

## Supplementary material

### **Evaluation protocol of the study**

All children underwent an ear, nose and throat examination, a lateral neck X-ray and an attended PSG. Age, gender, weight, height, body mass index (BMI) for sex/age z-score, and underlying medical comorbidities including prematurity, obesity, gastroesophageal reflux, respiratory and neurological comorbidities were recorded. Obesity was defined if a BMI z-score  $\geq 2$ , using national reference values.<sup>1</sup> Adenoid hypertrophy was determined based on a lateral neck X-ray measuring the airway space immediately behind the upper part of the soft palate (nasopharyngeal airway/soft palate (NA/SP) ratio) according to the Cohen and Konak method.<sup>2</sup> Patients were graded as normal= NA/SP ratio  $\geq 1$ ; mild-to-moderate hypertrophy= NA/SP ratio 0.5-1; and severe hypertrophy= NA/SP ratio  $< 0.5$ . Tonsils were graded according to the Brodsky grading scale<sup>3</sup> where 0= no tonsils visible, +1=  $< 25\%$  of the oropharynx occupied by tonsils, +2= 25-50% of the oropharynx occupied by tonsils, +3=50-75% of the oropharynx occupied by tonsils, and +4=  $> 75\%$  of the oropharynx occupied by tonsils. Tonsils and adenoid grade variables were reduced as a single combined variable. Patients were classified in three groups: normal (NA/SP ratio  $\geq 1$  and tonsils grade 0 or +1), mild-to-moderate hypertrophy (NA/SP ratio 0.5-1 and/or tonsils grade +2), and severe hypertrophy (NA/SP ratio  $< 0.5$  and/or tonsils grade +3 or +4).

## **Neurophysiological and respiratory signals recorded**

Monitoring included electroencephalogram channels (EEG) (F3-A2, F4-A1, C3-A2, C4-A1, O1-A2, O2-A1), electrooculogram (EOG), intercostal and submental electromyogram (EMG), airflow by oronasal thermistor (Th) (Protech Services Inc, Murrysville, PA, USA) and a pediatric nasal cannula (Salter Labs, Arvin, California, USA), chest and abdominal movements using respiratory inductive plethysmography, arterial oxygen saturation by pulse oximetry (SpO<sub>2</sub>), PtcCO<sub>2</sub> (TCM4 monitor, Radiometer, Copenhagen, Denmark), PetCO<sub>2</sub> (Microcap Micro-stream, Oridion Capnography Inc., Needham, Massachusetts) via nasal sampling cannula, snoring by microphone, electrocardiography, body position and simultaneous video recording. No patients had blood gas measurements to validate PetCO<sub>2</sub> and PtcCO<sub>2</sub> values.

## **Criteria for the scoring of sleep and respiratory events during sleep**

Sleep stages, arousals and respiratory events were scored according to standard criteria.<sup>4</sup> Obstructive apnea was defined as the cessation of airflow (<10% of baseline level) for at least the duration of two breaths associated with respiratory effort. Central apnea was defined as the cessation of airflow (<10% of baseline level) with absent inspiratory effort for at least the duration of two breaths and followed by an arousal or an oxygen desaturation  $\geq 3\%$  or for at least 20 seconds in the absence of any associated arousal or oxygen desaturation events. Mixed apnea was recorded if apnea criteria were met for at least the duration of two breaths with absent respiratory effort during one portion of the event and the presence of inspiratory effort in another portion. Hypopnea was defined as a decrease in airflow  $\geq 30\%$ , for the duration of at least two breaths and associated with an arousal or  $\geq 3\%$  oxygen desaturation. Respiratory

effort-related arousals (RERA) were defined as a sequence of breaths lasting  $\geq 2$  breaths characterized by increasing respiratory effort, flattening of the inspiratory portion of the nasal cannula (NC) waveform, or snoring which did not meet criteria for apnea or hypopnea or lead to an arousal from sleep.

The obstructive apnea-hypopnea index (OAHl) was calculated based on the number of obstructive and mixed apneas and hypopneas per hour of total sleep time (TST).

### **Statistical analysis**

Differences between PetCO<sub>2</sub> and PtcCO<sub>2</sub> repositioning and hypoventilation during sleep detected in both methods were evaluated using the McNemar test. Percentages of total recording time (TRT) with uninterpretable data in PetCO<sub>2</sub> and PtcCO<sub>2</sub> were compared using the Wilcoxon test. Factors associated with uninterpretable data >50% of TRT and hypoventilation were evaluated by Pearson's chi-square or Fisher's exact test for categorical variables, the chi-square for linear trend for ordinal variables and the Student's t or Mann-Whitney U test for quantitative variables. Differences between PetCO<sub>2</sub> and PtcCO<sub>2</sub> values were assessed by paired samples t-tests, and the agreement was evaluated using the intraclass correlation coefficient (ICC) and the Bland and Altman method. A p-value <0.05 was considered statistically significant.

## References

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2. Cohen D, Konak S. The evaluation of radiographs of the nasopharynx. Clin. Otolaryngol 1985; 10, 73–78.
3. Brodsky L. Modern assessment of tonsils and adenoids. Pediatr. Clin. North Am 1989; 36:1551–69.
4. Berry RB, Brooks R, Gamaldo CE, Harding SM, Lloyd RM, Quan SF, Troester MM, Vaughn BV; for the American Academy of Sleep Medicine. The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications. Version 2.4. Darien, IL: American Academy of Sleep Medicine; 2017.