



## Original Research

## Dermatology residency research policies: A 2021 national survey

Pratibha Anand MBA<sup>a</sup>, Mindy D. Szeto MS<sup>a</sup>, Hania Flaten MD<sup>a</sup>,  
Josephine D'Angelo MD<sup>b</sup>, Cory A. Dunnick MD<sup>a,c</sup>, Robert P. Dellavalle MD, PhD,  
MSPH<sup>a,c,\*</sup>



<sup>a</sup> Department of Dermatology, University of Colorado Anschutz Medical Campus, Aurora, Colorado

<sup>b</sup> State University of New York Upstate Medical University, Syracuse, New York

<sup>c</sup> Rocky Mountain Regional Veterans Affairs Medical Center, Aurora, Colorado

## ARTICLE INFO

## Article history:

Received 27 October 2020

Revised 3 May 2021

Accepted 8 May 2021

## Keywords:

Dermatology  
residency  
survey  
research  
education  
accreditation  
policies  
requirements

## ABSTRACT

**Background:** In this follow-up study to previous work, the authors survey the availability of key measures and resources pertaining to residency research in U.S. Accreditation Council for Graduate Medical Education–accredited dermatology residency programs, including potential policy changes following the COVID-19 pandemic.

**Objective:** The chief objective of this survey was to evaluate and compare dermatology programs' resident research requirements and guidelines.

**Methods:** This cross-sectional study employed a 13-item survey administered online in early 2021 to assess the degree to which dermatology residency programs require and support their new physician graduates in scholarly research endeavors.

**Results:** A total of 32 program directors representing 30 dermatology residency programs (30 of 138 accredited programs contacted [22%]) responded to the survey. Almost all programs described quality improvement project requirements for residents and were able to provide funding for resident conference participation. Most programs also reported resident publication requirements and the availability of research electives. However, the vast majority did not have required research rotations or a formal mentorship program. The COVID-19 pandemic did not have a substantial impact on residency research requirements.

**Conclusion:** Our survey provides objective data about the current dermatology resident research requirements across the United States. These findings may prove valuable to prospective applicants, residency programs, and accrediting agencies in improving, advancing, and structuring dermatology residency guidelines and resources with the aim of encouraging new physician trainees to pursue research.

© 2021 Published by Elsevier Inc. on behalf of Women's Dermatologic Society.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Dermatology remains one of the most competitive specialty residency programs in medicine, with a 2020 match rate of just 84.7% for U.S. graduating senior medical school students. Applicants who successfully matched into dermatology demonstrated a

robust commitment to research, with an average of 19 total abstracts, presentations, and publications, 9.4 volunteer experiences, and 5.8 research experiences ([National Resident Matching Program, 2020](#)).

The decidedly systematized applicant selection process notwithstanding, dermatology residency programs diverge considerably in their structure and commitment to resident research. Although the Accreditation Council for Graduate Medical Education (ACGME) expects residents to participate in scholarly activity, the particulars regarding research are largely nonspecific, imprecise, and sparingly characterized in the literature, and most dermatology residency programs do not formally set aside time dedicated to research ([Wagner et al., 2013](#)).

Our present survey is a follow-up study to our initial 2018 cross-sectional study of 12 key resident research-related criteria in

**Abbreviations:** NRMP, National Resident Matching Program; USMLE, United States Medical Licensing Examination; AOA, Alpha Omega Alpha; NIH, National Institutes of Health; ACGME, Accreditation Council for Graduate Medical Education; U.S., United States; COMIRB, Colorado Multiple Institutional Review Board; RED-Cap, Research Electronic Data Capture; AMA, American Medical Association; AAD, American Academy of Dermatology; QI, Quality Improvement; RRC, Residency Review Committee.

\* Corresponding Author: Originally received: October 27, 2020.

E-mail address: [robert.dellavalle@cuanschutz.edu](mailto:robert.dellavalle@cuanschutz.edu) (R.P. Dellavalle).

