

Effects of long-term masticatory reduction in adult swiss mice: impairment of spatial memory, number of dentate gyrus' neurons and anxiety-like behavior

Lima, CM., Almeida, MNF., Almeida, INF., Santos, RLF., Bastos, GA., Ghammachi, BC., Torres Neto, JB., Diniz, CWP. and Sosthenes, MCK.

Universidade Federal do Pará

Masticatory reduction has been associated with cognitive impairments and neurodegeneration. We investigated the impact of masticatory reduction induced by a model of soft (powder) in comparison with hard (pellet) food, from 21st postnatal day until adulthood, on cognitive decline and neuronal numbers of the polymorphic layer of dentate gyrus. Behavioral, immunohistochemical and stereological essays were applied to 14 female mice. Spatial, episodic-like memory and anxiety-like behavior were assessed in two experimental groups: (PO), n = 9 feed with soft (powder) food and (PE), n = 5 feed with hard (pellet) food, from 21^o postnatal day until 6 months old. Four subjects of each group were sacrificed after behavioral tests, perfused with aldehyde fixatives and had their brains processed for immunohistochemistry for Neu-N. Water maze (WM), episodic-like memory (EM), dark/light box (DLB) and elevated plus maze (EPM) were video recorded and analysed by Any Maze (Stoeling®). Optical fractionator (Microbright Systems Inc) was used to estimate neuronal population. In all statistical tests (T-test or ANOVA one-way, Bonferroni a priori) the threshold for significance was set at $p < 0.05$. Learning rate in WM was significant at 2nd day of training in PE (0.33 ± 0.18) whereas in PO (0.32 ± 0.1) only in the 4th training day. In retention trial (without platform) the entries in the platform region for PE (3.80 ± 1.02) was lower than PO (8.11 ± 0.99), in the working memory test PE learned platform new position in the 2nd trial ($1^{st} 7.28 \pm 1.22/2^{nd} 2.0 \pm 0.61$), and PO in the 5th ($1^{st} 2.47 \pm 0.46/5^{th} 1.37 \pm 0.19$). Both groups distinguished old and recent objects in EM. PO spent more time in the dark zone of DLB (82.50 ± 3.4) and closed arm in EPM (71.18 ± 3.47) than the PE (68.2 ± 1.22 and 63.87 ± 3.04 respectively). A significant reduction in the number of neurons of the polymorphic layer of dentate gyrus was found in PO (17961.31 ± 1230.22) in comparison with PE (23122.98 ± 1370.09). Taken together the results indicate that hippocampus is a target area of neurodegenerative processes related to masticatory stress and neuronal reduction seems to be an important neuropathological feature of the polymorphic altered layer.