Medical Mysteries Along the Most Radioactive River in the World

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Life in a Real Nuclear Wasteland

Strange illnesses in one of the most contaminated towns in the world challenge what we think we know about the dangers of radioactivity.

A man walks next to his old house in the village of Muslumovo, Russia. The village is located on the banks of the Techa river in Russia's Urals, one of the country's most lethal nuclear dumping grounds. Photo by Denis Sinyakov/Reuters

In pop culture, irradiated wastelands are fascinating. If a person can't afford a packaged tour of the Chernobyl Zone, he or she can buy an avatar on S.T.A.L.K.E.R., a popular online game where players in a virtual Chernobyl Zone battle zombies, druids, and invisible plumes of contaminants. Part of the fantasy is surviving alone in an abandoned place no longer fit for the living, but the sad fact is that there are irradiated zones that are fully inhabited, and have been since the first years of the nuclear arms race. Despite a media culture enthralled with nuclear accidents, the cameras generally turn off after the first clouds of radioactive vapors dissipate.

What do we know about communities living on contaminated terrain? Two years after the meltdown of three reactors in Fukushima, Japan, the World Health Organization forecasts that there will be no significant rise in cancers among people living nearby. These projections are based on guesses from models calculated from prior studies, mostly of Japanese people who survived Hiroshima and Nagasaki. Yet when Japanese scientists and inspected the bodies of 38,000 children living in the Fukushima Prefecture, they found 36 percent had abnormal growths on their thyroids a year after the accident.

We have grown accustomed to this scenario—media attention to nuclear accidents followed by a long, slow quarrel among scientists about whether the spilled fission products will damage human bodies or not. It will take decades to learn the public health impact of the 2011 meltdown. By then, most of the public will have lost interest. But there are other ways to get at this question of what it means to live on earth sullied with decaying radioactive isotopes.

No one has lived longer on contaminated terrain than people in the village of Muslumovo in the southern Russian Urals located downstream from the Maiak plutonium plant, built in 1948 to produce Soviet bomb cores. Unlike the S.T.A.L.K.E.R. game, daily life in Muslumovo is terrifyingly banal: long waits at medical clinics, worries over the price of prescriptions, reams of paperwork related to compensation and disability claims, sick kids, unemployment, poverty, and chronic illness.

I showed up in Muslumovo on a Saturday morning in August 2009. Muslumovo is a big village, sprawled inside a crooked elbow of the Techa River, which is slow, sluggish, and considered to be the world's most radioactive. The village center has a train station, a few apartment buildings, and a corner store. Marat Akhmadeev met me at the station in his Soviet vintage car, dusty and dented. We jolted up and down on the choppy seas of the unpaved streets. Muslumovo is a strange village—half there and half gone. Many houses are abandoned, some partly dismantled, exposing weathered wallpaper and overturned appliances.

The Techa became a flowing radioactive reservoir in 1949 when engineers at the plutonium plant ran out of underground storage containers for high-level radioactive waste. A Dixie cup of this waste could kill everyone in a large ballroom. Compelled by the arms race, the plant director ordered it dumped in the Techa River. The men running the plant didn't tell anyone about this decision. The 28,000 Russian, Bashkir, and Tatar farmers living on the

river—drinking, cooking, and bathing with river water—had no idea. In the 1950s and '60s special forces resettled most of the 16 contaminated villages on the Techa, but a few villages were too large and expensive to move, so they stayed. Muslumovo is one.

There's no work in Muslumovo. A person either commutes 60 miles to the industrial city of Cheliabinsk or farms a patch of land of the long-defunct Muslumovo collective farm. Marat farms, living off the land—a term that takes on new meaning in Muslumovo, where in 2008, an American team found domestic interiors registering radiation at 40 times above the background level. After we pulled up at Marat's house, his teenage son silently trailed us. Noticing a twitch in the boy's step, I turned to look at him. His mouth drooped and fingers twisted, as he mouthed a stuttered greeting. Marat explained, "This is Kareem, nash luchevik," meaning "our radiant one," said in an off-hand manner, as if every family has a luchevik.

Marat showed me to a table full of food—veal, goose, salads, beets, potatoes. Murat wanted to eat first and talk later "in Tatar tradition." I didn't want to eat. It was 9 .a.m. and I wasn't hungry, but mostly I wasn't brave enough to ingest his homegrown food. This was the elephant in the room, about which neither he, nor I, nor his quietly attentive wife spoke; their food, which they must eat every day, must live on, was too radiated for me to eat for just one meal. Increasingly agitated, Murat rushed out to light up his sauna, and pulled out a bottle of vodka, offering me some. I turned the sauna and vodka down too. Soon, a neighbor arrived. The two men started to drink. In a few hours, Murat was howling drunk.

There is a legal contest going on over the health of the people of Muslumovo: whether they are sick and, if so, ill from the radioactive isotopes dumped in the river or from poor diets and alcohol abuse. Medical evidence has been contradictory. In 1959, Soviet scientist A. N. Marei wrote a dissertation in which he argued that the Techa villagers were in poor health because of their poor diets. In 1960, in contrast, local Soviet officials linked the river-dwellers' illnesses to the contaminated river. This debate between nature (radiation) and nurture (lifestyle) has been going on a long time.

