

Analysis of the Effect of the α -Amylase Enzyme Preparation from the Genetically Modified Strain *Komagataella phaffii* 2xAmy-BaLi-a-II-ZeoR-(Y-5231) on the Behavioral Reactions of Male Wistar Rats

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INTRODUCTION & AIM

α -Amylases are widely used in the food industry as an enzyme preparation (EP) for the degradation of carbohydrates. The genetically engineered strain *K. phaffii* 2xAmy-BaLi-a-II-ZeoR-(Y-5231) is a modern biotechnological producer of this EP. Upon oral administration in an active form, α -amylase can potentially influence the level of releasing peptides that modulate the production of cholecystokinin – a mediator involved in the regulation of digestion and behavioral acts, including the feeling of satiety. The aim of this work was to assess the behavioral responses and locomotor activity of animals to exclude a possible neurotropic effect of the α -amylase EP.

METHOD

Experimental design

- ✓ Subacute experiment - 90 days.
- ✓ 4 groups of male Wistar rats.
- ✓ Standard semi-synthetic diet based on AIN 93M, provided at a rate of 15-22 g/day (dry weight) with water ad libitum.
- ✓ EP doses (daily gavage): 1, 10, and 100 mg TOS/kg body weight/day

2nd CPAR test

24 hours after the 1st – Day 60
Short-term memory

Elevated Plus Maze (EPM) test

Assessment of locomotor activity and anxiety-related functions

