



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

Journal Home Page: <https://www.atlantis-press.com/journals/artres>

P86: BLUNTED CEREBRAL MICROCIRCULATION OXYGENATION DURING EXERCISE IN NEWLY DIAGNOSED HYPERTENSIVE PATIENTS: LINKS WITH INDICES OF MACROCIRCULATION AND ARTERIAL STIFFNESS

Areti Triantafyllou, Konstantina Dipla, Nikolaos Koletsos, Alexandros-Savvas Zafeiridis, Stauros Papadopoulos, Iris Grigoriadou, Eugenia Gkaliagkousi, Andreas Zafeiridis, Stella Douma

To cite this article: Areti Triantafyllou, Konstantina Dipla, Nikolaos Koletsos, Alexandros-Savvas Zafeiridis, Stauros Papadopoulos, Iris Grigoriadou, Eugenia Gkaliagkousi, Andreas Zafeiridis, Stella Douma (2018) P86: BLUNTED CEREBRAL MICROCIRCULATION OXYGENATION DURING EXERCISE IN NEWLY DIAGNOSED HYPERTENSIVE PATIENTS: LINKS WITH INDICES OF MACROCIRCULATION AND ARTERIAL STIFFNESS, Artery Research 24:C, 103–103, DOI: <https://doi.org/10.1016/j.artres.2018.10.139>

To link to this article: <https://doi.org/10.1016/j.artres.2018.10.139>

Published online: 7 December 2019

(Aix) with ABI in individuals with and without peripheral arterial disease (PAD). The study group included 670 subjects mean age 57 ± 16 years (248 PAD (ABI ≤ 0.9) and 422 No-PAD (ABI $\geq 0.91 - 1.3$). The aPWV, and Aix was estimated using applanation tonometry. 2. The ankle systolic pressure measurements for the calculation of the ABI was obtained using an 8-mHz Doppler probe. After stepwise selection process, in PAD patients aPWV and Aix were not related to ABI.

References

- Hirsch AT, Haskal ZJ, Hertzner NR. ACC/AHA 2005 practice guidelines for the management of patients with peripheral arterial disease (Lower extremity, renal, mesenteric, and abdominal aortic). *Circulation* 2006; 113:463-654.
- Laurent S, Cockcroft J, Van Bortel L, Boutouyrie P, Giannattasio C, Hayoz D, Pannier B, Vlachopoulos C, Wilkinson I, Struijker-Boudier H. Expert consensus document on arterial stiffness: methodological issues and clinical applications. *Eur Heart J* 2006; 27: 2588-2605.

Poster Session II – Brain

P85

CEREBRAL SMALL VESSEL DISEASE AND RISK OF INCIDENT STROKE, DEMENTIA AND DEPRESSION, AND ALL-CAUSE MORTALITY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Sytze Rensma¹, Thomas van Sloten², Lenore Launer³, Coen Stehouwer²

¹Maastricht University Medical Centre +, Maastricht, the Netherlands

²Maastricht University Medical Centre +, Maastricht, the Netherlands

³National Institutes of Health, Bethesda, USA

Background: MRI features of cerebral small vessel disease, i.e. white matter hyperintensities, lacunes, microbleeds, perivascular spaces, and cerebral atrophy, may be associated with clinical events, but the strength of these associations remains unclear.

Methods: We conducted a systematic review and meta-analysis on the association between these features and incident ischaemic and haemorrhagic stroke, all-cause dementia and depression, and all-cause mortality.

Results: For the association with stroke, 36 studies were identified (number of individuals/events [n] = 38,432/4,136), for dementia 28 (n = 16,458/1,709), for depression nine (n = 9,538/1,746), and for mortality 28 (n = 23,031/2,558). Only two studies evaluated perivascular spaces; these results were not pooled. Pooled analyses showed that all other features were associated with all outcomes (hazard ratios ranged 1.22–2.72). Combinations of two features were more strongly associated with stroke than any individual feature.

Conclusions: Individual features and combinations of CSVD features are strongly associated with incident ischaemic and haemorrhagic stroke, all-cause dementia and depression, and all-cause mortality. If these associations are causal, the strength of these associations suggests that a substantial burden of disease is attributable to CSVD.

