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The global trend of intravenous anesthesia and tumors: a bibliometric and visualized study

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Abstract

Background Through bibliometric analysis, this paper summarizes the growing literature and analyses the development trends and hot spots in the research field of the association between intravenous anesthesia and tumors.

Methods A literature overview was conducted using relevant articles retrieved from the Web of Science Core Collection published between 1991 and 2024. Bibliometric websites and tools (VOSviewer, CiteSpace, and bibliometric R package) are used to analyze the co-occurrence of keywords and reference citations, detailing countries, institutions, authors, references, journals, and keywords.

Results A total of 1198 relevant articles were included in the study. The USA, China, and Germany have the largest number of publications, with the USA and China having the most interagency cooperation and Germany relatively less cooperation. The institution that publishes the most articles is the University of National Defense Medical Center, and the journal that publishes the most articles is *Anesthesiology*. The five most productive authors are Li J., Liu J., Zhang B., Yu X.J., and Xu J. "Surgery", "anaesthesia", and "propofol" are the most common keywords. In recent years, research has focused mainly on intravenous anesthesia and tumor survival.

Conclusion Both Western countries and China have made outstanding contributions to intravenous anesthesia and tumors. In recent years, the number of publications in China has steadily increased, and the quality and influence of these articles deserve recognition. Future research should focus on the key areas of intravenous anesthesia, tumor recurrence, and survival.

Keywords Intravenous anesthesia, Tumor, Bibliometric analysis, VOSviewer, CiteSpace

Introduction

Tumors are a major threat to global health, are a leading cause of death worldwide, and can impose a significant economic burden on countries (Bray et al. 2018; Siegel et al. 2024). Effective early intervention, especially surgery, has the potential to cure many solid tumors (Coles et al. 2022; Cornford et al. 2024; Dar et al. 2024; Piqeur et al. 2024). Many recent studies have highlighted the influence of perioperative anesthetic factors, especially the choice of intravenous anesthesia, on the fate of tumor cells during tumor-related surgery (Allan et al. 2024; Hussain et al. 2024; Oliver et al. 2024; Potocnik et al. 2024). Beyond their conventional anesthetic and sedative functions, intravenous anesthetics have been increasingly recognized for their potential impact on tumor progression, immune modulation, and metastatic potential (Carnet Le Provost et al. 2024; Chida et al. 2024; Rodriguez Arango et al. 2024; Wang et al. 2024).

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Despite growing interest in the oncological implications of anesthetic techniques, existing research has primarily concentrated on the effects of various anesthetic drugs on immune function (Wang et al. 2023), the role of acupuncture in cancer treatment (Yang et al. 2023), comparisons of different anesthesia modalities (Qu et al. 2023), neurotransmitter involvement (Shi et al. 2022), and strategies for cancer pain management (Cascella et al. 2022). However, a dedicated bibliometric analysis comprehensively mapping the intersection between intravenous anesthesia and oncology remains absent. Addressing this gap is crucial, as an in-depth understanding of the research landscape can facilitate the identification of emerging trends, research hotspots, and potential future directions in this field.

Bibliometric analysis offers a timely, intuitive, and fairly objective approach to generating representative articles, journals, and publishers; monitoring advances in distinct knowledge domains; and investigating knowledge frameworks. Originally, researchers in intelligence, library science, and archival science predominantly utilized this analysis in their initial phases. However, with the evolution of research progress and the adoption of interdisciplinary methodologies, this form of analysis is currently extensively applied across various realms in the medical field (Huang et al. 2019; Liu et al. 2024; Wang et al. 2024; Xu et al. 2024). Leveraging the Web of Science Core Collection (WOSCC) database, this study conducts a bibliometric analysis of research at the interface of intravenous anesthesia and oncology, utilizing VOSviewer, CiteSpace, and other established bibliometric tools. By offering a structured overview of this evolving field, our study provides valuable insights into its development and future research directions, helping bridge the existing knowledge gap.

Methods

Data analysis methods

The WOSCC is considered the leading database for scientific publications across various research areas. It provides access to numerous databases that encompass interdisciplinary research and delve into specialized fields across multiple disciplines (De Castilhos Ghisi et al. 2020). For this research, WOSCC served as the primary data source, and articles focusing on "tumor" and "intravenous anaesthesia" were chosen as the search criteria. Owing to variations in the English terminology for the subject matter, the topic search term was employed in conjunction with the "logical" (AND) operator for a more comprehensive search. The search formula was as follows: TS = (Neoplasms OR Tumor OR Neoplasm OR Tumors OR Neoplasia OR Neoplasias OR Cancer OR Cancers OR Malignant Neoplasm OR Malignancy OR Malignancies OR Malignant Neoplasms OR Neoplasm, Malignant OR Neoplasms, Malignant OR Benign Neoplasms OR Benign Neoplasms OR Neoplasms, Benign OR Neoplasm, Benign) AND TS = (intravenous anaesthesia OR Intravenous anaesthesia OR Intravenous anaesthesia). The export date of the search results was set to April 20, 2024. Bibliometric software such as VOSviewer (Van Eck and Waltman 2010), CiteSpace (Chen 2006), and bibliometrix R packages (http://www.R-project.org/) were used to display publications on the basis of authors, countries, institutions, and keywords. Two team members worked together to increase the accuracy of the data collection. Out of a total of 1253 articles gathered, 1198 were deemed suitable for the study. A visual representation of the literature screening process is shown in Fig. 1.

Literature publication time and country/region analysis

The online analysis platform for bibliometrics (http://bibliometric.com/) assesses patterns in the number of published papers and yearly publications from different countries to ascertain the dispersion of literature.

Examination of academic connections among countries, institutions, authors, and publications

Examination of cocitations among countries, institutions, and authors with noteworthy impacts on discipline and potential collaboration.

The software VOSviewer 1.6.17 was used to analyze and produce maps illustrating cooperation among countries, instructions, and co-cited authors. The specific configurations include analysis type, co-citation; unit of analysis, cited author; and set threshold, an author must have a minimum of 50 citations. For institutions, analysis type, coauthor; unit of analysis, organization; and set threshold, an organization must have a minimum of 20 documents. For countries, analysis type, coauthor; unit of analysis, country; and set threshold, country must have a minimum of 5 documents. The network diagram displays nodes and connections, with nodes representing countries, organizations, or authors. Nodes in the same color indicate close collaboration between the corresponding countries, organizations, or authors.

Researchers utilize CiteSpace software to generate dual maps of academic journals. The main goal of overlaying these maps was to uncover the distribution of topics in the journal. By examining publications and citations within a specific field, researchers can gain insights at the disciplinary level. The cocitation analysis of scholarly works was conducted via CiteSpace 6.1.6. In the visual representations produced by the software, individual elements such as authors, countries, institutions, and keywords are depicted as dots, with the size of the dot representing the significance of the element.

