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Palladium nanoparticles selectively induce apoptosis in lung cancer cells through reactive oxygen species

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One of the leading causes of cancer-associated deaths in most men and women in the world is lung cancer. Current standards of care for lung cancer include surgery, radiation, and chemotherapy. With the rapid development of nanotechnology, the nanomaterials lead to people's attention for probable toxic effect. In the present study, it was aimed to evaluate the cytotoxic and apoptotic effects of palladium (II) in PEG–DSPE micelle formulation (PdNP) on lung cancer. The non-small cell lung cancer (NSLC) cell line H1299 was treated with different concentration of PdNP (0.5–5μg/ml) effects on cell viability were detected by SRB and ATP assay at 48 h. Nuclear morphology and plasma membrane integrity were visualized fluorescence staining for 12 h and 24 h. The induction of apoptosis was confirmed by (caspase 3/7 activity, annexin-V, mitochondria membrane potential (MMP), Bcl-2 activation, JC-1 dye, cell cycle and oxidative stress level) by flow cytometry at the concentration (1 μg/ml) for 24 h and 48 h. PdNP showed anti-growth effect against H1299 cell in a dose dependent manner. Pyknotic nuclei and sub-G1 hypodiploid cells well-known markers for apoptosis, was observed after treatment with PdNP. However, PdNP induced a mitochondria-dependent apoptotic pathway via modulation of Bcl-2 expressions, resulting in the disruption of mitochondrial membrane potential. PdNP induced reactive oxygen species generation. PdNP induces cytotoxicity and apoptosis in H1299 cancer cells, and this effect is likely mediated through ROS generation and mitochondrial mechanism. Therefore, PdNP may be used for the treatment of non-small cell lung cancer that is extremely resistant to conventional therapy.

Biography

Ferda Ari gained a PhD Degree in Biology/Molecular Biology from the University of Uludag in 2010. She is especially interested in cytotoxicity studies and anti-cancer drug development and investigating the mechanism by which they inhibit growth. Her work is also focused on plant-based anti-cancer agent development studies and she has experience in isolating cancer stem cells (breast cancer) from cell lines or primary samples removed from patients. She is currently interested in nanoparticles in cancer treatment.

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