<https://doi.org/10.1016/j.ijwd.2021.05.003>

2352-6475/© 2021 Published by Elsevier Inc. on behalf of Women's Dermatologic Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

**Table 1**

Online survey questionnaire covering criteria related to research support and resources in residency, distributed via e-mail to dermatology residency program directors in early 2021

Question	Response type
1. Do you have a publication requirement for your residents?	Yes/no
2. Do you have a quality improvement project requirement for residents? → Describe your quality improvement project requirement.	Yes/no Free response
3. Do you have a required research rotation for residents?	Yes/no
4. Do you have a research elective for your residents?	Yes/no
5. Describe the length of time set aside for research.	Free response
6. Do you have a written statement outlining your program policies on resident research and conference attendance? → Describe your written program policies on resident research and conference attendance.	Yes/no Free response
7. How many days off per year do your residents have to attend academic events such as research symposia or professional conferences?	Numeric: 0 to >10
8. Is there funding allocated for residents to attend the American Academy of Dermatology Annual Meeting? → Describe funding for American Academy of Dermatology Annual Meeting attendance.	Yes/no Free response
9. Is there funding for residents to participate in other conferences or educational activities? → Describe funding for residents to participate in other conferences or educational activities.	Yes/no Free response
10. Is there any additional funding for residents who will be presenting research (poster or talk)? → Describe additional funding for residents who will be presenting research (poster or talk).	Yes/no Free response
11. Do residents have access to research mentors?	Yes/no
12. Do you have a formal mentorship program to connect residents with research mentors? → Describe this mentorship program.	Yes/no Free response
13. Have your residency research policies changed due to the COVID-19 pandemic? → Describe any COVID-19–related policy changes.	Yes/no Free response

30 ACGME dermatology residency programs in the United States (Anand et al., 2021). We built on our original findings by resurveying a larger number of ACGME programs (n=138) in early 2021, a substantial increase from the 114 programs surveyed in 2018. We additionally focused on how the COVID-19 pandemic has influenced residency research among dermatology programs. We thus lay the foundation for more nuanced, context-specific, and robust research support, in hopes of increasing engagement, transparency, and possibly standardization of research requirements for dermatology residency programs across the United States.

## Methods

### Survey development and dissemination

In accordance with previously published methods (Anand et al., 2021), we administered a cross-sectional survey with a categorical, study-specific, online questionnaire. A team of subject experts, including practicing dermatologists, dermatology residency program directors, and medical students, developed the survey. An institutional review board exemption for non-human subject research (COMIRB #17-1634) was obtained from the Colorado Multiple Institutional Review Board. The Research Electronic Data Capture (REDCap) platform hosted at the University of Colorado Denver was used to collect and manage the study data. REDCap is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry, 2) audit trails for tracking data manipulation and export procedures, 3) automated export procedures for seamless data downloads to common statistical packages, and 4) procedures for importing data from external sources (Harris et al., 2009).

Our final survey (Table 1) contained 13 items: 12 yes/no questions and one numerically coded question querying respondents about how many days annually residents in their program are allocated to attend academic events, such as the American Academy of Dermatology (AAD) Annual Meeting, research symposia, or other professional conferences. Free response options were available to elaborate on yes answers.

All 142 ACGME-accredited dermatology residency programs were eligible for our study. Structured searches in the ACGME, American Medical Association, and AAD websites allowed retrieval of program contact information. Information was collected directly

from individual program websites for programs where this information was unavailable or outdated according to the aforementioned sources. Four programs that declined to be recontacted after the 2018 survey were excluded. Each program then received e-mails between January 2021 and February 2021 outlining the objectives of our study and providing a secure website link to the REDCap survey. Programs that did not respond to our initial survey request were recontacted via e-mail. The survey data were then securely downloaded from the REDCap database and tabulated as responses were obtained.