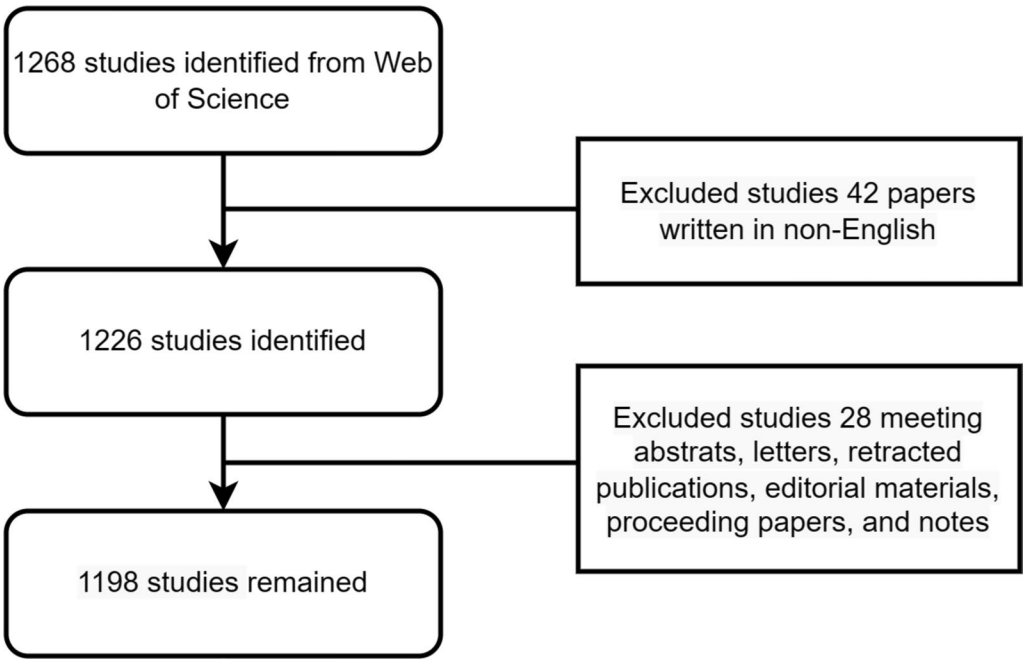


Fig. 1 Flowchart outlining the literature inclusion and exclusion process

Knowledge-based analysis of intravenous anesthesia and cancer

Bibliometric analysis plays a crucial role in identifying knowledge bases and research trends in a particular field. To achieve this, several essential steps are necessary, such as literature cocitation analysis, citation path analysis, keyword clustering, and keyword burst identification.

CiteSpace 6.1.6 was used to conduct a cocitation analysis of the literature. This software provides visual representations with elements, such as authors, countries, institutions, and keywords, represented by dots of varying sizes. The connections between these dots signify cocitation relationships, with a greater number of connections indicating stronger collaboration. The parameters for CiteSpace were defined as a time range from 1991–2024, 1 year per slice, including all the etymologies, selecting the top 50% of the data, and visualizing the cluster view in static mode with a merged network display. The frequency of occurrence or reference is reflected in the size of each dot in the visual graph, whereas the color and thickness of the circle around the dot indicate the number of occurrences or references and their corresponding time frame.

Analysis of the author keyword co-occurrence clustering network graph was conducted via VOSviewer. This visualization shows keyword elements represented as nodes in a spatial layout, with connections between nodes illustrating the coreference relationships. The elements are categorized, and their importance is symbolized through distinct colors, shapes, and sizes. In the cocitation graph, each point represents a unique keyword, and the point size indicates the frequency of occurrence. The connecting lines demonstrate coreference relationships, whereas the varying colors of the points and lines signify different clusters or chronological periods. Data analysis begins by importing information into VOSviewer and selecting the "create map on the basis of txt file word" option. The search results from the WOSCC were then incorporated with keywords extracted from titles and abstracts, and only those occurring 15 times or more were retained. Following this, any extraneous keywords were manually removed to yield the co-occurrence results.

To infer future research trends, we utilized a combination of keyword co-occurrence analysis, burst detection, and thematic evolution tracking. VOSviewer was employed to cluster high-frequency keywords and identify emerging trends over time, whereas CiteSpace was used to detect burst keywords, reflecting rapidly growing research interests. Additionally, co-citation network analysis was performed to pinpoint influential studies shaping the field. By integrating these approaches, we systematically projected potential research directions within the domain of intravenous anesthesia and cancer.

