Special Issue

Genetic and Epigenetic Regulation of Gene Expression

Message from the Guest Editor

This Special Issue explores the mechanisms controlling when, where, and how genes are expressed to shape cellular and organismal functions. The genetic regulation of gene expression includes DNA sequences, such as promoters, enhancers, insulators, and small RNA target sequences, as well as cis-regulatory polymorphisms within them, that modulate transcriptional activity and transcript stability as well as maturation. It also involves a combination of transcription factors, cofactors, and RNA-binding proteins interacting with these sequences to modulate gene activity. In parallel, epigenetic mechanisms affect gene expression through modifications. These epigenetic changes are essential for developmental differentiation, responses to environmental stimuli, and the maintenance of genome stability. Furthermore, they can be heritable, reprogrammable, and reversible, providing an additional layer of regulatory complexity. Advances in technologies, like next-generation sequencing, single-cell genomics, and epigenomic profiling, have significantly deepened our understanding of these regulatory systems.

Guest Editor

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