Abstract Title: Action Observation Therapy Modifies Structural Brain Plasticity in Healthy Adult Individuals

Press Release Title: Can You Boost Your Brain Power Through Video?

Objective: To assess brain gray (GM) and white matter (WM) volume changes following action observation therapy (AOT) in healthy controls (HC), and their correlations with improvement of motor performance.

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Background: Motor training modifies brain structure in HC.

Design/Method: Thirty-six right (R)-handed HC, without particular manual ability, performed a motor training, consisting in 10 sessions of 10-minute passive mobilization of the R hand, vision of three videos lasting 5 minutes and execution, with the R hand, of three daily-life actions. Subjects were randomized into 2 groups: AOT-group watched videos representing daily-life actions, enviromental-group watched videos of landscapes. At baseline (T0) and after a 2-week training (W2), dexterity and strength measures were assessed and 3DT1-weighted MRI sequences were acquired. Longitudinal GM and WM volume changes were evaluated using Tensor-Based Morphometry.

Results: At T0, no between-group differences were found. At W2, both groups showed GM volume increase of the bilateral paracentral lobule, anterior and posterior cingulum, calcarine cortex and R cerebellum. The AOT-group showed also an increased GM volume of the R cuneus and R insula. The AOT-group had a reduced GM volume of the R supplementary motor area, while the enviromental-group had a decreased GM volume of several fronto-patieto-occipital regions, R middle and anterior cingulum and R cerebellum. Enviromental-group showed an increased WM volume of the R superior frontal gyrus and a reduced WM volume of the R forceps major. Both group showed a reduced WM volume in brainstem regions. Compared to enviromental-group, AOT-group had an increased GM volume of the R cerebellum and left insula. In both groups, improvement at motor performance was correlated with GM/WM volumetric changes.

Conclusions: A 10-day manual dexterity training with AOT influences structural reorganization of GM and WM volumes in HC, facilitating motor skill improvement and promoting structural brain plasticity.

Study Supported by: The Italian Foundation for Multiple Sclerosis