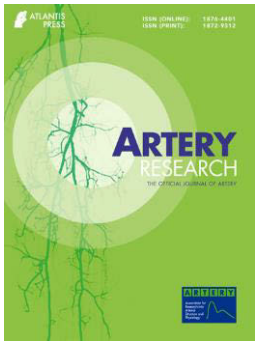

ATLANTIS PRESS

Artery Research

ISSN (Online): 1876-4401 **ISSN (Print): 1872-9312**
Journal Home Page: https://www.atlantis-press.com/journals/artres

PO-06: EFFECTS OF SYSTEMIC NIACIN INFUSION ON SYMPATHETIC ACTIVITY, ARTERIAL STIFFNESS AND AORTIC WAVE REFLECTION: A PILOT STUDY

M. Mozer, J.L. Taylor, M.J. Joyner, T.B. Curry, D.P. Casey

To cite this article: M. Mozer, J.L. Taylor, M.J. Joyner, T.B. Curry, D.P. Casey (2014) PO-06: EFFECTS OF SYSTEMIC NIACIN INFUSION ON SYMPATHETIC ACTIVITY, ARTERIAL STIFFNESS AND AORTIC WAVE REFLECTION: A PILOT STUDY, Artery Research 8:4, 168–168, DOI: https://doi.org/10.1016/j.artres.2014.09.012

To link to this article: https://doi.org/10.1016/j.artres.2014.09.012

Published online: 7 December 2019

[a]*Department of Exercise Science, Syracuse University, Syracuse, NY, USA*
[b]*Department of Psychology, Syracuse University, Syracuse, NY, USA*
[c]*Department of Public Health, Syracuse University, Syracuse, NY, USA*
[d]*Cardiovascular Engineering, Inc., Norwood, MA, USA*

The matching of vascular supply to neuronal metabolic demand during cognitive engagement is known as neurovascular coupling (NVC). Excessive hemodynamic pulsatility may have a detrimental effect on neural function and affect NVC. Arterial stiffness is a prominent determinant of pulsatility in the brain.[1, 2]

Objectives: We explored changes in arterial stiffness and cerebrovascular hemodynamic pulsatility *during* cognitive engagement in healthy adults.

Methods: Twenty-seven adults (age 39 ± 3 yrs, BMI 24±1 kg/m^2) underwent Doppler ultrasonography and applanation tonometry of the common carotid artery (CCA) to derive 1) CCA elastic modulus (Ep) and β-stiffness index; 2) CCA flow pulsatility index (PI); 3) CCA pulse pressure (PP), and 4) CCA augmentation index (AIx). Transcranial Doppler was used to assess cerebral PI at the middle cerebral artery (MCA). All measures were made simultaneously at rest and during a 4-minute Stroop task.

Results: CCA PI was reduced ($p<0.05$) while MCA PI was unchanged ($p>0.05$) during Stroop. Brachial PP increased during Stroop ($p<0.05$) while CCA PP was unchanged ($p>0.05$). Similarly, CCA Ep ($p>0.05$) and β-stiffness ($p>0.05$) were unchanged. CCA AIx increased ($p<0.05$).

Conclusion: Carotid pressure pulsatility and cerebral flow pulsatility is unaltered while carotid flow pulsatility is reduced during cognitive engagement. Carotid stiffness does not change suggesting that factors other than the elastic properties of the vessel moderate cerebrovascular pulsatility during cognitive engagement.

Table 1 Hemodynamic and vascular parameters at rest and during Stroop task.

Variable	Baseline	Stroop	*P*—value
Brachial pulse pressure, mmHg	43 ± 1	46 ± 1	0.002
Carotid pulse pressure, mmHg	36 ± 1	35 ± 1	0.324
Carotid β-stiffness, aU	4.4 ± 0.4	4.2 ± 0.3	0.224
Carotid Ep, kPa	54.5 ± 5.5	53.8 ± 4.9	0.670
Carotid pressure AIx, %	1 ± 4	13 ± 4	0.001
Carotid distension AIx, %	4 ± 2	8 ± 2	0.001
Carotid mean diameter, mm	5.62 ± 0.13	5.74 ± 0.13	0.010
Carotid pulsatility index	1.75 ± 0.06	1.57 ± 0.06	0.016
Cerebral pulsatility index	0.75 ± 0.02	0.75 ± 0.01	0.841

References
1. Mitchell GF, van Buchem MA, Sigurdsson S, Gotal JD, Jonsdottir MK, Kjartansson O, Garcia M, Aspelund T, Harris TB, Gudnason V, Launer LJ. Arterial stiffness, pressure and flow pulsatility and brain structure and function: The age, gene/environment susceptibility–reykjavik study. *Brain*. 2011;134:3398-3407
2. Tarumi T, Ayaz Khan M, Liu J, Tseng BM, Parker R, Riley J, Tinajero C, Zhang R. Cerebral hemodynamics in normal aging: Central artery stiffness, wave reflection, and pressure pulsatility. *Journal of cerebral blood flow and metabolism*. 2014

PO-06
EFFECTS OF SYSTEMIC NIACIN INFUSION ON SYMPATHETIC ACTIVITY, ARTERIAL STIFFNESS AND AORTIC WAVE REFLECTION: A PILOT STUDY

M. Mozer [a], J. L. Taylor [a], M. J. Joyner [a], T. B. Curry [a], D. P. Casey [b]
[a]*Mayo Clinic, Rochester, MN, USA*
[b]*University of Iowa, Iowa City, IA, USA*

Objective: Free fatty acids (FFA) may increase sympathetic activity and arterial stiffness. Niacin decreases FFA, however, little is known regarding the direct effects of niacin on sympathetic activity and arterial stiffness. We tested the hypothesis that niacin would decrease arterial stiffness, central aortic blood pressures, indices of aortic wave reflection, and muscle sympathetic nerve activity (MSNA).

