

Hippocampal mossy fiber sprouting of rats after spatial learning: fact or artifact?

Vyssotski,D.L.¹, Pleskacheva,M.G.², Vyssotski,A.L.¹, Wolfer,D.P.¹, Lipp,H.P.¹

¹University of Zürich, Institute of Anatomy, CH-8057 Zürich, Switzerland

²Laboratory of Physiology & Genetics of Behavior, Moscow State University

Ramirez-Ayala et al. have reported that spatial overtraining of adult rats in a Morris water maze induces significant sprouting of infrapyramidal mossy fibers (IIP-MF) in the septal part of the rat hippocampus (Hippocampus: 631-636, 1999). Since reactive sprouting of mossy fibers is usually confined to the supragranular layer of the dentate gyrus, and because size variations of IIP-MF in rodents are strongly genetically dependent, we replicated this study. In brief, a total of 40 adult male Wistar rats from an outbred stock were tested. 15 received spatial overtraining, i.e., 3 days with 10 trials each, duration 60 s. 15 rats were left swimming without goals (swim controls) to match the swimming time and schedule of the spatially trained animals, and 10 rats served as passive controls taken from their home cages. Analysis of size variations of the IIP-MF in the septal part of the hippocampus did not show any group differences ($F(2,37) = 0.01$, $p = 0.98$). We noted two sources of errors likely to produce false-positive findings: a) IIP-MF in the septal portion of the hippocampus show a steep gradient – exact determination of the sampling plane is thus crucial. b) There is remarkable interindividual variability of the IIP-MF pattern as typically observed in outbred populations and shown many times to be genetically dependent. We conclude that either the mossy fiber sprouting effect is highly specific for particular rat samples, or more likely, that the divergent results originated from morphometric sampling errors.

Supp. by SNF 31-57139.99, 7IP062645 & BIO4CT980297/BBW98.0125.