

A parenteral lipid emulsion protects from mitochondrial dysfunction in a MCAO mouse model of ischemic stroke

Gunter P. ECKERT¹, Dirk BERRESSEM¹, Heidi SCHUSTER², Jochen KLEIN¹

¹ *Department of Pharmacology, Biocenter, Goethe-University of Frankfurt, Germany;*

² *Scientific Affairs, Fresenius Kabi Deutschland GmbH, Bad Homburg, Germany*

Recent investigations demonstrated efficacy of docosahexaenoic acid (DHA) to reduce stroke size and severity in the transient middle cerebral arterial occlusion (MCAO) model in rats when applied intravenously after reperfusion. In this study we investigated the beneficial effect of OMEGAVEN (Fresenius Kabi, Germany) a medical lipid emulsion for parenteral nutrition that contains the long-chain omega-3 fatty acids eicosapentaenic acid (EPA) and DHA in a model of transient stroke. Mice underwent transient MCAO and OMEGAVEN was administered intravenously (5 ml/kg b.w.) after stroke (90 min) at reperfusion that represents an early moment for potential intervention. The degree of damage, mitochondrial function and neuroinflammation were investigated. Treatment with OMEGAVEN significantly decreased stroke area by 21% and lowered stroke severity by 50%. OMEGAVEN significantly improved mitochondrial membrane potential (MMP) and ATP levels in the ischemic brain hemisphere. These findings are accompanied by an enhanced mitochondrial function, e.g. the mitochondrial respiration, of complexes responsible for oxidative phosphorylation in mitochondria isolated from the ischemic brain hemisphere. The inflammation markers COX-2 and iNOS significantly decreased after treatment with OMEGAVEN. This pilot study demonstrated that OMEGAVEN could represent a promising, approved lipid emulsion for the early therapeutic intervention in ischemic stroke.

Conflict of interest:

Collaborative Project between Goethe-University of Frankfurt und Fresenius-Kabi Deutschland GmbH, Bad Homburg, Germany.