عنوان مقاله:

Rat Hepatocellular Primary Cells: A Cellular and Genetic Assessment of the Chitosan Nanoparticles-Induced Damage and Cytotoxicity

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خلاصه مقاله:

Chitosan (CH) is a non-toxic vital polymer that is derived naturally from chitin. Due to its anti-bacterial and anti-fungal properties, it has attracted researchers' attention. The anti-bacterial activity of ۱-۳ CH is ideal in an acidic medium due to its weak solubility at pH levels higher than ۶.۵. The type of CH and the degree of its polymerization affect its anti-microbial activity, as well as some of its other chemical and physical properties. The present study was conducted to investigate the damage induced by chitosan nanoparticles (CHNPs) at various concentrations on the cultured rat hepatic cells. The CHNPs were synthesized by the ionotropic gelation of CH with sodium tripolyphosphate anions. Hepatic cells were cultured from tissues freshly isolated from the liver of normal laboratory rats. Cells were allowed to reach a confluence level before the treatment with CHNPs. In total, five different concentrations of CHNPs were used, and cell cytotoxicity was evaluated using the MTT assay. The genetic expression of P۲Y۱, P۲Y۲, and P۲Y۴ purinergic receptors was evaluated on the cellular level using Qualitative Reverse Transcription Polymerase Chain Reaction technique. The primary culture of rat hepatic cells was thoroughly exposed to a range of CHNPs. Under normal conditions, the cells showed normal cellular morphology with clearly defined borders and normal nuclear structure. Apoptotic cellular damage was observed in the cultured hepatic cells when exposed to CHNPs. Moreover, irregular cellular morphology and heavy pigmentation were noticed in the hepatic cells when exposed to a high concentration of CHNPs. Purinergic receptor gene expression indicated an inflammatory response by an increased gene fold change post-exposure to CHNPs. This study concludes that CHNPs have a strong cytotoxic effect on the cultured rat hepatic cells. Overall, CHNPs showed an inhibitory response to hepatic cells evoking a purine receptor-mediated inflammatory response.

کلمات کلیدی:

Cell culture, chitosan nanoparticles, hepatic