# Researchers, Funding, and Priorities
## The Razor's Edge

Hamilton Moses III, MD

BIOMEDICAL RESEARCH IN THE UNITED STATES IS A $100 billion to $120 billion enterprise. Between 1994 and 2004 the total amount of research funding tripled and doubled in real terms after inflation adjustment.[1,2] In 2009 the American Recovery and Reinvestment Act provided a 1-time one-third increase to the budget of the National Institutes of Health (NIH), much of it earmarked for research in health services, outcomes, and clinical epidemiology. This pattern of sponsorship, even during a period of international financial stress, reflects the public's high regard for medical research and for the scientists who conduct it.[3] This sponsorship confirms that biomedical research serves multiple purposes: not only to find new and more effective treatments, but also to generate commercial value for companies, to further political policy, to foster regional and national competitiveness, and to provide a source of jobs.

The broad range of estimates for total research spending is a consequence of the difficulty in assembling a complete picture of financial sponsorship. No single source of such data exists and separate sources for private and public spending are difficult to reconcile. Nonetheless, computing the national total is much easier than learning how individual researchers are supported.

In this issue of *JAMA*, Zinner and Campbell[4] have illuminated those microeconomics by providing survey data on who is doing what type of research, sponsorship, productivity, researchers' links to industry, and researchers' perception of the value of collaboration. The authors also question whether the emphasis on discovery, rather than evaluation of the effects of research, is right; an issue made more vexing by the, at times, conflicting aims of sponsors and investigators.

Researchers in medical schools are highly motivated. Overall 22% have no external sponsorship, especially those in health services research (47% unfunded) and clinical research (57% unfunded). Those whose research involves basic science, clinical trials, and translational investigations and those working across stages (multimodal) garner the most external support. Age is also a factor, with senior faculty receiving more grant funding than their juniors by a 3:1 ratio; who then supports the shortfall? Medical schools and teaching hospitals provide the necessary cross-subsidies with estimates varying from 17% to 26% overall and approximately 40% for junior, laboratory-based investigators.[5] Nonetheless, many researchers have no support for their investigations and conduct their studies on their own time, albeit with significant access to the academic medical centers' infrastructure and proximity to other faculty and laboratory groups. Whether the cross-subsidies will be maintained during an era of economic upheaval is one edge of the razor.

Industry sponsorship is the razor's other edge. Zinner and Campbell confirm that investigators perceive that working with companies is a source of valuable ideas and collaborations and an enabler of productivity.[4] It is significant that basic science, translational, and multimodal investigators hold those views as strongly as those conducting clinical trials, even though the latter are more likely to have been initiated and supported by industry. Because the survey was performed during a time of intense controversy over the propriety of such industry-academic ties, the value placed on the ties by researchers is problematic for the skeptics who doubt those ties should be encouraged.

Are investigators blinded by their interactions, or are they only unaware of the risks? In the study by Zinner and Campbell,[4] 15% of researchers reported a negative outcome with industry interactions, whereas 40% of researchers initiated industry relationships that had important nonfinancial scientific contributions. This finding should neither mitigate the consequences of the misbehavior of investigators or companies who have inappropriately exploited their ties, nor soften public scrutiny of the ties. However, this finding underscores the complexity of getting the balance right. Safeguards are needed to prevent inappropriate relationships while encouraging productive interactions.

Safeguards should enhance the nonmonetary factors adding to productivity: exchange of individuals and ideas or access to material and instrumentation, areas that avoid involvement in marketing and promotion because those are

**See also p 969.**

**Author Affiliations:** The Alerion Institute, North Garden, Virginia; and Johns Hopkins University School of Medicine, Baltimore, Maryland.
**Corresponding Author:** Hamilton Moses III, MD, The Alerion Institute, PO Box 150, North Garden, VA 22959 (hm@alerion.us).

far more problematic. This may well be possible, as researchers value those qualitative attributes more than money, since 60% have industry collaborations but only 20% receive compensation.[4]

A descriptive taxonomy of research is a prerequisite for judging effect, productivity, and value. The term *translational research* is in vogue but is used too broadly and has been applied to everything from basic discovery to clinical outcomes. Zinner and Campbell use the term narrowly to define the critical function of preparing a discovery and its first application in humans (the "T1" stage).[6] They also apply the term *multimode research* to investigators who work at several stages. These 2 groups are disproportionately productive. They have more patents, more papers in journals with higher impact factors, more ties with industry (with proportionally greater negative experiences), and more NIH grants. Although these translational research investigators are no older, they are more likely to have a PhD or MD-PhD. This finding is at odds with the NIH report that applicants with an MD degree alone are equally competitive.[7] The productivity of the multimode and translational scientist should dispel any notion that research is a linear process, with a straight path from idea to discovery to application.

