

# Clinical physiology and sleep: highlights from the European Respiratory Society Congress 2018 presented by early career members

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The 2018 Annual Congress of the European Respiratory Society (ERS) held in Paris has featured the novel insights on sleep and clinical physiology. The ERS Congress provides an excellent opportunity to young pneumologists and researchers to present their work to the recognized experts in their fields. This year, we highlight some of the best rank studies carried out by early career members from assembly 4.

## Impaired cerebral oxygenation and exercise tolerance in obstructive sleep apnea syndrome

Altered regional cerebral blood flow (rCBF) in OSA has been suggested to contribute to most of the neurological and cognitive deficits described in these patients (1,2). In the first study, Dr. Marillier *et al.* showed that the impaired cerebral oxygenation could be translated to a poorer exercise tolerance in severe OSA (3). Fifteen OSA patients and twelve controls were included in the study. A maximal cardiopulmonary exercise test and measurements of oxygen in prefrontal cortex and muscle tissues were assessed by near-infrared spectroscopy. The results supported the previous findings linking OSA with an altered cerebrovascular response to exercise, but also could contribute to an exercise intolerance in these patients. In addition, the follow up of these patients after 8 weeks of CPAP treatment or control period revealed that the exercise tolerance is not improved by this OSA treatment.

## Apolipoprotein E polymorphisms and incident arterial hypertension (AH) in OSA

Regarding OSA and cardiovascular outcomes, Dr. Cerezo *et al.* brings novel mechanistic insights about the association between OSA and AH (4). Specifically, the authors investigated the potential association between the presence of some well described genotypes of Apolipoprotein E (ApoE) with the incidence of AH in OSA patients from an 8-year follow-up cohort. Over the last decades, several works have evaluated the potential association between OSA and polymorphisms in the apolipoprotein E (APOE) gene (5,6). In this study, the authors included 123 patients which underwent nocturnal polysomnography and ApoE genotyping to further analyze the AH onset with the presence of the 3 alleles of ApoE. Interestingly, the authors stated that the presence of the allele E4 or genotypes E3E4 or E2E4 in the patients evaluated were associated with higher incidence of AH.

## The effect of CPAP treatment on galectin-3 level in OSA

In a very recent work, Dr. Andreieva presented an increased galectin-3 in OSA patients (7). Galectin-3 participates in many functions including inflammation (8). Interestingly, this protein has been associated to several consequences which have been also linked to OSA such as, coronary plaque burden (9), pulmonary vascular remodeling (10),

metabolic disorders (11) and cancer (12). In the work presented by Dr. Andreieva, she investigated the effect CPAP therapy on circulating Galectin-3 in severe OSA patients in a prospective study (13). A total of 57 patients were included and randomly were treated with CPAP for 3 months ( $\geq 4$  hours per night) (36 patients) or non-treated (21 patients). After analyses, no changes were observed in galectin-3 after CPAP treatment respect to the non-treated group. However, regression analysis revealed that galectin-3 was associated with body mass index (BMI) and age.

### **OSA as risk factor for incident metabolic syndrome**

Respect the development of metabolic syndrome (MetS) in OSA, Dr. Hirotsu *et al.* presented the most recent data from an observational prospective study involving Episono and HypnoLaus cohorts which evaluated OSA patients over 8 and 5 years, respectively (14). MetS was assessed according to the Joint Interim Statement (JIS) or “harmonized” criteria. OSA was classified as mild (5.0–14.9) and moderate/severe ( $\geq 15.0$ ). From 1,853 OSA patients included in the study, 318 (17.2%) developed MetS. Interestingly, further analysis revealed that moderate to severe OSA is linked with MetS incidence and therefore, providing a strong support to previous findings in this field (15).

### **New insights in the treatment of OSA: mandibular advancement splint (MAS)**

Although CPAP is the gold standard treatment for OSA, there are still intolerance and poor compliance in a relevant percentage of patients. During the last decade, oral appliances have emerged as alternatives to CPAP. Specifically, MAS is currently a well-accepted alternative to CPAP for mild and moderate OSA. Dr. Alves-Ferreira *et al.* evaluated MAS efficacy in 139 OSA patients (16). A cephalometric evaluation and polysomnography were carried out in all patients at baseline with MAS. Interestingly, the use of MAS promoted a symptomatic improvement in 86.4% of those patients as well as improvements in sleep quality and oxygen desaturation parameters. Authors also described that higher values of SNB (the angle formed by the sella-nasion-B point) and lower values of ANB (the angle formed by the nasion-A point-B point) and  $\Delta$  ANS-Gn could help to predict a successful outcome of MAS.

### **VitaBreath on exercise tolerance in chronic obstructive pulmonary disease**

During the last years, there has been increasing interest in the use of non-invasive ventilation (NIV) to improve exercise capacity in some patients. Specifically in COPD, it has been shown that NIV could improve exercise capacity (17). In the work presented by Dr. Vogiatzis *et al.*, they compared the effects of the VitaBreath device (Philips) on exercise tolerance, dynamic hyperinflation (DH), symptoms of breathlessness and leg discomfort to pursed-lip breathing (PLB) technique (18). At the beginning, the patients performed an incremental cycling test to the limit of tolerance ( $W_{peak}$ ). Then, they were randomly subjected to a constant-load exercise protocol or an interval exercise protocol. Patients breathed through the VitaBreath device during the first minute of each 2-min rest periods in both exercise protocols. Their results showed that VitaBreath can increase exercise endurance time and, at the limit of tolerance, reduces DH, Borg scale breathlessness and leg discomfort. Therefore, this device seems to have promising results on exercise tolerance for both protocols tested.

### **Usefulness of incremental step test in patients with pulmonary hypertension**

Cardiopulmonary exercise testing (CPET) has become an important clinical tool to evaluate exercise capacity. It provides assessment of the integrative exercise responses of the cardiorespiratory and skeletal muscle systems. A symptom-limited incremental step test (IST) can determine maximum physiological responses for several diseases. In pneumology, a symptom-limited incremental step test has been previously shown to be well tolerated and reproducible in patients with COPD (19). In the work presented by Dr. Vieira *et al.*, they investigated the use of a maximal symptom-limited cardiopulmonary incremental protocol on a single step in patients with pulmonary hypertension (PH) (20). To this end, the authors included twenty-one patients with PH which randomly performed a symptom-limited CPET on cycle ergometer (CYCLE) and IST. They assessed metabolic, cardiovascular, ventilatory and gas exchange variables. Finally, authors found that IST was successfully performed in patients with PH providing a new tool to assess the maximum physiological responses in these patients.

### Effects of pregnancy on respiratory function

Dr. LoMauro *et al.* presented new insights in the ventilatory changes induced in the respiratory system during pregnancy (21). Previous works have shown that the major physiologic changes during pregnancy include increased minute ventilation. However, in spite of the alterations produced in the chest wall by an enlarged uterus, the vital capacity and other measures of forced expiration are well preserved (22). The authors performed optoelectronic plethysmography and ultrasound in 11 primiparous and 11 nulliparous women (control) at each trimester. Dr. LoMauro *et al.* showed that during pregnancy the subcostal angle, antero-posterior and mediolateral RC diameters progressively increased, while RC height decreased with constant RC volume. As previously reported, breathing frequency increased. They didn't found changes in the thickness or displacement of the diaphragm.

In conclusion, the studies presented are quite diverse and provides novel insights in the physiology of OSA among other respiratory diseases. Also, most of the works highlighted in this review have potential impact in clinical practice.

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### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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