### Outcomes and objectives

Characterizing the potential program differences in the specifications and requirements of their dermatology residency research policies was the primary aim of our study. Our surveyed criteria included publication requirements, quality improvement (QI) projects, availability of research rotations and research electives, funding for academic events, and accessibility of research mentors. We also assessed the existence of a formal written statement describing the program's policies regarding resident research and conference attendance. Subsequently, we intended to examine the nature of these program differences, if any, and to categorize and systematize our findings for possible future use and benefit by dermatology associations, accrediting organizations, dermatology residency programs, and prospective dermatology applicants.

## Results

We collected a total of 32 responses to our questionnaire from dermatology program directors and coordinators representing 30 different residency programs (summary of responses anonymized by program region and size in Table 2). The majority of respondents (n=16; 53%) reported having resident publication requirements. Almost all respondents (n=27; 90%) described QI requirements for residents. Alternatively, only four respondents (13%) reported having a required research rotation for residents, but 18 (60%) reported offering a research elective option, a large increase from the 11 programs surveyed (37%) offering research electives in 2018. Two previously surveyed university programs that did not offer a research elective in 2018 had added this option by 2021. Of note, however, three other university programs responding in 2018

**Table 2**  
Summary of anonymized research policy survey responses sorted by dermatology residency program region and size

Residency region	Residency class size <sup>a</sup>	Department size <sup>b</sup>	Program type	Patient population	Publication requirement?	Quality improvement project requirement?	Required research rotation?	Research elective?	Written research policy?	Funding for American Academy of Dermatology Meeting?	Other conference funding?	Access to research mentors?	Formal mentorship program?
West	Small	Small	Community	Urban	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
West	Medium	Medium	University	Urban	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes
West	Medium	Medium	University	Urban	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes
West	Large	Large	University	Urban	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
West	Large	Large	University	Urban	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Midwest	Small	Small	University	Urban	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Midwest	Small	Large	Community	Urban	No	Yes	No	No	Yes	Yes	Yes	Yes	No
Midwest	Small	Small	University	Mix	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Midwest	Small	Small	University	Mix	No	No	No	No	Yes	Yes	Yes	Yes	No
Midwest	Small	Small	Community	Rural	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No
Midwest	Medium	Small	University	Urban	No	Yes	No	Yes	No	Yes	Yes	Yes	No
Midwest	Medium	Small	University	Urban	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Midwest	Medium	Medium	University	Urban	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes
Midwest	Medium	Medium	University	Urban	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
South	Small	Small	University	Urban	Yes	Yes	No	No	Yes	No	No	Yes	Yes
South	Small	Small	University	Mix	Yes	Yes	No	No	Yes	Yes	Yes	No	No
South	Small	Small	Community	Mix	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
South	Small	Medium	University	Urban	No	Yes	No	No	Yes	Yes	Yes	Yes	No
South	Medium	Small	University	Mix	No	Yes	No	No	No	Yes	Yes	Yes	No
South	Medium	Small	University	Mix	No	Yes	No	No	Yes	Yes	Yes	Yes	No
South	Medium	Medium	University	Mix	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
East	Small	Small	University	Urban	No	Yes	No	Yes	No	Yes	Yes	Yes	No
East	Small	Small	University	Mix	No	Yes	No	Yes	Yes	No	Yes	Yes	No
East	Small	Medium	University	Urban	Yes	Yes	No	Yes	No	No	No	Yes	Yes
East	Small	Medium	University	Urban	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
East	Small	Large	University	Urban	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
East	Medium	Medium	University	Urban	No	Yes	No	No	Yes	Yes	Yes	Yes	No
East	Medium	Medium	Community	Rural	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
East	Large	Large	University	Urban	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

<sup>a</sup> Residents/year: Small = 1–3; medium = 4–6; large ≥ 7

<sup>b</sup> Faculty in dermatology department: Small = 1–19; medium = 20–39; large ≥ 40

reported that they had removed their earlier publication requirements by 2021, and another academic program had withdrawn its stipulation for a resident QI project over that time period as well.

