

CARDIOVASCULAR MEDICINE AND SOCIETY

A Changing Landscape in Cardiovascular Research Publication Output



Bridging the Translational Gap

Diane Gal, BSc^{PHARM}, MPH,^a Bart Thijs, PhD,^b Wolfgang Glänzel, DR. RER. NAT., PhD,^{b,c} Karin R. Sipido, MD, PhD^a

ABSTRACT

The concern about predominance of basic discovery research and lack of translation into clinical medicine, and segregation between these research communities, led the authors to study these research communities through mapping networks of publications and cross-references. Cardiovascular research from 1993 to 2013 was published in 565 journals, including 104 new journals. Only 50% were published in core cardiovascular journals, such as the *Journal of the American College of Cardiology*, whereas one-half of cardiovascular publications were found in broader biomedical/multidisciplinary journals. The growth of the clinical journal community and merging into one broad journal community suggests a decreasing dichotomy between basic/preclinical and clinical research, potentially contributing to bridging the translational gap. (J Am Coll Cardiol 2018;71:1584-9)
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The growth in cardiovascular research (1), with >50,000 cardiovascular publications in 2013, reflects major activity, in line with the societal burden of cardiovascular disease (2). Ensuring that investment in cardiovascular research results in improved cardiovascular health remains a challenge. Scientists, funders, and society have issued concerns about results from basic discovery research leading to novel clinical application (so-called “valley of death”). In 2002, the National Institutes of Health leadership recognized a widening gap between basic and clinical research with major spending in basic discovery; also, in Europe, leadership pointed to the disconnect between basic biology research and clinical needs (3). Funding in the United States and Europe has responded and encouraged “translational” research through specific funding schemes and strategic actions. Nevertheless, concerns about lack of communication persist.

Publications in peer-reviewed journals are an important means of science communication, especially in the biomedical sciences. By analyzing citation patterns, we can identify scientific communities that are connected by their intercommunication. As time progresses, these communities can split or merge to form more diverse or more well-connected communities. We have examined journals and networks based on cardiovascular research publications (1) and their citations to address whether the gap is widening between preclinical/basic and clinical communities in the cardiovascular field.

