

Smallpox: Uncertain Threat

"Biological terrorism is our future, and smallpox is a serious threat," insists Ken Alibek, who headed the former Soviet Union's biological weapons program. Now vice chairman of Advanced Biosystems, based in Alexandria, Va., Alibek was *one* of 200 epidemiologists and tropical disease experts who gathered in Geneva last October to discuss how nations should prepare for an outbreak.

The U.S. has already outlined its plan--a voluntary regimen that aims to vaccinate a total of 10.5 million people in phases.

Some scientists, *however*, see little data to support such widespread vaccination. The plan is partly based on mock scenarios and mathematical models that attempt to predict the magnitude of an outbreak. One major problem is that *they* must use data on smallpox transmission gathered from pre-1977 Africa, where the last smallpox case occurred. The virus might behave completely differently in today's unvaccinated cosmopolitan societies. And all models rely on assumptions that by their nature are inaccurate.

The most grave outbreak scenario is "Dark Winter," to which U.S. Secretary of Defense Donald H. Rumsfeld has referred a number of times. *It* predicts that simultaneous attacks in three shopping malls could balloon to as many as one million dead and three million infected.

But many scientists find the scenario too extreme. What is most contentious is the infection rate. Dark Winter assumes that each infected person will transmit the virus to 10 others and even to descendants for several generations. *This* is not, *however*, what epidemiologists have observed in the field. Rarely was smallpox transmitted to more than two or three people, if at all, says J. Michael

Lane, former director of the smallpox eradication program at the Centers for Disease Control and Prevention, and most were infected by prolonged exposure. What is more, the virus is not transmissible until physical symptoms appear. By that time, Lane states, the person usually feels "so awful" that they are bedridden. And *even though* the virus may not behave the same way today, Dark Winter assumes that the sick are not effectively isolated, which is "totally unrealistic," *he* adds.

So instead of vaccinating millions, Lane would prefer to vaccinate a core group of first responders--around 40,000 people--and *then* to vaccinate only people who come into contact with an infected person (the vaccine is also effective for up to four days after infection). His plan more closely reflects what has actually transpired in terms of vaccination numbers.

Proponents of mass vaccination also cite a few exceptional cases in which smallpox spread easily. In 1970 a young engineer returned to his home in Meschede, Germany, after spending some time in Pakistan. *Soon after*, he checked himself into a hospital with flulike symptoms. Doctors quickly diagnosed *him* with smallpox, but during his stay 19 other people also became ill. The most bizarre case was the infection of a person who had briefly walked into the hospital lobby, discovered *he* was lost and left. The sick engineer had a cough, a highly unusual symptom but *one* that nonetheless made the virus highly transmissible. No one knows whether the smallpox strain was unusually hardy or the patients uncharacteristically weak.

Another outbreak occurred in 1963 when a young man, who had spent some time in India, came down with smallpox on returning to his home in Poland. By the time health authorities figured out *he* had smallpox several weeks later, 99 other people became ill. To contain the outbreak, authorities vaccinated eight million people, *even though* the population had been vaccinated as infants. (The illness tends to be less severe in vaccinated people, however.) Scary as *they* are, these stories are isolated cases and clearly do not represent how the virus behaved in the majority of outbreaks. "Surveillance and containment strategies were key components of the smallpox eradication program," Lane notes. "We must not lose sight of that."

(Scientific American: December 15, 2003)