Although 23 programs (77%) had a written statement outlining program policies on resident research and conference attendance, only three programs (10%) allotted  $\geq 10$  days off per year for residents to attend academic events, such as research symposia or professional conferences, a decrease from 23% ( $n=7$  of 30 of programs) with this allotment in 2018 (five previously surveyed programs decreased the number of allowed conference days off, and only one program increased its allotment). Despite this, the large majority of programs reported having funding allocated for residents to attend the AAD Annual Meeting ( $n=26$  of 30 [87%]), as well as funding to participate in other conferences or educational activities ( $n=27$  of 30 [90%]).

Most programs surveyed were found to financially support conference and meeting attendance, but far fewer ( $n=19$ ; 63%) had additional funding for residents to present their research (poster or talk) at these events. Even fewer programs ( $n=10$ ; 33%) reported a formal mentorship program for residents and research mentors to connect. Nevertheless, all but one program ( $n=29$  of 30 [97%]) confirmed that their residents had access to research mentors.

## Discussion

The ACGME continues to maintain that graduate medical education should take place in “an environment of inquiry and scholarship in which residents participate in the development of new knowledge, learn to evaluate research findings, and develop habits of inquiry as a continuing professional responsibility.” The Residency Review Committees of the ACGME explicitly oblige residents to engage in scholarship in the course of their training, including case reports, reviews of research, and original research (ACGME, 2017). Inadequate or unsatisfactory evidence of residents' scholarly pursuits is one of the most frequent reasons why residency programs are cited by the Residency Review Committees (Beasley et al., 2002), and inviting subsequent studies of policy fulfillment and outcome measures will be important in the future.

Studies point to specific common elements shared by successful research training programs, including 1) protected research time, 2) research methods instruction, 3) effective mentorship, and 4) an environment that promotes and celebrates research participation (Bland and Ruffin, 1992; Bland and Schmitz, 1986; Temte et al., 1994). Although many of these elements were included by the programs we surveyed, our findings overall indicate that residency policies, procedures, structure, and support for dermatology research is considerably varied, despite the numerous advantages associated with resident research. The majority of residency programs did encourage research activity; concerningly, however, most of the program directors surveyed described several impediments to research, including the absence of existing research requirements, funding, curricula, guidelines, and mentors.

Certain study limitations should be noted. First, our sample size was limited to those ACGME dermatology residency programs that responded to our survey, which was approximately one-fifth ( $n=30$  of 138 [22%]) of all programs. Our findings as reported in aggregate terms could be subject to response bias and therefore may not be representative of ACGME dermatology programs as a whole. Second, although participants were given the option to elaborate on their responses, not all opted to answer the open-ended free-response questions, and the degree of elucidation or elaboration provided varied considerably. Nonetheless, the survey responses we gathered included many top 20 medical schools (U.S. News, 2021), residency programs from every geographical region of the United States and covered a wide range of settings, including urban, rural, large, small, academic, public, private, and

government-run, institutions. Patterns of research requirements or funding availability were not found to differ substantially by setting, suggesting that broader systemic trends and lack of policy standardization may be contributing factors.

Our survey provides a notable addition to the paucity of recent empirical literature describing and evaluating the specific elements of a comprehensive resident research program, especially in dermatology. Whereas other specialties have outlined the type of research rotations, support, curricula, or policies required during residency training (Boninger et al., 2001; Kanna et al., 2006; Segal et al., 2006; Vinci et al., 2009), dermatology residencies particularly call for further consideration because they attract exceptionally high-achieving applicants and are uniquely poised to spearhead resident research (Wagner et al., 2013). Dermatology residencies have also historically been organized to grant residents protected time to pursue academic pursuits outside of the required clinical responsibilities (Gorouhi et al., 2014; Tuong et al., 2015; Wu et al., 2006), in sharp contrast to many other specialties prior to the implementation of strict duty-hour regulations (Oxnard et al., 2009).

