

Radiomimetic effects from irradiated food

Radiomimetic effects are similar to radiation effects, but are not caused by radioactivity. To the body radiomimetic effects are equally harmful as radiation effects.

Radiation effects

Sharp drop in lymph cell numbers

The most radiation sensitive cells in the body are lymph cells. A sharp drop in the number of lymph cells has been repeatedly found in patients undergoing radiation therapy and experimental animals exposed to radiation. It appears that even at low radiation doses lymph cells manifest this sensitivity (1).

Inhibition of mitosis

Mitosis is a technical name for biological cell division. First the chromosomes duplicate themselves. They carry the genetic code. Then the two equal sets of chromosomes are pulled apart and a new cell wall is formed between them. This results in two new cells with the same genetic material.

When the mitosis is inhibited, the chromosomes duplicate, but are not pulled apart and no additional cell wall is formed. This results in a cell with a double set of chromosomes. When this is repeated a cell with a fourfold chromosome number comes into being. These abnormal cells are called polyploid. They are very rare.

Polyploid lymph cells occur routinely in patients undergoing radiation treatment. Therefore it was suggested to use their level as a measure of radiation exposure for people accidentally exposed to radiation (4). But there was no clear relation between the level of polyploids and radiation dose. So, polyploids could not be used.

Reproductive organs

The second most radiation sensitive cells in the body are the germ cells in the reproductive organs. Very radiation sensitive are the developmental stages of sperm cells such as spermatogonia, spermatocytes A and B, and spermatids.

Total-body radiation of mice and rats gave after 10 to 20 days depending on the dose, a sharp drop in the number of spermatogonia, spermatocytes, spermatids and sperm (10).

Chromosomal aberrations

A well-known effect of ionising radiation is damaged chromosomes. They can break and re-link with the wrong parts, break and keep in short broken pieces or form rings or bridges or translocations. One of the consequences can be that you end up with the wrong number of chromosomes in new cells. When one or more chromosome are too many or missing, the cells are called aneuploid.

Chromosomal aberrations can happen anywhere in the body and are not limited to the reproductive organs (13).

Radiomimetic effects

Sharp drop in lymph cell numbers

Rat food, hard dried cakes, was gamma irradiated with a doses of 30 kGy and 90 kGy. Rats fed on this irradiated food had a decrease in absolute lymph cell numbers of 15 to 20% within a few days to a few weeks after the feeding began. This effect equals a total body irradiation of about 20 rad (2, 3).

Feeding result: polyploid lymph cells

In 1975 the National Institute of Nutrition of India investigated how malnourished people (children) would cope with irradiated food. The wheat component of the food was irradiated at 0.75 kGy, the dose recommended for grain disinfestation.

After four weeks only, polyploid lymph cells were found in the blood of children on food containing irradiated wheat. After six weeks there was a steep increase of polyploids. At that stage it was decided to halt the trial to protect the children from eventual harm (5).

This trial was repeated with monkeys. And again polyploid lymph cells showed up (6). When the trial was repeated with rats and mice their bone marrow was examined (Bone marrow is the place where blood and lymph cells are formed). Again an upsurge in polyploid cells was found (7, 8).

Chinese hamsters were fed a pelletised dry feed. When this was radiation sterilised polyploid cells showed up in their bone marrow (9).

Feeding result: drop in germ cells

A significant drop in the number of spermatogonia A and B and of resting primary spermatocytes was found in mice fed irradiated wheat. Rats were hardier, feeding irradiated wheat gave only a significant drop in germ cells when the rats were malnourished (8, 11). A third research found that sperm-forming cells were completely absent after rats were fed for 20 months a standard animal house diet containing irradiated products (12).

Chromosomal aberrations

When mice were fed irradiated wheat for 3 months aneuploid cells showed up in their testis (8).

Increased structural chromosomal aberrations such as translocations and bridges were found in developing spermatogonia of young mice weaned from parents fed irradiated wheat (14, 15).

Rats showed a significant increase in dominant lethal mutations after feeding irradiated wheat for 3 months (11). Dominant lethality is caused by structural and numerical chromosomal aberrations.

References

1. Mathe, G. et al. 1971. Acute irradiation in man: treatment of hematologic disorders. In: Pathology of Irradiation, ed. C.C. Berdjis. By Williams & Wilkins Company - Baltimore, p. 636.
2. Schubert, J. 1969. Mutagenicity and cytotoxicity of irradiated foods and food components. Bulletin WHO 41: 873-886-904
3. Kesavan. P.C. et al. 1971. Cytotoxic and mutagenic effects of irradiated substrates and food material. Radiation Botany 11: 253-266-281.
4. Bender, M.A. 1971. Use of chromosome analysis in the diagnosis of radiation injury. IAEA Technical Report Series No. 123, p. 277.
5. Bhaskaram, C et al. 1975. Effects of feeding irradiated wheat to malnourished children. Am. J. Clin. Nutr. 28: 130-135.
6. Vijayalaxmi. 1978. Cytogenetic studies in monkeys fed irradiated wheat. Toxicology 9:181-184.
7. Vijayalaxmi et al. 1975. Chromosome aberrations in rats fed irradiated wheat. Int. J. Radiat. Biol. 27 No.2: 135-142.
8. Vijayalaxmi 1976. Genetic effects of feeding irradiated wheat to mice. Can. J. Genet. Cytol. 18: 231-238.
9. Renner, H.W. 1977. Chromosome studies on bone marrow cells of Chinese hamsters fed a radiation sterilised diet. Toxicology 8: 213-222.
10. Sommers, S.C. 1971. Effects of ionising radiation upon endocrine glands. In: Pathology of irradiation, ed. C.C. Berdjis. By Williams & Wilkins Company - Baltimore, p. 428-431.
11. Vijayalaxmi et al. 1976. Dominant lethal mutations in rats fed on irradiated wheat. Int. J. Radiat. Biol. 29, no.1: 93-98
12. Ivanov, A.E. et al. 1981. Pathomorphological changes in the testes of rats fed on products irradiated with γ -rays. 0007-4888/81/9102-0232 1981 Plenum Publishing Corporation. Translated from: 'noi Biologii i Meditsiny, vol.91, No.2
13. Berdjis, C.C. 1971. Cell. In: Pathology of Irradiation, ed. C.C. Berdjis. By Williams & Wilkins Company - Baltimore, pp. 20-22
14. Buggy, L et al. 1968. Do irradiated foods have a radiomimetic effect? Atompraxis 14, No.3: 112-118 (in French)15.
15. Buggy L. et al. WHO Technical Reports series No. 451, p. 28. Geneva 1970.



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