



RUTIN DISRUPTS THE OXIDO-INFLAMMATORY CASCADE DRIVING TAU/A β PATHOLOGY IN AN ALUMINUM CHLORIDE-INDUCED ALZHEIMER'S DISEASE MODEL

Cynthia N. Ikeji, Abiola J. Oladepo, Rebecca P. Dickson, Chinwendu Elu, Opeyemi Oluwuyi, Ebenezer O. Farombi

Molecular Drug Metabolism and Toxicology Research Laboratories, Department of Biochemistry, College of Medicine, University of Ibadan, Ibadan, Nigeria.



BACKGROUND

Alzheimer's Disease (AD) is driven by several pathological conditions, including oxidative stress, inflammation, and tau/A β accumulations in the brain, thereby leading to neuronal damage and cognitive impairment, and Aluminum chloride exposure mimics the same pathological conditions seen in AD models.

Rutin, a bioflavonoid with high efficacy, has been noted to have a good neuroprotective role in experimental models.

RESEARCH OBJECTIVES

Broad Objective

to investigate the neuroprotective role of rutin against aluminum chloride-induced hippocampal oxidative stress, inflammation, and tau/A β pathology in the Alzheimer's Disease rat model.

Specific Objectives

- ❖ To examine the impact of rutin pre-treatment on cognitive performance and memory retention in animals exposed to aluminum chloride using behavioral testing
- ❖ To evaluate the effect of rutin on hippocampal oxido-inflammatory indices and key protein expressions related to AD-pathology, neurodegeneration, and synaptic plasticity in the experimental animals.

