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Editorial

Abnormal Differentiation of Lens Epithelial Cells and Pathology of Eye Lens

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The eye or crystalline lens is a relatively simple and closed system enveloped by the lens capsule which is the basement membrane of lens epithelial cells (LECs), LECs that lines the anterior inner surface of the lens capsule and lens fiber cells that constitute the majority of the lens. The LECs have an incredible ability to divide and terminally differentiate into lens fiber cells resulting in the growth of lens that takes place throughout the life although at an age-dependent diminishing rate [1]. Besides the terminal differentiation into lens fiber cells, LECs also can differentiate into myofibroblast-like cells through the process of trans-differentiation of epithelial-mesenchymal transition (EMT) [2-4].

A cataract is usually considered as an age-related disease and opacity develops in the nuclear and cortical region of the lens. Cataracts are also associated with conditions such as radiation exposure, drug exposure such as steroids, trauma, etc. This type of exposures or conditions usually results in the development of opacities below the anterior and/or posterior surface of the lens and hence known as anterior and posterior subcapsular cataracts [5]. Besides cataract, the post-operative capsular opacification (PCO) that takes place after the otherwise successful cataract surgery is also a significant cataract associated condition. With the advent of modern surgical technology, IOL design, and material, the incidence of PCO has reduced considerably, it is still a major problem in the pediatric and young adult cases [6,7].

The subcapsular form of cataracts is usually associated with the abnormal differentiation of LECs in a form of EMT and terminal differentiation. The EMT is a process in which an epithelial cell such as LECs acquires a mesenchymal phenotype to acquire the migratory ability and/or for the deposition of extracellular matrix (ECM) rich in proteins such as collagen I and fibronectin which ultimately results into fibrosis of tissue. Plaques, both anterior and posterior capsular plaques (ACP and PCP respectively) are the forms of subcapsular cataracts and results due to the EMT of LECs and subsequent deposition of fibrous tissue [4,5]. During the development of PCO, the EMT process provides LECs with the migratory ability so that they can reach posterior capsule where they deposit ECM rich in collagen I resulting in fibrous PCO or may undergo terminal differentiation into lens fiber cells to form granular PCO. Many times PCO is a mix of both granular and fibrous components [2,3,6].

Hence, the LECs have varied differentiation ability which is dependent on the initial stimuli and results in the different forms of cataracts such as ASC and PSC. After cataract extraction, the abnormal differentiation ability of LECs results in the development of PCO. Surgeons should be aware of the role of LECs in the development of subcapsular cataracts and PCO and can accordingly design their preventive and treatment regimes.

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