

Effects of Irradiation on Correlation Erythropoiesis and Reticuloendothelial Function

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Following the previous reports, radiation effects upon the correlation between bone marrow RE function and erythroid precursor activity of rabbit was investigated.

Irradiation:

With Telecobalt therapy unit, the hemipelves and the left lower limbs of rabbits were subjected to 1,600R, 3,200R and 5,000R respectively.

Evaluation of radiation effects:

Radioassay and marrow scanning with ratemeter tracing were performed.

In order to clarify the erythroid precursor activity, approximately 20 microcuries of $^{59}\text{FeCl}_2$ was administered intravenously 17 hours prior to the killing.

For the purpose of evaluation of RE function, about 50 microcuries per Kilo of body weight was injected intravenously an hour prior to the killing.

The radioactivities of the femoral and tibial marrow were counted with well-type scintillation counter and the ratio of net cpm per gram of the left tissue to net cpm per gram of the right tissue was calculated.

From this calculation and dividing the decreased ratio by unirradiated control ratio, the inhibitory effects of irradiation on RE function or erythroid precursor activity was evaluated.

In terms of marrow scanning, about 50 microcuries of ^{198}Au colloid was injected intravenously and scanning was performed in prone position with 5 inch scanner where ratemeter was attached.

Results:

^{59}Fe incorporation in irradiated RBC precursors was inhibited.

The much higher dose was irradiated, the more remarkable inhibition was noted. Within a month's observation, ^{59}Fe incorporation did not return to normal.

On the other hand, although ^{198}Au colloid uptake by marrow RE cells was suppressed by irradiation, the inhibition was not so remarkable as that of ^{59}Fe incorporation. Namely ^{59}Fe incorporation decreased to 90% in 2 days through 6 days after each dose of irradiation, ^{198}Au uptake was suppressed only less than 50%. In addition the rate of inhibition was not necessarily proportional to radiation dose.

Namely the inhibition was much remarkable in 1,600R or 3,200R irradiation than in 5,000R irradiation.

Both the change of ^{198}Au concentration on the marrow scan and ratemeter tracing confirmed this results of radioassay.

Within a month's observation, RE function did not return to normal.

Comments:

The inhibitory effects of irradiation upon RE function did not correlate well quantitatively with that upon erythroid precursor activity.

Since the slight change of RE function was able to be projected on marrow scan and ratemeter tracing, however, the radiocolloid scanning is useful in showing the distribution of hemopoietic marrow.