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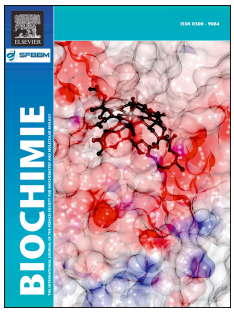

Modulation of Kv3.1b potassium channel level and intracellular potassium concentration in 158N murine oligodendrocytes and BV-2 murine microglial cells treated with 7-ketocholesterol, 24S-hydroxycholesterol or tetracosanoic acid (C24:0)

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ABSTRACT

Little is known about K^+ regulation playing major roles in the propagation of nerve impulses, as well as in apoptosis and inflammasome activation involved in neurodegeneration. As increased levels of 7-ketocholesterol (7KC), 24S-hydroxycholesterol (24S-OHC) and tetracosanoic acid (C24:0) have been observed in patients with neurodegenerative diseases, we studied the effect of 24 and/or 48 h of treatment with 7KC, 24S-OHC and C24:0 on Kv3.1b potassium channel level, intracellular K^+ concentration, oxidative stress, mitochondrial dysfunction, and plasma membrane permeability in 158N oligodendrocytes and BV-2 microglial cells. In 158N cells, whereas increased level of Kv3.1b was only observed with 7KC and 24S-OHC but not with C24:0 at 24 h, an intracellular accumulation of K^+ was always detected. In BV-2 cells treated with 7KC, 24S-OHC and C24:0, Kv3.1b level was only increased at 48 h; intracellular K^+ accumulation was found at 24 h with 7KC, 24S-OHC and C24:0, and only with C24:0 at 48 h. Positive correlations between Kv3.1b level and intracellular K^+ concentration were observed in 158N cells in the presence of 7KC and 24S-OHC, and in 7KC-treated BV-2 cells at 48 h. Positive correlations were also found between Kv3.1b or the intracellular K^+ concentration, overproduction of reactive oxygen species, loss of transmembrane mitochondrial potential and increased plasma membrane permeability in 158N and BV-2 cells. Our data support that the lipid environment affects Kv3.1b channel expression and/or functionality, and that the subsequent rupture of K^+ homeostasis is relied with oligodendrocytes and microglial cells damages.