OPR-036 | Aerobic training and potential neurogenesis in progressive multiple sclerosis: Focus on the hippocampus and the subventricular zone

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Background and Aims: In multiple sclerosis (MS) patients, aerobic exercise may exert a neuroprotective role on the brain by stimulating neurogenesis in the dentate gyrus (DG) of the hippocampus and in the subventricular zone (SVZ), but further evidence is needed. We assessed the effects of aerobic exercise on the volume of the hippocampus and its subfields and on diffusivity measures of the SVZ in progressive MS.

Methods: We retrospectively analyzed data from 84 patients with progressive MS enrolled at four sites in the CogEx MRI substudy. Thirty-nine patients performed aerobic training, while 45 undertook a balance- and stretching-based sham intervention. Both groups trained twice weekly for twelve weeks. At baseline, post-intervention and 6-month follow-up, patients underwent MRI assessment on a 3.0 T scanner. FreeSurfer's longitudinal pipeline was used to analyze hippocampal subfields' volumes. Fractional anisotropy and mean diffusivity were extracted from the SVZ and the thalamus (as control region).

Results: No baseline differences were observed between the aerobic and the sham exercise groups ($p \geq 0.070$). The DG showed a significant volume increase post-intervention in the aerobic group (mean change = 0.63%, 95% confidence interval [95% CI] = 0.04%; 1.22%, $p = 0.035$), but not in the sham exercise group (mean change = −0.26%, 95% CI = −0.81%; 0.28%, $p = 0.337$). Between-group difference in DG volume change was significant ($p = 0.029$). No significant changes were found in the other hippocampal subfields or SVZ diffusivity metrics ($p \geq 0.057$). No changes in either group were found between post-intervention and 6-month follow-up ($p \geq 0.061$).

Conclusion: Aerobic exercise increases DG volume in progressive MS patients but does not modify microstructural integrity of the SVZ.

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