

MILITARY RESEARCH

Researchers Target Flaws in Ballistic Missile Defense Plan

Researchers are stepping up efforts to shoot down a proposed U.S. missile defense system. More than three dozen scientists journeyed to Washington, D.C., this week to warn lawmakers that the \$60 billion system, designed to knock incoming warheads out of the sky, is technically flawed because it can't pick out real warheads from decoys. Pentagon officials heatedly deny a new report by one scientist that contractors have rigged trials to hide the problem, although they admit that some tests were simplified to save time. In the wake of these events, a leading Democrat is urging President Bill Clinton to delay a pending decision on building the system.

The national missile defense (NMD) system, one of several antimissile technologies being developed by the Department of Defense (DOD), is supposed to seek out and destroy intercontinental ballistic missile warheads as they approach their targets. Its interceptors, guided by onboard sensors and ground- and space-based radars, would smash into the warheads at speeds approaching 24,000 kilometers an hour, shattering them with brute force. Current plans call for a limited defense, with 20 Alaska-based interceptors by 2005 and 100 in 2007, that could blunt a missile threat from North Korea, Iraq, and other so-called "rogue states." The Pentagon has conducted four tests in the past 4 years, but Clinton has said he will wait until after a fifth interceptor test next month to decide whether to proceed.

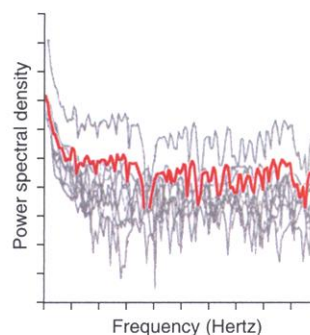
Some scientists say such a rigid deadline is a mistake and that the carefully controlled test won't determine if the system can foil a real attack. "The [system] is not capable of handling countermeasures" such as decoy

balloons, physicist Kurt Gottfried of Cornell University in Ithaca, New York, told attendees at a 12 June rally held at the Capitol. The Union of Concerned Scientists, which organized the rally, and the American Physical Society (APS) have reached similar conclusions (*Science*, 14 April, p. 243), with the APS Council noting on 29 April that the tests conducted so far "fall far short of those required to provide confidence in the [system's] 'technical feasibility.'" Added physicist Joseph Lach of the Fermi National Accelerator Laboratory in Batavia, Illinois: "Before you plunk down the money and start up the factories, make sure it works."

One blistering technical attack comes from physicist and nuclear engineer Theodore



Lost in the noise. Critics at a Washington rally this week, including physicist Joseph Lach, said missile defense sensors won't be able to distinguish between the infrared signatures produced by a real warhead (red) and clever fakes (gray).



Postol of the Security Studies Program at the Massachusetts Institute of Technology, who calls the tests to date "a scientific hoax." Postol analyzed data from a 1997 flight that tested the ability of an early version of the kill vehicle to distinguish between a real target and nine decoys. He concluded that engineers—despite public claims to the contrary—had failed to solve the system's main technical challenge of devising a sensor aboard the missile that could home in on the twinkling, erratic infrared signal produced by a real warhead tumbling through the vacuum of space. "The signals from both the warhead and balloons had no features that could be

exploited to tell one from the other using credible scientific methods," he wrote in an 11 May letter to White House Chief of Staff John Podesta demanding an independent review of the program.

To cover up that failure, Postol says, engineers at the Pentagon's Ballistic Missile Defense Organization and major contractor, TRW Inc. of Redondo Beach, California, selectively analyzed data and then simplified three subsequent tests by reducing the number and complexity of the decoys. They also scheduled trials to take advantage of beneficial light conditions, Postol claims. He compares the changes to "rolling a pair of dice and throwing away all the outcomes that did not give snake eyes." Similar charges have been leveled at TRW by Nira Schwartz, a former project engineer who was dismissed in 1996. Schwartz claims that she was fired after urging the company to share its knowledge of the kill vehicle's flawed vision. Legal documents generated in the course of Schwartz's suit are the basis for much of the information that Postol reviewed.

Pentagon officials concede that they simplified some tests to speed development. But they insist that the changes were not meant to hide any flaws in the system and do not undermine its credibility. "I will categorically deny that we're fixing the flights," Jacques Gansler, undersecretary of defense for acquisition and technology, told reporters shortly after *The New York Times* described Postol's analysis in its 9 June issue. Postol's review was limited to an early flight, DOD officials note, and thus ignores improvements in the kill vehicle, such as the addition of new sensors. It also fails to account for expected improvements in radars and computers. The first tests showed "proof of principle," Pentagon officials say, adding that it will take years for all the pieces of the system to be integrated into a smoothly functioning defense shield.

Postol, however, doubts that new equipment will be able to decode the confusing infrared signals. A major problem, he says, is that the kill vehicle must rely on its own infrared "eyes" in the final minute or two before impact, and that no amount of systems integration can correct for its inability to spot the right target. In addition, he says it is "incredible" that the government expects nations ca-

CREDITS: (LEFT TO RIGHT) RICK KOZAK; T. POSTOL

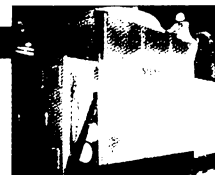


1949

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Q&A with
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1955

Fuel cells
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pable of developing nuclear-tipped missiles to be unable to deploy effective decoys. NMD is "a system in search of a cooperative enemy," says Representative Rush Holt (D-NJ), formerly a physicist at Princeton University.

