Biocompatible Dextran Coating Reduces the Cytotoxicity of ZnO Nanoparticles

Nirmalya Tripathy, Ahmad Rafiq, 한윤봉*
전북대학교 BIN 융합공학과
(ybhahn@jbnu.ac.kr*)

Currently, nano-ZnO is increasingly recognized for their utility in biological applications, including biosensor and medicine, although it is known to cause serious oxidative stress and DNA damage to mammalian cells. The aim of this study was, therefore, to minimize the cytotoxic effect of nano-ZnO by coating with biodegradable dextran. Nano-ZnO was synthesized via a simple facile solution process at low temperature and successfully coated with dextran. The characterizations of the particles include transmission electron microscopy (TEM), X-ray diffraction (XRD), FTIR and zeta potential. The cytotoxicity, membrane damage, oxidative assault and apoptosis were assessed in human lung epithelial (A549) cell line, employing methyl tetrazolium (MTT), lactate dehydrogenase (LDH), 2', 7' – dichlorofluorescin diacetate (DCFH-DA) and GSH assays. This work delineates the dose-dependent toxicity of nano-ZnO, effect of surface modification and present 'safe by design' nano-ZnO as a potential platform for use in therapeutic delivery procedures and pharmaceutics.