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Title: Changes in respiratory impedance during deep inspiration in healthy newborns

Mr. Bence 8533 Radics radics.bence@gmail.com ¹, Dr. Zita 8534 Gyurkovits gyurkovits2000@yahoo.com MD ², Dr. Hajnalka 8535 Szabo szabo65@yahoo.com MD ³, Prof. Hajnalka 20978 Orvos orvosh@gmail.com MD ², Prof. Peter 8536 Sly p.sly@uq.edu.au MD ⁴ and Prof. Zoltán 20977 Hantos hantos.zoltan@med.u-szeged.hu ^{1,4}. ¹ Medical Physics and Informatics, University of Szeged, Szeged, Hungary ; ² Gynaecology and Obstetrics, University of Szeged, Szeged, Hungary ; ³ Paediatrics, University of Szeged, Szeged, Hungary and ⁴ Queensland Children's Medical Research Institute, University of Queensland, Brisbane, Australia .

Body: Introduction: Deep inspirations (DI) have known effects on respiratory impedance (Zrs), reduce airway resistance (Raw), increase airway diameter and decrease airway responsiveness. The changes in Zrs during a natural sigh have not been studied in newborns. Methods: Healthy term newborns (n=42) were measured with the forced oscillation technique during natural sleep within 24 hrs after birth. Within-breath changes in Raw and tissue elastance (E) were estimated from Zrs. In each DI epoch 4 volume (V) points were defined. A: end-expiratory V preceeding the DI (0 ml), B: end-tidal V, C: V at minimum resistance, D: maximum V of DI. Results: Raw decreased significantly as V increased (data: median [1st, 3rd interquartile]) ($Raw_A = 26.4$ hPa.s/l [18.5-32.6], $Raw_D = 18.4$ [13.9-34.3]) but the minimum occurred before the peak V of DI ($Raw_C = 13.7$ [10.4-22.4]). E increased with V monotonously. ($E_A = 502$ hPa/l [377-633], $E_D = 1068$ [806-1315]. ($p < 0.001$; RM ANOVA on Ranks)

Discussion: Changes in Zrs during breathing and DIs can be detected successfully in unsedated newborns. The elevation in E indicates the increasing stiffness of the tissues. The decreasing trend in Raw with increasing V can be attributed to the passive dilatation of intrathoracic airways. The drop in Raw before the peak of DI suggests the involvement of active mechanisms (e.g. maximum opening of the glottis) during sighs. Supported by Hungarian Scientific Research Fund grant K 105403.