

Radiophobia: Long-Term Psychological Consequences of Chernobyl

Guarantor: LTC Ross H. Pastel, MSC USA

Contributor: LTC Ross H. Pastel, MSC USA

The primary health effect of Chernobyl has been widespread psychological distress in liquidators (workers brought in for cleanup), evacuees, residents of contaminated areas, and residents of adjacent noncontaminated areas. Several psychoneurological syndromes characterized by multiple unexplained physical symptoms including fatigue, sleep and mood disturbances, impaired memory and concentration, and muscle and/or joint pain have been reported in the Russian literature. These syndromes, which resemble chronic fatigue syndrome and fibromyalgia, are probably not due to direct effects of radiation because they do not appear to be dose related to radiation exposure and because they occur in areas of both high and low contamination.

Introduction

After the Chernobyl accident in 1986, more than 100,000 people were evacuated from the most heavily contaminated areas, and an estimated 600,000 to 800,000 cleanup workers (called liquidators), many of whom were military reservists, were brought in during the emergency situation and for subsequent cleanup operations.¹ Although some physical health effects due to radiation were seen after Chernobyl, the primary health effect has been widespread psychological distress in liquidators, people living in contaminated areas, and people living in noncontaminated areas close to contaminated areas. The relationship between psychological distress and radiation exposure is complex and is confounded by many factors, including the economic collapse and breakup of the Soviet Union, the evacuation and resultant long-term relocation of large numbers of people, a persistent climate of distrust in medical, scientific, and government authorities, poor nutrition, and changes in diet due to contamination problems.

The label "radiophobia" has been used widely in the former Soviet Union to denote a fear of radiation, usually with political overtones and in a pejorative manner. Although radiophobia sounds like a clinical term, it is not. The *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV), has strict clinical criteria for phobias, including "Marked and persistent fear that is excessive or unreasonable, cued by the presence of a specific object or situation" (criterion A) and "The person recognizes that the fear is excessive or unreasonable" (criterion C).² Radiation is invisible, so in the absence of physical dosimetry or biodosimetry, exposure can be uncertain. Long-term health effects, especially when doses are in the low range (20–70 cGy) or below, are also uncertain. Given these uncertainties, it is impossible for someone to know if their fear is excessive or unreasonable.

Radiation Pathophysiology and Toxicology Department, Armed Forces Radiobiology Research Institute, 8901 Wisconsin Avenue, Bethesda, MD 20889-5603.

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Several psychoneurological syndromes have been reported in the Russian literature as sequelae of Chernobyl. Many of the syndromes are unfamiliar to Western medicine—for example, neurasthenia, vegetative dystonia, neurovegetative circulatory syndrome, and astheno-vegetative syndrome.^{3–5} Asthenia means lack of strength and energy,⁶ in other words, weakness and fatigue. Neurasthenia implies a weakness in the central nervous system. Vegetative dystonia refers to an altered tonicity in the vegetative nervous system, an old name for the autonomic nervous system. The neurovegetative circulatory syndrome adds a cardiovascular component—the patients quickly tire on physical effort (fatigability) and suffer dyspnea and tachycardia. This syndrome resembles neurocirculatory asthenia (also called Effort Syndrome), which was prevalent in U.S. and British troops during World War I and was a common long-term effect seen in gas casualties.^{7,8} The symptoms of these psychoneurological syndromes overlap and include fatigue, general weakness, fatigability, headache, sleep disturbances, mood disturbances, irritability, impaired memory and concentration, abdominal pain, nausea, and muscle and/or joint pain.^{3–5} The symptoms also overlap with the Western medical syndromes of fibromyalgia and chronic fatigue syndrome.

No statistically significant correlations among physical symptoms, physical examination data, and radiation dose were found in one study of Russian liquidators.⁴ The average whole-body radiation dose was 10 to 15 cSv with a maximum of 70 cSv, although the reliability of reported doses is uncertain. Despite the low radiation doses, liquidators were convinced that the radiation exposure would be harmful and interpreted their symptoms as consequences of radiation exposure. In a study of 1,412 Latvian liquidators, 615 (43.6%) were diagnosed with mixed mental-psychosomatic disorders using *International Classification of Diseases*, 9th edition (ICD-9), coded disorders of depression, cardiovascular physiological malfunction arising from mental factors (i.e., neurovegetative circulatory syndrome), or unspecified disorders of the autonomic nervous system (i.e., vegetative dystonia).⁹ The number of liquidators affected would probably have been even higher, but anxiety, post-traumatic stress disorder (PTSD), and sleep disturbances were not studied because the ICD-9 lacks codes for these disorders. No radiation doses were reported in this study. An epidemiological study of 4,742 Estonian liquidators found no increase in incidences of leukemia, all cancers, or overall mortality. The mean radiation dose (estimated by biodosimetry) was 11 cGy.¹⁰ However, a statistically significant excess of suicides²⁸ accounted for almost 20% of the mortality. The standardized mortality ratio for suicide was 1.52 (95% confidence interval of 1.01–2.19). The incidence of suicide in this cohort of Estonian liquidators was 590 per 100,000. The increase in suicide is consistent with severe psychological distress.

