Characteristics and Outcomes of Research Funded by the American Head and Neck Society Foundation

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For decades, the American Head and Neck Society (AHNS) has been providing funding for meritorious research to investigators for studies on head and neck cancer. Recently, the AHNS Foundation sought to evaluate the impact of its funds for investigators and research.

OBJECTIVE To examine the mechanisms and outcomes of research funding by the AHNS.

DESIGN, SETTING, AND PARTICIPANTS An online survey was sent to all AHNS grant-funded principal investigators who had received funds from 1998 to 2018. Over this time, approximately $1.5 million in grant funding was awarded for research. Grants were separated into 2 groups: pilot and resident grants (PRs), approximately $10 000 each type of grant for 1 year, and career development grants (CDAs), approximately $20 000 to $80 000 over 1 to 2 years.

RESULTS Of 82 awardees, 49 individuals (60%) responded to the survey (36 men [73%]), including 28 recipients (57%) of PR grants and 21 recipients (43%) of CDA grants. Twenty-six studies (53%) were reported as translational, 20 studies (41%) were basic science, 2 studies (4%) were clinical, and 1 study (2%) was outcomes research. At the time of the award, 19 recipients (39%) were faculty/attending physicians, 11 recipients (22%) were fellows, and 19 recipients (39%) were residents/students. Twenty of 21 CDA grants (95%) were given to fellows or faculty. Thirty-seven grants (75%) resulted in publications, with a total of 84 publications reported. Nineteen CDA grants (90%) and 18 PR grants (64%) resulted in publication. Thirty-one (63%) investigators were awarded another grant after their AHNS grant: 19 CDA (90%), 8 pilot (44%), and 4 (40%) resident awardees reported having a future grant. Twenty of 21 CDA grants (95%) were given to fellows or faculty. Thirty-one (63%) investigators were awarded another grant after their AHNS grant: 19 CDA (90%), 8 pilot (44%), and 4 (40%) resident awardees reported having a future grant. Fourteen respondents (29%) reported a future K, R, or other major foundation grant. Of all awardees, 46 recipients (93%) were still conducting research and 40 recipients (82%) reported serving as academic faculty. Respondents also noted associations between grants and mentorship, investigator development, institutional support, and academic promotion.

CONCLUSIONS AND RELEVANCE The findings of this study suggest that, over the past 20 years, the AHNS funding mechanism has resulted in 80% of awards generating publications and 63% resulting in future funding. The additional benefits of AHNS grant awards on the culture of research is also substantial. Continued analysis of these data may help guide future AHNS funding and award decisions.
ing. To assess the characteristics and outcomes of research funded by the AHNS foundation, a survey of investigators who had received funding was conducted.

Methods

An online survey was sent to all AHNS grant-funded principal investigators who had received funds from 1998 to 2018. The survey consisted of 42 questions that evaluated publications, subsequent (ie, those received after the AHNS grant), current career, and perceptions of the grant program. Responses were collected and analyzed; data were not deidentified. Nonrespondents were contacted 2 more times, and, if necessary, were then contacted directly by one of us (J.C.L.). For those without valid email addresses, attempts were made to identify a professional contact through their grant institution. Contacts for all but 1 awardee were identified. This study was determined to be exempt from institutional review board approval by the Lewis Katz School of Medicine Institutional Review Board as not human subjects research.

At least 5 types of funds were captured: Young Investigator Award, Ballantine Resident Research Grant, Pilot Research Grant, Surgeon Scientist Career Development Grant, and Translational Innovator Award. Grant types and names changed slightly over the years. These grants were categorized into 2 groups. The pilot and resident research grants were combined into a single group (PR). Resident research grants are aimed at residents in training, and pilot grants are open to all training levels. Grants are for 1 year and the sum is usually $10 000. The Young investigator Awards (Duane Sewell and AAOHNS/AHNS combined), Translational Innovator Award, and Surgeon Scientist Career Development were grouped into a single career development award (CDA) category. These grants varied in amount and time from $20 000 to $70 000 over 1 to 2 years.

Eighty-two grant recipients were initially identified over the 20-year period. Recipients were contacted by email with the survey. In total, 80 recipients with a valid email address were contacted. The total funding for all grants from the AHNS foundation was $1 583 848. Forty-six of the grants (56%) were PRs and 36 grants (44%) were CDAs.

Federally funded independent funding (RO1 grants) were searched for via NIH RePORTER. The AHNS and RO1 award amounts were not adjusted for inflation by year of award.

Results

Of the 82 grant recipients, 49 individuals (60%) responded to the survey; of these, 36 were men (73%) and 13 were women (27%). The mean (SD) time since grant award was 10 (5.8) years (Figure). Forty-five recipients (92%) were otolaryngologists; the remaining were general surgeons or other, usually PhD or medical students. The survey respondents reported that 21 grants (43%) were CDAs and 28 grants (57%) were PRs. The research type was categorized into 4 groups: translational (26 [53%]), basic science (20 [41%]), clinical (2 [4%]), and outcomes (1 [2%]). At the time of application, 19 recipients (39%) were faculty/attending physicians, 11 recipients (22%) were fellows, and 19 recipients (39%) were residents/students (Table 1). For CDA applications, 20 of the applicants (95%) were faculty (15 [71%]) or fellows (5 [24%]) at the time of application.

