

North Carolina: adding innovation to military medicine

\$66B

total economic
impact in
North Carolina



6

major military
installations

\$1.9B

provided by
Department of
Veterans Affairs
in medical care
to North Carolina



12%

of North Carolina's GDP is military



Source: Data from the North Carolina Military Business Center

U.S. Department of Defense

We're bringing innovative life science technologies and expertise to key military and national security agencies to benefit our state—and our country.

North Carolina is home to a dynamic life science ecosystem alongside a robust defense sector that contributes \$66 billion in total economic impact. At NCBiotech, we are working with leaders around the state to leverage our military presence and life science research capabilities to find solutions to issues faced by the Department of Defense (DoD).

NCBiotech is working with its partners to increase North Carolina's share of DoD spending by aligning our well-recognized life science strengths with DoD and national security strategic priorities. Life science research companies statewide are working to provide vaccines and wound-healing technologies for soldiers, and to protect the world's food supply.

Companies throughout the state are harnessing compounds, microorganisms and unique materials to bring novel therapeutics, surgical devices and regenerative medicine to civilian and military markets. For example:

- **Entegriion** is developing new ways to prolong the useful life of plasma;
- **Keratin Biosciences** is developing products that promote regenerative healing of complex tissue injuries, skin wounds and other skin conditions;

- **Medicago** received funding from the Department of Defense to produce novel flu vaccines and therapeutic proteins in genetically altered tobacco plants;
- **Humacyte** is developing a unique bioengineered blood vessel that can save lives in field hospitals.

Funding Bio Defense Innovation

In 2014, NCBiotech launched its Bio Defense Initiative. Through the program, NCBiotech supports innovative technologies and in-state university research in the sector through its grants and loans. Recent funding examples include:

- Greenville-based **RFPI**, developing imaging technology that visualizes blood flow without the need for injections, dyes, radiation or direct patient contact;
- **InnAVasc Medical** of Durham, developing a safer and more accessible arteriovenous graft (an indirect connection between an artery and vein), for use by hemodialysis patients;
- **NC State University**, developing light-activated cellulose coatings with anti-infective properties for use in novel, renewable, biodegradable, anti-microbial consumer staples;
- **Wake Forest Innovations** for LacunaDx, a novel nucleic acid-based point-of-care diagnostic for infectious disease.

North Carolina: connecting life science to military evolution



DoD Partnership Drives Innovation

Entegriion's ongoing development of a pooled, pathogen reduced dehydrated human plasma product for transfusion, Resusix, drew the attention of the Department of Defense. To date, the federal agency's contracts with the Durham-based company have totaled more than \$88 million. Resusix, which is entering its second phase of development, is intended to overcome the storage and safety limitations of fresh frozen plasma and to meet the demands of remote and austere military settings. Entegriion is a joint spinout from East Carolina University and the University of North Carolina at Chapel Hill.

Helping Wounded Soldiers

Winston-Salem-based **Keratin Biosciences**, formerly KeraNetics, has improved the treatment of soldiers injured in combat using the versatile material found in skin—keratin. As KeraNetics, the company developed Kerastat for wound care and Keragenics for tissue regeneration. Both products are based on research and patents originally developed at Wake Forest University.

The company received grants and funding from NCBiotech, Biomedical Advanced Research and Development Authority (BARDA) of the U.S. Department of Health and Human Services, and the Department of Defense.

Improving America's Medical Response

Medicago USA develops vaccines using virus-like particles grown in the leaves of *Nicotiana benthamiana*, an early form of tobacco. Half of its \$42 million factory "greenhouse" in Research Triangle Park was funded by the Defense Advanced Research Projects Agency (DARPA), which develops emerging technologies for the U.S. military. DARPA needed a fast and flexible source of vaccines in case of a bioterror attack or pandemic. NCBiotech helped recruit the Canadian company's U.S. manufacturing site.

Targeting Battlefield Wounds

Humacyte, a Duke spinout with over 100 employees developing a life-changing bioengineered blood vessel, has formed a global partnership with Fresenius Medical Care that includes a \$150 million equity investment. And DoD funding is helping Humacyte through clinical development. The Durham company's unique vessels show unmatched promise for repairing severe injuries and restoring critical blood flow.

North Carolina has a unique blend of a strong military presence and leading life science R&D capabilities. Ask NCBiotech how we can help you transform your life science technology into a defense asset.

North Carolina Biotechnology Center

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