

Regulation of retinal homeobox gene transcription by cooperative activity among cis-elements. ^[1]

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Abstract

The retinal homeobox (Rx/rax) gene is essential for the development of the eye. Rax is among the earliest genes expressed during eye development, beginning in the prospective eye fields in the anterior neural plate. Additionally Rax expression persists in retinal progenitor cells and in differentiated photoreceptors. We have isolated and characterized a 2.8 kb genomic DNA fragment that regulates expression of Rax in the developing and maturing retina. We have discovered and characterized cis-acting elements that function to specifically control spatial and temporal Rax expression during retinal development. We have found that the regulation of Rax2A promoter activity requires cooperative interactions between positive and negative regulatory elements. Further, a highly conserved genomic element containing SOX, OTX, and POU transcription factor binding sites is necessary but not sufficient for promoter activity in retinal progenitor or stem cells. Finally, a putative binding element for forkhead transcription factors is necessary for promoter activity and can cooperate with other cis-acting elements to drive Rax2A promoter activity.

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