P 192

Nanoparticles Synthesized by Stentrophomonas SP Induced Cell Cycle Changes in Esophageal Cancer Cells

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Introduction: Esophageal cancer is among the top ten leading causes of cancer-related death globally. Eastern to Central Asia are high incidence regions for this malignancy, including our country Iran. To develop more effective chemical agents against cancer, a lot of research has been currently focused on nanoparticles. Among different methods for synthesis of nanoparticles, use of microorganisms is a nontoxic and environmentally friendly approach. Herein, we evaluated effects of biosynthetic zinc and copper oxide nanoparticles (ZnNPs and CuONPs) on esophageal cancer cells by propidium iodide (PI) and flow cytometry.

Methods: ZnONPs and CuNPs were synthesized by a psychrotrophic bacterium, Stentrophomonas sp. Then, esophageal cancer cells, KYSE30 cell line, were treated with 12.5 µg/ml ZnNPs and CuONPs for 24 h, while untreated cells were considered as control. Finally, cells were collected, stained with PI and analyzed by flow cytometry.

Results and conclusion: Analysis of the cell cycle indicated that 55.7% and 34.3% of control cells were detected in G1 and G2/M phases, respectively. However, treatment with ZnNPs induced G2/M arrest, as 29.7% and 54.3 % of cells were detected in G1 and G2/M phases, respectively. More interestingly, CuONPs induced cell death as well as G2/M arrest, as 12%, 28.8% and 52.7% of cells were in sunb G1, G1 and G2/M phases, respectively. Accordingly, CuONPs induce more toxic effects on esophageal cancer cells, and therefore, it would serve as a good candidate for future anticancer studies.

Keywords: Biosynthetic nanoparticle, Esophageal cancer, Cell cycle analysis

P 196

The Effect of Vitamins A, E, C and D on Wound Healing

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Introduction: Wound healing is a dynamic and complex process that leads to the restoration of tissue integrity and homeostasis. It involves four phases such as homeostasis, inflammation, proliferation and tissue remodeling. Vitamins are undoubtedly the most studied micronutrients in the process of wound healing. Vitamin deficiency profoundly impacts cell migration and proliferation, and is thus an influential factor of long-term wound healing. As mentioned, Vitamins are extremely important in wound healing process, for instance: Vitamin C (ascorbic acid) is a water-soluble micronutrient required for human health. Vitamin C is involved in all phases of wound healing; in the inflammatory of apoptosis during the proliferative, vitamin C assists in the synthesis, maturation, secretion and degradation of collagen. Deficiencies affect the maturation phase by altering collagen production and scar formation. Finally, it promotes collagen synthesize in order to heal the wounds. Vitamin D is an important regulator of immune system function and it decreases chronic inflammatory effects in a variety of tissues. It is also a pleiotropic molecule that has widespread effects not only on calcium homeostasis, but also cellular differentiation, proliferation and immune response. Vitamin A is another essential micronutrient found in the forms of retinols, retinals, and retinoic acids. Retinoids regulate