Brain cyclooxygenase and nitric oxide synthase are involved in restraint stress-induced neuronal activation of spinally projecting neurons in rat brain

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Corticotropin-releasing factor (CRF), known as a stress-related neuropeptide, plays an important role in activation of the sympathetic nervous system. We recently reported that brain cyclooxygenase (COX) and nitric oxide synthase (NOS) are involved in central CRF-induced neuronal activation of spinally projecting neurons in rat brain. These findings raise the possibility that brain COX and NOS regulate stress-induced sympathetic activation. In the present study, we examined the effect of inhibitors of COX and NOS on the restraint stress-induced neuronal activation of spinally projecting neurons, using rats microinjected with a monosynaptic retrograde tracer into the IML of the spinal cord. Restraint stress induced Fos expression in the spinally projecting neurons in the hypothalamic paraventricular nucleus (PVN). Intraperitoneal administration of SC-560 (a COX-1 inhibitor), NS-398 (a COX-2 inhibitor) and S-methylisothiourea (an inducible NOS inhibitor) reduced stress-induced Fos expression. On the other hand, 7-nitroindazole (a neuronal NOS inhibitor, i.p.) had little effect on the stress-induced Fos expression in the spinally projecting neurons. These results suggest that COX-1, COX-2 and inducible NOS mediate stress-induced neuronal activation of spinally projecting neurons related to central sympathetic activation in rats.