

## Public Health Benefits of Biomedical Innovation

### Universities promise innovation and economic development

Innovative biomedical research has repeatedly shown its immense value by finding cures for devastating diseases, improving public health, and generating economic prosperity. The impact on society of breakthrough research and its consequential innovation, such as universally recommended vaccines for children, recognition of tobacco as a health hazard, and fluoridation of drinking water to prevent dental cavities, are highlighted on the Centers for Disease Control's list of the ten top public health achievements of the 20th century.

Biomedical innovation includes development of new drugs, medical devices, and prosthetics; techniques for public health protection; information systems; and more. Successful and wide-reaching examples include long-lasting insecticide-treated bed nets for malaria prevention, the bebionic3 artificial hand, and phacoemulsification, which revolutionized the surgical removal of cataracts.

Public health innovation also comes in the form of policy and protocol, from small pox vaccination and diabetes control through healthy lifestyles, to simple solutions such as Vitamin A supplementation to decrease blindness and mortality in pediatric populations of developing countries.

The University System of Georgia helps drive biomedical research findings from the laboratory into accessible health care for the citizens of Georgia and beyond.

### Biomedical research creates jobs and economic development

The key to American global competitiveness and economic health is in significant funding of research, the first step to innovation.

- The United States ranks fifth globally among the most innovative nations.
- In 2013, academic research centers conducted about 60 percent of basic research in the U.S.
- Companies founded as a result of university research are more likely to be successful, to create high-quality jobs, and to spur economic activity.
- A 2012 licensing survey conducted by the Association of University Technology Managers reported 705 startup companies formed from a research university in 2011, with over 4,000 earlier startups still in operation.
- For every \$1 million in research and development spent at academic research universities, 36 jobs are generated.
- Most North American research parks are operated by university or university-affiliated nonprofits.
- University science parks employ more than 300,000 workers in North America.
- Every research park position generates an additional 2.57 jobs in the economy.
- The United States has produced more Nobel Prize winners than any other country.

### Academic research generates success stories

“Colleges and universities play a critical role in state economies through the production of workers in critical occupations, the conduct of research, and the dissemination and commercialization of new knowledge,” reports the National Governors Association.

- Google began as a basic research project by two graduate students at Stanford University with support from a National Science Foundation grant. Their ideas developed into an internet giant with a workforce of more than 19,000.
- Statistical Analysis System, a software suite, began as a USDA-supported research project to analyze agricultural data at North Carolina State University. SAS Institute now holds the largest market share in advanced business analytics and employs more than 11,000 people.
- More than 90 percent of HIV-infected patients take at least one of the drugs invented by Dr. Raymond Schinazi, a professor and research scientist at Emory University in Georgia. His discovery and subsequent commercialization of several antiviral medications through synthetic, biochemical, pharmacological, and molecular genetic approaches has resulted in successful treatment for millions of patients.

### Augusta University is a major source of research innovation

At AU, recent innovations and discoveries are hallmarks of forward-thinking scientists addressing public health needs. They include:

- **The AU Stroke/Telestroke Network** utilizes telehealth technology to overcome geography in the assessment and care of stroke patients living in rural Georgia. Through REACH, emergency room physicians use cameras and telephones to confer with consultants in Augusta to visually assess patients, eliminating delay in care and costly travel while giving patients access to state-of-the-art medicine. The network comprises 11 hospitals statewide.
- **Build-A-Brain**, a unique teaching app collaboratively developed by AU allied health sciences faculty and IT specialists, uses 3D models and a game-like format to support students in their understanding of the brain’s complex neural system – its parts, relationships, and connections. Physicians and educators can also access the app to help patients visualize diagnosis and treatment in brain disorders.
- **The AU Driving Simulation Lab** evaluates and helps improve driving performance of both healthy individuals and those with impairments due to stroke or other central nervous system conditions. The lab’s innovative research develops wide-ranging applications that improve quality of life for neurologic patients while setting standards of care in the field.

The [Augusta University Office of Innovation Commercialization](#) – home to four biomedical start-up companies, each with the potential to greatly impact public health worldwide.

- **Camellix** –Harnessing the power of ECGC, the component of green tea that suppresses the body’s inflammatory response, Dr. Stephen Hsu is developing better, natural treatments for illnesses both rare and common.
- **Jinfiniti Biosciences** – Jinfiniti provides a variety of high-throughput scientific services, including nucleic acid isolation, genomic analysis, antibody production, immunoassays, medicinal chemistry, and toxicity evaluation, for academic and pharmaceutical institutions.
- **Luminomics** – The company’s research is focused on zebrafish with the hopes of developing a streamlined procedure for large-scale drug screenings, currently based largely on other animal models that don’t have sufficient regenerative capacity.
- **SISENE Oncology** – SISENE is developing a new drug therapy that targets glioblastoma multiform, the most common type of malignant brain tumor, and other large solid tumors such as those found in lung and colorectal cancer.

### [Building supportive biomedical innovation environments](#)

For Georgia to achieve its goal of becoming a center for global health, supportive environments at the university and institutional levels must be continually nurtured and reinforced. Supportive environments have a forward-thinking vision for biomedical innovation and a focus on solving public health needs. They include:

- Clearly defined institutional policies created with faculty input that promote research creativity.
- A fair share of revenues generated by the research to the inventor.
- Development of innovative research scientists trained to select suitable research targets.
- Collaboration with medical device and pharmaceutical companies.

In addition, training of PhD and post doc students in the recognition of public health needs, basic steps of research disclosure and technology transfer, and the IP legal and regulatory environment is vital to building a strong homegrown base of scientists. Scientists who make breakthroughs in Georgia and are helped to disseminate and commercialize their findings will create companies and jobs in Georgia. Our challenge is to find ways to help them be successful here at home.

In 2013, 165 university chancellors and presidents representing all 50 states addressed a letter to President Obama and the U.S. Congress asking them to close the innovation deficit and increase investments in research and education, pointing out that more than half of U.S. economic growth since World War II has been a consequence of technological innovation resulting overwhelmingly from federally funded scientific research.

Studies indicate that biomedical research takes about 17 years to transfer just 15 percent of clinical trial results to patient care. A separate study found that Technology Transfer Officers believe fewer than half of inventions with commercial potential created by faculty are disclosed to their employing universities. It speculates that faculty may not realize the commercial potential of their invention or are unwilling to become involved in licensing procedures.



For Georgia to push to the front line of biomedical research, the state must cultivate supportive communities that take advantage of developing health technology and innovation. Biomedical research works to find solutions to public health needs; without public participation in that research, breakthroughs have no meaning. Community participation through advisory boards, as research subjects, and in sharing health stories inspires scientists and makes biomedical breakthroughs possible. It is the responsibility of both the research university and the community it serves to work together for the greater good.

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