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The 100 Most Influential Papers and Recent Trends in the Field of Gastrointestinal Stromal Tumours: A Bibliometric Analysis

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Abstract

Background

Bibliometric analysis is a statistical tool used to examine the exponential growth in medical research. Many analogous analyses have been conducted, but none existed for gastrointestinal stromal tumors (GISTs). Hence, we conducted a citation analysis of the hundred most cited and recently published articles on this topic.

Methods

Scopus was chosen as the primary database, through which the top 100 and recent publications were ranked according to the citation count and were then analysed.

Results

The 100 most cited articles were published between 1992 and 2013, among which the greatest number of articles were published in the years 2002 (n = 15) and 2006 (n = 11). Amidst the 24 countries from which the articles originated, the United States of America (n = 76) topped the list. The Journal of Clinical Oncology (n = 15) and the American Journal of Clinical Pathology (n = 10) contributed majority of the top articles. Harvard Medical School alone produced 44 of the top 100. Articles from 2013 to date showed the same trend as that of top 100 articles regarding origin and institutions.

Conclusion

Basic science and genetics of GISTs are established, and new drugs are being studied for medicinal therapy. Surgical management and diagnostics of these tumors, however, are yet to be studied as extensively.

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Introduction

Explosive growth in the medical literature has contributed to massive leaps within evidence-

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based medicine, which combines clinical expertise of a physician with current scientific research to provide adequate patient care[1,2].

All this growth in the academic arena requires a method by which researchers can efficiently track the most impactful advances and identify the pressing challenges. Bibliometric analysis, a statistical tool by which frequency and trends of citations of the published literature undergo quantitative scrutiny, can fulfil this objective[3,4]. Medical research is historically a competitive field and bibliometrics can serve as a guide to examine research performance from a global perspective, pinpointing successful advances and breakthroughs of individual countries, researchers, and journals[5]. Several such analyses have been conducted for various topics, such as breast cancer[6], orthopaedic surgery[7], epilepsy[8], thrombolytic therapy[9], and valvular heart diseases[10]. Within oncology, however, our thorough search indicated that there has been no bibliometric analysis of the literature on gastrointestinal stromal tumors (GISTs).

Although infrequent, GISTs are the most common mesenchymal tumors of the gastrointestinal tract[11], with an incidence at 10–15 per million per year[12]. Introduced as a diagnostic term in 1983[13], GISTs have emerged from being poorly defined, treatment-resistant tumors to treatable tumor entities used as a paradigmatic cancer model for multidisciplinary, targeted therapy directed against a driver oncogene[14-16]. Citation Classics[17]on GISTs are also recognized in our article, providing an insight into the specific aspects the scientific community appears to be focusing on, the existing gaps and possible directions for future global research[8].

The present bibliometric analysis accumulates all relevant data represented by the 100 most cited articles on GIST. This work will enable researchers to acquire the latest information about the work being done in this arena, while identifying future challenges to focus on.

Materials And Methods

A citation search was conducted to identify the topmost 100 cited articles in the available literature, as well as top 50 articles from 2013 to the current date, concerning gastrointestinal stromal tumors. Coequal to other researchers[9,10], we chose Elsevier's Scopus online database (http://www.scopus.com) for our bibliometric analysis, as it provides 20% more coverage than Web of Science with more accurate citation counts than Google Scholar[18]. However, full articles were accessed from PubMed, Excerpta Medica dataBASE (EMBASE), and Science Direct.

The keywords 'Gastrointestinal Stromal Tumors (GIST)', 'Gastrointestinal Pacemaker Cell Tumors(GIPACT)' [19], and 'Gastrointestinal Sub-epithelial Tumors' were obtained from Medical Subject Headings (MESH) of PubMed and sections (C49.A0-5) and (C49.A9) of the International Classification of Diseases 10 (ICD-10). All electronic database searches were performed on August 22 and 23, 2017. Keywords were searched in 'article titles', 'abstracts', and 'keywords'. Relevant articles were retrieved and sorted by the option of 'Cited by', which gave us the articles arranged in descending order of their number of citations. No filters of language, time, human studies, subject area, territory, or affiliations were used. Abstracts and full texts of the articles were read from the sorted list and irrelevant ones were removed. GISTs are soft tissue tumors with mesenchymal origin[20], but studies regarding soft tissue tumors that did not primarily discuss GISTs were excluded.

