Radiation Oncology Grant Funding Portfolio Analysis

2017

PREPARED BY

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ASTRO Portfolio Analysis Results

In 2016, ASTRO began an evaluation of the radiation oncology grant portfolio to determine the scope and interests of radiation oncology researchers within the field. The goal of this project was two-fold: to understand the amount of NIH funding dedicated to research in radiation oncology and to evaluate how successful our researchers are in obtaining funding. The information gathered is being used to develop programs for researchers in radiation oncology and to determine methods to improve the funding status of radiation oncology research within federal and non-federal granting institutions.

Methods:

The analysis was performed in two parts. First, faculty names from radiation oncology division/department were used to perform a search for active grants in the National Institutes of Health (NIH) RePORTER database. This search included grants which listed a faculty member as either principal investigator (PI) or co-PI. Second, department chairs from each of the Society of Chairs of Academic Radiation Oncology Programs (SCAROP) member departments were asked to provide information about funded and unfunded grants that were submitted by researchers in the department.

Of the 90 SCAROP members, 31 responded to this request. The funded grant data correlated well with the data received through the 2016 SCAROP survey indicating about 1/3 of SCAROP radiation oncology departments have active research funding. Therefore, we conclude that still about 1/3 of SCAROP departments have active research funding. The list of respondents is representative of the SCAROP member organizations with active research funding.

Below is a summary of our results.

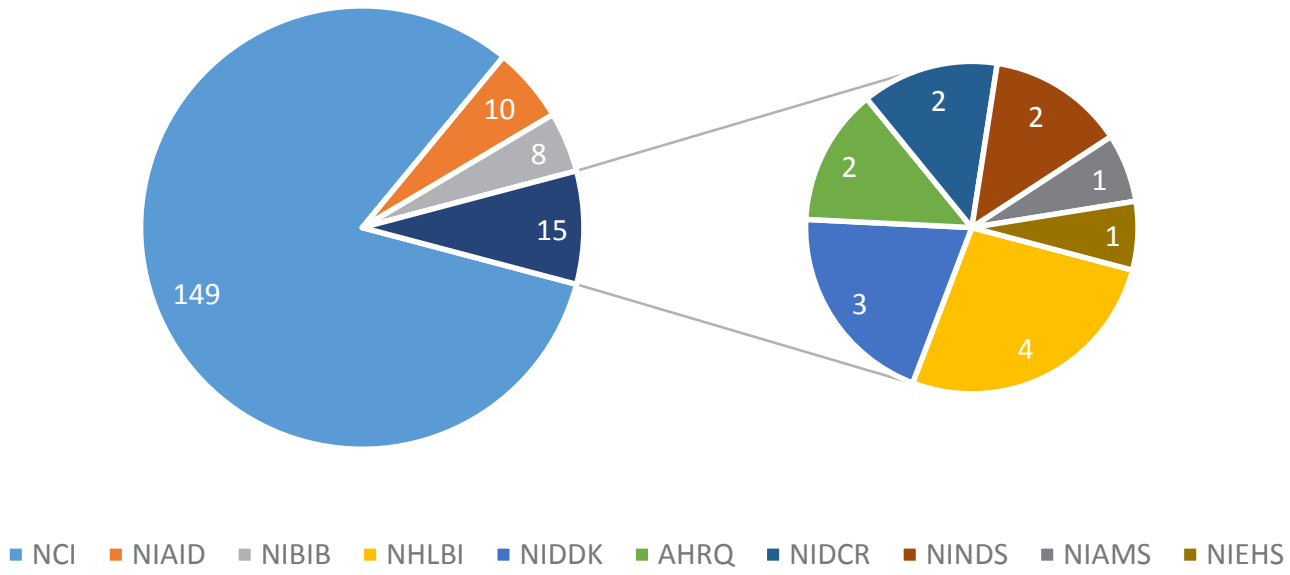
NIH RePORTER Analysis:

Data were downloaded from the NIH RePORTER website for all active grants from FY 2014 through FY2016 with principal investigator or co-investigator names matching the list of faculty members as described previously.

