

This Week's Citation Classic

Bond V P, Fliedner T M, Cronkite E P, Rubini J R, Brecher G & Schork P K.

Proliferative potentials of bone marrow and blood cells studied by *in vitro* uptake of H³-thymidine. *Acta Haematol.* 21: 1-15, 1959.

***In vitro* incubation with tritiated thymidine of blood from normal individuals and patients with infection and infectious mononucleosis, demonstrated the presence of small numbers of labeled large mononuclear cells of different morphological types indicating that the cells are capable of DNA synthesis and division. [The SC[®] indicates that this paper was cited 144 times in the period 1961-1977.]**

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"In the years just preceding this paper, there was a great deal of work and discussion on the mechanism of protection against radiation lethality by shielding of a limb or of the spleen. There was a substantial debate as to whether the protection afforded was mediated via a humoral or a cellular factor.

"In connection with a number of shielding and cell fractionation experiments, Peggy Swift and I showed that irradiating one-half of the body followed by irradiating the other half after a brief interval afforded substantial protection compared to accomplishing the entire exposure at the same time. Nearly simultaneously, Brecher and Cronkite showed that parabiosis protected the irradiated member of the pair. Also, somewhat equivocal evidence had been available that peripheral blood might have protective action against the effects of whole body irradiation.

"These studies showed that the protective agent is produced normally and is in the blood stream. At this time no method was available that would allow us to determine directly, if cells capable of proliferation were normally in

transit in the blood stream.

"Shortly thereafter Taylor and Hughes first used the specific DNA precursor tritiated thymidine and autoradiograph to study chromosome replication in plant cells. A group of us at Brookhaven (including the authors of the above publication) initiated extensive work with this new and potent tool, to study the kinetics of cell proliferation in the mammal, under normal conditions and as related to radiobiology. Although the work primarily involved studies of kinetics of cell proliferation in the bone marrow and other organs, we were also interested in using this new technique to see if under normal conditions, there were cells in the blood that were synthesizing DNA, and therefore presumably capable of proliferating in body locations distant from their origin. The experiments were not difficult to perform, and such cells were readily found.

"The finding clearly supported what had been suspected, namely that segments of a ubiquitous organ such as bone marrow are able to exchange cells, and that there is a common pool of proliferating cells available to all segments of the organ. Thus a mechanism was available for part of an organ to contribute directly to the rate of recovery of another portion of the organ that may have been damaged. Since that time a similar mechanism via the blood stream has been shown to exist in other systems, e.g., the lymphopietic system, neoplastic growth. Practical implications of the findings have been demonstrated by T M. Fliedner and others, i.e., protection against radiation and other forms of bone marrow damage is afforded by transfusing peripheral blood leukocytes. Collection of these cells from the peripheral blood and preservation through freezing, can be used for such protection with diminution of graft versus host reactions when the circulating stem cells are largely separated from T-lymphocytes."