

PRELIMINARY EVALUATION OF SECOND-GENERATION N-CPAP MACHINE PILOT SLEEP STUDY

White DE¹, Bartley J², Campbell AJ³, Neill AM³

¹BioDesign Lab, School of Engineering, Computer & Mathematical Sciences, Auckland University of Technology, New Zealand, ²Department of Physiology, University of Auckland, New Zealand,

³WellSleep Centre, University of Otago, Wellington, New Zealand.

Introduction: Overcoming poor adherence to continuous positive airway pressure (CPAP) treatment remains one of the biggest obstacles in effectively treating obstructive sleep apnea (OSA). The use of supplementary humidification during CPAP treatment has addressed symptoms of airway drying and realized slight improvement in treatment adherence. A second-generation nasal continuous positive airway pressure (n-CPAP) machine, called rest-activity-cycler positive airway pressure (RACer-PAP), has been developed that reinstates normal inter-nasal airflow partitioning that is disturbed during conventional n-CPAP treatment. This new technology allows the pre-setting of both the time periods of the nasal cycle and the degree of airflow partitioning between each naris to restore normal nasal airway functioning. The aim of this pilot study was to ensure that RACer-PAP was at least non-inferior to conventional n-CPAP in terms of effective suppression of OSA and was tolerated by subjects.

Methods: Each of the three n-CPAP tolerant obstructive sleep apnea patients underwent two overnight in-laboratory polysomnogram studies. Night 1 treatment was delivered via a Fisher & Paykel Icon+ Auto positive airway pressure (APAP) device (with supplementary humidification) to acclimatize and check adequacy of current pressure. Night 2 treatment was delivered by RACer-PAP at 90% of APAP pressure and without supplementary humidification. Both treatments used the same type of nasal mask. Sleep and respiratory measures and adverse upper airway symptoms were compared between the two treatments.

Results: With the exception of one participant who had no change in severity of throat dryness between treatments, all participants reported reductions in nasal mouth and throat dryness, and nasal congestion severity when using RACer-PAP compared to APAP. Apnea/hypopnea index (AHI) was equivalent between nights for all patients. Arousal index (AI) was within night to night variation for all 3 participants between nights. Two participants experienced a 27.6% improvement in sleep efficiency, while one showed no change.

Conclusion: This pilot study of RACer-PAP technology appears to demonstrate a reduction in the severity of airway drying symptoms associated with APAP over a one night trial. Indices of effective OSA treatment were equivalent between devices. A randomized, controlled study comparing n-CPAP with RACer-PAP treatment adherence and therapy is currently underway.

Support: Funding for RACer-PAP technology development and this pilot study has been provide by KiwiNet, Health Innovation Hub and Auckland University of Technology co-funding.