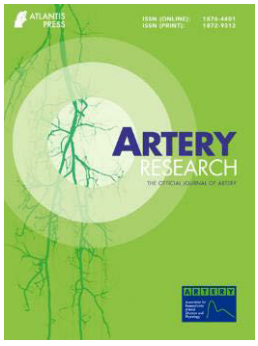

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P90: KINETIC ENERGY AND ENERGY LOSS IN THE MIDDLE CEREBRAL ARTERY (MCA) OF HEARTMATE II PATIENTS

Koichi Akiyama, Ruiping Ji, Autumn Clemons, Francesco Castagna, Alberto Pinsino, John R. Cockcroft, Melana Yuzefpolsakaya, Reshad Garan, Hiroo Takayama, Koji Takeda, Yoshifumi Naka, Veli Topkara, Joshua Willey, Barry J. McDonnell, Paolo Colombo, Eric Stöhr

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Table 1: Extra- and intra-cranial cerebrovascular reactivity during cognitive activity in non-hypertensives and hypertensives (expressed as Δscore; mean ± SD).

Measure	Non-Hypertensive	Hypertensive	Group	Time	GxT
Prefrontal cortex					
TSI (%)	-0.252 ± 2.328	0.706 ± 1.965	0.23	0.42	0.09
Middle cerebral artery					
PI	-0.01 ± 0.06	-0.01 ± 0.06	0.42	0.20	1.00
Carotid artery					
PWV-Beta (m/s)	+0.4 ± 0.8*	+0.4 ± 1.1*	0.15	**<0.01**	0.89
PI	-0.09 ± 0.15*	-0.07 ± 0.13*	0.26	**<0.01**	0.58
Aorta					
cf PWV (m/s)	+0.2 ± 0.6	+0.3 ± 1.0	0.20	0.04	0.71
Mean pressure (mmHg)	+6 ± 4*	+6 ± 6*	0.04	**<0.01**	0.78

TSI, tissue saturation index; PI, pulsatility index; PWV, pulse-wave velocity; cf, carotid-femoral; GxT, group-by-time interaction. *Post-hoc p<0.01 vs rest.

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CENTRAL PRESSURE IN PATIENTS WITH ACUTE ISCHEMIC STROKE IN ACUTE PHASE: A PILOT STUDY

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Acute Ischemic Stroke (AIS) is defined as sudden onset of a neurologic deficit. The main risk factor for stroke is high blood pressure (BP) and it is elevated in more than 70% or more of patients with AIS. In patients with AIS, management of blood pressure by brachial pressure is very important, but recent evidence suggests that central pressure is more strongly related to future cardiovascular events. In this study we started to evaluate central pressure (CBP) in patients admitted with AIS in the first 24 h.We evaluated 34 patients, 23 male and 11 females. The age mean was 72,7 years (49 − 96 years). The patients presented a mean NIHSS score of 5,4 at admission (minimum of 0 and maximum of 18), that was higher in males (mean of 8,1) than in females (mean of 4,3). In males, the mean BP was 148,41/79,04 mmHg and systolic CBP varied from 109 mmHg to 215 mmHg and diastolic from 63 mmHg to 128 mmHg (mean of 138,76/81,33 mmHg). In females, the mean brachial pressure was 143,72/76,45 mmHg and the systolic CBP varied from 102 mmHg to 190 and the diastolic from 44 mmHg to 104 mmHg (mean of 132,23/78,95 mmHg). The mean of augmentation index was 35% (34% in females and 35% in males).The aim of this study is enlarge our sample and evaluate the correlation between BP and CBP with RANKIN and NIHSS score of the patients not only at the acute phase but also after that, and the occurrence or not of new events.

References

1. Roman MJ, Devereux RB, Kizer JR, Lee ET, Galloway JM, Ali T, Umans JG, Howard BV. Central pressure more strongly relates to vascular disease and outcome than does brachial pressure: the Strong Heart Study, Hypertension, 2007, vol. 50 (pg. 197−203)
2. Appleton JP, Sprigg N, Bath PM Blood pressure management in acute stroke Stroke and Vascular Neurology 2016;1:doi:10.1136/svn-2016-000020

P89

3 HOURS UNINTERRUPTED SITTING INCREASES CEREBROVASCULAR RESISTANCE AND REDUCES CEREBRAL BLOOD FLOW IN SUBJECTS WITH INCREASED CARDIOVASCULAR RISK

