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Paramagnetic Manganese in the Atherosclerotic Plaque of Carotid Arteries

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Abstract

© 2016 Yury Chelyshev et al. The search for adequate markers of atherosclerotic plaque (AP) instability in the context of assessment of the ischemic stroke risk in patients with atherosclerosis of the carotid arteries as well as for solid physical and chemical factors that are connected with the AP stability is extremely important. We investigate the inner lining of the carotid artery specimens from the male patients with atherosclerosis (27 patients, 42-64 years old) obtained during carotid endarterectomy by using different analytical tools including ultrasound angiography, X-ray analysis, immunological, histochemical analyses, and high-field (3.4 T) pulse electron paramagnetic resonance (EPR) at 94 GHz. No correlation between the stable and unstable APs in the sense of the calcification is revealed. In all of the investigated samples, the EPR spectra of manganese, namely, Mn^{2+} ions, are registered. Spectral and relaxation characteristics of Mn^{2+} ions are close to those obtained for the synthetic (nano) hydroxyapatite species but differ from each other for stable and unstable APs. This demonstrates that AP stability could be specified by the molecular organization of their hydroxyapatite components. The origin of the obtained differences and the possibility of using EPR of Mn^{2+} as an AP stability marker are discussed.

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