Effects of Systemic Niacin Infusion on Sympathetic Activity, Arterial Stiffness and Aortic Wave Reflection: A Pilot Study

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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	60min	90min	120min	150min
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*