Dermatology Practical & Conceptual

Dermatology Receives Fewer Grants Versus Other Specialties but Excels in Citation Impact in a Cross-sectional Analysis of R01 Grants 2000-2022

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To the Editor,

Grant funding is essential for conducting high-impact biomedical research, and the National Institutes of Health (NIH) Research Project Grant R01 remains the benchmark non-industry funding mechanism. We aimed to characterize number and citation impact of R01 grants awarded to dermatology compared to other fields.

The NIH Research Portfolio Online Reporting Tools database was retrospectively reviewed for new R01 grants issued to dermatology and other specialties, 2000-2022. Primary investigators with MD or MD-PhD were defined as "physician-scientists," and those with PhD or equivalent as "research-scientists." NIH iCite database was searched for Relative Citation Ratio (RCR), measuring field- and time-independent citation rate for each publication per grant.[1] Reviews and articles without RCR were excluded. Weighted RCR for each grant, defined as sum of grant-associated manuscript RCRs, represented the overall grant impact, and mean RCR represented the average RCR of grant-associated publications.

There were 396 new R01 dermatology grants (total grant money: $153,057,895), resulting in 3,975 publications and 10.04 articles/grant 2000-2022. Number of dermatology grants/year was stable (m of best fit line 0.087, variance 16.72, Supplemental Table 1). Average number of grants/physician was 0.032 for dermatology and 0.052 for all specialties (Table 1). Most primary investigators were physician-scientists (220 grants, 55.5%). Mean weighted RCR for physician-scientist grants (27.49, 95% confidence interval [CI], 20.95-34.03) was greater than for research-scientist grants (15.05, 95% CI, 12.17-17.93) (0 = .0017) (Figure 1). Mean RCR for physician-scientist publications (1.81, 95% CI, 1.57-2.04) was greater (P = 0.02) than for research-scientist publications (1.44, 95% CI, 1.24-1.63) (Supplemental Figure 1).

Table 1. Number of new National Institute of Health R01 grants and associated publications by specialty, 2000-2022

Specialty	# Grants	#Publications	Average # Grants/Physician*
Internal Medicine	12,168	192,553	0.101
Psychiatry	3,742	55,754	0.096
Pediatrics	2,722	38,114	0.045
Radiology	2,150	36,192	0.077
Neurology	1,973	33,818	0.139
General Surgery	1,572	26,169	0.061
Ophthalmology	1,065	17,307	0.055
Obstetrics and Gynecology	693	8,108	0.016
Dermatology	396	3,975	0.032
Family Medicine	315	3,221	0.003
Urology	277	3,525	0.027
Physical Medicine and Rehabilitation	166	2,291	0.017
Emergency Medicine	144	1,280	0.003
All Specialties	27,383	422,307	0.052

*Number of grants/physician was calculated with the number of active physicians per specialty, obtained from the Association of American Medical College (AAMC) Physician Specialty Data Report, as the denominator.

