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Perspective

Ependymal Cells: Their Role in Homeostasis of Cerebrospinal Fluid (CSF)

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DESCRIPTION

Ependymal cells are ciliated-epithelial glial cells that develop from radial glia along the surface of the ventricles of the brain and the spinal canal. They are essential for the homeostasis of the Cerebro spinal Fluid (CSF), for the metabolism of the brain, and for the removal of waste products from the brain. Developmental disorders such as cancer, and neurological diseases have all been linked to these cells as causes of disease across the lifetime. Ependymal cells are still generally understudied. We draw important conclusions about the amazing conservation of ependymal cell gene signatures across age, geography, and species using single-cell RNA sequencing. The central canal and ventricles of the spinal cord are lined with an epithelial sheet made up entirely of ependymal cells called the ependyma. Despite having glial lineage, these cells exhibit several epithelial traits, such as a basement membrane, cell-cell connections, and motile cilia. It is a type of cell that lines the cavities filled with fluid in the brain and spinal cord. It is one of several glial cells.

Ependymocytes is a subclass of glial cells, are the ependymal cells that make up the ependyma. These tissues line the cerebrospinal fluid-filled ventricles in the brain and the central canal of the spinal cord. These are basic columnar neural tissue cells, similar in shape to certain mucosal epithelial cells. For their role in the circulation of cerebrospinal fluid, early monociliated ependymal cells are differentiated to multiciliated ependymal cells. These cells have tentacle-like extensions on their basal membranes that connect to astrocytes. Cilia and microvilli cover the apical side.

Functions

Ependymal cells are ciliated-epithelial glial cells that form from radial glia on the outside of the ventricles of the brain and spinal canal. They are essential for maintaining the homeostasis of the Cerebrospinal Fluid (CSF), brain metabolism, and waste removal from the brain. Ependymal cells, which line the spinal canal and ventricles that are filled with CSF, are crucial to the creation and control of CSF. Cerebrospinal Fluid (CSF) is circulated around the CNS *via* the cilia that cover their apical surfaces. Microvilli, which absorb CSF, are also present on their apical surfaces. The choroid plexus, which is made up of modified ependymal cells and capillaries and is located within the brain's ventricles, is responsible for producing CSF.

Neuroregeneration: These cells self-renew and were subsequently depleted as they produce new neurons, not meeting the need for stem cells. According to one study, cells that can be transplanted into the cochlea to treat hearing loss may come from ependymal cells found in the lateral ventricle's lining.

CONCLUSION

The different subtypes and states of ependymal cells across regions and ages of the nervous system were also identified by our investigation. For example, neonatal ependymal cells maintained a gene signature consistent with developmental processes like the establishment of left/right symmetry, whereas adult ventricular ependymal cells, not spinal canal ependymal cells, appeared to express genes involved in regulating cellular transport and inflammation. These findings collectively shed light on ependymal cells' understudied roles, which will require further research to fully comprehend their roles in both health and disease.

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