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# ISSUE BRIEF

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## Reshaping AHCs' Role in Biomedical Research

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A discussion featuring

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## Reshaping AHCs' Role in Biomedical Research

While marking dramatic increases in managed care, training of primary care practitioners, and biotechnology advances, the 1990s chronicled a downturn in academic health center (AHC) fortunes. The increases had a direct impact upon AHCs' historic missions: delivery of health services, provision of medical education, and conduct of biomedical (especially clinical) research. Toward the end of the decade, changes in federal payment policy began to have an adverse impact on the bottom lines of teaching hospitals, further affecting AHC prospects. These changes included a freeze on the rate of increase in payment for Medicare services and cuts in subsidies for the care of low-income persons and for the graduate education of medical residents.

With managed care organizations diverting services to less costly health care providers, affected AHCs experienced strains in their service bases. And with pharmaceutical conglomerates and biotechnology firms rapidly outpacing them in the conduct of biomedical research and with nonacademic entities emerging to organize clinical trials and other research functions, affected AHCs saw their research bases threatened as well. Despite these problems, however, those ready to dismiss AHCs as unviable in a reconfigured health marketplace received a strong warning from the scientific community. As the educators of biomedical researchers—those with Ph.D.s as well as those with M.D.s—AHCs cannot easily be counted out. Moreover, the teaching hospitals of some AHCs serve as safety-net providers, with interns and residents as relatively low-paid staff. The commingling of service delivery, medical education, and medical research is a powerful mix, as legislators on Capitol Hill and in state capitols have heard time and time again.

AHCs partnered with the National Institutes of Health (NIH) and other government agencies, as well as private pharmaceutical, biotechnology, and medical device companies, to propel the United States to leadership in biomedical research in the second half of the 20th century. As the century ends, they face an uncertain future. The titles of various reports on their plight tell the story: "The Changing Landscape for Clinical Research,"<sup>1</sup> "The Impact of Managed Care on Clinical Research: A Preliminary Investigation,"<sup>2</sup> "Managed Care Squeezes Research Funds and Charity Health Aid,

Studies Find,"<sup>3</sup> and *From Bench to Bedside: Preserving the Research Mission of Academic Health Centers*.<sup>4</sup> But AHCs are ending the decade of the '90s on an up note. Enactment of the Medicare, Medicaid, and SCHIP (State Children's Health Insurance Program) Balanced Budget Refinement Act of 1999 will restore some service and subsidy cuts made by the Balanced Budget Act of 1997 (BBA), and new efforts to address and reshape AHCs' role in clinical research and health outcomes investigation are under way.

This Forum session—the first in a series of meetings on the public stake in biomedical research—will explore AHCs' changing role. It will look at AHCs as they have reconfigured to meet health marketplace and other pressures, as well as their relationships to the continuum of biomedical inquiry. The session will also examine the problems confronting AHCs, public and private incentives and pressures they face, and initiatives they have undertaken or that have been undertaken in their behalf.

### BACKGROUND

In a rapidly changing health marketplace, characterized by the merger or takeover of existing provider and insurer organizations to form new entities and by the emergence of hybrid organizations to address new or altered functions, there is no absolute definition of an AHC, sometimes called an academic medical center

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(AMC). The Association of Academic Health Centers defines an AHC as “an entity that has an allopathic or osteopathic medical school, one or more other health professional schools or programs (such as nursing, public health, or pharmacy), and one or more teaching hospitals.”<sup>5</sup> A 1998 Association of American Medical Colleges (AAMC) document on “biomedical and health sciences research” notes that the “biomedical research system nurtured by [federal grants-in-aid and patient care revenues] has grown to include 125 allopathic medical schools and more than 400 teaching hospitals as part of 1,700 institutions receiving NIH support.”<sup>6</sup>

According to Gerard Anderson, Ph.D., and two colleagues, the first institution to integrate patient care, clinical education, and research was Johns Hopkins University, which opened its medical school in 1893. The 1910 Flexner Report strongly supported this model, which Columbia University and Presbyterian Hospital adopted that same year, thereby becoming the first AHC formed as a result of a merger. As Anderson and his co-authors point out:

Most of the growth of AHCs occurred in the period following World War II, when policymakers in Washington decided to expand the number and size of medical schools, invest heavily in biomedical research, adopt a generous payment system for services provided by hospitals and physicians, and adopt other regulatory and financing initiatives that have encouraged the expansion of AHCs.<sup>7</sup>

The co-authors also indicate that AHCs traditionally have these commonalities: (a) faculty heavily involved in “biomedical and clinical research,” (b) commitment to patient services that are highly specialized, and (c) dedication to pre- and postdoctoral teaching, carried on by a large faculty who spend only a small amount of time in teaching activities.<sup>8</sup>

There also are differences in terminology and definitions of biomedical research. Some see it as a continuum, beginning with basic research or “bench” science, continuing with translational research (to “translate” basic science into new methods of diagnosis and treatment), moving to clinical investigation, and ending with outcomes studies. Others prefer to forego the term “biomedical” and use individual (rather than blanket) terms, such as basic, translational, clinical, and health sciences research.

Research participants from various aspects of the field who were convened by the AAMC, the American Medical Association (AMA), and Wake Forest University in 1998 viewed the lack of an agreed-upon definition of clinical research as a major problem. They

recommended that the following be adopted: “Clinical research is a component of medical and health research intended to produce knowledge valuable for understanding human disease, preventing and treating illness, and promoting health.” In their view, it encompasses disease mechanisms; translational research; clinical knowledge, detection, diagnosis, and natural history of disease; therapeutic interventions, including clinical trials; prevention and health promotion; behavioral research; health sciences research; epidemiology; and community-based and managed care-based trials.<sup>9</sup> Hence, it tends to encompass nearly all the research activities in which AHCs are engaged.

## THE PROBLEMS

As indicated in the background paper that introduced this series of meetings,<sup>10</sup> the patient care, medical education, and research dollars that have contributed to AHCs’ strength in the health arena have also made them vulnerable. More costly because of their joint missions, they have been less attractive to managed care plans seeking lower costs per member. For example, according to data from HCIA, a Baltimore-based health information company, the median expense per adjusted admission for a major teaching hospital was \$9,833 in 1998, while the median revenue per adjusted admission was \$9,935. In contrast, the medians for all hospitals that year were \$5,065 (expense per adjusted admission) and \$5,181 (revenue per adjusted admission).

Moreover, payers and risk organizations have been less willing to subsidize medical education than were traditional insurers under fee-for-service arrangements. Also, the BBA started ratcheting down federal indirect medical education payments under Medicare, and state Medicaid programs have been uneven in their recognition of medical education costs. Moreover, health plans generally refused to pay the costs of care for their members in clinical trials, thereby having a chilling effect on patients’ participation in them.<sup>11</sup> “In sum,” as the authors of “The Changing Landscape for Clinical Research” contend, “clinical research in AMCs became extraordinarily susceptible to modifications of federal policies of sponsored research support and changes in the organization, financing, and delivery of medical care.”<sup>12</sup>

As the health marketplace placed greater value on delivery of services in ambulatory rather than inpatient settings, on financing of care under capitated or discounted arrangements rather than fee for service, and upon primary rather than specialty care, AHCs lost

ground. Their common elements—high faculty-to-patient ratios because of clinician-scholars' involvement in teaching and research, high specialty-to-generalist ratios, and high faculty-to-student ratios—turned out to be liabilities in a reconfigured environment. Added to this were the higher capital costs needed to maintain and perpetuate the academic medicine enterprise, although some of the major medical schools and teaching hospitals have endowments and capital gifts to help underwrite the costs.

Perhaps because of the marketplace changes (not only the decreased attraction of biomedical investigation but also the increased attraction of other fields of endeavor in the health field), the numbers of personnel entering the field, particularly clinical investigators and especially M.D.-trained researchers, are decreasing. Warnings first sounded in the late 1980s, gained legitimacy partly as a result of a 1991 Institute of Medicine (IOM) study (*Careers in Clinical Research: Obstacles and Opportunities*), and achieved even more credence when several NIH panels stressed the importance of recruiting and retaining fellows, new investigators, and seasoned researchers. In view of the pressure upon AHCs to educate more primary care practitioners and to put more emphasis upon training in ambulatory settings, some institutions are putting clinician-educators and clinician-investigators on separate tracks. "Just as researchers excel at the discovery of new knowledge but have little time for teaching and clinical care, clinician-educators excel at teaching and clinical care but have little time to conduct research."<sup>13</sup> This approach requires AHCs to provide different advancement criteria for faculty in the two tracks, without favoring or penalizing either. Because the AHC is crucial to the recruitment, nurturing, and production of biomedical researchers—whether M.D. or Ph.D. or both—it is the focus of most efforts to address the problem of the so-called disappearing investigator.

