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Title: The influence of posture on airway structure and function in healthy subjects

Mr. Glenn 1048 Leemans glenn.leemans@ua.ac.be^{1,3}, Mr. Kris 1047 Ides kris.ides@ua.ac.be¹, Mr. Cedric 1045 Van Holsbeke cedric.vanholsbeke@fluidda.com², Dr. Dirk 1049 Vissers dirk.vissers@ua.ac.be¹, Dr. Wim 1044 Vos wim.vos@fluidda.com² and Prof. Dr Wilfried 1046 De Backer wilfried.debacker@ua.ac.be MD^{1,3}. ¹ Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium ; ² FluidDA, nv, Kontich, Belgium and ³ Pulmonary Medicine, University Hospital Antwerp, Edegem, Belgium .

Body: Rationale: Lateral posture (LP) has a positive effect on airway clearance in the depended lung, but the exact principle behind this is not well understood. One of the underlying hypotheses is that LP causes higher local airflow velocity during tidal breathing, resulting in sufficient shearing forces to move mucus.

Aim: To confirm this hypothesis by investigating the changes in local airway dimensions, regional airflow distribution and velocities between supine (SP) and right lateral decubitus (RLP) position. Methods: 4 healthy male subjects (26[21-33]years old) underwent CT scans (spirometry controlled) in SP and RLP at expiration (FRC) and inspiration (TLC). Functional respiratory imaging (FRI) was used to evaluate changes in airway structure and function. Airway functionality was assessed at a simulated inspiratory flow rate of 25L/min.

Results: In SP a homogeneous airflow distribution between both lungs was observed (R/L=52/48). Switching to RLP caused an increased ventilation towards the right lung (R/L=63/37, $p < 0.0001$). This was combined with a decreased airway diameter ($\Delta = -4.8\%$, $p = 0.0002$) and increased velocity ($\Delta = +21.3\%$, $p = 0.02$) in the depended lung. Conclusion: FRI demonstrated increased ventilation, higher airflow velocity and decreased airway dimensions in the depended lung in RLP. These preliminary results in healthy subjects confirm that posture changes affect local airflow velocity.