Grant funding among underrepresented minority and women urologists at academic institutions

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Introduction: *Grant funding to Urology has decreased over the last decade. Documented lack of gender and race diversity at the faculty level raises concerns for funding disparities. This study sought to characterize disparities based upon race and gender in National Institutes of Health (NIH) funding data to Urologic faculty.*

Methods and materials: *Data from 145 ACGME accredited Urology residency programs incorporating faculty gender and underrepresented in medicine (URiM) status was utilized. The NIH Research Portfolio Online Report Tool was queried between 1985 and 2023 for grants related to current Urology faculty. URiM status, gender, years of practice, academic rank, and Doximity residency program rank were factors in multivariable analysis.*

Results: *A total of 2,131 faculty were included. Three hundred one Urologists received 793 urologic grants for a total of $993,919,052 in funding. By race, grants were awarded to: White 72.9%, Asian 21.8%, Hispanic 3.0%, Black 2.1%. Men received 708 grants (89.3%) worth $917,083,475 total. Women received 85 grants (10.7%) worth $76,835,577 total. Likelihood of being awarded a grant was significantly associated with non-URiM status ($p < 0.001$) and men ($p < 0.0001$). On multivariable analysis, Doximity rank ($p < 0.001$) and academic rank ($p < 0.001$) were significant predictors of receiving a grant; male gender, URiM status, and years of practice were not. Academic rank was also a significant predictor of number of grants received ($p = 0.04$) and total funding ($p = 0.04$); years of practice, Doximity rank, URiM status, and gender were not.*

Conclusions: *NIH grants were more likely awarded to higher ranked faculty from higher Doximity ranked institutions with no differences based on URiM status or gender.*

Key Words: urology, cultural diversity, educational grants, gender

Introduction

Despite ongoing initiatives and efforts to increase both gender and racial diversity within the field of Urology, there is continued and well-documented disparity between the demographic representation of patients in the United States and practicing urologists. This discrepancy is not just limited to trainees designated as underrepresented individuals in medicine (URiMs); it extends to the faculty level as well, with both women and racial and ethnic minorities being underrepresented in Urologic leadership positions.[1-3] According to 2021 AUA census data regarding the race

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and ethnicity of practicing urologists, 2.4% identify as Black, 4.4% as Hispanic, 12.8% as Asian, and 83.3% as White, representing significant differences from the 2022 United States Census race and Hispanic origin data for the general population that estimates 13.6% of citizens as Black, 18.9% as Hispanic, 6.1% as Asian, and 75.8% as White.[4,5] Additionally, only 10.9% of practicing Urologists are women, representing gross underrepresentation compared to the general population.[4,5] This lack of representation carries drastic implications for future diversity; prospective URiM applicants report higher discrimination and demonstrate more favorable views of programs with URiM representation at the resident and faculty levels, and representation of women Urologic faculty was recently shown to have a direct correlative effect on the gender diversity of residency classes.[6-8] Research funding is one important way programs can hire and support a diverse cohort of faculty, with many initiatives in recent years centered around providing grants to URiM faculty.[9,10]

Unfortunately, inequity in grant funding from the National Institutes of Health (NIH) has raised concerns since initial disparities were first reported by Ginther et al in 2011, and recent calls to action have reiterated the importance of funding a diverse group of researchers.[11-14] While Lauer et al documented a decreasing funding gap for Black and Hispanic R01 applicants in 2022, data analyzing the funding of surgeon-scientists by race and ethnicity is limited, and studies have shown similar persistent funding disparities for URiM surgeons.[15,16] There is better data regarding gender disparities in grant allocation which imply that despite mild improvements in equitable funding, a gender-gap still exists for NIH grants.[17-19] Unfortunately, over the past decade, yearly funding by the NIH for Urologic research has decreased by 15.6% with a substantial decrease in grant acceptance rate in comparison to other surgical subspecialties.[20]

In the setting of this noted decrease in Urologic funding, assessing the current state of allocation of research funds is paramount. The goal of this study is to investigate differences in NIH grant funding by URiM status and gender. We hypothesize that there would be a difference in grant funding between URiMs and non-URMs and between genders.

