

The health effect interpretation strategy at low doses cosmogenic natural radiation exposure to human population in far north

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It's well known that at low doses radiation exposure can also plausibly induce severe health effects such as malignancies which are statistically detected in a population, but can't be unequivocally associated with individual exposures. Japanese carcinogenic risk assessment have shown that natural radiation cause 1-3% malignant. Hereditary effects to radiation exposure have been statistically detected in mammals and are presumed to occur in humans as well. The high positive correlation between the average annual solar radiation and number of the patients with disseminated sclerosis, which was born in these years have been found.

These, so called, stochastic effects because of their random (i.e. probabilistic) nature are expressed after a latency period, presumably over the entire range of doses without a threshold level. In addition, there is a possibility of health effects in children exposed to radiation *in utero* during certain periods of pregnancy, including a greater like hood of leukemia and severe mental retardation.

From literature data it's known that natural radiation exposures in Severodvinsk have been cause of heightened Arctic human population morbidity and mortality of adults and children/ There was found a correlation between natural radiation background and malignant diseases (from 1991-1999 years. It's possible reflect the population - weighted average annual effective dose from cosmic radiation that's assumed to be 10-20% higher in high latitudes (>72°N) - has been estimated by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) - and logically we must to expect the same situation in Murmansk region. But we didn't reveal the elevated statistically detectable morbidity effects there. Why? From one side, as known, the cosmic ray dose rate depends on height above sea level and on latitude. Annual doses in areas of high exposure (locations with higher elevations) are about five times the average. It means, that the dose seem to be different in different communities of Murmansk region in compare with Severodvinsk due to depends on local geology and the type and ventilation housing construction and use. This may combine to give exceptionally high dose rates from radon decay products of several hundred times the average.

From another side, the phenomenological aspects of the genomic instability induced by low-dose radiation are complex scientific problem and the regularity of the chromosome instability induction do not correspond to the classical conception of the radiation genetics (hit principle add target theory).

The mechanisms and the biological significance of this new genetic phenomenon and it's connection to human health state, in European North need more deep epidemiological investigations including mutagenic effects assessment *in vivo* and *in vitro* levels.