## PUBLIC AND PRIVATE INCENTIVES AND PRESSURES

Although the NIH, part of the Department of Health and Human Services (DHHS), is mentioned most often as AHCs' partner in biomedical research, other federal agencies are important as well. At DHHS, these include the Agency for Healthcare Research and Quality (AHRQ), which conducts health services research on access, cost, and quality issues; the Centers for Disease Control and Prevention (CDC), which work on disease and injury prevention and environmental health; the Food

and Drug Administration, which is responsible for food, cosmetic, drug, medical device, and radiation-emitting product safety; and the Health Care Financing Administration, which administers and oversees delivery of Medicare, Medicaid, and Child Health Insurance Program services. Another key partner is the Department of Veterans Affairs (VA), which is involved in research on fundamental biological processes, clinical trials, health services research, and disability and functional concerns.

AHCs are most closely associated with the NIH—conducting more than half of the research funded by its various institutes—and with the VA, which also is involved in patient care, medical education, and research. Their ties with the other agencies are growing, as they focus more on health services research, disease and injury prevention, and primary care, the purview of another DHHS agency, the Health Resources and Services Administration. But NIH remains the giant; for instance, fiscal year 2000 appropriations for AHRQ (\$205 million) and the CDC (\$2.9 billion) pale beside the NIH's \$17.9 billion.

Of the \$42 billion of research and development funding in the United States in 1997, AHCs received \$12 billion, or 28 percent, according to the authors of *From Bench to Bedside*. The majority of funds to AHCs came from the federal government, primarily from the NIH. Federal research funds tended to be concentrated in a few institutions, "a pattern that can be illustrated with data from the NIH. In 1996, 5 percent of AHCs received 25 percent of all NIH funds, and 15 percent of AHCs received 50 percent of all NIH funds."<sup>14</sup> The top ten were the following:<sup>15</sup>

AHC	Percentage
Eight affiliated institutions grouped as one:	
Harvard University	
Massachusetts General Hospital	
Brigham and Women's Hospital	
Dana-Farber Cancer Institute	
Children's Hospital (Boston)	
Beth Israel Hospital (Boston)	
New England Deaconess Hospital	
Massachusetts Eye and Ear Infirmary	7.35
Johns Hopkins University and its facilities	4.06
University of Washington	4.00
University of Pennsylvania and its Children's and Graduate Hospitals	2.95

University of California San Francisco and San Francisco General Hospital Medical Center	2.93
Washington University with Barnes Jewish Hospital	2.53
University of Michigan	2.47
University of California Los Angeles with its affiliated institutions	2.44
Yale University	2.40
Stanford University	2.11

In some ways, the federal agencies cut across the continuum of biomedical research—from basic discoveries, to the translation of discoveries from “bench to bedside,” to clinical practice, and to outcomes and quality initiatives. Unlike health agencies in most other countries, where research is centralized, the work conducted under their aegis is largely carried out in the private sector, under grants and contracts, subject to the dictates of the health marketplace. While some think this encourages innovation and creativity, others fear that it may result in misalignment of priorities and of proprietary claims to so-called public knowledge. The marketplace is highly politicized, with legislators’ responses to disease group advocates driving the authorization and appropriation of funds and the support of disease-directed research efforts. The NIH, however, has done significant work comparing the allocation of public dollars according to the burden of illness and is continually under pressure to re-examine its priorities. Nonetheless, by all accounts, the federal-AHC partnership that has developed in this political, pluralistic system has served the nation well, leading to concerns that significant changes—in response to new marketplace incentives—may skew research priorities, projects, and applications.

