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Age Related Changes in ^{3}H-Thymidine Localization in Bone Marrow Cells of Mice

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The different types of blood cells are derived from a common pluripotent stems cells and generated chiefly in the bone marrow. At embryonic stage, pluripotent stem cells circulating in the blood stream are able to settle in the bone marrow, spleen and/or liver and establish new hematopoietic colonies in those organs. By radioautographic approach using a radioisotope precursor one can elucidate the rate of cell proliferation and growth, and cell kinetics in a specific organ [1]

The present study was undertaken to identify differentiating cells by radioautographic localization of ^{3}H-thymidine uptake in the mouse bone marrow and to determine the labeling index in the different ages of the animal from day one after birth up until the 10th month.

The results of intracellular sites of radioautographic localization of ^{3}H-tymidine are shown in Figs 1-2. Silver grains due to the uptake of radiolabeled precursor were observed in the hematopoietic cells such as the erythroblasts (Fig. 1), myeloblasts (Fig.2) and monoblasts (Fig. 2).

The results of the quantitative analysis (Fig. 3) showed that DNA synthesis increased consistently from one day to 10 month old animals. An average of 10% labeled cells was recorded at one-day-old animals, increased slightly to about 15% in 7-day-old animals. At 14th day after birth, a labeling index of 25% was recorded. This was the highest activity recorded and thereafter, the number of labeled cells as well as the labeling index decreased. DNA synthetic activity recorded the least at 5% in almost a year old senescent animals.

The number of silver grain per labeled cell was compared with the age of the animals. The average grain count showed a positive correlation with the labeling index ($p<0.05$).

From the results of the present study, it could be inferred that DNA synthesis is highest among the younger animals declined as animal ages. Furthermore, it could be inferred that the erythroblasts and some white blood cell precursors are actively undergoing DNA synthesis in bone marrow in young animals. Similar results were observed with mouse spleen cells undergoing DNA synthesis [2] and protein synthesis [3].

References

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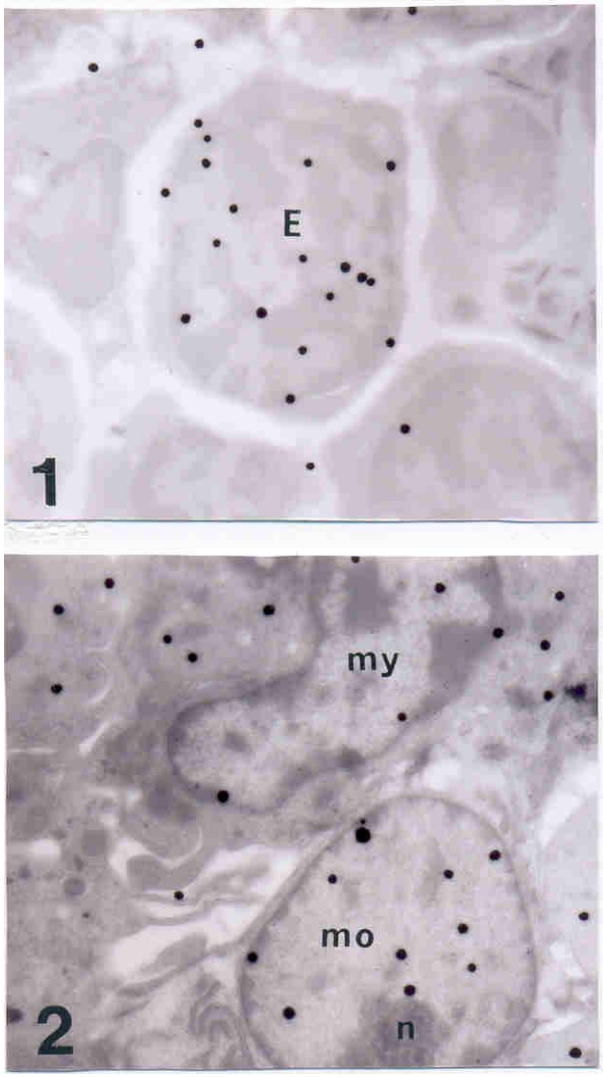

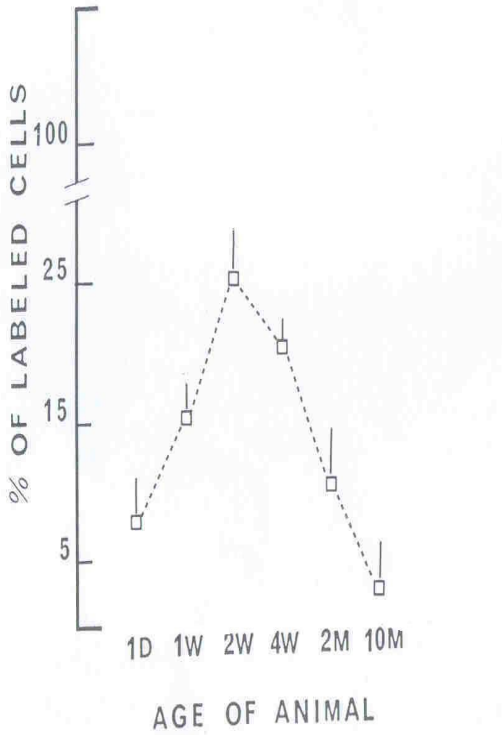

Fig. 1. EM radioautogram of labeled erythroblast(E) of 2-week-old animal. Silver grains are observed over the nucleus.
Fig. 2. EM radioautogram of labeled myeloblast(my) and monoblast(mo) in 2-week-old animal. Silver grains are observed over the nucleus.
Fig. 3. The percentage labeled cells in mouse bone marrow cells from 1-day-old to 10-month old. ± S.D.

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