

The influence of flavonoids from Georgian endemic grape species “Saperavi” on mechanisms of learning/memory processes in laboratory white rats of different ages

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Flavonoids and other phenol compounds play an important role in the human diet. Flavonoids are powerful antioxidants and are characterized by scavenging of wide range of reactive oxygen and nitrogen. Flavonoids can easily pass through the blood brain barrier and they have ability to accumulate in the brain structures, especially in the cortex and hippocampus, thus they can participate in the hippocampal related learning/memory processes. The aim of our work was to determine the effects of flavonoids from Georgian endemic grape species Saperavi on aging-related changes in hippocampus-dependent spatial memory function in laboratory white rats.

Behavioral experiments were planned on laboratory rats of 2 different ages (8-10 and 28-32 weeks old). To define the effects of flavonoids from Saperavi grape species on learning/memory ability and emotional state of rats, 2 different regime of 8 days administration of flavonoids were used – early postnatal (P7 - P15) or late supplementation of rats with 25mg/kg daily directly before testing them in a standardized behavioral paradigms. The open field, T-maze and passive avoidance tests were carried out to assess emotional state, fear level, defensive reactions and memory/learning ability of animals.

In morphological experiments we studied the influence of administration of flavonoids in early postnatal period on the formation of hippocampal structure for what we evaluated cytoarchitectonics of P8, 15, 21 and 60 days old experimental and control white laboratory rats.

As morphological analysis showed, the supplementation with flavonoids in P8, 15, 21 and 60 days old experimental white laboratory rats caused early formation and layering of hippocampal structure as compared to control groups where these processes took place in much later period.

In conclusion we suggest, that dietary flavonoids from the Saperavi grapes have beneficial effects on hippocampal related plasticity and the ability to correct ageing-related memory disturbances. No significant changes were observed when flavonoids from Saperavi grapes were administered in 8-10 week old rats. The analysis of data showed that supplementation with

flavonoids from Saperavi grapes during early postnatal period positively modulates hippocampal-related plastic processes in the 8-10 week old rats (a shift of the curve of learning dynamic to the left).