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The identification of neuro-reparative lipids in ischemic stroke

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In the ischemic stroke pathologies, there is a transition from the inflammatory phase to the phase for neural repair. So far, lipid mediators have been known to regulate inflammation after ischemic stroke; however, there is still no comprehensive study which investigates various fatty acids and their metabolites in ischemic stroke. The aim of this study is to identify novel lipid which promotes neural repair after ischemic stroke.

The LC/MS analysis of the lipids collected from murine ischemic brains revealed that the polyunsaturated fatty acids and their metabolites in the brain were dramatically altered over time after the onset of ischemic stroke. We then investigated the time-dependent expression of various PLA2 subtypes which liberate free fatty acids in the ischemic brain and identified the PLA2 subtype which was important for the generation of ω -6 fatty acids, such as linoleate and gamma-linolenate. The deficiency of this PLA2 subtype exacerbated the ischemic stroke pathologies and significantly decreased the expression of peptidyl arginine deiminase which promote the neural repair after ischemic stroke. By examining various metabolites of ω -6 fatty acids, we successfully identified some lipid metabolites which induced the expression of peptidyl arginine deiminase and improved ischemic stroke pathologies.

These results indicated that a certain kind of ω -6 fatty acids was important for neural repair after ischemic stroke. The recovery from neurological deficits of ischemic stroke may be possible by the dietary intake of these neuro-reparative lipids.