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## New insights into the epigenetic control of satellite cells

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## Abstract

Epigenetics finely tunes gene expression at a functional level without modifying the DNA sequence, thereby contributing to the complexity of genomic regulation. Satellite cells are adult muscle stem cells that are important for skeletal post-natal muscle growth, homeostasis and repair. The understanding of the epigenome of satellite cells at different stages and of the multiple layers of the post-transcriptional regulation of gene expression is constantly expanding. Dynamic interactions between different epigenetic mechanisms regulate the appropriate timing of muscle-specific gene expression and influence the lineage fate of satellite cells. In this review, we report and discuss the recent literature about the epigenetic control of satellite cells during the myogenic process from activation to proliferation and from their commitment to a muscle cell fate to their differentiation and fusion to myotubes. We describe how the coordinated activities of the histone methyltransferase families Polycomb group, which represses the expression of developmentally regulated genes, and Trithorax group, which antagonizes the repressive activity of the Polycomb group, regulate myogenesis by restricting gene expression in a time-dependent manner during each step of the process. We discuss how histone acetylation and deacetylation occurs in specific loci throughout satellite cell differentiation to enable the time-dependent transcription of specific genes. Moreover, we describe the multiple roles of microRNA, an additional epigenetic mechanism, in regulating gene expression in satellite cells by repressing or enhancing gene transcription or translation during each step of myogenesis. The

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