

## EMBRYONIC EXPRESSION OF *OTX2* AND *DMBX1* IN human BRAIN

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### Background

A remarkable volume of data has been collected these few last decades dealing with the function of homeobox genes during brain organogenesis, especially from mouse and chicken. Among homeobox genes, the orthodenticle group comprise the *Drosophila orthodenticle* (*Otd*) and the vertebrate *Otx1* and *Otx2* genes. These play major roles in the specification and regionalization of the anterior neuromeres. Genetic manipulations suggest conserved functional equivalence of *Otd/Otx* genes, in spite of the different CNS architectures between *Drosophila* and mouse. However, this equivalence is still subject to differential transcriptional and translational control. In vertebrates, *Otx* gene duplication and corresponding modification in genetic pathways may have resulted in novel developmental programmes, including the modification in shape and size of different brain areas. The analysis of the expression of *OTX* genes in human embryos may therefore reveal possible innovative roles in brain organogenesis and unsuspected links with neurological disorders. This may be particularly relevant in the cases of *OTX2* and *DMBX1*, the latter of which functions as a transcriptional repressor. Here, we present our preliminary data on *OTX2* and *DMBX1* gene expression in two human developmental stages (Carnegie Stages 15 and 19).

### Results

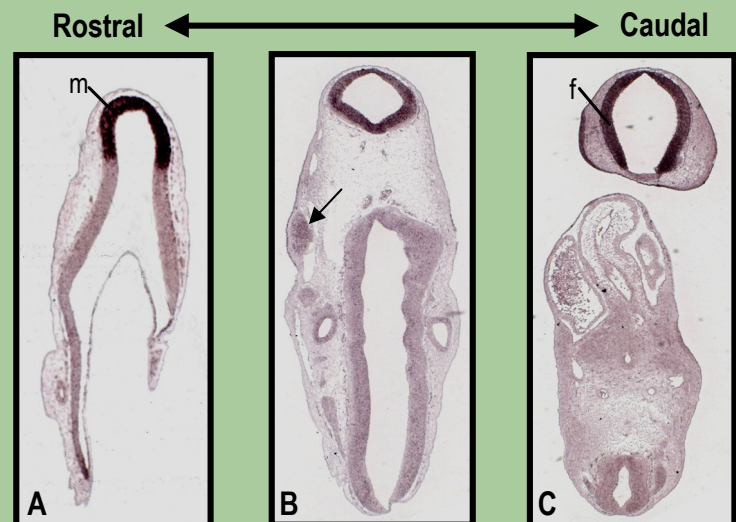


Fig. 1: *OTX2* expression abuts the midbrain (m)-hindbrain junction (A), and is lacking in the basal forebrain (f) (C). Note the light label (arrow) in the trigeminal ganglion (B). CS15.

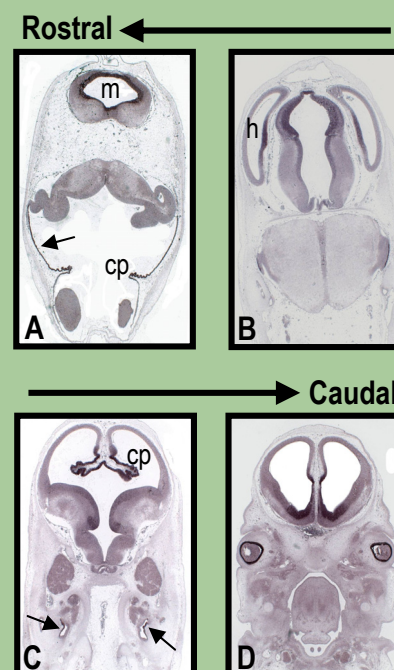


Fig. 2: *OTX2* is strongly expressed in the midbrain (m) neuroepithelium, in the roof of the fourth ventricle (arrow), and in the choroid plexus (cp) of the fourth (A) and lateral ventricles (C). *OTX2* is also expressed in the developing hippocampus (h) and dorsal thalamus (B), and in the subpallium (C and D). Note also in (C) the *OTX2* expression in the inner ear primordia (arrows). CS19.

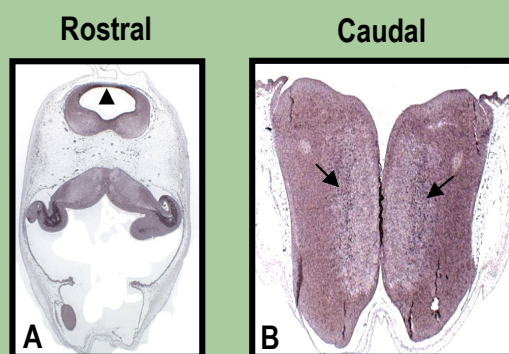


Fig. 3: *DMBX1* gene is expressed in the midbrain neuroepithelium, but not in the roof plate (arrowhead). Note also the expression in the cerebellum (A). In (B), the arrows indicate *DMBX1* expression in the medulla oblongata. CS19.

### Discussion

Our data show that *OTX2* is expressed in the forebrain and midbrain of CS15 with a sharp arrest of the expression in the isthmus. It is known that this structure play a central role in brain patterning. Our results also suggest a possible role of *OTX2* in the specification of subpallial areas. *DMBX1* expression shows a strong overlapping with *OTX2* in earlier stages (data not shown). Further analysis is needed to correlate *OTX2* and *DMBX1* expression in different stages.

#### Acknowledgments:

The project (DGEMap) is supported by the European Community - Research Infrastructure Action under the FP6 "Structuring the European Research Area" Programme (Contract number 011993).

**Partners:** Newcastle University and National e-Science Centre, University of Edinburgh (UK).

Developmental material was obtained from the MRC-Wellcome Human Developmental Biology Resource (HDBR). The HDBR provides human embryonic and fetal material to the international scientific community and is held at the Institute of Human Genetics (Newcastle University) and the Institute of Child Health (University College, London) ([www.hnbr.org](http://www.hnbr.org) and email [hnbr@ncl.ac.uk](mailto:hnbr@ncl.ac.uk) or [hnbr@ich.ucl.ac.uk](mailto:hnbr@ich.ucl.ac.uk)).

**Reference:** *Otx* genes in corticogenesis and brain development (1999). Acampora et al. *Cerebral cortex*, 9: 533-542.

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