Research was funded by many NIH Institutes and Centers

In total, 182 grants were funded by NIH, with 149 of those (81.9%) funded by the National Cancer Institute (NCI) [Figure 1]. These 182 grants total over $85 million, or approximately 0.7% of the active NIH research grant funding budget at the time of analysis. Although the number of grants supported by the NCI vastly exceeds the support from other NIH Institutes and Centers (ICs), radiation oncology researchers did receive funding from 11 other NIH ICs, indicating that other ICs outside of the NCI are viable sources of grant funding for research in radiation oncology. Among other institutes, NIAID was the second largest funder of researchers in radiation oncology (10/182, 5.4%) and NIBIB was the third largest funder (8/182, 4.3%). See Appendix A for full list of funding ICs.

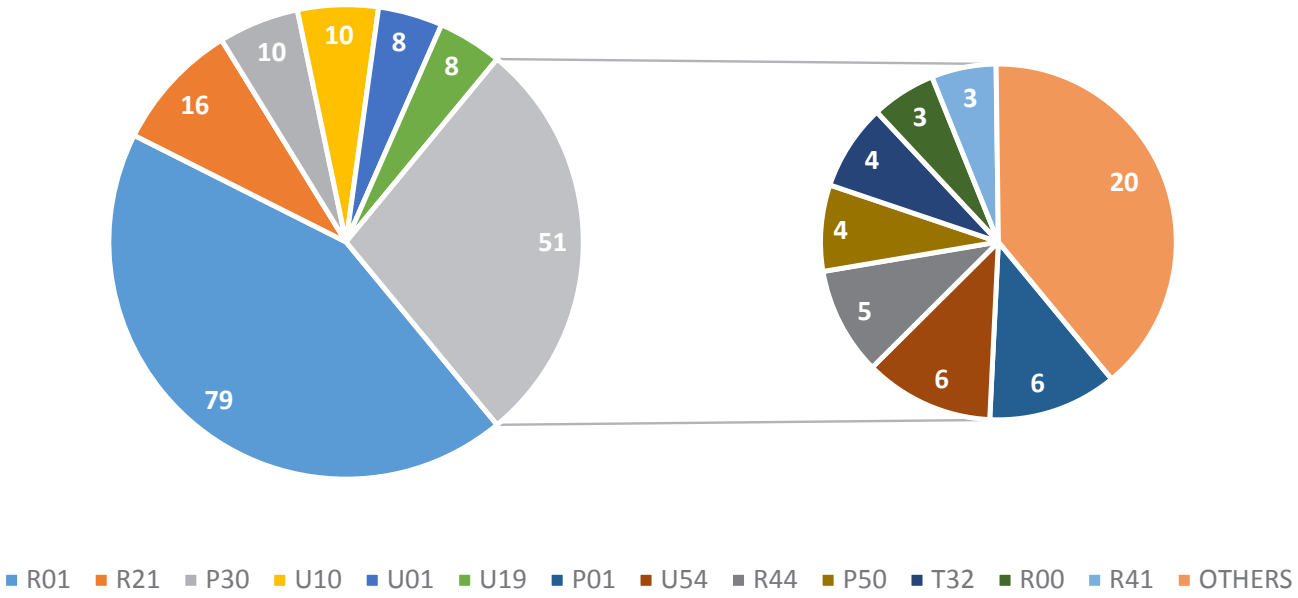
Figure 1. Number of Grants by Administrating NIH Institute or Center



Research was funded by many different funding mechanisms

Of the 182 active grants, 79 grants (43.4%) were funded under the R01 funding mechanism, which represents 2.0% of the 3,897 active R01 grants funded by NCI at the time of analysis [Figure 2]. While almost half were funded under the R01 mechanism, an additional 8.7% were funded under the R21 mechanism, 17.6% were funded as cooperative agreement (U) awards, and 7.7% were program project/center (P) awards. Funding under the R21 mechanism was lower than anticipated. This could be because the NCI suspended funding of R21 grants for many years, therefore the low percentage of R21 grants may represent the lack of use of that funding mechanism. See Appendix B for the complete list of NIH funding mechanisms.