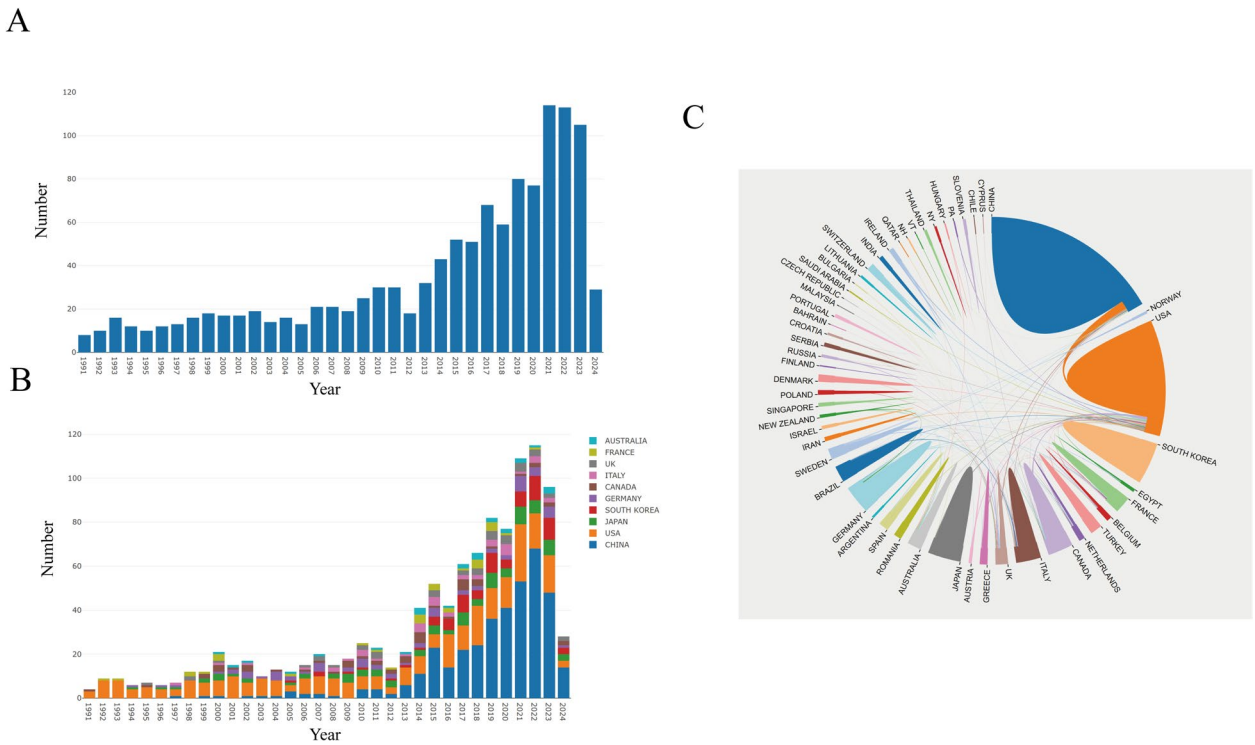


Fig. 2 Articles on intravenous anesthesia and tumors published worldwide. **A** The general publication number from 1991 to 2024. **B** The number of publications varies over the years. **C** Cooperation between countries according to bibliometric online analysis

Results

Overall publication number and global trend

A flowchart of the data-processing process is illustrated in Fig. 1. In accordance with the specified inclusion criteria, 1198 research papers were selected from the WOSCC database. Figure 2A illustrates the increasing trend in annual publication numbers, signifying sustained global interest in the correlation between intravenous anesthesia and tumors. To identify the top nations in this particular field of study, an extensive examination of articles from diverse countries was conducted via a bibliometric tool for online analysis. The USA is at the forefront of this research domain, with consistent growth in publication output. Despite its initial slow start, China has made remarkable progress in publications related to intravenous anesthesia and tumors (Fig. 2B). Notably, the highest number of publications on intravenous anesthesia and tumors were recorded in 2021 (Fig. 2A).

Contribution by country

Among the 54 countries that published studies on intravenous anesthesia and tumors, the USA led in terms of the number of research articles, with China and Germany following closely behind (Fig. 2B). Both the USA and China have established strong collaborations with numerous other countries, whereas Germany has fewer intercountry partnerships (Fig. 2C). The analysis of country output indicated a significant increase in publications from China in recent years, with the USA also experiencing steady annual growth (Fig. 3A). The total citation counts reveal that papers originating from the USA far surpass those from any other nation, with China coming second with lower total citations (Fig. 3B).

Contribution by institution and author

There are 560 institutions worldwide involved in the research of intravenous anesthesia in cancer, the top 10 of which are shown in Table 1. The University of National Defense Medical Center has the highest number of publications and citations, demonstrating its significant academic influence in the field. Among the top 10 authors, nine were affiliated with China, whereas one was affiliated with the USA (Table 2). Li led the list of prolific authors and has contributed 55 articles since 2009.

The coordination among countries, institutions, and authors is shown in Fig. 4. As shown in the figure, China and the USA are at the forefront of research on intravenous anesthesia and tumors. The country collaboration network map (Fig. 4B) presents the cooperation among different countries within this research field. The figure reveals a close collaborative relationship between the

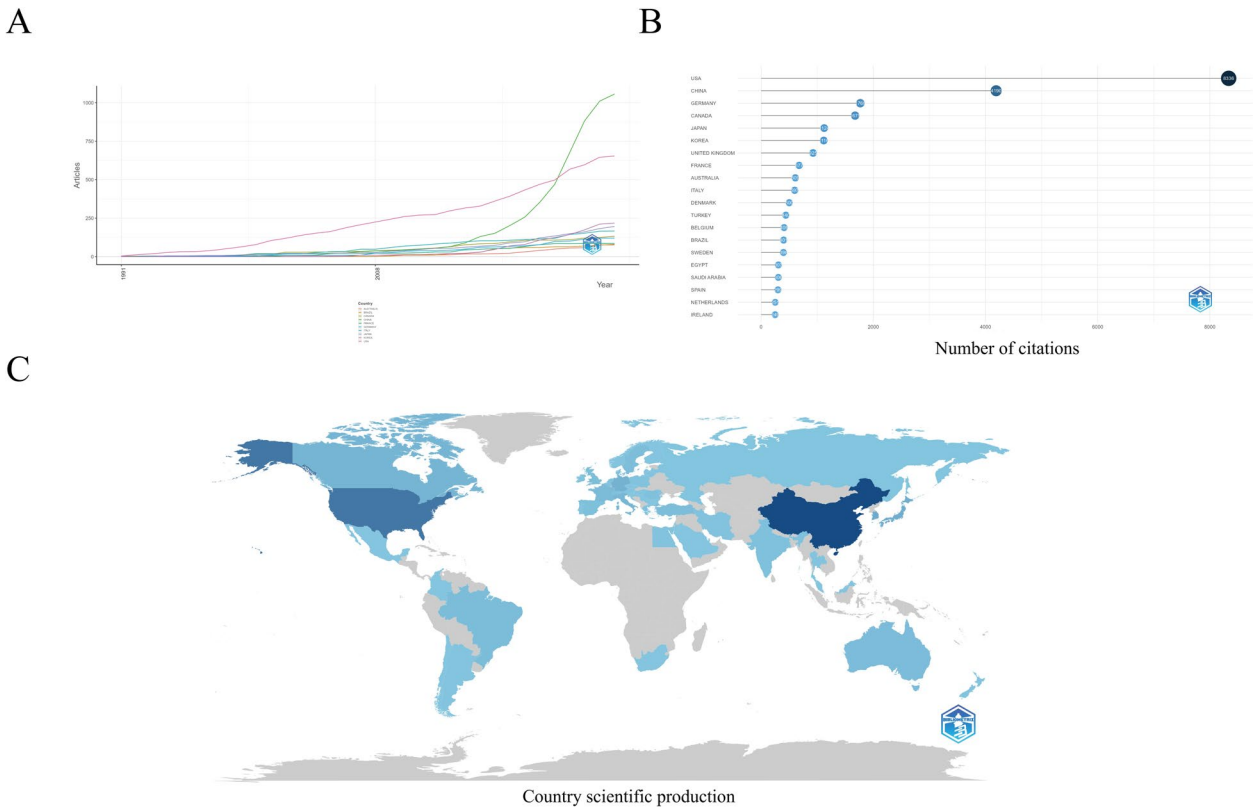


Fig. 3 Analysis of studies on intravenous anesthesia and tumors among nations. **A** Trends in the annual distributions of the leading 10 productive countries over time. **B** Map visualization displaying the top 20 countries with the most publications. **C** Geographical distribution of the global output

Table 1 Top 10 most productive institutions for intravenous anesthesia and tumors

Rank	Institutions	Documents	Citations	Average Citation
1	National Defense Medical Center	24	366	15.25
2	Tri-Service General Hospital	18	328	18.22
3	Seoul National University	52	300	5.77
4	University of Melbourne	20	207	10.35
5	Monash University	9	183	20.33
6	University of Texas MD Anderson Cancer Center	40	159	3.98
7	Yonsei University	38	141	3.71
8	Seoul National University Hospital	8	118	14.75
9	University of Ulsan	7	116	16.57
10	Peter MacCallum Cancer Centre	6	115	19.17

USA and China, as well as partnerships among other countries such as Japan, Germany, and France.

