

# Study seeks to pinpoint federally funded research, development programs that generate significant economic impact

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The Academy of Radiology Research reported in the current issue of *Nature Biotechnology* (Volume 32, Issue 6) that patent output from the National Institutes of Health (NIH) is vital to understanding which various areas of science are contributing most to America's innovation economy. The report, "Patents as Proxies: NIH Hubs of Innovation," confirms an increased economic value of NIH patents as compared to private sector patents, as well as meaningful differences in the rate and quality of invention across different research and development (R&D) investments.

"The Academy of Radiology Research undertook this analysis to address a need from the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP) to develop econometric evidence to better guide federal R&D budgets," said Michael Kalutkiewicz, co-author of the report and senior director for government affairs at the Academy of Radiology Research. "Looking at the NIH as a whole, the results demonstrate that the quality of NIH's scientific discoveries can't be replicated by the private sector alone. However, when we look across the agency, the data also reveal meaningful differences in patent productivity and downstream economic impact between various areas of NIH-funded research."

Patents are widely-accepted as being vital to growing America's innovation economy, and the U.S. Congress and the White House have

been taking steps to strengthen America's patent system. There is also a nascent [movement](#), fueled by both the congress and the administration, to [improve](#) how the impacts of federal spending are measured in an effort to guide R&D investments.

According to the report, [patents](#) generated by NIH-funded research are of particularly high quality and provide a downstream economic footprint that exceeds comparable research funded by the private sector. On average, NIH patents provide the intellectual foundation for 8 additional downstream patents, while biotechnology patents created by [private sector](#) entities only spur 1.7 future patents over a similar time period.

"The report in Nature Biotechnology provides empirical evidence that NIH-funded discoveries not only fuel a high level of additional R&D activity, but also that the scientific base for the nation's innovation economy would be significantly diminished without publicly-funded research," said Renee Cruea, MPA, Executive Director of the Academy of Radiology Research.

The report also showed that budget size did not correlate to a higher rate of new inventions. The strongest producer of new intellectual property (IP) was the National Institute for Biomedical Imaging and Bioengineering (NIBIB), the most recent Institute created by Congress and having one of the smallest operating budgets within NIH. Other strong producers were the National Institute of General Medical Sciences (NIGMS), the National Institute of Dental and Craniofacial Research (NIDCR), the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), the National Eye Institute (NEI) and the National Cancer Institute (NCI).

Over the last 10 years, NIBIB researchers have created 16 patents for every \$100 million in research dollars, compared to 2.4 patents for every

\$100 million in NIH funding from other institutes. This equates to a cost of just \$6 million for each imaging research patent compared to \$39 million for one patent in other areas of research. Since patents lead to higher rates of new technologies, companies and jobs, imaging and bioengineering science results in the greatest economic impact from public research funds.

"The traditional scientific criteria that guide the way that we prioritize investments in medical research are important and time-tested," said Richard Ehman, MD, the report's co-author and president of the Society of Body Computed Tomography and Magnetic Resonance Imaging (SBCTMR). "But rates of invention and related outcome measures deserve to be considered as criteria that can help to identify areas of science – such as in imaging research – that demonstrate a strong return-on-investment."

The metrics examined in this report are receiving more attention from policymakers and other stakeholders, particularly in light of [growing calls](#) for the development of better evidenced-based budgeting in federal science programs.

"We in the science community should do more to satisfy the public interest in quantifying the impact of federally-funded medical research," said Cruea. "This study is a step towards evidence-based budgeting that satisfies the dual aim of translation to patient care and downstream economic development."

"This study underscores the far-reaching impact of robust public-private collaboration in biomedical imaging and bioengineering research," said Michael Harsh, vice president and chief technology officer for GE Healthcare. "American medical innovation relies in part on industry R&D coming alongside NIH, NIBIB, academia and clinical researchers to help increase quality, access and affordability in the healthcare space."

Industry innovation leaders, like GE Healthcare, see value in this continuing collaboration as we look to bring groundbreaking discoveries to the clinical setting – which ultimately impacts patient care."

Given the importance of hard data to reinforce the value of federal funding to NIH, the Academy is finalizing a follow-on analysis that looks at patent output through a number of additional metrics, such as by mechanism and study section.

**More information:** Study paper: [www.nature.com/nbt/journal/v32...6/full/nbt.2917.html](http://www.nature.com/nbt/journal/v32...6/full/nbt.2917.html)

Provided by Academy of Radiology Research

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