The new applications of ceramide and sphingosine-1-phosphate system in diagnosis of ischemic stroke.

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Background and Purpose: The reliable blood biomarkers of cerebral ischemia are still lacking. We study the potential usefulness of sphingolipids (SFs), such as ceramide and sphingosine-1-phosphate (Sph-1-P) as biomarkers of acute ischemic stroke and transient ischemic attack (TIA). Methods: Levels of individual ceramide species and Sph-1-P in blood serum of patients with acute ischemic stroke (n=42), TIA (n=27) and age-matched neurological patients without cerebral ischemia (n=34), were assessed by means of LCMS/MS technique. The SF levels were subject to Spearman's rang correlation analysis with several clinical parameters. Results: We found significant increases in levels of several SFs, with particularly strong elevations of Cer-C20:0 in patients with acute stroke in comparison with non-stroke subjects. In opposite, Cer-C24:1 was the only ceramide species, which concentrations decreased as a result of acute stroke. Moreover, its levels inversely correlated with the number of days after stroke onset, but did not correlate with any other analyzed parameters. It suggests that Cer-C24:1 is an independent parameter related to the course of stroke. To increase the accuracy of SF system in stroke diagnostics, we calculated values of ratios of Sph-1-P/individual ceramide species and individual ceramide species/Cer-C24:1. We found several ratios significantly changed in stroke patients. Two ratios, Sph-1-P /Cer-C24:1 (p0.001) and Cer-C24:0/Cer-C24:1 (p0.001), presented especially strong increments in patients with acute stroke. Moreover, Sph-1-P /Cer-C24:1 values were augmented in TIA patients. Conclusion: We found that serum SFs can be good candidates for the ischemic stroke biomarkers. We identify two SF ratios, Sph-1-P /Cer-C24:1 and Cer-C24:0/Cer-C24:1, with strong diagnostic potential in ischemic stroke. We found Sph-1-P /Cer-C24:1 ratio as possibly useful in TIA diagnostics, also in long-term after ischemic incidence, which is essential in further anti-stroke preventive treatment.