Materials and methods

Institutional review board approval was sought and met criteria for exemption due to publicly available data. We utilized a previously synthesized database of 2,131 faculty from 145 ACGME Urology residency programs created using publicly available data to identify all active academic Urologists of interest as previously described in the methodology from Tella et al 2022.[21] The database included demographic information including gender, academic rank, and ascribed URiM status, from faculty members with an MD or DO degree who held an appointment with the department or division of Urology and completed a Urology residency.[21]

Next, the NIH Research Portfolio Online Report Tool (Re-PORTER) (https://reporter.nih.gov) which contains information regarding NIH funded projects of the last 37 years, was queried between 1985 and 2023 for any grants related to each Urology faculty member. The search terms were "first name, last name"; middle initials were not used to widen results and ensure capture of all grants. To confirm the identity of principal investigators, additional search engines (e.g., Google, Linkedin, Doximity) were used. For each faculty member we determined the number of grants awarded, academic rank, total funding, years of practice, URiM status, and the current Doximity rank of their institution. Grants with multiple or co-principal investigators were attributed to the primary principal investigator listed on the grant. The Doximity ranking system found on the website's residency navigator page is derived from nomination survey responses limited to board-certified Urologists, by which participating surgeons nominate residency programs they believe offer the best urologic training. Response data is controlled to account for self-nomination, weighted to favor program director nominations, and compiled over the prior 3-year period to calculate reputation ranking.[22] Alternative ranking systems like US News were not used because they do not rank all urology residency programs and leave many programs unranked. For individual grants, the project activity codes (e.g K, R, U awards, etc), funding, years funded, principal investigator (PI) name, number of published journal articles associated with the project were recorded. Data regarding specific NIH funding source was limited for older grants, and thus was not included in data collection.

Statistical analysis

Descriptive statistics for grants awarded and allocated funding were reported as medians with IQRs and percentages where appropriate. Chi-square testing was used to assess for differences in awarded grants by URiM status and gender, and Mann-Whitney U testing was used to assess for differences

in total funding by URiM status and gender. Logistic regression was performed to determine predictors of faculty being awarded grants, with institutional Urology residency program Doximity rank, academic rank, gender, URiM status, and years of practice included as possible predictors. Further linear regression was performed to determine predictors of number of grants awarded to faculty and total allocated funding. Given potential confounding effects of grant funding on both Doximity ranking and academic rank, variance inflation factors and correlation matrices were run to rule out collinearity in multivariate analysis. Statistical analysis was performed using R (version 4.2.2, Boston, MA, USA) with $p < 0.05$ considered statistically significant.

Results

Our final database included 2,131 faculty at 145 ACGME accredited Urology residency programs. A total of 8.6% of listed faculty (184/2131) were URiMs, and 91.4% (1947/2131) were not and 17.4% (371/2131) of listed faculty were women, and 82.6% were men (1760/2131). Between 1985 and 2023, a total of 793 Urologic grants were funded for a total of 3,115 grant years, $993,919,052 in total funding, and a median per-grant value of $726,203 (IQR 339,949-1,648,695). White faculty received 72.9% of the awarded grants, Asian faculty received 21.8% of the awarded grants, Hispanic faculty received 3.0%, and Black faculty received 2.1%. Men received 708 grants (89.3%) worth $917,083,475 total, whereas women faculty received 85 grants (10.7%)

TABLE 1. **Summary of grant data**

Grant activity codes	**Count (%)**
R01	230 (29.0)
U01	109 (13.7)
M01	73 (9.2)
R21	59 (7.4)
K08	46 (5.8)
P50	30 (3.8)
R13	23 (2.9)
R03	20 (2.5)
T32	17 (2.1)
K23	17 (2.1)
I01	17 (2.1)
P01	16 (2.0)
P20	12 (1.5)
K12	11 (1.4)
Other grants	113 (14.2)
Publications	8,615
Median publications per grant	5 (IQR 1-13)
Total funding	$993,919,052
Median per-grant funding	$726,203 (IQR $339,949-$1,648,695)

TABLE 2. **Univariable analysis by gender**

	Men	**Women**	**p value**
Number (%)	1760 (82.6%)	371 (17.4%)	
Academic rank			
Professor	463	41	
Associate Professor	357	62	
Assistant Professor	585	184	
Other	355	84	
Total grants awarded (%)	708 (89.3%)	85 (10.7%)	< 0.001*
Total funding received	$917,083,475	$76,835,577	
Median funding per faculty receiving grants	$3,055,700	$400,000	0.015*
Median years of practice	18	10	< 0.001*
Median years of practice for faculty receiving grants	24	14	< 0.001*