Publication analysis

A total of 764 journals published articles on intravenous anesthesia and cancer between 1991 and 2024. The data were analyzed via VOSviewer software. *Anesthesiology* led the way with 33 publications, making it the top journal among the top ten. Of these, four were from England, and four were from the USA (Table 3). The *Canadian Journal of Anaesthesia* achieved the highest average number of citations per paper (10.80), followed by *Anesthesiology* and *Scientific Reports*.

Table 2 Top 10 most productive authors on intravenous anesthesia and tumors

Rank	Journals	Documents	Citations	Average citation
1	Anesthesiology	33	276	8.36
2	BMC Anesthesiology	32	102	3.19
3	Plos One	18	90	5.00
4	Journal of Clinical Anesthesia	16	66	4.13
5	Acta Anaesthesiologica Scandinavica	9	66	7.33
6	Anesthesia and Analgesia	26	65	2.50
7	Medicine	29	64	2.21
8	Scientific Reports	7	62	8.86
9	Canadian Journal of Anesthesia	5	54	10.80
10	British Journal of Anaesthesia	14	48	3.43

Figure 5A is a co-citation analysis network map generated using CiteSpace, illustrating the collaboration and citation networks among different academic papers. The figure reveals complex citation relationships between papers, with nodes in the central region typically representing key research areas or trending topics. As shown, studies related to "anesthesia," "cancer," and "treatment" appear to be among the most active areas. Figure 5B is a document co-citation network map generated by CiteSpace, where the core research topics in the central region still include keywords such as "anesthesia," "cancer," and "treatment." The peripheral nodes contain emerging research topics, which may represent recent trends or issues, such as "novel anesthetic drugs" and "targeted therapy."

Keyword analysis

VOSviewer analysis of keyword co-occurrence provides a visual representation of clustered keywords, highlighting two main categories. Evaluating the frequency and quantity of keywords within a specific timeframe is crucial for predicting research trends. Figure 6A presents a tree map of the top 20 core keywords in the field of intravenous anesthesia and tumors. Each rectangle corresponds to a keyword, with its size directly proportional to its occurrence in the literature. Terms such as "surgery," "anesthesia," "propofol," "tumor," and "management" occupy larger areas, indicating their high frequency in related research. Figure 6B is a keyword frequency distribution chart. Each dot represents a keyword, with the size of the dot proportional to its occurrence frequency. The chart shows that "surgery" and "anesthesia" appear most frequently in the literature.

Figure 6C is a theme-related keyword word cloud. The size of each word corresponds to its frequency in the dataset—the more frequently a word appears, the larger its font. In Fig. 6C, "anesthesia" and "surgery" are the most prominent keywords, indicating their high occurrence in the dataset and highlighting the critical role of anesthesia and surgery in cancer treatment. The keywords in the word cloud reveal the core topics in current anesthesiology research, including anesthetic drugs, surgery, postoperative pain, anesthesia types, and specific clinical conditions such as tumor recurrence and drug efficacy.

Furthermore, Fig. 7 displays the keyword visualization generated by the VOSviewer software, which effectively presents a network diagram illustrating the patterns and trends of keywords. Figure 7A shows that the keyword "anaesthesia" was the most concentrated node, followed by "propofol" and then "propofol." The overlay visual map summarizes the occurrence of keywords from a temporal perspective. The yellow nodes in Fig. 7B represent the keywords that have appeared recently, indicating that the research hotspots in recent years involve intravenous anesthesia and cancer recurrence and survival. In summary, research on the relationship between intravenous anesthesia and tumors over the past decade has focused on a particular intravenous anesthetic drug. However, as an increasing number of studies have reported, researchers are increasingly concerned with the impact of intravenous anesthesia on the prognosis and survival of patients with cancer.

One distinguishing characteristic of CiteSpace is its ability to display an abrupt surge of terms within a particular research field during specific timeframes, highlighting the potential focal points and trends during each period. Using this tool, we analyzed emerging terms related to intravenous anesthesia and cancer, as depicted in Fig. 8. Figure 8A shows the timeline distribution of luster analysis of keywords, and "intravenous patient-controlled analgesia" and "propofol-based total intravenous anaesthesia" have been discussed recently. The top 25 keyword bursts were examined via CiteSpace. Figure 8B shows these bursts, which span 1991–2024. Notably, the keyword "tumor necrosis factor" had the most prominent intensity

