

SCIENTIFIC PUBLICATIONS IN BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS (BBRC): A 20-YEARS BIBLIOMETRIC ANALYSIS

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ABSTRACT

Introduction: Biochemical and Biophysical Research Communications (BBRC) was founded in 1959, and is the prestigious international journal dedicated to the rapid dissemination of timely and highly important experimental results in all areas of biological research. Based on its long history and high-quality articles, BBRC is qualified to be indexed by several databases such as Web of Science (WOS) and PubMed. This research provides a thorough overview of the journal in the past 20 years by using bibliometric analysis to evaluate its performance.

Materials and methods: We retrieved related publications published in BBRC from the WOS database and PubMed database between 2000 and 2019. Different aspects, such as the total number of articles, total citations, average citations per item, H-index, research type, institutions, journals and top cited articles were classified and analyzed. In addition, collaboration and keywords co-occurrence networks were constructed by using VOSviewer software.

Results: From 2000 to 2019, BBRC published 40930 papers in WOS. Of these, Japan constituted a large share, accounting for 25.56%, followed by the USA and China. VOSviewer analysis showed that China had a close cooperation with the US, South Korea and Japan. Nevertheless, plenty of research collaborations could also be observed between Germany and other countries. High contribution institutions, their indicators of publication quality and the top 10 cited articles were also listed, which could reflect the visibility and influence of the research being published. Keyword co-occurrence analysis found a slight shift of focus in the research hotspots published during the past 20 years. BBRC possesses a long history and published large numbers of documents from researchers worldwide.

Conclusions: This study performed a thorough overview of the publications trends that have published in the BBRC between 2000 and 2019. Moreover, the evolution of keywords published on BBRC also provide a comprehensive perspective of biochemical and biophysical research.

Keywords: bibliometric analysis, PubMed, Web of Science, institutions, citations.

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Introduction

Biochemical and Biophysical Research Communications (BBRC) was founded in 1959 and published by Elsevier (San Diego, CA), and it is the prestigious international journal dedicated to the rapid dissemination of timely and highly important experimental results in all areas of biological research.

BBRC covers a number of research areas, including: biochemistry, bioinformatics, biophysics, cancer research, neurobiology, plant biology and proteomics. Based on its long history and high-quality articles, BBRC is qualified to be indexed by several databases such as MEDLINE and Web of Science (WOS) databases. As a result, large numbers of articles and studies from all over the world published in BBRC every year.

However, little is known about the relevant scientific output and research status regarding BBRC.

Bibliometrics focuses on the trends of research based on research hotspots and citation counts. This technology or method can appraise the visibility and influence of an individual research achievements, such as a journal article and total citations, or a group of research outputs, such as all research achievements and by a particular scientific group or institution⁽¹⁾. Previously, bibliometric analysis has been performed for evaluating different fields, such as critical care⁽²⁾, neurosurgery^(3,4), respiratory⁽⁵⁾ and urology⁽⁶⁾ to evaluate and rank scientific achievements both within institutions and on a national or international level. However, there exists no bibliometric reports assessing the relevant research trends and scientific output regarding BBRC in particular.

To provide an overview of insights into papers published on BBRC and publication trends, we performed bibliometrics analysis to analyze the bibliometric characteristic of BBRC during two decades, 2000-2019. Furthermore, we also explored the frequency and interconnection of keywords to detect and analyze pertinent research hotspots, frontiers, and trends.

Methods

Bibliometric Data

Based on previous similar articles^(7,8), all data and tools were acquired on July 17, 2020 from PubMed database and the web of science (WOS) online databases. We did not apply for ethical approval because the data is free of charge and there are no ethical issues. Articles in BBRC published between 2000 and 2019 were retrieved from the WOS online databases, which included the Science Citation Index Expanded (SCIE), Social Sciences Citation Index (SSCIE) and Arts & Humanities Citation Index (A&HCI). In addition, we acquired the information on research articles types from the PubMed database, including case reports, randomized controlled trials (RCTs), reviews, clinical trials and basic research.

