Outcomes From the Occupational Physicians Scholarship Fund: Private Support for Physician Residency Training

Judith Green-McKenzie, MD, MPH
Edward A. Emmett, MD, MS

The Occupational Physicians Scholarship Fund (OPSF) was established 20 years ago with the goal of helping to address the critical shortage of qualified physicians entering occupational and environmental medicine (OEM). We examined descriptive and outcome measures to evaluate its success. Information was obtained from members of the original board of directors, the OPSF office, and the American Board of Preventive Medicine (ABPM). Most of the scholars (88%) are diplomates of the ABPM, certified in OEM. Scholars represent 6% of board-certified OEM physicians, score higher on the certifying examination than other examinees, practice in all regions of the United States, and are represented in diverse practice settings. The OPSF has achieved its objectives, producing well-trained physicians who contribute to the growth and vitality of the specialty improving worker health, business productivity, and the environment. (J Occup Environ Med. *2006; 48:513–522*)

The Occupational Physician Scholarship Fund (OPSF) represents an unusual, if not unique, mechanism to provide private support for postgraduate physician training. Support is provided to residents training in the field of occupational and environmental medicine (OEM), a public health specialty dedicated to the prevention, diagnosis, and treatment of illnesses and injuries related to the workplace and the environment. There is a strong perception of community need for OEM physicians[1] and a documented shortage of formally trained physicians entering the field,[2–4] yet there is a paucity of public training funds.[5,6] This shortage of formally trained physicians is reflected in membership of the professional society for OEM, the American College of Occupational and Environmental Medicine (ACOEM) in which less than half (40%) of the membership (active and retired, excluding student members) are diplomates of the American Board of Preventive Medicine, certified in Occupational Medicine (ABPM/OM). This may be a reflection of the reality that many practice in the field of OEM without formal training or viable prospects for formal training. Many physicians enter the field in midcareer having already completed formal training and achieved board certification in other areas of medicine such as internal medicine and emergency medicine at a stage of life when return to school for formal education as a full-time resident is generally not a feasible option,[5,7]

From the Division of Occupational Medicine, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.

Address correspondence to: Judith Green-McKenzie, MD, MPH, University of Pennsylvania, School of Medicine, 3400 Spruce Street, Occupational Medicine, Ground Floor Silverstein, Philadelphia, PA 19104-4283; E-mail: jmckenzi@mail.med.upenn.edu.

DOI: 10.1097/01.jom.0000201818.86110.2d

Innovative residency programs are being developed to provide accredited high-quality alternatives to traditional residency arrangements for physicians making such midcareer changes.[3,8]

The OPSF was established with the specific goals of helping to address the critical shortage of qualified physicians entering the field of OEM and fostering the growth of a talented leadership cadre whose skills and commitment would help to move the field forward. Its mission was to provide scholarship stipends for the most qualified physicians in the United States, allowing them to complete an academic year (Master of Public Health degree) and/or practicum (rotation training) year in an accredited OEM residency program. It has now been 20 years since the inception of this Fund.

This article describes the history of the fund, the process for candidate selection, and the success of its fundraising efforts. We also describe the number of scholarships awarded, the location of training programs attended by the scholars, and gender distribution of OPSF awardees. The outcome measures examined are the number of scholars who become diplomates of the ABPM/OM, scholar performance on the ABPM/OM-certifying examination compared with their peers, geographic area and type of subsequent practice, retention of scholars in the field, and the number of scholars who are members of the ACOEM during academic year 2004–2005.

Conception of the Fund

The OPSF was initially a brainchild of two eminent occupational physicians, Dr Joseph Cannella (then Corporate Medical Director at Mobil Corporation) and Dr Thomas McDonaugh (then Corporate Medical Director for Exxon Corporation) who saw the need for sustainable funding to train physicians in the field of OEM. Their vision resulted in a grant from Exxon Corporation to the American Occupational Medical Association Samuel N. Bacon, Jr., Research and Education Fund in January 1984 for the purpose of studying the possibilities of establishing scholarship funds to train physicians in OEM. One year later, additional funding was secured. These donations resulted in the incorporation of the OPSF as a not-for-profit corporation in the state of Illinois on October 18, 1985. The general purpose of this fund, overseen by the Board of Trustees, was to aid in the financing of studies in OEM at approved universities. The composition of the Board of Trustees of OPSF in January 1986 is given in Table 1 along with the composition as of January 2005. Although there has been turnover during the intervening years, four current trustees were members of the founding Board of Trustees.

