CHOLESTEROL AND GAUCOMA: WHEN THE EYE BECOMES TANGLED UP… EPISODE 2

Glaucoma, the second cause of blindness worldwide, is a neurodegenerative disease affecting the retinal ganglion cells. The mechanisms responsible for the death of these neuronal cells are still poorly understood and no curative treatment is available at present. Understanding the biological pathways behind the degeneration of ganglion cells represents a major challenge for the development of new therapeutic approaches.

In the brain, several neurodegenerative pathologies such as Alzheimer or Huntington's diseases have been associated with dysregulations of cholesterol metabolism. In the retina, cholesterol metabolism is less documented and its potential link with glaucoma has been little explored. A CSGA team, which has been scrutinizing the role of certain lipids in retinal physiopathology, has recently brought new knowledge in this area. Researchers have demonstrated that the induction of glaucoma in the rat is associated with several alterations in retinal cholesterol metabolism. In particular, they have observed a transient increase in retinal cholesterol levels, a phenomenon known to be potentially neurotoxic. Their work has also shown that following these initial disturbances, regulatory mechanisms are put in place to restore the level of cholesterol allowing the survival of ganglion cells.

The researchers have also studied the role of *Müller glia*, the cells involved in the physical and functional support of retinal neurons. Their experiments, carried out *in vitro*, suggest that Müller cells are central players in the maintenance of cholesterol homeostasis in the retina since these cells respond to 24S-hydroxycholesterol, a signaling molecule released by retinal neurons, adapting their own cholesterol metabolism accordingly.

This research highlights the importance of cholesterol in retinal physiopathology. The results enable a better understanding of the underlying mechanisms which contribute to the development of neurodegenerative diseases in the retina.

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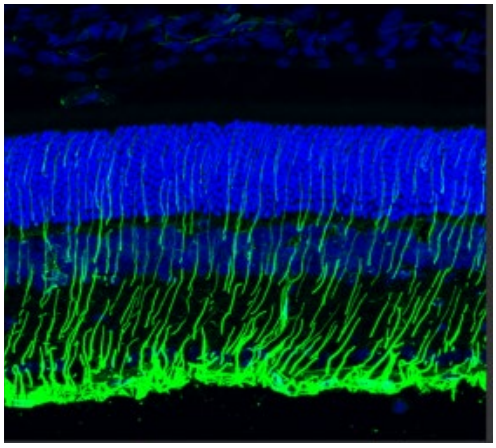
To know more

Léger-Charnay E, Masson EAY, Morala T, Martine L, Buteau B, Leclere L, Bretillon L, Gambert S (2019). Is 24(S)-hydroxycholesterol a potent modulator of cholesterol metabolism in Müller cells? An in vitro study about neuron to glia communication in the retina. Experimental Eye Research 189, 107857.

Key-words

Eye; retina; glaucoma; lipids; cholesterol; glia



Section of rat's retina: Müller cells are labeled in green and ganglion cells in blue. CSGA©