Clearly, there are a myriad of benefits associated with research during residency. Enhanced patient care may result from fostering critical appraisal skills, clinical reasoning, and lifelong learning through research (Abramson, 1977; Goodman, 1994). Because publication during residency is associated with careers in academic medicine (Hillman et al., 1989), integrating postgraduate training research could also aid in bolstering the diminishing numbers of clinician investigators (Rosenberg, 2000). Presentation and publication of resident research may also increase the reputation of residency programs, improving their appeal to more competitive applicants (Heinrich et al., 1999; Schultz, 1996). Finally, research experience during residency is advantageous to residents applying for jobs or fellowships (Souba et al., 1996).

Although there is a rising need for clinician-scientists, significant obstacles discourage new medical graduates from pursuing careers in clinical research. A dearth of formal programs is currently set up to target resident physicians interested in research, and even though ample efforts have been made to develop research exposure and training for medical students and fellows, prior studies have indicated that residents develop an increasing disinterest for research, coupled with less time set aside for research (Thompson and Moskowitz, 1997). It is likely that residency was deemed too hectic to accommodate research, due to its busy schedule emphasizing clinical training and subspecialty selection. Residents are expected to achieve mastery in an ever-mounting span of health care knowledge in medical innovations, data, and technology as patient care has concomitantly become more challenging due to shorter hospital stays, greater acuity, and higher turnover. Demands to decrease patient length of stay and improve other metrics, such as discharge disposition, may lead to the unintended consequence of dissuading residents from engaging in research by compromising scientific inquiry (Oxnard et al., 2009).

Various solutions have been proposed and implemented in response to limited or otherwise compromised research requirements, opportunities, and access during dermatology residencies. For example, in 2005, the dermatology residency program at the University of Texas Medical Branch introduced several changes in its dermatology residency program with the objective of integrating formal research projects into the training period. Initially, the program supported voluntary research, and by 2009, the curriculum required scholarly projects of all its dermatology residents. The dermatology department supported this requirement by assigning residents a faculty mentor with similar research interests and providing monetary support for materials and statistical consultations. The department also implemented a 2-week research elective that gives residents protected time from clinical activities

with the goal of publishing their work in a peer-reviewed journal. Each year, an award is given in recognition of the best resident scholarly project (Wagner et al., 2013).

The University of Miami likewise has a mandated research requirement for its dermatology residents, with the goal of publishing peer-reviewed research. Unlike the program at the University of Texas Medical Branch, residents at the University of Miami are not granted protected time to work on their research projects. However, the program is highly structured. By November of their first year of training, residents must present a research grant proposal to the departmental research committee and identify a faculty advisor. As their training progresses, residents report ongoing work and cumulative results at weekly scientific research meetings. Research findings are presented in various settings, including regional and national meetings. The departmental research committee evaluates the financial feasibility of projects, and costs associated with the scholarly projects are covered by the faculty advisor or departmental fund dedicated to resident research (Kirsner et al., 1999a).

Lack of adequate research funding is not necessarily a barrier to scholarly project completion. One survey examining required research in internal medicine programs found that most residents (54%) did not have funding for their projects (Rivera et al., 2005). Programs can help maintain financial viability by helping residents focus and hone their research questions and by making use of previously established resources, such as databases and data gathered from prior research, because many scholarly projects can be retrospective or cross-sectional analyses. Modest prospective studies are also potential research learning experiences (Hamann et al., 2006). Because resident research is usually not subsidized by grants or other funding sources, procuring statistical support can be a frequent challenge. Preferably, research program directors can aid with basic statistical issues, but a dedicated research account should be established that includes funds for travel, poster creation, and statistical expertise. Residency programs can also limit monetary expenses by capping the amount of funds set aside for research, by subsidizing no more than one presentation per resident, or by granting set amounts of discretionary funding. Faculty advisors and research mentors may also elect to subsidize travel expenses. Lastly, a program may choose to host a local or regional research meeting to showcase residents' scholarly projects (Hamann et al., 2006).

