Histology and Histopathology
From Cell Biology to Tissue Engineering

Oligodendrocyte metabolism throughout its differentiation: immunocytochemistry study and its impact in remyelination

Gismero Rodríguez J.[1], López Villodres JA.[1], Escamilla Sánchez A.[1], García Díaz B.[2], Rodríguez Pérez LM.[1], Mercado Sáenz S.[1], Ortega Jiménez MV.[1,3], Arranz Salas I.[1,3], Peláez González A.[1] and Bermúdez Flores D.[1]

[1] Department of Human Physiology, Human Histology, Anatomical Pathology and Physical Education. University of Malaga (UMA), 29010. Malaga, Spain. [2] Biomedical Research Institute of Malaga (IBIMA), Spain. [3] Unit of Anatomical Pathology, Virgen de la Victoria University Hospital, 29010 Malaga, Spain

Introduction: Oligodendrocytes (OL) role in demyelinating pathologies such as multiple sclerosis and other neurodegenerative diseases is only recently being subject of extensive research. While the genetic and molecular aspects have been thoroughly studied, their metabolism was overshadowed. In order to develop new therapies to promote remyelination of already damaged axons, we need to accurately describe how OL metabolism affects axon myelination and trophic support (1). The objective of this study is to obtain cytological evidence of the extent of both glycolytic metabolism and oxidative phosphorylation by immunocytochemistry throughout the development of OL.
Methods: Oligodendroglia cells from post-natal mice cortices were obtained and cultured. A wide assortment of differentiation-stage-specific cell surface antigens, a glycolytic and an oxidative phosphorylation marker were combined in several immunofluorescences to study both metabolic pathways in each step of differentiation.
Results: After analysing them under confocal microscopy and imaging software, we observed a constant upregulation of glycolytic metabolism throughout differentiation, while oxidative phosphorylation seemed to increase with differentiation to then decrease when oligodendrocytes achieved their final maturation stage.
Conclusions: Therefore, oxidative phosphorylation may be crucial in the differentiation of precursors and glycolysis would thus be the preferred metabolic pathway for fully matured OL.

[1] Rosko L. et al. Neuroscientist. 2019;25(4):334–43.

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