Antipurinergic Therapy with Suramin as Treatment for Autism Spectrum Disorder

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Abstract

Background: This review article discusses the opportunities and possibilities of suramin with various therapies, including antipurinergic therapy (APT), on mice models with Autism spectrum disorder (ASD) and Fragile X Syndrome. To date, 1-2% of children in the United States are affected by ASD [4]. Risk factors range from metabolic, environmental and genetic conditions, although these factors influence each child differently [4]. The central focus of each study was to advance the approach and treatment for neurodevelopmental disorders, including ASD and Fragile X. The objective of this review article was to determine if controlled doses of suramin:

- Alleviate ASD conditions
- Contain anticancer properties
- Alleviate arthritic symptoms [13-14]

Methods and Findings: Content for this review article was gathered using search terms "suramin and autism;" "suramin therapy and autism;" "autism therapy;" and "autism," through public electronic databases such as ProQuest, PubMed, Sciencedirect, and Google Scholar. Publications included *Molecular Autism*, *Clinical Therapeutics*, and PLoS ONE. Clinical studies tested alternative therapeutic methods using APT with suramin to repair genetic abnormalities as related to neurodevelopmental disorders, including ASD, and Fragile X Syndrome. The following gene strains on mouse models found APT with suramin to repair damaged synapses and improve behavior:

- APT with poly(IC) mouse model
- FMRP and Fragile X Fmr1 gene mouse model
- a7 (nAchRa7) activity in MIA mouse model
- FVB and Fragile X (Fmr1) knockout mouse model

Controlled doses of suramin were found to repair damaged synapse and improve behavior related to ASD.

Conclusion: Genetic and environmental implications play a significant role in the diagnosis and understanding of ASD and Fragile X Syndrome. Tests with Fragile X mouse model found that

APT with suramin positively influenced the synapse structural irregularities, metabolism, and behavior. APT with suramin also showed positive results in environmental MIA model. Recent studies show positive results in genetic model of Fragile X knockout. APT provides new research opportunities into pathogenesis and new drug development for human ASD and other spectrum disorders. The repairing methods and capabilities of APT with suramin can be better understood with additional clinical studies. Recommendations for future research include clinical and preclinical trials on suramin as a novel therapy.