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Background: Sedentary behavior has deleterious effects on cardiovascular risk. Uninterrupted sitting is associated with an impaired peripheral blood flow and vascular function. However, the relation between cerebrovascular flow and sedentary behavior is currently unknown. Impaired cerebrovascular flow and function are associated with impaired cognitive function and dementia. Therefore, this study investigated the effects of a prolonged sedentary bout on cerebrovascular flow and function.
Methods: 19 participants with increased cardiovascular risk (age $>$ 55 years, BMI 28 kg m^{-2} or hypertension) underwent a 3 hours uninterrupted sitting intervention. At baseline and after intervention middle cerebral artery blood flow velocity (MCAv) was measured using transcranial Doppler. Cerebrovascular resistance index (CVRi) was expressed as the ratio of MAP:MCAv.
Results: Due to technical difficulties, three participants were excluded from analysis, leaving 16 participants (age = 64 ± 5 years, BMI = 30.5 ± 4.5 kg m^{-2}). MCAv decreased after 3 hours sitting from 50.4 cm^{-1} s^{-1} (95% CI 47.0 − 53.7) to 46.9 cm^{-1} s^{-1} (95% CI 43.3 − 50.4) cm s^{-1} (mean difference = 3.5 cm s^{-1} (95% CI -0.1 − 7.0), P = 0.055). This was accompanied by an increase in CVRi (2.08 ± 0.35 cm^{-1} s^{-1} to 2.39 ± 0.56 cm^{-1} s^{-1}, P = 0.016).
Conclusions: Our results indicate that prolonged sedentary bouts impair cerebrovascular blood flow and stress the importance of frequently interrupting sitting periods in order to maintain adequate cerebral blood flow. Future studies should further investigate the impact of sedentary behaviour in the context of cerebrovascular diseases.

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KINETIC ENERGY AND ENERGY LOSS IN THE MIDDLE CEREBRAL ARTERY (MCA) OF HEARTMATE II PATIENTS

Koichi Akiyama [1], Ruiping Ji [1], Autumn Clemons [1], Francesco Castagna [1], Alberto Pinsino [1], John R. Cockcroft [2], Melana Yuzefpolsakaya [1], Reshad Garan [1], Hiroo Takayama [1], Koji Takeda [1], Yoshifumi Naka [1], Veli Topkara [1], Joshua Willey [1], Barry J. McDonnell [1], Paolo Colombo [1], Eric Stöhr [3]
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Background: In heart failure patients with continuous-flow left ventricular assist devices (CF-LVAD), arterial pulsatility in the brain is reduced and diastolic blood velocities (Vmin) are maintained. The effects of such altered hemodynamics on kinetic energy and, importantly, energy loss in the cerebral circulation have never been studied.
Methods: Angle-corrected Doppler ultrasound movies of the middle cerebral artery (MCA) were recorded in 11 healthy volunteers, 5 patients with severe heart failure, and 4 patients with HM II. Data were analyzed offline using validated Vector Flow Mapping software (Cardio Flow Design, Tokyo, Japan). Vmin, pulsatility index (PI), total Energy Loss (ELAUC) and total Kinetic Energy (KEAUC) and both variables normalized for different heart rates (ELAUC/time & KEAUC/time) were calculated (Figure 1). Correlations between these energetic parameters and PI were determined.
Results: PI, KEAUC and ELAUC were significantly lower in HM II ($P < 0.0001$ and $P < 0.05$) while Vmin was similar (Fig 1). Normalization of data for

different heart rates (ELAUC/time & KEAUC/time) revealed the same results. PI correlated with KEAUC (logr2 = 0.33, P = 0.008) but not ELAUC (logr2 = 0.154, P = 0.087).
Conclusions: ELAUC and KEAUC were significantly lower in HM II. The correlation between KEAUC and PI suggests that pulsatility may have an important impact not only on the stretch of arteries but also on the energetics of blood flow. Future studies should evaluate the clinical meaning of these observations.

P92
PARAMETERS FOR CENTRAL BLOOD PRESSURE AS PREDICTORS FOR THE EARLY CLINICAL AND FUNCTIONAL OUTCOME AFTER STROKE

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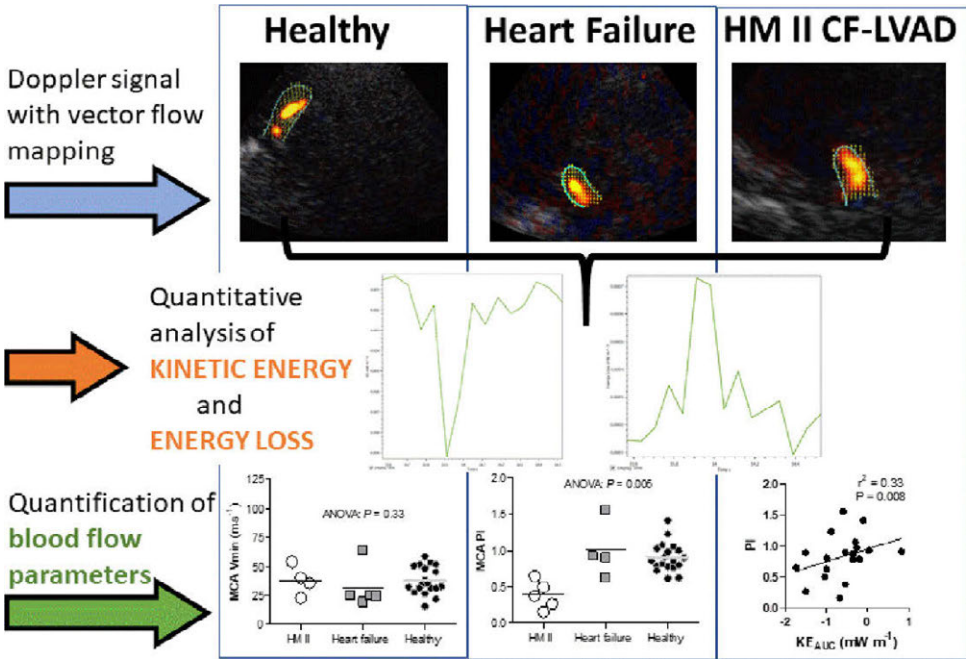