P86

BLUNTED CEREBRAL MICROCIRCULATION OXYGENATION DURING EXERCISE IN NEWLY DIAGNOSED HYPERTENSIVE PATIENTS: LINKS WITH INDICES OF MACROCIRCULATION AND ARTERIAL STIFFNESS

Areti Triantafyllou¹, Konstantina Dipla², Nikolaos Koletsos¹, Alexandros-Savvas Zafeiridis¹, Stauros Papadopoulos², Iris Grigoriadou²,

Eugenia Gkaliagkousi¹, Andreas Zafeiridis², Stella Douma¹

¹3rd Dep. of Internal Medicine, Papageorgiou Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece

²Dep. of Physical Education and Sports Science at Serres, Aristotle University of Thessaloniki, Serres, Greece

Purpose/Background/Objective: Hypertension has been considered as one of the most common modifiable risk factors for stroke and cognitive

impairment. Decreased cerebral perfusion and oxygenation, as a result of capillary rarefaction and microvascular impairment of brain vessels, have been suggested as potentials underlying mechanisms. However, there is no study investigating whether these parameters are present in newly-diagnosed hypertensive patients (HP), without any co-morbidities. Thus, we examined (i) whether functional activation of the human cerebral cortex during handgrip exercise is altered in newly diagnosed HP and (ii) whether cerebral oxygenation correlates with different markers of arterial stiffness.

Methods: Forty-five newly diagnosed HP and 36 normotensives underwent an exercise protocol, consisting of a 3-min-rest, a 3-min-handgrip exercise (30% MVC), and a 3-min-recovery. Continuous-near-infrared-spectroscopy (NIRS) was used to monitor changes in cerebral-[O₂Hb]. IMT, Augmentation Index, Central-BP and PWV (Sphygmocor) were assessed.

Results: No significant differences were detected between groups in age, BMI, sex, MVC and force maintained during handgrip. During handgrip, cerebral-[O₂Hb] increased in both groups; however, hypertensive patientsexhibited a significantly lower average response than normotensives [1.6(1.1–2.7) vs. 2.4(1.4–3.2) μ M], respectively, $p < 0.05$ and a lower peak [O₂Hb] [4.2(3.3–6.2) vs. 5.9(4.3–9.2), $p < 0.01$]. Significant negative correlations were found between cerebral-[O₂Hb] and aortic BP, AI, and PWV.

Conclusions: Hypertensive patients exhibited a blunted cerebral [O₂Hb] response during handgrip exercise compared to their normotensive counterparts. This blunted increase in cerebral oxygenation during exercise was present in patients with recent diagnosis of hypertension and without evident TOD and correlated with macrovascular stiffening, indicating a cross-talk between micro- and microcirculation.

P87

CEREBROVASCULAR REACTIVITY DURING COGNITIVE ACTIVATION IN ADULTS WITH CONTROLLED HYPERTENSION

Wesley Lefferts¹, Jacob DeBlois², Tiago Barreira², Kevin Heffernan²

¹University of Illinois at Chicago, USA

²Syracuse University, USA

Hypertension, even when pharmaceutically controlled, may accelerate arterial stiffening and impair changes in blood flow necessary to support neural activity (neurovascular coupling [NVC]). Optimal NVC requires continuous, non-pulsatile flow, which is partially determined by extra- and intra-cranial vessel function.

Purpose: Examine extra- and intra-cranial hemodynamics during cognitive activity in adults with well-controlled hypertension and without hypertension.

Methods: 30 middle-aged, medicated hypertensive and 30 age-, sex-, and Body Mass Index (BMI)-matched non-hypertensive adults (56 ± 6 yrs, BMI 28.2 ± 2.9 kg/m²; 32 men) underwent cerebrovascular measures at rest and during a Stroop task. Applanation tonometry and ultrasound were used to assess aortic and carotid (single-point) Pulse Wave Velocity (PWV), respectively. Ultrasound and Doppler were used to measure carotid and Middle Cerebral Artery (MCA) blood velocity pulsatility. Near-infrared spectroscopy was used to measure prefrontal oxygenation (tissue saturation index; TSI). Accuracy and reaction times were computed to assess cognitive performance.

Results: Stroop performance was similar between groups ($p > 0.01$). Aortic and carotid PWV increased, carotid pulsatility decreased ($p < 0.01$; Table 1). Reductions in CCA pulsatility during the Stroop were associated with increases in cortical TSI in the combined sample ($r = 0.27$), suggesting extracranial hemodynamics may play a role in optimizing intracranial NVC.

Conclusions: Our findings indicate that middle-age adults with medically-controlled hypertension display similar intra- and extra-cranial cerebrovascular reactivity to adults without hypertension. Additionally, adults with and without hypertension may utilize reductions in extracranial pulsatility during NVC to minimize intracranial pulsatility and improve downstream cerebral oxygenation.