Dystopias in medicine are most evident in judging cost vs value. Tensions are increasing as developed countries become more aggressive in controlling their spending on health care.[8] Since the mid 1990s biotechnology, pharmaceutical, and device companies have invested 14% to 21% of their revenue in research and development of new products, proportionally more than any other industry.[9] In 2004 spending on biomedical research was 5.6% of the amount spent on health care services and products. In contrast, US spending on research on best practices, effectiveness, quality, cost, and outcomes was only 0.2% of spending on physicians and hospitals and 0.1% of spending overall.[1] In recognition of this mismatch between investment in new interventions and their evaluation, the United States and the European Union have mobilized more support for health services research. Health services researchers will welcome this, but it will also increase the potential for conflicts of interest as sponsors seek answers that are favorable to their agendas. Although their goals may be to inform political and economic policy or guide payment, rather than develop new drugs and devices, those conducting health services research must not substitute new conflicts for old.

Zinner and Campbell also ask, "is the balance right?" They acknowledge that one group's scientific discovery is another's clinical advance and still another's incremental cost. However, to date, there is no workable compromise among those competing aims. Momentum behind health reform in the United States favors coverage of the uninsured and cost control as 2 main goals. In the absence of good information about which technologies save money and which add only expense or marginal value, the result will be increasing pressure to direct investment toward the greatest burden of disease, not necessarily where clinical choices are most vexing. The debate over research priorities has already begun.[10]

Sixty years ago, Dale,[11] the master physiologist of histamine, wrote a prescription for innovation. His alchemy was a mixture of the young and old in the laboratory, the autonomy of each researcher within a family (his term) of others, and a single-minded focus on a goal with continual awareness of other fields, so as to apply one's own discoveries to them and adopt others' to one's own. Since then, it seems, his prescription had been followed. The current environment of the successful researcher vindicates him.

**Financial Disclosures:** Dr Moses reported serving as consultant to foundations, academic medical centers, and biopharmaceutical and technology companies in his role as chairman of Alerion Advisors. He reported previously serving as partner and senior advisor at The Boston Consulting Group.

**REFERENCES**


**1.** Moses H III, Dorsey R, Matheson DHM, Thier SO. Financial anatomy of biomedical research. *JAMA*. 2005;294(11):1333-1342.

**2.** 2007 Investment in US health research. Research!America. http://www.researchamerica.org/uploads/healthdollar07.pdf/. Accessed August 7, 2009.

**3.** Public praises science; scientists fault public, media (July 9, 2009). Pew Research Center for the People and the Press. http://people-press.org/report/528/. Accessed July 15, 2009.

**4.** Zinner DE, Campbell EG. Life-science research within US academic medical centers. *JAMA*. 2009;302(9):969-976.

**5.** Dorsey ER, Van Wuyckhuyse BC, Beck CA, Passalacqua WP, Guzick DS. The economics of new faculty hires in basic science. *Acad Med*. 2009;84(1):26-31.

**6.** Woolf SH. The meaning of translational research: why it matters. *JAMA*. 2008;299(2):211-213.

**7.** Dickler HB, Korn D, Gabbe SG. Promoting translational and clinical science: the critical role of medical schools and teaching hospitals. *PLoS Med*. 2006;3(9):e378.

**8.** Wilensky GR. Developing a center for comparative effectiveness information. *Health Aff (Millwood)*. 2006;25(6):w572-w585.

**9.** Pisano G. *Science Business.* Boston, MA: Harvard Business School Press; 2006:122-124.

**10.** Editorial: reforming heath care: this is going to hurt. *Economist*. 2009;27:13.

**11.** Dale H. Antihistamine substances. *Br Med J*. 1948;2(4570):281-283. doi:10.1136/bmj.2.4570.281.


 