All article types excluding those requiring manual searching, telephone access, guidelines, and non-PubMed indexed articles, were included. The dataset was further evaluated, examining title, first and senior author, institution, department of the first author, topic, source, year of publication, and country of origin. In contrast with other researchers[9,10], we used

CiteScore[21], Source Normalized Impact per Paper (SNIP) and SCImago Journal Rank (SJR), to rank our journals. Some articles were cited more frequently than others due to differences in time since publication. We eliminated this error by determining citation index for each article.

Citation analysis of the articles extracted was conducted both on Scopus and by manual screening of the articles. They were classified into three broad categories: Basic Sciences, Therapeutic, and Diagnostic. Tables and charts were created using Microsoft Excel 2016. IBM Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 20.0. Armonk, New York) was used to apply the Pearson product moment correlation co-efficient to evaluate the relationship between citation times, CiteScore and citation density. The Mann-Whitney U test was applied to determine whether there was any significant difference in citations of review and original articles. The Kruskal-Wallis test was used to evaluate any significant difference between subject area and year, and also between distributions of citations among the subject area. p-value < 0.05 was considered significant in all cases.

Results

Top 100 article trends

(a) Citation Count, Citations per Year and Citation Trend

The top 100 articles were published between 1992 and 2013 (see Appendix A). Most were original articles (n = 79), while others comprised review articles (n = 19), conference papers (n = 1), and letters to the editor (n = 1). The citations of those articles summed up to 59,911, ranging from 260 to 3,076, with a median of 396 and a mean of 599.11 (interquartile range 281). Approximately 7% were self-cited and 4% were book citations, reducing the original citations to 53,520. Citation density (citations per year) ranged from 12.12 to 203.13, with a median of 32.18 and a mean of 47.29 (interquartile range 38.02). A significant positive correlation was found between citation and citation density (r = 0.883) and citation and CiteScore (r = 0.223) but there was no significant correlation between citation and year of publication. Figure *1* shows the trend of total citations by year.

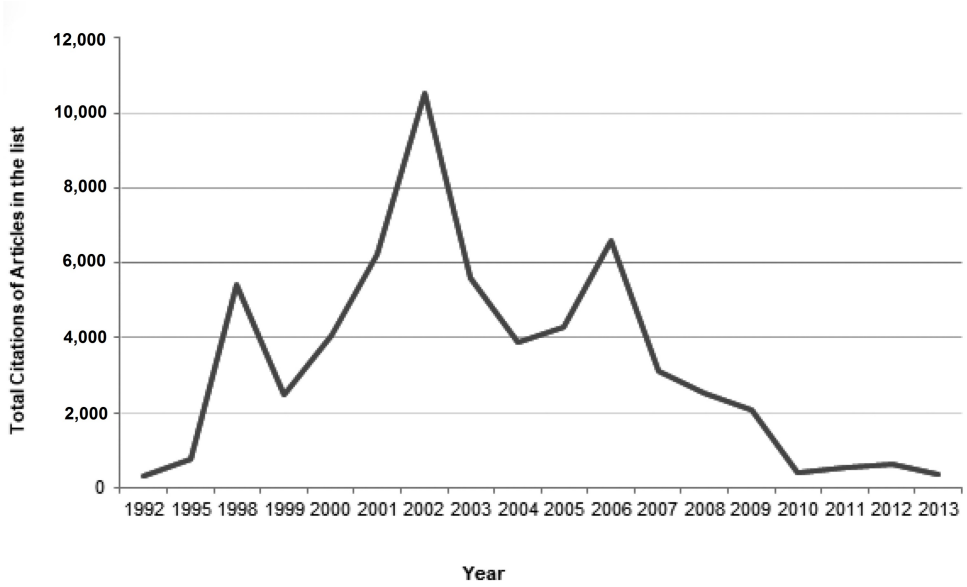

FIGURE 1: Citations per year.

(b) Origins, Institutions, and Authorships

The top 100 articles were produced by 24 different countries, with almost half (n = 44) of the articles having contributions from more than one country. The USA (n = 76), Finland (n = 15), and Belgium (n = 12) were the top contributors (Figure *2*).

