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AUTISM SPECTRUM DISORDER AND ADVANCES IN EPIGENETIC RESEARCH

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RESUMO

Introduction Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition whose etiology involves an intricate interplay between genetic, epigenetic, and environmental factors. Recent studies highlight the crucial role of epigenetic mechanisms in ASD pathogenesis, particularly in regulating gene expression during brain development. Dysregulation of these processes can lead to persistent alterations in synaptic plasticity and neural functioning, contributing to the core features of the disorder. **Objective** This review aims to explore the epigenetic mechanisms involved in ASD, with special focus on histone modulation effects and the therapeutic potential of histone deacetylase inhibitors (HDACi). **Methods** We conducted a systematic literature review of scientific studies published between 2000 and 2023. Included were original articles, systematic reviews, and meta-analyses addressing epigenetic aspects of ASD. Databases searched included PubMed, Scopus, and Web of Science, using terms such as "autism," "epigenetics," "histone acetylation," and "sodium butyrate." **Discussion** Epigenetics emerges as a central axis in understanding ASD. The animal model of prenatal valproic acid (VPA) exposure clearly demonstrates how histone deacetylase (HDAC) inhibition can induce autism-like behavioral changes. Studies show that VPA causes hyperacetylation of H3 and H4 histones, leading to altered expression of genes critical for neural development. Experimental data reveal that sodium butyrate, an HDAC inhibitor, can partially reverse these effects when administered postnatally. This compound acts by restoring excitatory-inhibitory balance in the prefrontal cortex, a region frequently affected in ASD. Epigenetic modulation also appears to influence serotonin levels, which may explain some behavioral symptoms. **Conclusion** Advances in epigenetic research are redefining our understanding of ASD and opening new therapeutic perspectives. Although HDAC inhibitors like sodium butyrate show promise in animal models, robust clinical studies are needed to assess their safety and efficacy in humans. Integrating epigenetics with other therapeutic approaches may represent a milestone in ASD treatment, offering hope for more precise and personalized interventions in the future.

PALAVRAS-CHAVE: Autism Spectrum Disorder, Epigenetics, Histone Deacetylase, Valproic Acid

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