Search strategy

In WOS, the search terms were as follows: Publication name: (biochemical and biophysical research communications), Refined by: document types: (article or editorial or review or letter or clinical trial) and languages: (english) and languages: (english), Databases= Wos, Biosis, Inspec, Kjd, Medline, Rsci, Scielo Timespan=2000-2019.

In PubMed, the search terms were as follows: ("biochemical and biophysical research communications"[Journal]) Filters: Publication date from 2000/01/01 to 2019/12/31; English Literature type included basic research, randomized controlled trials, clinical trials, review and case reports. To search for basic research, we identified the species as "other Animals".

Bibliometric analysis

The intrinsic function of WOS was used to analyze publication trends in research and publication quality from 2000 to 2019, including country/region, institution distribution, and top 10 cited references with high citation frequency.

In addition, VOSviewer (Van Eck& Waltman, Leiden University, Netherlands) and Microsoft Excel were used for data mining and mapping and clustering of the retrieved articles. These programs portrayed keywords and countries by colors and sizes of the circles according to keyword or country occurrences in both the titles and abstracts.

Results

Evaluation of global publications on BBRC

Based on the search strategy, a total of 40930 papers were published in BBRC between 2000 and 2019 in the WOS. The global number of publications published in BBRC displayed a smooth trend. A total of 90 countries and regions published articles in BBRC. Among them, Japan published the largest number of articles (10460, 25.56 %), followed by the USA (9422, 23.024 %), China (8670, 21.186 %), South Korea (4111, 10.046 %) and Germany (1999, 4.885 %). Unlike the global publication trend, the annual number of publications in BBRC from each country showed different trends (Figure1A-D). The number of papers published in BBRC by Japan and USA had gradually decreased. Conversely, the number articles published by China and South Korea have increased year by year (Figure1A-C).

Based on the network map of VOSviewer analysis, China closely coordinated with the United States, South Korea and Japan. Nevertheless, plenty of research collaborations could also be found between Germany and other countries, such as the India, Italy and England, which may be involved in the flow of researchers in biochemical and biophysical research areas, countries and technological levels (Figure 1D).