A high rate of publications resulting from grant awardees was noted. Thirty-seven recipients (75%) reported having their research published, with a total of 84 publications. Twenty-three respondents (47%) had 2 or more publications from the same research (Table 2). Nineteen CDA grants (90%) resulted in publication compared with 18 PR grants (64%).

Thirty-one respondents (63%) reported obtaining a future grant: 19 grants (90%) were CDAs and 12 grants were PRs [resident, 4 [40%], and pilot, 8 [40%]]. Twelve of 29 subsequent grants (41%) were obtained within 1 to 3 years (median, 2 years; mean, 2.7 years). Table 3 reports the length of time between receipt of the AHNS grant and receipt of the next grant. One respondent reported that 20 years passed until subsequent funding; because the period was an outlier, this factor was excluded from median and mean calculations of time to subsequent grant. Future grants included 8 RO1 grants, 7 K08/K23 grants, 8 foundation or other career development awards, 3 foundation merit awards, 18 internal/institutional grants, and 12 industry/private grants. For the recipients awarded RO1 grants, the median year of their AHNS grant award was 2007. A total of 14 respondents (29%) progressed to a K, R, or major foundation career development award. Of the 21 respondents with an AHNS CDA, 8 individuals (38%) received subsequent K, R, or foundation career development award funding.

The aggregate first RO1 grant funding amount for the 8 grants was $8 060 831. This number represents the first RO1 funds, without renewals or subsequent R funding. The total R funding for all recipients since 1998 was $26 250 535. The total R funds of all surveyed members, including respondents and nonrespondents, was $40 771 928.

Regarding their current positions, 46 respondents (93%) reported still being engaged in research; of these, 25 respondents (54%) stated that the research is related to their grant. Forty respondents (80%) reported being academic faculty and 30 respondents (60%) reported some amount of protected research time. Forty-two respondents (86%) indicated that they were fellowship trained, with 35 fellowships (83%) head and
Nine of the 13 women (69%) received PR grants, and the remaining grants were CDAs. Four of the 13 women (31%) progressed to receiving a subsequent K, R, or foundation career development grant, compared with 10 of the 36 men (28%).

**Discussion**

The funding sources for medical research are varied, including the federal government, usually the NIH, but also industry, foundation nonprofit organizations, or states. For physician investigators who aim to make research a substantial component of their career, extramural funding, usually from the NIH, is the major source. As a foundation source, the AHNS has provided funding for physician researchers in head and neck cancers for decades. Some of this funding is focused on trainees, such as the resident research grants. Other funding is more focused on early career investigators, such as the Translational Innovator Award or Young Investigator Award. While the resident research grants help to promote research for trainees early, the latter awards are meant to assist young investigators until they achieve independent extramural research funding.

It can take several years from the completion of clinical training to achieve extramural independent funding. The age of physician investigators who obtain their first NIH R01 is approximately 44 years. With no gap years from undergraduate studies starting at 18 years, the approximate age of an otolaryngologist after 4 years of medical school, 5 years of residency, and 1 year of fellowship training is 32 years. This 12-year gap illustrates the lengthy time and degree of support needed for young investigators who are interested in a career in research.

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**Box. Selected Comments From Respondents**

**How did the CORE grant help you with your career?**

“CV building for future grant applications and promotion”

“It allowed me to work closely with mentors who have been instrumental in my development as an academic surgeon.”

“I think the research experience definitely helped me in securing an academic faculty position at the location I desired.”

“…mentored training grant, it forced me to create a mentoring team which sustained me through my early career. I would have dropped out of research long ago if not for the mentoring contacts I made through that grant.”

“I am deeply grateful for the CORE grant, as this provided a necessary catalyst to build a larger group of collaborators and organize our institutional research efforts.”

“Facilitated supplies and personnel to be able to complete project, which would have been far too much of an endeavor for one person to take on.”

“The CORE grant mechanism is the only thing that will save research in our field at a time when institutional and government funds are drying up.”

**How did the CORE grant help you with future grants (if applicable)?**

“I think the best thing about it is the positive reinforcement that it gives to a successful applicant … more than the funding even … it is a huge morale boost after years of hard work with little other means of recognition and can stimulate future grant applications.”

“This is one of the most important missions of the AHNS.”

“Please do not stop support of young future surgeon-scientists. We are a dying breed.”

“CORE will keep research efforts alive at a time when I fear for the future of academic medicine.”

AHNS, American Head and Neck Society; CORE, Combined Otolaryngology Research Efforts.
In evaluating the past 20 years of the AHNS funding program, success can be evaluated using many measures, such as frequency of publication and future grants. Future grant success could be defined as any additional funding, any subsequent extramural funding, or, specifically, NIH R grant funding. Our data herein suggest that the AHNS grant program has been successful according to many measures. From the publication standpoint, 80% of grant recipients reported at least 1 publication from their work, and 63% reported receiving a subsequent grant following their AHNS grant, with 29% of the cohort progressing to an NIH or major foundation grant.