In addition, grants offered by dermatologic societies for research and presentation support throughout the year are manifold. The AAD maintains a list of several dozen grants for dermatology research (AAD, 2021a), including a list of research grants from outside organizations (AAD, 2021b). Other examples include the American Skin Association's funding of a \$100,000 Investigative Scientist Award for Melanoma Research, as well as several \$60,000 awards for research in a variety of other focus-specific areas (American Skin Association, 2021); the Skin Cancer Foundation awards two \$50,000 grants and one \$25,000 grant for clinical study and research related to furthering skin cancer prevention, detection, and treatment methods (Skin Cancer Foundation, 2021); the National Psoriasis Foundation also issues Early Career research grants of up to \$50,000 (National Psoriasis Foundation, 2021).

Nonetheless, overall resident exposure to researchers who can serve as mentors has declined due to increased reliance on hospitalists as attending physicians on inpatient wards at teaching hospitals (Kralovec et al., 2006). Given that dermatology remains primarily an outpatient specialty, many residency programs rely heavily on outpatient rotations, limiting opportunities for residents on inpatient consult services. Dermatology residents may therefore have less access to mentorship and training with hospitalist physicians, a large potential source of research mentorship for residents. However, changes in medical care have contributed to increased value being placed on dermatologists as consultants for hospital-

ized patients, while fewer patients are being admitted to dermatology services (Kirsner et al., 1999b; Mancusi and Neto, 2010). Maximizing opportunities for teaching and mentorship in both the outpatient and inpatient setting is thus also an important consideration for resident education, especially given the recent shift to telemedicine during the COVID-19 pandemic (Hammond et al., 2020).

Understandably, the deprivation of mentorship exposure during residency is likely to result in a dearth of researchers in the future, because residency is the time in which most graduates are deciding on their career trajectories (Freeman et al., 2008). Physicians committed to research careers must now consider the rising financial challenges of research, the volatility of federal research budgets, and a lack of mentorship opportunities (Nathan, 1998; Rosenberg, 1999; Wolf, 2002). Thus, morale among aspiring investigators is waning, with many opting to relinquish their research interests to pursue full-time clinical careers (Shulman, 1996; Thompson and Moskowitz, 1997). The eventual effect of these trends has not yet been fully realized and is especially concerning given movement toward faster-paced health care delivery, precision medicine, and technological innovation (Oxnard et al., 2009).

Ultimately, requiring and supporting resident research has the ability to improve the quality and future of medicine and dermatology. Nevertheless, for fruitful research to take place on a large scale, residency training programs must overcome several significant hurdles. Successful implementation demands a thoughtful methodology that focuses on surmounting specific obstacles, beginning with organizational changes to encourage an environment of scientific inquiry, an assurance of external institutional support (e.g., from the American Medical Association, AAD, and ACGME), and the economic investment to create the infrastructure required to support research endeavors.

## Conclusion

The noteworthy significance and benefits of resident research notwithstanding, our study indicates that a large number of dermatology residency programs lack some or all of the requisite support, structure, and resources needed to satisfactorily and effectually promote and maintain research training efforts. Our findings evaluate various factors pertaining to resident research training and add to an emergent body of research with the ability to guide future scholarship and interventions aimed at addressing residency research deficits.

## Declaration of Competing Interest

Dr. Robert P. Dellavalle is a joint coordinating editor for Cochrane Skin, a dermatology section editor for UpToDate, a social media editor for the *Journal of the American Academy of Dermatology*, editor-in-chief of the *Journal of Medical Internet Research (JMIR) Dermatology*, and a podcast editor for the *Journal of Investigative Dermatology*. He is also a coordinating editor representative on Cochrane Council. Dr. Cory A. Dunnick is a clinical trials investigator for Pfizer, Abbvie, Amgen, Kyowa, and Target Derm.

## Funding

None.

