AMPHETAMINE-INDUCED RELEASE OF DOPAMINE IN THE STRIATUM IS DECREASED BY TRAINING WHEREAS NEURODEGENERATION IS NOT CHANGED
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There is scarce information about the relationship between the effects of chronic exercise and the synthesis, release and action of dopamine (DA) in the striatum, before and after amphetamine administration. Moreover, the influence of exercise under amphetamine administration on neurodegeneration, including apoptosis, is even less studied. Thus, this study aimed to verify in rats the influence of chronic exercise on the release of striatal dopamine induced by a single administration of amphetamine and on neurodegeneration.

Two groups of male Sprague-Dawley rats (5-7 animals/group) were used (one with and another without (controls) exercise). Exercise was performed in a treadmill (Panlab, model LE8706), being the training (of increasing intensity) performed for 6 weeks. Rats were anaesthetized with pentobarbital, placed into a stereotaxic frame and an intracerebral guide cannula was implanted into the caudate-putamen (CPu). On the day of the tests, a dialysis probe was slowly inserted through the guide cannula into the CPu. The probes were perfused with artificial cerebrospinal fluid. Microdialysis in vivo in these freely moving rats was performed in a campanula, being amphetamine (30mg/Kg) or a saline solution (NaCl 0,9%) injected intraperitonially; the room temperature was maintained at 18oC. High performance liquid chromatography with electrochemical detection was used to quantify the level of DA present in the samples, collected every 30 min for 6 hours. Neurodegeneration was assessed after 72 h post amphetamine treatment by using FluoroJade C staining; kainate (10 mg/Kg, intraperitonially) was used as a positive control.

Chronic exercise in the absence of amphetamine did not significantly increase extracellular DA concentrations. On the contrary, amphetamine strongly increased the DA release. The maximal DA levels (Cmax) and the extent of release (measured by the area under the curve (AUC) of concentration versus time) in the rats treated with amphetamine are significantly lower in the trained rats compared with controls. In the trained animals there is also a prolongation over time of the effect of amphetamine on the release of DA. In addition, we did not observe any neurodegeneration either with amphetamine and / or chronic exercise.

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