In another study of Russian liquidators, PTSD was diagnosed in 21 of 65.¹¹ Although the two groups did not differ in age, education, or sex (all of the liquidators in both studies were male), those diagnosed with PTSD scored much higher on a Radioactive Threat Perception Questionnaire. They suffered more anxiety and fear about the radiation hazard, they were more likely to worry about their health, and almost all believed that they had been harmed by radiation. PTSD symptoms were also found in a study of immigrants to Israel from the Chernobyl area.¹² PTSD symptom scores were highest in liquidators and immigrants from the most exposed group, with much lower scores seen in immigrants from control and less-exposed groups. Depression and anxiety scores were also significantly different among the groups, but somatization scores were not. Self-reported physical symptoms were most common in liquidators and immigrants from high-exposure areas, least common in immigrants from nonexposure areas, and intermediate for immigrants from low-exposure areas. Compared with immigrants from nonexposure areas, liquidators and immigrants from exposure areas were also more likely to report chronic health conditions of heart disease, problems with vision or hearing, and migraines.

Significant amounts of anxiety and stress were found in people from both contaminated (>5 Ci/km²) and control areas of Belarus, Ukraine, and Russia in an International Atomic Energy Agency study done 3 years after Chernobyl.¹³ High levels of stress were indicated by symptom checklist data, sleep disturbance reports, and alcohol consumption patterns of people from both the contaminated and control areas. Nearly 50% of the populations in both contaminated and control villages were uncertain whether they had a radiation-related illness. However, more people in the contaminated villages believed they did have a radiation-related illness (45% vs. 30% in control villages). A study of a relatively uncontaminated (<5 Ci) village in Belarus 9 years after Chernobyl found that 35% of the adults surveyed still thought about Chernobyl almost every day.¹⁴ Continuing health concerns were evident in that 55% believed that radiation was responsible for their aches and pains, 65% believed that radiation was responsible for their family members' aches and pains, and 15% believed that they had been exposed to high radiation levels. These health concerns were probably exacerbated by the finding that almost one-half (48%) believed the government gave inaccurate health information. An epidemic of vegetative dystonia has occurred in children of the Ukraine.³ Nearly 75% of the children in the Kiev area were reportedly affected, and nearly 25% of hospitalized children were diagnosed with it, according to an American doctor who visited Kiev in 1991. Even Western Europe was affected by fear of radiation. A 60% increase in voluntary abortions in June 1986 was reported in Switzerland (based on trend analysis from 1984 to 1988), with similar reports from northern Italy and Greece. Birth rates fell in contaminated areas of the former Soviet Union, and a decreased number of pregnancies was reported in Sweden, Norway, and Italy following the accident.¹⁵

Despite the widespread radioactive contamination, radiation was directly responsible for only 31 deaths in the first 60 days after the accident.¹ However, the strong psychological effect of radiation may have contributed to more deaths, as suggested by the increased number of voluntary abortions in several coun-

tries in Europe and the increased standardized mortality ratio due to suicide seen in Estonian liquidators.^{10,15} The suicide incidence rate in that cohort was extremely high (590 per 100,000), which suggests that more extensive studies of suicide should be done among liquidators. The largest health effect of Chernobyl has been the psychological effects—expressed by widespread fear, anxiety, and depression in both contaminated and relatively noncontaminated regions. One epidemiological study reported ICD-9 coded mental-psychosomatic disorders in nearly one-half of the cohort studied.⁹ Some of the common factors include fear of long-term health consequences of radiation exposure to self and to family members, distrust of government, scientific, and medical authorities, uncertainties about both actual radiation exposure and long-term consequences of that exposure, scare stories in the mass media, and perceived exposure to high radiation doses coupled with a strong belief in long-term harmful effects of that exposure.

Although the psychological distress was originally labeled radiophobia, the term is a misnomer—radiophobia is not a clinical phobia. Still, it is important to remember that both the reported physical symptoms and the distress are real. Although the physical symptoms may be due in part or in whole to psychological effects (e.g., depression, anxiety disorders, somatization disorders, or PTSD), the pain is real and not “in their heads.” If the origin of the physical symptoms and the psychoneurological syndromes are, at least in part, psychological, psychological methods may prove effective for treatment. Regardless of causal factors, these psychoneurological syndromes are widely prevalent, difficult to treat, and costly in terms of both direct treatment costs and lost productivity due to illness. More research into the causes and treatment of these syndromes is urgently needed.

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