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Murine and human D_{1A} dopamine receptor promoters were differentially regulated by human Act and AR1 sequences

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The D_{1A} dopamine receptor gene underlies complex transcriptional regulation in order to achieve the tissue-specific expression. Transcription in the D_{1A} genes proceeds from two distinct promoters utilized for the tissue-specific regulation of these genes. Furthermore, analysis of the human D_{1A} dopamine receptor gene has revealed that the region between nucleotides -1173 and -1136 (ActAR1) of the gene might be important for its neural cell-specific expression. To investigate the function of D_{1A} dopamine receptor promoters in the brain cell-specific expression of transgenes, we analyzed the regulatory patterns of two distinct protein-binding regions of ActAR1, i.e., an Act sequence (-1174/-1154) and an AR1 sequence (-1154/-1136), toward murine and human D1A promoters. Transient expression analyses using various chloramphenicol acetyltransferase constructs revealed that Act could not activate murine or human D_{1A} promoters, and that AR1 could effectively stimulate these promoters in a cell type-non-specific manner. Only ActAR1, a combination of Act and AR1 could activate murine and human D_{1A} promoters in a prominent cell type-specific manner. Abundant protein binding to Act was detected by gel mobility shift assay using nuclear extracts from SK-N-MC, NS20Y, OK, and C6 but faint protein binding using nuclear extracts from HepG2. Furthermore, strong protein binding to AR1

was detected using nuclear extracts from SK-N-MC, NS20Y, HepG2 but faint protein binding from C6 extracts and no detectable protein binding from OK extracts. These observations suggest that the tissue-specific expression of the D_{1A} gene is due, at least in part, to the differential expression of these activator proteins that bind to Act and AR1.