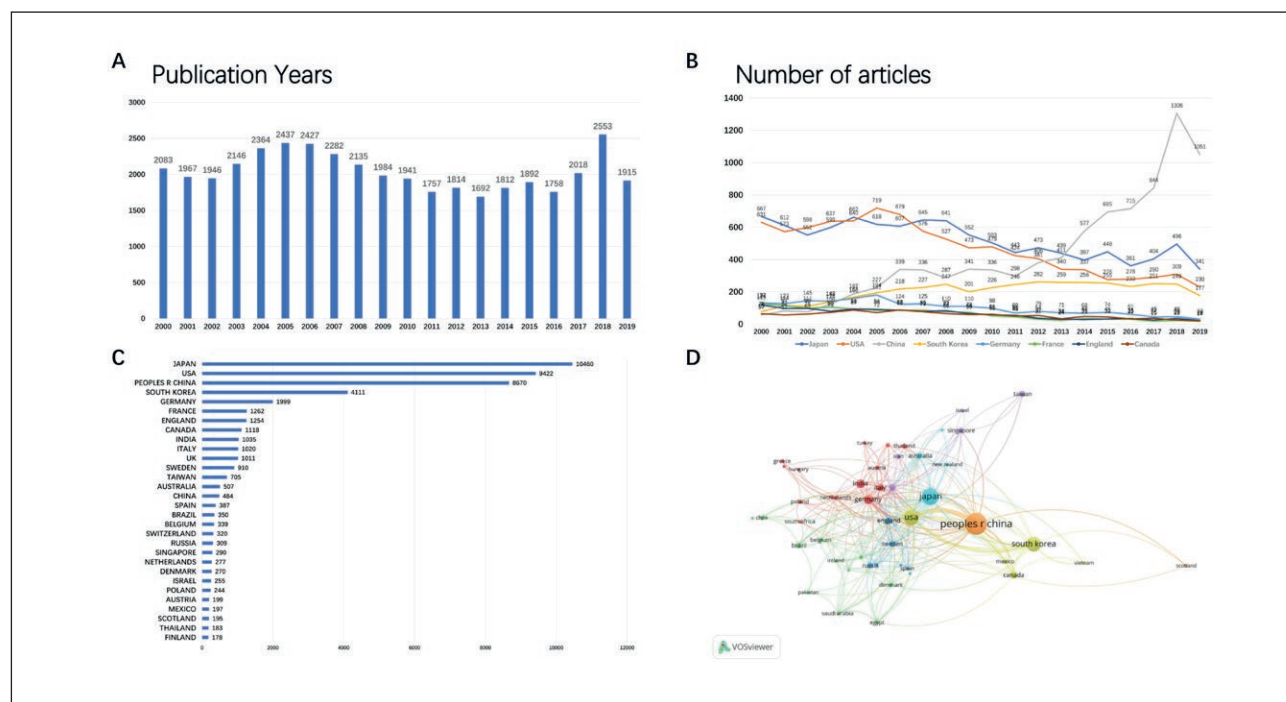


Figure 1: Evaluation of global publications in BBRC (A) The global number of publications in BBRC. (B) The time curve of articles from the top 8 countries. (C) The number of articles in BBRC from the top countries over two decades. (D) Co-author collaboration network by country from articles published by BBRC between 2000 and 2019.

Distribution of highly contributive institutes and quality assessment

The top 10 highly contributive institutes are presented in Figure 2A. A total of 11625 institutions or organizations from different nations or regions published papers in BBRC between 2000 and 2019. University of Tokyo in Japan published the most papers overall with 1335 papers, followed by Chinese Academy of Science (1008 publications), and Osaka University (932 publications). Among the top 10 highly contributive institutes, four of them were from Japan, and the other institutions were from China, South Korea and USA institutions, which is similar to the distribution by country/region.

The number of citations is a measure of its influence and visibility to other researchers. In this respect, University Tokyo ranked the first, which had 39463 sum of the times cited, 29.56 average citations per item and an 84 h-index. In terms of the total citations, another two Japanese institutions were third and forth, which is in accordance with the proportion of article numbers (Figure 2B). Although the number of articles from Chinese Academy of Science is large, the total citations is not very high.

The distribution of article types and the top 10 cited articles

In WOS database, we classified the research ar-

reas of articles from BBRC in the last two decades. Globally, there were 91 research areas on articles in BBRC, among which biochemistry molecular biology (40,874, 99.929%), biophysics (40,874, 99.929%), cell biology (27,761, 67.870 %), genetics heredity (26,801, 65.523 %), and pharmacology pharmacy (15,374, 37.586 %) were the most common areas (Figure 2C). Based on PubMed search strategy, a total of 40356 articles were published in BBRC from 2000 to 2019. Basic research was the main research types in the BBRC with 21462 papers, accounting for 53.18% of the total number of papers over the last two decades. Moreover, 794 reviews (1.97%), 107 case reports (0.265%), and 72 clinical trials (0.178%) were published in BBRC. Considering that clinical trials and other article types were scarce, Figure 2D just exhibits the proportions of the three main article types.

To explore the impact of BBRC, it was of interest to confirm the most frequently cited papers. As shown in Table 1, Arita et al⁽⁹⁾. published the most highly ranked article in the journal (1436citations), followed by a article authored by Sakuma et al⁽¹⁰⁾. (1235 citations) and Radonic et al⁽¹¹⁾ with 1173 citations, which is also a measure of its visibility to other researchers. Among the top 10 cited papers, the oldest paper in our study collection was written in 2000 and ranked fifth⁽¹²⁾, while the most recent paper was written in 2006, and ranked 1st⁽⁹⁾.

