Aspirin improves the regenerative plasticity in the brain of experimental adult mice

Jemi Feiona Vergil Andrews[1], Divya Bharathi Selvaraj[1], Syed Aasish Roshan[2], Akshay Kumar[1], Muthuswamy Anusuyadevi[2], Mahesh Kandasamy [1,3]

[1]Laboratory of Stem Cells and Neuroregeneration, Department of Animal Science, School of Life Sciences, [2]Molecular Neuro-Gerontology Laboratory, Department of Biochemistry, School of Life Sciences, Bharathidasan University, Tiruchirappalli 620024, Tamil Nadu, India.[3]University Grants Commission-Faculty Recharge Programme (UGC-FRP), New Delhi, 110002, India

Background

Aspirin is a widely used generic non-steroidal anti-inflammatory drug (NSAID) that inhibits the activity of cyclooxygenase enzyme (COX)-2 and reduces the action of prostaglandins responsible for pain and inflammation. Aspirin has been used as a pharmacological preventive measure against coronary artery disease (CAD), heart attack, ischemic stroke, and blood clots. Though there exist some controversial reports, aspirin has been reported to be beneficial for neurocognitive improvements. However, the underlying cellular and molecular biological mechanisms by which aspirin improves cognitive performance remains unknown. Regulation of neurogenesis in the hippocampus of the adult brain has functionally been linked to learning and memory. Therefore, inhibition of COX in the brain appears to play a vital role in boosting neuroplasticity. Thus, aspirin may boost cognitive functions via the regulation of neural stem cell-mediated neurogenesis. Thus, this study has been designed to investigate the effect of aspirin on the regulation of neurogenesis in the brain of adult mice and their neurocognitive behaviors. Results from Novel Object Recognition (NOR) and Morris water maze (MWM) behavioral tests revealed that aspirin treatment improves learning and memory in association with an increased number of doublecortin (DCX) positive young neurons and neuronal differentiation in the hippocampus of adult experimental mice.

Aim and Objectives

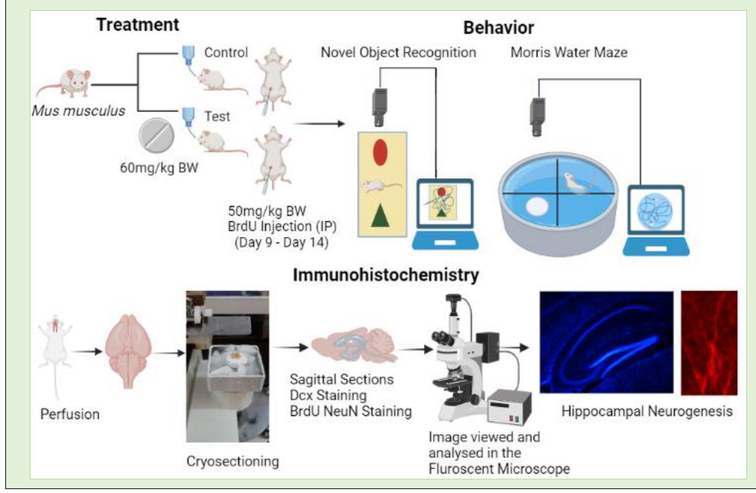
Aim

The aim of the study is to investigate the effect of aspirin on the regulation of hippocampal neurogenesis in the brain.

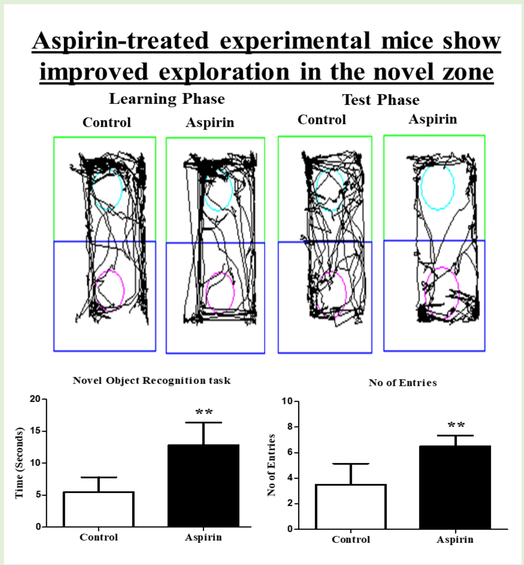
Objectives

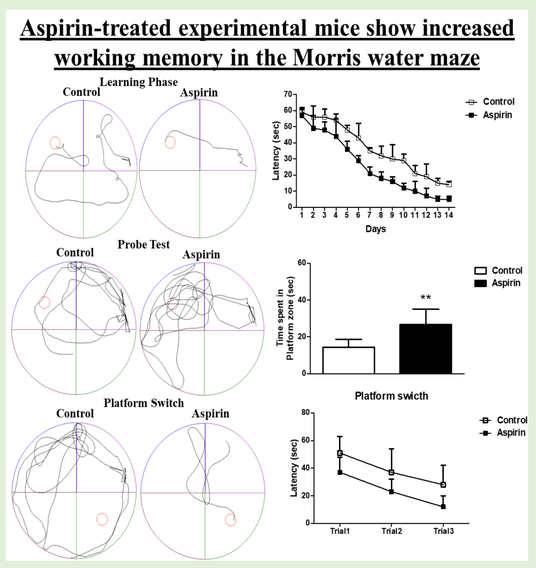
1. To analyze the effect of aspirin on learning and memory using behavioral tests such as Novel Object Recognition (NOR) and Morris Water Maze (MWM).
2. To analyze the effect of aspirin on the number of immature neurons between the control and aspirin-treated group.
3. To determine the number of proliferating cells which differentiate into mature neurons upon aspirin treatment.

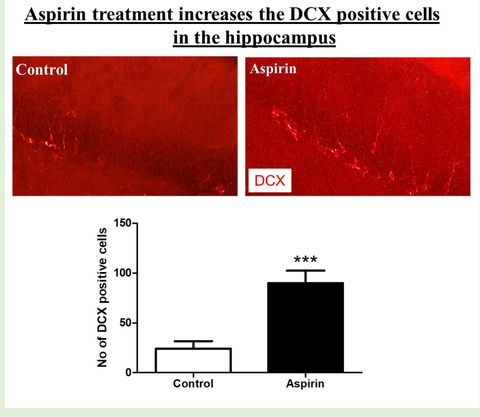
Methodology

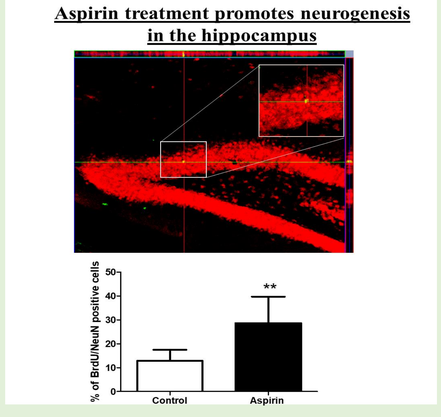


Results









Discussion

Regulation of hippocampal neurogenesis is an important key for learning and memory. Aspirin may boost the mechanism of neural stem cell proliferation, differentiation, and survival of new neurons via its antioxidant and neuroprotective effects. The signaling cascade responsible for cell cycle induction and fate determination toward neurogenic programs may be activated via aspirin-mediated effects in the hippocampus of the brain.

Conclusion

Aspirin treatment improves spatial working memory via increasing the level of neurogenic process in the hippocampus of the adult brain. Aspirin consumption may act as a therapeutic drug not only for cardiovascular disease but also for dementia.

Acknowledgments

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