3rd CPAR test

3 weeks after the 1st – Day 80
Long-term memory

1st CPAR test

Memory function in “Passive avoidance conditioned reflex” (CPAR) test
Day 59

LE872 Passive Avoidance Box

SHUTAVOID Software

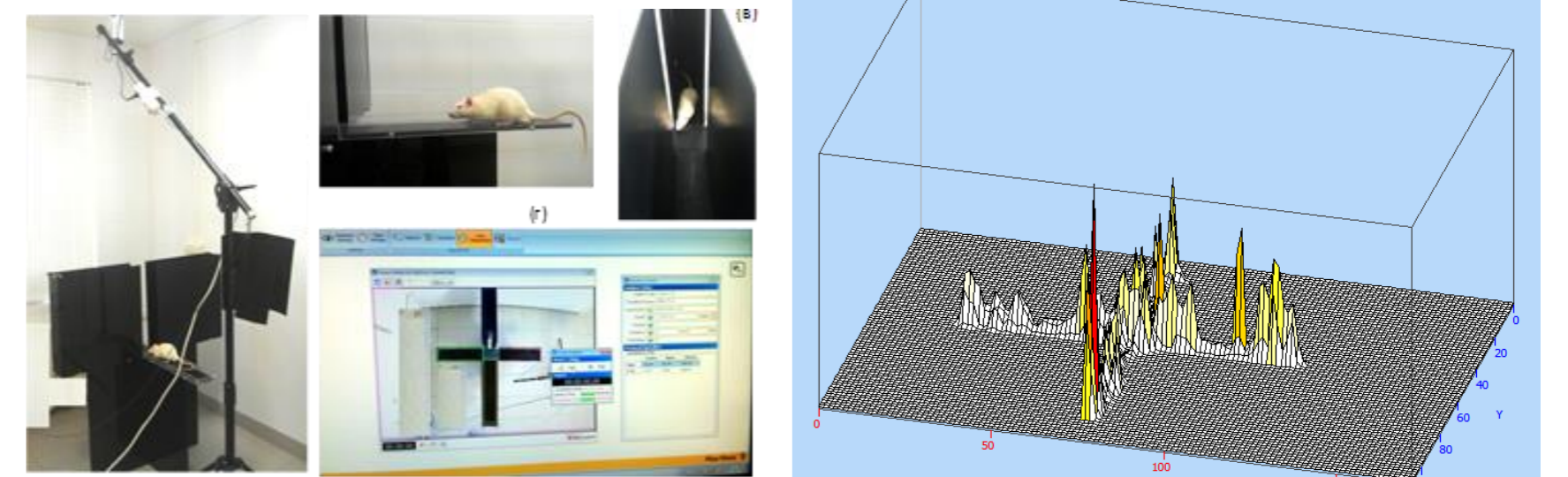


LE800 Control box

LE10026 Shocker

Equipment and demonstration of the EPM test

Chart showing the locomotor activity pattern of animal of the EPM test

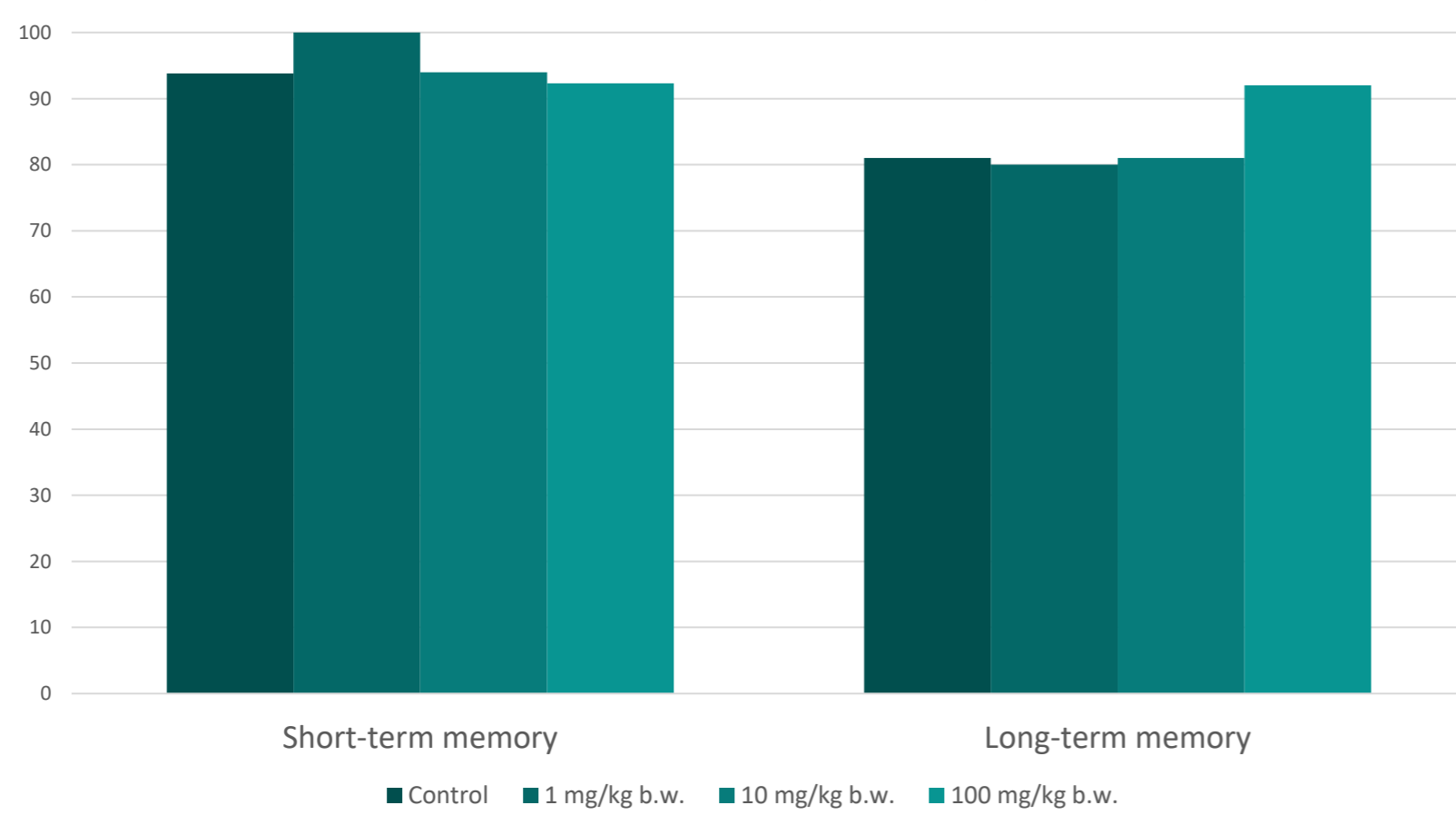


RESULTS

Table 1. Mann–Whitney test

1→2	>0.1
1→3	>0.1
1→4	>0.1
2→3	>0.1
2→4	>0.1
3→4	>0.1

Assessment of memory trace fixing



Stress-related functions

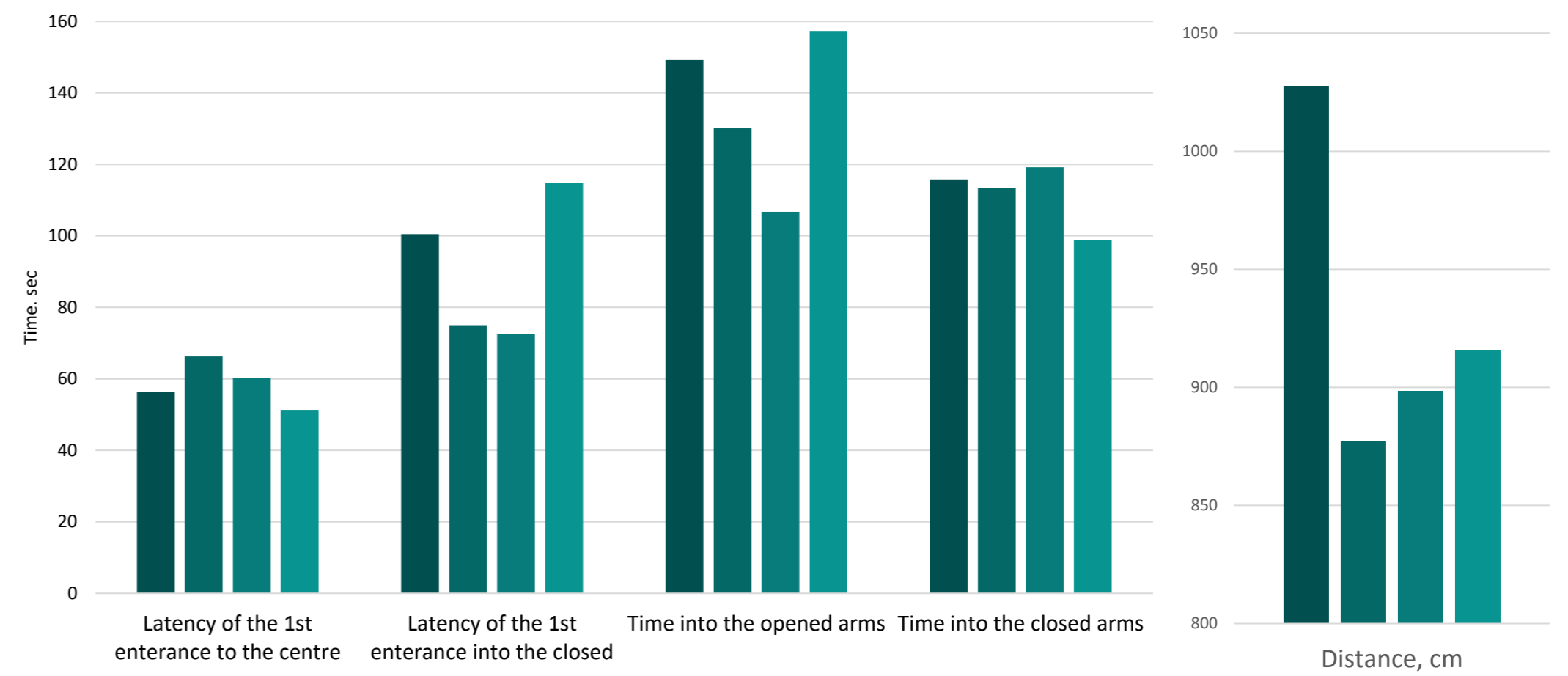
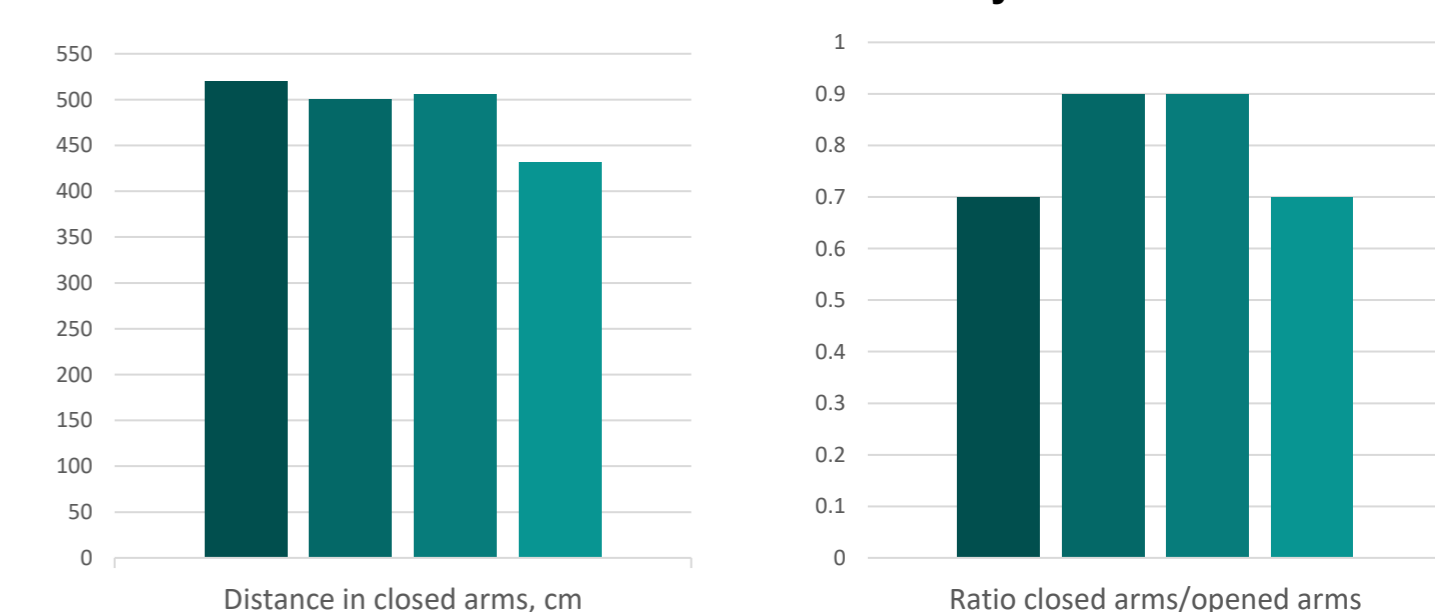


Table 2. Results of the CPAR assessment

Group	Number of rats	Dose, mg/kg b.w.	Latency, sec, M±m		Memory trace fixation, %	
			Median	Intervals of change	Short-term memory	Long-term memory
1	16	0	58.1	8.7-141.6	93.8	81
2	16	1	67.3	20.1-180.0	100.0	80
3	16	10	48.2	7.3-149	94	81
4	14	100	49.5	10.3-180	92.3	92

Locomotor activity



CONCLUSION

Patterns of behavioral and locomotor activity in all experimental groups corresponded to the normal reactions of the control group. The investigated α -amylase enzyme preparation does not possess neurotropic properties and does not affect the memory function of rats within the studied doses under 90-day exposure.

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