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Behavioral characterization of spontaneously hypertensive stroke-prone rats – a pilot study

Solveig Jandke1,2, Cathleen Knape1,2, Hans-Jochen Heinze1,2,3, Stefanie Schreiber1,2, Axel Becker4

1 – Department of Neurology, Otto-von-Guericke University, Magdeburg
2 – German Center for Neurodegenerative Diseases (DZNE), Magdeburg
3 – Leibniz Institute for Neurobiology (LIN), Magdeburg
4 – Institute of Pharmacology and Toxicology, Otto-von-Guericke University, Magdeburg

Question:
Sporadic cerebral small vessel disease (CSVD) is frequently found in the aging brain and represents one of the major causes of stroke and (vascular) dementia. The spontaneously hypertensive stroke-prone rat (SHRSP) develops malignant hypertension and displays the broad spectrum of CSVD-related pathologies comprising blood brain barrier breakdown, small vessel wall damage and thrombus formation. In this pilot study, we investigated the behavioral phenotype of that rodent model.

Methods:
Behavioral tests were performed in 16 SHSRP and 15 Wistar control rats (age groups: 6 weeks, 24 weeks, 32 weeks) to assess general locomotor activity and anxiety (open field), as well as learning and memory functions (novel object recognition (NOR) after 30 min, 2 h, 24 h), and sensorimotor gating (prepulse inhibition (PPI)).

Results:
There were no differences in locomotor activity between SHRSP and control rats at any age. In the NOR task, 6 weeks old SHRSP rats showed a significantly higher retention index compared to controls in the short-term memory task (novel object was presented after 30 min and 2 h). In contrast, in the older SHRSP (24 & 32 weeks) the retention index was significantly higher in the long-term memory task (novel object was presented after 24 h). In the PPI task, 32 weeks old SHRSP showed a significant reduction of the PPI compared to Wistar rats.

Conclusions:
Our pilot data revealed behavioral differences between the SHRSP and Wistar controls pointing towards an influence of CSVD especially on learning and memory function and sensorimotor gating which are independent of locomotor activity. Still, the animal numbers have to be raised in ongoing experiments and histopathological correlation studies have to be performed to make reliable statements on the influence of CSVD on behavioral performance in SHRSP.