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## Why federal funding for basic research is important

by Richard C. Atkinson  
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In the next few days, Congress will decide how the nation will invest in basic scientific research and development. But unlike most of the other election-year end-of-session votes that will be cast, this one represents a once-in-a-century opportunity with ramifications well into the new millennium.

Some of the benefits of basic research are obvious. It helps American families lead healthier lives through amazing new drug treatments and medical devices, better nutrition, and cleaner air and water. The fruits of basic research fill our homes - from microwave ovens to music CDs. Improved satellite, global positioning systems and computer technologies will help emergency services save lives and minimize damage during hurricanes, earthquakes and forest fires.

Beyond these quality-of-life issues, however, the more fundamental issue facing Congress is how basic research funding can help maintain our nation's economic strength. As Federal Reserve Chairman Alan Greenspan recently observed, there is a clear connection. Indeed, almost all of the technological advances of the past 50 years are linked to improvements in fundamental knowledge - much of it stimulated by federal research dollars.

This support has created the knowledge and skilled workers that have given our country its competitive edge in information technology, biotechnology, health science and new materials. Today's research funding will keep the cycle of economic growth going and shape the next wave of innovation.

While market pressures lead industry to invest heavily in applied research, funding for basic research - whose long-term rewards benefit the whole society - falls principally to the federal government. Through its science and technology partnerships with universities and businesses, federal investments made 40 to 50 years ago have given rise to today's genomics, information technologies and telecommunications industries. Spread over 24 federal agencies, this broad R&D "portfolio" supports the scientific advances that foster economic productivity, social prosperity and good health.

But we must not take the nation's scientific prowess for granted. The federal government must expand its investment in basic research to ensure continued success in science and the economy.

Hefty investments in the National Institutes of Health (NIH), for example, have paid big health dividends for the average American. Deaths from heart attacks and strokes have been cut by more than 50 percent over the past two decades, with federally supported research (such as hypertension research) playing a decisive role. Nutritional studies funded by the NIH have lasting effects for today's children and seniors.

Similar commitments to the physical sciences, mathematics and engineering, through increased basic research budgets at the National Science Foundation (NSF), NASA, the Department of Energy's Office of Science, the Department of Defense and other federal agencies, will have equally significant benefits.

As successful as federal support for basic research has been in the past, a diverse, balanced and robust research portfolio will be even more crucial in driving future scientific advances.

The next wave of basic research is increasingly interdisciplinary: in medicine, biologists and chemists now work hand-in-hand with computer science and engineering researchers. NIH's successful efforts to cure deadly diseases such as cancer depend on the underpinning research supported by the NSF, for example. NSF investments have yielded many new medical technologies such as magnetic resonance imaging and digital mammography - not to mention entire industries such as biotechnology and e-commerce.

Procedures for diagnosing and treating diseases are often engineering feats as much as they are medical wonders. Nanotechnologies are developing materials and processes at sizes that are tens of thousands of times smaller than the width of a human hair, making it possible to build surgical tools that can operate on a single cell or molecular robots that doctors can guide to destroy cancer cells.

Now is the time to increase federal support for basic research. Scientists in almost every field are close to new discoveries that could transform the way we live and work.

Looking back on the century that just closed, we see "an American century." Will we be able to look forward several decades ahead and see that we made the fundamental R&D investments for this century at the right time? Congressional funding decisions in the next few days for basic research represents the nation's first investment of the 21st century. Let's seize the opportunity.

*Atkinson is president of the University of California and previously served as director of the National Science Foundation from 1977-80.*