JOURNAL OF CLINICAL RESEARCH BEST PRACTICES

Vol. 11, No. 11, November 2015 "Happy Trials to You"

Using Sunshine Act Data for Competitive Analysis and Other Purposes

By Norman M. Goldfarb

In June 2015, the Centers for Medicare and Medicaid Services (CMS) published the dataset it collected for 2014 under the National Physician Payment Transparency Program: Open Payments ("Sunshine Act" or "Open Payments"). The first dataset, for 2013, was much smaller and probably too flawed to be of much use, but the 2014 dataset, while still imperfect, is very informative. Some patients are, no doubt, using the Open Payments database to investigate their healthcare providers, but the database is also an extraordinary tool for competitive analysis and other purposes. This article describes the landscape and some of the idiosyncrasies of the Open Payments database. Further analysis can reveal detailed information for more specific purposes.

Uses of Open Payments Data

The CMS explains the purpose of the Open Payments system as follows:

> Sometimes, doctors and hospitals have financial relationships with healthcare manufacturing companies. Open Payments is the federally run transparency program that collects information about these financial relationships and makes it available to you. These relationships can involve money for research activities, gifts, speaking fees, meals or travel… Exploring this information, and discussing the results you find with your healthcare provider, can help you make more informed healthcare decisions.

If you have not done so already, search for your physicians' data at https://openpaymentsdata.cms.gov/search. You might grow concerned about your physicians' lucrative relationships with industry — or be disappointed that industry shows so little interest in them.

Open Payments data also can be used by companies, healthcare systems, physicians, regulatory authorities, other state and federal government agencies (e.g., CMS and NIH), insurance companies, institutional review boards (IRBs), investors, academics, journalists and others to:

- Compare competitor payments and financial interests. For example, which physicians received food and beverages from companies that market drugs for diabetes?
- Assess market rates. For example, what do companies with cardiovascular products pay to key opinion leaders?
- Identify best practices, based on payments and financial interests by industry leaders. For example, what percentage of research payments goes to key opinion leaders?
- Assess the strength — in financial terms — of relationships in the industry. For example, which companies have the strongest financial relationships with which hospitals?
- Identify financial conflicts of interest. For example, which staff physicians own stock in which companies?
- Verify compliance with policies. For example, are the Open Payments data consistent with internal financial disclosures?

- Find patterns in the data. For example, do payments shift over time from one type to another?
- Reconcile the Open Payments dataset to other datasets, such as clinicaltrials.gov and the FDA's Bioresearch Monitoring Information System (BMIS), to find discrepancies. For example, do Open Payments investigator records match up with BMIS FDA Form 1572 filings?

However, one cannot determine from the data whether a company received fair value for a given payment. Nor can one conclude from the data that any particular payment or financial interest is associated with improper conduct. To do that, a thorough assessment of the conduct is required. For example, while the data might raise questions about a surgeon's use of a particular implant, that implant might be the best available for those patients.

While the Open Payments system will expose and perhaps reduce payments and financial interests that lead to public harm, it is too soon to say whether the enormous cost of reporting the data justifies the potential benefits. In fact, the Open Payments system might be counterproductive — it might cause some payments and financial interests to *increase*. For example, some key opinion leaders will probably discover that they are relatively undercompensated, forcing companies to boost payments to keep up with their competitors.

It is unclear how many patients will use the data to assess their physicians' integrity, but it is certain that many companies, hospitals and physicians are already using the data to assess their competitive positions. Payments and financial interests might increase, or they might decrease, but they will most likely become more consistent, as in any market that becomes more transparent.

Conflict of Interest in Clinical Research

The Sunshine Act principally provides transparency to the potential conflict of interests that might be created when a physician is prescribing or selecting drugs, medical devices, or diagnostics for a patient.

In clinical research, financial incentives might create conflicts of interest that lead to improper actions. For example, they might encourage a physician to unduly influence patients to enroll and stay in a study. Or, they might bias a physician toward generating positive results in a study. However, it is not clear how a physician would do so in a randomized, double-blinded study. On the other hand, they might encourage a physician to generate the best possible data for the study. If such financial interests were disclosed to patients, patients might hesitate to enroll based on suspicions about the physician's motives. Or, they might leap to enroll, based on the physician's apparent vote of confidence in the company.

Payments for clinical research (and other activities) are only one side of the equation. On the other side are the physician's time, energy, staff and facilities, as well as the financial, reputational and other risks associated with clinical research. In many cases, physicians *lose* money by conducting clinical research instead of clinical practice. In such cases, is there a *negative* conflict of interest?

Open Payments Terminology

Open Payments data covers payments and other transfers of value by "applicable manufacturers and group purchasing organizations [GPOs]" to physicians and teaching hospitals. The Open Payments website (https://www.cms.gov/openpayments) explains who must report what payments to whom, describes how the system works, defines various terms, and provides some disclaimers. The Open Payments website also includes search tools for determining payments and financial interests for specific companies, hospitals and physicians.

Two important sentences on the Open Data website are as follows:

> A **teaching hospital** is any institution that received a payment for Medicare direct graduate medical education (GME), inpatient prospective payment system (IPPS), indirect medical education (IME), or psychiatric hospital IME programs under 1886(d)(5)(B), 1886(h), or 1886(s) of the Social Security Act during the last calendar year for which such information is available.
>
> Additionally, applicable manufacturers and applicable GPOs are required to report ownership or investment interests in the entity held by a **physician** (referred to as a physician owner or investor) or the physician's immediate family members and report payments or other transfers of value to these physicians holding ownership or investment interests.

This article refers to applicable manufacturers and group purchasing organizations (GPOs) as "companies," both teaching and non-teaching hospitals as "hospitals," and individual recipients at "physicians," "researchers," or "research physicians." "Research" includes all types of research, from basic science to epidemiology studies. Clinical research studies have a "principal investigator," as defined by Open Payments; for other types of research, identifying the researcher is optional. Just because a research payment to a hospital identified a physician, that does not mean the physician personally received any of the payment.

The data also includes physician "ownership and investment interests," which this article refers to as "financial interests." "Interest" is the reported value of the stock or other financial instrument at the time of issuance. "Value" is the value of the stock or other financial instrument at the time of reporting (i.e., "current"). "Profit" is the increase (or decrease) from initial interest to current value but does not include any profit to the physician in the initial value. Companies explain to CMS their calculations for financial interest and value in "Assumption Documents," which are not available to the public. "Immediate family members" is defined very broadly.

This article only touches on the definitions and reporting rules. The complexity of the definitions and reporting rules probably caused misreporting or unreporting of some payments and other transfers of value.

Open Payments Reporting Requirements

Teaching hospitals comprise only about 20% of U.S. hospitals but deliver about 50% of hospital services. Table 1 shows how Open Payments reporting requirements for payments depend on what the payment is for, whom the company pays, and the intended final recipient.

Table 1. Open Data Payment Reporting Requirements

Payment To	Payment For	Researcher	End Recipient	Reported For
Teaching hospital	Clinical research	Physician (PI)	Researcher	Teaching Hospital, listing Physician as PI
Teaching hospital	Clinical research	Physician (PI)	Teaching Hospital	Teaching Hospital, listing Physician as PI
Teaching hospital	Clinical research	Non-physician	Researcher	Teaching Hospital
Teaching hospital	Clinical research	Non-physician	Teaching Hospital	Teaching Hospital
Teaching hospital	Other research	Physician	Researcher	Teaching Hospital, listing Physician as PI
Teaching hospital	Other research	Physician	Teaching Hospital	Teaching Hospital, listing Physician as PI
Teaching hospital	Other research	Non-physician	Researcher	Teaching Hospital
Teaching hospital	Other research	Non-physician	Teaching Hospital	Teaching Hospital
Teaching hospital	General	N/A	Researcher	Teaching Hospital
Teaching hospital	General	N/A	Teaching Hospital	Teaching Hospital
Non-teaching hospital	Clinical research	Physician (PI)	Researcher	Non-teaching Hospital as recipient , listing Physician as PI
Non-teaching hospital	Clinical research	Physician (PI)	Non-teaching hospital	Non-teaching Hospital as recipient , listing Physician as PI
Non-teaching hospital	Clinical research	Non-physician	Researcher	Not subject to reporting
Non-teaching hospital	Clinical research	Non-physician	Non-teaching hospital	Not subject to reporting
Non-teaching hospital	Other research	Physician	Researcher	Non-teaching Hospital as recipient , listing Physician as PI
Non-teaching hospital	Other research	Physician	Non-teaching hospital	Non-teaching Hospital as recipient , listing Physician as PI
Non-teaching hospital	Other research	Non-physician	Researcher	Not subject to reporting
Non-teaching hospital	Other research	Non-physician	Non-teaching hospital	Not subject to reporting
Non-teaching hospital	General	N/A	Researcher	Not subject to reporting
Non-teaching hospital	General	N/A	Non-teaching hospital	Not subject to reporting

Companies are required to report transfers of value in the form of financial interests as received by physicians, regardless of any research or general payments.

Certain research payments or other transfers of value may be delayed from publication on the Open Data website for up to four years, to balance the need for confidentiality of proprietary information with the need for public transparency.

Open Payments Data

The 2014 data is available at www.cms.gov/openpayments in three datasets (5.8 GB):

- Research Payments (OP_DTL_RSRCH_PGYR2014_P06302015.csv) (585,079 records)
- General Payments (OP_DTL_GNRL_PGYR2014_P06302015.csv) (10,818,053 records)
- Ownership and Investment Interests (OP_DTL_OWNRSHP_PGYR2014_P06302015.csv) (4,785 records)

CMS has assigned identification numbers to 685,296 physicians, podiatrists, dentists and other healthcare professionals (OP_PH_PRFL_SPLMTL_P06302015). It has also assigned

identification numbers to at least 1,121 teaching hospitals and 1,384 companies but has not published separate datasets listing them.

Table 2 shows that there were 585,079 research payment records, of five types.

Table 2. Number of 2014 Research Payment Records

		Number of Records/Number of Physicians					
		585,079[1]	490,068[2]	30,614[3]	64,397[4]	641[5]	388[6]
		28,645	27,631	5,990	6,376	215	299
Data Fields	Principal_Investigator_1_Profile_ID	All	X		X	X	X
	Physician_Profile_ID	All		X		X	
	Teaching_Hospital_ID	All			X		

Notes:
1. 28,645 physicians with unique ID numbers, both independent and hospital-related (27,631 hospital-related plus 5,990 independent, less 4,976 that are in both categories).
2. 27,631 researchers with unique investigator ID numbers.
3. 5,990 independent researchers with unique physician ID numbers.
4. 6,376 physicians with investigator ID numbers related to 670 unique hospital ID numbers. (347 of the 704 hospitals that received research payments received 4,273 research payments without any physician ID numbers being listed.) The amount, if any, of the payments that passed to the physician is unknown to the author.
5. 215 physicians with both investigator ID numbers and physician ID numbers. For the purposes of this article, these investigators are lumped in with the 30,614 records.
6. 299 researchers with investigator numbers but without hospital ID numbers. For the purposes of this article, these records have been lumped in with the 490,096 records.

Some physicians appear with different names under the same ID number — the 5,990 unique ID numbers in the table above have 6,363 different names. This duplication can occur, for example, when a physician's name includes or does not include a middle initial or a blank space. The same types of duplication occur with some hospitals and companies. This article does not attempt to merge the records of physicians that appear as both independent and hospital-affiliated researchers. Neither does it attempt to merge the records of companies or hospitals that consist of multiple related entities. It is unknown to the author how many payments went unreported because the company did not know the correct name of a hospital in the Open Payments system.

Company ID numbers begin with "1000000". To save space in the tables below, only the unique digits are included.

In this article, the term "payment" includes monetary payments and other transfers of value, such as food, beverages and travel, provided to the physician or hospital.

Research payments do not consider the physician's or hospital's cost for conducting the research, which might very well exceed the payment.

Companies, not recipients, are responsible for reporting payments and financial interests to CMS. CMS gives recipients the opportunity to propose corrections to their data, but that might not be a realistic option for many research sites. Hospitals and physicians might be disinclined to correct understated or unreported payments and financial interests. It is unknown to the author what corrections have or have not been made.

Highlights of the Findings

CMS reported $6.49 billion in payments by 1,443 biopharmaceutical, medical device, and GPO companies, including 1,383 that made general payments, 548 that made research payments, and 218 that provided financial interests. These payments were made to 607,000 physicians and 1,121 teaching hospitals in the U.S. The $6.49 billion total includes $2.56 billion in general payments, $3.23 billion in research payments, and $0.70 billion in financial value (https://openpaymentsdata.cms.gov). However, some financial value numbers include costs to the physicians, so they are overstated.

Open Payments reporting requirements are complex. They are designed for the purpose of identifying possible physician conflicts of interest, so do not provide a complete picture of all payments from companies to hospitals, physicians and researchers. (Table 1)

Of the 28,645 physicians identified with payments for research, 5,990 received payments directly from companies and 27,631 were associated with payments to hospitals. Of the 5,990 that received research payments from companies, 4,976 were also associated with payments to hospitals (Table 2).

Physicians that have financial interests in companies are in the states one would expect based on population and health science activity. However, Illinois has an exceptionally high *number* of financial interests, while Massachusetts has an exceptionally *low* number (Table 3).

Medical doctors received 94.7% of the 4,785 financial interests, mostly consisting of stock, stock options, and other forms of equity (Tables 4 and 5). Researchers received only 4.2% of the financial interests, with a median value of $57K (Table 6). Only 96 independent researchers received financial interests. For the 75 researchers with a financial interest value greater than zero, the median value of their research payments was $3,784, 11% of the $35,379 value of their financial interests (Table 7).

A total of 218 companies provided financial interests to a median of six physicians each (range of 1 to 1,166), with a median value of $82K per physician. Medical device companies accounted for 63.3% of the financial interests, GPOs accounted for 29.7%, and biopharmaceutical companies accounted for only 4.6% (Tables 8 and 9).

The 10 companies that provided the most value to physicians provided a median of $1.1M each to a median of 15 physicians. Seven of these companies produced medical devices, one produced biomedical products, one produced diagnostic products, and one was a GPO; none were biopharmaceutical companies (Table 10). The 10 companies that had the largest number of financial relationships with physicians provided a median of $37K each to a median of 102 physicians. Seven of these companies were GPOs, three produced devices, and one produced diagnostic products (Table 11).

The 10 companies that provided the most value to researchers provided a median of $310K each to a median of 3.5 researchers. The median $310K that these researchers received was 28% of the median $1.1M that the top 10 physicians in general received. Nine of these companies produced devices and one was a GPO (Table 12).

The 10 companies that had the largest number of financial relationships with researchers provided a median of $99K each to a median of five researchers. The median of five relationships that these companies had with researchers was 5% of the median 102 relationships that top-10 companies had with physicians in general. Nine of these companies produced devices and one was a GPO (Table 13).

Only 0.2% of hospital research revenue came from companies through the 69 affiliated researchers who had a financial interest in the paying company. For the 69 physicians

associated with hospital research revenue, 91% of the relationships were with 35 device companies and none were with biopharmaceutical companies (Table 14).

Of the 704 hospitals that received research payments, 52% received at least one payment with no physician identified. Payments for research other than clinical studies do not have to identify a "principal investigator," as defined by Open Payments; it is unknown to the author which records are missing a physician for this reason. It is the responsibility of the companies that report the payments to identify the researchers, although the recipients can ask CMS to correct the data (Table 15).

Royalty or license payments constituted 31.4% of general payments to hospitals, including a few very large payments. The catch-all category, Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program, constituted 24.7% of general payments. Consulting fees constituted 14.4%. Food & beverage, with a median amount of $14, constituted 87% of payments but only 8.8% of payment amounts (Table 16).

For the top 10 hospitals by general payment amount (not considering affiliated entities), royalties and licenses comprised by far the largest share of general payments (87.7%). The only other types with significant shares were consulting fees (5.3%), grants (3.6%), and Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education (2.0%). The three hospitals that received the most general payments did so because of large royalty or license payments. Seven of the hospitals received research payments exceeding $6M (Table 17).

Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program constituted 30.2% of general payments to non-research physicians but only 3.2% of recipients. Royalties and licenses comprised 23.6% of payments to non-research physicians but only 0.2% of non-research physicians. Food and beverage comprised only 11.8% of payment amounts but 63.6% of recipients. (Table 18).

Ninety percent of independent research physicians received general payments. Of payments to independent research physicians, general payments constituted 20%. Research payments constituted the other 80%. Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program comprised 30.8% of payment amounts but only 11.4% of recipients. Food and beverage comprised only 4.4% of payment amounts but 30.5% of recipients (Table 19).

Eight of the 10 hospitals that received the most general payments received between 13.3% and 70.2% of their general payments from a single company. Royalties and licenses accounted for some of the concentration (Table 20).

Six of the 10 companies that made the largest general payments, including the three that made the most, were medical device companies. Four companies made between 18% and 50% of their payments to a single researcher (Table 21).

The top-10 researchers based on general payments all received over $10M in general payments, all or almost all from a single company. All of these companies manufacture medical devices (Table 22).

Tables

This article includes the following 22 tables:

1. Open Data Payment Reporting Requirements
2. Number of 2014 Research Payment Records
3. Financial Interests by State (Top 10 by Interests)
4. Payments & Financial Interests by Recipient Profession
5. Physician Financial Interest Types
6. Researcher Financial Interest Types
7. Independent Researcher Financial Interests (by Value)
8. Types of Companies That Have Provided Financial Interests to Physicians
9. Companies That Provided Financial Interests to Physicians
10. Companies That Provided Financial Interests to Physicians (Top 10 by Value)
11. Companies That Provided Financial Interests to Physicians (Top 10 by Number of Interests)
12. Companies That Provided Financial Interests to Researchers (Top 10 by Value)
13. Companies That Provided Financial Interests to Researchers (Top 10 by Number of Interests)
14. Research Payments to Hospitals Associated with Researchers Who Have a Financial Interest in the Paying Company
15. Hospitals that Received Research Payments with No Physician Identified
16. General Payment Types to Hospitals (by Amount)
17. Top 10 Hospitals by General Payment Amount ($)
18. General Payments to Non-Researcher Physicians (by Amount)
19. General Payments to Independent Researchers (by Amount)
20. Top 10 Hospitals Based on General Payments and the Companies That Paid Each of Them the Most
21. Top 10 Companies for General Payments and the Top 10 Physicians They Made Payments To
22. Top 10 Researchers Based on General Payments and the Companies That Paid Each of Them the Most

23. Financial Interests by State

Table 3 shows that the 10 states with the most financial interests accounted for $347M (73%) of the total $477M, with 3,001 (63%) of the relationships. They accounted for 91% of the profit. Of these 10 states, seven rank in the top 10 for population. New Jersey ranks 11th, Massachusetts ranks 14th, and Minnesota ranks 21st. Of these 10 states, eight rank in the top 10 for Gross Domestic Product (GDP). Massachusetts ranks 12th and Minnesota ranks 17th.

Ohio (#7 in population and GDP) and North Carolina (#9 in population and GDP) did not make the top 10 states.

Illinois has, by far, the largest number of financial interests. Massachusetts has relatively few financial interests, given the dollar value of those interests.

Table 3. Financial Interests by State (Top 10 by Interests)

State	Interest ($)	Value ($)	Profit ($)	Profit %	# of Interests	Population Rank	GDP Rank
California	219,268,591	265,876,363	46,607,772	18%	428	1	1
New York	26,861,783	38,678,442	11,816,659	31%	202	4	3
Massachusetts	20,862,136	63,660,810	42,798,674	67%	66	14	12
Florida	20,650,454	30,063,799	9,413,345	31%	340	3	4
Georgia	14,032,544	19,668,909	5,636,365	29%	132	8	10
Texas	9,956,000	20,252,684	10,296,685	51%	201	2	2
Pennsylvania	9,778,775	15,517,927	5,739,152	37%	190	6	6
New Jersey	8,884,151	52,139,575	43,255,424	83%	72	11	8
Illinois	8,848,879	33,358,848	24,509,969	73%	1,271	5	5
Minnesota	7,988,189	13,189,800	5,201,611	39%	99	21	17
Top-10 states	347,131,502	552,407,156	205,275,654	37%	3,001		
Other states	129,511,413	150,631,266	21,119,853	14%	1,784		
Total	476,642,915	703,038,422	226,395,507	32%	4785		
Top 10 (%)	73%	79%	91%		63%		

Payments and Financial Interests by Recipient Profession

Table 4 shows that medical doctors comprised 27,481 (94.7%) of the 29,029 people who received research payments (or were identified in a hospital payment record). They received 96.3% of the total research amount, 93.3% of general payments, and 91.4% of financial value.

Doctors of osteopathy received 3.2% of research payments and 2.3% of general payments, but held only 1.1% of financial value.

Doctors of dentistry received only 0.1% of research payments and 3.0% of general payments, but held 5.3% of financial value.

The Open Payments system does not capture payments to researchers with other credentials, e.g., PhD.

Table 4. Payments & Financial Interests by Recipient Profession

Recipient Type	Research Payments ($)	Share	# of Payments	Average ($)	Median ($)	# of People	Share
Medical Doctor	2,967,965,222	96.3%	555,744	5,341	642	27,481	94.7%
Dr. of Osteopathy	101,848,713	3.2%	23,115	4,406	569	1,184	4.1%
Dr. of Optometry	11,873,143	0.3%	1,124	10,563	4,000	142	0.5%
Dr. of Podiatric Medicine	3,750,144	0.1%	360	10,417	3,980	58	0.2%
Dr. of Dentistry	3,619,109	0.1%	445	8,133	2,500	162	0.6%
Chiropractor	7,600	0.0%	3	2,533	200	2	0.0%
Total	3,089,063,930	100.0%	580,791	41,393	11,891	29,029	100.0%
Hospitals (347)	136,084,979		4,273	31,848	24,285		
Empty records	0		15	0	0	0	
Total	3,225,148,909		585,079	5,512		29,029	

Recipient Type	General Payments ($)	Share	# of Payments	Average ($)	Median ($)
Medical Dr.	2,387,817,943	93.3%	9,423,916	253	15
Dr. of Osteopathy	59,419,782	2.3%	894,072	66	13
Dr. of Optometry	18,377,461	0.7%	170,323	108	20
Dr. of Podiatric Med	15,144,445	0.6%	98,939	153	21
Dr. of Dentistry	77,466,506	3.0%	227,848	340	35
Chiropractor	153,747	0.0%	2,955	52	19
Total	2,558,379,885	100.0%	10,818,053	236	

Recipient Type	Financial Value ($)	Share	# of Interests	Average ($)	Median ($)
Medical Dr.	642,735,750	91.4%	4,316	148,919	17,761
Dr. of Osteopathy	8,012,541	1.1%	244	32,838	977
Dr. of Optometry	11,823,916	1.7%	56	211,141	121,200
Dr. of Podiatric Med	2,511,335	0.4%	52	48,295	31,250
Dr. of Dentistry	37,463,717	5.3%	113	331,537	55,753
Chiropractor	491,163	0.1%	4	122,791	49,382
Total	703,038,422	100.0%	4,785	146,925	

Types of Financial Interests

Table 5 shows that most financial interests consisted of equity: stock, stock options, warrants and membership units. Financial interests of type "other/unknown" consisted of two or more types, were rare of types (e.g., royalties or incentive units), or did not state their type.

Table 6 shows that researchers held 204 (4.2%) of the 4,785 financial interests, accounting for $703M (3.7%) of the $26M value. The median value of these financial interests was $57K.

The value of the financial interests for 37 physicians (including researchers) increased by more than $1M, in one case by $68M. The value of the financial interests for 44 physicians declined, in four cases by more than $1M.

The value of the financial interests for three researchers increased by more than $1M, in one case by $2M. The value of the financial interests for 15 researchers declined, but in no cases by more than $1M.

The out-of-pocket cost of the financial interests to the physician or researcher is unknown to the author. The methodology for calculating the value of interests and values is unknown to the author. Financial interests in companies that no longer exist are unknown to the author.

Table 5. Physician Financial Interest Types

Type	# of Interests	Share	Interest ($)	Profit ($)	Value ($)	Share	Median Value ($)	Median Profit %
Stock & membership units	4,021	84%	282,618,904	217,871,155	500,490,056	71%	261,167	5%
Stock options & warrants	73	2%	2,266,323	1,619,615	3,885,938	1%	19,848	n/a
Stock and/or options	36	1%	179,896,833	1,675,138	181,571,972	26%	2,886,663	255%
Debt	46	1%	2,073,014	9,538	2,082,550	0%	158,781	16%
Other/unknown	609	13%	9,787,840	5,220,062	15,007,902	2%	92,849	0%
Total	4,785	100%	476,642,914	226,395,508	703,038,418	100%	68,646	n/a

Table 6. Researcher Financial Interest Types

Type	# of Interests	Share	Interest ($)	Profit ($)	Value ($)	Share	Median Value ($)	Median Profit %
Stock & membership units	161	79%	15,830,977	8,378,954	24,209,931	93%	147,915	0%
Stock options & Warrants	9	4%	68,423	178,856	247,279	1%	31,289	n/a
Stock and/or options	3	1%	280,912	255,488	536,400	2%	127,744	91%
Debt	1	0%	0	14,518	14,518	0%	14,518	n/a
Other/unknown	30	15%	795,263	149,816	945,079	4%	39,148	n/a
Total	204	100%	16,975,576	8,977,633	25,953,209	100.0%	56,900	n/a

Independent Researcher Financial Interests

Table 7 shows that independent researchers comprised 96 (0.2%) of the 4,292 physicians with financial interests and held 1.0% of the value of the financial interests. Twenty-one (22%) of researchers with financial interests showed a financial value of $100K or more, 37 (39%) showed a value of $10K or more, 21 (22%) showed a value of less than $10K, and 21 (22%) showed a value of zero. Median independent researcher profit was 0.0%. Twenty (20%) of researchers showed profits of 100% or more; 24 (25%) showed profits of less than 100%, 33 (34%) showed no change in value, and 19 (20%) showed losses. Their mean average profit was 17%, compared to 48% for non-researcher physicians. For the 75 researchers with a financial interest value greater than zero, the median value of their research payments was $3,784, 11% of the $35,379 value of their financial interests. The research payments to 23 physicians were less than $1,000, which does not buy much research.

Table 7. Independent Researcher Financial Interests (by Value)

Researcher	ID#	Interest ($)	Value ($)	Profit ($)	Profit (%)	Research Payments	Companies
Michael Stillabower	205473	481,393	520,838	39,445	8%	93	Merit Medical Systems Inc
David M Albala	289399	75,600	507,765	432,165	572%	6,172	Applied Medical
Barry Hirsch	1296715	50,000	500,000	450,000	900%	842	Wright Therapy Products,
Dwight Tyndall	149396	400,000	468,000	68,000	17%	8,500	Spineology Inc.
Blair Lewis	303748	100,000	378,666	278,666	279%	2,700	EndoChoice, Inc.
Barry T Katzen	61012	347,406	347,406	0	0%	9,730	Endologix, Inc.; CeloNova BioSciences, Inc.; EKOS Corporation
Carl H Sadowsky	71573	200,000	294,551	94,551	47%	22,371	MRI Interventions, Inc.
David Benditt	139110	128,303	291,600	163,297	127%	15,754	Advanced Circulatory Systems Inc.
Carlos Buznego	220671	91,950	236,200	144,250	157%	1,000	Rapid Pathogen Screening, Inc.
Michael Mooney	345396	299,251	218,827	-80,424	-27%	6,491	Spineology Inc.
Yogesh Mittal	170835	200,000	200,000	0	0%	3,605	Amendia, Inc.
Harry Pappas	338788	187,500	187,500	0	0%	5,500	LENSAR, INC.
Leslie Katz	149484	54,900	184,800	129,900	237%	33,536	Glaukos Corporation
John Regan	182490	102,698	166,769	64,071	62%	31,200	Paradigm Spine, LLC; Centinel Spine, Inc.
Ralph Rashbaum	39058	50,000	162,889	112,889	226%	7,290	Paradigm Spine, LLC
Stephen Barnett Solomon	273606	1	133,291	133,290	13329020%	150	Devicor Medical Products, Inc.
Andrew L Clavenna	212217	109,798	130,542	20,744	19%	2,475	ISTO TECHNOLOGIES, INC.
Lucio Navarro Gordan	151918	99,000	125,070	26,070	26%	900	RT Oncology Services Corporation
Steven Jeffrey Hager	104828	97,524	123,205	25,681	26%	900	RT Oncology Services Corporation
Robert Replogle	81057	110,000	117,000	7,000	6%	10,500	Spineology Inc.
Philip Davidson	204654	100,036	104,680	4,644	5%	5,960	Cardiosolutions, Inc.
Domagoj Coric	238003	73,046	81,364	8,318	11%	116,431	Spine Wave, Inc.
Marlene R Moster	361157	52,500	76,250	23,750	45%	21,669	Rapid Pathogen Screening, Inc.
John Uribe	110008	1	73,800	73,799	7379900%	1,349	Arthrosurface Incorporated
Pankaj Pasricha	355627	0	73,533	73,533	0%	51,325	APOLLO ENDOSURGERY INC

Gary A Dix	14141	55,512	71,429	15,917	29%	2,848	ISTO TECHNOLOGIES, INC.; Paradigm Spine, LLC
John Berdahl	130878	49,950	66,600	16,650	33%	10,350	Rapid Pathogen Screening, Inc.
Kenneth Morgenstern	19593	49,950	66,600	16,650	33%	10,000	Rapid Pathogen Screening, Inc.
Frank Arko	50863	29,950	66,000	36,050	120%	10,000	Penumbra, Inc.
Choll Kim	277118	63,000	63,000	0	0%	10,332	Safewire, LLC; Spine View, Inc.
Christopher John Gostout	173139	0	53,533	53,533	0%	35,859	APOLLO ENDOSURGERY INC
Charles Park	39169	54,000	50,760	-3,240	-6%	500	Vertebral Technologies, Inc.
Jodi Ian Luchs	243626	50,000	50,000	0	0%	86,531	Rapid Pathogen Screening, Inc.
Mahmood Razavi	83596	7,265	45,924	38,659	532%	600	Mercator MedSystems, Inc., Veniti, Inc.
Robert H Hawes	240618	0	45,600	45,600	0%	2,545	APOLLO ENDOSURGERY INC
Brian Litt	359816	7,500	44,250	36,750	490%	942	NeuroPace, Inc.
Thomas J Ellis	147306	150,000	42,020	-107,980	-72%	626	DNE LLC
Lindsey Rolston	17478	180,072	35,379	-144,693	-80%	3,054	OrthoPediatrics Corp.
Ian Winchester Flinn	336273	26,710	33,744	7,034	26%	9,236	RT Oncology Services Corporation
Lee Leray Swanstrom	134433	6,000	29,820	23,820	397%	192,938	Applied Medical Corporation
Henry Halperin	362918	1,225	25,113	23,888	1950%	60,000	MRI Interventions, Inc.
Craig McCoy	47597	1	25,000	24,999	2499900%	2,500	InControl Medical, LLC
Maurice Buchbinder	83389	24,998	24,998	0	0%	1,050	Ablative Solutions, Inc.
Omid Hamid	55583	20,000	24,500	4,500	23%	3,784	RT Oncology Services Corporation
Robert Snyder	138656	20,000	24,000	4,000	20%	30,225	Wound Care Technologies, Inc.
Ronald A Surowitz	121627	50,000	21,000	-29,000	-58%	900	Atlas Spine, Inc.
Bradley Heiges	85156	20,000	20,000	0	0%	4,591	ISTO TECHNOLOGIES, INC.
Dennis Tarnow	313334	12,540	19,000	6,460	52%	24,000	BioHorizons Implant Systems Inc.
Mansoor N Saleh	66594	14,059	17,761	3,702	26%	389	RT Oncology Services Corporation
David M Waterhouse	252415	13,144	16,606	3,462	26%	1,018	RT Oncology Services Corporation
Peter Kowey	277648	16,449	16,449	0	0%	5,340	Braemar Manufacturing, LLC; Universal Medical, Inc.
Robert C Hermann	127106	13,420	16,440	3,020	23%	1,723	RT Oncology Services Corporation
Mehdi M Moezi	320066	12,525	15,823	3,298	26%	56	RT Oncology Services Corporation
Gregory Haber	166143	0	14,713	14,713	0%	538	EndoChoice, Inc.
Jason Highsmith	241203	14,300	14,300	0	0%	5,112	ISTO TECHNOLOGIES, INC.
Harcharan S Gill	742828	20	11,600	11,580	57900%	2,200	NeoTract Inc.
Don Lester	339337	0	11,400	11,400	0%	10,358	Blue Belt Technologies, Inc.
Stephen R Ash	199711	10,000	10,000	0	0%	2,100	Vasc-Alert LLC
Nandagopal Vrindavanam	177401	4,854	5,945	1,091	22%	17	RT Oncology Services Corporation

Ray Page	166358	4,760	5,831	1,071	23%	370	DARA Biosciences, Inc.; RT Oncology Services Corporation
Sarang Desai	8396	0	4,110	4,110	41099900%	600	OrthoPediatrics Corp.
Brian J. Dunkin	153752	0	3,776	3,776	0%	6,322	New Wave Surgical Corp.
Avraham Belizon	279312	0	3,776	3,776	0%	1,307	New Wave Surgical Corp.
Adnan Hussain Siddiqui	25048	3,300	3,300	0	0%	17,750	Blockade Medical, LLC
Keith E Matheny	281857	0	2,415	2,415	24149900%	3,498	COGENT THERAPEUTICS LLC
Roger A Mann	43291	23	2,122	2,099	9126%	525	SI-BONE, Inc.
David F Scott	49989	80,001	1,696	-78,305	-98%	91,385	Amedica Corporation; OMNIlife science, Inc
Kevin P McCarthy	154782	64,228	1,132	-63,096	-98%	8,070	Amedica Corporation
Hugh Grosvenor Calkins	123544	25	513	488	1950%	1,488	MRI Interventions, Inc.
Timothy Deer	39400	434	434	0	0%	26,500	BIONESS INC
Clifford B Tribus	117381	15,406	271	-15,135	-98%	1,000	Amedica Corporation
Mark S Schubert	49961	9,598	79	-9,518	-99%	3,738	Pulmonx Corporation
John Philip Byrne	46306	100,000	1	-99,999	-100%	9,275	OMNIlife science, Inc
Edward S Szuszczewicz	276251	383,314	1	-383,313	-100%	38,565	OMNIlife science, Inc
Wesley E Kinzie	9393	585,786	1	-585,785	-100%	3,361	OMNIlife science, Inc
Ewen Tseng	92999	50,000	0	-50,000	-100%	3,654	COGENT THERAPEUTICS LLC
Suneet Mittal	66498	125,756	0	-125,756	-100%	3,300	Topera, Inc.
Ralph Boccia	175674	0	0	0	0%	46,362	DARA Biosciences, Inc.
Suzanne Kirby	55964	0	0	0	0%	30,289	DARA Biosciences, Inc.
David Riseberg	278172	0	0	0	0%	20,000	DARA Biosciences, Inc.
Archana Maini	179038	0	0	0	0%	6,500	DARA Biosciences, Inc.
Stefan Gluck	63758	0	0	0	0%	2,990	DARA Biosciences, Inc.
Sharad Ghamande	188746	0	0	0	0%	1,578	DARA Biosciences, Inc.
Gail Wright	211190	0	0	0	0%	1,355	DARA Biosciences, Inc.
Anirudha Dasgupta	129356	0	0	0	0%	875	DARA Biosciences, Inc.
Sanjaykumar Hapani	361529	0	0	0	0%	875	DARA Biosciences, Inc.
Siobhan Lynch	111581	0	0	0	0%	542	DARA Biosciences, Inc.
George Gjerset	201570	0	0	0	0%	224	DARA Biosciences, Inc.
Julio Peguero	257101	0	0	0	0%	155	DARA Biosciences, Inc.
Zdenka Segota	254560	0	0	0	0%	155	DARA Biosciences, Inc.
Noman Rafique	46611	0	0	0	0%	43	DARA Biosciences, Inc.
Le Roy Jones	1231981	2,000	0	-2,000	-100%	3,105	UroGPO LLC
Paul R Sieber	174335	329	0	-329	-100%	2,233	Innovative Medical Technologies, LLC
Linda S Osborne	311762	370	0	-370	-100%	1,821	Innovative Medical Technologies, LLC
Ronald Tutrone	284752	2,000	0	-2,000	-100%	1,350	UroGPO LLC
Scott D Cohen	176149	329	0	-329	-100%	226	Innovative Medical Technologies, LLC
Total researchers (96)		5,816,009	6,833,312	1,017,302	17%	1,240,087	
Median		13,739	18,381	1,595	0.00%	3,203	
Others (4,196)		470,826,906	696,205,110	225,378,205	48%	3,223,908,822	
Total (4,292)		476,642,915	703,038,422	226,395,507	47%	3,225,148,909	

Table 8 shows that 218 companies provided financial interests valued at $703M to 4,519 independent physicians, with a median number of physicians per company of six, (range of one to 1,166). The median value was $82K per physician. Device companies accounted for 138 (63.3%) of the companies (25.7% orthopedic devices and 13.3% cardiovascular devices). GPOs accounted for 43 (19.7%) of the companies. Biopharmaceutical companies accounted for only 10 (4.6%) of them.

Table 8. Types of Companies That Have Provided Financial Interests to Physicians

Product Type	Number of Companies	Share	# of Physicians	Share	Median Value/ Physician
Cardiovascular devices	29	13.3%	377	8.3%	96,160
Dental devices	7	3.2%	57	1.3%	315,266
Surgical devices	18	8.3%	102	2.3%	78,699
Endoscopy devices	8	3.7%	52	1.2%	195,095
Orthopedic devices	56	25.7%	803	17.8%	97,363
Other devices	20	9.2%	101	2.2%	312,314
Total devices	138	63.3%	1,492	33.0%	108,088
Biopharmaceuticals	10	4.6%	497	11.0%	66,146
Materials	10	4.6%	66	1.5%	157,630
Diagnostics & radiology	9	4.1%	126	2.8%	279,239
Group purchasing organizations	43	19.7%	2,315	51.2%	29,369
Other and N/A	7	3.2%	23	0.5%	194,544
Total	218	100.0%	4,519	100.0%	82,116

Companies That Have Provided Financial Interests to Physicians

Table 9 shows the 218 companies that provided financial interests to physicians.

Table 9. Companies That Provided Financial Interests to Physicians

Alexza Pharmaceuticals, Inc.	Cryo Specialty Medical, LLC	Merit Medical Systems Inc	Saphena Medical, Inc.
Allergan Inc.	Curax Scientific LLC	Metric Medical Devices, Inc.	SEFL Cryo Associates LLC
Alliqua BioMedical, Inc.	CVRx, Inc.	Midwest Cryotherapy LP	Senate Surgical Distribution, LLC
Allotech, LLC	DARA Biosciences, Inc.	Midwest Surgical Alliance, LLC	Sequent Medical, Inc.
Alpine Implant Alliance, LLC	Devicor Medical Products, Inc.	Millennium Spine, LLC	Sequoia Surgical Distributors, LLC
Amedica Corporation	DFINE, INC	Miromatrix Medical Inc.	SI-BONE, Inc.
Amendia, Inc.	DNE LLC	Mobile Cryosurgical Partners LP	Siesta Medical, Inc.
American Medical Technology Inc	Domain Surgical, Inc.	MRI Interventions, Inc.	Skyline Medical Inc.
Amphastar Pharmaceuticals, Inc.	Eagle Vision, Inc.	Nanovis LLC	SNAP Diagnostics LLC
Anesthetic Gas Reclamation, LLC	EKOS Corporation	NDI Medical, LLC	Somersault Orthopedics, Inc
Apollo Endosurgery Inc	Ellipse Technologies, Inc.	NeoTract Inc.	SonaCare Medical, LLC
Applied Medical Corporation	EndoChoice, Inc.	NeuroPace, Inc.	SONOCINE, INC.
Applied Medical Technology Inc.	EndoEvolution, LLC	New England Cryotherapy LP	Southeast Cryotherapy LP
Aptis Medical, LLC	Endogastric Solutions, Inc	New Wave Surgical Corp.	Southern Surgical Solutions, LLC
Aquesys, Inc.	Endologix, Inc.	Niveus Medical, Inc	Spinal Modulation Inc.
Argon Medical Devices, Inc.	Entellus Medical, Inc.	North Alabama Surgical Services GP, LLC	Spine View, Inc.
Arizona Cryosurgical Partnership LP	Essential Dental Systems Inc.	North Alabama Surgical Services, LLC	Spine Wave, Inc.
Arthrosurface Incorporated	Evergreen Orthopedic Research Lab LLC	North Idaho Surgical Cooperative, LLC	Spineology Inc.
Atlas Spine, Inc.	Extremity Medical	North Shore Surgical Services, LLC	SpineSelect, LLC
Avinger Inc.	Farallon Surgical, LLC	North Texas Surgical Services, LLC	Strategic Dentistry LLC
Axogen	Flowonix Medical Incorporated	Novabone Products	Summit Medical
Bacterin International Inc	Fort Worth Surgical Supply, LLC	NovoCure Limited	Synapse Biomedical Inc
Beacon Endoscopic Corporation	Glaukos Corporation	NovoSource, Inc.	SynCardia Systems, Inc
Beaver-Visitec International, Inc.	Grace Medical, Inc.	Nutech Spine, Inc.	Tactile Systems Technology Inc
Becton, Dickinson and Company	Great Lakes Medical Services, LLC	OBI Biologics, Inc	The North Carolina Mutual Wholesale Drug Company Inc
Benvenue Medical Inc	Great Plains Surgical Distributors, LLC	Oklahoma Urologic Therapies LP	The Orthopaedic Implant Company
BioHorizons Implant Systems Inc.	Gulf States Cryotherapy LP	Olive Medical Corporation	Topera, Inc.
BioMedical Enterprises Inc	Halt Medical, INC	OmniGuide, Inc.	Transcend Medical, Inc.
Bioness Inc.	Hand Biomechanics Laboratory	OMNIlife science, Inc	Transonic Systems Inc.
Blockade Medical, LLC	HET Systems LLC	Ortho Restore, LLC	TriReme Medical LLC
Blue Belt Technologies, Inc.	Highline Surgical Solutions, LLC	OrthoPediatrics Corp.	Ultradent Products Inc
Blue Sky Bio, LLC	iCAD, Inc	Orthopedic Sciences, Inc.	Universal Instrumentation LLC
Braemar Manufacturing, LLC	ICU Medical Inc	Orthosensor Inc.	Universal Medical, Inc.
Braintree Laboratories, Inc.	InControl Medical, LLC	Osteogenics Biomedical Inc.	UroGPO LLC
Calvary Spine Products, LLC	Inland Surgical Products, LLC	OsteoReady LLC	US WORLDMEDS, LLC
Calvary Spine, LLC	Innovative Medical Technologies, LLC	Ozark Cryosurgery, LLC	Vapotherm Inc
Capitol Cryotherapy LP	Intersect ENT, Inc.	Paradigm Spine, LLC	Vasc-Alert LLC
Cardiosolutions, Inc.	InterValve, Inc.	Paragon 28, Inc.	Vector Surgical, LLC
Cardiox Corporation	Interventional Spine, Inc.	Penumbra, Inc.	Veniti, Inc.
CareFusion Corporation	iRhythm Technologies, Inc.	Physician Discoveries, LLC	Vertebral Technologies, Inc.
CBA Associates, LLC	Ironwood Pharmaceuticals, Inc	Prosidyan, Inc	Verthermia, Inc.
CCPA Purchasing Partners, L.P.	ISTO Technologies, Inc.	Pulmonx Corporation	Vertiflex, Inc.
CeloNova BioSciences, Inc.	Joint Active Systems, Inc.	Pursuit Vascular, Inc.	Viewray Inc
Centinel Spine, Inc.	JustRight Surgical LLC	Radlink, Inc	Vista Orthopedics, LLC
Central California Surgical Distributors, LLC	Keystone Dental Inc.	Rapid Pathogen Screening, Inc.	Vital Art and Science, LLC
Central Dallas Surgical Supply, LLC	Laser Specialty Medical, LLC	Reverse Medical Corporation	Vivex Biomedical, Inc.
Chek-Med Systems, Inc.	LDR Holding Corporation	Roanoke Area Surgical Lasers, LLC	Wenzel Spine, Inc.
Cogent Therapeutics LLC	Lensar, Inc.	Rocky Mountain Cryotherapy LP	Westpac Partners, LP
ConforMIS, Inc.	LVB Acquisition, Inc.	Romark Laboratories, LC	Wound Care Technologies, Inc.
Consensus Orthopedics, Inc.	Medimetriks Pharmaceuticals, Inc.	RSB Spine, LLC	Wright Therapy Products, Inc.
Convergent Dental Inc.	Medline Industries, Inc.	RT Oncology Services Corporation	Xhale, Inc.
CorMatrix Cardiovascular Inc.	Memphis Cryo Associates LP	Safewire, LLC	Zogenix Inc.
Cosmedent, Inc.	Mercator MedSystems, Inc.	San Francisco Surgical Services, LLC	Zyga Technology Inc

Table 10 shows that the 10 companies that provided the most value to physicians provided a median of $1.1M each to a median of 15 physicians. Seven of these companies produced devices, one produced biomedical products, one produced diagnostic products, and one was a GPO; none were biopharmaceutical companies.

Table 10. Companies That Provided Financial Interests to Physicians (Top 10 by Value)

Company	ID#	# of Interests	# of Physicians	Interest ($)	Profit ($)	Value ($)	Value/ Physician ($)	Interest Type	Company Products
ICU Medical Inc	10660	4	4	170,544,848	0	170,544,848	42,636,212	Stock, Options	Infusion devices
SI-BONE, Inc.	11100	63	57	6,542,918	38,704,229	45,247,147	718,209	Stock	Pain management devices
Paradigm Spine, LLC	11090	66	66	21,095,339	15,376,809	36,472,148	552,608	Preferred units	Orthopedic devices
Avinger Inc.	10570	29	29	33,783,285	0	33,783,285	1,164,941	Common stock	Vascular devices
Braintree Laboratories, Inc.	150	2	2	24,120	27,314,530	27,338,650	13,669,325	Restricted stock	Bowel prep kit biomedical
HET Systems LLC	350	4	4	0	24,802,856	24,802,856	6,200,714	Class A units	Compression devices
Medline Industries, Inc.	5430	11	11	10,880,223	13,013,764	23,893,986	2,172,181	Shares	Cooperative group
Rapid Pathogen Screening, Inc.	10780	67	67	7,483,775	9,301,125	16,784,900	250,521	Common stock	Diagnostics
NovoCure Limited	10490	16	16	16,251,903	0	16,251,903	1,015,744	Preferred stock	Oncology devices
ConforMIS, Inc.	10400	15	14	1,095,950	14,485,248	15,581,199	1,038,747	Common stock	Orthopedic devices
Total		277	270	267,702,361	142,998,561	410,700,922			

Table 11 shows that the 10 companies that had the largest number of financial relationships with physicians provided a median of $37K each to a median of 102 physicians. Seven of these companies were GPOs, three produced devices, and one produced diagnostic products. Only one company, Rapid Pathogen Screening, Inc., a diagnostics company, appears in both tables 9 and 10.

Table 11. Companies That Provided Financial Interests to Physicians (Top 10 by Number of Interests)

Company	ID#	# of Interests	# of Physicians	Cost	Profit	Value	Value/ Physician	Interest Type	Company Products
CCPA Purchasing Partners, L.P.	10810	1,171	1,166	42,406	59,021	101,427	87	LP interest	Cooperative group
Corporation	10960	312	295	8,724,464	4,160,308	12,884,772	41,297	Preferred stock	Cooperative group
Technologies, LLC	66360	215	208	66,214	-66,214	0	0	LLC units	Cooperative group
UroGPO LLC	46250	154	154	336,250	-336,250	0	0	Common Stock	Cooperative group
MRI Interventions, Inc.	5430	104	63	4,702,409	24,578	4,726,987	45,452	Warrant	Vascular devices
Physician Discoveries, LLC	11010	99	99	554,920	-86,269	468,652	4,734	LLC units	Cooperative group
OrthoPediatrics Corp.	10730	90	75	14,343,864	-10,107,182	4,236,683	47,074	Preferred stock	Orthopedic devices
Rapid Pathogen Screening, Inc.	10780	67	67	7,483,775	9,301,125	16,784,900	250,521	Common stock	Diagnostics
NovoSource, Inc.	10680	66	45	3,294,050	-1,100,168	2,193,882	33,241	Preferred stock	Cooperative group
Vertebral Technologies, Inc.	10827	64	60	8,860,108	1,900,738	10,760,846	168,138	Stock ownership	Orthopedic devices
Total Top 10		2,342	2,232	48,408,461	3,749,687	52,158,148	590,544		
Other Companies (208)		2,443	2,060	428,234,454	222,645,820	650,880,274	1,181,001		
Total (218)		4,785	4,292	476,642,915	226,395,507	703,038,422	2,362,001		

Companies That Have Provided Financial Interests to Researchers

Table 12 shows that the 10 companies that provided the most value to researchers provided a median of $310K each to a median of 3.5 researchers. The median $310K that these researchers received was 28% of the median $1.1M that the top 10 physicians in general received. Nine of these companies produced devices and one was a GPO.

Table 12. Companies That Provided Financial Interests to Researchers (Top 10 by Value)

Company	ID#	# of Interests	# of Researchers	Interest ($)	Profit ($)	Value ($)	Value/ Researcher ($)	Interest Type	Company Products
Paradigm Spine, LLC	11090	4	4	3,260,224	2,247,976	5,508,200	1,377,050	Preferred units	Orthopedic devices
Ablative Solutions, Inc.	76380	13	11	3,106,005	1,379,300	4,485,305	345,023	Preferred stock	Cardiology devices
NeuroPace, Inc.	10700	3	2	552,025	1,349,125	1,901,150	633,717	Restricted stock	Neurology devices
Wenzel Spine, Inc.	10380	1	1	575	1,592,573	1,593,148	1,593,148	Common stock	Orthopedic devices
Penumbra, Inc.	10580	4	4	144,100	773,950	918,050	229,513	Preferred stock	Orthopedic devices
Spineology Inc.	11200	3	3	809,251	-5,424	803,827	267,942	Common stock	Orthopedic devices
Avinger Inc.	10570	6	6	769,984	0	769,984	128,331	Common stock	Vascular devices
Wright Therapy Products	76360	2	2	300,007	450,000	750,007	375,004	Preferred stock	Compresson devices
RT Oncology Services Corp.	10960	13	13	382,282	225,349	607,631	46,741	Preferred stock	Cooperative group
Endologix, Inc.	80	2	2	549,075	0	549,075	274,538	Restricted stock	Endoscopic devices
Total		51	48	9,873,528	8,012,849	17,886,377	350,713		

Table 13 shows that the 10 companies that had the largest number of financial relationships with researchers provided a median of $99K each to a median of five researchers. The median of five relationships that these companies had with researchers was 5% of the median 102 relationships that top-10 companies had with physicians in general. Nine of these companies produced devices and one was a GPO. Fifty-percent of the companies appear in both Table 11 and Table 12.

Table 13. Companies That Provided Financial Interests to Researchers (Top 10 by Number of Interests)

Company	ID#	# of Interests	# of Researchers	Interest ($)	Profit ($)	Value ($)	Value/ Researcher ($)	Interest Type	Company Products
RT Oncology Services Corp.	10960	13	13	382,282	225,349	607,631	46,741	Preferred stock	Cooperative group
Ablative Solutions, Inc.	76380	13	11	3,106,005	1,379,300	4,485,305	345,023	Preferred stock	Cardiology devices
Blockade Medical, LLC	5710	12	12	422,301	0	422,301	35,192	Stock	Cardiology devices
EKOS Corporation	11030	8	4	16,051	0	16,051	2,006	Ownership	Vascular devices
MRI Interventions, Inc.	5430	7	4	291,257	32,937	324,194	46,313	Warrant	Vascular devices
Avinger Inc.	10570	6	6	769,984	0	769,984	128,331	Common stock	Vascular devices
Rapid Pathogen Screening	10780	5	5	294,350	201,300	495,650	99,130	Common stock	Diagnostics
EndoChoice, Inc.	5630	4	2	100,000	293,379	393,379	98,345	Option on units	Endoscopic devices
Penumbra, Inc.	10580	4	4	144,100	773,950	918,050	229,513	Preferred stock	Vascular devices
Paradigm Spine, LLC	11090	4	4	3,260,224	2,247,976	5,508,200	1,377,050	Preferred units	Orthopedic devices
Total		76	65	8,786,554	5,154,191	13,940,744	183,431		
Other companies		4,709	4,227	467,856,361	221,241,316	689,097,678	146,336		
Total		4,785	4,292	476,642,915	226,395,507	703,038,422	2,690,670		

Research Payments to Hospitals Associated with Researchers Who Have a Financial Interest in the Paying Company

Table 14 shows that only $6.8M (0.2%) of hospital research revenue came from companies through the 69 (1.6%) affiliated researchers who had a financial interest in the paying company. For the top 10 physicians associated with such revenue, eight of the relationships were with six device companies, two with one GPO (RT Oncology Services), and none with biopharmaceutical companies. Three of the companies appear twice in the table.

For the 69 physicians associated with hospital research revenue, 63 (91%) of the relationships were with 35 device companies (primarily cardiovascular), one with a diagnostic app company, five with three GPOs, and none were with biopharmaceutical companies. Ablative Solutions, Inc. and Blockade Medical, LLC each accounted for nine (13%) of the relationships.

Table 14. Research Payments to Hospitals Associated with Researchers Who Have a Financial Interest in the Paying Company

Physician	ID#	Research ($)	Interest ($)	Value ($)	Profit ($)	Hospital	Company
Dean Kereiakes	64866	1,359,633	82,221	82,221	0	The Christ Hospital	Ablative Solutions, Inc.
J Duffy Mocco	51582	729,692	20,000	20,000	0	Vanderbilt University Hospitals & Clinics	Blockade Medical, LLC
Miguel A. Islas-Ohlmayer	59223	611,905	13,144	16,606	3,462	Jewish Hospital of Cincinatti	RT Oncology Services Corporation
William Clark Christie	290346	390,954	250,007	250,007	0	UH Case Medical Center	Wright Therapy Products, Inc.
Thomas Davis	144154	385,719	247,975	247,975	0	St. John Hospital & Medical Center	Ablative Solutions, Inc.
John Scott Roth	359097	367,440	0	3,776	3,776	University Hospital	New Wave Surgical Corp.
Ricardo Alexandre Hanel	242650	211,862	62,621	62,621	0	Rush University Medical Center*	Blockade Medical, LLC
E Randolph Broun	239661	191,885	13,144	16,606	3,462	Jewish Hospital of Cincinatti	RT Oncology Services Corporation
Demetrius Lopes	53027	172,115	55,950	506,050	450,100	Rush University Medical Center*	Penumbra, Inc.
Tony Das	285169	165,065	24,999	24,999	0	Munson Medical Center	Avinger Inc.
Top 10 researchers with financial interests		4,586,271	770,062	1,230,862	460,800		
Other researchers with financial interests (59)		2,241,469	10,389,504	17,889,035	7,499,531		
Total researchers with financial interests (69)		6,827,739	11,159,566	19,119,897	7,960,331		
Other physicians (4,196)		3,218,321,169	465,483,349	683,918,525	218,435,176		
Total (4292)		3,225,148,909	476,642,915	703,038,422	226,395,507		

Hospital Research Payments without an Identified Researcher

Table 15 shows that, of the 704 hospitals that received research payments, 347 (52%) received at least one payment with no physician identified. For these hospitals, an average of 20% and median of 13% of the payment records did not identify a researcher. Of the total amount, including all hospitals, 4% did not identify a researcher. Dana Farber Cancer Institute (50%), Cleveland Clinic Hospital (47%), and Vanderbilt University Hospitals and Clinics (43%) received, by far, the highest proportions of payments with no physician identified.

Payments for research other than clinical studies do not have to identify a "principal investigator," as defined by Open Payments; it is unknown to the author which records are missing a physician for this reason. It is the responsibility of the companies that report the payments to identify the researchers, although the recipients can ask CMS to correct the data. The CMS database allows companies to enter up to five physician ID numbers for a payment, but almost none entered more than one.

Table 15. Hospitals that Received Research Payments with No Researcher Identified

Hospital	ID#	Amount w/o Researcher ($)	Amount with Researcher ($)	Total	% without Researcher
UT MD Anderson Cancer Center	2116	3,056,713	89,684,579	92,741,292	3%
Dana-Farber Cancer Institute	1183	20,294,898	20,606,924	40,901,822	50%
Cleveland Clinic Hospital	1548	11,781,276	13,321,618	25,102,894	47%
Brigham and Womens Hospital	1184	7,500	24,979,320	24,986,820	0%
Hospital of the University of Pennsylvania	1413	4,561,113	19,381,598	23,942,710	19%
Emory University Hospital	1911	1,490,218	21,148,115	22,638,333	7%
Langley Porter Psychiatric Hospital	2308	5,666,383	13,014,165	18,680,548	30%
Vanderbilt University Hospitals & Clinics	1982	7,947,791	10,407,769	18,355,559	43%
University of Michigan Hospitals & Health Centers	1708	2,342,794	14,590,736	16,933,530	14%
Massachusetts General Hospital	1187	2,620,226	14,096,709	16,716,935	16%
Ronald Reagan UCLA Medical Center	2349	1,822,148	13,331,835	15,153,983	12%
Mount Sinai Hospital	1266	523,953	13,058,370	13,582,323	4%
OHSU Hospital and Clinics	2239	973,473	12,558,117	13,531,590	7%
H. Lee Moffitt Cancer Center	1953	431,379	12,305,767	12,737,147	3%
University of Alabama Hospital	2026	1,453,076	10,725,281	12,178,357	12%
UC Davis Medical Center	2309	1,228,026	6,839,854	8,067,880	15%
Cedars-Sinai Medical Center	2314	798,803	7,159,273	7,958,076	10%
Beth Israel Deaconess Medical Center	1180	1,295,216	6,419,090	7,714,306	17%
Karmanos Cancer Hospital	1336	368,008	6,829,144	7,197,152	5%
Duke University Hospital	1893	1,424,314	5,708,630	7,132,944	20%
Top 20		70,087,307	336,166,894	406,254,201	17%
Others (317)		64,771,627	199,180,330	263,951,957	25%
Hospitals that received payments with no physician identified (347)		134,858,934	535,347,224	670,206,158	20%
Others (357)		0	2,554,942,751	2,554,942,751	0%
Total (704)		134,858,934	3,090,289,975	3,225,148,909	4%

Hospital General Payment Types

Table 16 shows that royalty or license payments constituted 31.4% of general payments to hospitals. The average of $59K was much higher than the median of $3.6K because of a few very large royalty payments. Other types of payments also showed a range of disparities between these numbers. The catch-all category, Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program, constituted 24.7% of general payments. Consulting fees constituted 14.4%. Food & beverage, with a median amount of $14, constituted 87% of payments but only 8.8% of payment amounts.

Table 16. General Payment Types to Hospitals (by Amount)

General Payment Types	Amount ($)	Share	Average ($)	Median ($)	# of Payments	Share
Royalty or license	803,485,046	31.4%	58,589	3,552	13,714	0.1%
Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program	632,441,640	24.7%	2,764	1,700	228,825	2.1%
Consulting fee	369,443,088	14.4%	2,977	1,500	124,098	1.1%
Food and beverage	224,542,799	8.8%	24	14	9,412,741	87.0%
Travel and lodging	179,101,057	7.0%	340	176	526,990	4.9%
Grant	85,116,230	3.3%	10,853	3,000	7,843	0.1%
Honoraria	69,452,459	2.7%	2,001	1,800	34,711	0.3%
Education	65,816,825	2.6%	177	14	371,196	3.4%
Current or prospective ownership or investment interest	42,646,590	1.7%	8,450	445	5,047	0.0%
Gift	28,878,652	1.1%	439	100	65,775	0.6%
Compensation for serving as faculty or as a speaker for a non-accredited and noncertified continuing education program	23,106,455	0.9%	2,338	2,000	9,885	0.1%
Space rental or facility fees(teaching hospital only)	16,099,102	0.6%	1,967	1,000	8,186	0.1%
Charitable Contribution	9,715,326	0.4%	7,256	1,600	1,339	0.0%
Compensation for serving as faculty or as a speaker for an accredited or certified continuing education program	8,125,862	0.3%	4,047	2,500	2,008	0.0%
Entertainment	408,724	0.0%	72	29	5,688	0.1%
None	31	0.0%	4	0	7	0.0%
Total	2,558,379,885	100.0%	236	19,431	10,818,053	100.0%

Top 10 Hospitals by General Payment Amount

Table 17 shows that, for the top 10 hospitals by general payment amount (not considering affiliated entities), royalties and licenses comprised by far the largest share of general payments (87.7%). The only other types with significant shares were consulting fees (5.3%), grants (3.6%), and Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education (2.0%).

The three hospitals that received the most general payments did so because of large royalty or license payments. Nine of the hospitals received royalty and license payments exceeding $2M.

Seven of the hospitals received research payments exceeding $6M.

One hospital, Denver Health Medical Center, received no royalty or license payments, but the largest consulting fees and, by far, the largest payments for Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program.

Table 17. Top 10 Hospitals by General Payment Amount ($)

	City Of Hope National Medical Center	Massachusetts General Hospital	The Unity Hospital of Rochester	Denver Health Medical Center	Cleveland Clinic Hospital	UT MD Anderson Cancer Center	Brigham and Womens Hospital	Hospital of the University of Pennsylvania	Cedars-Sinai Medical Center	Dana-Farber Cancer Institute			
ID#	**2317**	**1187**	**1438**	**2189**	**1548**	**2116**	**1184**	**1413**	**2314**	**1183**	**Total**	**Median**	**Share**
Royalty or license	250,969,337	30,716,497	20,932,378	0	2,819,578	9,644,847	2,629,458	4,722,227	4,534,490	2,678,771	329,647,583	4,628,358	87.7%
Consulting fee	0	409,602	1,700	6,529,506	4,966,390	67,113	6,332,004	1,130,172	39,176	500,995	19,976,658	455,298	5.3%
Grant	89495	1,635,643	0	242,389	2,651,725	2,100,770	947,717	3,345,533	1,407,449	1,068,250	13,488,970	1,237,850	3.6%
Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program	11,022	225,755	14,344	5,546,393	806,711	62,152	383,945	275,049	59,384	8,900	7,393,656	143,954	2.0%
Other	94,720	417,463	9,500	589,499	685,147	196,880	462,686	373,650	241,050	274,596	3,345,191	324,123	0.9%
Education	22,543	38,903	125	1,466	210,886	253,858	259,713	319,407	359,397	315,000	1,781,299	232,372	0.5%
Honoraria	0	8,513	0	500	21,552	8,000	0	0	0	0	38,565	0	0.0%
Travel and lodging	961	3,057	0	2,189	225	588	0	0	852	205	8,077	407	0.0%
Food and beverage	155	603	32	134	3,059	2,231	22	95	325	112	6,768	144	0.0%
Gift	11,132	349,016	422	17,433	711,002	16,167	15,594	202,879	113,826	2,054	2,054	16,800	0.0%
Current or prospective ownership or investment interest	0	0	0	0	0	0	0	6,812	0	0	0	0	0.0%
Total general payments	251,199,365	33,805,053	20,958,501	12,929,510	12,876,276	12,352,607	11,031,139	10,375,823	6,755,948	4,848,883	375,688,821	12,614,441	100.0%
Research payments	6,101,464	16,716,935	0	723,717	25,102,894	92,741,292	24994320	23,942,710	7,958,076	40,901,822	239,183,229	20,329,822	
Total payments	257,300,829	50,521,987	20,958,501	13,653,227	37,979,169	105,093,899	36,025,459	34,318,533	14,714,024	45,750,706	614,872,051	37,002,314	
General payments % of total	97.6%	66.9%	100.0%	94.7%	33.9%	11.8%	30.6%	30.2%	45.9%	10.6%	61.1%	0	

General Payments to Non-Researcher Physicians

Table 18 shows that Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program constituted 30.2% of general payments to non-research physicians but only 3.2% of recipients. Royalties and licenses comprised 23.6% of payments to non-research physicians but only 0.2% of non-research physicians.

Food and beverage comprised only 11.8% of payment amounts but 63.6% of recipients. Education comprised only 2.3% of payment amounts but 17.1% of recipients.

Payments to hospitals included any (unknown) amounts that hospitals passed along to physicians.

Table 18. General Payments to Non-Researcher Physicians (by Amount)

Type of Compensation	Amount ($)	Share	# of Payments	Average ($)	Median ($)	# of Recipients	Average/ Recipient ($)	Median/ Recipient ($)	Share
Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program	556,007,585	30.2%	197,245	2,819	1,650	28,138	19,760	3,300	3.2%
Royalty or license	433,792,514	23.6%	10,261	42,276	5,229	1,871	231,851	28,229	0.2%
Consulting fee	283,213,844	15.4%	105,648	2,681	1,500	33,583	8,433	2,000	3.8%
Food and beverage	216,534,549	11.8%	9,190,834	24	14	562,499	385	141	63.6%
Travel and lodging	155,210,641	8.4%	465,744	333	175	66,307	2,341	905	7.5%
Honoraria	60,213,767	3.3%	30,744	1,959	1,800	9,128	6,597	2,500	1.0%
Education	43,229,931	2.3%	349,871	124	14	151,536	285	55	17.1%
Current or prospective ownership or investment interest	38,195,123	2.1%	4,946	7,722	445	783	48,780	5,758	0.1%
Compensation for serving as faculty or as a speaker for a non-accredited and noncertified continuing education program	18,905,074	1.0%	8,176	2,312	1,800	2,853	6,626	2,100	0.3%
Grant	15,209,300	0.8%	3,006	5,060	1,576	2,017	7,541	2,000	0.2%
Gift	11,450,663	0.6%	58,182	197	84	20,648	555	104	2.3%
Compensation for serving as faculty or as a speaker for an accredited or certified continuing education program	7,070,883	0.4%	1,813	3,900	2,500	516	13,703	3,000	0.1%
Charitable Contribution	452,474	0.0%	238	1,901	250	218	2,076	250	0.0%
Entertainment	354,963	0.0%	5,421	65	29	3,904	91	37	0.4%
Total general payments to non-research physicans	1,839,841,311	100.0%	10,432,129	176	14	884,001	2,081	50,379	100.0%
General payments to researchers	175,611,715								
General payments to hospitals	542,926,859								
Total general payments	2,558,379,885								

General Payments to Independent Researcher

Table 19 shows that 90% (5,412 of 5,990) of independent research physicians received general payments. Of payments to independent research physicians, general payments constituted 20% of the total. Research payments constituted the other 80%.

Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program comprised 30.8% of payment amounts but only 11.4% of recipients. Consulting fees comprised 28.9% of payment amounts but only 15.3% of recipients.

Food and beverage comprised only 4.4% of payment amounts but 30.5% of recipients. Education comprised only 1.8% of payment amounts but 13.2% of recipients.

Table 19. General Payments to Independent Researchers (by Amount)

Type of Compensation	Amount ($)	Share	# of Payments	Average ($)	Median ($)	# of Recipients	Average/ Recipient ($)	Median/ Recipient ($)	Share
Compensation for services other than consulting, including serving as faculty or as a speaker at a venue other than a continuing education program	54,169,734	30.8%	24,703	2,193	1,900	1,957	27,680	9,500	11.4%
Consulting fee	50,748,464	28.9%	16,837	3,014	2,000	2,612	19,429	7,492	15.3%
Travel and lodging	23,420,822	13.3%	60,548	387	183	3,427	6,834	2,468	20.0%
Royalty or license	17,206,866	9.8%	553	31,115	5,613	117	147,067	26,457	0.7%
Honoraria	8,720,572	5.0%	3,756	2,322	2,000	831	10,494	4,000	4.9%
Food and beverage	7,733,007	4.4%	217,052	36	16	5,232	1,478	837	30.6%
Current or prospective ownership or investment interest	4,398,196	2.5%	63	69,813	154	14	314,157	15,560	0.1%
Compensation for serving as faculty or as a speaker for a non-accredited and noncertified continuing education program	3,504,544	2.0%	1,685	2,080	2,000	338	10,368	4,000	2.0%
Education	3,159,289	1.8%	10,165	311	14	2,257	1,400	85	13.2%
Grant	1,565,147	0.9%	75	20,869	5,047	44	35,572	5,000	0.3%
Compensation for serving as faculty or as a speaker for an accredited or certified continuing education program	709,604	0.4%	169	4,199	2,500	34	20,871	6,750	0.2%
Charitable contribution	132,585	0.1%	10	13,259	6,500	9	14,732	6,000	0.1%
Gift	113,463	0.1%	366	310	23	141	805	62	0.8%
Entertainment	29,420	0.0%	199	148	32	103	286	69	0.6%
Total general payments	175,611,715	100.0%	336,181	522					100.0%
Research payments	705,179,289		520,682	1,354		5,412			
Total payments	880,791,004								

Largest General Payment Amounts to Hospitals

Table 20 shows that eight of the 10 hospitals that received the most general payments received between 13.3% and 70.2% of their general payments from a single company. City of Hope National Medical Center received 99.8% of its general payments from Genentech, Inc., and the Unity Hospital of Rochester received 99.9% its general payments from the same company. Royalties and licenses accounted for some of the concentration.

Table 20. Top 10 Hospitals Based on General Payments and the Companies That Paid Each of Them the Most

Hospital	ID#	Company	ID#	General Payments ($)	From Other Companies ($)	Total ($)	Share
City of Hope National Medical Center	2317	Genentech, Inc.	89	250,805,275	394,090	251,199,365	99.8%
Massachusetts General Hospital	1187	Zimmer Holding Inc	103	23,737,956	10,061,097	33,799,053	70.2%
The Unity Hospital of Rochester	1438	GlaxoSmithKline, LLC.	5449	20,932,378	26,123	20,958,501	99.9%
Denver Health Medical Center	2189	Amgen Inc.	278	4,014,472	8,915,038	12,929,510	31.0%
Cleveland Clinic Hospital	1548	Siemens Medical Solutions USA, Inc.	10755	1,707,811	11,168,464	12,876,275	13.3%
UT MD Anderson Cancer Center	2116	Otsuka Pharmaceutical Co.,	112	3,519,728	8,832,879	12,352,607	28.5%
Brigham and Womens Hospital	1184	Eisai Inc.	136	5,054,509	5,976,630	11,031,139	45.8%
Hospital of the University of Pennsylvania	1413	Genentech, Inc.	89	4,169,166	6,199,846	10,369,011	40.2%
Cedars-Sinai Medical Center	2314	Boston Scientific	5674	2,089,715	4,666,233	6,755,948	30.9%
Dana-Farber Cancer Institute	1183	Fujirebio Diagnostics, Incorporated	10917	1,360,193	3,488,690	4,848,883	28.1%
Total				317,391,202	759,615,926	1,077,007,128	

Table 21 shows that six of the 10 companies that made the largest general payments, including the three that made the most, were medical device companies. Four companies made between 18% and 50% of their payments to a single researcher. Five of these researchers received over $10M from these companies. Two companies paid less than $1M to their top researcher recipient. Sujata D. Narayan, who received, by far, the largest amount, founded Topera, the company that paid him.

Table 21. Top 10 Companies for General Payments and the Top 10 Physicians They Made Payments To

Company	ID#	Physician	ID#	General Payments ($)	Paid to Other Physicians ($)	Total ($)	Share
Topera, Inc.	10985	Sujata D. Narayan	281659	43,859,955	48,803,882	92,663,838	47%
St. Jude Medical, Inc.	309	Sanjay Yadav	127963	23,089,486	23,225,045	46,314,531	50%
Medtronic Sofamor Danek USA, Inc.	10384	Kevin Foley	311622	18,589,438	49,923,657	68,513,095	27%
Genentech, Inc.	86	Charles Sawyers	1219074	10,164,325	264,039,704	274,204,029	4%
Allergan Inc.	274	William Jay Binder	1166415	8,286,882	38,298,695	46,585,577	18%
DePuy Synthes Products LLC	5596	Douglas Alan Dennis	427951	4,513,237	54,089,724	58,602,961	8%
Stryker Corporation	10497	Martin William Roche	22082	2,500,590	70,635,312	73,135,901	3%
Zimmer Holding Inc	96	Evan Flatow	1001850	2,024,760	48,756,464	50,781,224	4%
Pfizer Inc.	278	John Henry Diliberti	1287821	446,950	52,816,267	53,263,218	1%
AstraZeneca Pharmaceuticals LP	137	Robert Sheldon Epstein	705886	405,426	72,129,588	72,535,014	1%
Total				113,881,048	722,718,338	836,599,387	

Table 22 shows that the top-10 researchers based on general payments all received over $10M in general payments, all or almost all from a single company. All of these companies manufacture medical devices. Topera, Inc. and Medtronic each appear three times in this table.

Table 22. Top 10 Researchers Based on General Payments and the Companies That Paid Each of Them the Most

Physician	ID#	Company	ID#	General Payments ($)	Paid by Other Companies ($)	Total ($)	Share
Sujata D. Narayan*	281659	Topera, Inc.	10985	43,859,955	26	43,859,981	100.0%
Karen R Underwood	933844	Topera, Inc.	10985	28,540,871	0	28,540,871	100.0%
Sanjay Yadav	127963	St. Jude Medical, Inc.	310	23,089,486	36	23,089,522	100.0%
Gregory Piskun	303750	Covidien Sales LLC	98	21,733,719	0	21,733,719	100.0%
Kevin Foley	311622	Medtronic Sofamor Danek USA, Inc.	10386	18,589,438	344,501	18,933,939	98.2%
Stephen S Burkhart	288926	Arthrex, Inc.	5371	16,638,411	171	16,638,582	100.0%
Brent David Laing	31879	Medtronic USA, Inc.	10383	14,751,093	49	14,751,142	100.0%
Rodney D Raabe	372823	Covidien LP	5371	13,603,490	59,107	13,662,597	99.6%
John David Green	166475	Medtronic USA, Inc.	10383	11,800,060	1,064	11,801,124	100.0%
Sanjiv M. Narayan*	1235478	Topera, Inc.	83	10,972,127	9,026	10,981,153	99.9%
Total				203,578,650	413,981	203,992,631	99.8%

* Wife and husband

Author

Norman M. Goldfarb is Managing Director of First Clinical Research LLC, a provider of clinical research best practices information services. Contact him at 1.650.465.0119 or ngoldfarb@firstclinical.com.

The author thanks Md Momtaz Uddin of Dhaka, Bangladesh, for his tireless work in preparing the data for analysis and performing many complex queries.