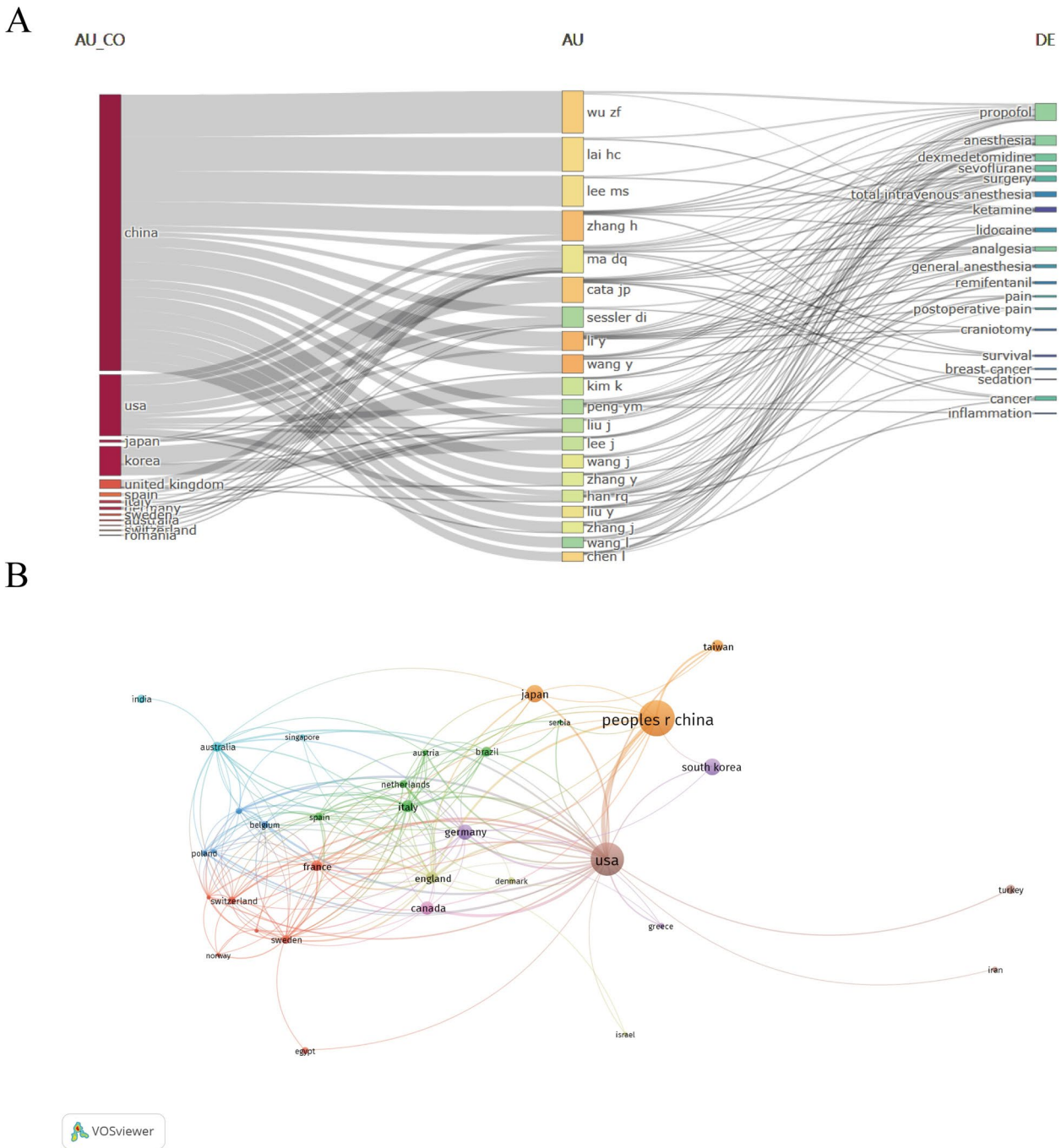


Fig. 4 Contribution maps of institutions for intravenous anesthesia and tumors. **A** Dual-map overlay of collaboration networks among countries, authors, and institutions. **B** Mapping of cooperation between institutions from different countries

at 9.88. Notably, in the last 5 years, the keyword bursts focused on "survival" (2019–2024), "cognitive function" (2019–2020), "volatile" (2020–2024), "lung cancer" (2020–2022), "intravenous anesthesia" (2020–2022), "invasion" (2020–2022), and "long-term survival" long-term survival (2022–2024). The findings indicate that these areas of research have received significant interest from scholars and continue to remain popular for extended periods.

Scientific contribution analysis

Figure 9 illustrates the disciplinary clustering network of research on intravenous anesthesia and cancer. The

Table 3 Top 10 most influential articles on intravenous anesthesia and tumors

Rank	Author	Articles	Articles fractionalized	Total citation	H-index	Production year start
1	Li J	55	6.01	1267	19	2009
2	Liu J	46	4.68	1941	22	2008
3	Zhang B	44	4.56	1485	20	2008
4	Yu Xj	41	3.96	988	19	2013
5	Xu J	40	4.26	1035	19	2012
6	Li Y	39	4.98	537	16	2005
7	Zhang L	38	5.29	1671	21	2002
8	Liu Y	36	4.67	844	13	2000
9	Kimmelman	33	5.93	7663	24	2011
10	Zhang Y	30	3	636	12	2008

figure presents the dynamic evolution and interrelations of multiple disciplines. In the figure, "medicine" and "anesthesiology" are connected by curves, revealing their intersections and mutual influences in different studies. Specifically, the impact of anesthetic agents on tumor biological behavior may be reflected in the domains of medical and clinical research.

Discussion

Extensive research has been conducted on the detailed analysis and visualization of authors, countries, regions, and journals of articles focusing on intravenous anesthesia and tumors from 1991 to 2024. We aim to present the present research landscape, potential areas of interest, and future trends to foster advancements in the field and promote further innovation. Using tools such as CiteSpace and VOSviewer, we visually examined research spanning three decades and identified 1198 publications within this domain.

Research indicates that the number of articles and references on intravenous anesthesia and tumors is increasing annually. Potential reasons for this pattern may be attributed to several factors. First, advancements in diagnostic technology, especially in the diagnosis and treatment of oncological diseases in developing countries, have led to higher detection rates and timely surgical treatment of such diseases (Papri et al. 2021). Moreover, increased research focus and financial support have driven the development of novel diagnostic methods and treatments for cancer, resulting in an increase in research output and literature on this topic (Kendall et al. 2024; Kroese et al. 2024). Additionally, improved collaboration and knowledge sharing among healthcare professionals, scientists, and organizations have contributed to greater emphasis on managing and preventing oncological conditions (Miao et al. 2024; Zhao et al. 2024).

Our analysis revealed that the USA and China serve as primary hubs for research on intravenous anesthesia and tumors, collectively representing approximately half of global publications in this area. In terms of institutions, the most cited is Monash University in Australia. The USA is the most cited country in this field. Our observations revealed that China ranks as the second-largest nation in terms of articles published on intravenous anesthesia for tumors. These differences in research productivity may be influenced by several factors, including national funding priorities, regulatory environments, and institutional research focus (Feng et al. 2022; Wilson et al. 2021). The USA, for instance, has a long history of government-backed oncology research through agencies such as the National Cancer Institute, whereas China has seen a recent surge in research investment, particularly through the National Natural Science Foundation of China. Additionally, regulatory differences in clinical trial approval processes and publication incentives may contribute to variations in output and research emphasis between these two countries. A more structured and sustained research funding environment in the USA might account for its dominance in citation impact, whereas China's rapidly expanding research landscape suggests increasing global contributions in this field.

