

Relationship between the regulation of blood pressure and in vivo noradrenergic neural activities in the locus coeruleus of young Spontaneously Hypertensive Rats

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The purpose of the present study was to determine whether in vivo noradrenergic neural activity in the locus coeruleus is related to the development of hypertension. Two groups of animals were prepared, 1) young spontaneously hypertensive rats (SHR) and 2) age-matched normotensive wistar kyoto rats (WKY). At 6 weeks of age, the release of norepinephrine (NE) and 3,4-dihydroxyphenylglycol (DOPEG) from locus coeruleus of young SHR and WKY as an index of neural activity were determined by in vivo microdialysis along with blood pressure (BP) at three conditions : 1) normal; 2) elevated BP by systemic injection of phenylephrine and 3) alpha-1 adrenoceptor stimulated by perfusion of phenylephrine into the locus coeruleus through microdialysis probe. Basal releases of NE and DOPEG from the locus coeruleus were 0.415 ± 0.089 pg/20min, 1.311 ± 0.293 pg/20min in SHR and 0.204 ± 0.078 pg/20min, 1.492 ± 0.365 pg/20min in WKY respectively. Basal release of NE from the locus coeruleus of SHR was significantly greater than that of WKY. Phenylephrine systemic injection caused elevation of BP in both SHR and WKY in a dose related manner. Following phenylephrine injection, the releases of NE and DOPEG from the locus coeruleus of SHR were significantly decreased, whereas there were no significant changes in the releases of NE and DOPEG in young WKY. Alpha-1 adrenoceptor stimulation in the locus coeruleus by perfused phenylephrine through microdialysis probe caused pressor responses in both SHR and WKY, but the magnitude of pressor response in SHR was larger compared with that in WKY. The result from the present study suggests that noradrenergic neural activity in locus coeruleus may contribute as one of triggering factors for the expression of hypertension in young SHR.