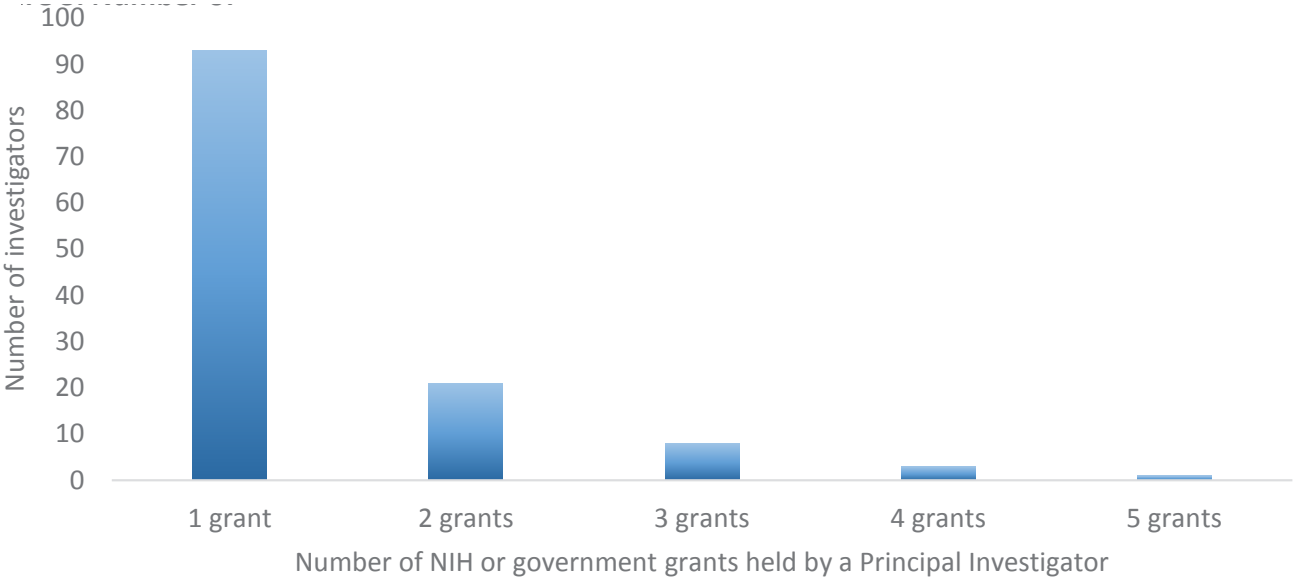
Figure 2. Number of NIH Grants by Funding Mechanism



Most principal investigators had a single NIH-funded grant

The 182 NIH active grants in radiation oncology were awarded to 126 principal investigators. Stated differently, 90.5% of radiation oncology researchers with NIH funding only had 1 award [Figure 3]. This indicates that research in radiation oncology was neither concentrated in a few labs nor conducted by a limited number of investigators or institutions. We cannot rule out that projects were conducted through teams that include many investigators. We do feel, however, that overall there were many independent laboratories conducting unique work.

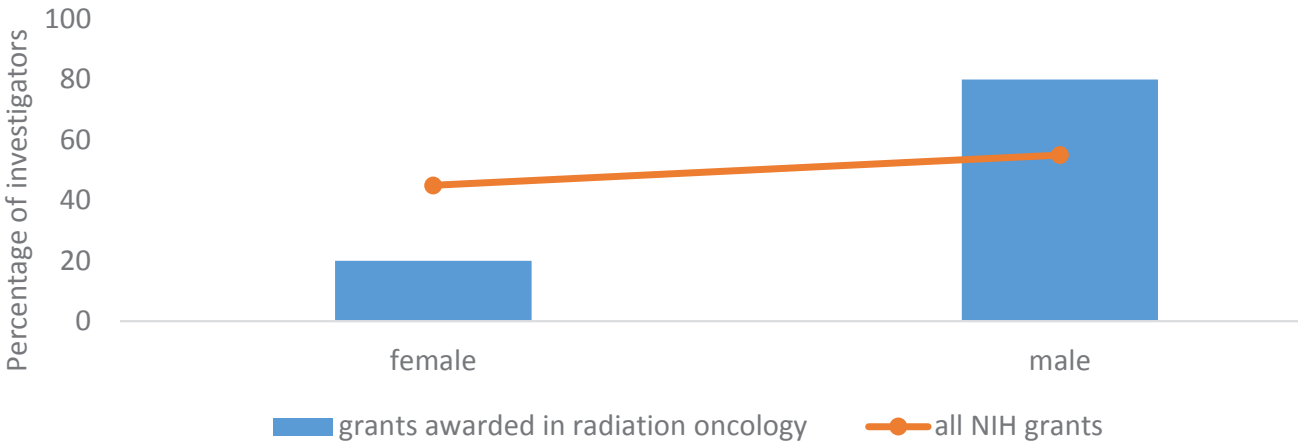
Figure 3. Number of grants awarded to each principal investigator



