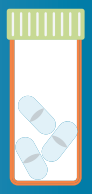
HEALTH AND BIOSCIENCE AT NIST

BY THE NUMBERS

7+ billion
Clinical lab tests are performed annually *(American Clinical Laboratory Association)*

10%
Of patient deaths are attributed to diagnostic errors *(Improving Diagnosis in Health Care, 2015)*

4.3 billion
Prescriptions were filled in U.S. in 2014 *(IMS Health)*



1.6+ million

People are employed by 73,000+ U.S. bioscience businesses *(Battelle/BIO, 2014)*

$86 billion
Total U.S. medical exports in 2014 *(Census)*

Precision—or personalized—medicine tailored to individual differences in genes, environments and lifestyles can improve health and patient care while helping to control U.S. health care costs, now totaling $3 trillion annually. But for precision medicine to become a clinical reality, the measurements that drive treatment decisions must be reliable and the individualized therapies must be safely and efficiently manufactured. With improved measurement capabilities, progress in science—from genomics and tissue engineering to bioinformatics and nutrition—and medical technology can be harnessed. At the same time, this work can yield bioscience-based solutions to challenges in energy, food security, sustainable industrial products and more.

What NIST Does

- Develops the measurement tools necessary to further technology in key emerging areas, including microbiome research, regenerative medicine and synthetic biology.
- Creates repositories of reference materials and data to assure the quality of clinical and analytical measurements.
- Partners with other government agencies, industry and academia to establish best practices and standards.

www.nist.gov

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Recent Program Highlights

- Issued the first DNA reference material that laboratories can use to assess how accurately their gene-reading machines and software are performing when analyzing patients' genomes, or genetic blueprints.
- Launched a five-year research effort with an industry partner to develop tools and measurements that will be used in the development and production of biopharmaceuticals.
- Demonstrated the first calibration system for positron emission tomography (PET) scanners directly tied to national measurement standards. Better calibrations of the machines potentially can increase the accuracy of their diagnostic images by several times.
- Launched a collaborative project to develop cybersecurity solutions that protect wireless medical devices from unintended or unauthorized access and change, including malicious acts.

New for FY 2017

NIST will expand its effort to improve the predictability of biomanufacturing processes. The request includes a $2 million increase to:

- Coordinate a measurement infrastructure to support expanded applications in biomanufacturing. NIST will convene stakeholders to identify measurement and standards needs and begin the creation of a community-driven pipeline of high-quality data.
- Develop robust design and testing tools for biological systems. NIST will design methods for measurement of these systems, including developing new components for testing the function of engineered cells as "factories" to manufacture small molecule drugs and other products.

Program Goals

- Provide a solid **foundation of measurement assurance** to enable reproducibility of biomedical research results and confidence in clinical decision-making.
- Increase the efficiency of biological manufacturing for biopharmaceutical and industrial applications by **developing analytical tools** to improve characterization of materials and in-process measurement.
- **Develop the measurement infrastructure** to enable the engineering of biological systems to harness the metabolic diversity of the natural world for human needs.

Budget