MATERIALS AND METHODS

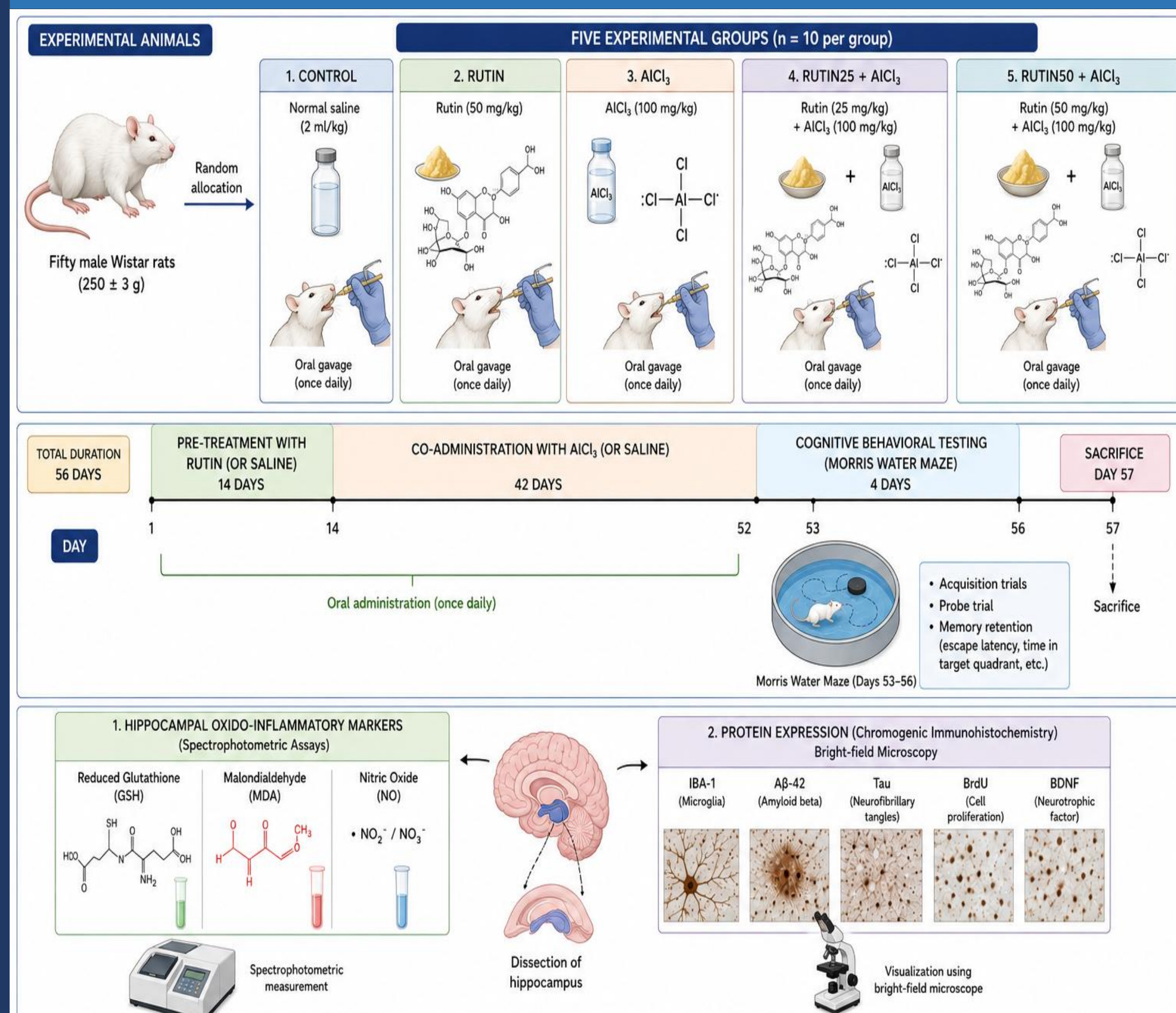


Figure 1: Cartoon Depiction of the Methodology Employed

RESULTS

Rutin Significantly Decreased memory deficit and Hippocampal Oxido-inflammatory Markers in AICl₃-exposed rats.

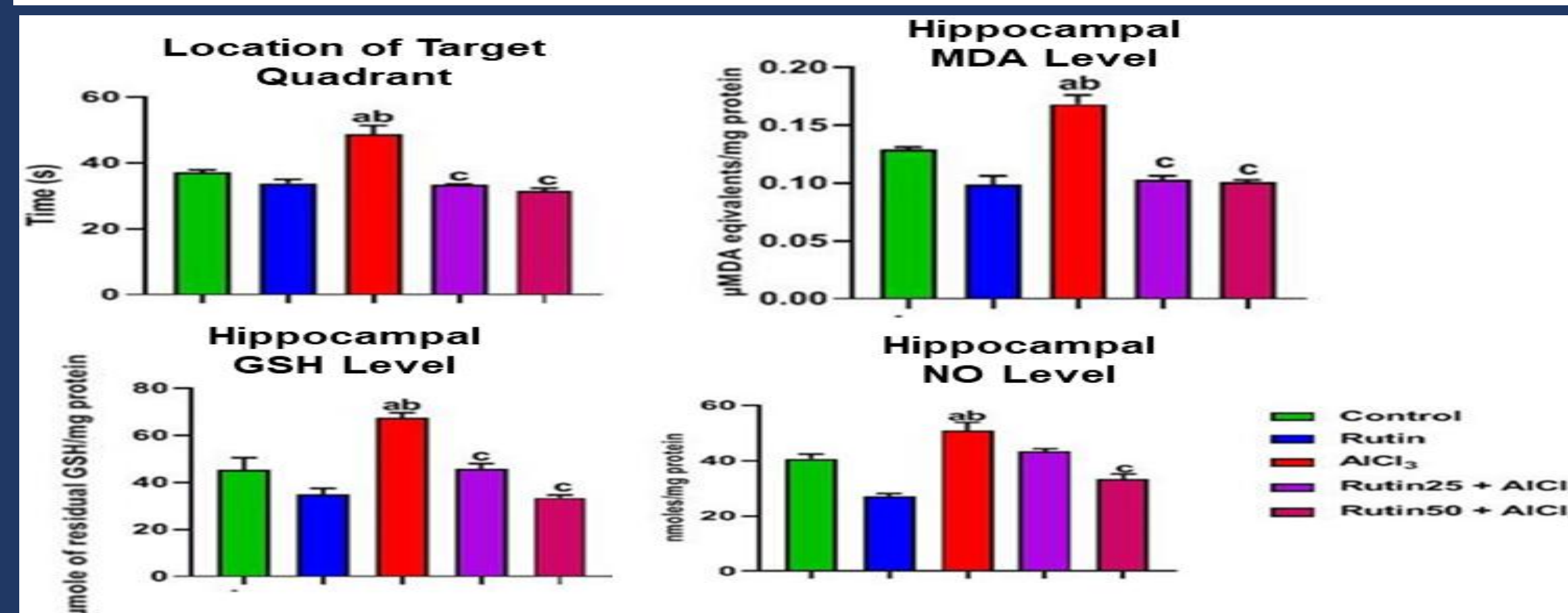


Figure 2: Effect of Rutin on Time to locate target quadrant and hippocampal MDA, GSH, NO in AICl₃-exposed rats. Values with different alphabets significantly differ (p < 0.05).