Nine of the top ten authors were from China, with the remaining author from the USA. An analysis of popular keywords revealed that "anaesthesia," "surgery," "cancer," "propofol," and "management" were frequently utilized. These terms reflect the prevalent research topics in the field from 1991 to 2024 (Yan et al. 2018; Hovaguimian et al. 2020; Ramirez and Cata 2021; Xia et al. 2023). Additionally, by using CiteSpace software, we examined emerging terms in the last three decades, offering insight into significant changes within specific research areas. This methodology can help to identify trends and future directions for researchers. Within the realms of intravenous anesthesia and tumor studies, recent breakout terms such as "survival," "volatile," "lung cancer,"

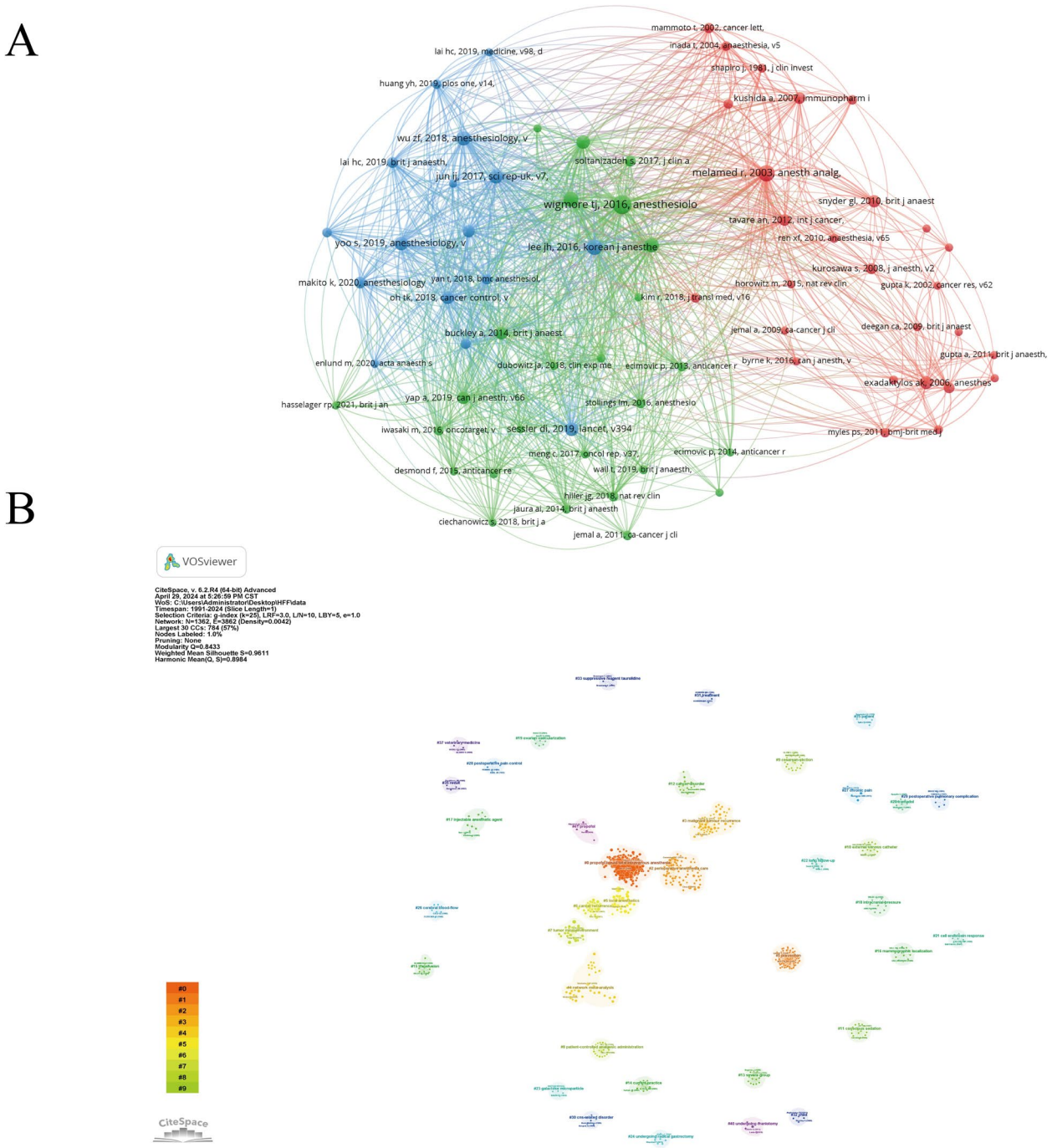


Fig. 5 References and cocitation clusters on intravenous anesthesia and tumors. **A** Literature clustering analysis of the intravenous anesthesia used in the cancer cocitation network drawn in CiteSpace. **B** Analysis of literature citation relationships and research field trends

"intravenous anesthesia," "invasion," and "long-term survival" gained prominence between 2019 and 2024 (Qi et al. 2019; Gaskell and Sleigh 2020; Wang et al. 2022; Zhang et al. 2022; Murphy et al. 2023). This suggests that future research in this field should focus on these key areas.

These emerging trends suggest a growing emphasis on the potential impact of intravenous anesthesia on long-term oncological outcomes. Given that perioperative factors have been increasingly recognized as critical determinants of cancer recurrence, future research should focus on understanding how intravenous

