



COMBATING DISEASE.
PURSUING CURES.



/NEIDL

National Emerging
Infectious Diseases
Laboratories

BOSTON
UNIVERSITY



“Infectious diseases have always afflicted mankind and always will. New infectious diseases emerge and old diseases re-emerge as microbes adapt to new hosts and new environments. To remain one step ahead of our pathogenic microbial foes, we must understand in detail how pathogens interact with their hosts, and how biological, environmental, and social factors combine to allow pathogens to infect new organisms.”

— DR. ANTHONY FAUCI,
Director, National Institute of Allergy and
Infectious Diseases
(Cell, 2006, 124:665–670)



“The future of humanity and microbes likely will unfold as episodes of a suspense thriller that could be titled Our Wits Versus Their Genes.”

— DR. JOSHUA LEDERBERG,
1958 Nobel Laureate in Medicine
(Science, 2000, 288:287–293)

FOR THE LAST SEVERAL DECADES, A NEW VIRUS, BACTERIUM, OR PARASITE THAT CAUSES HUMAN ILLNESS HAS EMERGED OR RE-EMERGED SOMEWHERE IN THE WORLD EVERY 12–18 MONTHS.

Because we are globally connected through travel and trade, these emerging and re-emerging pathogens represent real global public health threats, no matter where they arise and no matter where we live. The potential for a global pandemic due to emerging pathogens is a reality. Whether it is a continually evolving virus, such as avian influenza (“bird flu”), or the first introduction of a previously known pathogen threat into the United States, such as West Nile virus, which rapidly spread across the United States and elsewhere in the Western Hemisphere in 1999, or previously unknown viruses, such as severe acute respiratory syndrome (SARS) in 2002–2003 and Middle East respiratory syndrome (MERS) in 2012, these microorganisms pose serious threats. The unprecedented 2014–2015 outbreak of Ebola virus in West Africa reinforces the notion that there is a continuous risk to the US and other countries around the world.

Why are these emerging events happening? First, microbes have one very major advantage over us—they multiply, evolve, and adapt over very short time frames. Second, while many emerging agents reside in animal reservoirs, they have been able to cross species lines to infect humans due to increased contact in nature, in live animal markets, and from the legal and illegal global trade of exotic species. Third, insect vectors, including mosquitoes and ticks, which are often involved in transmission of emerging infections to humans, are either already established in the United States or are spreading beyond their initial habitats.





OUR MISSION

“Research and education are central to our economy and are what make Boston different from most other cities. We want to be a premier emerging infectious diseases institute, not only in the United States, but in the world.”

— RONALD B. CORLEY, PhD, Director, NEIDL



The National Emerging Infectious Diseases Laboratories (NEIDL) has been constructed at Boston University's Medical Campus to conduct basic and translational research to increase our understanding of emerging infectious agents that cause human disease. Through our own research and national and international collaborations, the NEIDL uses this knowledge to identify and develop new and better treatments, vaccines, and diagnostic tools while working in the most secure and safe environment.

In parallel, the NEIDL is a center for training and education in emerging infection research. It is essential to develop and train the next generation of scientists to meet the ongoing and future challenges. The NEIDL also contributes to advancing public knowledge and awareness, and further complements the region's reputation as a major biomedical research hub.



THE BUILDING

The NEIDL is a 192,000-square-foot, 7-story building, designed and built in accordance with the most stringent specifications set by the US government for conducting infectious disease research. It also incorporates the cumulative experience of existing biosafety level 4 (BSL-4) facilities in North America into its development. Because safe research with human pathogens requires different levels of bio-containment, the NEIDL has been built with BSL-2, BSL-3, and BSL-4 containment spaces for research.

Approximately 40% of the building is dedicated to the infrastructure and redundant support systems required for working in the BSL-3 and BSL-4 laboratories in a safe and secure manner. The NEIDL's redundant capacity for all critical building systems ensures the safe and uninterrupted operation at all containment levels at all times. These extra capacities are designed to protect the facility in the event of a power outage or natural event such as storms or earthquakes. All NEIDL operating systems and procedures are built upon, or exceed, best practices in the field, and are tested and maintained on a regular schedule by our highly skilled and dedicated facilities staff.



