



## MANDIBLE BEHAVIOUR IN SEVERE OBSTRUCTIVE SLEEP APNEA PATIENTS UNDER CPAP TREATMENT<sup>§</sup>

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**INTRODUCTION:** As we are interested in mandible movements in sleep disordered breathing, we measured the instant opening of the mouth during sleep by two magnetometers fixed on the forehead and on the chin. We wanted to know if different behaviours were detectable in OSA patients, before and under CPAP treatment, and in a control group.

**METHODS:** In this retrospective study, patients were selected according to the criteria that the polysomnography and related CPAP therapy control recordings were available, the mandible movement and mask pressure signals were also available and the applied positive pressure was tolerated. Statistical analysis of four parameters composed of the apnea-hypopnea index (AHI), the arousal index (Arl), the average of the mandible movement signal during the night (avMM), reflecting the mean mouth opening level, and the mean peak-to-peak amplitude around the instantaneous mean of the mandible movement signal (ppaMM), reflecting the variations of the mandible movement signal, were performed on three groups: the OSA group, the CPAP group, and a control group, the latter being composed of healthy subjects prospectively recorded.

The mandible movement signal was recorded by a distance-meter (Jawsens, Nomics) made of two probes magnetically coupled. The two probes are placed on the medium line of the face on the forehead and on the chin (Figure 1).

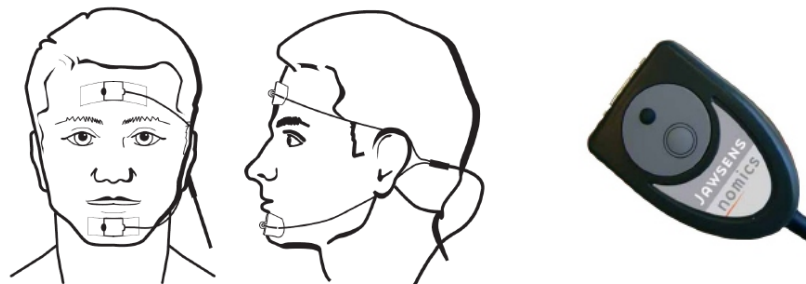


Figure 1: Mandible movement sensor. The probes are placed on the medium line of the face on the forehead and on the chin. The mandible movement signal corresponds to the distance between them. The Jawsens device that interfaces the sensor to the PSG system is illustrated on the right.

**RESULTS:** Both the OSA and CPAP groups were composed of thirty-four recordings, while thirteen healthy recordings were in the control group. There was significant difference ( $p < 0.05$ ) in the four parameters between the OSA group and both the CPAP and control groups. While the average of the mouth opening of the CPAP group did not differ significantly from the one from the control group, the three other parameters differ in these two groups though they are close to each other (Table 1).

Table 1 – Averages and standard deviation of the 4 parameters (AHI, ArI, avMM and ppaMM) in the 3 groups.

	AHI (n/h)	ArI (n/h)	avMM (mm)	ppaMM (mm)
Severe OSA (Gr 1)	49.2 ± 17.3 *°	51.9 ± 15.6 *°	-9.1 ± 3.5 *°	0.9 ± 0.6 *°
CPAP (Gr 2)	4.0 ± 3.1 **	14.7 ± 8.3 **	-5.8 ± 3.5	0.2 ± 0.1 **
Healthy (Gr 3-control)	1.5 ± 1.8	8.5 ± 5.1	-6.0 ± 2.1	0.1 ± 0.1

\* statistically significant difference between Gr 1 and Gr 2 ( $p < 0.05$ )

° statistically significant difference between Gr 1 and Gr 3 ( $p < 0.05$ )

\*\* statistically significant difference between Gr 2 and Gr 3 ( $p < 0.05$ )

Figure 2 shows the four parameters for the three groups and the statistical differences ( $p < 0.05$ ) found. Figure 3 is an illustrative case report of manual titration showing significant changes in mandible behaviour as the titration progresses.

**CONCLUSIONS:** When the efficient pressure is reached, the mandible behaves much more like in healthy patients, i.e. a more closed mouth, fewer broad sharp mouth closures and absence of, or at least very small, oscillating movements.

§ To be published.

