P-18 APOPTOSIS AND HERDS ARE RELATED TO PHYSIOLOGICAL ACTIVITY IN EMBRYONIC TURTLE RETINA.
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Introduction: Apoptosis in vertebrate retina occurs in three stages during development. The third of these stages coincides with the synaptogenesis between ganglion cell axons and their targets, i.e., with the time when electrophysiological activity becomes important. In turtles, we have shown that emergence of synapses are necessary for triggering the appearance of spontaneous waves of activity. This occurs at Stage 22 (S22) of embryogeny. In turn, emergence of ganglion-cell light responses require the maturation of photoreceptors at S23. In this work we establish the temporal relationship between apoptosis, synaptogenesis, and electrophysiological activity in turtle retinas.

Materials and methods: Retinas from Trachemys scripta elegans embryos were processed for TUNEL technique. Densities of apoptotic cell bodies, in inner nuclear layer (INL) and ganglion cell layer (GCL), were estimated. We prepared other retinas for transmission electron microscopy. A new specific method to detect the presence of RNA, in the apoptotic cells was used.

Results: TUNEL⁺ cells were observed from S16 to S24 in both INL and GCL, with peak densities occurring at S19 and S20, and vanishing by hatching (S26). In all stages, the TUNEL⁺ cells density was greater in central retinal areas than in peripheral ones. Electron micrographs showed: (1) Early nucleolar disorganization (at S18 and S20); (2) Different patterns of nuclear chromatin distribution; (3) Masses of electrodense material dispersed in the cytoplasm, called HERDS (Heterogeneous Ectopic Ribonucleaseprotein-Derived Structures); (4) Presence of abundant RNA in HERDS.

Conclusions: The surge of apoptosis at S19 and S20 is a remodeling phenomenon necessary for normal retinal synaptogenesis in the IPL. Hence, this surge may be necessary for the emergence of normal electrophysiological activity. Electron-microscopic data suggest that in turtle retinas, apoptosis is a complex, multi-stage process. The HERDS may be morphological signs of transcriptional arrest observed in early embryonic development.

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