

## Editorial

# Anthrax and Anthrax Anxiety: Sverdlovsk Revisited

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The ancient disease anthrax is suddenly and dramatically in the news. To date, seventeen cases have been identified in the United States, and four persons have died. All cases appear to derive from the deliberate spiking of letters with pure cultures of *Bacillus anthracis*. In response, the American public and medical communities have scrambled to develop an understanding of what to expect from the disease, including its natural history and attendant mortality rate. From our relative ignorance, in mid-October, literally thousands of noses were cultured and a comparable number of prescriptions written, all in hopes of averting a public health calamity.

Among other things, the current scare has revealed just how little we know about anthrax. The search for previously reported outbreaks, our traditional source of information, reveals a surprisingly bare cupboard, except for the celebrated 1979 outbreak in Sverdlovsk, a Soviet city of 1.2 million persons.<sup>1</sup> The remarkable particulars of the story, both the outbreak and how it came to be reported, have become legend in the medical literature; and, importantly, many of our assumptions and expectations regarding the most feared form of anthrax, inhalational disease, derive from this report. Yet complete reliance on this outbreak for the facts about anthrax may actually be serving to conflate an already overheated situation.

A careful reading of the article reveals a wonder of detective work. The cleverness and tenacity of the investigators in overcoming almost comically profound obstacles are remarkable and even inspiring. The authors began their investigation some 13 years after the event itself and were faced with missing records, faded memories, and the chaos anticipated when one tries to reconstruct events so long after the fact. Nevertheless, they persevered and uncovered such remarkable details as the wind direction each day in April 1979 (kept by the local airport) and the number of dead sheep in downwind towns. From this, they were able to conclude that a plume of *B. anthracis* had been released from a known military facility and was carried by a north wind, and that numerous persons had contracted inhalation anthrax from the exposure.

A subplot emerges from their investigation as well. The KGB destroyed most of the records and appears to have impeded investigations. The official explanation was

that the epidemic had been caused by ingestion of anthrax-tainted meat, a very unusual complication. Perhaps involved in this obfuscation was the chief Communist Party official for the region, Boris Yeltsin. In 1992, 13 years after the epidemic and soon after the fall of the Iron Curtain, now President Yeltsin (mirabile dictu) reportedly conceded "the KGB admitted that our military developments were the cause [of the epidemic]."<sup>2</sup>

As remarkable as the story is, however, a methodologic flaw looms large, something that even these ingenious investigators could not overcome. We simply do not know the true denominator of persons at risk, the number exposed, or the actual number of infected persons. When, after 9 days of unexplained illnesses, health authorities identified anthrax as the cause, they organized an impressive response, with triage to a designated health care facility, aggressive medical support of the very ill, distribution of tetracycline to households where a case had occurred, and an active vaccine campaign. However, no active case finding was undertaken to identify subclinical cases or persons who had received antibiotics for nonspecific symptoms, including those administered tetracycline by the health authorities.

Thus, the familiar 80+% mortality rate for inhalational anthrax established by this study may in fact be inflated. Unless anthrax operates by a set of rules unique among bacteria, one would expect to encounter a spectrum of disease, from the subclinical to the mild to the routine to the severe. The denominator used for this report, of necessity, was restricted to the group sick enough to be hospitalized or to have died. In other words, any sick persons who recovered without hospitalization were excluded, concentrating only the most ill patients in the report.

Furthermore, we have little idea of the attack rate for the town. The authors were able to determine a 1 to 2% incidence among workers at an affected ceramics factory. The population at highest risk from the plume was thought to number at least 7000 and thousands more downwind who might have been at risk for inhalation of a lower spore inoculum. Yet, the official number of cases was only 96, with information on 77 reported in the article. Thus, the doomsday scenario, wherein a single anthrax release results in the death of millions, may be overstated. Yes, this is a remarkably frightening disease, and yes, the ease of production and stability of spores make this a most worrisome weapon, and yes, the arsenal of pathogenic exotoxins available to *B. anthracis* is alarming indeed. Yet, it does not

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seem to be quite the lethal weapon that we so fear, but rather a disease that open-eyed doctors, informed patients, and a well-funded public health infrastructure can contain if not prevent.

Our current predicament with anthrax and other potential agents of bioterror demonstrates the short-sightedness of decades of inadequate funding and attention to countless diseases, infectious and otherwise. The frantic catch-up we are attempting now may be successful, and yet, one wonders if the largest lesson of all will be overlooked: that funds directed to biomedical research are never wasted, no matter the apparent obscurity of the disease or eccentricity of the question. With enough time, every disease seems, unfortunately, to have its moment.

Perhaps most of all, the events of recent weeks in New York City and Washington underline the need for a

cool head and steady hand from local public health and infectious disease experts in times of panic. Despite incomplete information, insufficient diagnostic tools, and an overheated public, good decisions were made that were based on coldblooded facts, not fears and what-would-happen-if scenarios. The only cure for anthrax anxiety, it seems, is control of anthrax itself. And this can only be achieved by the relentless pursuit of the epidemiologic, clinical, molecular biologic, and microbiologic facts about the new and old enemy, *Bacillus anthracis*.

## REFERENCE

1. Meselson M, Guillemin J, Hugh-Jones M, et al. The Sverdlovsk anthrax outbreak of 1979. *Science* 1994; 266:1202-1208.

## 2000 – June 2001 Reviewers

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