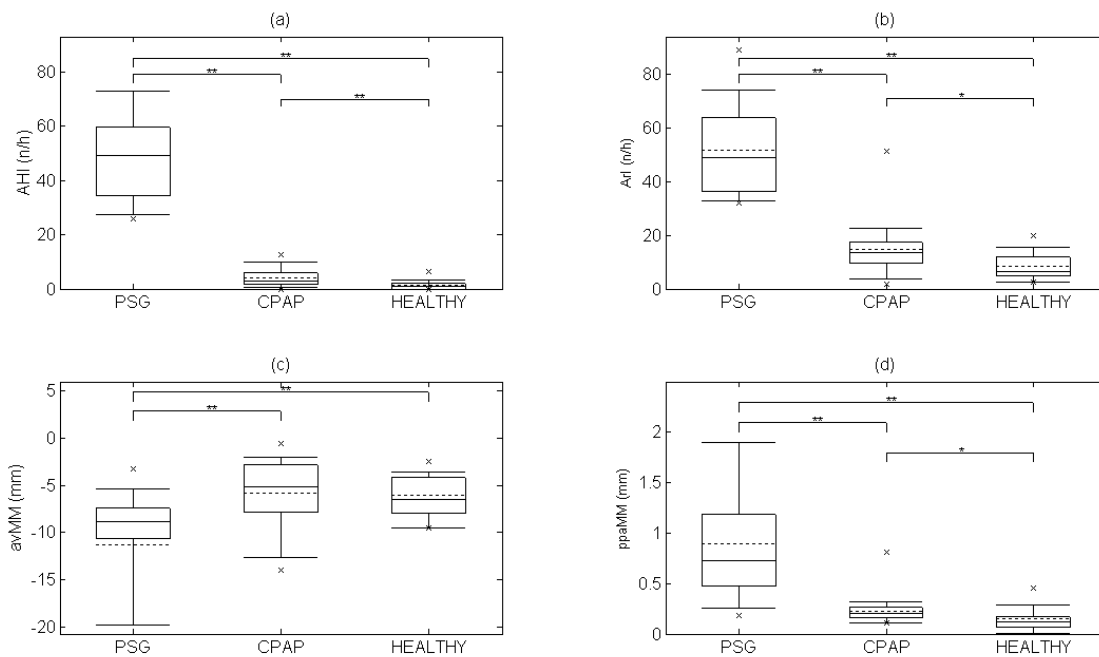


Figure 2: Box plots of the four parameters AHl (a), Ari (b), avMM (c) and ppaMM (d).  
 The x crosses indicate the extrema, the box height covers the interquartile range (between 25<sup>th</sup> and 75<sup>th</sup> percentile), the solid line in each box corresponds to the median and the dashed line is the mean.  
 \*\* corresponds to a p-value lower than 0.01 and \* is related to a p-value lower than 0.05 but greater than 0.01.

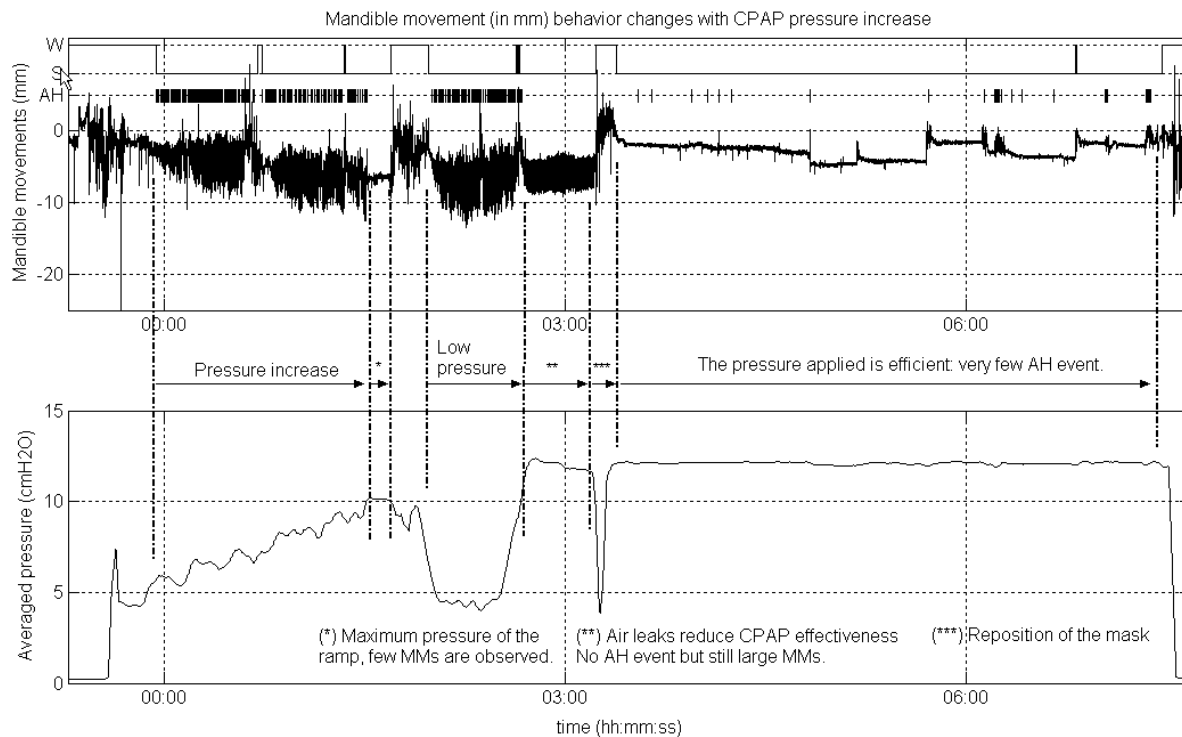


Figure 3: Illustration of the mandible movement signal (MM, in mm) behaviour under CPAP during CPAP titration night. The scored apnea and hypopnea (AH) events and hypnogram are shown above mandibular movements.  
 In the first third of the night, the CPAP pressure is increased manually from 4 to 10cmH2O. At 10cmH2O (\*), no event was scored and few MM was observed. The pressure was then reduced to 4cmH2O for 30 minutes and then fixed at the *best* value (defined by the technician). An air leakage was detected (\*\*) leading to large oscillating MM without any AH event. The mask was repositioned (\*\*\*) and the efficiency of the CPAP and stability of the mandible can be appreciated until the end of the night.