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Mitochondria specific antioxidants and their derivatives in the context of the drug development for neurodegeneration and cancer

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Abstract

Oxidative stress induced mitochondrial DNA over proliferation and/or deletion of the organ and/or tissues, especially the mitochondrial energy demands, have been implicated in the pathogenesis of several diseases, including AD, tumor growth, and metastasis. The present study has determined if an intimate, i.e. causal, relationship between oxidative stress and mitochondrial damage and/or vascular lesions occurs before the development of human AD, in animal models that mimic human neurodegeneration and human colorectal carcinoid cancer or malignant brain cancer. In situ hybridization and ultra structural analysis of the mitochondria (mitochondria with electron dense matrix, mitochondrial-derived lysosomes) showed that mitochondria with the abnormal structures and lipofuscin appear to be features of hippocampal damaged neurons in human AD, aged Tg (+) mice, 2 vessel occlusion model of the brain hypoperfusion, and malignant primary and metastatic cancer. The abnormal mitochondria appeared to be a permanent feature in all cellular compartments; in situ hybridization analysis with mouse and human mtDNA probes found a large amount of deleted mtDNA in human AD and in all models that mimic human AD hippocampus and cancer tissues compared to aged controls.

Our study, for the first time, demonstrated the pattern of oxidative stress induced mitochondrial DNA over proliferation and/or deletion during the development of human AD, and animals that mimic human AD, colorectal cancer in liver metastasis, and malignant brain cancers, which can be used as new diagnostic tools and/or criteria for the earlier detection, and future considerations new and more specific and effective treatment strategies against for these devastating diseases.

Biography

Professor Gjumrakch Aliev, MD & PhD completed his MD and PhD at the age of 27 years from Moscow State University, Russia and postdoctoral studies from University College London. He is the President & CEO of GALLY International Biomedical Research Consulting LLC, a world class premier biomedical service organization. He has published more than 180 papers in reputed journals and serving as an editors' chief and editorial board member of more than 80 nationally and internationally repute journals.