

## Dose-Dependent Effects of Fast-Neutron Irradiation in Mouse Liver

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Much information about the hepatic damages made by ionizing radiation such as X-ray,  $\gamma$ -ray and ultraviolet ray has been reported and extensively investigated. There, however, has been little work on the irradiation of the liver by the fast neutron. Mice were irradiated with fast neutrons. The absorbed doses were 0, 0.25, 1, 2, 4 and 8 Gy at a dose rate of 30cGy/min. The results obtained show that there were inflammatory reactions and a decrease of hepatocytes in a dose-dependent manner. Fatty changes of hepatocytes were detected only at 8 Gy, but fibrosis was not observed in any of the doses. The proliferation of hepatocyte increased significantly at 0.25 and 1 Gy compared to the control, but decreased markedly from 2 Gy. The expressions of p53 and p21 proteins were not observed in any of the doses. The activation of cytochrome P450 2E1 (CYP 2E1) showed a dose-dependent increase after fast-neutron irradiation. The activation of phosphorylated-Smad2/3 (p-Smad2/3), signaling intermediates of the transforming growth factor-beta (TGF- $\beta$ ), resulted in the suppression of inducible nitric oxide synthase (iNOS) after exposure of 0.25, 1 and 2 Gy of fast neutrons. In conclusion, there were dose-dependent hepatic damages such as hepatic necrosis, decreased proliferation and fatty change. Several change related proteins such as p53, p21, iNOS and p-Smad2/3 were not related with the doses of fast-neutron irradiation except CYP 2E1. Further studies will be needed regarding the mechanisms in the hepatic responses against fast-neutron irradiation.

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