Epigenetic Regulation in Stem Cell Differentiation

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Abstract. Epigenetic modifications play a crucial role in stem cell differentiation and the maintenance of cellular identity. This article reviews the mechanisms of DNA methylation and histone modification in regulating gene expression during differentiation. The potential of epigenetic therapies in regenerative medicine is also discussed.

Keywords: Epigenetic Regulation, Stem Cell Differentiation, DNA Methylation, Histone Modification, Regenerative Medicine

Introduction

Stem cells possess the remarkable ability to differentiate into various cell types, a process that is intricately regulated by epigenetic modifications. These modifications, including DNA methylation and histone modification, influence gene expression without altering the underlying DNA sequence, thereby maintaining cellular identity and guiding differentiation. Understanding the dynamics of epigenetic regulation in stem cells is critical for advancing regenerative medicine and developing therapies for degenerative diseases. Recent advancements have highlighted the potential of targeting epigenetic pathways to enhance stem cell differentiation and repair damaged tissues.

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