Methods: High-fidelity radial arterial pressure waveforms and carotid-femoral pulse wave velocity (c-f PWV) were measured noninvasively by applanation tonometry before and during intravenous infusion of niacin (2.8 mg/min) at t=60, 90, 120 and 150 minutes in 5 healthy adults (2M/3F; aged 29±9 years). FFA (HPLC), MSNA (microneurography), arterial blood pressure (brachial arterial catheter) and heart rate (HR, ECG) were measured before and during niacin.

Results: While niacin produced a 75% reduction in FFA, contrary to our hypothesis, MSNA increased by 28-56% over all time points. After 60 minutes of niacin infusion, augmentation index (AIx) corrected for HR (AIx@75bpm) increased compared to baseline (Table 1; $P<0.05$). Repeated measures ANOVA also revealed trends for a main effect of niacin over time for AIx (P=0.12), augmented pressure (AP; P=0.18), and c-f PWV (P=0.13) (Table 1). When only comparing changes between baseline and t=60 (via paired t-test), both AIx and AP were both significantly increased ($P<0.05$).

Conclusions: Our preliminary results in a small group of subjects suggest that although IV niacin dramatically reduces FFA, it causes increases in MSNA and aortic wave reflection (AIx@75bpm). Inclusion of more subjects is needed to statistically confirm the strong trends for increased indices of wave reflection and arterial stiffness with niacin. Additionally, further studies are warranted to determine if chronic oral niacin therapy exerts similar effects.

Table 1 Hemodynamic and vascular measurements before and during niacin.

		Baseline	60 min	90 min	120 min	150 min
HR (bpm)		73±6	71±5	69±7	71±8	76±9
BSP (mmHg)		122±4	128±5	126±7	126±6	126±6
BDP (mmHg)	76±2	79±3	79±3	77±3		78±3
BPP (mmHg)	47±2	49±3	48±4	48±4		48±4
ASP (mmHg)	105±4	115±6	112±8	110±6		110±6
ADP (mmHg)	77±3	80±4	80±3	79±3		79±3
APP (mmHg)	28±1	34±3	32±5	31±4		30±5
PPA (%)	165±6	146±8	154±10	159±9		165±10
AIx (%)	6.9±2.1	18.6±4.7	14.5±5.2	12.3±4.4		8.6±5.6
AIx@75bpm (%)	5.0±3.3	15.8±4.8*	10.9±3.4	9.8±2.7		8.6±2.5
AP (mmHg)	1.9±0.6	6.9±2.0	5.6±2.7	4.6±2.2		3.7±2.6
c-f PWV (cm/s)	7.1±0.4	7.8±0.8	7.8±1.0	7.3±0.6		7.2±0.5

Data are mean±SE; N=5;
*$P<0.05$; BSP, brachial systolic pressure; BDP, brachial diastolic pressure; BPP, brachial pulse pressure; ASP, aortic systolic pressure; ADP, aortic diastolic pressure; APP, aortic pulse pressure; PPA, pulse pressure amplification.

PO-07
RACIAL DIFFERENCES IN CIRCULATING csRAGE AND ALTERNATIVELY SPLICED esRAGE IN HEALTHY ADOLESCENTS: RELATION WITH AORTIC STIFFNESS

Ericka Tank [a], Lauren Wegman-Points [a], Mohana Pajaniappan [c], Katherine Darracott [c], Gary L. Pierce [a,b]
[a]*Department of Health and Human Physiology, University of Iowa, Iowa City, IA, USA*
[b]*Fraternal Order of Eagles Diabetes Research Center, University of Iowa, Iowa City, IA, USA*
[c]*Georgia Prevention Institute, Department of Pediatrics, Georgia Health Science University, Augusta, GA, USA*

Background: Binding of ligands to the receptor for advanced glycation end products (RAGE) triggers pro-inflammatory/oxidant signaling in the vascular wall. Increased circulating soluble forms of RAGE (sRAGE) are associated with decreased vascular risk and may be protective by acting as a decoy to prevent ligand binding to full-length RAGE. Sheddases, such as matrix metalloproteinase-9 (MMP 9) proteolytically cleave cell surface receptors including RAGE, forming cleaved soluble RAGE (csRAGE). However, sRAGE also includes endogenous secretory RAGE (esRAGE), an isoform of RAGE without receptor function derived from alternative splicing of RAGE pre-mRNA. sRAGE is lower in African-American (AA) compared with Caucasian adults and is hypothesized to contribute to elevated arterial stiffening and vascular risk in AAs. Indeed, we have previously demonstrated that sRAGE (1567±68.9 vs. 955±101.1 pg/mL, $p<0.001$) but not MMP9 is higher in Caucasian compared with AA adolescents and associated with lower carotid-femoral pulse wave velocity (CFPWV) (5.3±0.2 vs. 5.9±0.2 m/sec, $p<0.05$).

Objectives: We hypothesized that increased sRAGE in Caucasian versus AA adolescents is from increased circulating esRAGE through alternative splicing of RAGE pre-mRNA.

Methods and results: Circulating esRAGE (ELISA) was significantly higher (369±24.8 vs. 242±26.5 pg/mL, $P<0.01$) in Caucasian (n=24, age 16.5±0.3 yrs; BMI 22.9±0.8 kg/m^2) vs. AA (n=15, age 16.8±0.3 yrs; BMI 24.5±1.0 kg/m^2) adolescents ($P>0.05$). esRAGE was correlated with sRAGE (r=0.708, $P<0.001$), but esRAGE:sRAGE ratio did not differ between race (0.24±0.01