

Epigenetic Regulation of specific transcription factors in Osteogenic Differentiation of Mesenchymal Stem Cells

Abstract

Abundance of experiments has been performed to clarify the differentiation process of MSCs. Osteogenic differentiation and in vitro conditions favoring these cell lineages have attracted the attention of many researchers. Moreover, gene expression profile during MSC differentiation toward its main specialized cells (bone, cartilage and adipose cells) has been mostly understood. In the last decades another layer of investigation has attempted to clarify the epigenetic mechanisms underlying MSC differentiation into its specialized cells. It has been shown that as MSCs progress through the differentiation process, more non-specific genes undergo DNA methylation to prevent differentiation into improper cell fates. Also, promoters of lineage-specific genes are strongly hypo-methylated in MSCs during differentiation. The main objective of this review is to address the role of major epigenetic mechanisms such as DNA methylation, histone modifications and non-coding RNAs especially miRNAs in osteoblastic differentiation of MSCs and to summarize all the previous studies which have determined the epigenetic alterations of nuclear genome during osteoblastic differentiation of MSCs.

Key Words: Epigenetic, MSCs, Osteogenic Differentiation, Specific Transcription Factors