

A MORPHOLOGICAL STUDY ON THE DISPOSITION OF NEURAL CREST CELL DETACHMENT

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Under the electron microscope we have observed the ultrastructure of the first migrating neural crest cells to detach from the neural epithelium in the chick embryo. White Leghorn chick eggs were incubated and embryos at stages 9 to 12 processed for electron microscopy. The embryos were fixed in 2.5% glutaraldehyde - 0.5% tannic acid and postfixed in 1% osmium tetroxide. They were contrasted in block using uranyl acetate and finally embedded in araldite. Semithin transversal sections were stained with toluidine blue and visualized under the light microscope. The same embedded blocks were used to obtain ultrathin sections containing the region of interest. The ultrathin sections were then contrasted with lead citrate and observed under the electron microscope.

We have identified the first neural crest cells migrating from the neural crest to invade the dorsal mesodermal space. This mesodermal cell-free space, triangular in transversal sections, is limited by the continuous basement membranes of the neural tube and the epiblast. A continuous basement membrane is not present in the neural crest. It is in the cell-free mesodermal space where projections of the cytoplasm of neural crest cells are observed protruding ventrally away from the neural crest. The early migrating neural crest cells can be observed in the tight interstium that separates the epiblast from the recently fused neural folds from which neural crest cells detach just around the time of neural tube closure. The first neural crest cells to detach from the neural crest appear to be isolated or in groups of two or three cells. At this stage of early migration, neural crest cells are elongated and show irregular perimeters, large nuclei and abundant ribosomes and mitochondriae in their cytoplasm. The epithelium-to-mesenchyma transformation that neural crest cells suffer by the time they detach from the neural epithelium could account for their morphology at this stage. Nevertheless, these morphological features do not make them significantly different from adjacent neural tube cells and further studies combining morphological and immunocytochemical approaches are needed to identify neural crest cells in their early stage of detachment from the neural crest.

References

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Figures

Figure 1. Morphology of neural crest cells at the time of neural tube fusion. Neural crest cell protruding towards the mesodermal cell-free space (curved arrow). Epiblast (E). Mesodermal cell-free space (s). Neural crest cells (NCC).