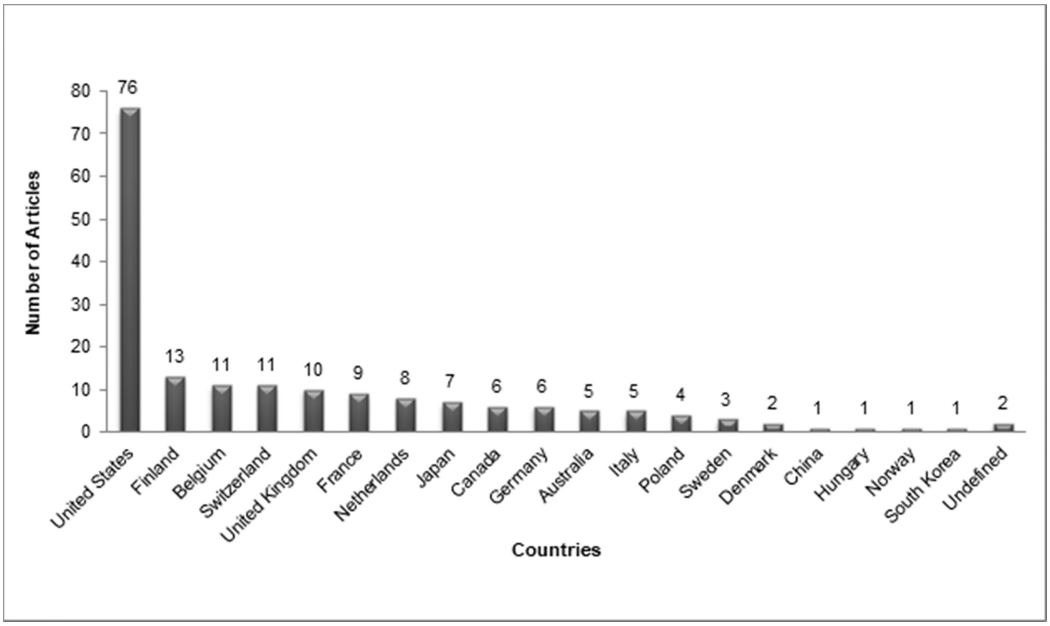

FIGURE 2: Articles originating from each country.

In addition, 202 different institutions were associated with the top 100 articles. Harvard Medical School (n = 44) and University of Helsinki (n = 29) alone contributed to 73% of our top 100 articles on GISTs. Table *1* lists the top 10 institutions with eight or more articles among the top 100.

Institutions	Number of Documents
Harvard Medical School	44
University of Helsinki	29
Armed Forces Institution of Pathology	18
Oregon Health and Science University	14
Memorial Sloan-Kettering Cancer Center	10
Novartis International AG	9
Royal Marsden Hospital, London	8
Erasmus University Medical Center	8
VA Medical Center	8
KU Leuven–University Hospital Leuven	8

TABLE 1: Institutions with eight or more articles among the top 100.

A broad range of 528 authors contributed to the top 100 articles. Each paper had a median of eight authors. The number of authors per article ranged from 1 to 59. Authors with more than 10 articles in the list are shown in Table2.

Author	Number of Articles	Author Position				Author Affiliations	H Index	Primary Topic of Interest	Years	Highest Citation
		First	Last	Others	Corresponding					
Demetri, GD	21	5	5	11	2	Dana-Farber Cancer Institution, Boston, United States	91	Medicinal Therapy and Genetics	2000-2013	3,050
Heinrich, MC	20	7	4	8	9	Oregon Health and Science University, Portland, United States	73	Medicinal Therapy and Genetics	2002-2011	3,050
Miettinen, M	19	14	4	1	14	National Cancer Institution, Laboratory of Pathology, Bethesda, United States	96	Pathology and Genetics	1995-2006	2,279
Fletcher, CDM	18	1	2	15	1	Brigham and Women's Hospital, Department of Pathology, Boston, United States	111	Medicinal Therapy and Genetics	2000-2008	3,050