Rutin Significantly Decreased Hippocampal Glial Activation and Neurodegeneration in AICl₃-exposed Rats.

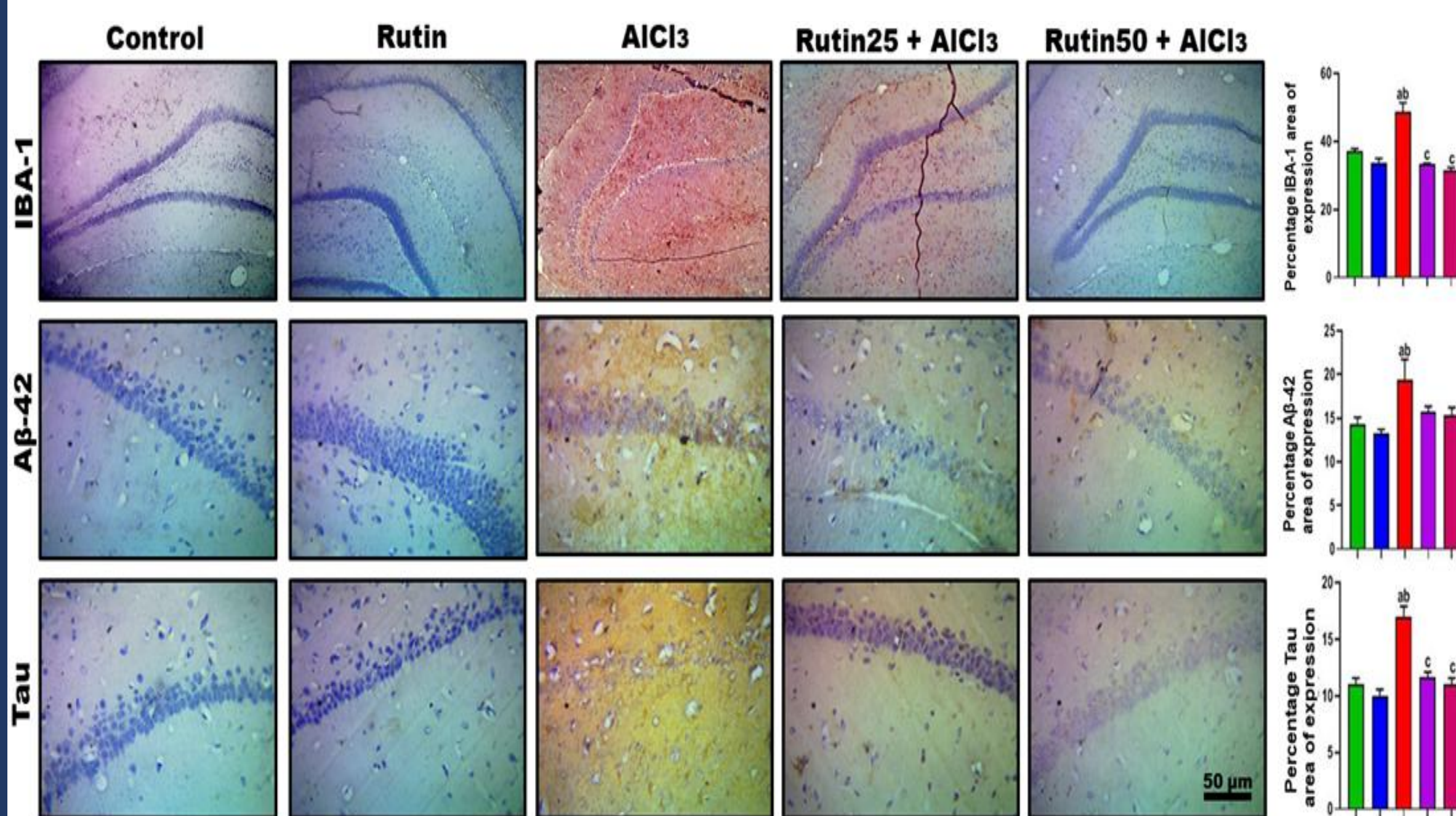


Figure 3: Effect of Rutin on Hippocampal Protein Expressions of IBA-1, A β -42, and Tau in AICl₃-exposed rats. Values with different alphabets significantly differ (p < 0.05).