Fewer women received NIH funding than expected

Based on data from the SCAROP financial survey (2016), approximately 35% of physician scientists in radiation oncology academic departments are women. This percentage is slightly higher than the gender distribution within the ASTRO membership (30% women). We anticipated that the distribution of grants to women in radiation oncology would be between 30 – 35%. However, when evaluating the number of NIH grants awarded to women in radiation oncology, we found that only 20% of the grants were awarded to female principal investigators. This is also lower than the reported 46% of investigators receiving NIH research awards (R career awards) being female, per the NIH website. [Figure 4]

Figure 4. Gender distribution of radiation oncology grants from the NIH compared with all NIH grants



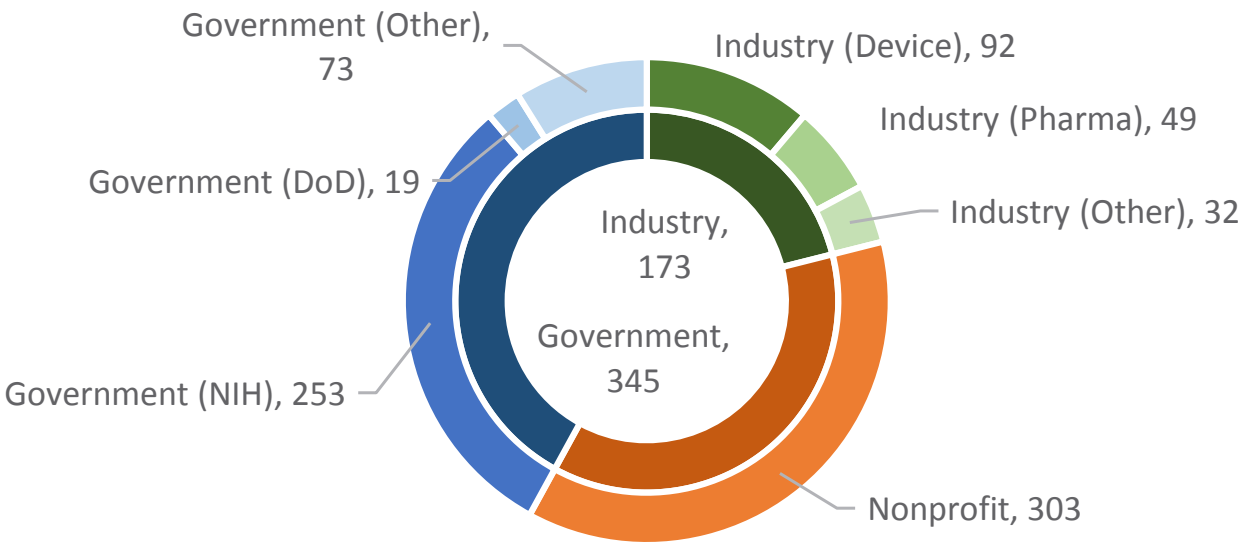
SCAROP Department Data Analysis:

The data we received from SCAROP departments included 816 funded and 1031 unfunded grants from all sources in the field of radiation oncology. Grants with funding between fiscal year 2014 through FY2016 were included. Where possible, the funding start date was used to determine if a grant fit this criteria; when funding start date was not supplied (such as in the case of unfunded applications), date of application submission was used instead.

