

Manual for a Better Medicine

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One of the many achievements of Kate Brown's remarkable new book is to relocate the Chernobyl disaster and its official medicine internationally, but *Manual for Survival* also certainly illuminates the particularities of Soviet and post-Soviet medicine. The Soviet Union had a penchant for secret medicine with regard to radiation. Brown's readers learn early of Angelina Gus'kova, who was the first expert in Moscow to be called by the accident-stricken staff at the reactor, had treated more patients with radiation sickness than anyone else in the world, and had written the Soviet manual on the subject. Yet she did this having been forbidden to ask any patient directly about their exposure.

Much of radiation medicine was kept secret from the majority of Soviet doctors. Even those who worked near Chernobyl had no special training in it.¹ It was delegated to the Third Main Management of the Ministry of Health, and sealed hermetically from the rest of the public health apparatus, including the most senior medical administrators. One of the more interesting characters in the book is the Ukrainian Minister of Health, Anatolii Romanenko. He privately stood up for his subordinates against Moscow and its physicists while publicly reassuring the world about the accident. All the same, because of the secrecy surrounding radiation sickness, he knew almost nothing about it. The secret medicine continued after the accident in 1986. Brown reveals how Soviet medical authorities forbade doctors to diagnose chronic radiation syndrome as such. Its replacement, the vague vegeto-vascular dystonia, gave no hint that radiation sickness was at issue.²

Rebecca Manley has convincingly challenged the Stalin-era diagnosis of "nutritional dystrophy" as just a euphemism to hide mass starvation, showing how it advanced scientific understanding of malnutrition.³ Manley compels us to question euphemism in Soviet medicine generally. Dystonia may be an appropriate term because there is not one medical condition or set of symptoms that corresponds to radiation sickness. The post-Chernobyl emphasis on it, however, and the outright banning of mentioning chronic radiation syndrome, supports Brown's interpretation of camouflage through terminological vagueness. What is instead striking about the renaming of radiation sickness is how belated it was. Soviet official medicine resorted to euphemisms down to the dying days of the country.

Soviet officials also appear to have concealed their own homegrown, hard-won medical expertise from themselves. They instead turned increasingly to international medical experts. In her previous book, *Plutopia*, Brown

1. Kate Brown, *Manual for Survival: A Chernobyl Guide to the Future* (New York, 2019), 16.

2. Brown, *Manual for Survival*, 177.

3. Rebecca Manley, "Nutritional Dystrophy: The Science and Semantics of Starvation in World War II," in Wendy Goldman and Donald Filtzer, eds., *Hunger and War: Food Provisioning in the Soviet Union During World War II* (Bloomington, 2015), 206–64.

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chronicled the parallel development of the American and Soviet nuclear projects and communities, but in *Manual for Survival* she pushes much further, revealing the extent to which Soviet and international radiation medicine became intertwined.⁴ Even before Chernobyl, in the later years of the USSR, Soviet medicine had increasingly claimed its legitimacy through association with international medicine, most notably the World Health Organization. At key points in her book, beginning with the arrival of Robert Gale in Moscow immediately after the disaster, Brown recounts the dubious influence of western medicine and doctors on the Soviet response. To justify their weak response to the accident, Soviet authorities repeatedly leaned upon international agencies: the WHO, other UN bodies, and especially the International Atomic Energy Agency sent in their experts. Brown reveals their knowledge to have been incomplete and inadequate, however, and especially with regard to the IAEA, self-interested. In her book the international community of experts comes across as more like an international conspiracy, the transnational circulation of ideas as sinister.

Radiation hygiene could have been as stunted in its development as the reddened pines of the Forest of Miracles. Consider the apparent contrast with the Soviet science of non-radioactive toxins, which is what I study. One of the signatures of the Soviet science of environmental health is the *predel'no dopustimye konsentratsii*, usually rendered by their acronym, PDK. Literally, these are threshold-permissible concentrations but, more elegantly, maximum allowable concentrations, or just thresholds.

In the science of toxicology, a threshold is the point at which a toxin is sufficiently diluted or diffused for no effect on human health to be observed or, in Brown's terminology, it is the "safe dose." Toxicologists use a dose-response curve, the graph of which is non-linear and sigmoid for toxins: the responses to increasing doses of non-carcinogens rise very slowly before the threshold, prior to rising rapidly through it, then tailing off again afterwards. Therefore, an individual is considered "safe" when below the threshold.⁵

The determination of these concentrations was an international phenomenon, but the Soviet Union vigorously developed quantitative thresholds from the 1940s onwards for a range of toxins. In addition, chronic as well as acute poisoning, or "low dose" versus a single "high dose" in Brown's terminology, was a raised as a concern very early because the brevity of Soviet laboratory testing did not account for it.⁶ As a result, the thresholds for pollutants of both water and air were re-tested at the end of the 1950s with a more rigorous emphasis on sub-sensory damage to the organs and nervous system. In the early 1960s, Soviet standards for air pollution, although weakly observed, were stricter than those in California.⁷ By the

4. Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford, 2013).

5. Dade W. Moeller, *Environmental Health. Revised Edition* (Cambridge, Mass., 1997), 343.

6. Ia. M. Grushko, "Toksicheskie veshchestva i metodika kompleksnogo obosnovaniia gigenicheskikh normativov ikh dopustimoi konsentratsii v vodoemakh," *Gigiena i sanitaria* 14 no. 7 (July 1949): 11–15.

