A SAMPLE ABSTRACT – FOLLOW THIS LAYOUT AND STRUCTURE

STRIATAL DOPAMINERGIC MECHANISM FOR TRANSFER IN WORKING MEMORY UPDATING TRAINING

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Background: Working memory (WM) updating has been linked to striatal dopamine (DA) release, and WM updating training has been shown to enhance local phasic DA activity in the striatum when performing the trained task (Bäckman et al., 2011). Here we examined whether this striatal dopaminergic enhancement could underlie transfer from WM training and thus extend even to an untrained WM task.

Methods: Following Bäckman et al. (2011), we ran a randomized controlled trial where 28 right-handed adult men in the age range of 19 to 26 years were allotted either to a 5-week (3 times a week) computerized WM updating training regime or to a passive control group. At both pre- and posttest, the participants underwent two high-resolution PET measurements using [11C]raclopride and the bolus-plus-infusion technique. These measurements were used to examine striatal dopamine D2 receptor binding potential during an untrained updating task (verbal n-back) vs. a control task, and during a trained updating task (letter-memory updating) vs. a control task. The movement-corrected voxel-wise masked PET data was fit using LSRTM and cerebellum as reference.

Results: As regards transfer, voxel-wise Group x Time analysis with nSPM (trained group > controls) revealed a small cluster of increased activity in the left caudate for the n-back task in the training group (p<.01, uncorrected; MNI coordinates x= -17, y= +18, z= +12). A similar analysis for the trained letter-memory task revealed increased activity in the left ventral striatum for the training group (x= -20, y= +6, z= -11). A conjunction analysis of these two activation clusters indicated spatial overlap ventrally. Behaviorally, the training group showed significantly better post-training performance than the controls on the trained task but not on the untrained task. Thus, the transfer effect was seen in the PET results only.

Conclusion: our results indicate that the enhancement of left-sided striatal phasic DA activity following training of verbal WM updating extends even to an untrained WM updating task. This suggests a specific D2-receptor mediated striatal mechanism for transfer in WM updating.

Reference

Bäckman, L., Nyberg, L., Soveri, A., Johansson, J., Andersson, M., Dahlin, E., Neely, A.S., Virta, J., Laine, M., & Rinne, J.O. (2011) Effects of working-memory training on striatal dopamine release. Science, 333, 718.