Rutin Significantly Increased Hippocampal Neurogenesis and Synaptic Plasticity in AICl₃-exposed Rats.

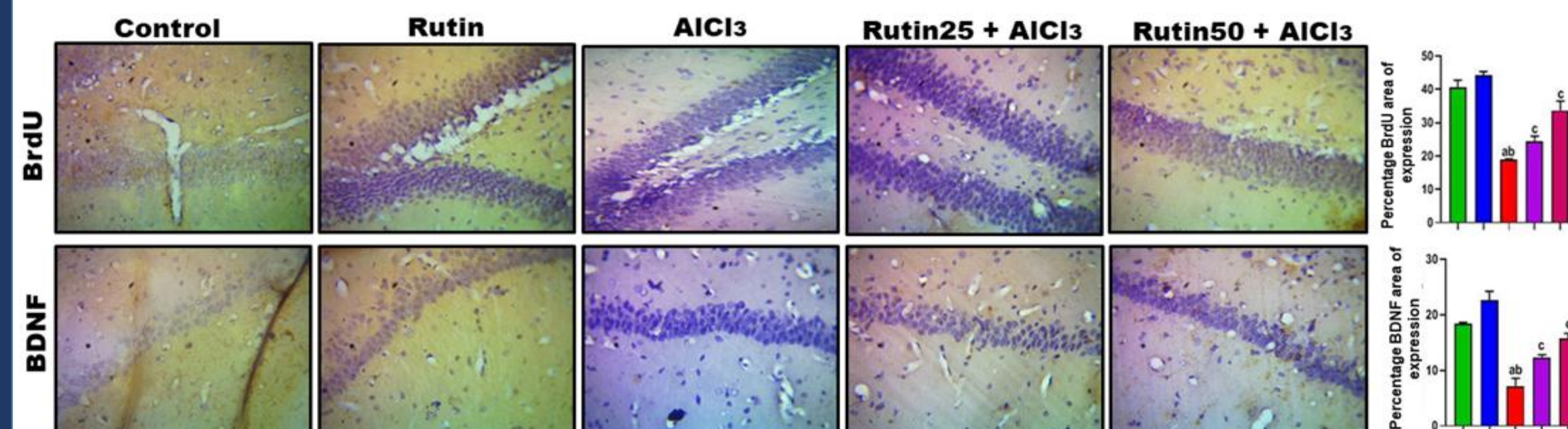
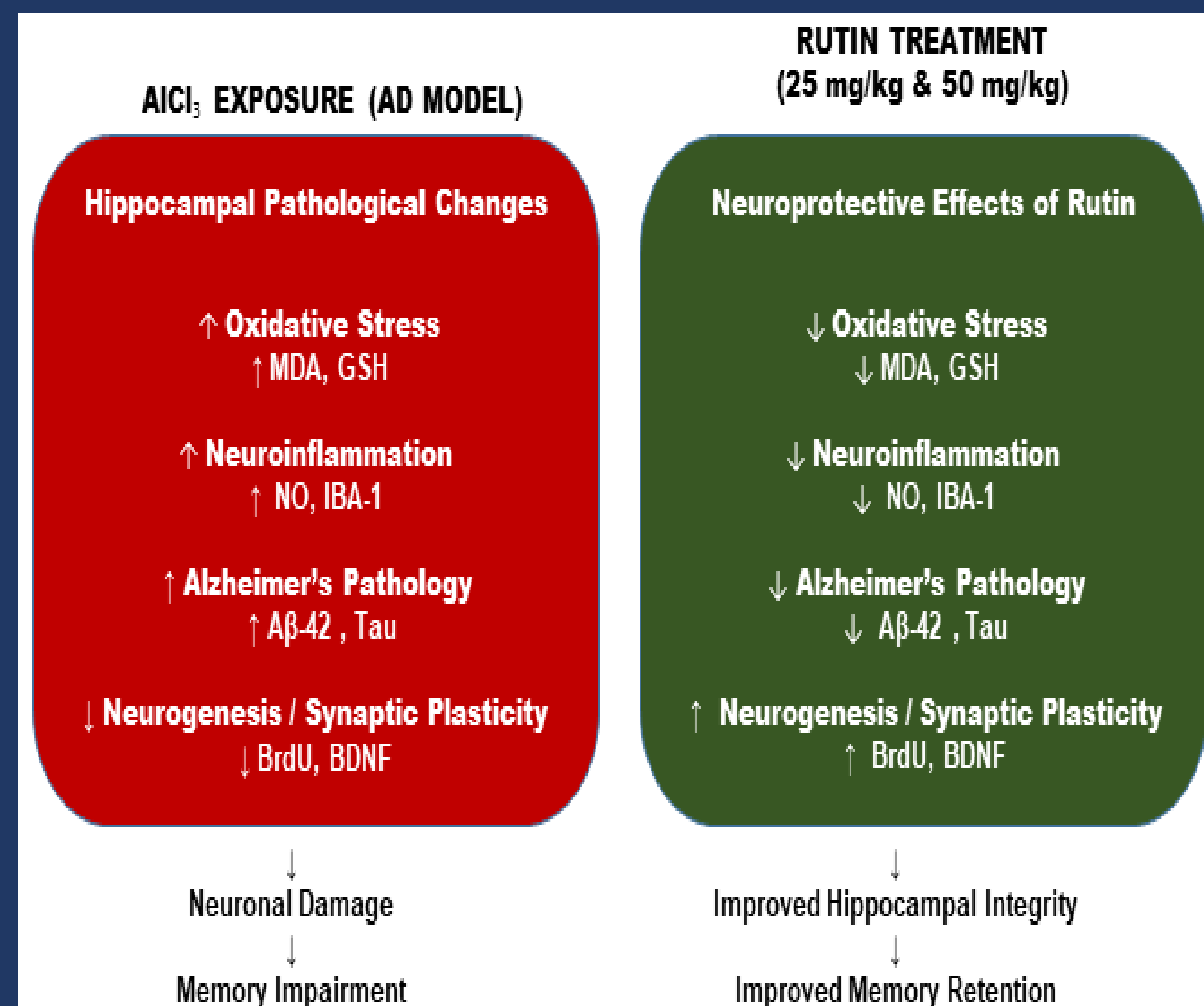