P91
THE EFFECTS OF DEVICE-GUIDED PACED BREATHING ON ARTERIAL STIFFNESS: IMPACT OF THE AUTONOMIC NERVOUS SYSTEM

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Objective: The autonomic nervous system (ANS) plays an important role in regulating blood pressure (BP), but its action on arterial stiffness (AS) is still debated. Here we examine if device-guided paced breathing (DGB) 1, via its action on ANS, can affect AS beyond its BP-lowering effect in hypertensive (HT) subjects.
Design and Methods: Central mean arterial pressure (MAP) (pulse-wave analysis of the radial artery, SphygmoCor, AtCor Medical, Australia), AS (carotid-femoral pulse wave velocity (cfPWV), SphygmoCor) and ANS activity (as high resolution heart rate variability (HRV) of low-frequency/high-frequency range (LF/HF)), (Schiller Medilog AR12plus, United States) were determined in HT subjects. All measurements were performed in supine position after 15 min of rest and subsequently repeated during supervised DGB therapy.
Results: 33 HT patients (18 male); age (mean ±SD) 46 ± 13 years; BP 144 ± 19/86 ± 9 mmHg; cfPWV 9.9 ± 2.1 m/s were recruited. DGB decreased (mean [95% CI]) LF/HF by 0.15 [0.08, 0.22] as well as MAP (−6.7 [−8.4,−5.1] mmHg) and cfPWV (−1.1 [−0.8,−1.3] m/s), all P < 0.01. Bivariate analysis showed a positive correlation between decrease in HRV activity and reduction of cfPWV and MAP (ß = 0.476 and ß = 0.402 respectively, both P < 0.05). The relationship between cfPWV and HRV activity was also still significant in multi-regression models adjusted for confounders (baseline PWV value and change in BP), P < 0.05.
Conclusions: DGB, via its action on ANS, affected both BP and AS in HT subjects. Reduction of cfPWV was not fully explained by the BP-lowering effect suggesting that the ANS may play an independent role in modulating AS.

References
1. Cernes R, Zimlichman R. RESPeRATE: The role of paced breathing in hypertension treatment. J Am Soc Hypertens. 2015;9:38−47.

Background: High mortality and the rate of patients who depend on care after survived stroke illustrate the importance of prevention and the importance of the development of predictors to identify patients with a high risk for an adverse progress of disease. The level of the arterial blood pressure depends especially on the function of vessels. This function can be described by the pulse wave velocity (PWV). New studies show that there is a correlation between the central blood pressure and possible damages of end organs like heart, kidney and brain.
Methods: In a prospective study, we enrolled patients with acute ischemic stroke 7 ± 2 days after stroke onset. We conducted a 24-h-blood pressure measurement as well as a pulse wave analysis with the Mobil O Graph (I.E.M., Stolberg, Germany 2009). We objectified the functional outcome after stroke on basis of the National Institute of Health stroke scale (NIHSS).
Results: In univariate analysis, we show that patients with a good early outcome after stroke have a significant lower PWV (p = 0,027). Central systolic blood pressure (cSBP), central diastolic blood pressure (cDBP), central pulse pressure and augmentation index were tendentially but not significantly lower in patients with good early outcome.
Conclusion: In ischemic stroke low aortic stiffness is associated with good early outcome. Patients with good early outcome had tendentially but not significantly lower cSBP and cDBP.

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RELATIONSHIP BETWEEN AORTIC PULSE WAVE VELOCITY AND MID CEREBRAL ARTERY PULSATILITY INDEX IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE; PILOT DATA FROM THE ARCADE STUDY

Mahfoudha Al Shezawi [1,2], John Cockcroft [2], Maggie Munnery [2], laura Watkeys [2], Nichola Gale [1], Barry McDonnell [2]