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Dimethyl fumarate and monomethyl fumarate promote post-ischemic recovery in mice

Fu-Dong Shi[1], [2]
[1]Tianjin Medical University General Hospital, China
[2]Barrow Neurological Institute, USA

Statement of the Problem: Oxidative stress plays an important role in cerebral ischemia-reperfusion injury. The complexity of the ischemia-reperfusion biological cascade, inadequate dosing of antioxidants and inappropriate targeting by antioxidants are among the possible reasons that have led to the failure of these clinical trials. It remains an urgent need to develop neuroprotective strategies targeting multiple key steps in the biochemical cascade of ischemia-reperfusion injury. Dimethyl fumarate (DMF) and its primary metabolite monomethyl fumarate (MMF) are antioxidant agents that can activate the nuclear factor erythroid-2-related factor 2 (Nrf2)/heme oxygenase-1 (HO-1) pathway and induce the expression of antioxidant proteins.

Methodology & Theoretical Orientation: Transient focal brain ischemia model was used to examine the role of DMF and MMF in the treatment of ischemic stroke in wild type and Nrf2 mutant mice. Neurobehavioral evaluation, MRI, histology, neural cell death, glial activation and expression of genes related to the Nrf2 pathway were analyzed to evaluate whether the Nrf2 pathway mediates the effects in ischemia-reperfusion injury.

Findings: In the current study, we demonstrated that DMF and MMF exhibited neuroprotective properties against cerebral ischemia-reperfusion injury with faster and better recovery from initial ischemia-reperfusion. DMF and MMF significantly reduce neurological deficits, infarct volume, brain edema, and cell death. Further, DMF and MMF suppress glial activation following brain ischemia. Importantly, the protection of DMF and MMF was mostly evident during the sub-acute stage and was abolished in Nrf2-/- mice, indicating that the Nrf2 pathway is required for the beneficial effects of DMF and MMF.

Conclusion & Significance: The protection of DMF and MMF was mostly evident during the subacute stage and was abolished in Nrf2-/- mice, indicating that the Nrf2 pathway is required for the beneficial effects of DMF and MMF.

fshi@tmu.edu.cn

Dermal exposure of Belgium florists to insecticide residues and their possible adverse health effect

Khaoula Toumi[1], **Laure Joly**[2], **Christiane Vleminckx**[2] and **Bruno Schiffers**[1]
[1]Gembloux Agro-Bio Tech - University of Liège, Belgium
[2]Scientific Institute of Public Health, Belgium

Flowers receive heavy pesticide applications prior to shipment to control various pests, insect infestation and disease carriers, such as mosquitoes, ticks, which can damage production and marketability. In order to evaluate the risk for florists exposed to insecticide residues during normal professional tasks, cotton gloves distributed to 20 florists (two pairs to each florist) were worn during two consecutive half days during normal professional tasks (from min 2 hours to max 3 hours/day) to measure their potential dermal exposure (PDE). The residual pesticide deposits on gloves samples were analyzed with a combination of gas and liquid chromatography and a multi-residue (QuEChERS) method. A total of 55 insecticides were detected on cotton gloves, an average of 0.34 mg/kg insecticide residue per glove sample were measured. The active substances detected are known for their toxicological properties (acute toxicity, with an action on the nervous system). Many of them may affect the skin of the florists after dermal exposure and 4 of 55 are suspected of causing cancer after prolonged or repeated exposure. Novaluron are the substance active for which the highest average concentration (3.38 mg/kg). Clofentezine was both the active substance for which the highest maximum concentration (18.37 mg/kg), the most detected insecticide and the substance active has a PDE (worst case) the most critical (five times higher their AOEL). Consequently, florists who worked for several years and handle a large number of flowers contaminated with insecticide residues are exposed daily with a potential effect on their health.

khaoula.toumi@doct.ulg.ac.be