## Study approval

Exemption was obtained from the Colorado Multiple Institutional Review Board (COMIRB #17-1634).

## References

- Abramson M. Improving resident education: What does resident research really have to offer? *Trans Sect Otolaryngol Am Acad Ophthalmol Otolaryngol* 1977;84(6):984–5.
- Accreditation Council for Graduate Medical Education. Common program requirements [Internet]. 2017 [cited April 16, 2021]. Available from: [https://www.acgme.org/portals/0/pfassets/programrequirements/cprs\\_2017-07-01.pdf](https://www.acgme.org/portals/0/pfassets/programrequirements/cprs_2017-07-01.pdf)
- American Academy of Dermatology. Awards, grants, and scholarships [Internet]. 2021a [cited April 16, 2021]. Available from: <https://www.aad.org/member/career/awards>
- American Academy of Dermatology. Research grants from outside organizations [Internet]. 2021b [cited April 16, 2021]. Available from: <https://www.aad.org/member/career/awards/outside>
- American Skin Association. For grant seekers [Internet]. 2021 [cited April 16, 2021]. Available from: <https://www.americanskin.org/research/seekers.php>
- Anand P, Szeto M, Flaten H, Dunnick C, Dellavalle R. Dermatology residency research policies and support: A national USA survey. *Our Dermatol Online* 2021;12(1):9–13.
- Beasley BW, Scrase DR, Schultz HJ. Determining the predictors of internal medicine residency accreditation: What they do (not what they say). *Acad Med* 2002;77(3):238–46.
- Bland CJ, 4th Ruffin MT. Characteristics of a productive research environment: Literature review. *Acad Med* 1992;67(6):385–97.
- Bland CJ, Schmitz CC. Characteristics of the successful researcher and implications for faculty development. *J Med Educ* 1986;61(1):22–31.
- Boninger ML, Chan L, Harvey R, Pine ZM, Helkowsky W, Garrison CJ, et al. Resident research education in physical medicine and rehabilitation: A practical approach. *Am J Phys Med Rehabil* 2001;80(9):706–12.
- Freeman SR, Greene RE, Kimball AB, Freiman A, Barzilai DA, Muller S, et al. U.S. dermatology residents' satisfaction with training and mentoring: Survey results from the 2005 and 2006 Las Vegas Dermatology Seminars. *Arch Dermatol* 2008;144(7):896–900.
- Goodman NW. Does research make better doctors? *Lancet* 1994;343(8888):59.
- Gorouhi F, Alikhan A, Rezaei A, Fazel N. Dermatology residency selection criteria with an emphasis on program characteristics: A national program director survey. *Dermatol Res Pract* 2014;2014.
- Hamann KL, Fancher TL, Saint S, Henderson MC. Clinical research during internal medicine residency: A practical guide. *Am J Med* 2006;119(3):277–83.
- Hammond MI, Sharma TR, Cooper KD, Beveridge MG. Conducting inpatient dermatology consultations and maintaining resident education in the COVID-19 telemedicine era. *J Am Acad Dermatol* 2020;83(4):e317–18.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42(2):377–81.
- Heinrich G, Nori D, Tome J, Parikh S. Developing a research program in a community teaching hospital. *Teach Learn Med* 1999;89–93.
- Hillman BJ, Fajardo LL, Witzke DB, Cardenas D, Irion M, Fulginiti JV. Factors influencing radiologists to choose research careers. *Invest Radiol* 1989;24(11):842–8.
- Kanna B, Deng C, Erickson SN, Valerio JA, Dimitrov V, Soni A. The research rotation: Competency-based structured and novel approach to research training of internal medicine residents. *BMC Med Educ* 2006;6:52.
- Kirsner RS, Kerdel FA, Falanga V, Trent J, Eaglstein WH. The role of mandated research during dermatology residency training. *J Invest Dermatol* 1998;112(3):400–1.