Corless, CL	18	4	1	13	1	Oregon Health and Science University, Portland, United States	79	Medicinal Therapy and Genetics	2002-2011	3,050
Fletcher, JA	15	0	7	8	2	Brigham and Women's Hospital, Department of Pathology, Boston, United States	91	Medicinal Therapy and Genetics	2000-2011	3,050
Lasota, J	14	2	11	1	0	National Cancer Institution, Laboratory of Pathology, Bethesda, United States	56	Pathology	1999-2006	2,279
Joensuu, H	12	5	2	5	5	Helsinki University Central Hospital, Department of Oncology, Helsinki, Finland	87	Medicinal Therapy and Genetics	2001-2013	3,050
Von Mehren, M	12	0	0	12	0	Fox Chase Cancer Center, Philadelphia, United States	46	Medicinal Therapy	2002-2013	3,050
Sarlomo-Rikala, M	11	1	1	9	0	Helsingin Yliopisto, Department of Pathology, Helsinki, Finland	39	Pathology	1998-2012	1,603
Sobin, LHH	11	0	2	9	0	National Cancer Institution, Frederick National Laboratory for Cancer Research, Bethesda, United States	78	Pathology	1999-2016	2,279

TABLE 2: Authors with more than 10 Articles in the top 100.

(c) Journals

The top 100 articles were published in 40 journals, with half of the articles published in six journals. Table3shows these six journals, various analytical parameters, and their subject areas.

Journal Name	CiteScore	Highest CiteScore Percentile	CiteScore Rank	%Cited	SNIP	SJR	Subject Area	Number of Articles	Total Citations
Journal Of Clinical Oncology	10.11	98	6/321	71	4.89	8.883	Oncology	15	8,548
American Journal Of Surgical Pathology	5.05	99	2/372	87	2.36	2.371	Surgery	10	4,145
Lancet	6.93	99	20/2,156	43	13.7	12.47	Medicine	7	5,713
European Journal Of Cancer	6.1	95	15/321	87	2.16	3.011	Oncology	7	2,659
American Journal Of Pathology	4.1	94	11/182	84	1.19	2.209	Medicine	6	3,305
Human Pathology	2.84	88	21/182	78	1.13	1.302	Medicine	6	4,713

TABLE 3: Journals with more than five articles in the top 100.

SNIP: Source Normalized Impact per Paper.

SJR: SCImago Journal Rank

(d) Subject Area and Topics

The top 100 GIST articles fell within three major subject areas: basic science, therapeutic, and diagnostic. More than half (n = 58) examined basic GIST science, while the remainder contributed to therapeutic (n = 40) and diagnostic (n = 10) knowledge about GIST. These major subject areas were further classified according to subtopics, as shown in Table4. 7% of the articles had overlap between subject areas.

Major Topics	Sub-topic	*Number of Articles
Basic Sciences	Genetic	24
	Pathology	20
	Prognosis	13
	Epidemiology	1
Therapeutic	Medical	37
	Surgical	2
	Both	1
Diagnostic	Radiological	7
	Others	2

TABLE 4: Major subjects and sub-topics of the top 100 articles.

*Numbers may not add up to 100. Numbers within each group may not add up to the total in each group, due to overlapping topics/sub-topics in the individual manuscripts.

A significant difference was found between the year of publication of articles and categories of subject areas (p = 0.00) but the distribution of citations was the same across subject area categories (p = 0.708). Figure 3 shows the trend of articles in different subject areas over time. Few articles imparting therapeutic or diagnostic knowledge about GIST were published before the year 2000. Most of the work in all three subject areas was performed from 2000-2010. Figure 4 displays the number of citations per subject area over time. As shown, the most citations for basic science articles were from 1992-2000. From 2000 on, citation counts were homogenous for all three subject areas.