Research grants were primarily supported by government and non-profit organizations

The number of grants supported by government agencies (345) was slightly higher than those supported by nonprofit entities (303), while industry-supported grants constituted a smaller proportion (173) [Figure 5]. Approximately 1/3 of grants were awarded by government agencies other than the NIH or DoD. These included both federal and state government institutions, such as the Department of Energy and the Cancer Prevention Research Institute of Texas (CPRIT).

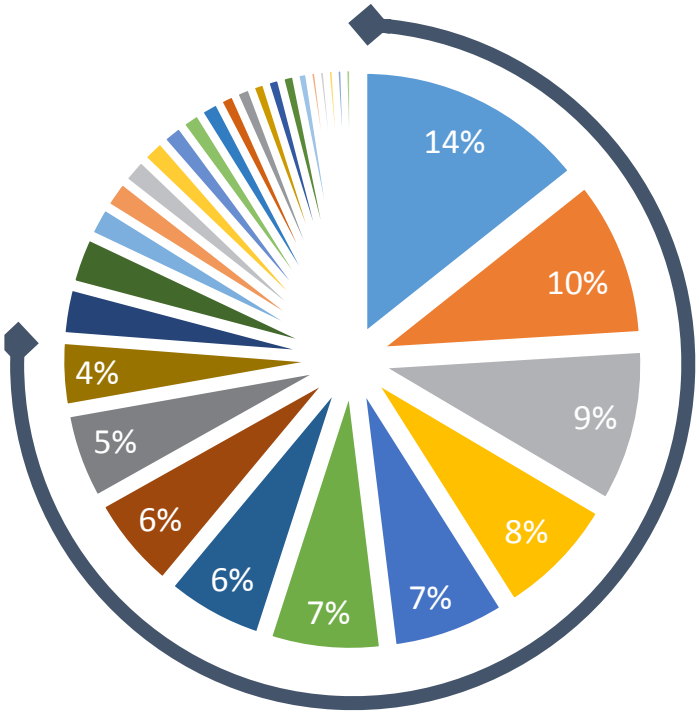
Figure 5. Total Number of Funded Grants by Funding Agency Type, 2014-2016



Grant funding was not equally distributed across SCAROP member institutions

When plotting the number of successful grant applications by institution, it is clear that some institutions obtained significantly more grant funding than others. As can be seen in Figure 6, with respect to number of funded grants, the 10 research intensive institutions have secured over 75% of the grants.

