

UNSCEAR BRIEFING NOTE

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EFFECTS OF IONIZING RADIATION ON THE IMMUNE SYSTEM

VIENNA|21 July 2009| It has long been known that high-dose irradiation can damage the immune system. However, some recent studies have shown that low levels can stimulate it, at least for short periods, says the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in a new report.

Some studies of people living in areas of high level natural radiation suggest an adaptive response to exposure, it says.

Because of the divergent effects ionizing radiation is better considered as a "modulator" of the immune response rather than a "suppressor," said Norman Gentner, Chair of UNSCEAR.

"It remains to determine the long term impact of low dose on the immune functions related to human health," he said.

The immune system plays an important role in fighting cancer. Both the negative and positive modulation of the immune response by radiation may influence cancer development, the Committee concluded.

The issue of immune system effects is the subject of one of three annexes of a major report published today by UNSCEAR. Since 1972 seven UNSCEAR reports have assessed aspects of radiation effects on the human immune system.

The 2006 report also assesses the effects of radon and the non targeted effects of radiation on cells. Release of the report was delayed because of resource issues that have been corrected.

The immune system findings result from experimental studies and large scale epidemiological assessments of survivors of the bombing of Hiroshima and Nagasaki by nuclear weapons, residents of areas in Russia and the USA contaminated by weapons production, Chernobyl emergency workers and residents, and patients undergoing radiotherapy.

Data from these groups showed common patterns. However, a reported increase in autoimmune diseases among Chernobyl workers and residents was not found among atomic bombing survivors nor among the US group studied.

It has also been suggested that effects on the immune system may help to explain an association between diseases other than cancer and radiation exposure recently found among atomic bombing survivors.

Damage to the immune system is often a consequence of moderate to high-dose irradiation (significantly higher for example than diagnostic x-rays). Lymphoid cells, part of the system that produces antibodies, are markedly affected by such levels of radiation.

The effects of ionizing radiation on the immune system may be stronger under certain conditions. There are critical periods of vulnerability during foetal development; and some human diseases such as HIV AIDS, autoimmune diseases and genetic disorders also impair the immune system, making it more sensitive to irradiation.

UNSCEAR was established in 1955, reporting to the UN General Assembly on levels and effects of radiation. Its authoritative findings led to the Partial Test Ban Treaty prohibiting atmospheric testing of nuclear weapons, and underpin international standards for radiation protection.

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