**Supplementary Table 2**

**Studies** **utilizing lower body negative pressure and tourniquets to alter cardiac output**

*CBF, cerebral blood flow; CI, cardiac index; CO, cardiac output; CVP, central venous pressure; ET CO2, end-tidal carbon dioxide; LBNP, lower body negative pressure; MAP, mean arterial pressure; NS. Not significant; PWA, pulse wave analysis; TCD, transcranial Doppler; Vmca, middle cerebral artery blood flow velocity*

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author (Year) [Reference #]** | **N** | **Subjects** | **Method of CBF measurement** | **Method of CO measurement** | **Intervention** | **Change in CO/CI** | **Change in MAP** | **Change in pCO2 (measure)** | **Change in CBF** |
| Bronzwaer  (2017) [30] | 40 | 40 adults stratified by age and gender. (Young = 19-27y, middle-aged = 51-61y, elderly = 70-79y) | TCD Vmca | PWA  and inert  gas rebreathing. | CO was decreased by LBNP. This was followed by a dynamic handgrip exercise session to increase CO. | With LBNP, CO decreased by 7±5% in young patients, and 6±5% in middle and old aged groups(all P<0.05) | With LBNP, MAP decreased by 3±4%, 8±4%, and 4±6% in young, middle and old aged groups respectively (young and middle aged P<0.05). | With LBNP, ETCO2 decreased by 5±4%, 10±6%, and 14±9% in young, middle and old aged groups respectively (young and middle aged P<0.05). | With LBNP, V,mca mean decreased by 5±5%, 15±7%, and 11±6% in young, middle and old aged groups respectively (young and middle aged P<0.05). |
| Deegan (2010) [31] | 19 | 19 healthy volunteers | TCD Vmca and anterior cerebral artery flow velocity | Echocardiography | A thigh tourniquet was placed then released causing a drop in MAP. | While supine, CI increased from baseline (2.2±0.3 L/min/m2) with tourniquet application (2.7±0.3) and with tourniquet release (3.0±0.3) (p<0.05). Similar results were achieved when sitting. | While supine, MAP increased from baseline (90±3 mmHg) with tourniquet application (101±3) and decreased from baseline with tourniquet release (84±2) (p<0.05). Similar results were achieved when sitting. | While supine, ETCO2 remained stable from baseline (39.8±0.6 mmHg) with tourniquet application (38.7±0.8) and release (38.7±0.8). Similar results were achieved when sitting. | Vmca and anterior cerebral artery flowvelocity did not change from baseline (100%) with tourniquet application (101±2% and 103±2%respectively), but did decrease after tourniquet release (94±2% and 97±2% respectively). (P<0.05). Similar results were achieved when sitting, although baseline velocities where lower. |
| Levine (1994) [38] | 13 | 13 healthy volunteers | TCD Vmca | Inert gas rebreathing technique | LBNP | CO decreased with maximal (-55mmHg) LBNP from 5.6L/min to 3.5 L/min (a decrease of 29.9%) | MAP remained stable with maximal (-55mmHg) LBNP: from 82±2mmHg at baseline to 88±3mmHg | No data | Mean Vmca decreased from rest to maximal LBNP by 15.5±5% (P<0.05).  Simultaneously, there was a 17.2±10% increase in pulsatility ratio (P<0.05). |
| Brown (2003) [39] | 13 | 13 Healthy volunteers | TCD Vmca | Impedance  cardiography | LBNP | CO decreased progressively with increased LBNP (6.86±0.57 at rest to 3.80±0.38 at -50mmHg) (P<0.01) | MAP did not alter significantly during all values of LBNP (86±2 to 91±3mmHg at -50mmhG) (NS) | ETCO2 did not alter significantly until LBNP reached -40mmHg but tended to decrease with increasing LBNP.  37±2 to 31±2 at -50mmhG) (P<0.01) | Mean Vmca decreased once LBNP reached -30mmHg with increasing LBNP, due to decreased systolic velocities. Mean Vmca 71±4 to 57±3 at -50mmhg. (P<0.01) systolic Vmca 117±7 to 89±6mmHg. (P<0.01)  diastolic Vmca 48±3 to 44±3 (NS).  Pulsatility ratio increased from 1.48±0.07 to 1.72±0.13 (P<0.01). |
| Ogawa (2007) [41] | 12 | 12 healthy volunteers | TCD Vmca | Impedance cardiograph | Rapid changes in blood volume were achieved LBNP (-15 and -30 mm Hg)). | CO decreased with -30mmhg of LBNP (4.16±0.79 to 2.80±0.59). (p<0.05). | MAP did not change with LBNP (80±9 to 77±8mmHg) | EtCO2 did not change with LBNP (41±3 to 40±2mmHg) | Vmca decreased with -30mmHg LBNP (-4.7±4.7%) (P<0.05). |
| Ogoh (2005) [42] | 7 | 7 healthy volunteers | TCD Vmca | Aceytlene re-breathing technique | Rapid changes in blood volume were achieved LBNP (-8 and -16 mm Hg), both with and without cycling | CO decreased with -16mmhg of LBNP (6.5±0.3 to 5.3±0.3) (p<0.05); and this was maintained with cycling (14.7±1.0 to 13.7±1.1) (p<0.05).  CVP decreased by  2.8±0.5 mmHg at -16mmHg, and  and 2.9±0.4 mmHg during exercise. | MAP did not change with LBNP in resting (96±3 to 99±4mmHg) or exercising (109±5 to 106±4mmHg) subjects. | paCO2 did not change with LBNP in resting (42±1 to 40±1mmHg) or exercising (41±1 to 41±1 mmHg) subjects. | Vmca did not change with LBNP in resting (66±4 to 62±4mmHg) nor exercising (70±5 to 68±3mmHg) subjects. |