TABLE 3. **Analysis by URiM status**

	URiM	Non-URiM	p value
Number (%)	184 (9%)	1947 (91%)	
Academic rank			
Professor	23	481	
Associate Professor	38	385	
Assistant Professor	81	689	
Other	42	392	
Total grants awarded (%)	41 (5.2%)	752 (95%)	< 0.001*
Total funding received	$54,426,145	$939,492,907	
Median funding per faculty receiving grants	$2,903,038	$3,113,769	0.829
Median years of practice	14	16	0.013*
Median years of practice for faculty receiving grants	18	23	0.083

URiM = underrepresented in medicine

worth $76,835,577 total. The top awarded grant type was the R01 (29.0%), then U01 (13.7%), followed by the M01 (9.2%), and R21 (7.4%). Grants were funded for a median of 4 years (IQR 2-5years). There were 8,615 generated publications associated with 793 grants. The median number of publications per grant was 5 (IQR 1-13). Grant data is summarized in Table 1.

TABLE 4. **Multivariable analysis**

Predictor	p value
Likelihood of receiving a grant	
Male gender	0.73
Doximity rank	< 0.001*
Years of practice	0.60
URiM faculty	0.73
Academic rank	< 0.001*
Number of grants received	$R^2 = 0.04$, $p < 0.001$
Male gender	0.64
Doximity rank	0.72
Years of practice	0.05
URiM faculty	0.483
Academic rank	0.04*
Total funding received	$R^2 = 0.05$, $p = 0.002$
Male gender	0.24
Doximity rank	0.09
Years of practice	0.09
URiM faculty	0.972
Academic rank	0.04*

Women faculty had significantly fewer median years of practice than their male counterparts (10 versus 18 years respectively, $p < 0.001$). For faculty receiving grants, the women faculty awarded grants also had significantly fewer median years of practice (14 versus 24 years, $p < 0.001$). URiM faculty also had significantly fewer median years of practice than their non-URiM counterparts (14 versus 16 years, $p = 0.013$); but when looking only at faculty who received grants the difference in median years of practice was not significant ($p = 0.082$). Univariable analyses by gender and race including academic rank data are present in Tables 2 and 3 respectively.

On multivariable analysis, Doximity rank ($p < 0.001$) and academic rank ($p < 0.001$) were significant predictors of receiving a grant; male gender ($p = 0.73$), URiM status ($p = 0.73$) and years of practice ($p = 0.60$) were not. Academic rank was a significant predictor of number of grants received ($p = 0.042$); years of practice ($p = 0.051$), Doximity rank ($p = 0.72$), URiM status ($p = 0.48$), and gender ($p = 0.64$) were not. Academic rank was a significant predictor of total funding received ($p = 0.04$); years of practice ($p = 0.089$) and Doximity rank ($p = 0.094$), URiM status ($p = 0.97$) and gender ($p = 0.24$) were not. Multivariable analyses are summarized in Table 4.

Discussion

NIH funding and support for Urologic research has markedly decreased over the past decade.[20] This decrease in funding, coupled with documented, albeit improving inequity of NIH funding of

researchers, highlights the importance of assessing the allocation of research funding thus far to Urologic surgeon scientists.[14,19] To date, several studies have reported disparities in NIH funding; Waisbren et al found that among all academic faculty at eight affiliated institutions, women were awarded less money per grant than men at equal academic rank.[23] These gender disparities were echoed in Lewit et al, who discovered that women academic surgeon scientists receive smaller and fewer NIH grants than their male counterparts and found no R01 awards given to Black women during their study period.[16] Ginther et al demonstrated Black biomedical researchers are less likely to be awarded R01 grants and less likely to be awarded NIH funding in general.[11] Those same racial disparities in funding were demonstrated again by Hoppe et al in 2019, who found a persistent funding gap in R01 awards for Black biomedical scientists.[12] Recent studies have indicated improvements in the R01 funding gap regarding total funding by race, racial funding inequities persist.[15] While Hakam et al discovered that women faculty in Urology have a higher proportion of PhDs in basic science and produced publications with a higher impact factor, to our knowledge, no study has analyzed variance in funding to Urologic surgeon-scientists based on both race and gender.[20] Our reported findings ultimately did not support our hypothesis that there is a difference in grant funding to academic urologists based on race and gender.

