

# European Respiratory Society Annual Congress 2013

**Abstract Number:** 1856

**Publication Number:** 1489

**Abstract Group:** 7.1. Paediatric Respiratory Physiology

**Keyword 1:** Sleep disorders **Keyword 2:** Imaging **Keyword 3:** Children

**Title:** Functional respiratory imaging as a tool to assess upper airway patency in children with OSA

Cedric 15038 Van Holsbeke cedric.vanholsbeke@fluidda.com<sup>1</sup>, Dr. Wim 15039 Vos wim.vos@fluidda.com<sup>1</sup>, Dr. Kim 15040 Van Hoorenbeeck kim.vanhoorenbeeck@ua.ac.be MD<sup>2</sup>, Prof. Dr An 15041 Boudewyns an.boudewyns@uza.be MD<sup>3</sup>, Dr. Jan 15042 De Backer jan.debacker@fluidda.com<sup>1</sup>, Prof. Dr Wilfried 15043 De Backer wilfried.debacker@ua.ac.be MD<sup>4</sup> and Prof. Dr Stijn 15044 Verhulst stijn.verhulst@ua.ac.be MD<sup>2</sup>. <sup>1</sup> Fluidda, Fluidda, Edegem, Belgium ; <sup>2</sup> Pediatrics, Antwerp University Hospital, Edegem, Belgium ; <sup>3</sup> ENT, Antwerp University Hospital, Edegem, Belgium and <sup>4</sup> Respiratory Medicine, Antwerp University Hospital, Edegem, Belgium .

**Body:** Objective: To investigate if anatomical and functional properties of the upper airway using computational 3D-models derived from CT images better predict obstructive sleep apnea (OSA) severity than standard clinical markers. Methods: Children with suspected OSA underwent polysomnography, clinical assessment of upper airway patency and a CT scan while being awake. A 3D-reconstruction of the pharyngeal airway was built from these images, and computational fluid dynamics modelling of low inspiratory flow was performed. Results: 33 children were included (23 boys, mean age was  $6.0 \pm 3.2$  years). OSA was diagnosed in 23 patients. Children with OSA had a significantly lower volume of the overlap region between tonsils and adenoids, a lower mean cross-sectional area at this location and a lower minimal cross-sectional area. Various significant correlations were found between several imaging parameters and the severity of OSA, most pronounced for upper airway conductance. No differences or significant correlations were observed with clinical parameters of upper airway patency. Preliminary data after treatment showed that none of the patients with residual OSA had their smallest cross-sectional area located in segment 3 and this frequency was significantly lower than in their peers whose sleep study normalized (64%;  $p = 0.05$ ). Conclusion: Functional imaging parameters are highly correlated with OSA severity and are a more powerful correlate than clinical scores of upper airway patency. Preliminary data also showed that we could identify differences in the upper airway of those subjects who did not benefit from a local upper airway treatment.