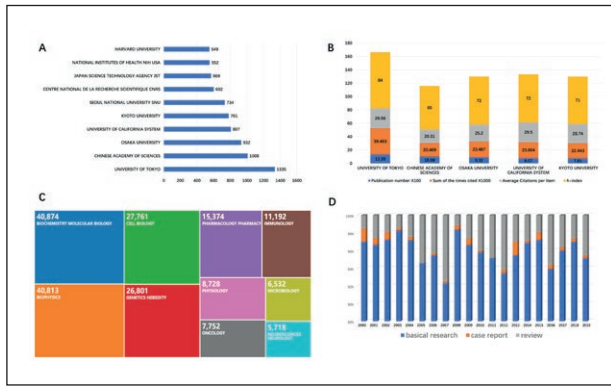


Figure 2: Distribution of highly contributive institutes and quality assessment (A) The top 10 institutions contributing manuscripts to BBRC. (B) The publication quality assessment of the institutions contributing manuscripts to BBRC. (C) research areas of articles in BBRC. (D) Distribution of article types in BBRC.

As shown in Figure 3C-D, three clusters with high co-occurrence frequencies were found between the period 2000-2019. The red cluster owned terms related to “activation”, “cells” and “proteins”, while the blue cluster included terms related to “expression”, “proliferation” and “cancer”, and the green cluster had terms related to “apoptosis”. When we divided the 20 years into two parts, we could observe the dynamic change of hot topics over time (Figure 4C-D). During 2000-2009, the keywords with high co-occurrence frequencies included four clusters, being the blue cluster related to “expression”, “cell” and “mice”. The red cluster incorporated keywords related to “gene”, “protein” and “binding”, the green cluster contained keywords related to “activation”, “gene-expression” and “transcription”, and the yellow clusters included “in vitro” and “proliferation”.

Title	First author	Year	volume	issue	Total citations	Average Citations per Year
TDP-43 is a component of ubiquitin-positive tau-negative inclusions in frontotemporal lobar degeneration and amyotrophic lateral sclerosis	Arai, Tetsuaki;	2006	351	3	1436	95.73
DNA-binding specificity of the ERF/AP2 domain of Arabidopsis DREBs, transcription factors involved in dehydration- and cold-inducible gene expression	Sakuma, Yoh;	2002	290	3	1285	67.63
Guideline to reference gene selection for quantitative real-time PCR.	Radonic, Aleksandar;	2004	313	4	1173	69
Detection of loop-mediated isothermal amplification reaction by turbidity derived from magnesium pyrophosphate formation.	Mori, Y;	2001	289	1	1152	57.6
Phylogenetic classification of prokaryotic and eukaryotic Sir2-like proteins.	Frye, R A	2000	273	2	1021	48.62
Extensive modulation of a set of microRNAs in primary glioblastoma	Ciafre, SA;	2005	334	4	901	56.31
Validation of housekeeping genes as internal control for studying gene expression in rice by quantitative real-time PCR	Jain, Mukesh;	2006	345	2	813	54.2
Ghrelin stimulates gastric acid secretion and motility in rats.	Masuda, Y;	2000	276	3	733	34.9
Resistin is expressed in human macrophages and directly regulated by PPARgamma activators.	Patel, Lisa;	2003	300	2	732	40.67
Ghrelin and des-acyl ghrelin: two major forms of rat ghrelin peptide in gastrointestinal tissue.	Hosoda, H;	2000	276	3	726	34.57

Table 1: The Top 10 highly cited papers that were published between 2000 and 2019.

Hotspot analysis of BBRC between 2000-2019

To understand the topics published by BBRC, all titles and abstracts of the 40317 papers published between 2000-2019 were input and analyzed to build the co-occurrence network, producing clusters that can be linked with research hotspots.

However, in this decade (2010-2019), the network of the main popular topics formed 3 clusters. The red cluster was “expression”, “cell” and “activation”, the blue cluster contained “proliferation”, “cancer” and “metastasis”, and the green cluster included “pathway”, “apoptosis” and “inflammation”.