Figure 6. Percentage of Total Funded Grants by Institution, 2014-2016

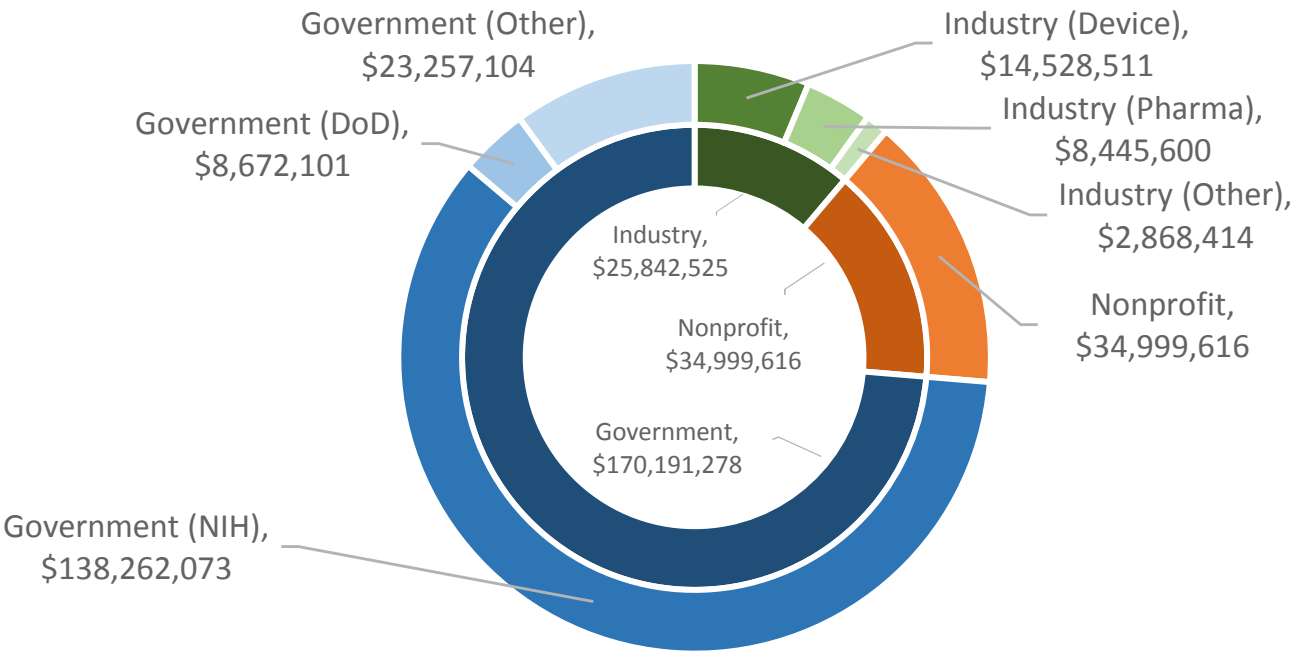


10 research intensive institutions have over 75% of grants

Most research dollars came from government agencies

Evaluation of grant funding data by total grant value revealed that government grants totaled over $170M, while nonprofit and industry grants totaled approximately $35M and $25M, respectively [Figure 7]. This indicates that although government and nonprofit/philanthropic institutions support funding of almost the same number of grants, clearly grants from government sources were of significantly larger value. This could reflect the funding for research by some nonprofit/philanthropic institutions, suggesting that they may focus on providing grant dollars to support smaller, early career development awards. (* Note: From one institution, we only received grant types and funding status. No information about value of the grant was provided. Therefore, these data were not included in any graphs regarding funding values.)

Figure 7. Funded Grants Value by Granting Agency Type, 2014-2016



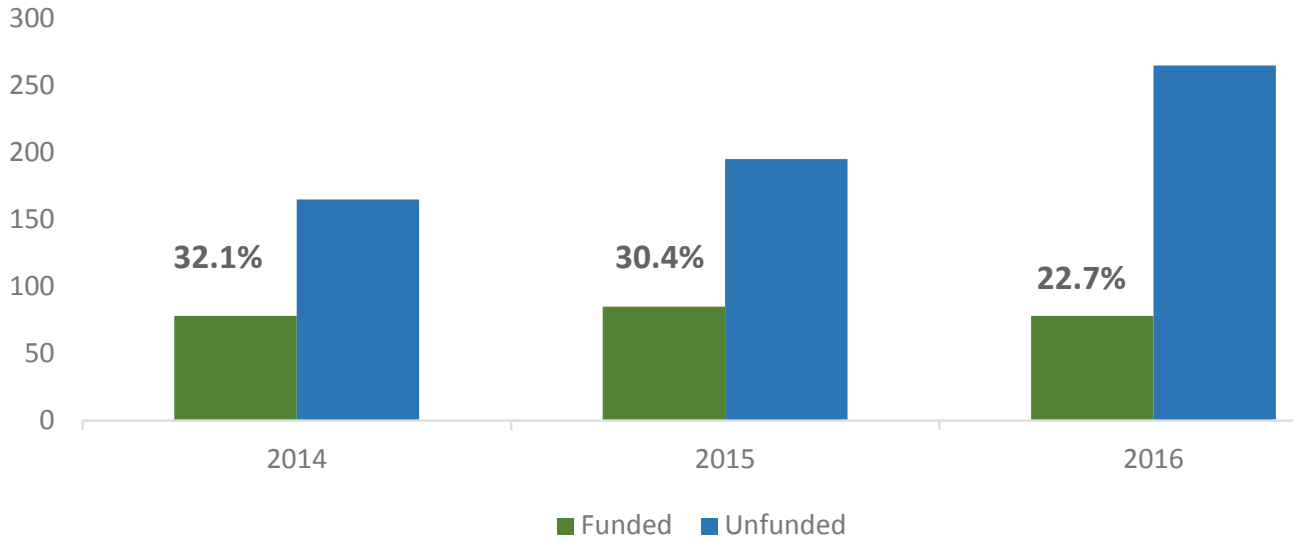
*Does not include data from grants without value information

