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Safety of intravenous injection of 50 nm gold nanorods (AuNRs) in dogs

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There is an increasing interest in the application of gold nanoparticles in cancer therapy; however, their toxicity should be carefully assessed before its application in clinical trials. The present work was conducted to evaluate the possible toxicity of intravenous injection of 50 nm gold nanorods; this included their effect on hematology, liver and kidney functions, histopathology and TEM for liver, spleen and Kidney. 16 Baladi dogs were divided into three groups; control (n=5); acute toxicity (n=5), and long term acute toxicity (n=6) groups. Dogs in the treated groups were intravenously injected with 75 µg of 50 nm AuNRs/kg body weight, while dogs in the control group were injected with normal saline solution. Blood samples were collected before AuNRs injection, on day-15 and on day-30 after AuNRs injection to study the acute, and up to the 6 months after AuNRs injection to study the long term acute toxicity, and from control group, blood samples were collected at the same times. Biopsy samples were collected from the control and after the first and six months of AuNRs injection and prepared for histopathology and TEM examination. Blood samples were analyzed for complete blood count, liver and kidney functions. Results showed no aberrant clinical changes after intravenous injection of AuNRs in dogs. Also, no gross morphological changes in size, color and texture of liver, kidney and spleen were detected at biopsy sampling. Histopathological examination of the biopsy samples revealed that, intravenous injection of AuNRs produced mild changes in liver and kidney in at long term acute toxicity group, while spleen tissues were not affected by AuNRs injection. TEM failed to detect AuNRs in spleen, kidney or liver of treated animals either in acute or long term acute toxicity groups. There were mild changes in RBCs, HGB, MCM, total protein, globulin, total bilirubin and creatinine levels in the blood samples taken from dogs in both AuNRs groups compared with control dogs. In conclusion, intravenous injections of AuNRs did not elicit harmful effect on liver, kidney or spleen of dogs; therefore, it can be safely used in cancer therapy in dogs without any impairment of their physiological functions.

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