Expression of the ADHD candidate gene Diras2 in the brain.

Grünewald L, Becker N, Camphausen A, O'Leary A, Lesch KP, Freudenberg F, Reif A.


Abstract

The distinct subgroup of the Ras family member 2 (DIRAS2) gene has been found to be associated with attention-deficit/hyperactivity disorder (ADHD) in one of our previous studies. This gene is coding for a small Ras GTPase with unknown function. DIRAS2 is highly expressed in the brain. However, the exact neural expression pattern of this gene was unknown so far. Therefore, we investigated the expressional profile of DIRAS2 in the human and murine brain. In the present study, qPCR analyses in the human and in the developing mouse brain, immunocytological double staining on murine hippocampal primary cells and RNA in situ hybridization (ISH) on brain sections of C57BL/6J wild-type mice, have been used to reveal the expression pattern of DIRAS2 in the brain. We could show that DIRAS2 expression in the human brain is the highest in the hippocampus and the cerebral cortex, which is in line with the ISH results in the mouse brain. During mouse brain development, Diras2 levels strongly increase from prenatal to late postnatal stages. Co-expression studies indicate Diras2 expression in glutamatergic and catecholaminergic neurons. Our findings support the idea of DIRAS2 as a candidate gene for ADHD as the timeline of its expression as well as the brain regions and cell types that show Diras2 expression correspond to those assumed to underlie the pathomechanisms of the disease.