

THE MORPHOGENESIS PATTERNS OF THE OPTIC CUP DEVELOPMENT IN THE CHICK EMBRYO

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The chick embryo is an ideal model to assess the morphogenesis of the vertebrate eye. Cellular proliferation and apoptosis have large effects on the morphogenesis of tissues. The objective of this study was to observe the patterns of morphogenesis of the neural retina and retinal pigmented epithelium of the chick embryo. Here, we describe the pattern of morphogenesis of the optic cup of chick embryos in defined incubation stages. Freshly laid fertilised eggs (N = 50) were incubated at 37°C according to an incubation plan. Incubation was terminated at 2, 2.5, 3, 3.5, 4, 4.5, 5, 6, 7 and 10 days, the embryos were fixed and prepared for Haematoxylin/Eosin and immunohistochemical staining. Immunohistochemical staining using Anti-Proliferating Cell Nuclear Antigen Antibodies (Anti-PCNA) with DAB chromogen was done to detect cell proliferation until the stage at which natural pigmentation occurs. The terminal deoxynucleotidyl transferase dUTP nick end labelling (TUNEL) method was used to detect apoptosis in later developmental stages

Morphogenesis was initiated with the formation of optic vesicles and invagination leading to the formation of the optic cup and tissue differentiation to form the eye. Until three days of incubation, proliferation was seen in almost all the cells of the optic cup. The proliferation rate declined progressively in the inner cells of the optic cup, limiting proliferation to the front of the optic cup. Subsequently, proliferation was reduced in the cells of the border of the retinal pigment epithelium. Surprisingly, after seven days of incubation, proliferation of the perimeter of the optic cup and retinal pigment epithelium ceased. Proliferation of the ciliary body was detected until ten days of incubation. Apoptosis was not present in stages studied. Thus, we can conclude that proliferation is localised in the ciliary body until later developmental stages.

In conclusion, although cellular proliferation occurred in all cell areas of the optic cup during initial development, this was gradually reduced in subsequent developmental stages. Cellular proliferation in the ciliary body, however, persisted until the latter part of development.