



III INTERNATIONAL CONGRESS OF PSYCHOBIOLOGY

Granada, May 29th- 31st, 2019

POSTER SESSION 1, No.1

ENVIRONMENTAL ENRICHMENT RESULTS IN BOTH BRAIN CONNECTIVITY EFFICIENCY AND SELECTIVE IMPROVEMENT IN DIFFERENT BEHAVIORAL TASKS

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Exposure to environmental enrichment (EE) has been a useful model for studying the effects of experience on brain plasticity, but to date, few is known about the impact of this condition on the brain functional networks that probably underlies the multiple behavioral improvements. Hence, we assessed the effect of an EE protocol in adult Wistar rats on the performance in several behavioral tasks testing different domains (Open field(OP): locomotor activity; Elevated-zero maze (EZM): anxiety-related behaviors; 5-choice serial reaction time task(5-CSRTT): attentional processes; 4-arm radial water maze (4-RAWM): spatial memory) in order to check its effectiveness in a wide range of functions. After this, we analyzed the functional brain connectivity underlying each experimental condition through cytochrome C oxidase (COx) histochemistry. Our EE protocol reduced both locomotor activity in the OP and anxiety-related behaviors in the EZM. On the other hand, enriched rats showed more accuracy in the 4-RAWM, whereas 5-CSRTT performance was not significantly ameliorated by EE condition. In relation to COx functional connectivity, we found that EE reduced the number of strong positive correlations both in basal and training conditions, suggesting a modulating effect on specific brain connections. Our results suggest that EE seems to have a selective effect on specific brain regions, such as prefrontal cortex and hippocampus, leading to a more efficient brain connectivity.

Supported by grant PSI 2013-42704P (Spanish Ministry of Economy and Competivity) and FC15-GRUPIN14-088 (Principality of Asturias). Author P.S.P. holds a 'Juan dela Cierva-formation grant from the Spanish Ministry of Economy, Industry and Competitiveness (code: FJCI-2015-23925).

Keywords: Environmental enrichment, Open Field, Elevated-zero maze, 4-RAWM, 5-choice serial reaction time task, functional connectivity.