Grant Success Rate

To determine the overall success of researchers in obtaining external funding from the NIH, we divided the number of funded grants by the total number of applications. Overall, our evaluation indicated that there was a 28% success rate for radiation oncology proposals submitted to the National Institutes of Health between 2014 and 2016 [Figure 8]. Although our success rate decreased from FY14 through FY16, during this entire period this success rate was significantly higher than both the reported NIH application success rate (~10% for FY16) and that of the NCI (~13% for FY16). Part of the reason for the decline in success rate could be that the total number of applications increased by 41% from 2014 to 2016. Taken together, these data likely indicate that radiation oncology researchers are successful at securing research funding, and that the research being proposed is both high-quality and relevant.

From 2014 – 2016, we identified 1,856 grant applications that were submitted to any granting agency or institution from research intensive organizations. From 2014 – 2016, NCI funded 5,150 new research grants. During this time, the estimated success rate for NCI funding was approximately 12%. Given this rate, it is reasonable to estimate that 42,916 grants were submitted during this period. Based on this, our submission rate was approximately 4.3% of the total number of proposals submitted for review. A key finding of this portfolio analysis is that our success rate in obtaining funding is quite high, while our submission rate of applications overall is quite low.

Figure 8. Success rate of radiation oncology grants submitted to the NIH



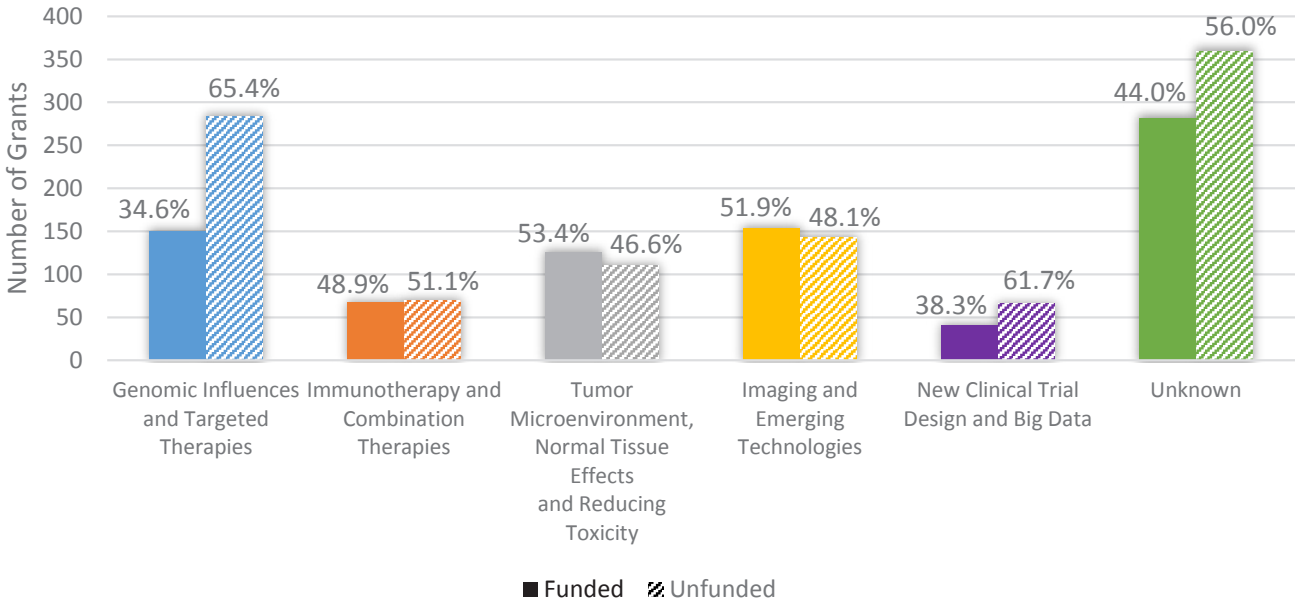
Grant Categorization

To determine the research focus of grants within radiation oncology, we evaluated grant titles of 1568 grants provided to us by the SCAROP departments. The titles were categorized by their overall subject focus and relevance to each of the areas set out in the 2017 ASTRO Research Agenda (Figure 9).

