

Harmonization of Radiation for Human Life - Summary Report of Radiation Hormesis Research -

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Radiation hormesis

In a review article entitled "Physiological Benefits from Low Levels of Ionizing Radiation," published in Health Physics in December of 1982, Professor T.D. Luckey, of the University of Missouri, asserted the "radiation hormesis" with 200 references.

CRIEPI organized a Hormesis Research Steering Committee composed of leading specialists in the field concerned, and began research in cooperation with a number of universities, as well as the National Cancer Research Institute, and the National Institute of Radiological Science.

We carried out experimental activities on the effects of low-dose radiation on mammals. After years of research activities, we are recognizing Luckey's claim. Some surveys including Sakamoto's success of low dose application on cancer therapy and animal experiments have brought us exciting information on the health effects of low-dose radiation.

The interesting results we obtained can be categorized in five groups.

1. Enhancement of immune systems such as lymphocytes and suppression of cancer and so forth.
2. Radio-adaptive response relating to the activation of DNA repair and apoptosis.
3. Rejuvenation of cells such as increase of SOD and cell membrane permeability.
4. Radiation effect on neuro-transmitting system through increase of key enzymes, and hormones.
5. Other beneficial effects, including the therapy of adult-disease such as diabetes and hypertension.

Formation of great numbers of ions, free electrons, and free radicals by ionizing radiation enhances and creates many comprehensive bio-chemical reactions, followed by significant biological responses.

Living materials exist on the homeostatic potentiality which directs all of our physical activities to obtain the survival keeping healthy condition against all kinds of degradation occurring by the environment. This is adaptive response itself.

Scientific thresholds

Robley Evans showed a clear threshold in past days on radium induced bone cancer. Don Luckey asserted a threshold naming ZEP through animal data survey. Myron Polycove and Ludwig Feinendegen presented a comprehensive insight on the damage control system of DNA like as prevention, repair, and removal. K. Sakamoto, S. Kondo, and O. Yamamoto have strong confidence on threshold assertion.

Future

The recent progress of analytical technique on the observation of DNA structural responses greatly contributes the unbelievable success of our research on the adaptive response of low level radiation.

Certain optimum dose rates for various bio-positive effects shall be found in future through really comprehensive animal tests in all kinds of responses categorized above for actual application of low level radiation to obtain healthful condition of human being. Not only dose rate optimization but also various combination with other factors such as food and circumstantial temperature shall be the most economical research subject to obtain, really increased quality of lives of human being in next century.

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