

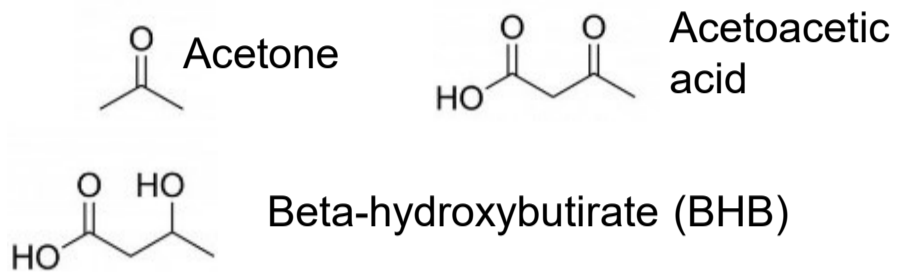
Prolonged treatment with medium chain triglycerides (C8, C10) induces positive effect on cognitive abilities of intact rats

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INTRODUCTION

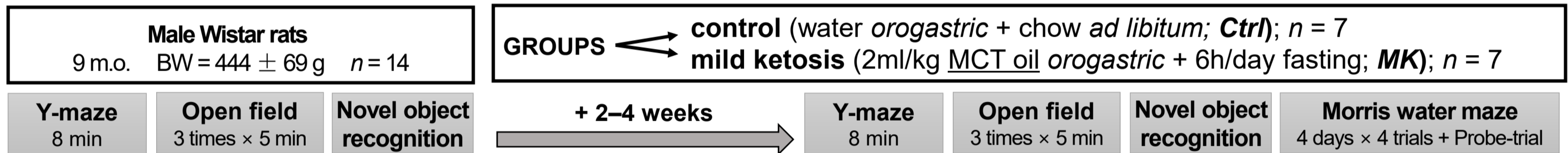
- Cognitive impairment often occurs as a result of the brain glucose hypometabolism and insufficient energy supply [1].
- Ketone bodies (KB), the bi-products of fatty acid beta-oxidation, represent an alternative source of energy for the brain with high energetic potential.
- Ketosis, an increased usage of KBs as energy supply, demonstrates a broad neuroprotective effect in such pathologies as epilepsy [2], AD and PD [3-4], amyotrophic lateral sclerosis [5], autism [6], depression [7], ADHD [8], traumatic brain injury [9], etc.
- Ketosis may be achieved via strict ketogenic diet or fasting, however such nutritional manipulations are difficult to adhere to and may be detrimental for the liver, which limits their application.
- It is possible to intensify the KB generation even in the presence of carbohydrates by treatment with medium-chain saturated fatty acids (caprylic C8, capric C10) or their triglycerides (MCT).



We aim to develop a model to gain in-depth knowledge about the mechanisms of effects of MCT-treatment on cognitive abilities of animals in various conditions.

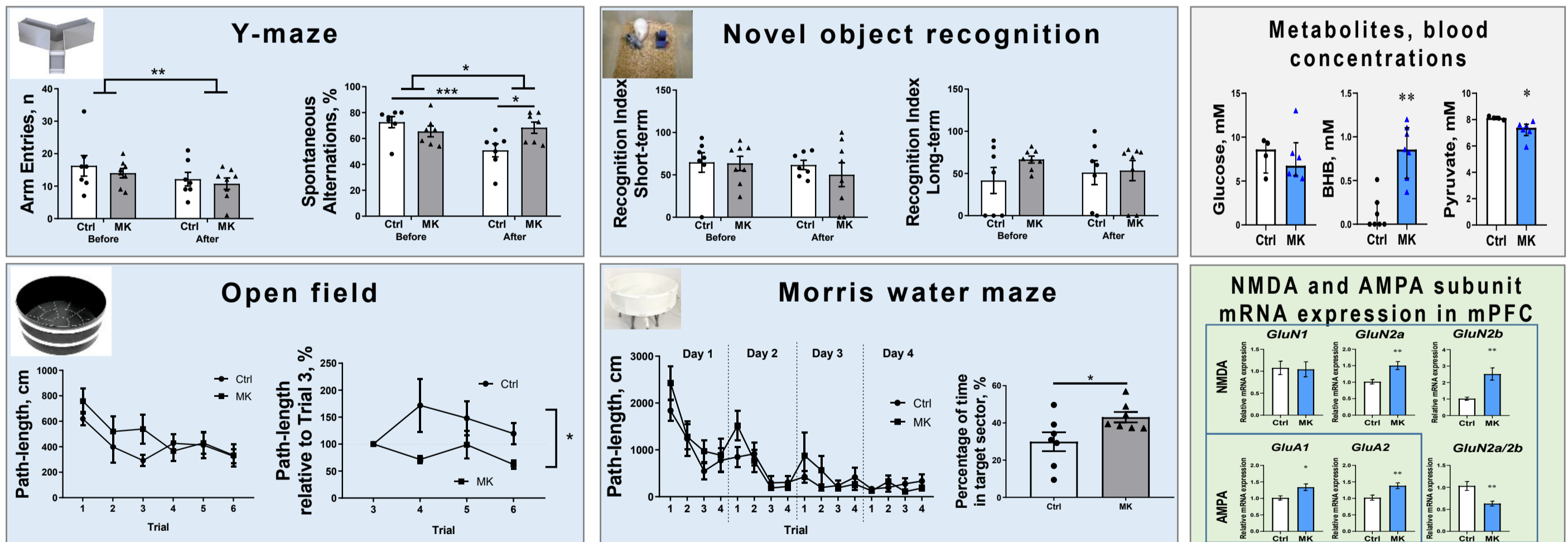
Supported by Russian Science Foundation, project No. 19-75-10076

STUDY FLOW



RESULTS

The animals of two groups did not differ in terms of Body weight and calorie consumption throughout the experiment.



CONCLUSIONS

In comparison with control group, animals treated with MCT for 2–4 weeks demonstrated:

- better cognitive performance in the behavioral tests [1. better working memory (more spontaneous alternations in the Y-maze); 2. better memory of the environment (decreased path-length in the Open field, when normalized to pre-diet trials); 3. better spatial memory (more time spent in the target quadrant in the probe-trial of Morris water maze)];
- no differences from the control group in the Object recognition test in terms of short-term and long-term recognition index;
- same blood glucose level as in control, while increased β -hydroxybutyrate and decreased pyruvate levels, which may suggest a higher rate of the Krebs cycle due to using ketone bodies instead of pyruvate for the acetyl-CoA synthesis, which would allow increasing the capacity of the Krebs cycle by redirecting pyruvate towards oxaloacetate synthesis;
- altered expression of NMDA and AMPA receptor subunit genes in the cortex, which is characteristic of the development of stronger synaptic connections between neurons, which may reflect one of the molecular mechanisms of the beneficial effects of the MCT administration on learning and memory.

MCT-treatment is a promising approach to improve cognitive functioning that is worth further physiological and biochemical investigations.

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