Figure 9. 2017 ASTRO Research Agenda

The categories in the 2017 ASTRO Research Agenda represent five main areas of research interest in radiation oncology, approved by the ASTRO Board of Directors in early 2017. These five topics encompass the vast majority of research performed in the field of radiation oncology. By categorizing the grants from our study by these topics, we could determine the overall interest in each of these topics and how successful our researchers are within each area.

Figure 10. Distribution of radiation oncology grants according to the research agenda category



When categorized according to our research agenda, we found that most grants were submitted and funded in biology research topics (Figure 10); of the 1,851 total grants submitted, 806 (43.5%) fell into the genomic influences and targeted therapies, immunotherapy and combination therapies, tumor microenvironment, normal tissue effects and reducing toxicities categories. Although success rates for obtaining grants in genomic influences was lower than other biology categories (34.6% for genomic influences vs 48.9% for immunotherapy vs 53.4% for tumor microenvironment and normal tissues, Figure 10), the overall success rate of obtaining funding remained quite high. A total of 297 (16.0%) grants fell in the imaging and emerging technologies category. While imaging was a smaller share of our submissions, more than 50% of the imaging-focused proposals were funded. The smallest share of grant funding was in new clinical trial design and big data. Percentages listed in Figure 10 reflect the percent funded or unfunded in each category. Data included external funding from government, non-profit, and industry sources. The unknown category reflects those grants with a title that could not be binned into any of the five categories.

Conclusions

The purpose of this analysis was to determine the amount of grant funding awarded to researchers in radiation oncology and to gain a clearer picture of underlying factors that may contribute to lower levels of funding. Data from these analyses will be used to develop new programs to aid researchers in our field and to strategize on how to advocate for increased grant funding from a variety of sources. We will also use these data to identify new collaborations that should be sought to maximize our funding opportunities.

General conclusions

- From 2014 – 2016, only 1,851 radiation oncology related grants out of approximately 42,916 oncology grant applications (4%) were submitted to any granting agency or institution.
- Radiation oncology researchers are successful (~28%) at obtaining grants when applications are submitted.
- Though the relative success of radiation oncology researchers obtaining funding is encouraging, the decreasing percentage of funding occurring during a time of increasing importance of radiation oncology for cancer care is something that needs to be reversed.
- Efforts need to be taken to increase the total number of grants submitted to funding agencies.
- The majority of grants and most grant dollars are awarded from government agencies.
- Funding is not limited to the NCI within the NIH. Researchers might consider applications to, and follow announcements from other Institutes.
- Grants pertaining to radiobiology are applied for more often than clinical or physics-based grants.
- Funding from any source to researchers in radiation oncology remains low.
- Support for research in radiation oncology must continue to grow.

ASTRO has been analyzing these data carefully to determine the best way to increase grant funding within radiation oncology. It is essential to sustain a culture that supports and rewards research so that radiation oncology remains a vital partner in cancer research and cancer care. Review of research funding and commitment to research by departments should be conducted to develop new ways of sustaining researchers.

Appendix A: List of HHS/NIH Institutes and Centers Providing Funding

HHS/NIH Institute or Center	Number of Grants
National Cancer Institute (NCI)	149
National Institute of Allergy and Infection Diseases (NIAID)	10
National Institute of Biomedical Imaging and Bioengineering (NIBIB)	8
National Heart, Lung and Blood Institute (NHLBI)	4
National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)	3
National Institute of Neurological Disorders and Stroke (NINDS)	2
National Institute of Dental and Craniofacial Research (NIDCR)	2
Agency for Healthcare Research and Quality (AHRQ)	2
National Institute of Environmental Health Sciences (NIEHS)	1
National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)	1

Appendix B: List of NIH Funding Mechanisms

NIH Funding Mechanism	Number of Grants
RO1	79
R21	16
P30	10
U10	10
U01	8
U19	8
P01	6
U54	6
R44	5
P50	4
T32	4
R00	3
R41	3
K07	2
K08	2
N01	2
P20	2
R03	2
R25	2
U24	2
K12	1
K99	1
P41	1
R18	1
R42	1
UH2	1