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High-Stakes Science

Labs that research deadly microbes are proliferating around the country, but are they creating more risks than they prevent?

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Biologist Thomas Geisbert knows the drill. When Boston University's National Emerging Infectious Disease Laboratories opens sometime in 2008, he and his wife Joan, also a biologist, will conduct experiments in the building's most secure facility: a dense concrete bunker that has been described as a safe within a submarine and that requires FBI clearance to access. Several times a day they will change from street clothes to scrubs, then to spacesuits, hook themselves up to plastic coiled air hoses, endure a seven-minute chemical shower, and clear at least three retinal scanners before entering the lab itself. The facility is known as a BSL4 lab, for "biosafety level 4"—the highest level of lab security. Once inside, the couple will study the world's deadliest pathogens—those with no known cure. For Geisbert the risk is worth it. "There is so much fertile ground at this stage of research," he says. "So much work that hasn't been done yet."

But whether or not they get to work at all may depend on how the surrounding community, and by extension the nation, resolves its concerns about what has become a well-funded but poorly regulated national research program. Before the anthrax mailings of 2001, the United States had just two BSL4 labs—both within the razor-wire confines of government-owned campuses. Now, thanks to a tenfold increase in funding—from $200 million in 2001 to $2 billion in 2006—more than a dozen such facilities can be found at universities and private companies across the country.

That expansion has touched off a battle over how and where we should study such pathogens. Natural outbreaks of incurable diseases (including a Rift Valley fever outbreak that killed more than 100 people in Sudan earlier this month) continually underscore the need for high-containment research—as does the ever-present threat of bioterrorism. Yet more labs, money and scientists dedicated to this line of work create only more opportunities for the accidental or intentional release of something truly horrendous. "In 1999 there were about six research groups working on anthrax; today there are about 200," says Edward Hammond, director of the Sunshine Project, a watchdog group that has been monitoring the unprecedented lab expansion. "You can't scale up like that without risking major problems."

A report by the Government Accountability Office recently found more than 100 security failures at high-containment labs (which include those rated BSL4 and the next-highest level, BSL3)—including cases of infected lab workers and missing stocks of virus and bacteria. A ferret infected with bird flu bit a lab worker in Maryland. Three plague-infected mice went missing from a New Jersey lab, and at the Fort Detrick military lab, anthrax-causing bacteria were found on a freezer handle and light switch. But at the same military facility the Geisberts helped discover a vaccine that may one day be used to protect humans from Ebola.

Citizen's groups have sued Boston University in an attempt to keep the Geisbert's nearly finished BSL4 lab (the first to be built in the densely populated Northeastern Corridor) from opening. A risk assessment by the National Institutes of Health (NIH)—which provided $128 million for the lab's construction—concluded that Boston was as safe a location for the facility as any less populated area. But last week the National Academies of Science (NAS) sided with a state judge and community activists when it determined that that assessment was not "sound and credible."

"They only considered the scenarios that would give them the outcome they wanted," says Lynn Klotz, a senior science fellow at the Center for Arms Control and Non-Proliferation, who was not involved in the NAS assessment. For example, NIH's worst-case scenario included the accidental release of a virus that is transmitted through cattle, but not one transmitted through rodents, which are obviously more prevalent in urban Boston. NIH also failed to factor in the health of the local neighborhood, which has a high prevalence of HIV/AIDS and would be particularly threatened by the release of an infectious agent.

Those who support the expansion of the nation's biodefense point to the inevitable threat posed by Mother Nature. Densely packed cities and the ability to travel easily from one part of the world to another mean that pathogens can spread faster and farther than ever before. "There is a sense that infectious diseases are emerging more rapidly, and history tells us it's only a matter of time before the next pandemic," says Richard Besser, director of the CDC's coordinating office for terrorism preparedness and emergency response. "We want to be the first generation truly prepared to fight that when it comes."

But some scientists say that argument obscures the true purpose of the current biodefense boom: to study potential biological weapons. "The university portrays it as an emerging infectious disease lab," says David Ozonoff, a Boston University epidemiologist whose office is right across the street from the new BSL4 facility. "But they are talking about studying things like small pox and inhalation anthrax, which pose no public health threat other than as bioweapons." And when it comes to terrorism, Ozonoff says, more labs will only increase the threat of an attack. "There has been one serious bioterror incident," he says. "That was anthrax, and it came from a biodefense lab." While the university has repeatedly stated that the new facility will not house bioweapons research, that might not be a promise it can keep. The original NIH mandate for the lab indicated that many groups—including the CIA and Department of Defense—would be allowed to use the lab for their own research, the nature of which BU might have little control over.

Still, if infectious disease research is necessary, the labs will have to go somewhere. "We have to decide," says Jack Murphy, a biologist at Boston University's medical school who supports the new facility. "Are there things that we should not study at all because they are too dangerous, or aren't there?" As the debate continues, Boston University's newest research facility waits on a corner of the school's medical campus, a complicated lattice of steel, wire and concrete that could one day house the first cure for Ebola—or the next dangerous accident.

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