

In vivo toxicity assessment of nanomaterials

Abstract

The biomedical applications of nanotechnology expand the boundaries of Healthcare. Nonetheless new technologies should fulfill strict criteria rendering their application safe. The objective of this study is to assess the possible toxicity of biodegradable nanoparticles (NPs) loaded with the anti-inflammatory drug, curcumin, in Wistar rats by means of peripheral blood markers and histopathologic lesions evaluation. Poly (lactic-co-glycolic acid)-PLGA NPs were used with diameter ranging from 100nm to 300nm, both plain and loaded with curcumin. A total 90 adult Wistar rats were bred and divided into 6 groups of 15 animals (A to F). Each group was administrated with a different solution: A: natural buffer intraperitoneally, B: curcumin via subcutaneous tissue of the cervix, C: plain nanoparticles via subcutaneous tissue of the cervix, D: plain nanoparticles endoperitoneal administration, E: nanoparticles with curcumin via subcutaneous tissue of the cervix, and F: nanoparticles with curcumin endoperitoneal administration. Each group was further divided into 3 subgroups of 5 animals, according to the postadministrative day which the dissection was performed (1 day, 2 days and 7 days). From all the animals, peripheral blood was collected and examined with ELISA for inflammation and markers. Specimens from the brain, liver, heart, kidney and stomach were collected and examined histologically for necrosis and inflammation. Moreover, from the animals who were administrated a solution subcutaneously, samples from the area of the injection were collected. The results demonstrate the safe profiles of the engineered NPs in line with their effectiveness in reducing inflammation. Thus, their clinical applicability can be envisioned.