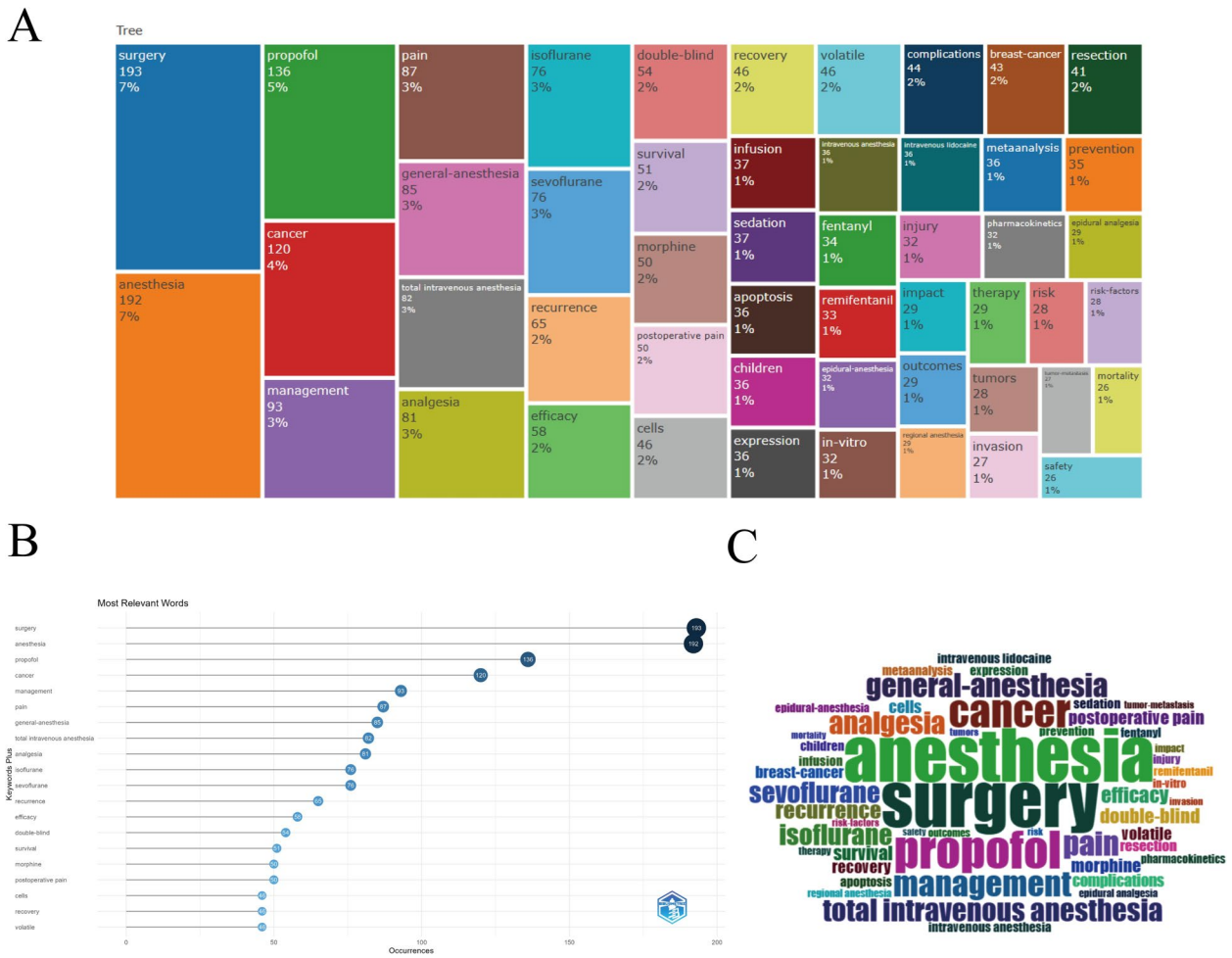


Fig. 6 Analysis of keywords related to intravenous anesthesia and tumors. **A** Keyword tree graph. **B** Keyword bar chart. **C** Keyword word cloud map

anesthetic agents influence immune modulation, inflammation, and tumor microenvironment. More specifically, studies investigating the effects of propofol, ciprofol, and other intravenous agents on metastasis, postoperative immune suppression, and patient survival could provide valuable insights for optimizing perioperative strategies to improve cancer outcomes.

Strengths and limitations

Our research represents a pioneering bibliometric analysis of current and emerging trends in global research on intravenous anesthesia and tumor studies. However, certain constraints must also be considered. First, the restriction of English-language articles may have skewed the selection process. Furthermore, bibliometric analysis tends to prioritize article quantity over quality and impact, potentially leading to an overestimation of certain findings in intravenous anesthesia and tumor research. Moreover, researchers have the potential to increase their influence and citations artificially through self-citation practices, thereby leading to an overestimation of the impact on certain individuals or groups. These limitations should be considered when the bibliometric findings are interpreted. Despite the inherent limitations of bibliometric methods, this research provides a valuable resource for understanding current trends and popular topics in the fields of intravenous anesthesia and tumor studies.

Conclusion

By conducting a bibliometric analysis of 1198 prominent studies on intravenous anesthesia and tumor release from 1991 to 2024, we examined the leading countries, institutions, authors, journals, citations, and keywords associated with these studies. Our investigation highlights the significant impact and input of developed Western nations, such as the USA, in this area. By contrast, China, as an evolving nation, has shown a consistent rise in publication numbers over time, and the quality and impact of these works deserve acknowledgment compared with

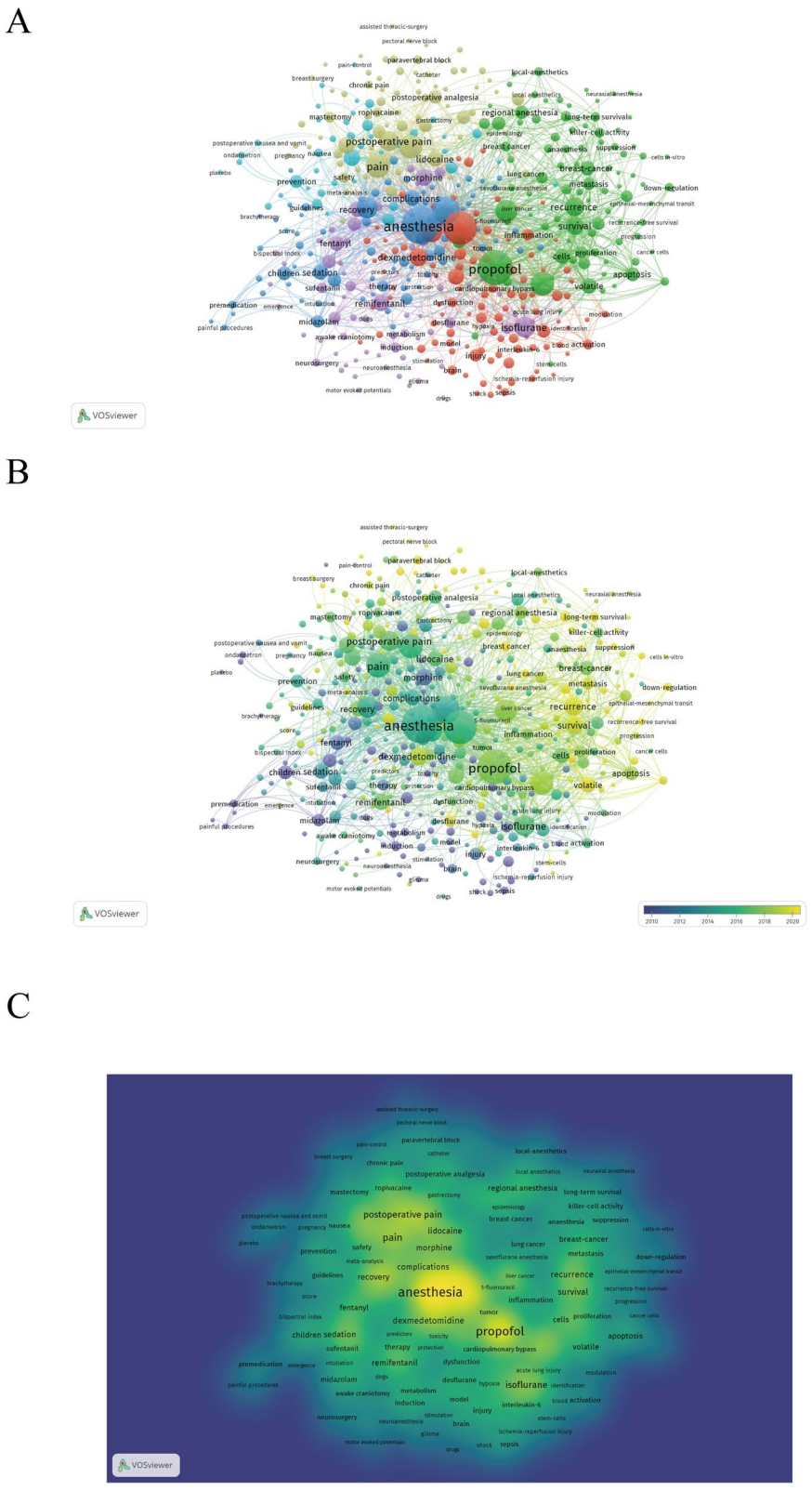
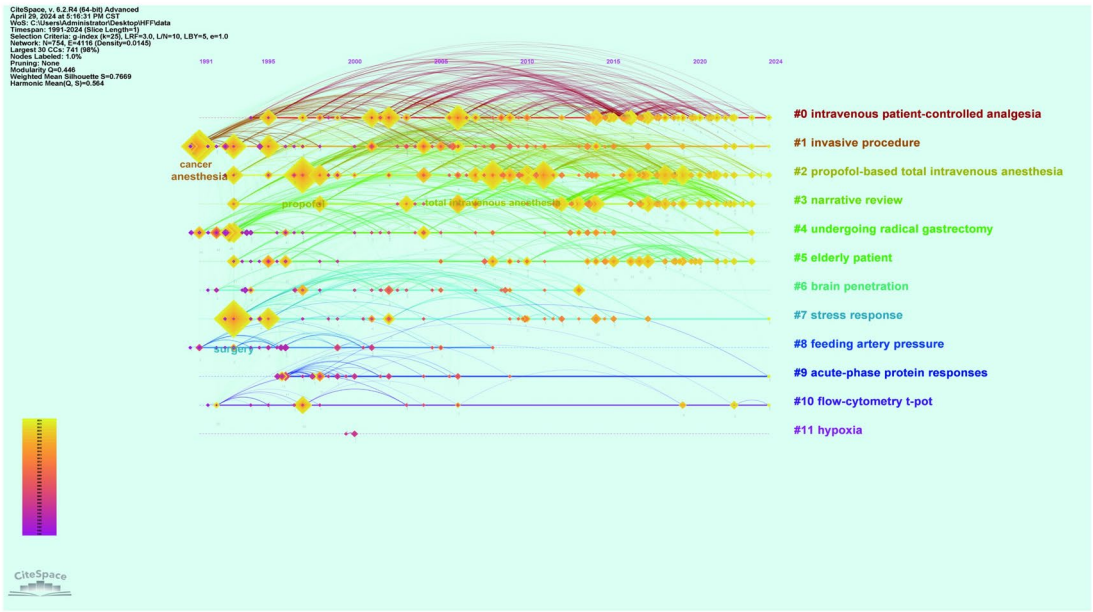