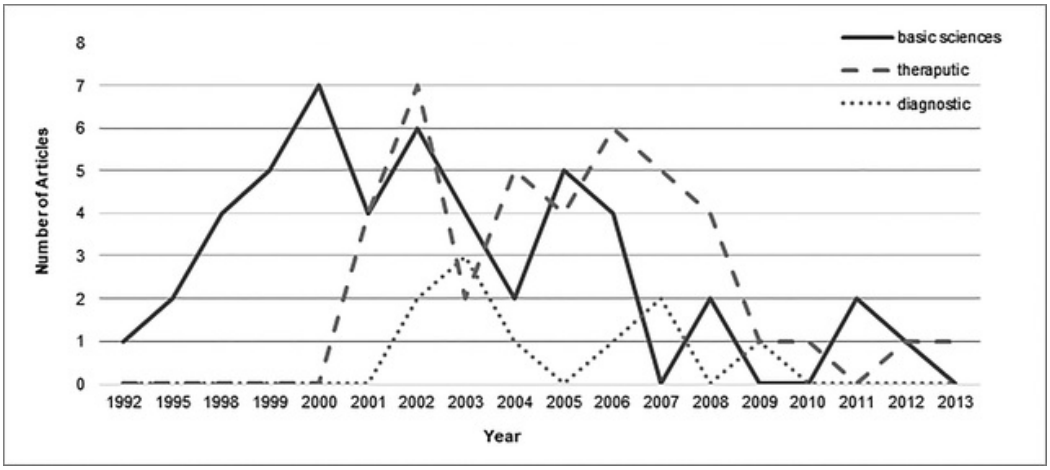

FIGURE 3: Number of articles of major subjects from top 100 articles published per year.

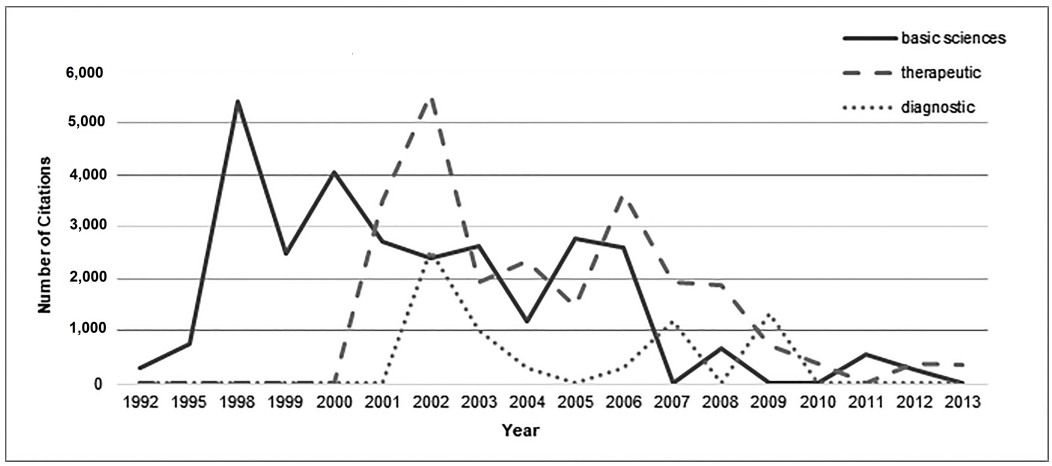

FIGURE 4: Number of citations of major subjects of top 100 articles per year.

Overall and to date trends

Figure *5* shows the overall trend of GIST articles from 1947 to date, showing 2012 (n = 653) as the year in which most of the work was done on GISTs, followed by 2015 (n = 630). The analysis of top 50 cited articles from each year ranging from 2013 till now showed that the most contributing countries were the USA and Italy with 54.45% and 21.8% articles, respectively. Harvard Medical School was again on the top of the list with 40.09% articles. However, basic sciences, therapeutic and diagnostic studies constitute 46.03%, 42.07% and 11.88% of past five year's top-cited articles, respectively. Demetri, GD (n = 13), Bauer, S (n = 11) and Blay, JY (n = 11) were the authors who worked eminently on the topic of GISTs in past five years.