Our data are consistent with the otolaryngology CORE mechanism as a whole, which includes grants from the AAOHNS and subspecialty societies. Eloy et al reviewed the outcomes of the CORE mechanism for subsequent grant and career success. In this study, of 192 CORE grant recipients, 40% had received subsequent NIH funding, of which 21% were R level grants. This rate of progression to extramural funding is similar to that of young investigator awards in other foundations. In orthopedic surgery, 22% of recipients of funding from the Orthopaedic Research and Education Foundation, a similar mechanism to the AHNS CDA award, had a progression to NIH funding. The American Society of Clinical Oncology has had a grant mechanism since the early 1980s. In their cohort after 2000, 28% of the investigators went on to receive NIH funding and 77% reported publication as a result of their research. From these data, the AHNS grant program rate of 29% appears to be in line with other major societies and CORE as a whole in supporting young investigators to receive NIH funding.

The AHNS grant award program has resulted in a robust return on investment. Approximately $1.6 million has been distributed by the AHNS Foundation since 1998. From 1998 to 2018, the value of the first R01 was $8 million, a 5.3 times return; the value of all R funding for the respondents was $26.2 million, a return of 17.4 times; and the value of all R funding was $40.7 million, for a return of 27.1 times. If $1.5 million had been wholly invested in 1998 into the Dow Jones Industrial Average, the return would have been approximately $4.6 million—a 3 times return not adjusted for inflation.

Even with this return on investment, this amount is underestimated because the number only evaluates return of NIH R grants and the return also includes K awards and other major CDA awards. K awards are frequently primarily salary support and are meant to be a bridge to R funding or other independent funding. The amounts of major foundation career development grants were not included in the study because those data were not captured in the survey. The CDAs in this study have referred to the AHNS grants targeted at young investigators up to $80,000. Other foundations offer more substantial CDAs, such as $200,000 awarded by the American Society of Clinical Oncology. The value of both K and major CDA awards was not captured in this study. A previous publication on 18 respondents from the AHNS from 1998 to 2007 documented an overall return of approximately $8 million, with inclusion of fewer respondents. Thus, our estimation of monetary return on investment is limited to future NIH R grants and underestimates the total monetary return.

Besides the monetary return on investment of supporting research, there are many additional benefits of the AHNS grant program to be considered. The Box shows the broad assistance of grant funding for the investigators. Respondents reported that an AHNS grant helped with career development, including curriculum vitae growth, negotiating protected time, improving job prospects, and being a part of academic promotion. This benefit is also reflected in the fact that 93% of respondents continue to be engaged in research, with 80% in academic centers.

Another key finding was the participants’ comments on mentorship. With the exception of the AHNS pilot grant, all grant mechanisms have mentorship and/or investigator development as part of the application. For resident research grants, a letter of support by the department chair is required. In addition, a letter of support by an identified primary mentor outlining the environment and commitment to training and mentorship is required. For the AHNS CDA, a major component of the research plan is inclusion of a comprehensive plan for investigator development and mentorship. This plan includes, among other elements, a discussion of the investigator’s career goals and objectives and identification of specific research training activities, such as coursework or meetings to be completed during the award in support of the investigator. The selected comments on mentorship and training (Box) highlight the importance of these elements.

In addition, the influence of AHNS grants and awards on the culture of research is highlighted. The AHNS grants were able to help investigators focus on institutional resources, mentorship, and collaboration around the project. The selected comments suggest that the benefits of grant funding are not just monetary, but also support investigator development, research success, and career success (Box). After factoring in these additional benefits of mentorship, future research training, academic promotion, and institutional commitment of resources to investigators, the overall return on the AHNS grant mechanism appears to be positive.

A notable finding was that sex did not appear to be associated with outcome. Although only 27% of the awardees were women, their progression to K, R, or foundation grants exceeded that of men (31% vs 28%). This finding supports the belief that investigator sex does not correlate with research success.

Limitations

There were limitations to this study, one of which was a temporal bias. Respondents had received grants from 1998 to 2018, but 11 individuals (22%) had received the AHNS grant within 5 years of the survey. Given that the median time to securing additional funding after an AHNS grant award is 2 years, and with the documented lengthy time following training until R01 funding, it may be too soon to assess the outcomes in many respondents. For the recipients awarded R01 grants in the survey, the median year of their AHNS grant award was 2007. In addition, our survey respondent rate was 60%, so a significant amount of respondent data were not captured and included.
Conclusions

The findings of this study suggest that benefits of the AHNS grant mechanism over the past 20 years have been numerous. Funding appears to offer a robust monetary return on investment with future R funding. In addition, there are reported benefits to an investigator’s career and research following receipt of an AHNS grant. The AHNS grant mechanism appears to offer many benefits for meritorious research and may be a useful mechanism of support for a culture of research and furthering our understanding of head and neck cancer.

REFERENCES