A small portion of the initial study grant fund was used to survey a variety of individuals generally within industry and including corporate medical directors to ascertain their perceptions of the value of the OEM profession as well as their perceptions of corporate interest in contributing to physician training. To ensure a professional approach to fundraising, a well-known consulting firm, Brakeley John Price Jones, was engaged to perform the survey and later to help with the campaign. The survey confirmed that the greatest prospect for fundraising lay in cor-

TABLE 1
Compositions of the Occupational Physicians Scholarship Fund Board of Trustees as of January 1986 and January 2005

January 1986	January 2005
Thomas J. McDonagh, MD*	George W. Anstadt, MD*
Exxon Corporation (Chair)	Occupational Health & Rehabilitation (Chair)
Joseph M. Cannella, MD*	Thomas J. McDonagh, MD*
Mobil Corporation (Vice-Chair)	Exxon Corporation (retired) (Vice-Chair)
Edward L. Baker, Jr., MD*	Colin Baigel, MD
NIOSH	Bristol Myers Squibb Co.
Duane L. Block, MD	Joseph M. Cannella, MD
Ford Motor Company (retired)	Mobil Corporation (retired)
Wayne O. Buck, MD	Edward A. Emmett, MD
Times Mirror Company	University of Pennsylvania
Theodore Cooper, MD, PhD	Arthur L. Frank, MD, PhD
The Upjohn Company	Drexel University
Edward A. Emmett, MD*	Michael Gochfeld, MD
John Hopkins University	UMDNJ–Robert Wood Johnson
Paul S. Entmacher, MD	William W. Greaves, MD
Metropolitan Life Insurance Company	Medical College of Wisconsin
Richard D. Finucane, MD	Ronald R. Loeppke, MD
General Foods Corporation	CorSolutions Inc.
Marcus M. Key, MD	J. Denise Clement, MD*
University of Texas	Retired
Robert N. Ligo, MD	Robert L. Goldberg, MD
E.I. Dupont de Nemours and Company	University of California, SF
Albert F. Ritardi	Pamela A. Hymel, MD
Allied-Signal, Inc.	Sedgwick CMS
Lloyd B. Tepper, MD*	D. Gary Rischitelli, MD, JD
Air Products Chemicals, Inc.	Oregon State University
Diana Chapman Walsh, PhD	Joseph P. Romano, MD*
Boston University	AT&T
Robert G. Wiencek, MD	James S. Russell
General Motors Corporation	Retired
	Joseph J. Schwerha, MD, MPH
	University of Pittsburgh
	Lloyd B. Tepper, MD
	Air Products & Chemicals (retired)

*Executive Committee.

porate contributions rather than in contributions from individuals, foundations, or other sources. This initial survey also identified that the number of potential donors was relatively small and concentrated in industry sectors such as petrochemicals, chemicals, manufacturing, and utilities. It found that interested corporations would more likely donate to a self-liquidating fund than to a permanent endowment, partly reflecting corporate perceptions of their own impermanence and of ever-changing societal needs. The survey found sufficient interest and potential for success to justify a fundraising campaign.

The Case Statement

The OPSF Board of Trustees asked Diana Chapman Walsh, PhD, then from Boston University, to prepare a case statement for the campaign. Dr Walsh had previously published on the role of corporate medical departments, including a well-received piece, "Is There a Doctor in the House?," published in the *Harvard Business Review*.[9] Using her research findings, information gleaned from the initial survey, and the results of interviews with key stakeholders, Dr Walsh developed a case for scholarships. She emphasized the need for, and value of, OEM physicians as perceived by potential donors.

Based on the findings of the initial survey, a case statement was written, largely with corporate donors in mind. Elements of the initial case statement include the following:

An introduction describing the importance and range of medical issues faced by corporations and managers. Issues cited included the dangers of toxic agents and hazardous processes, employment stresses, the effect of alcohol and drugs, demographic changes in the makeup and needs of the workforce, the struggles of single parents and aging workers, cushioning the impact of technology, the stresses on employees of downsizing, reorganizations, and mergers, the impact of laws and regulations for human resource policies, health and safety policies and employee benefits, the need to deal with the spiraling cost of healthcare services, and the need to provide "wellness" for employees helping them to address behaviors such as smoking.

The contributions made by OEM physicians. This included the following statement: ". . . results to date . . . suggest that effective health and safety programs justify their operating costs by: averting absenteeism; decreasing the costs associated with litigations and arbitrations; and reducing medical care claims against the benefit plan. It stated that there is every reason to expect refinements and strengthening of this case as corporate medical departments became more aggressive in their evaluations of their impact."

The shortage of properly skilled and trained occupational physicians. It was noted that occupational medicine physicians had never accounted for more than approximately 1% of the practicing physicians in the United States. Although government had recognized a manpower shortage as early as 1977, and Congress had first allocated funds for the National Institute of Occupational Safety and Health (NIOSH) to establish educational resource centers in occupational health that year, funding had peaked in 1980. By 1985 to 1986, the NIOSH training budget was only approximately 66% of the peak 1980 funding, and the future of funding was increasingly uncertain. Indeed, the 1987 federal budget proposed a complete closeout of NIOSH training funds. Additionally, compared with other hospital based residency programs, OEM residency programs were disadvantaged in their ability to generate revenues from patient care and in their ability to be reimbursed from Medicare or third-party payers. As a result, there were only 124 physicians in full-time occupational medicine residency programs and financial vulnerability was making it difficult for training programs to recruit good students. This section included the statement "The prevailing political and social climate is one which supports the argument that training of occupational physicians is a responsibility of the private sector."

Why residency training was critical. The case statement observed that physicians typically entered the field of OEM midcareer and often serendipitously or more by accident than design. According to the case statement, "There is now widespread consensus that on-the-job learning is no longer adequate for a productive career in OEM. Practitioners simply must have formal training in several disciplines; including clinical occupational medicine, toxicology epidemiology, management science and biomedical ethics . . . Broad training is now a requirement for professional certification as it is for effective performance on the job." It noted that the barriers for entry into this profession were being raised. The issue was not merely to recruit adequate numbers of physicians to fill staff openings, but also "how to attract some of the most highly qualified and brightest young physicians to Occupational Medicine so that new leadership would be developed to confront the existing challenges."

What the Scholarship Fund could accomplish and how the Fund would work. The case statement noted that the Fund was to be self-liquidating. The principal and interest would, over the next 10 years, provide tuition support and stipends to carry from 60 to 100 meritorious postdoctoral students through their residency training and remove financial barriers that had kept bright young medical graduates from the field, thus providing a new cohort of leaders. The Fund would help supply funding predictability to training programs and, for private industry, would help ensure the availability of a new generation of highly skilled practitioners who would be able to contribute to the integrity and profitability of American industry and move into complex managerial positions. The Fund was to seek and select applicants who had great potential and

were themselves "seeking a well-rounded training program that would equip them to practice their specialty in any and all settings, and grow into leadership roles." Reflecting the employment patterns of the time, the case was made that "since the vast majority of physicians in Occupational Medicine are employed by or consult to private industry, initial support for the fund is being solicited chiefly from the business organizations who have the most to benefit . . . ." The Fund was to operate according to Equal Opportunity principles.[10]

Progress of the Two Funding Campaigns

Exxon and Mobil Corporations donated the services of the senior managers of their respective philanthropic foundations to serve as advisors to the OPSF Board of Trustees. The expertise of these individuals helped immeasurably throughout the campaign. OPSF also developed a network of OEM leaders who, through business contacts or personal friendships, were able to facilitate access to key corporate decision-makers, including chief executive officers (CEOs), whose respective corporations would serve as potential donors. The corporate advisory board consisted of leaders of industry. The campaign executive committee chair was James E. Olsen (Chairman and CEO, AT&T), and members were James Ferguson (Chairman of the Executive Committee, General Foods Corp.), Paul F. Oreffice (Chairman and CEO, The Dow Chemical Co.), Donald E. Peterson (Chairman and CEO, Ford Motor Co.), and Joseph D. Williams Chairman (CEO, Warner Lambert Co.). Because the potential donor base was small, the OPSF trustees gave meticulous attention to ensuring the professionalism of all campaign approaches throughout the campaign. They also paid attention to the order in which donors were approached so as to try to avoid any early donor discouraging others from giving by making a token contribution. The vast majority of the $4,300,000 raised during this initial campaign was donated by corporations, with much smaller donations from individuals.

A second campaign was conducted from January 1995 to December 1998 as the OPSF funds were starting to become depleted. The focus was again on American corporations and to a much lesser extent on ACOEM members. This second campaign raised $2,700,000 with 50 American corporations giving more than $10,000 each.[11] Although the magnitude of the contributions donated during the second campaign was a clear indication of corporate support, it also became apparent that American corporate philanthropy had changed since the first campaign. Corporations themselves were becoming less generous with respect to funding, causing greater reliance on individual philanthropy. Business services such as occupational medicine services were increasingly being outsourced and proportionately fewer physicians were directly employed by corporations. The response led OPSF trustees to the view that, should these trends continue, corporate giving was likely to have less potential to sustain the fund in the future.

As of December 2004, total contributions to the OPSF fund have totaled $7,031,000. For many years James Russell, one of the trustees, initially an executive of Metropolitan Life Insurance, now retired, provided skilled financial advice to OPSF pro bono. Sound investment performances have allowed the returns from OPSF investments to consistently outperform performance yardsticks from comparable investments, at least over longer periods. For example, as of December 31, 2005, the 5-year average annual returns from the major investment vehicles used by OPSF were +5.5%, +7.5%, and +9.0% compared with annual average returns from the Upper Balance Fund yardstick of +2.01%, Dow Jones Industrial Index of +0.65%, and Standard & Poors 500 Index of −2.30%. As of December 31, 2004, OPSF investment income had totaled an additional $2,800,000. To date, just over 80% of expended funds have gone for scholarships to date, with less than 20% of the total going to fund administration and expenses of the two fundraising campaigns.

The most positive projections of this self-liquidating fund as of March 31, 2005, assuming conservative future return rates from invested funds and no further contributions, indicate that the fund will likely be exhausted around 2010. It is projected that OPSF will have provided 234 scholarships for residency training in OEM. The amount of each scholarship is set to be equal to the residency stipends paid by NIOSH and has varied slightly from year to year. The exact amount also depends on the postgraduate year of the scholar at the time of the award.

Applicants and Selection Process

Approximately 40 to 50 trainees apply to the OPSF each year and less than a dozen are chosen as OPSF scholars. Successful applicants are provided scholarship support for a period of 1 or 2 years of training, depending on whether or not the scholarship is renewed for the consecutive year. Scholars are not awarded scholarships for more than 2 years.

Selection factors applying to individual candidates include the college and medical school record with evidence that the candidate is a truly "educated person," possessing broad academic preparation. In addition, the candidate's residency and fellowship are considered, in which the committee looks for evidence of strong career direction, motivation, and professional development. Letters of recommendation that reflect sufficient time and interaction with the candidate to support an accurate and reliable assessment are weighed more heavily, in which assessments focus on specific skills; clinical judgment; motivation; thoroughness;

leadership; interaction with attendings, peers, and patients; and humane qualities. The candidate's personal statement is examined for development of interest in OEM; demonstration of activities that support the growth of competence; and illustration of career objectives, and noteworthy achievements, service, or interests in medicine and other fields. Finally, ancillary experiences or strengths in related disciplines such as industrial hygiene, toxicology, communication, computer science, or management and "business" are examined. Personal attributes such as background in an underrepresented minority group or educational achievement despite unfavorable economic or social factors are also considered.

General considerations influencing selection decisions include the distribution between first- and second-year awardees. It has been the usual practice to make an award for a second year to a scholar who has performed with merit in the first year of the award. That being the case, providing a major fraction of awards to first-year applicants constrains the ability to make as many first-year awards in the following year as might be appropriate. Therefore, an effort is made to approximate a 50–50 distribution between the years. An effort is also made to achieve a reasonable distribution between scholars who envision a research or teaching career and those who aspire to clinical or administrative practice in the private, institutional, public, or corporate sector. The intention of donors and of the Fund is to support residents through a stipend when no other practice-derived income exists. Candidates who have arrangements during the residency year(s) to earn substantial income from medical practice or from an employment situation with remuneration from corporate, military, or other organizations, for example, are not considered for an award.

Methods Used to Evaluate Success of the Occupational Physicians Scholarship Fund

To evaluate the success of the OPSF, we examined the following descriptive measures: the number of scholarships awarded, gender distribution of scholars, and training programs attended by OPSF scholars. To further assess the outcomes of the scholarship, we examined the following measures:

- Numbers or percent of scholars who become diplomats of the ABPM/OM;
- Performance of scholars on the ABPM/OM examinations;
- Performance of OPSF scholars on the National Board examinations as compared with both residency trained and nonresidency trained physicians;
- Number of scholars who become diplomates of other National Boards;
- Type of practice setting: clinical, corporate medicine, government service, and academic medicine (including the number of scholars who become residency program directors or associate directors);
- Site of subsequent practice;
- Retention of scholars in the field of OEM; and
- Number of scholars who are members of the OEM professional society (ACOEM) during academic year 2004–2005.

Information on the scholars regarding number of awardees and awards, residency program in which they trained, gender, and type of practice setting was obtained from the OPSF national office in Illinois. Much of this information was cross-referenced with information from the OPSF web site,[12] the 2004–2005 ACOEM directory,[13] and information available through Internet search engines. The ACOEM 2004–2005 directory[13] was consulted to ascertain which scholars were members of ACOEM during the 2004 academic year. Information on diplomates of the ABPM/OM was obtained from the APBM web site.[14] This information allowed the percentages of board-certified scholars to be calculated. Aggregate information on the performance of OPSF scholars in ABPM-certifying examinations from 1994 through 2004 and mean scores for all occupational medicine residency-trained physicians taking the comparable examinations was obtained from the American Board of Preventive Medicine (ABPM). Individual scores were not sought or revealed. Supplementary Information on the history of the OPSF fund was obtained by consulting some of the members of the original Board of Trustees.

Occupational Physicians Scholarship Fund Outcomes

Number and Gender Distribution of Scholars

The first scholarships were awarded in 1988. There have been 104 scholars and 149 1-year scholarships between 1988 and 2002. Sixty-one percent of the scholars were male ($n = 64$, 61%). Almost half of the scholars ($n = 44$, 42%) were awarded consecutive scholarships allowing support for 2 years of residency training. Table 2 shows the total number of scholarships awarded and the number of scholarship recipients each year.

Training Program Attended

As seen in Table 3, approximately half ($n = 52$) of the scholars (1988–2002) trained at seven institutions, with more than one fourth ($n = 28$) of all scholars training at Johns Hopkins Medical Center or the University of California, San Francisco. The remaining scholars trained at 24 institutions. Most of the residency programs trained one to two scholars. Geographically, two thirds of the scholars trained in northeastern states ($n = 45$, 43%) or the Pacific coast states ($n = 23$, 24%). The midwest, Rocky Mountain states, southwest, and southern states were also represented in that order with less

TABLE 2
Number of Scholarship Recipients by Year, 1988–2002

Year	New Recipients	Total Scholarships
1988	6	6
1989	6	7
1990	8	10
1991	8	13
1992	9	13
1993	7	11
1994	10	13
1995	5	12
1996	9	10
1997	5	10
1998	5	8
1999	10	11
2000	5	9
2001	6	9
2002	5	8
2003	5	8
2004	4	7
Total	113	164

than 12% of scholars attending training program in any of these regions.

Performance of Scholars on American Board of Preventive Medicine Occupational Medicine-Certifying Examination

Almost 90% of the scholars 1988 to 2002 scholars have become diplomats of the ABPM/OM (88%, 91 of 104). Table 4 shows the mean scores for OPSF scholars and for all occupational medicine residency trained physicians by year from 1994 to 2004 for core preventive medicine topics. The minimum passing scores are also displayed. For all years except 1999, the mean score obtained by OPSF scholars exceeded the national norm. If scores are averaged over the 11-year period, OPSF scholars scored approximately 46 points higher than their counterparts in the core preventive medicine components, with greater differences being recorded during the last 4 years. The recent change may partly reflect changes in the scaled scoring system used by ABPM. Table 5 shows the mean scores for OPSF scholars and for all OEM residency trained physicians by year from 1994 to 2004 for OEM topics. Minimum passing scores are also displayed. The mean scores obtained by OPSF scholars were higher than those of all occupational medicine residents in all but 1997. Similar to the experience in the preventive medicine core, the means scores averaged over this period for occupational medicine subjects were approximately 44 points higher for OPSF scholars than their non-OPSF scholar counterparts. The average yearly pass rate for OPSF scholars over the 1994–2004 period was 82% (range, 73–100%) compared with 70% (range, 60–77%) for all occupational medicine physicians. Taken as a whole, these results demonstrate superior performance for OPSF scholars compared with all residency-trained occupational physicians who take the certifying examination.

TABLE 3
Training Programs Attended by Occupational Physicians Scholarship Fund Scholars (1988–2003)

Medical Centers	No. of Recipients
Johns Hopkins	17
University of California, San Francisco	11
University of Washington	8
Harvard/ Harvard School of Public Health	7
Yale	6
Columbia	5
UMDNJ–Robert Wood Johnson	5
University of Iowa	4
University of Oklahoma	4
University of Cincinnati	4
University of Utah	4
University of Illinois, Chicago	3
University of Colorado	3
Duke University	2
Mount Sinai Medical Center	2
University of California, Davis	1
University of California, Irvine	2
University of Southern Florida	2
University of Texas	2
Emory University	1
Morristown Memorial Hospital	1
St. Louis University	1
University of Arizona	1
University of California, Berkeley	1
University of Connecticut	1
University of Michigan	1
University of Pittsburgh	1
University of Southern California	1
Unknown	1
West Virginia University	1

Board Certification in Other Fields

Almost half (50, 48%) of the 104 scholars are diplomates of one of the other boards accredited by the American Board of Medical Specialties. Forty-one (39%) are diplomats of the American Board of Internal Medicine, seven (6%) are diplomats of the American Board of Family Practice, one is a diplomat of the American Board of Toxicology, and four are diplomats of the American Board of Internal Medicine, Pulmonary Medicine subspecialty.

Current Practice Setting

As seen in Table 6, approximately one third (32) of OPSF scholars who trained from 1988 to 2002 are currently practicing in an academic setting. The majority of this cohort (26 of 32) holds academic appointments from assistant professor to full professor and/or residency director. Approximately 36% (37) work in clinical settings, 12 of whom are hospital-based, 18 are group practice/HMO-based, and seven are in solo practice or some other arrangement. Thirty percent (14) work in the corporate setting; approximately half (7) of these are corporate medical directors. There was no information available on the current type of practice for five of the scholars (5%). Only two former OPSF scholars are currently working outside OEM. Thus, at least 93% (97 of 104) of all scholars, and 98% of those whose practice setting is known, have remained in the field of OEM.

TABLE 4
Mean Scores Obtained in the American Board of Preventive Medicine Certifying Examination, Preventive Medicine Core, for Occupational Physicians Scholarship Fund (OPSF) Scholars and for All Occupational Medicine (OM) Residency Trained Physicians: 1994–2004, by Year

Examination Year	Minimum Passing Core Scaled Score	Average Scaled Score–Preventive Medicine Core	
		OPSF Scholars	National Occupational Medicine Residency Trained
1994	435	547.27	514.09
1995	435	558.78	531.62
1996	435	559.00	527.24
1997	435	510.83	505.16
1998	435	581.00	544.76
1999	435	540.75	546.38
2000	435	545.67	505.85
2001	435	626.75	533.64
2002	450	571.33	528.90
2003	450	653.83	542.16
2004	450	653.60	532.34

TABLE 5
Mean Scores Obtained in the American Board of Preventive Medicine Certifying Examination, Occupational Medicine Subject, for Occupational Physicians Scholarship Fund (OPSF) Scholars and for All Occupational Medicine (OM) Residency Trained Physicians: 1994–2004, by Year

Examination Year	Minimum Passing OM Scaled Score	Average Scaled Score–Occupational Medicine	
		OPSF Scholars	National OM Residency Trained
1994	440	518.64	501.82
1995	440	560.56	516.23
1996	405	546.00	503.38
1997	405	525.33	542.76
1998	405	551.17	513.53
1999	450	531.63	512.44
2000	450	530.44	495.77
2001	450	580.63	508.26
2002	450	544.60	516.54
2003	450	600.71	525.97
2004	450	734.00	593.96

Geographic Area of Practice as of June 2005

As of 2002, scholars practiced in 38 states and one foreign country, namely Canada. Information on practice location was not available for four scholars. The states with the most scholars practicing postresidency were California (17) and Maryland (7). The regional distribution of practice sites is different from that of training locations. As seen in Table 7, former OPSF scholars were most heavily concentrated in the southern states (28), northeastern states (21), and the Pacific coast states (19) with less concentration in the midwestern, southwestern, and Rocky Mountain states.

Percent of Scholars Who Are American College of Occupational and Environmental Medicine Members as of 2005

Slightly more than three fourths (79 of 104) of the scholars were members of ACOEM as of 2005.

TABLE 6
Type of Practice Setting for Former Scholars (1988–2002) as of 2005

Practice Setting	No. of Scholars
Clinical–OM	37 (36%)
Academic–OM	32 (31%)
Corporate–OM	14 (12.5%)
Government–OM	13 (12.5%)
Consulting–OM	1 (1%)
Unknown	5 (5%)
Not practicing OM	2 (2%)
Total	104

OM indicates occupational medicine.

TABLE 7
Geographic Region of Practice Location for 1988 to 2002 Occupational Physicians Scholarship Fund Scholars as of June 2005

Geographic Area	No. of Scholars
Southern states	28
Pacific Coast states	20
Midwestern states	19
Northeastern states	21
Southwestern states	6
Rocky Mountain states	5
Unknown	4
Foreign country	1
Total	104

Discussion

The OPSF appears to have successfully met its goals of providing scholarship stipends for some of the most qualified physicians in the United States to allowing them to train in OEM thus helping to address the critical shortage of formally trained/qualified physicians in OEM and of fostering the growth of a talented leadership cadre whose skills and commitment would help to move the field forward. As of 2005, over 160 scholarship years of residency training have been supported, and over 110 physicians have received OPSF scholarships. It is presently projected that when current funds are exhausted, there will have been a total of 234 OPSF scholarships with the last scholarships being disbursed in the year 2011.[12] Of the 104 scholars from 1988 to 2002, 91 (88%) are diplomats of the ABPM,

OM. Not only do OPSF scholars have a higher rate of board certification in OM than ACOEM members as a group, but they have also scored higher on both parts of the certifying examination (OM specialty and general preventive medicine core) than other residency trained examinees as a group. It is estimated that approximately 1500 to 1800 board-certified occupational medicine physicians[15] are currently estimated to be in active practice; thus, former OPSF scholars account for approximately 6% of this workforce.

The 2001 OPSF annual report stated that the "OPSF fund had achieved its founding mission, to seed the medical field with a cohort of leaders . . . over 100 physician-specialists expertly trained in OEM . . . who are prominently positioned to improve worker health, business productivity and our precious environment."[12] The distribution of former scholars appears to support this assertion. Almost all past OPSF scholars continue to practice OEM. Their practices are in a variety settings: academic, corporate, clinical (both with hospitals and group practices), and government.

The highest proportion of scholars currently practice in a clinical setting. Twenty-one of the former scholars who are in clinical practice are hospital-based and the remainder is group practice-based. In addition, of those in clinical practice, almost 50% (16 of 37) are in leadership positions as medical directors in their setting. The proportion in corporate medicine is around 13% (14 of 104). This appears to be less than that expected at the time of formation of OPSF and would seem to largely reflect a change in the demography of physicians working in corporate settings. Since the launching of the first campaign in 1985, there has been corporate downsizing and outsourcing of many functions. Some of the occupational medicine needs of corporations are now met by physicians in clinic-based, hospital-based, and academically based university health center practice. This represents an historic shift from the period before 1970 when much of OEM practice was limited to corporations and academia.[15] This is a useful outcome in that the greater concentration in hospital and academic settings appears to support the goals of the fund: provision of a critical mass of "trainers" for future generations of OEM physicians and provision of a research base for improved practice.

Despite the tendency for OPSF scholars to have taken training in the northeastern United States or the west coast, they are well-dispersed geographically subsequent to training, practicing in 31 states and two foreign countries. They are represented in all geographic regions of the country with some tendency to be concentrated in the southern, northeastern, and Pacific Coast states. Whereas only 14% of scholars trained in the south or midwest in 2005, 45% of those who completed training up to 2002 are in practice in those two regions. The current distribution of former OPSF scholars indicates that they practice in diverse settings seeming to fulfill the objective that scholars should have a well-rounded training program that would equip them to practice in any and all settings.

The OPSF was an innovative response to the twin issues of difficulties in funding occupational medical residencies and the community need for physicians trained in this specialty. Many specialty groups have established training funds through their professional societies, but these funds are generally used for research training or fellowships rather than postgraduate year 2 or 3 residency training. Recently, funding from pharmaceutical corporations has been proposed for residency training in dermatology.[16] Almost all other recognized specialties have access to public funds for standard residency training. The federal government funds graduate medical education through the Medicare program,[17] providing more than 100,000 residency positions annually.[16] The total number of Medicare-funded positions has been fixed since 1997 by the Balanced Budget Act.[16] It remains rare for any occupational medicine residency training to be funded by hospital Medicare-derived training funds and even if available, some restrictions could apply in their application to occupational medicine training. Other funding sources for residency training include the Department of Defense, Department of Veteran's Affairs, Partnerships for Quality Education (PQE) funded by the Pew Charitable Trust, the Robert Wood Johnson Foundation, state funding to state-operated medical schools, and Kellogg's Foundation Community Partnerships in graduate medical and nursing education.[17] There are generally restrictions on the use of most of these funds, which severely limit or prohibit use for OEM residency training. The American Cancer Society has support for a handful of physicians training in general preventive medicine or OEM only if they train with an emphasis on cancer control and prevention.[18] Some states, notably Utah and New York, have recently passed legislation allowing a small tax on workers' compensation premiums to be applied to training in occupational medicine. However, these state programs are, at best, only likely to meet regional needs.

The major source of training funds for OEM residencies has been NIOSH. Fortunately for OEM physicians, American industry, and American workers, the threatened elimination of NIOSH funding in 1987 did not occur. However, NIOSH funding has remained relatively static, and again in 2005, the NIOSH training effort is facing review. Furthermore, the funds that OPSF makes available for training are a net addition to the total OEM training funds, thus freeing funds from NIOSH or other sources for use in the funding of additional residents who would not otherwise have been able to formally train in the field of OEM.

Whereas in 1985, rigorous evaluation of the value added by occupational medicine was all but lacking, more recent studies have clearly documented the costs to society of occupational injury and disease,[19–24] the productivity gains and the cost savings to be gained from controlling injuries and workers' compensation and disability costs, and the benefits derived from better disease management and management of healthcare costs.[25–31] The case for community benefit from continued investment in training for occupational medicine would appear to be stronger than ever. The value added by occupational medicine practitioners has now been clearly established. However, the costs of health care have continued to escalate dramatically for both current employees and retirees to the extent that these costs threaten the ultimate survivability of some major American corporations.[32,33]

The case for continued funding of OEM residency training through a mechanism such as OPSF appears strong, although the identity of future donors may need reconsideration. Corporate giving, the driving force for the first two campaigns, may now have less potential. Individual philanthropy is increasingly supplanting corporate philanthropy in a variety of settings. Private foundations and planned giving are increasingly important for all charitable giving. The new trend for states to support occupational medicine training programs is welcomed but appears unlikely to provide the extensive nationwide benefits OPSF has achieved. The challenge will be to match the interests of donors with the exciting health improvements obtainable through training. Based on the available information, the OPSF has made a substantial contribution to the field and has demonstrably achieved its objectives. Efforts to replenish privately donated funds for training future occupational physicians appear warranted based on a proven track record of success in providing well-trained OEM physicians who remain in the field, contributing to the growth and vitality of the specialty, as well as to worker health, business productivity, and a healthy environment.

Acknowledgments

The authors acknowledge the support and helpful advice of Drs. Lloyd Tepper and Joseph Cannella, and Dwight Green, MBA.

References

1. McCurdy LE, Roberts J, Rogers B, et al. Incorporating environmental health into pediatric medical and nursing education. *Environ Health Perspect*. 2004;112: 1755–1760.
2. Castorina J, Rosenstock L. Physician shortage in occupational and environmental medicine. *Ann Intern Med*. 1990; 113:983–986.
3. Institute of Medicine. Role of the primary care physician in occupational and environmental medicine. Washington, DC: National Academy Press; 1988.
4. Cordes DH, Foster Rea D, Rea J, Peate W. Occupational and environmental medicine in preventionist residency. *J Occup Environ Med*. 1996;38:615–618.
5. Assessing the physician shortage in occupational and environmental medicine. National Academy of Sciences. 1991 Available at: www.nap.edu/openbook. Accessed June 30, 2005.
6. Wilenski GR. Who will pay for graduate medical education. *N Engl J Med*. 1998; 339:52–53.
7. *Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational and Safety Health Personnel. Committee to Assess Training Needs for Occupational Safety and Health Personnel in the United States.* Institute of Medicine. Washington, DC: National Academic Press; 2000.
8. Emmett EA, Green-McKenzie J. External practicum year residency training in occupational and environmental medicine. *J Occup Environ Med*. 2001;43:501–511.
9. Walsh DC. Is there a doctor in the house? *Harvard Business Review*. 1984;July–August:84–89.
10. Walsh DC. *The Summary Case Statement for the Occupational Physicians Scholarship Fund.* 1985.
11. The Occupational Physicians Scholarship Fund Campaign Update. Available at: www.opsf.org. Accessed June 27, 2005.
12. Occupational Physicians Scholarship Fund. Available at: www.opsf.org. Accessed June 27, 2005.
13. American College of Occupational and Environmental Medicine *Membership Directory. 2004–2005.* Arlington Heights, IL: ACOEM; 2004.
14. American Board of Preventive Medicine web site. Available at: abprevmed.org. Accessed June 28, 2005.
15. Imbus HR. Fifty years of hope and concern for the future of occupational medicine. *J Occup Environ Med*. 2004;46: 96–103.
16. Oransky I. How much for that dermatologist in the window? Private funding for residency slots. June 30, 2005. Available at: http://slate.msn.com/id/2121755/. Accessed July 4, 2005.
17. Council on Graduate Medical Education, Fifteenth Report. Financing graduate medical education in a changing health care environment. US Department of Health and Human Services. Health Resources and Services Administration. December 2000. Available at: http://www.cogme.gov/15.pdf. Accessed July 4, 2002.
18. American Cancer Society. Physician Training Award in Preventive Medicine. 2006 grant funding. Available at: http://www.acpm.org/2006_PTAPMannouncement.pdf. Accessed July 4, 2005.
19. Schulte PA. Characterizing the burden of occupational injury and disease. *J Occup Environ Med*. 2005;47:607–622.
20. Derr J, Forst L, Yun Chen H, Conroy L. Fatal falls in the construction industry, 1990–1999. *J Occup Environ Med*. 2001; 43:853–860.
21. Kissner S, Pratt S. Occupational fatalities among older workers in the United States. *J Occup Environ Med*. 1997;39: 715–721.
22. Hartley D, Biddle E, Grosch J, Marsh S. The burden of occupational fatal injury for older workers in the United States. *Injury Insights.* June/July 2002. Available at: http://www.nsc.org/workplace/olderworkr.htm. Accessed July 5, 2005.
23. Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ. Occupational injury and illness in the United States. Estimates of costs, morbidity, and mortality. *JAMA*. 1997;157:1557–1568.
24. Waehrer G, Leigh JP, Cassady D, Miller TR. Costs of occupational injury and illness across states. *J Occup Environ Med*. 2004;46:1084–1095.
25. Bernacki EJ, Tsai SP. Ten years' experience using an integrated workers' compensation management system to control workers' compensation costs. *J Occup Environ Med.* 2003;45:508–516.
26. Green-McKenzie J, Rainer S, Behrman A, Emmett E. The effect of a health care management initiative on reducing work-

ers' compensation costs. *J Occup Environ Med.* 2002;44:1100–1105.
27. Green-McKenzie J, Parkerson J, Bernacki E. Comparison of workers' compensation costs for two cohorts of injured workers before and after the introduction of managed care. *J Occup Environ Med*. 1998;40: 568–572.
28. Green-McKenzie J. Managing workers' compensation costs. *Clin Occup Environ Med.* 2004;2.
29. Keyes KB, Wickizer TM, Franklin G. Employer satisfaction with workers' compensation health care: results of the Washington State Worker's Compensation Managed Care Pilot. *J Occup Environ Med*. 2003;45:234–240.
30. Baldwin ML, Johnson WG, Marcus SC. Effects of provider networks on health care costs for workers with short-term injuries. *Med Care*. 2002;40:686–695.
31. Dembe AE, Fox SE, Himmelstein JS. *Improving Workers' Compensation Health Care: A National Challenge.* Massachusetts: OEM Press; 2003.
32. McArdle FB, Neuman P, Kitchman M, Kirland K, Yamamoto. Large forms' retirees health benefits before medicare reform: 2003 survey results. *Health Affairs, The Journal of the Health Sphere*. 2004. Available at: http//: content.healthaffairs.org/cgi/content. Accessed July 5, 2005.
33. GM blames health care costs for earnings gap. *Managed Care. News and Commentary.* 2004. Available at: http//:www. managedcaremag.com/archives. Accessed July 4, 2005.