1st International Congress of Veterinary Pharmacology & Pharmaceutical Sciences (1st ICVPS)
October 4 - 5, 2008 Tehran - Iran

Nanotechnology in therapeutic sciences: Possible risks and benefits

Amoabedini G[1], Koohi MK[2], Mortazavi SA[1], Mashhadi G[1], Malakoutikhah J[1]

[1]Faculties of [1]Engineering and [2]Veterinary Medicine, University of Tehran, Tehran, Iran (amoabedini@ut.ac.ir)

Nanotechnology is the design, characterization, production, and application of structures, devices and systems by controlling the shape and size at the nanometer scale. Since at nanoscale, the properties of materials differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter, nanotechnology has a wide-range of applications in different fields such as electronics, pharmaceuticals, materials, polymers, chemical and petroleum industry. This article aims to review the benefits and hazards of nano-particles in Therapeutic sciences. As the need for the development of new medicine is pressing, and given the inherent nanoscale functions of biological components of living cells, nanotechnology has been applied to diverse medical fields such as oncology, cardiovascular medicine and in the treatment of other chronic diseases. Indeed, nanotechnology is being used to refine discovery of biomarkers, molecular diagnostics, and drug delivery, which could be applicable to management of these patients. The ideal nanopharmaceuticals agent must be safe, biocompatible, biodegradable, and stealthy-disguised well enough that the body\'s immune system will not recognize it as foreign. The ultimate agent will recognize the toxic molecules, attract and bind them quickly, reduce the free drug concentration and in the process, trigger the heart to function normally. On the other hand, very small size appears to be predominant indicator for toxic effects of particle. For medical applications, immobilized nanostructure inside or on surfaces of medical devices such as surgical implants are expected to pose a minimal risk as long as they remain fixed. As for Nanopharmaceuticals, they can act on living cells at the nano level resulting not only in biologically desirable, but also in undesirable effects. From a regulatory point of view, a risk management strategy is already a requirement for all medical technology applications.

Keywords: Nanotechnology, Nanotoxicology, Health, Medical applications, Risk management

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The Liquorice Plant Extract proved CCL4-induced damages of the fish hepatoxicity

Malekinejad H, Alizadeh A, Dardmeh F, Cheraghi H, Mirzakhani N, Meshkini S

Faculty of Veterinary Medicine, Urmia University, PO Box 1177, Urmia, Iran (arash_az_666@yahoo.com)

The Liquorice Plant Extract (LPE) has been used traditionally in the world for various therapeutic purposes. LPE are extensively used in gastric ulcer, anticancer, inflammation and allergy. The hepatotoxic effect of carbon tetrachloride is due to the oxidative damage by free radical production, and antioxidant property is thought to be one of the approaches of hepatoprotective therapeutic agents. Moreover, CCL4-induced hepatoxicity could be used as a model for plenty of water contamination including chlorinated hydrocarbons. Therefore, we aimed to evaluate the antioxidant effect of LPE CCl4-induced hepatotoxicity in fish. Fresh roots of LP were air-dried; powdered and ethanolic extract was prepared using suxhlet. The hepatoprotective study was carried out in Common Carp (Cyprinus Carpio) weighing (30-50g). Thirty nine fishes were equally divided into 5 groups (n = 3 in each group). Group I (control) and group II were given DMSO and CCl4 respectively, for 45 minutes. CCL4 was administered in 3-subgroup at 3 various concentrations for 10 days. Group III, group IV and V were pretreated with LPE at different concentrations for 10 days and daily 3 h, and followed the same protocol of CCL4-treated group for 45 min. At the end of 10th day all groups anesthetized with Eugenol powder and blood samples were collected in heparanized tubes. The activity of two key liver-functional-enzymes namely Glutamic-Oxalacetic Transaminase (SGOT) and Alkaline Phosphatase (ALP) were measured to evaluate the potential effect of proposed herbal agent as hepatoprotective. Additionally, total in vivo antioxidant effect o f used compound was assessed, as well. The biochemical analyses revealed that: Firstly; CCL4 lowered total antioxidant power concentration-dependently and proposed herbal chemical could prove the decreased power in dose-dependent fashion; secondly ALP activity in serum following CCL4 treatment declined dramatically and at medium concentration of used herbal extract we obtained the remarkable increase in ALP activity. Moreover SGOT activity in sham groups decreased in comparison to control and only the lowest concentration of used drug could increase the activity. In conclusion, our data suggest that the CCL4-induced toxicity could be used as a model for water

Keywords: Liquorice plant extract; Alkaline phosphatase; Antioxidant power; Fish