université de Poitiers, Faculté de Médecine et de Pharmacie, Poitiers, France., [2] CHU de Poitiers, Service d'Explorations Fonctionnelles, Physiologie Respiratoire et de l'Exercice, Poitiers, France, [3] CHU de Poitiers, Service de Médecine Intensive Réanimation, Poitiers, France.,[4] CHU de Poitiers, Service de Neurophysiologie Clinique, Poitiers, France., [5] INSERM U-1084, Experimentaland Clinical Neurosciences Laboratory, Neurobiology and Neuroplasticity and Neuro-development Group, Poitiers, France.

Rationale: In mechanically ventilated patients, extubation is decided after passing a spontaneous breathing trial (SBT). Supplementary motor area, which can be non-invasively assessed by measuringamplitude of pre-inspiratory potentials (PIPs), is recruited in case of increased respiratory effort.
Weaning failure is accompanied by increased respiratory effort. We hypothesized that early increasedPIP amplitude from the start of SBT may predict SBT failure.
Patients and methods: We performed a single-center physiological prospective study in mechanically ventilated patients meeting weaning criteria. PIP amplitude was measured using electroencephalography under mechanical ventilation and then during the first 15-min of the SBT performed using a T-piece. Wecompared PIP amplitude between patients who passed a 1-hour SBT and those who failed.
Results: Among the 62 patients included, 17 (27%) failed the SBT. Whereas patients who failed the SBT had a lower median amplitude of PIPs under mechanical ventilation than those who passed the SBT(0.6 µV [IQR, 0-1.3] vs. 1.9 [1.2-2.9], $p<0.0001$), they had a higher amplitude of PIPs at the beginning of the SBT (2.1 µV [IQR, 1.7-2.9] vs. 1.2 [0.5-2.0], $p<0.005$). The change in PIP amplitude between mechanical ventilation and SBT significantly increased in case of SBT failure whereas it decreased in case of SBT success (+1.7 µV [1.2-2.1] vs. -0.5 [-1.8-0.1], $p<0.0001$). An increase of PIP above 0.43 µVwas associated with SBT failure with sensitivity of 100% and specificity of 87%.
Conclusion: Analysis of respiratory-related cortical activation is a non-invasive tool that may helpphysicians to identify patients ready for extubation.

Effect of low-frequency ventilatory oscillations in hypoxia to the low-frequencycomponent of heart rate variability

Eric Hermand [1], Aurélien Pichon [2], François Lhuissier [1], Jean-Paul Richalet [1]

[1] UMR INSERM U1272 Hypoxie & Poumon, [2] UR 20296 MOVE (Mobilité, Vieillissement et Exercice)

Heart rate variability (HRV) may be influenced by several factors, such as environment (hypoxia, hyperoxia, hypercapnia) or physiological demand (exercise). In this retrospective study, we tested thehypothesis that inter-beat (RR) intervals in healthy subjects exercising under various environmental stresses exhibit oscillations at the same frequency than ventilatory oscillations.
Spectra from RR intervals and ventilation (VE) were collected from 37 healthy young male subjects who participated in 5 previous studies focused on ventilatory oscillations (periodic breathing) during exercise in hypoxia, hyperoxia and hypercapnia.
Fast Fourier analysis of RR and VE signals showed that RR was oscillating at the same frequency than periodic breathing, i.e., ~ 0.09 Hz (11 s). During exercise, in these various conditions, the difference between minimum and maximum HRV peak power was positively correlated to the same change in ventilation peak power ($P < 0.05$). Low-frequency (LF) peak power was correlated to tidal volume ($P < 0.01$) and breathing frequency ($P < 0.001$).
This study suggests that low-frequency ventilatory oscillations in hypoxia are a major contributor to theLF band power of heart rate variability.

IMPACT OF USING GLI REFERENCE VALUE EQUATIONS FOR DLCOINTERPRETATION AMONG PATIENTS WITH PULMONARY HYPERTENSION

Antoine Beurnier [1, 3, 5], Mithum Kularatne [7], Farhin HASHEM POUR [1], Marcel Bonay [2, 4, 5], Marc

Humbert [1, 3, 6], David Montani [1, 3, 6]

[1] Université Paris Saclay, Faculty of Medicine, France., [2] Université Versailles Saint-Quentin-en-Yvelines, Faculty of Medicine, France., [3] Inserm UMR_S 999 « Pulmonary Hypertension: Pathophysiology and Novel Therapies », Marie Lannelongue Hospital, Le Plessis Robinson, France., [4] Inserm U1179 (END-ICAP), Montigny-le-Bretonneux, France., [5] AP-HP, Departement of Physiology – Functional Explorations, DMU 5 Thorinno, bi-site Bicêtre (Le Kremlin Bicêtre) and Ambroise Paré (Boulogne-Billancourt) Hospitals, France., [6] AP-HP, Departement of

Respiratory and Intensive Care Medicine, Pulmonary Hypertension National Referral Center, Bicêtre Hospital, DMU 5 Thorinno, Le Kremlin-Bicêtre, France., [7] *University of Calgary, Calgary, Canada.*

Background: This study aims to assess the impact of transitioning from the ECSC to the GLI referenceequation for interpretation of DLCO in a real-life context, across diverse populations of patients with pulmonary hypertension (PH).

Methods: We retrospectively enrolled patients with either overt features of venous/capillary involvement (PVOD), idiopathic or heritable pulmonary arterial hypertension (PAH), or chronic thromboembolic pulmonary hypertension (CTEPH) who performed adequate DLCO testing in the reference center for PH at the time of their inclusion in the French PH Registry. DLCO values at inclusion were expressed as percentages of predicted value (%pred) and z-scores using both ECSC and GLI equations.

Results: Fifty-five PAH patients (41 women, mean age 51.8 +/- 15.8 years), 37 PVOD patients (13
women, mean age 63.9 +/- 14.1 years), and 39 CTEPH patients (13 women, mean age 57.4 +/- 16.9 years) were included. Overall, employing GLI equations yielded higher values of DLCO %pred than ECSC equations (62.7 vs. 56.5, $p<0.001$). This increase was more significant in PAH patients, with a mean increase of 9.6 %pred, in contrast to 5.2 %pred in CTEPH ($p<0.001$) and 2.4 %pred in PVOD patients ($p<0.001$). The magnitude and direction of variation in z-scores varied across the groups, being
0.26 in PAH, 0.47 in CTEPH, and -1.31 in PVOD patients.

Conclusion: The distinct demographic characteristics and baseline DLCO raw values inherent to each PHcategory leads to divergent effects on DLCO %pred and z-scores. Clinicians should be aware of such impacts for patient management in clinical practice and research.