9-cis retinoic acid induces retinoid X receptor localized to the mitochondria for mediation of mitochondrial transcription

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Abstract

We previously reported that 9-cis retinoic acid (RA) treatment induced an increase in mitochondrial (mt)DNA transcription. In order to extend these results, we tested various concentrations of 9-cis RA were used to treat 143B cells. Cells with low membrane potential treated with 9-cis RA showed significantly lower amounts of RXRα in mitochondria. We also found lower RXRα levels in mtDNA-depleted cells. Treating cells with 9-cis RA significantly increased expression of ND1, ND6, and COX I RNA. However, 9-cis RA-treatment did not appear to induce any significant changes in mtDNA copy number or mitochondrial mass. This study represents that 9-cis RA increases mtDNA transcription but not mtDNA replication, and it suggests that the effects of 9-cis RA on mitochondria are mediated by RXR localization to mitochondria. In addition, this is the first report that 9-cis RA regulation of RXR mitochondrial translocation depends on mitochondrial membrane potential and ATP.