In the support and conduct of biomedical research, however, the private sector has surpassed the public sector. It has done so not only in the research carried on by pharmaceutical firms, biotechnology companies, and medical device manufacturers but also in the clinical and other investigation organized by some health systems and plans, contract research organizations (CROs) that arrange and monitor clinical trials, and physician-based research networks that implement research protocols and handle data collection. As indicated by the NHPF background paper, since the mid-1980s, the “industry’s share of total health research and development (R&D) expenditures has increased

from 34 percent to 43 percent,” while the NIH’s share “has decreased from about 35 percent . . . to about 29 percent today.”<sup>16</sup>

AHCs, which include both public (usually state-operated) and private academic institutions, partner with private enterprises as well as government agencies. For example, “since 1965, the Pharmaceutical Research and Manufacturers of America (PhRMA) Foundation has supported nearly 2,400 young researchers with almost \$44 million from contributions from PhRMA members.”<sup>17</sup> These range from undergraduate through post-doctoral awards and faculty awards and grants in academic research settings. Moreover, many AHCs, worried about declines in research support and about competitive threats from CROs, “are aggressively marketing their services to industrial research customers,” according to *From Bench to Bedside*. The report cites several risks:

For example, faculty members receiving industry support are more likely than others to choose research topics according to the potential for commercial application and more likely to experience delays in publishing. Life science companies that sponsor research in academic institutions typically require investigators to keep their results secret six months or more to protect their commercial value. Faculty with industrial support are more likely to withhold results from colleagues and to report that trade secrets have resulted from their work. These findings suggest that, unless carefully managed, the pursuit of industrial research support may have adverse consequences for academic norms in AHCs.<sup>18</sup>

The report also notes that CROs have grown from approximately 200 in 1974 to about 1,300 in the late 1990s and indicates “that 57 percent of all clinical trials were performed by investigators not affiliated with AHCs.”<sup>19</sup>

Anderson and his co-authors delineated four roles for AHCs in medical innovation. These roles cut across both publicly and privately sponsored research. The first is “the development of new drugs, devices, diagnostic techniques, and therapeutic procedures.” The second is adoption, being “the first institutions to acquire and use new technologies, instruments, and drugs.” The third is evaluation “of new technologies that have not yet diffused into medical practice” as well as “of technologies that already are used routinely but have not been carefully evaluated in all of the clinical settings in which they are used.” The fourth is advisory, identifying “the clinical need for certain drugs, surgical instruments, and diagnostic services” and providing “valuable scientific and clinical expertise during their

early and later stages of development.” Moreover, the co-authors underline AHCs’ contribution to education of innovators: “ranging from undergraduate medical education all the way through graduate medical education, doctorate training in research, and continuing education for practitioners—and the impact of that education on the health care system.”<sup>20</sup>

## SOME SOLUTIONS

In looking at problems that AHCs face and at approaches for addressing them, it is important to note that there is a great deal of variation among AHCs. While nearly all are nonprofit, some are public, connected to state universities or other governmentally owned entities. Others are private—in some cases, parts of integrated delivery systems; in other cases, parts of religious organizations; and, in still others, of community or other sponsors. While it seems to be common wisdom that AHCs in general are adversely affected by competitive marketplace changes and by public policy actions, their responses to market reconfiguration and delivery and payment provisions vary a great deal. How well they are faring depends upon various factors, such as where they are located and what kinds of capital sources and revenue flows they have (and how secure the sources and flows are).

While the financial data cover only the first half of the 1990s (from 1989 through 1995), the AAMC’s *The Financing of Medical Schools* distinguishes the revenues of public and private medical schools. It breaks down the revenues of four subsets of schools (public research-intensive, private research-intensive, community-based schools, and private freestanding schools) as well as of osteopathic schools. The contrasts are striking: in 1995, the median total revenues of private research-intensive schools were \$480.2 million, while the median total revenues of community-based schools were \$57.6 million (and for osteopathic schools, even lower—\$24.4 million). In terms of revenue sources—faculty practice plans, hospital revenues, endowments and gifts, federal research, state and local appropriations, tuition and fees, and other—the proportions of the sources for each subset tended to vary greatly. For example, federal research contributed 30 percent of the median total revenues of the private research-intensive schools and only 6 percent of the median total revenues of the community-based schools (and 5 percent of the osteopathic schools).<sup>21</sup>