7. Gosudarstvennyi arkhiv Rossiiskoi Federatsii (GARF), fond 8009, opis' 34, delo 1042, listy 3–4.

nineteen-eighties, over a thousand maximum allowable concentrations for toxins had been assigned.⁸

Compared to the open development of thresholds for non-radioactive toxins in the air, water, and soil, radiation hygiene continued on its furtive way. A further challenge loomed, however, to the Soviet science of environmental health, that of toxins for which no safe threshold existed at all. This applied to carcinogens, of which an increasing number were being discovered. Early on, Soviet hygienists also found that no safe threshold existed for a handful of non-carcinogenic toxins. For example, in the mid-1950s, the emission of tetraethyl lead into sewage water was banned completely in the USSR.⁹ Over time, the number of non-carcinogenic toxins identified with no safe threshold increased. Internationally, scientists have come to suspect there is no safe dose for any airborne toxin.¹⁰

By the 1980s, Soviet threshold science had therefore reached a conceptual dead end. Western specialists in environmental health had produced a solution, risk theory, where, in contrast to classical toxicology, there is no threshold or safe dose. The dose-response graph for carcinogens is linear, and toxicologists instead seek doses of the substance that are “acceptable” rather than “safe.”¹¹ Risk analysis relies heavily on computer modelling and statistical analysis, with both of these very problematic, but presumably what made it unacceptable to Soviet medical scientists was its monetary valuation of human life and the use of cost-benefit analysis. This was a medical solution rooted in capitalist economics. Brown describes how a consultant who specialized in risk analysis was hired by the IAEA to determine who to move from contaminated areas on the basis of financial cost but was met with astonishment by Ukrainians and Belarusians.¹²

Radioactivity is the ultimate refutation of threshold science. Research into it, however, has offered solutions other than risk. In *Plutopia*, Brown identifies a “people’s epidemiology,” created by those downwind of the Hanford nuclear reservation, in coalition with concerned doctors, scientists, and activists. Instead of impersonal statistical aggregates in which so much could be hidden, this “people’s epidemiology” was individuated, localized, and qualitative. A local survey gathered together individual and family experience with health and diet. Radiation hot spots, confirmed through local knowledge of winds and landscape, replaced the overlay of the concentric and hugely inappropriate circles of a nuclear bomb blast, to far more accurately map radioactive contamination.¹³

Brown presents no direct analogue to a “people’s epidemiology” in *Manual for Survival*, but there are glimpses of a more humane, sensitive medicine. Rather than the downwinders, Soviet and post-Soviet doctors provided it. Valentina Drozd was an endocrinologist who meticulously tracked child

8. V.A. Kashuba, *Ocherk o gigiene. Metodicheskaja razrabotka*, (Moscow, 1989), 58.

9. GARF, f. 8009, op. 2, d. 2283, ll. 10 ob.-12.

10. Beth Gardiner, *Choked: Life and Breath in the Age of Air Pollution* (Chicago, 2019), 22.

11. Aaron Wildavsky, “Trial and error versus trial without error,” in Morris, Julian, ed. *Rethinking Risk and the Precautionary Principle*, (Oxford, Eng., 2000), 29.

12. Brown, *Manual for Survival*, 288–89.

13. Brown, *Plutopia*, 316–17.

thyroid cancers in Gomel' province and insisted they be reported. She was belittled, Brown speculates, because of her gender within a heavily male research wing of Soviet medicine. These radiosensitive doctors, however, were found at the other end of the medical hierarchy, too: even a KGB General who was also a doctor advised that the Zone of Alienation around Chernobyl be extended to include Kyiv, because the much greater resources at his disposal gave him a clear understanding of the extent of the contamination.¹⁴ It bears emphasizing that one of the many achievements of Brown's scholarship is to identify, find, and often interview these scattered medical researchers and practitioners.

Brown concludes that it was local doctors who collectively provided the most information. Some had been doing so long before Chernobyl. Gus'kova and others had treated workers over many years from the flagship Maiak plutonium plant in the southern Urals, developing a body of diagnostics and treatments for radioactive contamination even though they could not ask their patients if they had been exposed to radiation. They started with damage to the central nervous system but learned the level of radiation exposure by reading backwards the extent of cell damage to the patient. Moreover, Brown reveals the existence of a forty-year study of three generations of residents along the Techa, the most irradiated river in the world, outside the Maiak plant.

Brown also reveals that, after more than seventy years of the nuclear age and the worldwide fear of radiation, no careful, large-scale, long-term study of nuclear contamination has been compiled. The American Life Span Study of Hiroshima comes closest but does not grapple effectively with the calamity of chronic low-dose radiation, since it focused on the single high-dose radiation of the atomic bomb. Brown implies that the medical studies of Chernobyl, the many years of work with patients at Maiak, and especially the multi-generational study of the Techa could collectively provide that opus. Here is a body of work that is individuated, qualitative, and localized, grappling with no safe doses of radiation far more satisfactorily than risk theory.

So far, that information has been largely ignored and post-Soviet developments in Russia are not encouraging. In Moscow in 2017, the flagship Sysin Research Institute for Human Ecology and Environmental Health became the Centre for the Strategic Planning and Management of Medical-Biological Risks to Health. This completed a conceptual transformation in the Soviet science of anthropogenic threats to human health that began many years earlier. In 2001, the director of the Sysin Institute, Yuri Rakhmanin, told me that the concept of risk lay at the center of post-Soviet environmental health.¹⁵ The renaming of his institute in 2017 seemed to mark the final triumph of this western import. Yet one of the implications of *Manual for Survival* is how the prelude and especially the aftermath of this nuclear catastrophe germinated the beginnings of a better, far more humane medicine, deep within Soviet healthcare. It may not be too late to learn from Chernobyl.

14. Brown, *Manual for Survival*, 193–94.

15. Yuri Anatolevich Rakhmanin, author interview, Moscow, 2001.