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Toxicity evaluation using mouse bone marrow mesenchymal stem cells: A predictive model for *in vitro* studies

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Abstract

Stem cells act as a new tool for developing an *in vitro* system to predict the toxicity of drugs chemicals and nanoparticles. The objective of the present study is to exploit primary mesenchymal stem cells isolated from mouse bone marrow as an *in vitro* model for toxicity evaluation of chemicals and nanoparticles. Bone marrow mesenchymal stem cells (BMSC) isolated from Swiss albino mice were used for the present study. The cells were cultured and maintained in DMEM-HG medium. The isolated cells were characterized for the expression of MSCs surface markers CD44, CD90. Confluent cells obtained after third passage were used for the toxicity evaluation. The cells were exposed to different concentration of pure imidazole and dextran coated ferrite nanoparticles (<50nm). Various toxic parameters such as cytotoxicity, reactive oxygen species (ROS) production, DNA fragmentation and apoptosis by Annexin V/PI assay using FACS were evaluated.

The results of the study indicated that imidazole and dextran coated ferrite nanoparticles altered the cytotoxic (MTT assay) response, ROS production. In addition, apoptosis was observed at higher concentrations. Hence the present study concluded that the BMSC can be used as an alternative test system for animal experimentation for the preliminary screening of toxicity.

Biography

P.V. Mohanan, Scientist and Head, Toxicology Division, Sree Chitra Tirunal Institute for Medical Sciences and Technology (Govt. of India), Trivandrum, Kerala, India, did his PhD on the 'Toxicological/Safety evaluation of an anticancer drug' under Biochemistry from University of Kerala and Post Doctoral programme from the University of Tsukuba, Japan. Mohanan is a visiting Professor at the Graduate School of Interdisciplinary New Science, Toyo University, Japan and Visiting Researcher at Bio-Nano Electronics Research Centre, Toyo University, Japan. Mohanan has 25 years of experience in various sectors.