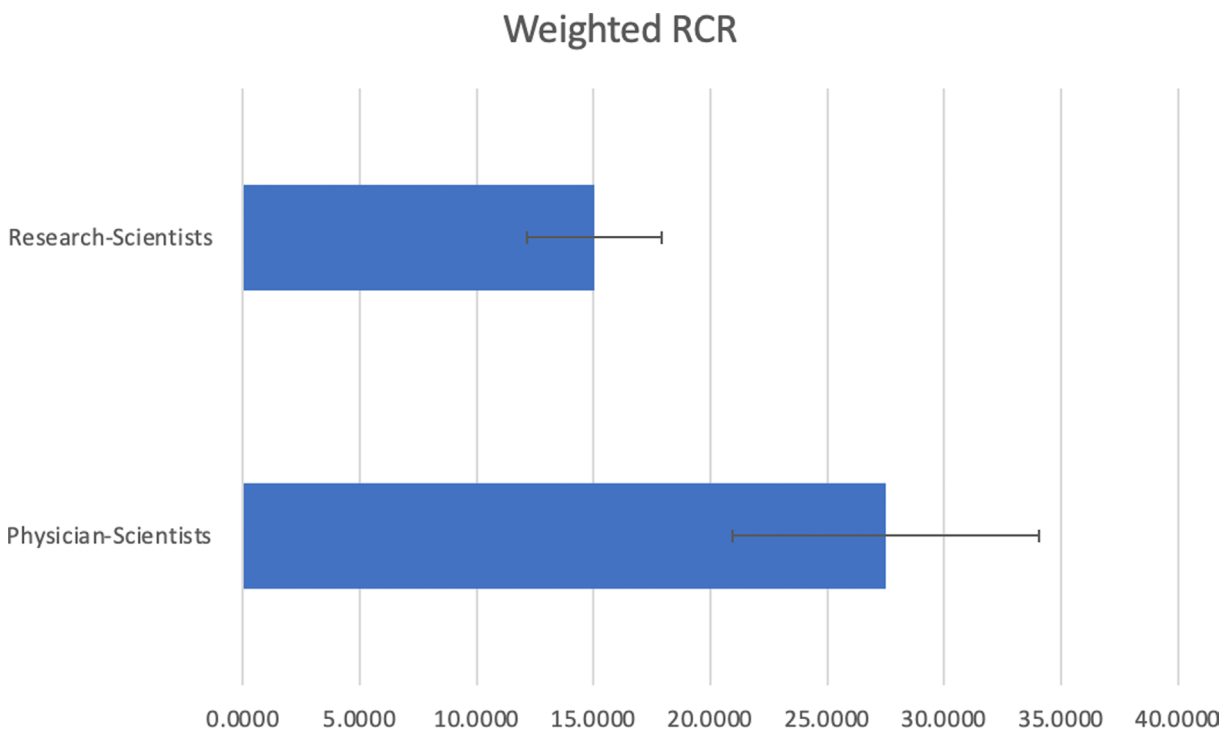

Figure 1. Mean Weighted Relative Citation Ratio for R01 Grants Issued to Department of Dermatology Investigators from 2000-2022, calculated using GraphPad unpaired 2-tailed *t* test.

The lines inside both blue bars represent the confidence intervals for the *t* test.
RCR = Relative Citation Rate

Our study demonstrated that NIH-funded dermatology research is highly impactful, considering the high mean RCR value versus a field-normalized RCR standard value of 1.0 for NIH-funded research. While dermatology performed above average for number of articles/grant (10.4 versus 7.36) [2], average grants/physician was lower compared to other specialties, suggesting limited allocation of NIH funds to dermatology or dermatology investigators applying for few grants.

Despite numerous challenges, physician-scientists produced significantly more impactful research than research-scientists. In a retrospective study of all NIH grants

awarded to dermatology departments, 2009-2014, R01 grants for MD investigators decreased by $1.4 million/year (P<0.001), and was stable for MD/PhDs ($0.34 million/year, P=.25), and PhDs ($0.20 million/year, P = 0.53) [3]. Furthermore, in a retrospective study of 106,368 R01 grant applications, 2000-2006, inclusion of human subjects significantly decreased likelihood of receiving NIH funding (P < 0.001), suggesting NIH inclination for basic over translational science [4]. Physician-scientists must balance patient care and research responsibilities, with only 28% of MD-PhD dermatologists spending >50% of their time on research, in a survey-based study of 6,786 MD-PhD graduates, 1975-2014 [5]. Dermatology physician-scientists have excelled in research output and deserve to be equally supported by funding agencies.

Institutional, philanthropic and industry-based funding mechanisms were not assessed, and RCRs might not fully capture influence of R01 grants, limiting our analysis.

In sum, dermatology performs above average for citation impact of R01-funded research, but receives fewer grants, on average, than other specialties. In addition, dermatology physician-scientists demonstrate higher citation impact than research-scientists. We encourage dermatology investigators to apply for NIH funding and persuade funding agencies to allocate resources supporting dermatology physician-scientists.

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