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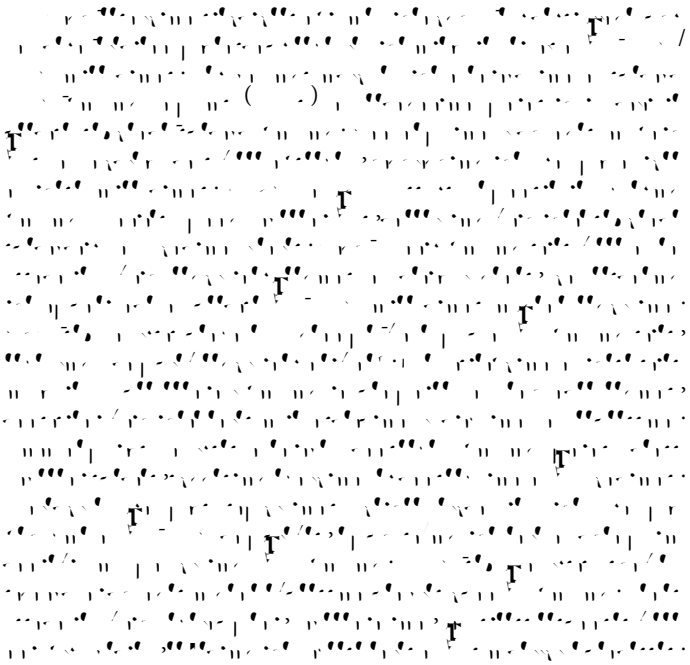
Abstract

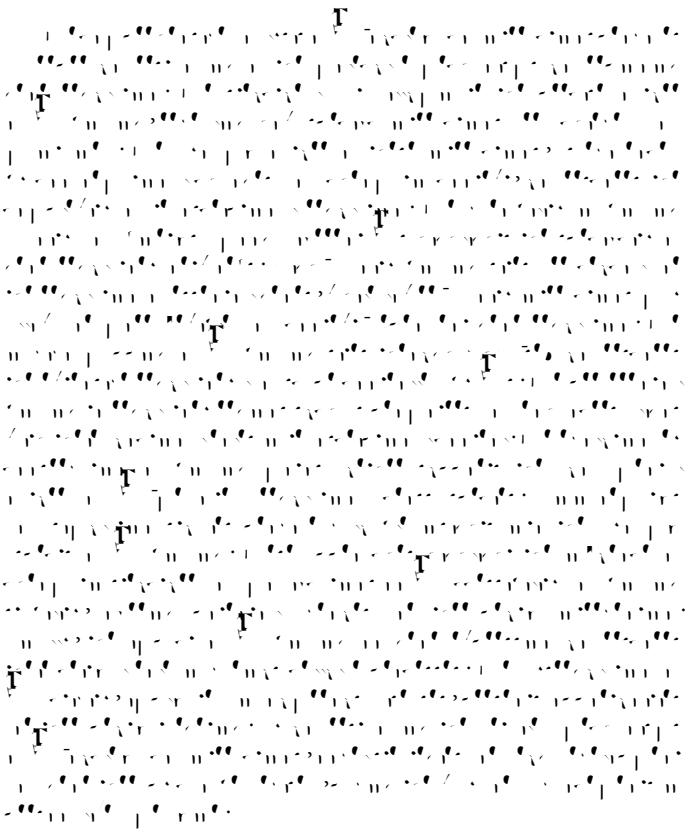
Transcription factors (TFs) play a pivotal role in gene regulation by recognizing and binding to speciýc nucleic acid sequences, thereby orchestrating the expression of genes critical for cellular function and development. This review delves into the intricate mechanisms of nucleic acid recognition and binding by transcription factors, elucidating the structural and biochemical underpinnings that facilitate their precise interactions with DNA and RNA. Advances in high-resolution structural biology techniques, such as X-ray crystallography and cryo-electron microscopy, have provided unprecedented insights into the conformational dynamics and speciýcity of TF-DNA/RNA complexes. We explore the diverse array of DNA-binding domains (DBDs) and their sequence-speciýc recognition motifs, highlighting the interplay between TFs and the chromatin landscape that modulates gene accessibility and expression. Additionally, we examine the implications of dysregulated TF activity in various diseases, emphasizing the therapeutic potential of targeting TFs and their binding sites for novel drug development. By integrating recent ýndings from genomics, proteomics, and bioinformatics, this review provides a comprehensive understanding of the molecular principles governing TF function, paving the way for innovative approaches in gene therapy and personalized medicine.

Results and Discussion

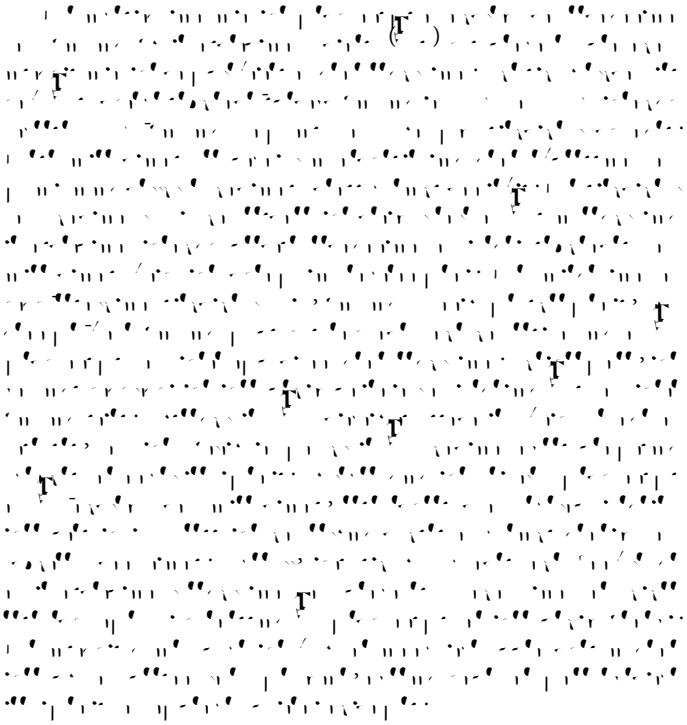
Results



Discussion



Conclusion



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