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Science Goes "Dry," Funding Cannot

A letter from David A. Brenner, MD, President and CEO of Sanford Burnham Prebys

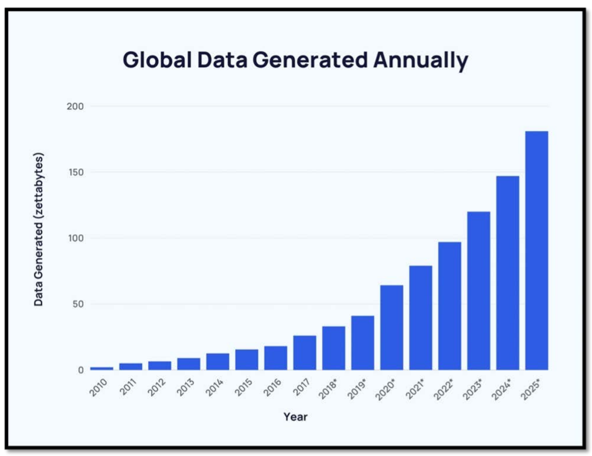
The current and continuing crisis in biomedical research funding, spawned by recent actions by the federal government, is impairing how laboratories function and, consequentially, the promise of new drugs and treatments.

For many, scenes of scientists laboring in semi-isolation in the lab, surrounded by the tools of their trade, from microscopes to Bunsen burners, are stereotypical. But times and technologies have changed.

There are still plenty of old-school "wet labs" where scientists work with tissue cultures, organic chemicals and liquid substances. Wet labs remain the backbone of life sciences. But more and more, there are "dry labs" in which experiments and studies are performed using computational or mathematical applications. Life in silico.

Both types of laboratory house laboratory information management systems, known as LIMS, that employ advanced software programs capable of organizing, managing, validating and storing enormous amounts of data, then feed it back into a world increasingly awash in information.

In 2024, roughly 402 million terabytes of data were created, captured, copied or consumed each day, adding up to 149 zettabytes of data per year. A terabyte is 1 trillion bytes or units of information—the equivalent of 1,000 copies of the Encyclopedia Britannica. A zettabyte is one sextillion bytes or a 10 followed by 21 zeros. It is enough data to fill more than 25 billion 32GB Apple iPads, enough iPads to build a Great iPad Wall of China.



Source: Semrush/Exploding Topics

We generate more information in a couple of days than has been captured from the dawn of human civilization to the 21st century. By 2028, it's estimated the annual volume of information will be almost 400 zettabytes.

Much of this data explosion comes from science.

One example: In July 2021, the technology company DeepMind announced it had used artificial intelligence (AI) to predict the shape of almost every protein in the human body, as well as hundreds of thousands of proteins in other organisms. Although the accuracy varied, they were able to share some 350,000 totally new predicted protein structures.

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Such breadth and depth of new knowledge advances biomedical research, from better understanding protein functions in cells to defining diseases more precisely and thus potential remedies.

Indeed, researchers at Sanford Burnham Prebys have leveraged the power of machine learning to systematically predict patient responses to cancer drugs at single-cell resolution.

These capabilities are not inexpensive. A sophisticated LIMS with necessary computing power, specialized software and sufficient data storage can cost tens to hundreds of thousands of dollars per year. Like much else in life, prices tend only to rise, including more prosaic examples of indirect costs, such as utilities and insurance. They are all essential to functional, effective science.

Modern labs have embraced this transformative shift in the pursuit of knowledge. A scientist using tools like AI, robotics and next generation DNA sequencing can gather more data in a single experiment or in a weekend of work than they could in a career just a few years ago.

Effective research today demands collaboration and coordination across laboratories and disciplines. It involves diverse types of experts and expertise who work across the hall and around the world. They must be nimble and adaptable because what constitutes “current thinking” may rapidly become incomplete or outdated.

The pronouncements by the National Institutes of Health to cap indirect costs and related actions like stopping study sections necessary to review and fund new research projects slow, and perhaps reverse, progress toward new discoveries and cures in biomedical research. Ignorance is this.

Technologies in modern labs are not simply an “indirect cost” of research. They are essential to actually conducting research, from the costs of utilities, required regulatory compliance and safety measures to administrative support. Indirect costs are not a tax on science. They do not detract or subtract from research. They support the institution’s ability to support the science.

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less,” two-time Nobel laureate Marie Curie once said.

The current and continuing crisis compels scientists to do less. Without remedy, the consequences will be fearful.

Sincerely,

David A. Brenner, MD
President and Chief Executive Officer
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