Literature regarding NIH funding to Urologic surgeon scientists is scarce, but the aforementioned contemporary analysis reported in Hakam et al provides support to our reported results.[20] The 793 grants awarded to Urology reported in our study for a total value of $993,919,052, and a median per-grant value of $726,203 (IQR 339,949-1,648,695) is comparable to that reported in Hakam et al ($675,484; IQR 344,170-1,369385). Additionally, our reported grants by activity codes were also similar to those reported in Hakam et al, with a majority of R01, U01, and R21 grants; the marginal difference in reported R01 grants (29% of our reported grants vs 41.7% in Hakam et al) likely reflects our longer study period in which we collected a wider variety of activity code types. Lastly, our analysis by gender reports both lower women urologist representation and fewer grants awarded to women faculty by percentage than subgroup analysis reported in Hakam et al; this is again possibly reflective of our longer study period and the increasing representation of women urologists over the last few decades.[3,20]

Our study highlights several important findings regarding NIH funding within Urology. Firstly, NIH grants during the study period were more likely to be awarded to faculty of higher academic rank from higher Doximity-ranked urology residency program institutions with no difference based on URiM status or gender. Secondarily, faculty of higher academic rank were more likely to receive more grants and more funding. Zhu et al found that increased NIH funding was associated with increased scholarly impact across academic ranks, but little research exists regarding how grants and funding are awarded by academic rank.[24] Doximity residency program rank data is derived from surveys of board-certified physicians within a given specialty and has been demonstrated to effect residency applicant decisions regarding where to apply.[22,25,26] While studies have questioned Doximity rankings for their lack of transparency and objective data input, our study implies the reputation data is significantly associated with NIH grant allocation.[27] Lastly, our study demonstrated years of practice was almost significant in predicting number of grants, similar to recent findings by Storino et al in 2022, who found colorectal surgeons in practice for 10+ years received significantly more funding than their junior counterparts.[28] Ultimately, academic rank and reputation likely play an important role in accruing NIH funding and are crucial to understanding funding equity.

Regarding race and gender, we did not find data supporting our hypothesis of significant funding differences depending on URiM status or gender. While on subgroup analysis significantly more grants were awarded to non-URiM faculty and men, grants were awarded at proportions reflective of races and genders reported in 2021 AUA census, and we did not find URiM status or gender to be a significant predictor of being awarded a grant, number of grants, or funding on multivariable analysis. While URiM status and gender seemingly do not play a role in NIH funding to Urologic scientists, it is nevertheless important to continue to monitor the scope of funding by URiM status and gender given the known racial and gender disparities at play regarding NIH funding to biomedical research.[11,23]

This study has several limitations of note. Firstly, we only assessed NIH funding data to Urologic faculty, while other avenues of funding including, but not limited to, private industry, Department of Defense medical research funding, professional societies, department funding, and philanthropic funding exist.[29] Second, our finding that URiM status and gender are not significantly associated with

NIH funding is subject to type II error. Given the limited number of underrepresented faculty receiving grants during the study period, it is possible our regression models were underpowered and unable to detect the true effect of race and gender on NIH funding to Urologists. Third, we only assessed current Urologic faculty and did not account for faculty that have left the workforce; likely leading to underreporting of grants during the study period. Despite this underreporting, our total number of grants was more than that reported in Hakam et al indicating appropriate collection of current faculty.[20] Additionally, Doximity rankings to programs have varied over the study period. While using only current program ranking serves as a potential source of error, unfortunately historic ranking data for Doximity is not publicly available, and we are unable to trend this data over time. Further, demographic information regarding race and ethnicity was ascribed from publicly available data as previously described. It is possible that a more verifiable source of demographic data would be the AUA census, but it is limited by self-reporting and response rate. However, the final URiM demographics of our database align with recent census data from the American Medical Association Physician Masterfile, providing credibility to our database methodology.

Conclusion

Allocation of NIH grants to current Urologic faculty over the last 37 years was associated with academic rank and institutional Doximity rank, but not with URiM status or gender. Academic rank was also associated with number of grants and total funding. The true impact of demographics on NIH grant funding to Urologic faculty is likely multifactorial, but this study provides important funding data by race and gender in the landscape of decreased funding. □

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