Ahmed Al-Jumail, J Pulm Respir Med 2015, 5:3
http://dx.doi.org/10.4172/2161-105X.S1.007

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International Conference and Exhibition on
Lung Disorders & Therapeutics
July 13-15, 2015 Baltimore, Maryland, USA

Improvements on CPAP treatment for OSA

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Over the last three decades the continuous positive airway pressure (CPAP) method has been used as an effective tool for the treatment of obstructive sleep apnea (OSA). It provides air at an elevated pressure, which is normally called the titration pressure, through a nasal or facial mask, creating a pneumatic splint that keeps the pharyngeal upper airway (UA) open during inspiration and expiration. In spite of the CPAP therapy effectiveness, a number of drawbacks and negative impacts have been reported with its use. Over 45% of CPAP patients report negative side effects including discomfort, nasal irritation problems and some possible negative physiological impacts caused by the effect of CPAP on cerebral blood flow. The airway binary fluid layer and the structural characteristics of the UA have significant influence on the activity of the airway muscles by changing airway compliance and collapsibility during OSA. However, modulating the titration pressure has been reported to introduce some improvements to remedy some of these problems. This presentation shows how pressure oscillation can modulate the upper airways and improves airway compliance. Computer simulation and clinical trials have demonstrated that incorporating pressure oscillation helps to improve the UA muscle activities, allowing better air delivery and reducing the requirements for a relatively high titration pressure.

Biography

Ahmed Al-Jumail did PhD and MSc from the Ohio State University and BSc from the University of Baghdad. He is a Fellow member of the ASME, and a member of 11 other international professional societies. He is the Editor of the ASME monograph series-Biomedical and Nanomedical Technologies and the Editor in Chief of the *Journal of Biomedical Engineering and Technology*, and has been on the editorial and refereeing boards for several international journals. He has published more than 270 papers in international journals and conference proceedings including two ASME books on Vibration and Acoustics in Biomedical Applications and a third one on CPAP devices. He has supervised more than 90 Postgraduate students in biomedical applications, vibrations, biomechanics, and electroactive polymers. During his academic career, he forged strong alliances between academia and industries; in particular in the medical devices area. His current research focuses on biomedical applications with particular interest in the application of vibration and acoustics to airways constriction therapies and artery non-invasive diagnostics.

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