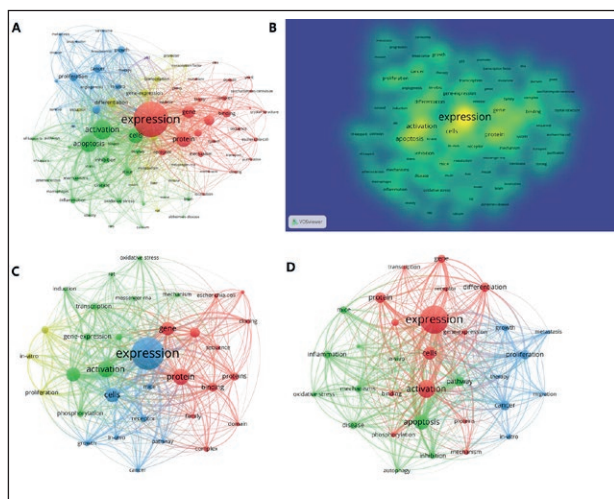


Figure 3: Hotspot analysis of BBRC between 2008 and 2017 (A) Mapping of the keywords in BBRC between 2000 and 2019. (B) The density of keywords with high co-occurrence frequencies in BBRC between 2000 and 2019. (C) Mapping of the keywords in BBRC between 2000 and 2009 (D) Mapping of the keywords in BBRC between 2010 and 2019.

Discussion

To the best of our knowledge, this is the first report that clearly showed the publication trends and quality assessment of BBRC over the past two decades. During 2000-2019, the number of publications increased smoothly overall. Even though the publications number of BBRC is large, the quality of its work and the its impact factor (IF) have not been adversely affected according to Journal Citation Reports. In fact, since 2017, BBRC has been placed among the third quartile journals in the “Biochemistry & molecular biology” discipline (170/293) and the second quartile journals in “Biophysics” discipline (35/72). With the stability and rapid economic growth of China, the scientific research strength of China has been gradually enhanced. As a result, China scored a tremendous achievement in research output and publication fields. For example, the publication numbers of anesthesiology⁽²⁾, critical care⁽¹³⁾ and the cancer field⁽¹⁴⁾, the number of papers published in BBRC has also increased gradually. In VOSview analysis, China collaborated closely with many other countries, suggesting that China is participating in increasing numbers of international collaborations.

From the perspective of highly contributing institutes, five out of the top eight institutions are from Japan, which is consistent with the distribution by countries/region. Citation and h-index analysis are generally considered to be an important indicators of publications quality by researchers or institutions.

Because of the massive number of papers published in BBRC, the citation and h-index of Japanese institutions indicated they are first in the world. However, in consideration of the gradual decline in the publication numbers in BBRC from Japan, its leading position may be eroded in the next 20 years.

In the past two decades, basic research has continued to be the main research article type published in BBRC. Clinical trials and case reports are scarce, which indicates that BBRC is more suitable for publication of basic research into the natural sciences. Further analysis of the top 10 cited articles published on BBRC showed that seven of the papers were published by researchers from Japan, whereas the other three were in collaboration with Italy, Germany and England, which further reflects the dominant position of Japan in BBRC. The analysis of keywords with high co-occurrence frequencies displays the dynamic change of research hotspots. Intriguingly, “activation”, “cells” and “expression” are still the main keywords in the first and second decade. However, with the changes in global research directions, “apoptosis”, “inflammation” and “autophagy” have gradually received more attention.

Obviously, our analysis also has some limitations. First, some articles are the products of international cooperation with different countries or regions. Our search results of institutional affiliations may introduce some bias into our study. In addition, some documents collected from PubMed and WOS databases may be delayed so that the citations and h-index may be flawed.

Conclusion

Our study performed a bibliometric overview of the publications trends that have occurred in the BBRC between 2000 and 2019, using the WOS and PubMed database to collect bibliographic information and listing a series of bibliometric parameters. Utilizing visual tool, we also presented co-occurrence network regarding on the BBRC over the past 2 decades. Moreover, the evolution of keywords published on BBRC provides a comprehensive perspective of biochemical and biophysical research.

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Abbreviations: IF=impact factors, RCTs = randomized controlled trials, SSCIE=Social Sciences Citation Index, A&H-CI=Arts & Humanities Citation Index, SCIE = Science Citation Index Expanded, WOS = Web of Science.

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Conceptualization, J.W. and WD.H.;

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data curation, WD.H.;

writing—original draft preparation, J.W and WD.H.;

writing—review and editing, ZY.X.;

supervision, JS.Y.;

funding acquisition, ZY.X.

All authors have read and agreed to the published version of the manuscript."All authors reviewed and approved the final version of the manuscript

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