EFFECTS OF GENDER ON NITRIC OXIDE-INDUCED MODULATION OF DOPAMINE TRANSMISSION IN PREFRONTAL CORTEX OF RATS

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Nitric oxide (NO) is one of the most important signalling molecules involved in many cellular events taking place in the cardiovascular, immune and nervous systems. In particular, it is now well established that NO plays an important role as a neuronal messenger in the central nervous system (CNS) [(1)]. In various brain regions, it has been demonstrated that NO modulates the release of dopamine (DA), glutamate and γ-aminobutyric acid (GABA) [(2,3)]. The aim of the present study was to characterize the *in vivo* local functional relationship between nitrergic, glutamatergic and GABAergic systems and the nature of the neuromodulatory control of NO on dopaminergic transmission in the prefrontal cortex of rats. Moreover, sex-differences in NO-induced modulation of dopaminergic system were also evaluated.
In vivo microdialysis sampling showed that male rats did not differ from female animals in their basal DA levels. In male animals, neither SNAP (1 mM, 20 min), bicuculline, a $GABA_A$ receptor antagonist (50 μM, for 100 min and during SNAP challenge) nor memantine, a NMDA receptor antagonist (100 μM, for 100 min and during SNAP challenge) affected DA levels during drug administration. However, extracellular DA concentrations were increased after co-administration of SNAP and bicuculline. The increase was still significant 3h after treatment.
In female rats, while SNAP or memantine did not modify DA levels, bicuculline perfusion increased them, during and for 3h after administration. In the presence of bicuculline, SNAP decreased DA levels. Furthermore, although memantine did not modify DA levels when administered in the presence of SNAP, it significantly increased DA concentrations 80 min after SNAP. The increase was still significant 3h after treatment.
In conclusion, these results suggest that, in the prefrontal cortex of freely moving rats, endogenous GABA and glutamate control the activity of dopaminergic transmission through NO pathway in a gender-dependent manner.

References

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