

RADIATION EFFECT ON HUMAN DIPLOID CELLS

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ABSTRACT

We studied in vitro the influence of $^{239}\text{PuO}_2$ with MMD 1.3um on short-term effect and long-term effect of human diploid cell population called 2BS cell line that is human embryo lung fibroblasts. The short-term effect includes proliferation, surviving fraction and ultrastructural changes. The long-term effect involves life-span shortening and transformation of the cells.

The short-term effect observed is that the changes of proliferation and surviving fraction of the cell line was significant following exposure at concentration of 0.0006uCi/ml observed for a week. On the 7th day after exposure the proliferation of control and treated cells was 10.5 and 4.88 PDN (population doubling number) and the surviving rate of them was 96% and 56.3% respectively.

For the long-term effect studies, the follow-up observation for 12 groups of culture exposed to $^{239}\text{PuO}_2$ was made. In three groups exposed at 0.003uCi/ml, the shape of the cells became shorter and shorter and their life-span shortened with higher mortality appearing early death. In 7 cultures exposed at 0.0015uCi/ml, the similar changes of cell morphology were the same as above and their life-span was shortened by 58.7% averagely. In other cultures at same concentration, not only the life-span was not shortened but it was longer than that on the controls. At last they appeared epithelium - like shape of transformed cells.

By electron microscopy the treated cells revealed sinking of the nuclear membranes into nucleus and hypertrophy of the nucleolus with netted structure. The nuclear volume increased largely and the ratio between nucleus and cytoplasm increased as well.

In this paper we provided the data of human cells in vitro for radiation protection, which are considered important in the absence of human experiment conditions.