The task force reached its conclusions prior to passage of the BBA, which enacted delivery and financing changes for fiscal year (FY) 1998 through FY

2002 that AHCs, for the most part, have viewed as inimical. These changes affected the annual rates of increase under the Medicare prospective payment system (PPS) for teaching and other inpatient hospitals, the disproportionate-share hospital (DSH) adjustment under Medicare for hospitals with heavy caseloads of low-income patients, the indirect medical education (IME) adjustment for each diagnosis-related group under PPS for teaching hospitals, and formula payments for capital expenses under Medicare for teaching and other hospitals. They also mandated payment for hospital outpatient services, inclusion of post-acute services under PPS, and incentives for Medicare beneficiaries to enroll in Medicare+Choice managed care plans under capitated or other at-risk financial arrangements.

On the AHC medical school side, the task force recommendations focused on the three AHC missions. Relative to patient care, they centered on “improving the competitiveness of the clinical enterprise,” such as by emphasizing generalist medicine, integrated multidisciplinary group practice, and clinical information systems. Relative to medical education, they urged collaboration among and merger of medical school programs; “increased use of small-group, interactive teaching in the preclinical curriculum” and greater use of “advanced information technology”; as well as “movement of clinical education from inpatient hospital settings to ambulatory and community settings, including managed care practice settings.” Relative to research, they supported changes in financing, for the most part, whether cost-sharing by various public and private sponsors, federal research grants, or initiation of new support grant programs.<sup>22</sup>

On the AHC teaching hospital side, the industry lobbied hard to soften the BBA changes and was successful in moderating some. The Medicare, Medicaid, and SCHIP Balanced Budget Refinement Act of 1999 decreased the reduction in the DSH adjustment and slowed the implementation of cuts in IME. It also eased the application of the outpatient PPS and made some changes in implementation of PPS for post-acute services.<sup>23</sup>

As AHCs addressed patient care and health professions education, there was a search for leadership relative to the third mission, research. While the scientific and policy literature resounded with warnings of doom, the NIH convened panels to study recruitment and retention of physician investigators in clinical research careers and other issues, the IOM examined priority-setting at the NIH, and the Commonwealth Fund undertook its work on AHC missions. The AAMC, AMA, and Wake Forest

School of Medicine undertook a Clinical Research Summit, culminating in the projected establishment, early in 2000, of a Clinical Research Roundtable at the IOM. Among other activities centered on clinical research, the roundtable will promote dialogue among the scientific community and the general public, establish mechanisms to track financial and other support, create a process to monitor and promote workforce career development across the health professions, and develop databases for patient- and population-based health research. It will also strengthen the linkages between basic science discoveries and their application to improved patient care, ensure AHCs' ability to conduct research and training, broaden the participation of the health professions, and work on strategies for disseminating new clinical research findings and evaluating outcomes of new procedures and treatments.

A vast array of organizations are involved in helping determine what shape biomedical research will take in the next decade and what contributions AHCs will make. In addition to AHCs themselves and the organizations that represent them, charitable foundations, coalitions of medical and scientific societies, disease-centered interest groups, voluntary health organizations, and academic and research organizations are involved in the endeavor. At this time, there seem to be more questions than answers, questions that NHPF plans to explore at this Forum session.

## KEY QUESTIONS

Following are the key questions that will provide a format for the Forum meeting:

- In what ways are AHCs alike and in what ways are they different relative to their fulfillment of the patient care, health professions education, and biomedical research missions? Are the three missions crucial to the identification of AHCs?
- What is the breadth and scope of biomedical research (or of the continuum of basic, translational, clinical, and outcomes research)? What roles have AHCs played traditionally? How are they changing?
- What is the nature of AHC relationships with different federal agencies? What roles do the agencies play in shaping and nurturing the public stake in biomedical research?
- What impact has reconfiguration of the health marketplace had on AHCs as a group? On different types of AHCs? How do they remain vital? What form will (should) they take?
- What effects has the BBA had on teaching hospitals? How accurate are the projections of effects in future years? Will provisions of the Medicare, Medicaid, and SCHIP Refinement Act of 1999 make a difference during the next year or two?
- What is the state of AHCs' capacity to train and retain biomedical researchers? What is the difference between M.D.- and Ph.D.-trained investigators? Should some AHCs cultivate clinical investigator "stars" to conduct research?
- What is the state of AHCs' research infrastructure? How is it funded? What is the ideal, relative to advancing technology and information systems?
- Should certain AHCs serve as "research centers of excellence"?
- Has NIH's role in supporting biomedical research changed during the 1990s? Relative to AHCs? Relative to other organizations?
- What impact has reconfiguration of the health marketplace had on NIH initiatives? What impact have recommendations made by different NIH panels had on the various institutes and centers? What expectations does NIH have of AHCs? How does it view AHC research relationships?
- What types of relationships do private-sector pharmaceutical, biotechnology, and medical-device firms have with AHCs? With government agencies? With intermediary organizations, such as CROs?
- Is the environment primarily competitive or collaborative relative to the conduct of biomedical research? What forces are driving the private sector?
- Should managed care play a greater role in biomedical research? What should its financial contribution be? How should it contribute (for example, to an all-payer fund, to the health costs of its members in clinical trials)?
- Should there be acknowledged leadership of biomedical research or pluralistic leadership? Who decides?

## THE FORUM SESSION

This Forum session will feature four presenters from various aspects of the health field. **John M. Eisenberg, M.D., M.B.A.**, administrator of the Agency for Healthcare Research and Quality, DHHS, will provide a stage-setting overview of the continuum of biomedical research and AHCs' roles in its perpetuation. Appointed

to head the Agency for Health Care Policy and Research (its earlier name) in 1997, he previously was chairman of the Department of Medicine and physician-in-chief at Georgetown University. Prior to that, he was chief of the Division of General Internal Medicine at the University of Pennsylvania. A founding commissioner of the Physician Payment Review Commission, on which he served from 1986 through 1995—chairing it the last two years—he was the first physician to be elected president of the Association for Health Services Research. He also has held numerous other leadership posts. He is a member of the IOM of the National Academy of Sciences. Author of more than 250 articles and book chapters, he received his M.D. degree from the Washington University School of Medicine and completed his residency in internal medicine at the University of Pennsylvania.

**Roger E. Meyer, M.D.**, senior consultant on clinical research at the AAMC, will review the problems or barriers confronting AHCs and some of the tensions in the research field. He has served in administrative and policy roles in Washington since 1993, when he became vice president for medical affairs at George Washington University. In the mid-1990s, he affiliated with the Association of Academic Health Centers, where he completed a study on the impact of managed care on academic psychiatry. Earlier, he was a fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford University, where he helped organize a study group on the impact of health care reform on AHCs. From 1977 to 1992, he held various positions at the University of Connecticut School of Medicine, first as professor and chair of the Department of Psychiatry and later as executive dean of the school. The author of more than 150 papers and six books, he has led several professional organizations and been a consultant to numerous federal agencies. He is a graduate of Harvard Medical School and completed his residency in psychiatry at Massachusetts Mental Health Center in Boston.

**Lana R. Skirboll, Ph.D.**, director of the Office of Science Policy, NIH, DHHS, will describe NIH's role and efforts to address some of the problems and tensions. In her current position, she advises the NIH director and deputy director and provides leadership to NIH institutes and centers on science policy issues. Earlier, she was director of the Office of Science Policy and Program Planning at the National Institute of Mental Health, a post she took when the Alcohol Drug Abuse and Mental Health Administration (ADAMHA) was reorganized and its three research institutes re-

turned to the NIH. Prior to that she was associate administrator for science and deputy science advisor at ADAMHA. A neuroscientist and author of more than 75 scientific publications, she received her Ph.D. degree in the Department of Pharmacology at Georgetown University Medical School, and did post-doctoral training in the Departments of Psychiatry and Pharmacology at the Yale University School of Medicine.

**Frank E. Samuel**, president of Edison BioTechnology Center, Inc., in Cleveland, will address the private-sector role and pressures. He has headed Edison BioTechnology Center, a consortium of private industry, research institutions, and the state's Thomas Edison Program, since 1989. For the five previous years, he was the president of the Health Industry Manufacturers Association (HIMA), the national organization representing health devices, diagnostics, and information systems manufacturers on state, federal, and international issues. A graduate of Harvard Law School, he practiced law in Washington, D.C., prior to rejoining HIMA, where he had worked earlier as vice president and general counsel. He also served in a variety of positions at the Department of Health, Education, and Welfare (the forerunner of DHHS), including deputy assistant secretary for legislation (health). He is on the boards of directors of several biotechnology organizations and is a member of the Advisory Committee of Catalyst Ventures and the Ohio Innovation Fund.

