Expression of an immunoglobulin constant domain genes in neurons of the mouse central nervous system

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Immunoglobulins are the first line of defense against pathogens and, as such it is widely assumed that they are exclusively expressed by B lymphocytes. In a recent study comparing the translatomes of spinal neuron subtypes, we obtained evidence indicating the presence of neuron specific Ighm transcripts encoding only the constant (Fc), but not the variable regions of IgM, in the CNS of mice. Using in situ hybridization we confirmed prominent expression of Ighm in the spinal cord and found expression in several other CNS areas e.g. deep cortical layers and the hippocampus (CA1 and Dentate Gyrus). Ighm expression persists in the CNS of Rag1-/- mice (lacking B- and T-cells), excluding that the detected mRNA was of lymphocytic origin. To understand the function of Ighm in the CNS we generated a conditional Ighm knock out (cKO) mouse model (Ighmflox; Snap25cre) in which Ighm is specifically deleted from neurons. We then subjected these mice to a battery of sensory and behavioral tests. Our preliminary data suggest that the lack of this heavy chain immunoglobulin gene does not affect basal thermal or mechanical sensitivity but may impair spatial learning, as a first cohort of mice displayed deficits in the water-maze place navigation test and spontaneous alternation in the T-maze. Taken together with Ighm expression in CA1 and the Dentate Gyrus our data suggests a potential function of Ighm in spatial working memory.