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Enhanced anti-cancer efficacy of Bromelain nanoparticles against Ehrlich ascites carcinoma upon oral administration

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Oral administration of anti-cancer drugs is an effective alternative to improve their efficacy and reduce undesired toxicity. Bromelain (BL) is known as an effective anti-cancer phyto-therapeutic agent; however, its activity is reduced upon oral administration. As a result, BL was encapsulated in Poly lactic-co-glycolic acid to formulate nanoparticles (NPs), which were further coated with Eudragit L30D polymer in order to provide stability against the gastric acidic conditions upon oral delivery of NPs. NPs were characterized for BL entrapment, proteolytic activity and mean particle size. The stability and release pattern of NPs was also evaluated under simulated gastrointestinal tract pH conditions. Cytotoxicity studies, carried out in human cell lines of diverse origin showed a significant dose advantage (~7-10 folds) with NPs in reducing the IC₅₀ values as compared to free BL. The cellular uptake of NPs in MCF-7, HeLa cells and Caco-2 cell monolayer was significantly enhanced several folds as compared to free BL. Altered expression of marker proteins associated with apoptosis and cell death (P53, P21, Bcl2, Bax) also confirmed the enhanced anti-carcinogenic potential of formulated NPs. Oral administration of NPs reduced the tumor burden on mice and also increased their life-span when compared with the free BL. The generation of reactive oxygen species, induction of apoptosis and impaired mitochondrial membrane potential in tumor cells treated with NPs confirmed the suitability of NPs as a promising candidate for oral chemotherapy.

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Environmental risk assessment progress of chemicals in China

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Chemical pollution has become a serious environmental problem in rapidly developing China since 1980s, and the environmental risk assessment of chemicals has increased attention from the government. This report briefly introduces the progress of risk assessment for environmental chemicals in China, the related challenges and research needs are also discussed. The Chinese government promulgated "Provisions on the first import of chemicals and the import and export of toxic chemicals" in 1994, "Measures on environmental management of new chemical substances" came into force in 2003, and was revised in 2010. These indicated that the management pattern of new chemical substances was converted from hazard assessment to risk assessment. In China, current environmental chemical risk assessment system includes qualitative ecological risk assessment, quantitative ecological risk assessment and qualitative health risk assessment. These three risk assessments are mainly composed by hazard assessment, exposure assessment and risk characterization to the environmental chemicals. Meanwhile, "the guideline for risk assessment of chemical substances" and "the guideline for hazard identification of new chemical substances" are established to protect the environmental ecosystem, ensure human health and regulate the chemical risk management and these two guidelines also provide technical support to the risk assessment of chemicals. Despite the good progress on risk assessment of environmental chemicals in China, the basic work still needs to be developed. Therefore, featured human and environmental exposure parameters based on characteristic of Chinese population and environment scenarios including suitable models applied in chemical risk assessment should be developed. Such researches will effectively promote the integration of chemical risk management in China.

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