

## Ambulatory diagnostic and monitoring techniques for sleep disordered breathing

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Sleep disordered breathing (SDB), including obstructive sleep apnea syndrome (OSAS), is directly related to obesity. Significant morbi-mortality is associated with OSAS, explaining the increasing demand for in-hospital polysomnography (PSG), the reference diagnostic method. As this technique is complex and time-consuming, many simplified portable monitoring (PM) devices for home sleep testing have been developed. However, the ability of PM devices to detect OSA remains limited: sleep time is not correctly assessed, OSA severity is underestimated, false negative results occur and the failure rate of the tests is high, up to 30%. Home-PSG (H-PSG) is an interesting alternative, avoiding many of these drawbacks.

*In the first part of this work*, we studied the tool in an original study comparing H-PSG and in-lab PSG. Diagnostic efficacy was good and the failure rate low (4.7 vs 1.5%). Patients slept in their own environment and thus sleep quality was better. We were then interested by reviewing recent literature data regarding prospective randomised trials comparing H-PSG and in-lab PSG. We concluded that H-PSG is an excellent alternative for in-lab PSG, allowing not only OSA detection but also diagnosis of a large panel of other sleep disorders (periodic leg movements during sleep, circadian disorders,..). As the best place to perform set-up for H-PSG remained unknown, we studied, in another prospective randomised study, the recording's quality obtained in both settings. As no difference was observed, lab set up was found to be the simpler option for performing H-PSG. We then tested, in a prospective pilot study, real-time telemonitoring (TM) of H-PSG in order to enhance recording quality. Results were encouraging but we faced some technical problems. In a second study, we applied TM coupled with PSG to detect SDB in acute coronary syndrome, in patients too unstable to come in the sleep lab. We compared also PSG results to polygraphy (PG). Surprisingly, 82% of patients suffered from SDB. PSG was much more sensitive than PG to screen SDB in this population and TM improves recording quality.

*In the second part of this work*, we have used actigraphy (Act) to assess sleep and physical activity in OSA patients in real-life conditions. Firstly, in a retrospective study, we documented these parameters before treatment. In a second multicentre study, we evaluated the changes in sleep schemes and physical activity under continuous positive airway pressure (CPAP) in 150 OSA patients. We observed that sleep time was increased under CPAP, but physical activity was not improved, contrarily to sleepiness and quality of life.

**In conclusion**, we have shown through these works the clinical interest of two excellent ambulatory tools, H-PSG and Act, for OSA management. Potential clinical implications include enhanced healthcare accessibility, earlier treatment initiation and a closer follow-up of treated patients, through ambulatory tools, in a comfortable environment for the patients.