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Research at US Colleges of Osteopathic Medicine: A Decade of Growth

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Although research is a critical component of academic medicine, it has not been a significant component of osteopathic medicine. For years, leaders in the osteopathic medical profession have called for increased research in osteopathic medical schools. The need for cost-effective clinical practice leading to improved clinical outcomes creates a necessity for conducting well-designed clinical outcomes research related to osteopathic practice. The authors assess the growth in research at osteopathic academic medical centers from 1989-1999. The amounts of extramural funding at each school, sources of funding, types of research funded, departments funded, and investigators' degree types are also assessed.

During the 10 years analyzed, total research funding increased 37%. Twenty-five percent of the grants and 55% of the funding to colleges of osteopathic medicine were from the National Institutes of Health. Most (63%) grants were awarded to PhD faculty. Most research was conducted in the basic biomedical sciences. Clinical research related to osteopathic practices appears to be a relatively minor component of research at osteopathic medical centers.

Research is a critical component of medical education. It is "the means by which missions of education and service transcend the learning and practice of a trade...to become informed by the spirit of scientific inquiry."[1] However, research has not historically been a significant component of the osteopathic medical profession.[2,3]

This lack of attention to the profession's research responsibility has occurred despite years of advocacy for conducting research at osteopathic medical schools. Research programs of the American Osteopathic Association (AOA) began in 1939 with the formation of the Committee on Research. In 1951, the Committee on Research merged with the Osteopathic Research Council, an advisory board formed in 1943, and became the Bureau of Research. In addition to the Bureau of Research, several other infrastructure components are available to support research in the osteopathic profession.[4]

In past years, several strong advocates for increasing osteopathic research have emerged. In 1987, David Rivers, PhD, then Assistant Director for Research and Evaluation at the AOA Department of Education, noted a revitalization of the research mission of the AOA Bureau of Research that focused on two primary goals: (1) targeting AOA resources toward research areas of high priority to the osteopathic medical profession, and (2) recruitment, training, and career development of osteopathic physicians as clinical investigators.[5] That same year, Gilbert E. D'Alonzo, Jr, DO, Chairman of the Committee on Grants for the AOA Bureau of Research, spoke out strongly for increasing research activities at colleges of osteopathic medicine. He stated that colleges of osteopathic medicine had an obligation to pursue both basic science and clinical research. The combination of research, teaching, and patient care creates an important interaction that enables the osteopathic profession to advance.[6] In 1991, Thomas Wesley Allen, DO, then the AOA's Editor in Chief, stated that "one of our most important responsibilities as a health profession is to meet the challenge of describing, defining, and studying osteopathic theory and practice."[7]

More recently, advocates have encouraged administrators of colleges of osteopathic medicine to recognize the need to develop their institutional research capacity to strengthen their position within the communities they serve and to secure a stable future for the osteopathic profession. Conducting research is an important mechanism to "garner societal support and recognition."[8] Research in colleges of osteopathic medicine has been recognized as an important way to assure societal recognition and institutional prestige and to broaden faculty intellect through the synthesis and evaluation of new knowledge. Society places a high value on an institution's ability to conduct research and is willing to support this activity.[8]

In the 1998 Louisa Burns Memorial lecture, Thomas Yorio, PhD, stressed the importance of the "three-legged stool" model of academia and that it remains vital to the mission of academic medical centers. The three-legged stool represents those activities that are generally accepted as standard practices for academic medical centers—teaching, delivery of clinical services, and research.[9]

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Table 1
Number of Grants and Amounts of Extramural Research Funding by College of Osteopathic Medicine, Fiscal Year 1999

School	No. of Awards	Dollars, Mean	Standard Deviation	Total Dollars	% Total Funding
UNTHSC	108	77,076	92,924	8,324,175	31.43
MSUCOM	53	112,878	105,081	5,982,536	22.59
UMDNJ/SOM	36	157,434	181,098	5,667,615	21.40
UNE/COM	2	568,000	101,823	1,136,000	4.29
PCOM	9	123,569	165,949	1,112,125	4.20
LECOM	7	124,908	275,987	874,357	3.30
NYCOM	11	58,526	69,271	643,787	2.43
KCOM	23	26,545	40,157	610,527	2.31
OSU-COM	12	50,582	39,160	606,990	2.29
DMU-OMC	18	32,705	44,832	588,698	2.22
OUCOM	12	48,849	68,894	586,182	2.21
CCOM	6	25,838	15,550	155,027	0.59
TUCOM	3	17,097	20,263	51,290	0.19
NSU-COM	3	16,307	13,828	48,920	0.18
AZCOM	2	18,800	5940	37,600	0.14
UHS/COM	3	11,332	1891	33,996	0.13
WesternU/COMP	4	4232	1107	16,928	0.06
PCSOM	1			6080	0.02
WVSOM	1			1950	0.01
All Schools	**314**			**26,484,783**	**100**

During the past few years, the American Association of Colleges of Osteopathic Medicine (AACOM) and the AOA have taken steps to increase research activity within the osteopathic profession. In December 1999, the first meeting of the Osteopathic Collaborative Clinical Trials Initiative Conference was held in Bethesda, Md. This meeting, sponsored by AACOM, convened representatives from the colleges of osteopathic medicine, the AOA, the American Academy of Osteopathy, the Louisa Burns Osteopathic Research Committee, and the American College of Osteopathic Family Practitioners who participated in workshops and presentations to address ways to enhance research activities within the profession. This group developed a plan to enhance research activities, which consisted of three key components: (1) development of a center for excellence in osteopathic research, (2) development of a research Web site for the osteopathic medical profession, and (3) development of a national clinical database to enhance communication among group members.[2]

The second Osteopathic Collaborative Clinical Trials Initiative Conference was held in Orlando, Fla, in November 2000. At that time, it was announced that $1 million was available for the formation of an osteopathic research center. This funding was obtained by pledges from AACOM, the AOA, and the American Osteopathic Foundation. The goals for this center are to promote a culture of research, coordinate research collaboration throughout the profession, and develop scientifically sound research protocols and procedures.[10] The third Osteopathic Collaborative Clinical Trials Initiative Conference meeting was in October 2001, and the fourth was held in March 2003.

Following are the findings of a descriptive study to assess the current status of research at osteopathic medical schools. This study examines the success of the osteopathic medical schools in developing extramurally funded programs of research. It examines the prevalent types of research being conducted at colleges of osteopathic medicine in fiscal year 1999. Additionally, this study compares the amount of

Table 2
Number of Grants and Amounts of Extramural Research Funding at Colleges of Osteopathic Medicine, Fiscal Year 1989 Versus Fiscal Year 1999

School	Total Research Funding, 1989	Total Research Funding, 1999	% Change*
UNTHSC	2,966,327	8,324,175	64.35
MSUCOM	8,286,013	5,982,536	−38.50
UMDNJ/SOM	2,427,000	5,667,615	57.18
UNE/COM	59,017	1,136,000	94.80
PCOM	255,000	1,112,125	77.07
LECOM	0	874,357	100
NYCOM	35,050	643,787	94.56
KCOM	646,366	610,527	−5.87
OSU-COM	100,700	606,990	83.41
DMU-OMC	100,726	588,698	82.89
OUCOM	835,084	586,182	−42.46
CCOM	813,956	155,027	−425.04
TUCOM	0	51,290	100
NSU-COM	0	48,920	100
AZCOM	0	37,600	100
UHS/COM	0	33,996	100
WesternU/COMP	0	16,928	100
PCSOM	0	6080	100
WVSOM	32,224	1950	−1552.51
Total funding	**16,557,463**	**26,484,783**	**37.47**

* % Change = (current year minus prior year) ÷ current year

external funding obtained by colleges of osteopathic medicine during 1989-1999. This provides a useful measure of progress in research activities during the past 10 years as well as gives an indication of what changes must be made to accomplish the objectives of the new Osteopathic Research Center.

Methods

To assess the quantity and types of research under way in osteopathic medical schools during fiscal year 1999, data were obtained from AACOM. Only the amounts of dollars received for research were compared. Colleges of osteopathic medicine were ranked by the amount of extramural funding for research that they obtained.

The sources of research funding were also ranked. We examined the relative amounts of research conducted in departments of basic science compared with clinical departments. Total and mean numbers of grants and funding dollars were compared for each college of osteopathic medicine and analyzed based on the type of funding agency, faculty degree, and whether the research was conducted in a basic sciences or clinical department. Analysis was conducted using SPSS statistical software, version 7.0.

Results

During fiscal year 1999, the 19 colleges of osteopathic medicine received 314 extramural awards totaling $26,484,783 (*Table 1*). The amount of awards varied greatly, ranging from $200 to $840,765. This represents a 37% growth in extramurally funded research at colleges of osteopathic medicine during 1989-1999. Most schools had significant growth in funding, with the greatest 10-year growth among schools in existence in 1989 occurring at University of New England College of Osteo-

Table 3
Number of Grants and Levels of Funding by Extramural Sources at Colleges of Osteopathic Medicine, Fiscal Year 1999

Funding Agency*	No. of Grants Funded	Mean Amount of Award	Minimum	Maximum	Total Dollars Awarded	% Total Funding
NIH	80	180,830	6000	750,000	14,466,373	54.62
Pharmaceutical	95	51,390	350	840,765	4,882,041	18.43
Other agencies	55	37,988	200	418,866	2,089,316	7.89
Other federal	20	84,200	4902	243,000	1,683,998	6.36
Foundations	35	37,369	2000	250,000	1,307,917	4.94
State and local government	7	83,936	4000	229,943	587,552	2.22
DOD	1				496,000	1.87
AOA	17	28,583	1950	58,785	485,910	1.83
CDC	1				294,715	1.11
HHS/HRS	3	63,654	19,816	100,000	190,961	0.72
All funding sources	**314**	**84,346**			**26,484,783**	**100**

* NIH indicates National Institutes of Health; DOD, Department of Defense; AOA, American Osteopathic Association; CDC, Centers for Disease Control and Prevention; HHS/HRSA, US Department of Health and Human Services/Health Resources and Services Administration.

pathic Medicine and New York College of Osteopathic Medicine of the New York Institute of Technology (95% increases for both schools). All colleges of osteopathic medicine had at least one externally funded research grant, and only four had decreases in external funding—Michigan State University College of Osteopathic Medicine, Kirksville College of Osteopathic Medicine, Chicago College of Osteopathic Medicine, and West Virginia School of Osteopathic Medicine (*Table 2*).

Funding to Colleges of Osteopathic Medicine

During fiscal year 1999, three of the nineteen colleges of osteopathic medicine were responsible for three fourths (75.48%) of total extramural research funding (*Table 2*). The University of North Texas Health Science Center at Fort Worth–Texas College of Osteopathic Medicine had 108 grants funded for a total of $8,324,175 (31% of total funding). Michigan State University College of Osteopathic Medicine received 53 grants totaling $5,982,536, which represents 23% of total funding. The University of Medicine and Dentistry of New Jersey School of Osteopathic Medicine had 36 funded grants equaling $5,667,615, representing 21% of total extramural research funding to all colleges of osteopathic medicine.

Sources of Funding

The federal government provided most of the funding for research at colleges of osteopathic medicine (*Table 3*). Over half of total research funding (80 grants totaling $14,466,373) was funded from the National Institutes of Health (NIH). These awards averaged $180,830, with a minimum award of $6000 and a maximum award of $750,000. Pharmaceutical companies funded more grants, but these grants accounted for only 19% of the total awards ($4,882,041). The average level of funding by pharmaceutical companies was less than one third the average level of award funded by the government. The AOA funded 17 (5.4%) awards for a total of $485,910.

Types of Research Funded

Most research conducted at colleges of osteopathic medicine is related to basic biomedical sciences (*Table 4*). In 1999, 65% of all extramural funding went to basic biomedical sciences research, for a total of $17,337,255. This represents 170 awards with a mean award of $101,983. Microbiology departments listed the greatest number of awards—41, totaling $5,496,638 (mean, $134,064). Physiology departments trailed slightly with 38 awards, totaling $3,340,679. The mean level of award was $87,912. Other departments with more than 10 awards or a million dollars in extramurally funded research included biochemistry (19 awards; total, $1,796,534; mean, $94,554), cell biology (13 awards; total, $1,134,985; mean, $87,306), pharmacology (17 awards; total, $1,462,328; mean, $86,019) and anatomy (20 awards; total, $733,069; mean, $36,653).

There were 59 extramural awards to clinical science departments (20%) totaling $5,197,686. The mean amount of

Table 4
Number of Grants and Level of Extramural Research Funding by Research Type at Colleges of Osteopathic Medicine, Fiscal Year 1999

Type of Research	No. of Awards	Mean Dollars Awarded	Total Dollars Awarded	% Total Funding
Basic biomedical sciences	170	101,983	17,337,255	65.46
Clinical science	59	88,096	5,197,686	19.63
Drug studies	71	43,802	3,109,933	11.74
Other	8	56,404	451,233	1.70
Behavioral science	6	64,779	388,676	1.47
All types	**314**	**355,064**	**26,484,783**	**100**

Table 5
Number of Grants and Level of Extramural Research Funding by Type of Investigator Degree at Colleges of Osteopathic Medicine, Fiscal Year 1999

Investigator Degree	No. of Awards	Mean Dollars Funded	Total Dollars Funded	% Total Funding
PhD	197	104,625	20,611,167	77.82
DO	84	52,195	4,384,396	16.55
MD	15	59,418	891,268	3.37
Other	12	36,536	438,450	1.66
Unknown/no response	3	45,074	135,222	0.51
DO + PhD	2	7245	14,490	0.05
MD + PhD	1		9790	0.04
All investigators	**314**	**84,346**	**26,484,783**	**100**

award was $88,096. Internal medicine departments received 37 awards totaling $2,305,973. The mean level of award was $62,323. Obstetrics and gynecology departments received the second highest level of funding (5 awards; total, $1,046,549; mean, $209,309). The next highest level of funding went to osteopathic manipulative therapy departments (12 awards; total, $977,113; mean, $81,426). Family medicine departments received 18 awards totaling $544,119 (mean, $30,228). Pharmaceutical trials provided 12% of extramural funding, totaling $3,109,933. There were 71 pharmaceutical trials funded (mean, $43,802). Pharmaceutical companies awarded 95 grants equaling $4,882,041, suggesting that 24 of these awards (6.69%; $1,772,108) were for types of research other than pharmaceutical trials.

Six awards totaling $388,676 were funded in behavioral science. This represents only 1.5% of total extramural research funding.

The AOA funded 17 research projects. Eleven of these awards were for clinical science research ($355,553), and five of these awards were for basic biomedical science research ($105,742). The AOA awarded one grant ($24,615) for a pharmaceutical trial.

Funding by Type of Investigator Degree

A total of 197 grants ($20,611,167; approximately 78% of funding) was awarded to principal investigators with PhD degrees. Clinical faculty received 102 grants totaling $5,299,944. The average amount of funding for PhD researchers was approximately twice the amount for clinical faculty (*Table 5*).

Discussion

Osteopathic colleges have had significant increases in external funding for research. This funding is typically from the federal government, with NIH representing the most significant source. However, the goal of the NIH has been to increase extramural funding for research by 100% between the years

1999 to 2003.[11] If we use this as a benchmark, colleges of osteopathic medicine have far to go to keep pace with the government's goals to increase research.

The data suggest that most externally funded research (74%) at colleges of osteopathic medicine is conducted by faculty in the basic biomedical science departments. This finding, coupled with the fact that 78% of the externally funded research is conducted by PhDs, suggests a paucity of clinical research, even when taking into account the fact that some PhDs may be doing clinical research and some clinicians may be doing basic biomedical research. Primarily, clinical research is conducted in departments of internal medicine, representing 13% of the total clinical research. Osteopathic manipulative medicine departments had 12 externally funded projects, accounting for about 6% of the externally funded research. Part of the reason externally funded research in this area is so small may be related to the paucity of funding sources. However, since the development of the Office of Alternative Medicine in 1992 (which became the National Center for Complementary and Alternative Medicine at NIH in 1998), an important source of funding for osteopathic manipulative medicine research exists. This center's budget rose from $2 million in 1993 to $68.7 million in 2000.[12] This could serve as an important resource for colleges of osteopathic medicine that want to conduct osteopathic research. The Office of Alternative Medicine/National Center for Complementary and Alternative Medicine funded 189 research projects or research training programs between 1993 and 1999.[12] Not one of these awards went to a college of osteopathic medicine.

As the profession moves toward establishing an osteopathic research center that focuses on clinical outcomes, this study may provide valuable insight into what is needed to develop a research agenda that can drive the profession's research activities during the next several years. Findings of this study suggest that collaborative research efforts conducted by the Osteopathic Research Center will be challenged by research infrastructures that are more aligned with basic science research than clinical research, and clinical research that is not focused on osteopathic outcomes. However, those of us who are spearheading the initiative to increase clinical outcomes research in the osteopathic profession can take heart in the fact that clinical researchers in the allopathic medical profession have the same problems. According to the Association of American Medical Colleges Task Force on Clinical Research, the current clinical research infrastructure is not capable of supporting the potential health care revolution.[13]

Colleges of osteopathic medicine as well as allopathic academic medical centers must develop educational programs that train clinical faculty in research methodology and design; they must develop suitable infrastructure to support clinical research; they must develop patient bases that supply adequate numbers of patients in appropriate settings; they must develop relevant clinical information systems; they must develop rational oversight mechanisms to ensure research that protects human rights; and they must develop appropriate funding mechanisms. These actions have been advocated by Association of American Medical Colleges[13] to enhance clinical research at academic medical centers.

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