Fig. 7 Network diagram showing collaborations among keywords related to intravenous anesthesia and tumors. **A** Keyword connectivity network map. **B** Keyword temporal evolution trend map. **C** Keyword density distribution heatmap

A



B

Top 25 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	1991 - 2024
children	1991	7.86	**1991**	2011	
tumor necrosis factor	1996	9.88	**1996**	2006	
cardiopulmonary bypass	1996	3.88	**1996**	2009	
pharmacokinetics	1997	3.97	**1997**	2005	
cancer pain	1992	4.84	**1998**	2013	
tumors	2002	5.1	**2002**	2011	
propofol	1997	5.09	**2006**	2012	
analgesia	1993	3.99	**2006**	2011	
responses	2006	3.98	**2006**	2015	
pressure	2009	3.98	**2009**	2014	
cancer	1991	3.96	**2010**	2011	
inflammatory response	2012	4.41	**2012**	2016	
metaanalysis	2014	6.1	**2014**	2017	
trial	2014	4.65	**2014**	2018	
retrospective analysis	2014	4.04	**2014**	2016	
epidural analgesia	2006	4.66	**2015**	2019	
anesthetic technique	2012	3.96	**2015**	2018	
patient-controlled analgesia	2016	4.4	**2016**	2018	
survival	2018	6.94	**2019**	2024	
cognitive function	2019	4.34	**2019**	2020	
volatile	2019	8.78	**2020**	2024	
lung cancer	2017	4.5	**2020**	2022	
intravenous anesthesia	2010	4.48	**2020**	2022	
invasion	2016	3.77	**2020**	2022	
long term survival	2017	4.04	**2022**	2024	

Fig. 8 Visualization depicting keyword analysis of intravenous anesthesia and tumors. **A** Distribution of timeline analysis for keyword clustering. **B** The top 25 keywords exhibiting significant citation bursts. Red lines highlight the duration of these bursts

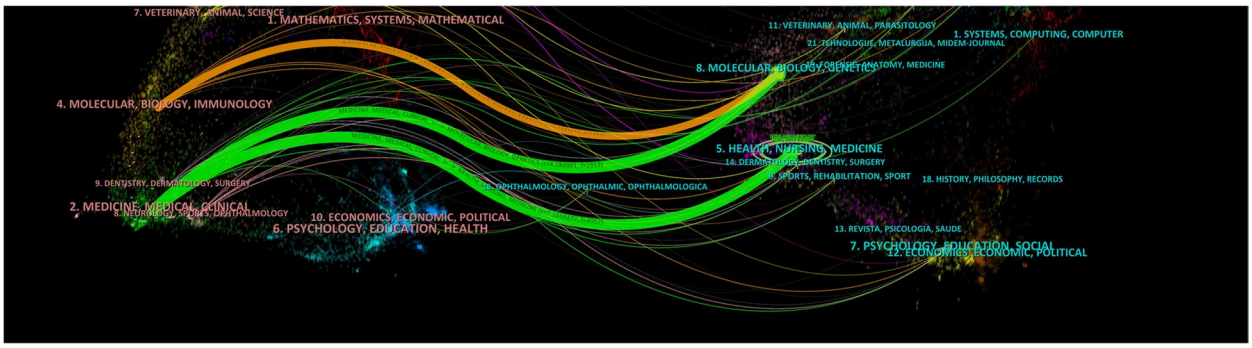


Fig. 9 Network clustering map of intravenous anesthesia and tumors research

their Western counterparts. Subsequent research should concentrate on the key aspects of intravenous anesthesia, tumor relapse, and patient survival. This examination will be beneficial to scholars seeking to explore progressive and emerging frameworks in intravenous anesthesia and cancer research, as well as to discover key authors and potential research partners. Additionally, it will aid researchers in recognizing the most influential institutions and references within the realm of intravenous anesthesia and cancer research.

Abbreviation

WOSCC Web of Science Core Collection

Acknowledgements

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Authors' contributions

Study concepts: FFH, WCZ; study design: FFH, SD; experimental studies: CY, SD; data analysis: HQS, ZC; statistical analysis: FFH, YD; manuscript preparation: FFH, CLD; manuscript editing: FFH, GL; manuscript review: FFH, WCZ. All the authors contributed to the manuscript and approved the submitted version.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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