- Kirsner RS, Yang DG, Kerdel FA. The changing status of inpatient dermatology at American academic dermatology programs. *J Am Acad Dermatol* 1999;40(5):755–7.
- Kralovec PD, Miller JA, Wellikson L, Huddleston JM. The status of hospital medicine groups in the United States. *J Hosp Med* 2006;1(2):75–80.
- Mancusi S, Neto CF. Inpatient dermatological consultations in a university hospital. *Clinics (Sao Paulo)* 2010;65(9):851–5.
- Nathan DG. Clinical research: perceptions, reality, and proposed solutions. National Institutes of Health Director's Panel on Clinical Research. *JAMA* 1998;280(16):1427–31.
- National Psoriasis Foundation. Early career research grants [Internet]. 2021 [cited April 16, 2021]. Available from: <https://www.psoriasis.org/early-career-research-grants/>
- National Resident Matching Program. Results and data: 2020 main residency match [Internet]. 2020 [cited April 16, 2021]. Available from: <https://www.nrmp.org/main-residency-match-data/>
- Oxnard GR, Zinkus TM, Bazari H, Wolf M. Integrating research training into residency: Tools of human investigation. *Acad Med* 2009;84(9):1295–300.
- Rivera JA, Levine RB, Wright SM. Completing a scholarly project during residency training. Perspectives of residents who have been successful. *J Gen Intern Med* 2005;20(4):366–9.
- Rosenberg LE. The physician-scientist: An essential—and fragile—link in the medical research chain. *J Clin Invest* 1999;103(12):1621–6.
- Rosenberg LE. Young physician-scientists: Internal medicine's challenge. *Ann Intern Med* 2000;133(10):831–2.
- Schultz HJ. Research during internal medicine residency training: Meeting the challenge of the Residency Review Committee. *Ann Intern Med* 1996;124(3):340–2.
- Segal LS, Black KP, Schwentker EP, Pellegrini VD. An elective research year in orthopaedic residency: How does one measure its outcome and define its success? *Clin Orthop Relat Res* 2006;449:89–94.
- Shulman LE. Clinical research 1996: Stirrings from the academic health centers. *Acad Med* 1996;71(4):362–3.
- Skin Cancer Foundation. Research grants [Internet]. 2021 [cited April 16, 2021]. Available from: <https://www.skincancer.org/about-us/research-grants/>
- Souba WW, Tanabe KK, Gadd MA, Smith BL, Bushman MS. Attitudes and opinions toward surgical research. A survey of surgical residents and their chairpersons. *Ann Surg* 1996;223(4):377–83.
- Temte JL, Hunter PH, Beasley JW. Factors associated with research interest and activity during family practice residency. *Fam Med* 1994;26(2):93–7.
- Thompson JN, Moskowitz J. Preventing the extinction of the clinical research ecosystem. *JAMA* 1997;278(3):241–5.
- Tuong W, Fazel N, Eisen DB. Factors influencing applicants' ranking of dermatology residency programs in the National Resident Matching Program. *JAMA Dermatol* 2015;151(12):1378–80.
- U.S. News. 2021 best medical schools [Internet]. 2021 [cited April 16, 2021]. Available from: <https://www.usnews.com/best-graduate-schools/top-medical-schools>
- Vinci RJ, Bauchner H, Finkelstein J, Newby PK, Muret-Wagstaff S, Lovejoy Jr FH. Research during pediatric residency training: Outcome of a senior resident block rotation. *Pediatrics* 2009;124(4):1126–34.
- Wagner Jr RF, Raimer SS, Kelly BC. Incorporating resident research into the dermatology residency program. *Adv Med Educ Pract* 2013;4:77–81.
- Wolf M. Clinical research career development: The individual perspective. *Acad Med* 2002;77(11):1084–8.
- Wu JJ, Ramirez CC, Alonso CA, Mendoza N, Berman B, Tyring SK. Dermatology residency program characteristics that correlate with graduates selecting an academic dermatology career. *Arch Dermatol* 2006;142(7):845–50.