Nervous System

10.3 Inhibition of NO-Synthase Modulates Sympathetic Nervous Activity in hypertensive Patients

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Introduction. Experimental studies demonstrate that nitric oxide (NO) plays a fundamental role in the regulation of sympathetic nervous system (SNS) outflow, and subsequently in cardiovascular homeostasis. In healthy subjects the infusion of an inhibitor of NO-synthase (LNMMA) exerts sympathoexcitatory effects, suggesting that NO may inhibit SNS activity in humans.

Aim. To investigate the relationship between NO and SNS activity in essential hypertensive patients.

Methods. In 8 never treated, essential hypertensive patients, ECG, non invasive beat-to-beat blood pressure (BP, Portapres) and muscle sympathetic nervous activity (mSNA, microneurography) were recorded continuously in basal conditions and during infusion of LNMMA (bolus 3 mg/Kg iv followed by infusion at 3 mg/kg/h iv for 40'). Seven matched hypertensive patients were infused with metaraminol (MET), an alpha-adrenergic agonist (2 microg/Kg/min iv for 40'), to obtain the same increase in BP. Mean BP, heart rate (HR) and mSNA values were analyzed as means of 5 minutes and expressed in mean $\pm$ SEM.

Results. Both LNMMA and MET increased mean BP in a similar fashion (LNMMA: from 104.6 ± 4.6 to 117.6 ± 6.1 mmHg, $p < 0.01$; MET: from 107.3 ± 2.6 to 118.9 ± 4.5 mmHg, $p < 0.01$; LNMMA vs MET: $p = ns$). Metaraminol infusion caused a more pronounced HR reduction as compared to LNMMA (LNMMA: from 65.5 ± 4.9 to 62.8 ± 4.5 bpm, $p < 0.01$; MET: from 71.1 ± 4.0 to 61.0 ± 2.7 bpm, $p = 0.01$; LNMMA vs MET: $p < 0.01$). MET significantly reduced mSNA (from 45.8 ± 4.0 to 31.8 ± 4.1 bursts/100HB, $p < 0.01$), while LNMMA had no effect (from 46.6 ± 6.4 to 49.6 ± 5.9 bursts/100HB, $p = ns$; LNMMA vs MET: $p < 0.001$).

Conclusions. As compared to metaraminol, LNMMA caused a similar elevation in BP but determined a blunted reduction in HR and failed to reduce mSNA. These data suggest that NO can negatively modulate SNS activity in essential hypertensive patients.