

LIVING IN RADIATION WORLD: POPULATIONS NEUROPSYCHIATRIC PROJECTIONS

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Nowadays we all live in ionizing radiation environment comprised of natural background radiation - space and terrestrial, and radiation from human activities - energy production, military, medical, nuclear technogenic accidents, etc that makes biological and health effects of radiation a great concern for the general and specific populations, especially under possible nuclear and radiological terrorist attack.

Today it is proved that human brain/CNS is highly radiosensitive and vulnerable system whose extent of perturbation can be represented by molecular, behavioral, and electrophysiological parameters.

International consensus exists that the mental health impact of Chernobyl is the largest public health problem. The main conclusions and lessons of Chernobyl in this aspect are following:

- 1) Mental disorders are one of the important medical and social problem among Chernobyl accident survivors during 20 years after the Chernobyl accident;
- 2) Mental health care of victims should be the focus of public concern at possible radiation accident in the future;
- 3) Mental health impact on the liquidators of Chernobyl accident includes:
 - psychological disorders
 - organic brain damage
 - suicides
 - Chronic Fatigue Syndrome
 - schizophrenia spectrum disorders
 - accelerated brain aging and neurodegeneration

- 4) There is a big gap in epidemiological evidences concerning mental health of exposed population, as well as in knowledge about biological mechanisms of low doses effects on the brain
- 5) There is a deficiency of mental health care and psychorehabilitation of survivors.
- 6) According to current knowledge, the potential radiation cerebral effects could be outlined as follows:
 - Potential radiation cerebral effects could be realized following exposure to $>0.15\text{--}0.5$ Sv
 - Dose-related cognitive decline following radiotherapy in childhood with the possible dose thresholds of delayed radiation brain damage at the doses as low as $0.1\text{--}1.3$ Gy on the brain;
 - Dose-related cognitive and neurophysiological abnormalities in prenatally exposed children;
 - Postradiation organic brain syndrome in ARS-patients and dose-related neuropsychiatric, neurophysiological, neuropsychological, and neuroimaging abnormalities following exposure to >0.3 Sv;
- 7) The CNS effects could be attributed to exposure to ionizing radiation are as follows:
 - Schizophrenia spectrum disorders;
 - Chronic Fatigue Syndrome;
 - Accelerated aging processes and neurodegeneration.

The pertinent analysis of other relevant populations (in the areas of high natural background radiation, Chernobyl Exclusion Zone, nuclear test area, A-bomb survivors, space station crews, etc) illustrates that degree of CNS impairment and corresponding spectrum of effects may range from stress-related symptoms via chronic fatigue syndrome to cognitive deficits, neurodegeneration, and neuropsychiatric disorders including schizophrenia, and can be a basis for related population perspectives on mental health.