Figure 4: Effect of Rutin on Hippocampal Protein Expressions of BrdU and BDNF in AICl₃-exposed rats. Values with different alphabets significantly differ (p < 0.05).

SUMMARY



CONCLUSION

Rutin mitigated aluminum chloride-induced cognitive and hippocampal damage by suppressing key Alzheimer's-related pathological mechanisms, highlighting its neuroprotective potential.

REFERENCES

- De Araújo, F. M., Frota, A. F., de Jesus, L. B., Cuenca-Bermejo, L., Ferreira, K. M. S., Santos, C. C., Soares, E. N., Souza, J. T., Sanches, F. S., Costa, A. C. S., Farias, A. A., de Fatima Dias Costa, M., Munoz, P., Menezes-Filho, J. A., Segura-Aguilar, J., Costa, S. L., Herrero, M. T., & Silva, V. D. A. (2023). Protective Effects of Flavonoid Rutin Against Aminochrome Neurotoxicity. *Neurotoxicity research*, 41(3), 224–241. <https://doi.org/10.1007/s12640-022-00616-1>
- Li, F., Zhang, L., Zhang, X., Fang, Q., Xu, Y., & Wang, H. (2024). Rutin alleviates Pb-induced oxidative stress, inflammation and cell death via activating Nrf2/ARE system in SH-SY5Y cells. *Neurotoxicology*, 104, 1–10. <https://doi.org/10.1016/j.neuro.2024.07.010>
- Tanikawa, T., Yu, J., Hsu, K., Chen, S., Ishii, A., & Kitamura, M. (2024). Effect of Nattokinase in D-galactose- and Aluminum Chloride-induced Alzheimer's Disease Model of Rat. *In vivo (Athens, Greece)*, 38(6), 2672–2679. <https://doi.org/10.21873/in vivo.13744>
- Wongpun, J., Chanmanee, T., Tocharus, C., Chokchaisiri, R., Chantorn, S., Pabuprapap, W., Suksamarn, A., & Tocharus, J. (2022). The effects of festedinol treatment on the D-galactose and aluminum chloride-induced Alzheimer-like pathology in mouse brain. *Phytotherapy : international journal of phytotherapy and phytopharmacology*, 98, 153925. <https://doi.org/10.1016/j.phymed.2022.153925>

ACKNOWLEDGEMENTS

