

DEVELOPMENTAL POTENTIALITIES OF THE MOUSE NEURAL TUBE GRAFTED IN CHICK EMBRYO

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Many open questions remain regarding the origin and developmental potential of cellular components of nervous system in mammals. Answer to these questions requires an experimental system that allows the isolation of identified progenitor cells and their *in vivo* manipulations, whereas mouse embryo is notoriously difficult to manipulate making analysis of cell lineage inaccessible. We recently devised to employ the chick embryo as host of developing mouse cells. In our first mouse chick chimeric construct we replaced somites in chick embryo unilaterally with somites from mouse foetus (Fontaine Pérus et al, 1995). Due to differences in the labelling properties of chick and mouse nuclei after use of DNA staining methods, it was easy to identify mouse among the chick cells.

We demonstrated that the developmental potentialities of the different components of the grafted somites (i.e. muscle, dermis and vertebrae) can be expressed in the chick. Particular attention was given to the myogenic behavior of grafted mouse cells through use of the desmin nls LacZ transgenic mouse (Li et al, 1993), expression of transgene serving as a specific marker of mouse muscle cells. In the present work based on the same proceeding we decided to examine the embryonic development of the mouse nerve system after grafting mouse neural primordium into chick host embryo. Our findings indicate the ability of mouse neural tube to develop when implanted in a chick environment. The mouse neural crest cells associated with the neural tube at the grafting time *in vivo* migrate and reach the normal arrest sites of host neural crests. Thus the mouse cells populate sensory and sympathetic ganglia, aortic plexus and adrenal medulla, the carotid body of the chick host and give rise to cells which line the motor nerves.

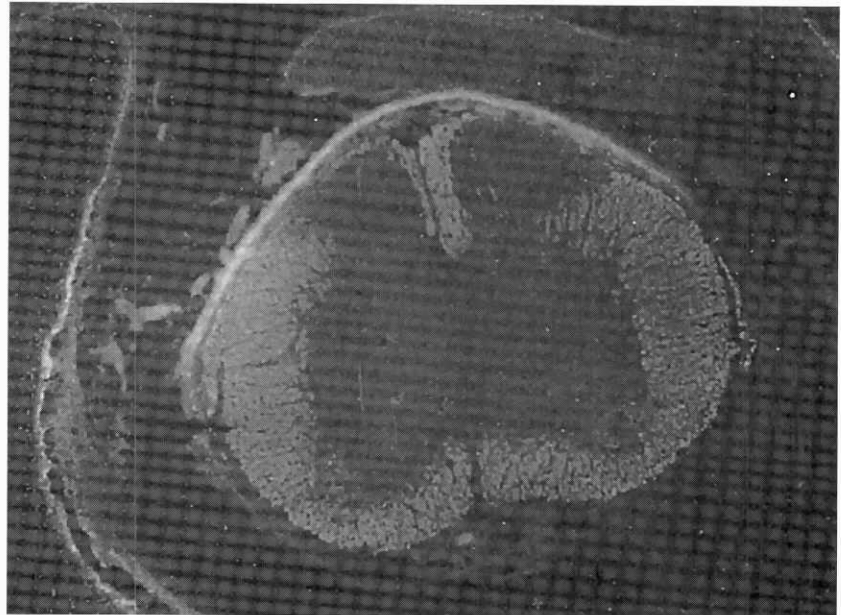


Figure 1: Mouse spinal cord developed into a 10-day-old chick host embryo implanted at the brachial level with mouse neural tube.

Due to the role of the axial organs in the specification of the muscular lineage of somites, our experiments led us to consider the involvement of signals emanating from grafted mouse neural tube on chick host myogenesis. The initiation of myogenic program is well demonstrated to be controlled by a set of basic Helix-Loop-Helix transcription factors including Myo-D, Myogenin, Myf-5 and MRF-4. In our xenograft experiments we analysed the myf-5 and Myo-D gene expression in chick myotomes forming at the level of mouse neural tube. Our objectives were to know whether in our chimeric system the mouse neural tissue was capable of contributing to the signaling processes required to myogenic gene expression in somites. We demonstrate that normal fate of cells occurs in the chick newly formed somites.

Our procedure is a particular interest at several levels since it allows the murine fetal cell to be studied by the classic methods of experimental embryology in terms of what happens to the avian embryo cell. Moreover, it also allows monitoring of the fate of murine cells bearing a gene modified in an environment in which vital outcome is not affected.

References

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