

appeared distorted with spiral-like artifacts. As the tube rotated, motion in and out of the imaging plane occurred. The cross section of the phantom in the beam varied. At the poles of the sphere there was a greater change in the axial cross-section radius of the sphere over one rotation resulting in a more pronounced change in density. While the moving phantom stayed in a quasi-static state at 0 and 100% exhalation, the artifacts were not obvious. We also accurately obtained the center position of the moving target for different motion states by 4D-CT. They were 59, 56, 51.5, 45.5 and 39.5 mm, corresponding to 0, 20, 50, 80 and 100% exhalation, respectively.

Residual motion artifacts were seen in gated scans when the object was moving in the scan plane. These artifacts were caused by the object's movement within the imaging plane during the tube rotation. Large deviations are seen at the poles of the sphere due to the greater change in the axial cross-section radius of the sphere over one rotation at this location. Even so, we could still determine the center position of the moving target accurately according to the 4D-CT method.

References

[1] M. B. Tacke, S. Nill, A. Krauss, et al., Med. Phys., 37(2010)753.
 [2] C. Bert, N. Saito, A. Schmidt, et al., Med. Phys., 34(2007)4768.

3 - 76 Effect of Carbon Ion Irradiation on Mouse Motor Function

Ye Fei, Li Qiang, Liu Xiongxiong and Zhao Ting

Lots of reports showed that motor coordination and stamina of mice are impaired by heavy ion radiation due to injury of nerve center system (CNS). However, the conclusion in the aforementioned reports where whole body irradiation was used might be problematic. Damages of heavy ions to the peripheral nerve may lead to the same result like whole body irradiation.

In this study the head of Blab/c mouse, mesencephalon specifically, was exposed to carbon ions of 5 Gy. To avoid affect the peripheral nerve of mouse head, a special collimator was developed. In order to explore the short-latency effect of exposure to high energy particle radiation (HZE) on motor coordination and stamina, Gait and rotarod tests were employed. Twelve female Blab/c mice and twelve genetically matched wild-type (WT) mice were used in this study. Gait test provides a powerful measure of the precision and coordination of walking by the degree to which the forepaw and hind paw prints overlap. The mouse's paws were dipped in ink (forepaw red and hind paw black) so that the walking gait can be recorded as a track of footprints on the paper. Rotarod provides a simple automated test of an animal's ability for motor coordination and balance on a rotating rob, where the speed of rotation was 20 r/m. Fig. 1 shows that Footprint pattern of a mouse one week after irradiation with carbon ions (30 keV/(m, 5 Gy).



Fig. 1 Footprint pattern.

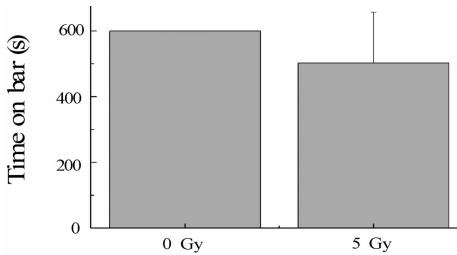


Fig. 2 Time for mice to stay on rotating rods.

Our experimental data reveal that motor coordination and stamina of mice in a short time after carbon ion irradiation remain intact. Together with whole body irradiation reports, these results imply that a decrease in motor coordination and stamina performance induced by heavy ions may result from injuries of ependyma or peripheral nerve system.