European Respiratory Society
Annual Congress 2012

Abstract Number: 3503
Publication Number: 1654

Abstract Group: 4.1. Clinical physiology and Exercise
Keyword 1: Physiology **Keyword 2:** Circulation **Keyword 3:** No keyword

Title: Within-breath femoral venous blood flow modulation

Barbara 19330 Uva barbara.uva@mail.polimi.it [1], Dario 19331 Bovio dario.bovio@polimi.it [1], Edoardo 19332 Colombo coledoco@alice.it MD [2] and Andrea 19333 Aliverti andrea.aliverti@polimi.it [1]. [1] Dipartimento di Bioingegneria, Politecnico di Milano, Milano, Italy and [2] Dipartimento di Medicina Clinica, Università degli Studi dell'Insubria, Varese, Italy .

Body: Breathing has a large effect on venous return and abdominal pressure (Pab) variations can cause the interruption of femoral venous flow (Qfv). The purpose of this study was to determine the values of Pab, airflow, volume and time at which Qfv ceases and restarts within the respiratory cycle time (T_{tot}). In 4 healthy subjects (age 45±22.1 yr) lying in semirecumbent position airflow was measured during quiet breathing (QB) by a pneumotachograph, Pab by gastric pressure measurements using catheter-balloon-transducer system and Qfv by an echo-Doppler probe. Qfv contour was extracted from the images recorded by the echo-Doppler. The values of Pab, airflow, volume above FRC (ΔV) and times t_1 and t_2 at which Qfv stopped and restarted (where femoral venous velocity could no longer be detected and became measurable again) within T_{tot} were calculated (see figure for a representative case). t_1 and t_2 occurred respectively during inspiration and expiration when airflow averaged 0.40±0.04 and -0.39±0.10 L/sec. No significant difference between Pab at t_1 (3.1±2.3 cmH_2O) and t_2 (2.8±2.0 cmH_2O) was found. ΔV was 0.33±0.09 at t_1 and 0.48±0.10 L at t_2 ($p<0.05$). The fraction of T_{tot} in which Qfv was negligible, defined as $(t_2-t_1)/T_{tot}$ averaged 0.33±0.07. These data suggest that during QB Pab variations produced by diaphragm contraction have a profound modulatory within-breath effect on venous return from the lower limb and this modulation is dependent on Pab dynamics.