

Evaluation of the Relative Citation Ratio, a New National Institutes of Health–Supported Bibliometric Measure of Research Productivity, among Academic Radiation Oncologists

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Abstract

Purpose: Publication metrics are useful in evaluating academic faculty for awarding grants, recruitment, and promotion. A new metric, the relative citation ratio (RCR), was recently released by the National Institutes of Health (NIH); however, no benchmark data yet exist. We sought to create benchmark data for physician faculty in academic radiation oncology (RO) and analyze correlations associated with increased academic productivity.

Methods: Citation database searches were performed for all US radiation oncologists affiliated with academic RO programs. Gender, NIH funding, career duration, academic rank, RCR, and weighted RCR were collected for each faculty. RCR and weighted RCR were calculated and compared between each subgroup of interest. RCR percentiles were also created for reference.

Results: A total of 1,299 RO physician faculty members from 75 institutions were included in the analysis. Overall, RO physician were very productive and influential with a mean RCR of 1.57 ± 1.53 SD and median RCR (interquartile range) of 1.32 (0.87–1.94). Academic rank, career duration, and NIH funding were associated with increased mean RCR and weighted RCR. Male gender and having a PhD were associated with an increased weighted RCR but not an increased mean RCR.

Conclusions: Current academic radiation oncologists have a high mean RCR value relative to the benchmark NIH RCR value of 1. All subgroups analyzed had an RCR value above 1 with professor or chair and previous NIH funding having the highest RCR and weighted RCR values overall. These data may be useful for self-evaluation of ROs as well as evaluation of faculty by institutional and departmental leaders.

Key Words: Bibliometrics, productivity, citations, relative citation ratio, radiation oncology

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INTRODUCTION

Objective measures of academic productivity are an increasingly utilized tool when awarding grants, recruiting new academic faculty candidates, and making decisions regarding promotion and tenure. Within academic medicine, residents and fellows also seek objective measures to evaluate and rank prospective programs with regard to academic output and the potential for mentorship and involvement in scholarly activities during training. Publication metrics [1-5], although imperfect, allow for evaluation and comparison of academic productivity among researchers [6-12]. Recently, the National Institutes of Health (NIH) released a new metric, the relative citation ratio (RCR) [13].

The RCR is a publication-level metric that improves on popular author-level citation indices such as the h-index [13] by utilizing the cocitation network of a particular article to normalize its impact to that of others in its field and compares the impact of a particular article against that of NIH-funded publications [13]. The use of a cocitation component ostensibly overcomes a limitation of the h-index, allowing cross-disciplinary comparison across scientific fields (eg, allowing comparison between radiation oncology and medical oncology, a much larger field). By comparison, the h-index must be contextualized relative to a given specialty or academic space to be sensible [2-5]; otherwise, high-citation academic ecosystems with many journals are compared with smaller fields, such as radiation oncology, which lack the potential citation opportunities as a function of the number of associated journals, practitioners, and specialty scope. If successful, this is obviously of value in comparison of NIH-supported researchers, because productivity of investigators from divergent fields can be judged relative to their specific publication ecosystems in a more readily interpretable manner.

The proponents of the RCR validated this metric in a data set including >88,000 publications and demonstrated that the RCR tracks well with expert opinion of research quality [13]. However, it is unknown whether this metric is applicable among specific groups within medical academia such as academic radiation oncologists (ROs). Therefore, this study aims to characterize RCR for ROs at academic institutions, to identify correlates between demographic groups and RCR, and to present RCR benchmarking information from our data set to allow for individual self-evaluation relative to academic ROs.

METHODS AND MATERIALS

Departmental and Faculty Inclusion Criteria

A list of academic radiation oncology departments was compiled by querying the website of the Association of Residents in Radiation Oncology for all programs currently accredited by the ACGME. Then, a list of clinical RO faculty was compiled from the individual department websites for each academic program [14]. Specific department websites were accessed from October to December 2016. Faculty members were classified as “clinical” if they had an MD or DO degree (ie, PhD-only faculty were not included). Gender, academic degree (PhD or no), and academic rank were also obtained from the departmental websites.

Bibliometric Analysis

A custom search was performed for each academic RO using the NIH iCite website [15]. The iCite database currently includes only PubMed-listed articles from 2002 to 2016. After the initial search for each faculty member, items categorized as nonarticles, defined by the iCite database as editorials, reviews, and meeting abstracts, were excluded. Subsequently, the total numbers of publications, mean RCR, and weighted RCR were collected. RCR-related information was collected in May 2017.

The publication-level RCR is defined as the total citations per year a publication receives divided by the average citations per year received by NIH-funded publications in the same field contemporaneously. This yields a ratio for which 1 represents the field-normalized, NIH-funded standard. For example, if a publication averages 1 citation per year and NIH-funded papers in the same field average 10 citations per year, this yields an RCR of 0.1. Author-level metrics were collected from the iCite search output, including the mean RCR for all an author's publications and the weighted RCR, defined as the sum of all an author's publication-level RCR values.

Finally, each RO was queried in Scopus (Elsevier BV, Amsterdam, the Netherlands). Academic career duration was estimated by subtracting year of first publication from 2016. This method of approximating academic career duration has been utilized in the calculation of bibliometric indices such as the m-index [16]. The NIH Research Portfolio Online Reporting Tools was queried to determine if the individual had ever received NIH funding. Career duration and NIH funding information were gathered in December 2016.

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