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Oral Sessions

Oxidative stress-mediated cell death induced by silica nanoparticles in neural cells.Yuji Kamikubo¹, Tomohito Yamana¹, Yoshie Hashimoto¹, Takashi Sakurai¹¹*Dept. Pharmacol. Juntendo Univ. Sch. Med.*

Nanomaterials have a variety of unique physical and chemical properties, and are being studied for biotechnological, pharmacological, and medical applications. Silica nanoparticles (SiNPs) are produced on an industrial scale and used in various fields. Despite these benefits, there is concern that exposure to SiNPs may lead to adverse effects in certain types of cells or tissues, such as developmental abnormalities in the brain and developing embryos. Although investigations on the toxicity of SiNPs against neurons are essential for medicinal use, a few studies have assessed the direct effects of SiNPs on cells derived from the central nervous system. In this study, we investigated the toxic effects of SiNPs on primary cultures of hippocampal cells. We showed that treatment with SiNPs caused oxidative stress and cell death. Furthermore, we found that these cytotoxicities were dependent on the particle size, concentration, and surface charge of SiNPs. The toxicity was reduced by SiNP surface functionalization or protein coating and by pretreating cells with an antioxidant, suggesting that contact-induced oxidative stress may be responsible for SiNP-induced cell death. These data will be valuable for utilizing SiNPs in biomedical applications.