Following brief presentations by each, there will be a roundtable discussion of the policy implications of reshaping AHCs' participation in biomedical research and the training of research investigators. The key questions listed earlier will provide a guide for both the presentations and the discussion.

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## ENDNOTES

1. Stephen J. Heinig, Andrew S. Quon, Roger E. Meyer, and David Korn, "The Changing Landscape for Clinical Research," *Academic Medicine*, 74, no. 6 (June 1999): 725-745.
2. Robert E. Mechanic and Allen Dobson, "The Impact of Managed Care on Clinical Research: A Preliminary Investigation," *Health Affairs*, 15, no. 3 (Fall 1996): 72-89.
3. Sheryl Gay Stolberg, "Managed Care Squeezes Research Funds and Charity Health Aid, Studies Find," *New York Times*, March 24, 1994.
4. Commonwealth Fund, *From Bench to Bedside: Preserving the Research Mission of Academic Health Centers: Findings and Recommendations of the Commonwealth Fund*

*Task Force on Academic Health Centers*, New York, April 1999, 65.

5. Gerard Anderson, Earl Steinberg, and Robert Heyssel, "The Pivotal Role of the Academic Health Center," *Health Affairs*, 13, no. 3 (Summer 1994): 147.

6. Association of American Medical Colleges (AAMC), *Maximizing the Investment: Principles to Guide the Federal-Academic Partnership in Biomedical and Health Sciences Research*, Washington, D.C., March 1998, 9.

7. Anderson, Steinberg, and Heyssel, "Pivotal Role of the Academic Health Center," 148.

8. Anderson, Steinberg, and Heyssel, "Pivotal Role of the Academic Health Center," 148.

9. Association of American Medical Colleges and American Medical Association, *Breaking the Scientific Bottleneck: Report of the Graylyn Consensus Development Conference, November 20-22, 1998*, Washington, D.C., November 1999, 33.

10. Karen Matherlee, *The Public Stake in Biomedical Research: A Policy Perspective*, background paper, National Health Policy Forum, November 1999, 6-7.

11. General Accounting Office, *NIH Clinical Trials: Various Factors Affect Patient Participation*, GAO/HEHS-99-182, September 1999, 10-11.

12. Heinig et al., "Changing Landscape," 727.

13. Wendy Levinson and Arthur Rubenstein, "Mission Critical—Integrating Clinician-Educators into Academic Medical Centers," *New England Journal of Medicine*, 341, no. 11 (September 9, 1999): 840.

14. Commonwealth Fund, *From Bench to Bedside*, 10-11.

15. Commonwealth Fund, *From Bench to Bedside*, 59.

16. Pharmaceutical Research and Manufacturers of America (PhRMA), "Collaboration between the National Institutes of Health and Industry," *PhRMA Publications: Industry Profile 1998*; accessed at <http://www.phrma.org/publications/industry/profile99/chap2.html>, November 30, 1999.

17. PhRMA, "\$1.5+ Million in Support of Researchers and Scientists in 1999," accessed at <http://www.phrmaf.org/news/04.20.99.press.html>, November 29, 1999.

18. Commonwealth Fund, *From Bench to Bedside*, 26.

19. Commonwealth Fund, *From Bench to Bedside*, 31.

20. Anderson, Steinberg, and Heyssel, "Pivotal Role of the Academic Health Center," 150-54.

21. Association of American Medical Colleges (AAMC), *The Financing of Medical Schools: A Report of the AAMC Task Force on Medical School Financing* (David Korn, Chair), Washington, D.C., November 1996, 3-5.

22. AAMC, *Financing of Medical Schools*, 21-36.

23. In addition, the legislation changed the methodology for computing direct graduate medical education payments under Medicare. It also included some provisions on Medicare+Choice, including authorizing hospitals that operate approved nursing and allied health professional training programs and receive Medicare reimbursement to get additional payments to reflect utilization by Medicare+Choice enrollees.