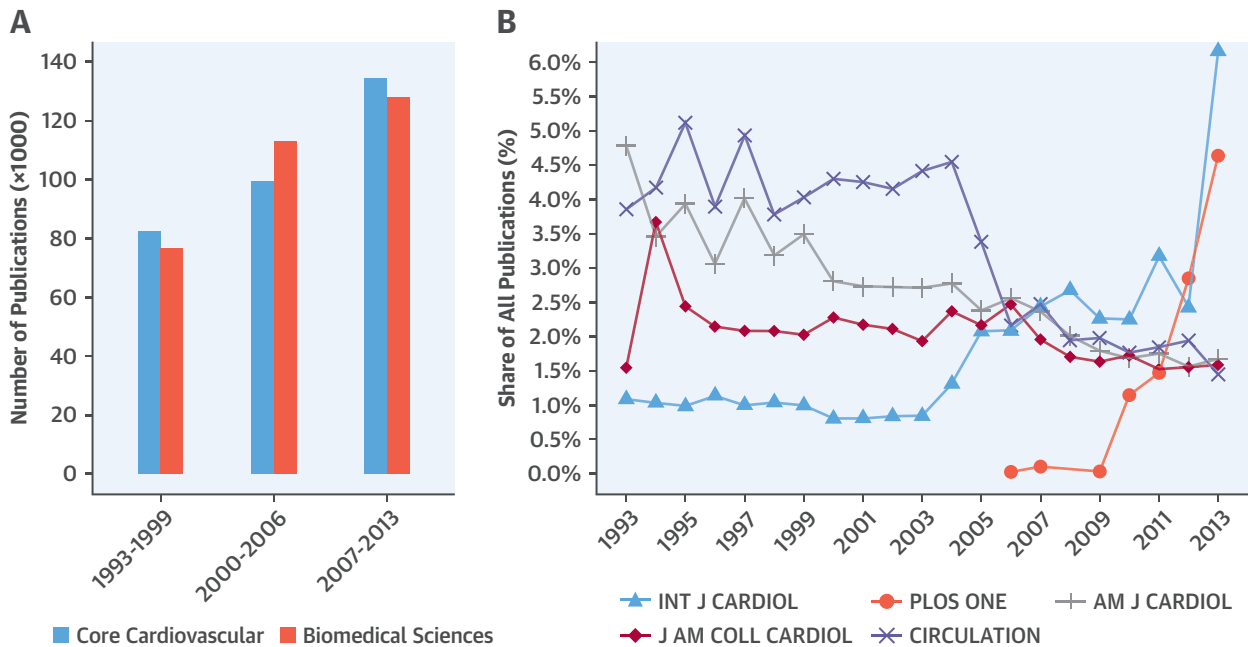
TOOLS TO ANALYZE NETWORKS

We investigated trends in journal initiation/development and publication output from 1993 to 2013. An annotated database with additional information can be found elsewhere (4). Based on the reference,

From the ^aDepartment of Cardiovascular Sciences, KU Leuven, Leuven, Belgium; ^bECCOOM and Department of Managerial Economics, Strategy and Innovation, KU Leuven, Leuven, Belgium; and the ^cDepartment of Science Policy & Scientometrics, Library of the Hungarian Academy of Sciences, Budapest, Hungary. Dr. Sipido is past Editor-in-Chief of *Cardiovascular Research* (2013 to 2017). Dr. Glänzel is Editor-in-Chief of *Scientometrics*. The authors have reported that they have no other relationships relevant to the contents of this paper to disclose.

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CENTRAL ILLUSTRATION Evolution of Journals Publishing Cardiovascular Research



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(A) Number of publications in each 7-year time period, according to journal field category. (B) Annual share of publications for the 5 journals with the largest change in share (4). Source: Clarivate Analytics Web of Science Core Collection.

abstract, and citation data for 804,152 cardiovascular publications in 5,984 journals (1), we included the most active and visible 565 journals according to rank, contributing the top 80% of all research output (n = 646,463 publications) and/or citations (n = 5,067,873) 2 full years after publication. Data were obtained from the Clarivate Analytics Web of Science Core Collection. All indicators were calculated yearly and for 7-year time periods: 1993 to 1999, 2000 to 2006, and 2007 to 2013. Each journal was also classified into 1 category: Core Cardiovascular; Broader Biomedical Science; Multidisciplinary; Natural Science; or Applied and Social Science. We compared the number/share of publications per journal, according to establishment and journal category. Statistically significant changes in proportions were evaluated by using the chi-square test, with p values <0.05.

We examined knowledge transfer and cardiovascular research communities through the flow of communication (cross-citations) between journals. The citation link strength (5) was calculated between individual journals based on the number of citations from Journal.A to Journal.B, standardized according

to the total number of citing publications' references in Journal.A and citations received by cardiovascular publications in Journal.B. We then clustered the journals according to the citation link strength using Infomap (6). The statistical significance of journal community changes over time was tested by using the Infomap bootstrap networks method.

AN EXPANDING AND DIVERSE COMMUNITY IN CARDIOVASCULAR RESEARCH

Cardiovascular research is published widely, with an equal output of publications in traditional core cardiovascular journals and broader biomedical science journals (Central Illustration, A). Overall, 37 journals have a publication share >0.5% in 2007 to 2013 (4). One-half of all journals maintained a steady contribution over time. The *International Journal of Cardiology* experienced the largest growth, attaining the highest relative share at 6% of all cardiovascular publications in 2013 (Central Illustration, B) (4), surpassing *Circulation*, the *American Journal of Cardiology*, and the *Journal of the American College of Cardiology*. The

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