OVERSIGHT

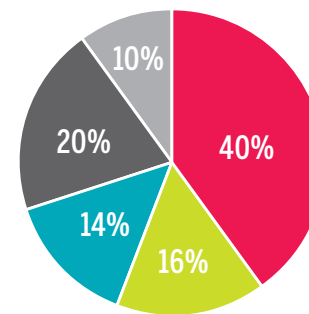
A number of safeguards are in place to protect researchers from the pathogens they study, which in turn ensures the safety of the outside community. The integrity of these safeguards are constantly monitored by internal and external oversight agencies, including both local and federal agencies with expertise and regulatory responsibilities.

Internally, and independent of the leadership and scientific staff of the NEIDL, the Institutional Biosafety Committee at Boston University has oversight responsibility for all biosafety programs within the University, including those at the NEIDL. Full-time Environmental Health & Safety (EH&S) professionals oversee all daily work within the facility, manage the Federal Select Agent Program to ensure that all work at the NEIDL adheres to safety guidelines, and provide leadership with ongoing educational and training programs.

Externally, all guidelines and regulations of the Boston Public Health Commission and the Centers for Disease Control for containment and select agent research are followed. Both agencies conduct unannounced as well as announced inspections of our facility, our researchers, and our standard operating procedures and practices. We also work closely with city and state agencies, such as Police, Fire, and EMS, on collaborative training programs, including tabletop and full-scale training exercises within the NEIDL and in the Metro Boston area.



NEIDL: TOTAL BUILDING AREA



- Building Support
- BSL-2 Research
- BSL-4 Research
- Administrative
- BSL-3 Research



SAFETY AND SECURITY

The NEIDL adheres to the most up-to-date and stringent engineering, security, and safety standards. Safety and security begins with our researchers and our staff, who understand they must work as a team and that everyone plays an essential role in keeping their work environment safe. As part of their job responsibility, each and every individual takes personal accountability for safety and security in the NEIDL. The rigorous observance of standard operating procedures for safety, security, and operations is of the utmost importance. Safeguards include extensive training, retraining, and certification of all staff. For this purpose, the facility houses a unique training simulator, built to facilitate the initial training of NEIDL researchers and staff in BSL-4 safety and procedures. Other safeguards include limited and controlled access to the building and its secured laboratories and infrastructure support spaces, and continuous engagement of all scientists with EH&S and facilities staff to emphasize a universal culture of safety.

Every individual working in the facility is initially evaluated through extensive background security checks, with a mandatory annual recertification.

Personal property, whether staff or visitor, is screened before entering the facility. Our highly trained Public Safety officers are on site 24/7 to manage and monitor the security of the facility, with particular attention to potential risks, threats, and vulnerabilities. Public Safety officers also monitor and audit all areas of access and manage personnel suitability on a continual basis to be certain we fully adhere to all regulations.

TRANSPARENCY

The NEIDL is committed to being completely transparent about its research and to engaging the public concerning safety and security within the facility. The Community Liaison Committee (CLC), made up of representatives from the neighborhoods around the NEIDL, routinely meets with NEIDL leadership and staff members. Regularly scheduled meetings are held to facilitate the continuing conversation and exchange of information between the community and the NEIDL about the facility's activities and research. The NEIDL's highest priority is maintaining trust across the broader community through this respectful dialogue. The NEIDL leadership and staff will continue to be responsive to community interests through outreach, educational programs, and seminars.



PERSONAL PROTECTIVE EQUIPMENT (PPE)



What do researchers wear at each biosafety level (BSL)?

According to the National Institute for Occupational Safety and Health, it is estimated that 20 million workers, such as firefighters, construction workers, and athletes, use personal protective equipment (PPE) on a regular basis to protect themselves from various job hazards.

At the NEIDL, PPE is worn by laboratory personnel for protection against lab exposures to any infectious materials. After each use, all PPE is removed, thoroughly cleaned, laundered, disinfected, and safely disposed of.

While the PPE and some engineering controls change at each biosafety level, all standard lab practices, such as use of a biosafety cabinet and no mouth pipetting, remain the same. All PPE must follow the CDC's regulations and meet specific performance standards for protection.



BSL-2

Laboratory coats
Gloves



BSL-3

Tyvek® suits
N95 mask/Powered Air Purifying Respirator (PAPR)
Eye protection



BSL-4

Full-body positive pressure suits
Multiple layers of gloves

To ensure that the laboratory is operating according to established parameters, daily inspections of essential containment and life support systems must be completed and documented before laboratory work begins. Researchers who use BSL-4 laboratories have extensive training in handling hazardous infectious agents. Access to BSL-4 laboratories is strictly controlled.





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For more information about the NEIDL,
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The NEIDL

represents a major step forward in advancing global public health and solidifying the New England area's reputation as the biomedical research hub of the nation.



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