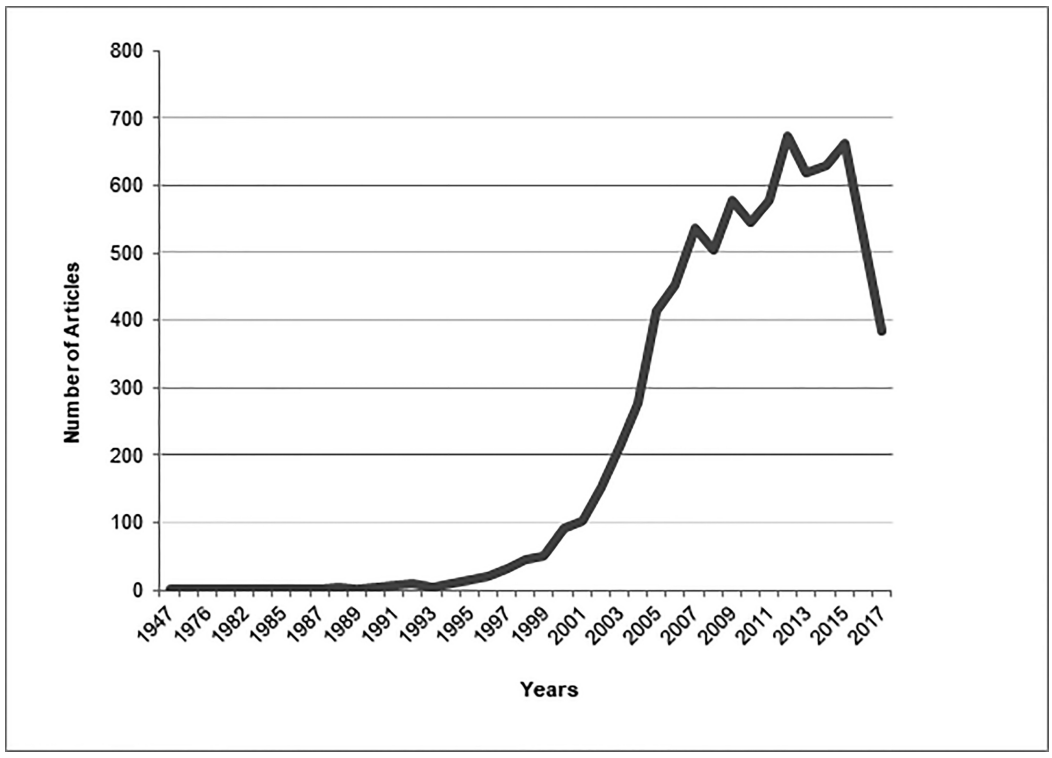

FIGURE 5: Overall trend of gastrointestinal stromal tumors

(GISTs) articles.

Discussion

The oldest article on GISTs, “Gant and his operations”, was published in 1947 and was not accessible through any online database. The second oldest relevant research paper accessible via Web of Knowledge, “Solitary solid stromal gastrointestinal tumors in von Recklinghausen's disease with minimal smooth muscle differentiation”, was published in 1984 and had 82 citations to date. Both these pioneer articles on GISTs did not make a place in the top 100 articles, hence indicating that the quality of the work plays a greater role in citation number than does the number of years the article has been a part of the literature.

Top 100 article citations and trends

(a) Citation Count, Citations per Year and Citation Trend

Among the top 100 articles, the eighty most frequently cited articles were published from 2000-2008. Throughout this nine-year span, more than five articles of top 100 list were published per year. The most-often cited article in the list was published in 1998, while the oldest of the top 100 articles cited was published in 1992. In accordance with previous studies[10], our graph of the total article citations over time (Figure*1*) showed two peaks, the highest in 2002 (n = 15) and the second-highest in 2006 (n = 11). After 2006, a gradual decrease in citations occurred, followed by a rapid decrease in 2008. Five articles that were published after 2008 made to the top 100 list. This finding strengthens the idea that some topics undergo intense study at a certain time during which extensive research is performed, and after which the topic ceases to be of broad and current interest[22]. There was no significant difference between the citations of original research articles and review articles (p = 0.310), contradicting the belief that review articles are more often cited[10]. Interestingly, the second article on the list had the highest citation density.

(b) Countries of Origin, Institutions and Authors

A total of 76 of the top 100 articles came from the USA (Figure *2*). Campbell explains this major contribution from the USA by stating that reviewers and authors from the USA show bias towards local papers[23]. Finland produced the second-highest number of quality papers (n = 13), followed by Belgium and Switzerland (both, n = 11). Only one paper from China was included in the top 100, despite GIST being most prevalent in that region[12].

Total 40 institutions contributed to our top 100 articles, all with at least two articles. Table*1* shows the top 10 institutions, four of which belong to the USA. A total of 55 of the extracted articles had multi-institutional origins. Of these, 25 papers had multinational origins, suggesting that international collaborations produce high-quality output that greatly benefits the scientific community[10].

None of the authors of the first article of top 100 articles were in the list of top 11 authors extracted, whereas seven authors of the second most-cited articles were in that list (Table*2*). Each of the top 11 authors contributed to at least 11 articles. Fletcher, CDM had the highest H-index, but he ranked fourth in our list, as he had 18 articles among the top 100. Authors with a high H-index not only have a greater chance of having their work accepted, but are also more likely to get promotions and become reviewers[24].