For Soviet leaders, the river dwellers were a unique opportunity in the history of health physics—what scientists call "a natural experiment" that promised to answer an important civil defense question about how to survive a nuclear attack. In 1962, the Cheliabinsk branch of the Soviet Institute of Bio-Physics, called FIB-4, started conducting regular medical exams of the Muslumovo population. FIB-4 doctors invited village children playing on the streets to a clinic room to take blood samples. In Cheliabinsk, they set up a repository of irradiated body parts: hearts, lungs, livers, bones. They started a collection of genetically malformed babies who died soon after birth, each infant preserved in a two-quart glass jar. A Dutch photographer, Robert Knoth, visited the repository and saw hundreds of babies in jars. He photographed one infant with skin like patched, rough burlap. Another boy had eyes on top of his head like a frog. During the examinations, doctors did not inform the villagers of their exposures or of diagnoses of radiation-related illness.

In 1986, soon after the Chernobyl disaster, Glufarida Galimova, working as chief doctor at a pediatric clinic in Muslumovo, her native town, was puzzled by the saturation of illness in her community. The illnesses were rare, strange, complex, and often genetic: hydrocephalic children, children with cerebral palsy, missing kidneys, extra fingers, anemia, fatigue, and weak immune systems. Many kids were orphaned or had invalid parents.

Galimova asked other doctors about it. They said the villagers were sick of their own doing, from poor diet and alcohol. Doubtful, Galimova investigated and learned that FIB-4 had a 50-year-old registry with Muslumovo's health records. She requested the records be opened to the public. Her requests went unanswered. She went to the press and helped organize citizens' groups. The security services accused her of disclosing state secrets, and she was fired from her job. Undaunted, Galimova teamed up with the chief of genetics of the Siberian Academy of Medical Science, Nina Solovieva. The two doctors tracked newborns and pediatric health in Muslumovo. When, in 1995, Solovieva died of breast cancer, Galimova continued alone. She found that more than half of the children born in Muslumovo in the 1990s suffered pathologies. In 1999, 95 percent had genetic disorders. Meanwhile, 90 percent of Muslumovo's children suffered from anemia, fatigue, or immune disorders. Galimova examined the records of the city's adults and found that all of 7 percent could be described as healthy.

In 1992, FIB-4 doctors finally declassified Muslumovo residents' health records. Galimova discovered that in 1950, plutonium plant doctors came up with a new disease, diagnosed, so far, only in the Russian Urals—chronic radiation

syndrome (CRS), caused by extended exposure to low doses of radioactive isotopes. The first young plant workers diagnosed with the syndrome complained of headaches, sharp pains in bones and joints, and a constant weariness. One memoirist described the terrible ache of CRS as a pain that made him "want to crawl up the walls." They lost weight. Their gait slowed. They suffered severe anemia, wheezed heavily, and started to show signs of heart disease. The doctors learned to predict the onset of this mysterious new illness by changes in the blood, often signaled in severe anemia.

Soviet radiation biology took a different trajectory from science in the United States. American researchers at that time were working with the highly politicized medical studies of Japanese bomb survivors. They narrowed the list of radiation-related illnesses to leukemia, a few cancers, and thyroid disease. Soviet doctors in formulating chronic radiation syndrome had grasped the effects of radiation on the body more holistically. They determined that radiation illness is not a specific, stand-alone disorder, but that its indications relate to other illnesses. They determined that radioactive isotopes weaken immune systems and damage organ tissue and arteries, causing illnesses of the circulation and digestive tracts and making people susceptible to conventional diseases long before they succumb to radiation-related cancers.

Over the years, FIB-4 doctors had diagnosed 935 people on the Techa River with chronic radiation syndrome. But as thousands of people in Ukraine worried about their exposures from the Chernobyl blast, Soviet medical officials backpedaled on the FIB-4 doctors' original findings. In 1991, Angelina Gus'kova, the chief official voice in evaluating Chernobyl health problems, argued that in fact there were only 66 cases of chronic radiation syndrome among the Techa River people. The rest, she claimed, suffered from more prosaic diseases such as brucellosis, tuberculosis, hepatitis, and rheumatism caused by poor diets and sanitation. As American researchers supported by the Department of Energy have taken over as lead researchers of studies in Muslumovo, the diagnosis of chronic radiation syndrome has largely dropped from the radar. Meanwhile, Russian officials, worried about lawsuits, charged that many people in Muslumovo had dreamed up illnesses in order to sue for compensation. These people, they said, had no chronic radiation disease but were chronic welfare cases looking for handouts.

The trope of ignorant, genetically deficient, and drunken villagers is a common one in Russia. In the southern Urals in the past few decades, the cliché has been useful in glossing over the human suffering connected to uncontrolled dumping into the Techa River. In conferences debating the number of victims of the Chernobyl accident, officials who draw paychecks from nuclear lobbies make similar arguments about alcohol abuse and "radiophobia"—stress-related illnesses caused by fear of radiation. It would be a mistake, however, to allow the longstanding politicization of medical studies to overtake this very important, yet overlooked, place for our understanding of radiation's effects on human bodies.