Isabella Panfoli, J Glycobiol 2018, Volume 7
DOI: 10.4172/2168-958X-C2-014

Galactose a nutrient specific for the extra mitochondrial aerobic metabolism, rescued mouse demyelination consequent to isolation

Isabella Panfoli
University of Genoa, Italy

It was shown that neurons generate ATP predominantly by oxidative phosphorylation (OXPHOS), which renders them vulnerable to ischemia. Myelin is the site of an extra-mitochondrial OXPHOS to support axonal bioenergetics. Galactose, whose metabolism is high in brain, is a key component of myelin lipids. It also increases the cell oxidative metabolism and is a good respiring substrate for purified myelin *in vitro*. Galactose becomes the substrate of hexose-6-phosphate dehydrogenase (*H6PD*, E.C. 1.1.1.47), a membrane-bound enzyme expressed in myelin. A dysfunctional H6PD is a gene positively correlated with development of Multiple sclerosis. Yet the role of mitochondrial function and energy metabolism impairment in the pathogenesis is unclear. A neuroprotective action of galactose on myelin energy metabolism was studied *in vivo*. The study utilized a model of myelin damage, obtained by isolating mouse siblings immediately after weaning, at 21 days post birth, for 40 days. Controls were three siblings that were kept together. This experiment was repeated four times. The metabolic aerobic activity of myelin was severely impaired in the isolated mouse that displays lower myelin content (45%) and dysfunctional redox activities. Galactose administration had a significantly positive effect on both myelin content and its aerobic activity, suggesting that a metabolic support of ATP production is pivotal. This is the first study to ascribe a role for galactose in the aerobic metabolic activity in promoting remyelination. Such neuroprotective action of galactose on brain suggests that it may be a rescue substrate and a key nutrient when the cellular ATP content is impaired.

Biography

Isabella Panfoli completed her PhD in Architecture and in Biochemistry from the University of Genoa, and more recently in Medicine at the Genoa University, School of Medicine. Since 2007, her proteomic, biochemical and imaging studies allowed to demonstrate an extra-mitochondrial oxidative phosphorylation in rod outer segments, myelin sheath, plasma membrane and exosomes. She is the Chief of Biochemistry Lab at DIFAR, Italy. She teaches Biochemistry at the Genoa University. She has published 97 papers in reputed journals and has been serving as an Editorial Board Member of repute.

panfoli@difar.unige.it

Notes: