

# **Does the presence of a medical school in the same university affect the rankings of the engineering school?**

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## **Objective**

One argument supporting the potential merger of Rice with BCM is that the merger will increase the Rice research rankings. Here we review the rankings of the top engineering schools to determine whether or not there is a correlation between the ranking of an engineering school and the presence or absence of a medical school in the same institution. Because of the important of biology in XXI century research, an initial exam is presented of the correlation between the ranking of biological research departments and the presence of absence of a medical school in the same institution.

## **Findings**

Engineering schools co-located with medical schools are less likely to be top ranked. Engineering schools in private universities without medical schools are, in average, ranked 10 positions higher than engineering schools in private universities with medical schools. Engineering schools in universities without medical schools have average departmental quality factor about 0.50 points (out of 5) higher than engineering schools in universities with medical schools.

There seems to be little to no correlation between the presence of a medical school and the rankings of basic biological research programs. Three of the top five and six of the top fourteen biological sciences programs belong to universities without a medical school; their average quality and rankings are essentially indistinguishable.

## **Conclusions and recommendations**

There seems to be no positive correlation between the mere presence or absence of a medical school and the ranking of other research programs; in fact, the correlation between the presence of a medical school and the ranking of engineering is negative. Although some private universities combine a top medical school with top engineering and biology programs (e.g., Stanford and, to a lesser extent, University of Pennsylvania), others have relatively weak programs in engineering (e.g., Duke, Johns Hopkins, Vanderbilt, Washington University in St. Louis, Yale) or biological sciences (Northwestern, Vanderbilt). In considering the Rice-BCM merger, reasons should be

identified that led to Stanford's success and the relative lower effectiveness of other peer private institutions. Any merger execution plan should foster an environment that is likely to lead to a Stanford-like outcome rather to other potential scenarios.

**Follow-up analysis**

Likely reasons for the negative correlation between presence of a medical school and ranking of the engineering school are competition for internal resources and differences in culture. This hypothesis is checked by comparing the relative size of the engineering and medical school to their relative rankings. The data show that size imbalance is an important factor in the rankings of the engineering school (overall institutional ranking is also an important factor). The proposed Rice-BCM merger will lead to one of the most imbalanced institutions (together with Johns Hopkins and Vanderbilt) in the peer group of universities with top engineering schools and is therefore likely to lead to an erosion of the institutional focus on engineering and, in the long term, an erosion of effectiveness and rankings of the school of engineering.

## Methods

The overall method of analysis is the comparative method (or natural experiment, see supplementary information on page 5). Departmental quality rankings for Bioengineering, Chemical, Civil, Electrical, and Mechanical Engineering were obtained from US News 2008 edition (most recent rankings at the time of the study). These rankings are compiled by asking US department chairs in each discipline to judge the quality of the scholarship of each US department, using a scale of 0 (poor) to 5 (excellent). These rankings were favored over the US News overall engineering school rankings because of their higher accuracy. Students and prospective faculty consult with their faculty advisors before deciding where to apply for graduate school, postdoctoral research, or faculty positions; therefore, rankings based on peer faculty assessment are the best indicator of a university ability to attract and retain top students, researchers, and faculty. In fact, the National Research Council used this criterion to rank-order departments in the most recent published study [Research-Doctorate Programs in the United States: Continuity and Change, National Academies Press, 1995; the new study is still unpublished].

Universities that had at least one engineering department in the top-25 departmental rankings were included (even if the other departments were not top ranked); this yielded a pool of 44 universities, 19 of which are private (including Cornell). 25 of these 44 universities have a medical school. For numerical analysis, values of 1 and 0 were assigned to universities that have or do not have a medical school, respectively.

The quality of the engineering school was calculated in two ways: by averaging the quality of all five departments (schools which missed one or more departments were not penalized), and by averaging the quality of Chemical, Civil, Electrical, and Mechanical Engineering (i.e., excluding BioE). Preliminary work was done to include Computer Science programs (which are often organizationally grouped with school of Arts and Sciences): the results change little when Computer Science is included in the analysis (not reported in the analysis tables).

The schools were ranked by overall quality of Chemical, Civil, Electrical, and Mechanical Engineering (BioE was excluded). The Pearson's product moment correlation coefficients were calculated to establish correlations between these variables: average quality and presence of medical school; average quality (no BioE) and presence of medical school; rank in the list and presence of medical school. A Pearson's coefficient of +1 indicates perfect correlation, -1 perfect anticorrelation, and 0 the lack of any correlation. The Pearson's product moment correlation coefficient is equivalent to the point-biserial correlation coefficient when one of the variables is dichotomous, and is equivalent to the Spearman's rank correlation coefficient when one of the variables is a rank-ordering.

The US News 2008 biological sciences rankings were used as primary data for the analysis of the correlation between biological programs and medical schools.

## Results

The Pearson correlation coefficient shows a small to medium negative correlation between any of the quality indicators and the presence of a medical school:

- Average quality and presence of medical school -0.22
- Average quality (no BioE) and presence of medical school -0.30
- Rank in the list and presence of medical school -0.31

There are 19 private universities (including Cornell) in the list of top 44 engineering schools. 12 have medical schools (including Cornell, whose medical school is about 220 miles away from the main campus). When only these schools are considered, the negative correlation becomes stronger:

- Average quality and presence of medical school -0.29
- Average quality (no BioE) and presence of medical school -0.38
- Rank in the list and presence of medical school -0.36

The average ranking and quality of the two groups are:

	Average Ranking			Average Quality (no BioE)			Average Quality (with BioE)		
	Med	No Med	Diff.	Med	No Med	Diff.	Med	No Med	Diff.
Cornell included with Med School	27.33	17.29	10.05	3.41	3.87	-0.46	3.49	3.99	-0.49
Cornell excluded	28.91	17.29	11.62	3.35	3.87	-0.52	3.46	3.99	-0.53
Cornell included without Med School	28.91	16.38	12.53	3.35	3.89	-0.54	3.46	4.01	-0.55

The table shows clearly that including Cornell in either peer group makes little to no difference in the overall conclusions. In average, engineering schools without a medical school are ranked 10 to 12 positions above those with a medical school. Moreover, the presence of medical schools has little effect on the quality metric when BioEngineering Departments are included. In average, the engineering schools without a medical school have a quality ranking of 0.5 points above those with a medical school. This spread is very substantial, because it constitutes approximately 28% of the range of quality values (1.70 when BioE departments are considered, 1.93 when they are not).

A simpler analysis is conducted of the top programs in the biological sciences.

	Average Ranking (number of schools in group)			Average Quality		
	Med	No Med	Diff.	Med	No Med	Diff.
Top 5 programs	2.50 (2)	2.67 (3)	-0.17	4.8	4.77	0.03
Top 14 programs	6.38 (8)	6.50 (6)	-0.12	4.58	4.60	-0.02

The table shows clearly that there is no difference in rankings (about one tenth of one position) and no statistical difference in the quality factors.

### **Supplementary Information**

How can one study the effect of medical schools on other university programs “scientifically”? In the words of Jared Diamond (*Collapse*, Viking press, 2005):

Science is often misrepresented as “the body of knowledge acquired by performing replicated controlled experiments in the laboratory.” Actually, science is something much broader: the acquisition of reliable knowledge about the world. In some fields, such as chemistry and molecular biology, replicated controlled experiments in the laboratory are feasible and provide by far the most reliable means to acquire knowledge. [...]

I was immediately confronted with the problem of acquiring knowledge without being able to resort to replicated controlled experiments, whether in the laboratory out doors. [...] I had to use different methods. Similar methodological problems arise in many other areas of population biology, as well as in astronomy, epidemiology, geology, and paleontology.

A frequent solution is to apply what is termed the “comparative method” or the “natural experiment”—i.e., to compare natural situations differing with respect to the variable of interest. [...] There is a large scientific literature on the obvious pitfalls of that comparative method, and how best to overcome those pitfalls. Especially in historical sciences (like evolutionary biology and historical geology), where it’s impossible to manipulate the past experimentally, one has no choice except to renounce laboratory experiments in favor of natural ones.

I used the comparative method to examine the effect of the presence or absence of a medical school on the quality of the engineering programs (as measured by the rankings that most reliably measure quality and affect recruitment of PhD students, postdocs, and faculty).

### **Follow-up analysis: effect of size of the medical school relative to the overall size of the institution and of the engineering school**

Data on the total number of full-time faculty in the university, in the medical school, and in the engineering school were collected from institutional websites (references available in excel format).

Data on the quality and ranking of the medical schools was taken from the most recent (Spring 2009) US News report (attached). Of the top 50 medical schools, only private institutions belonging to a university were considered (24 total). Of these, 11 have engineering schools with at least one department ranked in the top 25, 7 have engineering schools with no department ranked in the top 25, 5 have no engineering school, and one (Harvard) is difficult to classify (see Table for further information).

The data shows clearly that in universities where the medical school is not overwhelmingly large compared to the engineering school (size ratio of 3-10), the two schools have comparable quality and ranking. Interestingly, plotting ranking and quality vs. the relative size of the medical to engineering school reveals that there seems to be an upper ceiling to the quality (or lower ceiling on ranking) of the engineering school as the size ratio grows. In the best case scenario, if the relative size of the engineering and medical faculty remains at the merger values, the quality of the engineering school would not go up by more than about 0.2/5 points (it could go easily go down by a full point, reaching the typical values for Yale, Dartmouth, and other universities that are not considered in the present peer group). Achieving a Stanford-like scenario would require growing the engineering faculty (or shrinking the medical faculty) by a factor of five (i.e., reducing the medical faculty from roughly 1600 to approximately 320, or enlarging the engineering faculty to about 500). Enlarging the engineering faculty would also require a considerable growth in endowment to arrive at levels comparable to Stanford.

Conversely, the data shows that Rice could increase the quality of the engineering school without adding a medical school, by following models close to Princeton, Cornell, and Carnegie-Mellon—and, to a lesser extent, MIT and CalTech, which are more specialized institutions.

## 2008 US News Rankings

	w/ BioE	No BioE							Med		UG	Grad	
	Overall	Overall	CHBE	EE	MechE	Civile	BioE	School	Model				Notes
1 MIT	4.66	4.78	4.8	5.0	4.9	4.4	4.2	N	Private		4200	6000	
2 UC Berkeley	4.58	4.78	4.8	4.9	4.7	4.7	3.8	N	Public		24600	10300	
3 <b>Stanford</b>	4.48	4.68	4.5	4.9	4.8	4.5	3.7	Y	Private		6700	8000	
4 Cal Tech	4.26	4.53	4.8	4.6	4.6	4.1	3.2	N	Private		900	1200	
5 University of Illinois at Urbana-Champaign	4.50	4.50	4.1	4.7	4.5	4.7	NA	Y	Public		30900	11400	Large, State-supported, Midwest
6 University of Michigan	4.20	4.30	4.0	4.5	4.6	4.1	3.8	Y	Public		26000	15000	Large, State-supported, Midwest
7 Georgia Tech	4.34	4.28	3.9	4.5	4.4	4.3	4.6	N	Public		13000	6400	
8 UT Austin	4.02	4.18	4.3	4.0	4.0	4.4	3.4	N	Public		37400	11300	
9 Purdue University	3.96	4.13	3.8	4.1	4.4	4.2	3.3	N	Public		31300	7900	
10 Cornell	3.86	4.05	3.8	4.2	4.2	4.0	3.1	Y	Mixed		13500	6300	Separate Med School, in NY City, 820 students
11 Princeton	4.03	4.03	4.4	4.1	4.0	3.6	NA	N	Private		5000	2400	
12 Carnegie Mellon	3.76	4.00	3.9	4.3	3.9	3.9	2.8	N	Private		5900	5100	
13 University of Wisconsin at Madison	3.84	3.98	4.5	3.8	3.8	3.8	3.3	Y	Public		29000	11400	Large, State-supported, Midwest
14 University of Minnesota	3.74	3.90	4.7	3.5	3.8	3.6	3.1	Y	Public		28600	14000	Large, State-supported, Midwest
15 UC Santa Barbara	3.77	3.77	4.2	3.6	3.5	NA	NA	N	Public		17700	2800	
16 <b>Northwestern</b>	3.68	3.68	3.8	3.2	3.9	3.8	3.7	Y	Private		8300	9700	
17 Pennsylvania State University at University Park	3.46	3.58	3.4	3.6	3.8	3.5	3.0	N	Public		38000	6100	
18 Virginia Tech	3.55	3.55	2.9	3.6	3.7	4.0	NA	N	Public		23500	7200	
19 UCLA	3.36	3.55	3.3	3.8	3.8	3.3	2.6	Y	Public		25400	11200	Large, State-supported
20 Texas A&M	3.42	3.53	3.1	3.6	3.6	3.8	3.0	N	Public		38400	9100	
21 <b>John Hopkins</b>	3.74	3.50	3.2	3.6	3.7	3.5	4.7	Y	Private		4500	14300	
22 University of Washington in Seattle	3.64	3.48	3.4	3.6	3.3	3.6	4.3	Y	Public		30800	12100	Large, State-supported
23 University of Maryland at College Park	3.30	3.45	2.9	3.8	3.6	3.5	2.7	N	Public		26500	10500	Med School is at U Maryland in Baltimore
24 <b>University of Pennsylvania</b>	3.58	3.43	3.7	3.2	3.4	NA	4.0	Y	Private		10200	9700	
25 University of California San Diego	3.62	3.38	2.6	3.7	3.6	3.6	4.6	Y	Public		22700	4900	
26 Rice University	3.48	3.38	3.3	3.6	3.4	3.2	3.9	N	Private		3000	2100	
27 <b>University of Southern California</b>	3.30	3.38	2.9	4.0	3.4	3.2	3.0	Y	Private		16400	17000	
28 University of Florida at Gainesville	3.35	3.35	3.4	3.4	3.4	3.2	NA	Y	Public		35500	15900	
29 Rensselaer Polytechnic Insittute	3.26	3.35	3.1	3.5	3.5	3.3	2.9	N	Private		5400	2100	
30 <b>Duke University</b>	3.63	3.33	NA	3.3	3.4	3.3	4.5	Y	Private		6200	6800	
31 Ohio State	3.33	3.33	3.2	3.5	3.6	3.0	NA	Y	Public		34500	13300	
32 North Carolina State	3.24	3.33	3.4	3.4	3.1	3.4	2.9	N	Public		23700	7400	
33 UC Davis	3.26	3.33	3.4	3.1	3.2	3.6	3.0	Y	Public		24200	7200	
34 University of Colorado at Boulder	3.30	3.30	3.5	3.1	3.2	3.4	NA	N	Public		24000	4000	
35 <b>Columbia University</b>	3.26	3.23	2.8	3.6	3.3	3.2	3.4	Y	Private		6900	15700	
36 University of Delaware	3.10	3.10	4.1	2.6	3.0	2.7	NA	N	Public		16000	3500	
37 University of Virginia	3.18	3.08	3.0	3.1	3.1	3.1	3.6	Y	Public		13600	6200	
38 Lehigh University	3.03	3.03	2.8	2.8	3.1	3.4	NA	N	Private		4700	2100	
39 <b>Case Western Reserve University</b>	3.16	2.98	2.8	3.0	3.3	2.8	3.9	Y	Private		4200	5800	
40 <b>Washington University in St. Louis</b>	3.02	2.90	2.7	3.2	2.9	2.8	3.5	Y	Private		6100	6300	
41 <b>Vanderbilt University</b>	2.96	2.88	2.8	2.9	2.9	2.9	3.3	Y	Private		6600	5500	
42 <b>Boston University</b>	3.23	2.85	NA	3.0	2.7	NA	4.0	Y	Private		16700	13100	
43 University of Pittsburgh	2.84	2.65	2.8	2.7	2.6	2.5	3.6	Y	Public		17400	10100	
44 University of Utah	2.78	2.60	NA	2.6	2.6	2.6	3.3	Y	Public		28600	6500	



2008 US News Rankings	Average of CHBE, EE, Meche, Civile, BioE							0 if no medical school; 1 if there is a medical school	Med School	Funding	Rank relative to average	Quality relative to average (+ means higher quality), BioE is included	Quality relative to average (+ means higher quality), BioE is excluded	Presence of medical school relative to average	Rank correlations	Quality correlations, with BioE	Quality correlations, without BioE
	Overall	No BioE Overall	CHBE	EE	MechE	Civile	BioE										
1 MIT	4.66	4.78	4.8	5.0	4.9	4.4	4.2	0	N	Private	22.63	1.06	1.20	-0.63	-14.29	-0.67	-0.76
3 Stanford	4.48	4.68	4.5	4.9	4.8	4.5	3.7	1	Y	Private	20.63	0.88	1.10	0.37	7.60	0.32	0.40
4 Cal Tech	4.26	4.53	4.8	4.6	4.6	4.1	3.2	0	N	Private	19.63	0.66	0.95	-0.63	-12.40	-0.42	-0.60
10 Cornell	3.86	4.05	3.8	4.2	4.2	4.0	3.1	1	Y	Mixed	13.63	0.26	0.47	0.37	5.02	0.10	0.17
11 Princeton	4.03	4.03	4.4	4.1	4.0	3.6	NA	0	N	Private	12.63	0.43	0.45	-0.63	-7.98	-0.27	-0.28
12 Carnegie Mellon	3.76	4.00	3.9	4.3	3.9	3.9	2.8	0	N	Private	11.63	0.16	0.42	-0.63	-7.35	-0.10	-0.27
16 Northwestern	3.68	3.68	3.8	3.2	3.9	3.8	3.7	1	Y	Private	7.63	0.08	0.10	0.37	2.81	0.03	0.04
21 John Hopkins	3.74	3.50	3.2	3.6	3.7	3.5	4.7	1	Y	Private	2.63	0.14	-0.08	0.37	0.97	0.05	-0.03
24 University of Pennsylvania	3.58	3.43	3.7	3.2	3.4	NA	4.0	1	Y	Private	-0.37	-0.02	-0.14	0.37	-0.14	-0.01	-0.05
26 Rice University	3.48	3.38	3.3	3.6	3.4	3.2	3.9	0	N	Private	-2.37	-0.12	-0.20	-0.63	1.50	0.07	0.13
27 University of Southern California	3.30	3.38	2.9	4.0	3.4	3.2	3.0	1	Y	Private	-3.37	-0.30	-0.20	0.37	-1.24	-0.11	-0.07
29 Rensselaer Polytechnic Insittute	3.26	3.35	3.1	3.5	3.5	3.3	2.9	0	N	Private	-5.37	-0.34	-0.23	-0.63	3.39	0.21	0.14
30 Duke	3.63	3.33	NA	3.3	3.4	3.3	4.5	1	Y	Private	-6.37	0.03	-0.24	0.37	-2.35	0.01	-0.09
35 Columbia	3.26	3.23	2.8	3.6	3.3	3.2	3.4	1	Y	Private	-11.37	-0.34	-0.35	0.37	-4.19	-0.12	-0.13
38 Lehigh	3.03	3.03	2.8	2.8	3.1	3.4	NA	0	N	Private	-14.37	-0.57	-0.55	-0.63	9.07	0.36	0.35
39 Case Western Reserve University	3.16	2.98	2.8	3.0	3.3	2.8	3.9	1	Y	Private	-15.37	-0.44	-0.60	0.37	-5.66	-0.16	-0.22
40 Washington University in St. Louis	3.02	2.90	2.7	3.2	2.9	2.8	3.5	1	Y	Private	-16.37	-0.58	-0.68	0.37	-6.03	-0.21	-0.25
41 Vanderbilt University	2.96	2.88	2.8	2.9	2.9	2.9	3.3	1	Y	Private	-17.37	-0.64	-0.70	0.37	-6.40	-0.24	-0.26
42 Boston University	3.23	2.85	NA	3.0	2.7	NA	4.0	1	Y	Private	-18.37	-0.36	-0.73	0.37	-6.77	-0.13	-0.27
23.63	3.60	3.58						0.63			3434.42	4.37	6.64	4.42	<b>-0.36</b>	<b>-0.29</b>	<b>-0.38</b>
											STD Dev	STD Dev	STD Dev	STD Dev	<b>Correlations</b>		

# Schools of Medicine

## THE TOP SCHOOLS • RESEARCH

Rank/School	Overall score	Peer assessment score (5.0-highest)	Assessment score by residency directors** (5.0-highest)	'08 average undergrad GPA	'08 average MCAT score	'08 acceptance rate	'08 NIH research grants (in millions)	'08 NIH research grants per faculty member (in thousands)	'08 faculty/student ratio	'08 out-of-state tuition and fees	'08 total medical school enrollment
1. Harvard University (MA)	100	4.8	4.7	3.85	12.0	4.0%	\$1,228.7	\$152.2	11.1	\$43,223	728
2. Johns Hopkins University (MD)	81	4.8	4.8	3.84	11.8	6.8%	\$471.9	\$195.3	5.1	\$42,330	473
3. University of Pennsylvania	79	4.6	4.4	3.80	11.7	3.8%	\$516.2	\$218.3	3.9	\$44,084	614
3. Washington University in St. Louis	79	4.6	4.5	3.87	12.4	11.1%	\$347.2	\$223.1	3.3	\$45,550	476
5. University of California—San Francisco	77	4.7	4.4	3.71	11.5	4.3%	\$457.3	\$240.8	3.2	\$37,807	595
6. Duke University (NC)	75	4.6	4.6	3.78	11.5	4.2%	\$338.7	\$192.9	4.2	\$43,840	415
6. Stanford University (CA)	75	4.5	4.5	3.75	11.6	2.6%	\$236.2 *	\$296.4 *	1.7	\$43,529	465
6. University of Washington	75	4.3	4.2	3.67	10.4	5.8%	\$566.1	\$259.2	2.5	\$46,002	870
6. Yale University (CT)	75	4.3	4.3	3.80	11.8	5.9%	\$340.5	\$310.4	2.8	\$42,850	394
10. Columbia University (NY)	73	4.3	4.4	3.79	11.9	4.1%	\$342.9	\$183.7	2.9	\$47,092	647
11. University of California—Los Angeles (Geffen)	72	4.1	4.1	3.77	11.4	3.7%	\$493.9	\$211.6	3.3	\$36,418	698
11. University of Michigan—Ann Arbor	72	4.3	4.4	3.74	11.6	7.2%	\$347.5	\$200.4	2.6	\$41,485	671
13. University of Chicago (Pritzker)	69	3.9	4.2	3.79	11.9	3.8%	\$255.8	\$292.3	1.9	\$39,901	451
13. University of Pittsburgh	69	4.1	4.1	3.70	11.6	8.4%	\$354.6	\$172.6	3.6	\$41,506	577
15. University of California—San Diego	68	4.0	3.9	3.75	11.1	5.7%	\$284.8	\$297.9	1.8	\$36,824	520
15. Vanderbilt University (TN)	68	4.2	4.2	3.79	11.3	5.8%	\$306.1	\$160.7	4.3	\$41,249	442
17. Baylor College of Medicine (TX)	67	3.8	4.0	3.85	11.5	6.1%	\$229.6	\$117.1	3.0	\$25,903	664
18. Cornell University (Weill) (NY)	66	4.1	4.3	3.78	11.7	4.2%	\$233.1	\$133.7	4.2	\$44,665	414
19. Northwestern University (Feinberg) (IL)	63	3.8	4.1	3.79	11.7	6.5%	\$252.6	\$124.7	2.9	\$44,883	695
20. University of North Carolina—Chapel Hill	61	3.9	4.1	3.62	10.9	5.7%	\$234.8	\$171.8	1.9	\$36,957	732
20. U. of Texas Southwestern Medical Center—Dallas	61	4.2	4.0	3.81	11.0	11.7%	\$191.7	\$109.8	1.9	\$26,615	923
22. Emory University (GA)	60	3.8	4.0	3.69	11.3	7.3%	\$222.8	\$113.4	3.9	\$41,476	498
22. Mount Sinai School of Medicine (NY)	60	3.6	3.7	3.66	11.6	5.6%	\$209.2	\$191.9	2.1	\$39,610	516
24. University of Virginia	59	3.7	3.9	3.73	11.1	14.0%	\$149.7 *	\$159.4 *	1.6	\$42,432	580
25. Case Western Reserve University (OH)	58	3.5	3.8	3.63	11.5	8.6%	\$244.0	\$124.3	2.6	\$45,286	769
25. Mayo Medical School (MN)	58	3.7	3.9	3.82	10.9	2.5%	\$202.9	\$84.1	14.0	\$29,800	172
27. Ohio State University	56	3.3	3.5	3.74	11.1	9.1%	\$272.3	\$120.0	2.7	\$31,836	843
27. University of Wisconsin—Madison	56	3.7	3.8	3.72	10.5	8.3%	\$139.2	\$133.2	1.6	\$35,116	645
29. University of Alabama—Birmingham	55	3.8	3.8	3.72	10.0	12.3%	\$165.3	\$133.8	1.7	\$50,689	733
29. University of Colorado—Denver	55	3.6	3.7	3.72	10.9	7.7%	\$162.4	\$74.4	3.6	\$51,290	609
31. New York University	54	3.4	3.6	3.77	11.2	7.2%	\$145.6	\$94.6	2.3	\$47,476	669
31. University of Iowa (Carver)	54	3.6	3.7	3.69	10.6	10.0%	\$133.0	\$146.8	1.6	\$42,526	583
31. University of Rochester (NY)	54	3.5	3.6	3.69	10.8	6.4%	\$165.8	\$114.8	3.4	\$42,339	426
34. Brown University (Alpert) (RI)	53	3.2	3.7	3.63	11.2	3.2%	\$113.6	\$160.2	1.7	\$43,022	409
35. Boston University	52	3.3	3.5	3.72	10.3	4.9%	\$199.4	\$148.3	1.9	\$45,286	695
35. Dartmouth Medical School (NH)	52	3.4	3.7	3.73	11.0	5.5%	\$69.2	\$78.9	2.8	\$42,960	319
35. Oregon Health and Science University	52	3.5	3.6	3.63	10.2	4.8%	\$193.0	\$112.9	3.2	\$49,424	528
35. University of Minnesota Medical School	52	3.4	3.6	3.79	10.5	7.9%	\$146.3	\$92.1	1.6	\$41,818	964
39. Georgetown University (DC)	51	2.9	3.6	3.70	10.6	3.8%	\$184.0	\$110.3	2.1	\$44,444	789
39. University of Southern California (Keck)	51	3.3	3.6	3.58	10.9	5.3%	\$144.2	\$121.2	1.8	\$47,896	679
41. University of Cincinnati	50	3.1	3.3	3.60	10.8	9.5%	\$194.6	\$135.6	2.3	\$42,987	626
41. Yeshiva University (Einstein) (NY)	50	3.2	3.4	3.70	10.7	6.4%	\$170.6	\$63.8	3.4	\$44,780	777
43. University of Maryland	49	3.2	3.3	3.69	10.5	7.2%	\$149.7 *	\$126.0 *	1.9	\$43,175	626
43. Wake Forest University (NC)	49	3.2	3.5	3.67	10.4	3.6%	\$94.1 *	\$100.2 *	2.0	\$38,248	465
45. Indiana University—Indianapolis	48	3.3	3.5	3.74	10.3	14.0%	\$104.3 *	\$70.0 *	1.2	\$42,924	1,206
45. Tufts University (MA)	48	3.4	3.7	3.60	10.7	7.9%	\$89.2	\$55.5	2.2	\$48,992	715
45. University of California—Irvine	48	2.8	3.2	3.67	10.6	5.7%	\$106.0	\$217.2	1.3	\$38,039	390
48. University of California—Davis	46	3.1	3.4	3.64	10.0	4.3%	\$90.6	\$137.3	1.6	\$39,659	402
48. University of Florida	46	3.0	3.3	3.73	10.6	8.6%	\$79.9	\$65.8	2.3	\$54,361	521
48. University of Massachusetts—Worcester	46	3.0	3.2	3.65	10.6	23.8%	\$124.7 *	\$124.9 *	2.2	N/A	445

\*The school reported only research grants that the National Institutes of Health made to the medical school. No grants to affiliated hospitals were reported. \*\* Assessment data collected by Synovate.

Sources: U.S. News and the schools

THE TOP SCHOOLS • PRIMARY CARE

Rank/School	Overall score	Peer assessment score (5.0=highest)	Assessment score by residency directors (5.0=highest)	Selectivity rank	'08 average undergrad GPA	'08 average MCAT score	'08 acceptance rate	% '06-'08 graduates entering primary care	'08 faculty/student ratio	'08 out-of-state tuition and fees	'08 total medical school enrollment
1. University of Washington	100	4.2	4.1	48	3.67	10.4	5.8%	47.0%	2.5	\$46,002	870
2. University of North Carolina–Chapel Hill	86	3.6	3.6	36	3.62	10.9	5.7%	53.0%	1.9	\$36,957	732
3. Oregon Health and Science University	82	3.5	4.0	64	3.63	10.2	4.8%	47.0%	3.2	\$49,424	528
4. University of Colorado–Denver	80	3.6	3.5	28	3.72	10.9	7.7%	46.3%	3.6	\$51,290	609
5. University of California–San Francisco	79	3.7	3.8	16	3.71	11.5	4.3%	37.6%	3.2	\$37,807	595
6. University of Vermont	76	3.2	3.4	58	3.70	10.0	3.8%	56.7%	1.2	\$48,490	458
7. Mich. State U. Coll. of Osteopathic Medicine	72	2.6	3.0	109	3.56	8.8	10.6%	81.5%	0.3	\$65,670	843
7. University of Massachusetts–Worcester	72	3.2	3.3	56	3.65	10.6	23.8%	53.1%	2.2	N/A	445
7. University of Minnesota Medical School	72	3.4	3.7	30	3.79	10.5	7.9%	40.7%	1.6	\$41,818	964
10. University of California–Los Angeles (Geffen)	70	3.2	3.4	13	3.77	11.4	3.7%	44.0%	3.3	\$36,418	698
10. University of Iowa (Carver)	70	3.4	3.5	39	3.69	10.6	10.0%	43.0%	1.6	\$42,526	583
12. University of Michigan–Ann Arbor	69	3.4	3.7	13	3.74	11.6	7.2%	35.0%	2.6	\$41,485	671
12. University of Pennsylvania	69	3.3	3.3	7	3.80	11.7	3.8%	41.0%	3.9	\$44,084	614
12. University of Wisconsin–Madison	69	3.4	3.7	36	3.72	10.5	8.3%	39.3%	1.6	\$35,116	645
15. Harvard University (MA)	68	3.2	3.2	2	3.85	12.0	4.0%	42.0%	11.1	\$43,223	728
15. University of Rochester (NY)	68	3.4	3.7	32	3.69	10.8	6.4%	36.8%	3.4	\$42,339	426
17. Baylor College of Medicine (TX)	67	3.0	3.5	8	3.85	11.5	6.1%	42.8%	3.0	\$25,903	664
17. University of Nebraska College of Medicine	67	2.9	3.1	75	3.71	9.7	11.5%	60.0%	1.2	\$57,053	481
17. University of Pittsburgh	67	3.2	3.5	16	3.70	11.6	8.4%	41.0%	3.6	\$41,506	577
20. Michigan State University	65	3.2	3.6	89	3.57	9.8	5.8%	46.0%	1.1	\$54,956	550
21. Indiana University–Indianapolis	64	3.4	3.4	45	3.74	10.3	14.0%	39.5%	1.2	\$42,924	1,206
22. Dartmouth Medical School (NH)	63	3.2	3.4	25	3.73	11.0	5.5%	40.3%	2.8	\$42,960	319
22. University of Missouri	63	3.0	3.4	45	3.76	10.2	11.5%	47.0%	1.4	\$48,367	387
22. Wake Forest University (NC)	63	2.9	3.0	48	3.67	10.4	3.6%	55.0%	2.0	\$38,248	465
22. Yeshiva University (Einstein) (NY)	63	2.8	3.0	32	3.70	10.7	6.4%	55.0%	3.4	\$44,780	777
26. University of California–San Diego	62	3.1	3.3	22	3.75	11.1	5.7%	42.0%	1.8	\$36,824	520
26. Washington University in St. Louis	62	3.1	3.2	1	3.87	12.4	11.1%	37.1%	3.3	\$45,550	476
28. East Carolina University (Brody) (NC)	61	3.0	3.2	97	3.60	9.4	14.5%	53.3%	1.2	\$34,023	296
29. Brown University (Alpert) (RI)	60	3.1	3.3	28	3.63	11.2	3.2%	41.5%	1.7	\$43,022	409
29. University of New Mexico	60	3.4	3.3	100	3.61	9.2	18.7%	43.0%	2.3	\$44,943	316
29. University of Utah	60	3.2	3.6	81	3.65	9.7	10.2%	40.0%	2.7	\$40,840	412
29. University of Virginia	60	3.1	3.5	27	3.73	11.1	14.0%	38.0%	1.6	\$42,432	580
29. U. of N. Texas Health Sci. Ctr. (Col. of Oste Med.)	60	2.6	2.5	104	3.57	9.2	19.8%	73.8%	0.5	\$30,625	630
29. U. of Texas Southwestern Medical Center–Dallas	60	3.1	3.3	21	3.81	11.0	11.7%	40.0%	1.9	\$26,615	923
35. University of Alabama–Birmingham	59	3.4	3.4	62	3.72	10.0	12.3%	36.0%	1.7	\$50,689	733
35. University of California–Davis	59	3.2	3.3	69	3.64	10.0	4.3%	42.4%	1.6	\$39,659	402
37. Case Western Reserve University (OH)	58	3.1	3.3	25	3.63	11.5	8.6%	38.2%	2.6	\$45,286	769
37. Johns Hopkins University (MD)	58	3.2	3.1	3	3.84	11.8	6.8%	35.1%	5.1	\$42,330	473
37. Mayo Medical School (MN)	58	3.1	3.3	18	3.82	10.9	2.5%	37.0%	14.0	\$29,800	172
40. Ohio State University	57	2.9	3.4	23	3.74	11.1	9.1%	40.3%	2.7	\$31,836	843
40. Tufts University (MA)	57	3.0	3.2	50	3.60	10.7	7.9%	44.0%	2.2	\$48,992	715
42. Emory University (GA)	56	3.1	3.2	23	3.69	11.3	7.3%	38.0%	3.9	\$41,476	498
42. University of Connecticut	56	2.9	3.2	41	3.68	10.5	6.0%	45.0%	2.7	\$50,815	331
42. University of Maryland	56	3.0	3.2	41	3.69	10.5	7.2%	42.3%	1.9	\$43,175	626
45. Duke University (NC)	55	3.2	3.0	11	3.78	11.5	4.2%	35.0%	4.2	\$43,840	415
45. Stony Brook University (NY)	55	2.7	3.0	50	3.60	10.7	7.9%	52.3%	1.1	\$34,628	474
45. University of Arkansas for Medical Sciences	55	2.9	3.1	100	3.58	9.4	25.1%	51.3%	1.6	\$33,826	612
45. University of Chicago (Pritzker)	55	2.9	3.1	4	3.79	11.9	3.8%	39.0%	1.9	\$39,901	451
45. Vanderbilt University (TN)	55	3.2	3.3	15	3.79	11.3	5.8%	31.3%	4.3	\$41,249	442
50. Medical University of South Carolina	53	2.9	3.3	93	3.58	9.7	13.8%	44.7%	1.7	\$74,108	642

N/A: The school does not accept out-of-state students to its M.D. program.  
Sources: U.S. News and the schools. Peer assessment data collected by Synovate

## MEDICAL SCHOOL DEANS AND SENIOR FACULTY SELECT THE BEST PROGRAMS

### AIDS

1. University of California—San Francisco
2. Johns Hopkins Univ. (MD)
3. Harvard University (MA)
4. University of Washington
5. Columbia University (NY)
6. University of Alabama—Birmingham
6. University of California—Los Angeles (Geffen)
8. University of California—San Diego
9. University of North Carolina—Chapel Hill
10. Duke University (NC)

### DRUG/ALCOHOL ABUSE

1. Yale University (CT)
2. Harvard University (MA)
3. Columbia University (NY)
4. Johns Hopkins Univ. (MD)
5. University of California—San Francisco
6. University of Pennsylvania
7. New York University
8. Brown University (Alpert) (RI)
8. University of California—Los Angeles (Geffen)
10. University of California—San Diego

### FAMILY MEDICINE

1. University of Washington
2. University of North Carolina—Chapel Hill
3. University of Colorado—Denver
3. Univ. of Michigan—Ann Arbor
3. University of Missouri
6. University of California—San Francisco
6. University of Wisconsin—Madison
8. Oregon Health and Science University
9. Case Western Reserve University (OH)
9. Duke University (NC)

### GERIATRICS

1. Johns Hopkins Univ. (MD)
2. Mount Sinai School of Medicine (NY)
3. University of California—Los Angeles (Geffen)
4. Duke University (NC)
5. Univ. of Michigan—Ann Arbor
6. University of Washington
7. Harvard University (MA)
8. Yale University (CT)
9. University of California—San Francisco
10. University of Pittsburgh

### INTERNAL MEDICINE

1. Johns Hopkins Univ. (MD)
2. Harvard University (MA)
3. University of California—San Francisco
4. University of Pennsylvania
5. Duke University (NC)
6. Washington University in St. Louis
7. Univ. of Michigan—Ann Arbor
8. University of Washington
9. Columbia University (NY)
10. Yale University (CT)

### PEDIATRICS

1. Harvard University (MA)
2. University of Pennsylvania
3. University of Cincinnati
4. Johns Hopkins Univ. (MD)
5. Baylor College of Medicine (TX)
6. University of Washington
7. Stanford University (CA)
8. University of Colorado—Denver
8. Washington University in St. Louis
10. University of California—San Francisco

### RURAL MEDICINE

1. University of Washington
2. University of New Mexico
3. University of North Dakota
4. Oregon Health and Science University
4. University of Minnesota Medical School
6. University of North Carolina—Chapel Hill
7. East Carolina University (Brody) (NC)
7. East Tennessee State Univ. (Quillen)
7. Michigan State University
10. University of Iowa (Carver)
10. University of Utah

### WOMEN'S HEALTH

1. Harvard University (MA)
2. University of California—San Francisco
3. University of Pittsburgh
4. Johns Hopkins Univ. (MD)
4. University of Washington
6. University of Pennsylvania
6. Yale University (CT)
8. Columbia University (NY)
9. Duke University (NC)
9. University of California—Los Angeles (Geffen)

The 126 medical schools fully accredited by the Liaison Committee on Medical Education, plus the 20 schools of osteopathic medicine fully accredited by the American Osteopathic Association, were surveyed for the ranking of research medical schools; 120 schools provided the data needed to calculate the research rankings based on the indicators used in the medical school research model. The same medical and osteopathic schools were surveyed for the primary-care ranking; 119 schools provided the data needed to calculate the medical school primary-care ranking. The medical school research model is based on a weighted average of eight indicators, and the primary-care model is based on seven indicators. Four of the indicators are the same for both models. The research model factors in research activity; the primary-care model adds a measure of the proportion of graduates entering primary-care specialties.

**Quality assessment** (weighted by .40): Peer assessment surveys were conducted in the fall of 2008, asking medical and osteopathic school deans, deans of internal medicine or the directors of admissions to rate program quality on a scale of "marginal" (1) to "outstanding" (5). Respondents were asked to rate program quality for both research and primary-care programs separately on a single form. The response rate was 45 percent. A research school's average score is weighted by .20; the average score in the primary-care model is weighted by .25. Residency program directors were also asked to rate programs using the same 5-point scale on two separate survey instruments. One survey dealt with research and was sent to a sample of residency program directors in fields outside primary care, including surgery, psychiatry, and radiology. The other survey involved primary care and was sent to residency directors in the fields of family practice, pediatrics, and internal medicine. The response rate for those sent the research survey was 23 percent. The response rate for those sent the primary-care survey was 20 percent. Residency directors' surveys for the two most recent years were averaged and are weighted by

.20 in the research model and by .15 in primary care. The source for the names for both of the residency directors' surveys was the Graduate Medical Education Directory 2007–2008 edition, published by the American Medical Association.

**Research activity** (.30 in research model only): Research was measured as the total dollar amount of National Institutes of Health research grants awarded to the medical school and its affiliated hospitals (.20) and the average amount of those grants calculated per full-time medical school science and clinical faculty member (.10); both factors were averaged for fiscal years 2007 and 2008. An asterisk indicates schools that reported only NIH research grants to their medical school in 2008.

**Primary-care rate** (.30 in primary-care model only): The percentage of medical or osteopathic school graduates entering primary-care residencies in the fields of family practice, pediatrics, and internal medicine was averaged over the 2006, 2007, and 2008 graduating classes.

**Student selectivity** (.20 in research model, .15 in primary-care model): This is determined by three components that describe the medical or osteopathic class entering in fall 2008: mean composite Medical College Admission Test score (65 percent), mean undergraduate grade-point average (30 percent), and the acceptance rate, which is the proportion of total applicants accepted (5 percent).

**Faculty resources** (.10 in research model, .15 in primary-care model): Resources were measured as the ratio of full-time science and clinical faculty to medical or osteopathic students in 2008.

**Overall rank:** Indicators were standardized about their means, and standardized scores were weighted, totaled, and rescaled so that the top school received 100; other schools received their percentage of the top score.

**Specialty rankings:** The rankings are based solely on ratings by medical school deans and senior faculty at peer schools. They each identified up to 10 schools offering the best medical school programs in each specialty area. Those programs receiving the most nominations in the top 10 appear here.

University	Year	Budget Faculty		Medical	Medical %	Engin.	Eng %	Med/Eng	2009 ranking		2008 ranking			Ranking ratio	Qual ratio		
		Total	Total						rank	peer qual	rank	peer quality			BioE	no BioE	
									Medicine	Engineering	w/BioE	no BioE		BioE	no BioE		
Stanford	2008	3519	1878	801	42.7%	239	12.7%		<b>3.4</b>	<b>6</b>	<b>4.5</b>	<b>3</b>	<b>4.48</b>	<b>4.68</b>	<b>0.50</b>	<b>1.00</b>	<b>0.96</b>
USC	2009	2000	3200	1383	43.2%	165	5.2%		<b>8.4</b>	<b>39</b>	<b>3.3</b>	<b>27</b>	<b>3.30</b>	<b>3.38</b>	<b>0.69</b>	<b>1.00</b>	<b>0.98</b>
Boston U	2009	1911	3237	1449	44.8%	174	5.4%		<b>8.3</b>	<b>35</b>	<b>3.3</b>	<b>42</b>	<b>3.23</b>	<b>2.85</b>	<b>1.20</b>	<b>1.02</b>	<b>1.16</b>
Northwestern	2009	1561	3069	1766	57.5%	194	6.3%		<b>9.1</b>	<b>19</b>	<b>3.8</b>	<b>16</b>	<b>3.68</b>	<b>3.68</b>	<b>0.84</b>	<b>1.03</b>	<b>1.03</b>
Columbia	2009	2890	3566	2189	61.4%	164	4.6%		<b>13.3</b>	<b>10</b>	<b>4.3</b>	<b>35</b>	<b>3.26</b>	<b>3.23</b>	<b>3.50</b>	<b>1.32</b>	<b>1.33</b>
Vanderbilt	2008	2800	2997	1833	61.2%	118	3.9%		<b>15.5</b>	<b>15</b>	<b>4.2</b>	<b>41</b>	<b>2.96</b>	<b>2.88</b>	<b>2.73</b>	<b>1.42</b>	<b>1.46</b>
Penn	2009	5542	2524	1700	67.4%	108	4.3%		<b>15.7</b>	<b>3</b>	<b>4.6</b>	<b>24</b>	<b>3.58</b>	<b>3.43</b>	<b>8.00</b>	<b>1.28</b>	<b>1.34</b>
Johns Hopkins	2009	2400	3100	2594	83.7%	161	5.2%		<b>16.1</b>	<b>2</b>	<b>4.8</b>	<b>21</b>	<b>3.74</b>	<b>3.50</b>	<b>10.50</b>	<b>1.28</b>	<b>1.37</b>
Case Western	2009	898	2646	1985	75.0%	108	4.1%		<b>18.4</b>	<b>25</b>	<b>3.5</b>	<b>39</b>	<b>3.16</b>	<b>2.98</b>	<b>1.56</b>	<b>1.11</b>	<b>1.17</b>
Duke	2007	3474	2664	1756	65.9%	95	3.6%		<b>18.5</b>	<b>6</b>	<b>4.6</b>	<b>30</b>	<b>3.63</b>	<b>3.33</b>	<b>5.00</b>	<b>1.27</b>	<b>1.38</b>
WashU	2009	1794	3170	1727	54.5%	84	2.6%		<b>20.6</b>	<b>3</b>	<b>4.6</b>	<b>40</b>	<b>3.02</b>	<b>2.90</b>	<b>13.33</b>	<b>1.52</b>	<b>1.59</b>
Rice (projected)		1500	2114	1607	76.0%	107	5.1%		<b>15.0</b>	<b>17</b>	<b>3.8</b>	<b>26</b>	<b>3.48</b>	<b>3.38</b>	<b>1.53</b>	<b>1.09</b>	<b>1.12</b>

#### Notes

The following private universities have medical schools in the top-50 but engineering schools outside the top-50

Brown

Dartmouth

New York University

Tufts

University of Pittsburgh

University of Rochester

Yale

The following private universities have medical schools in the top-50 but no engineering school

Emory U

Georgetown U

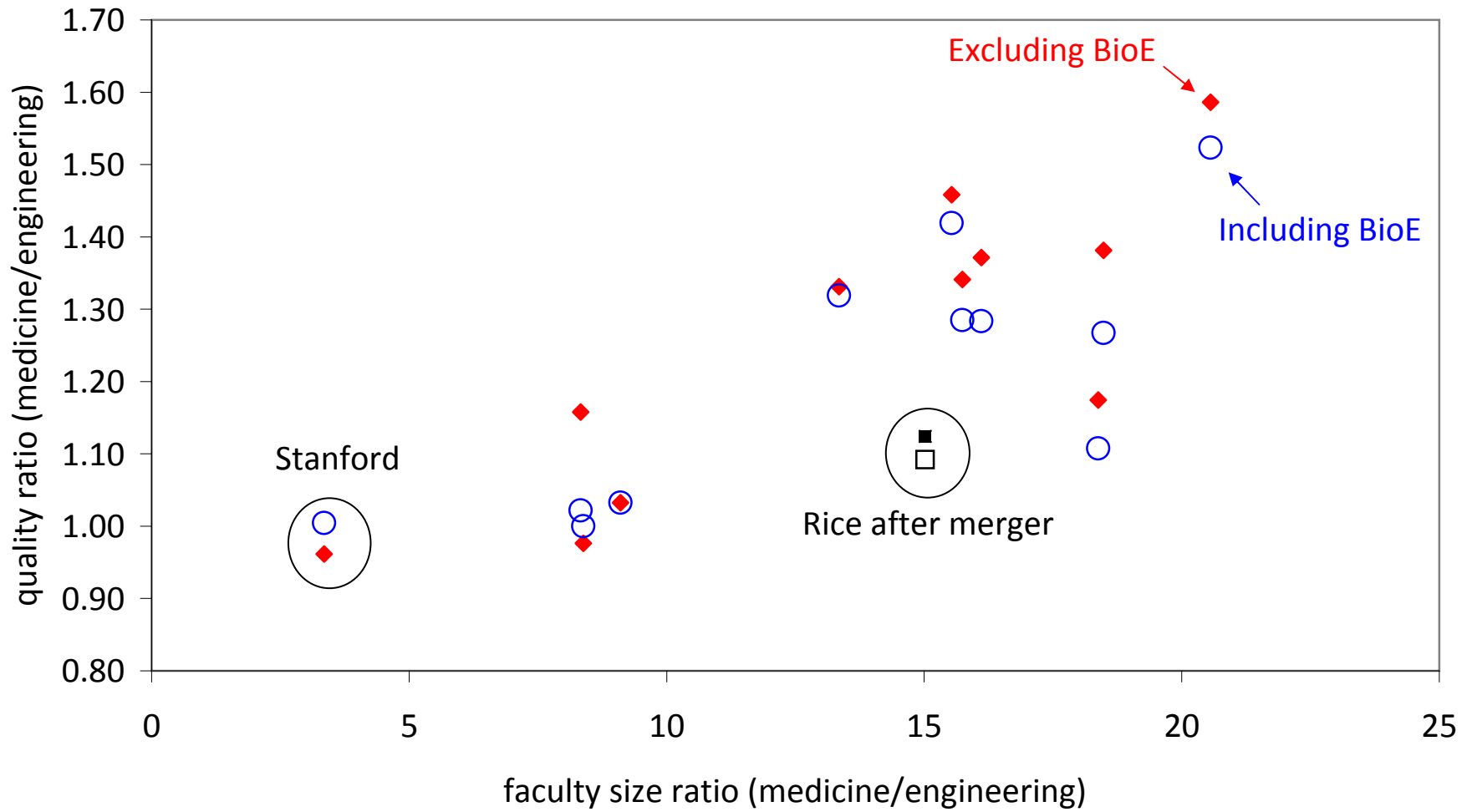
University of Chicago

Wake Forest

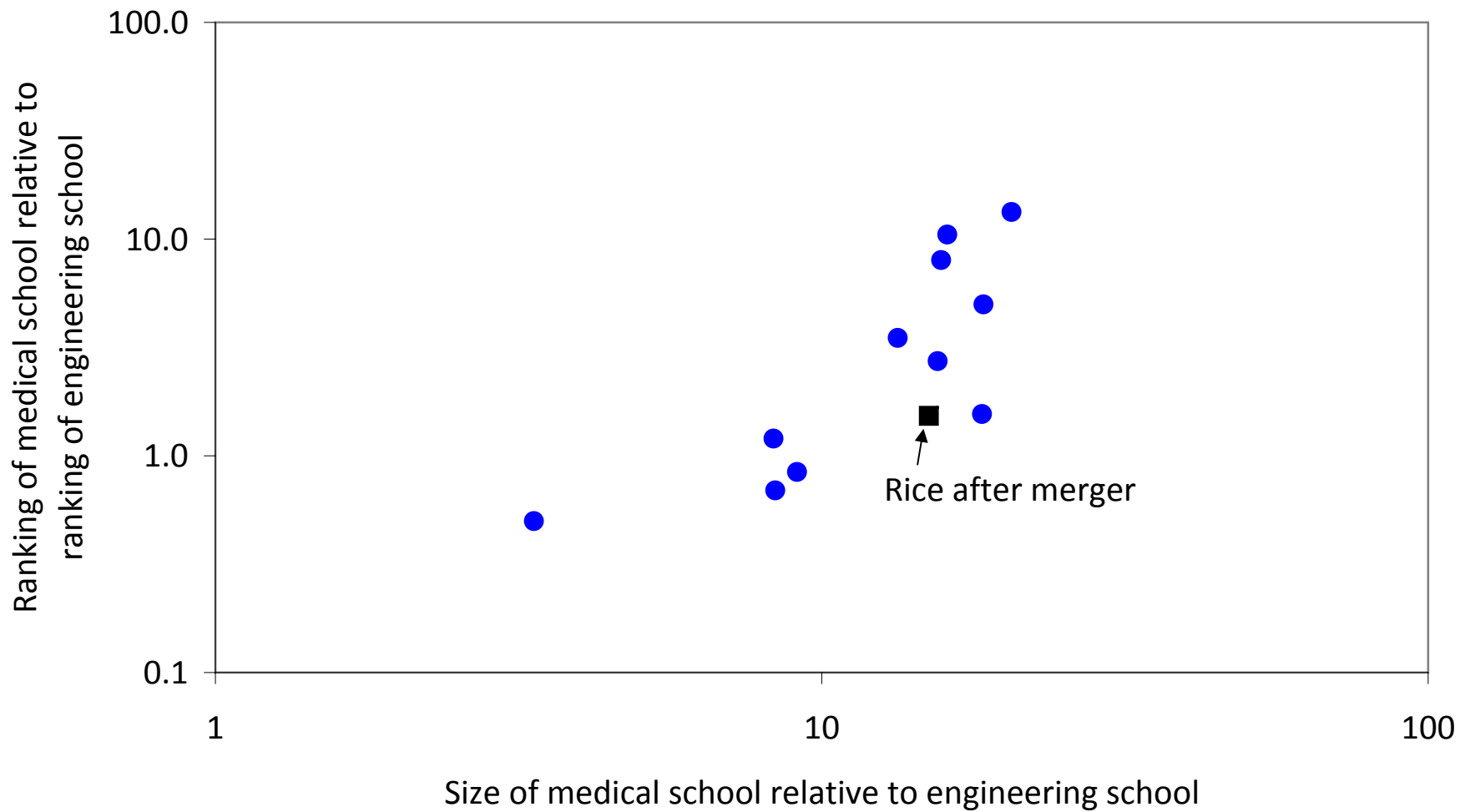
Yeshiva U

Harvard is difficult to classify because it does not have engineering departments and has a school of engineering and applied sciences (SEAS)

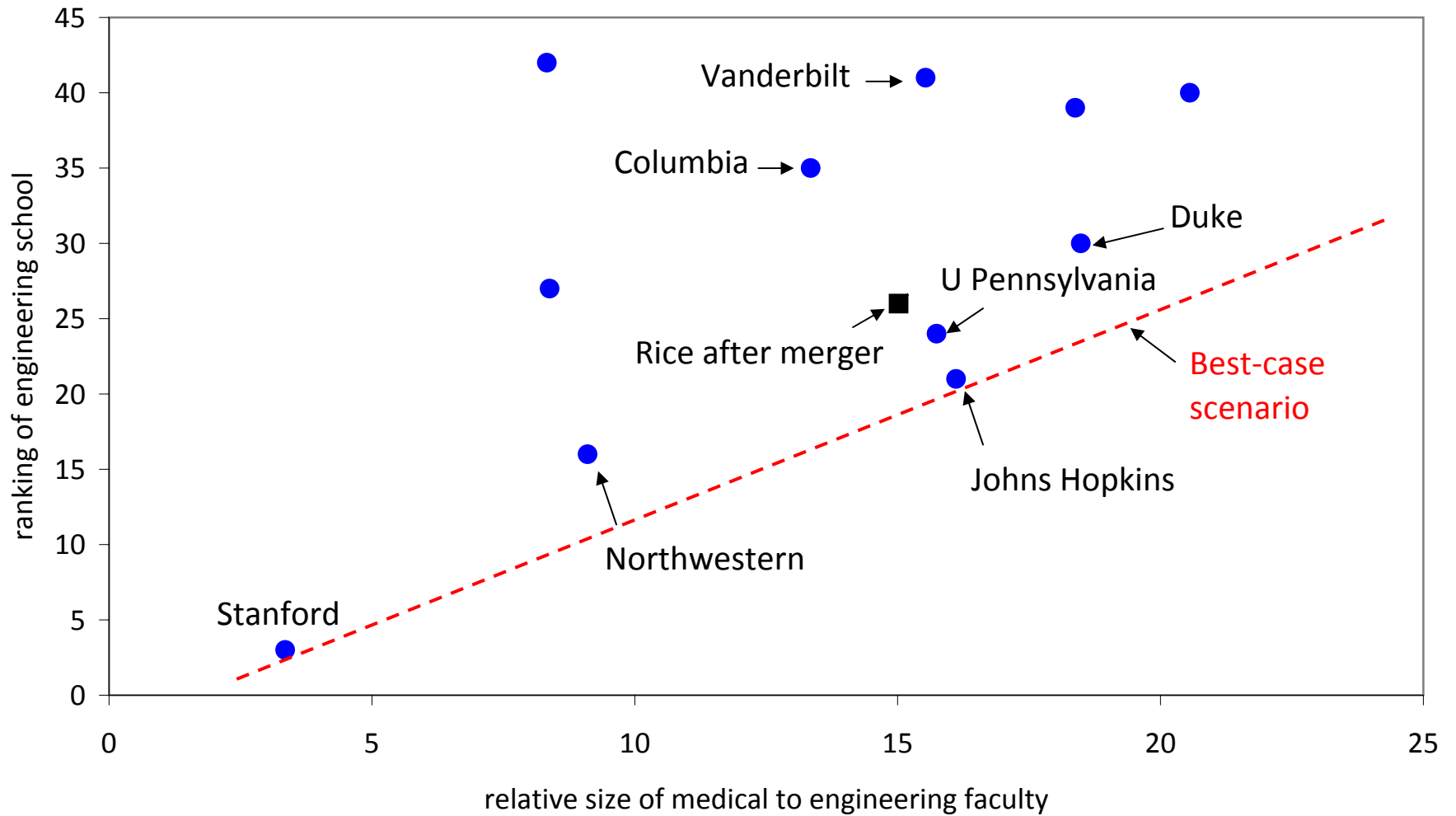
Relative size vs relative ranking  
of medical vs. engineering schools (private universities)



Relative numerical ranking of medical vs. eng school  
vs relative size ratio



ranking of engineering school vs. relative size of medical to engineering faculty  
restricted to universities with one engineering department ranked in top 25



Quality of engineering school vs. relative size of medical to engineering faculty  
restricted to universities with one engineering department ranked in top 25