Both NMD opponents and supporters agree that the technical dispute has further inflamed an international diplomatic debate over whether the United States should deploy the system. Russia and many U.S. allies oppose deployment on the grounds that it would require rewriting a 1972 treaty limiting such defenses. Such a step, they say, would increase the global risk of nuclear attack. Pointing to the system's technical problems and rising costs, even some senior Democrats are trying to persuade Clinton to leave the decision to the next president. If the system can't tell "a phony [missile] from a real one," says the Senate's top Democrat, South Dakota's Tom Daschle, "I don't know that we're ready to commit resources." That kind of uncertainty is music to the ears of the researchers who gathered here this week.

—DAVID MALAKOFF AND ADRIAN CHO

PUBLIC HEALTH

Deaths Among Heroin Users Present a Puzzle

The first symptom is an abscess where the needle broke the skin. Next, inflammation tears through the body, triggering a steep drop in blood pressure. The number of white blood cells skyrockets. Within hours, the victim's organs shut off one by one. More than 30 heroin users in Scotland and Ireland have died this dreadful way in the past 6 weeks, and health officials had reason to suspect that they were looking at the handiwork of a pathogen whose occasional appearance invariably is cause for alarm: anthrax, the notorious biological warfare agent.

The suspicions aroused a lightning-fast response from microbe hunters on both sides of the Atlantic. Their analyses, first posted on 1 June on *Eurosurveillance Weekly*—an Internet site that tracks infectious diseases in Europe—and in more detail in last week's *Morbidity and Mortality Weekly Report*, offer a somewhat reassuring conclusion: Anthrax did not kill the heroin users. It's unclear what did, but a new suspect has emerged.

"Drug addicts die all the time," says Syed Ahmed of the Greater Glasgow Health Board in Scotland. Even so, when Glasgow-area hospitals realized in early May that

heroin users were succumbing to a mysterious malady, it was obvious that the cases painted "a very different picture" from an overdose, Ahmed says. Rather, a pathogen appeared to be responsible. Then on 6 May, Per Lausund of the Norwegian Army Medical School in Oslo posted a notice on ProMED, an Internet forum for infectious disease specialists. It described the case of a heroin addict in Norway who had died of anthrax the week before. Lausund had not yet heard about the Scottish victims.

Researchers suspected that a batch of heroin of unknown origin had been contaminated, knowingly or otherwise, with the anthrax bacillus, the spores of which can lie dormant in harsh conditions for years. Although anthrax is not transmitted from person to person, the possibility of any commodity being spiked with the bacillus raised red flags. Springing to action was the U.K. Department of Health's Centre for Applied Microbiology and Research (CAMR) in Porton Down, a lab that keeps samples of many exotic diseases. "Anthrax is one of our specialties," says CAMR microbiologist Phil Luton. Its investigation drew intense public interest in the wake of news reports speculating about a budding anthrax epidemic.

Since the U.K. Department of Health issued a Europe-wide alert on 19 May, the death tally among heroin users has climbed to 18 in Scotland, seven in Ireland, and seven in England and Wales. In a conference call on 30 May, U.K. and Irish health officials concluded that they were "dealing with the same phenomenon," says Joe Barry of Ireland's Eastern Regional Health Authority in Dublin. The authority, like its Scottish counterpart, shipped samples from patients to the U.S. Centers for Disease Control and Prevention (CDC) in Atlanta for analysis.

The CDC and the CAMR returned good news: no anthrax. But the mystery deepened. The only bacteria the labs isolated are common ones unlikely to trigger such severe symptoms, says Ahmed. Although the outbreak appears to be subsiding, he says, "we still don't know what [the drug users] are dying of." The Norwegian death appears to be unrelated, he adds.

Suspicion now centers on *Clostridia*, a family of more than 30 species including the bacteria that cause botulism, tetanus, and gas gangrene. Like anthrax, *Clostridia* form spores hardy enough to survive the high temperatures reached when heroin is dissolved before injection. And some

Clostridia are hard to culture, which may explain why pathogenic strains have not yet been detected conclusively in tissue samples from the heroin users.

But the circumstantial evidence is mounting. Most of the victims had dissolved the heroin in citric acid before injecting it into their muscles. Citric acid damages tissue, perhaps providing a hospitable oxygen-starved environment for *Clostridia* spores to flourish, says Ahmed. What's more, toxins



One-way trip. A mystery pathogen is killing heroin users in the U.K. and Ireland.

churned out by many *Clostridia* species would account for the rapid progression of symptoms and death. "Once the toxin is produced, an antibiotic treatment is too late," says Brian Duerden of the Public Health Laboratory Service in London, the British version of the CDC.

Researchers haven't ruled out other possibilities, however. "It may be a new pathogen or something that makes you slap your head and say 'Gee, why haven't I thought of that before,'" says Martin Hugh-Jones of Louisiana State University in Baton Rouge. With roughly half of powder sold as heroin cut with filler, he says, "there's a lot of space to let you inject God knows what." And whatever that might be is likely to kill again.

—MICHAEL HAGMANN

TOXICOLOGY

Just How Bad Is Dioxin?

The verdict is in—again: Dioxin is even worse for human health than previously believed. But, as has been true with earlier pronouncements on dioxin's risks, that judgment is controversial and may be appealed.

This latest assessment comes in an eagerly awaited draft report from the U.S. En-