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MEETING ABSTRACT

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The evaluation of long-time neurological disabilities in mice after traumatic brain injury

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Background: Each year approximately 1.5 million people in Europe suffer from acquired complications after traumatic brain injury (TBI). It has become evident that surviving patients often develop progressive brain atrophy, depression and dementia of unknown origin resulting in significant morbidity. The hypothesis of the current study is that acute TBI triggers a chronic neuroinflammatory response which causes progressive post-traumatic neurodegeneration, cognitive decline and dementia. Currently, we lack experimental models and treatments that could tackle these chronic complications induced by TBI.

Objectives: The aim of the study is to characterize and understand long-lasting neurodegenerative changes occurring after lateral fluid percussion injury (latFPI).

Methods: Male Balb/c mice were subjected to latFPI and compared with sham-operated mice. The behaviour tests were done before and at 1, 7, 30, 90 and 180 days post-injury. The sensory-motor function was assessed by the neurological severity score (NSS) test. The motor coordination of the animal was evaluated by the accelerated rotarod test. The passive avoidance response (PAR), Y-maze and Morris water maze (MWM) tests were used to assess cognitive functionality after latFPI. Depression-like behaviour was assessed by the tail suspension test.

Results: In the NSS score test, sensory-motor function was significantly impaired during the observation period of 180 days after latFPI compared with sham-operated mice. In the rotarod test, the motor coordination was reduced on post-injury days 1 and 7. In the MWM test, the spatial memory was significantly impaired on post-injury days 30 and 90. In the Y-maze test, the latFPI group exhibited significant impairment of working memory on post-injury day 180. In the tail suspension test latFPI mice did not exhibit depression-like behaviour.

Conclusions: LatFPI elicits immediate and long-lasting impairments of sensory-motor functions, while the memory impairment is associated with progressive post-traumatic neurodegeneration. This knowledge suggests novel therapeutic strategies which may protect the brain from chronic post-traumatic atrophy and functional decline.

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Keywords: traumatic brain injury – fluid percussion injury – memory – sensory-motor function

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