(c) Journals

As previously mentioned, the top 100 articles were published in 40 journals. A total of 12 were oncology journals (41% of articles) and 16 were medicine journals (36% of articles). Among the oncology-based journals, Cancer Cell had the highest CiteScore of 16.19, followed by Nature Reviews Cancer, with a CiteScore of 15.79, but Journal of Clinical Oncology (n = 15) and The European Journal of Cancer (n = 7) has the most articles published in them (Table*3*). Both the top CiteScore journals had only one article each in the top 100. Among the medicine-based journals, The New England Journal of Medicine had the highest CiteScore of 12.82 followed by the Lancet. The most cited article of the top 100 list was published in Science, a multidisciplinary journal with a CiteScore of 14.39. Only two articles published in Science appeared in the top 100 list. Nature Genetics had the highest CiteScore (20.83) overall, but only one article of top 100 was published in it. We observed a weak positive correlation of CiteScore with citation (r = 0.233).

According to the Bradford law these 28 journals, oncology and medicine-based summed up, may be considered our core journals[25]. This trend indicates that high-quality articles are published in field-specific journals, as also reported by other bibliometric analysis[18]. We used multiple analytical parameters to rank our journals, including CiteScore, SJR, and SNIP to reduce bias[26]. CiteScore is a metric similar to a journal's Impact Factor that gives us a comprehensive view of the journal's effect on the Scientific Community.

(d) Subject Areas

A total of 58 of the top 100 articles concerned basic sciences. Under the sphere of the basic sciences, 20 articles covered the pathological, histochemical, and immunological aspects of GISTs. Twenty-three articles discussed genetics, while 12 studied disease prognosis and three focused on epidemiology. Basic sciences publications were highest in 2000 (n = 7), while therapeutic publications were highest in 2002 (n = 7; Figure*3*). However, papers from the basic sciences field that were most often cited were published in 1998 and there were more than 5,000 citations for both of these fields in these years as shown in Figure*4*.

Thirty-four therapeutic articles focused on the medical treatment of GISTs with imatinib, sunitinib, tyrosine kinase inhibitors, or other chemotherapeutic drugs. The articles examined treatment efficacy, mechanisms of action, associations, reactions, adverse effects, prognosis, and mechanisms of resistance. The remaining six articles examined surgical management or a combination of surgical and medicinal treatment. The most-cited articles from the therapeutic field were published in 2000. Only 10 of the top 100 articles pertained to the field of diagnostics. Most work imparting therapeutic or diagnostic information was published between 2000 and 2010; none was published before 2000 (Figure*3*). Several articles targeted both a genetic basis and medical therapy for GISTs; hence, we categorized these articles as both therapeutic and diagnostic. Similarly, prognosis and surgical management were discussed simultaneously in some articles.

Overall and to date trends

Our extensive recent analysis showed us that in contrast to other topics that are 'hot' in some era and got most of the work done on them in a specific period of time [22], GISTs was a progressive topic. Despite the fact that most cited articles on GISTs were from the last decade, the current decade is the one in which most of the work has been conducted (Figure*5*). Moreover, contrary to the top 100 articles on GISTs, a considerable number of the articles published from 2013 to date were regarding treatment and diagnostics (Figure*6*). Under the umbrella of therapeutic articles, compared to top 100 articles, the work on surgical management has increased considerably especially on the comparison of laparoscopic procedures to open gastric resection (Figure*7*). We also noticed that researchers have now been trying new medicinal therapies for GISTs, like olaratumab, regorafenib and other recent drugs,

in addition to previous ones like sunitinib and imatinib. Although work on diagnostics of GISTs has increased over time and most studied topics were radiographic and needle aspiration techniques, it is an understudied area warranting further work. Along with these, basic sciences were also kept under focus by scientists; the subgroup of genetics, especially, has been studied vigorously in past five years. A number of recent studies were extensive enough to add literature under the umbrella of multiple subjects, the majority of which contributed to the arena of genetics and medicinal therapy. Moreover, in accordance with the top 100 articles, the latest top cited articles were also mostly contributed by the USA and Harvard Medical School.

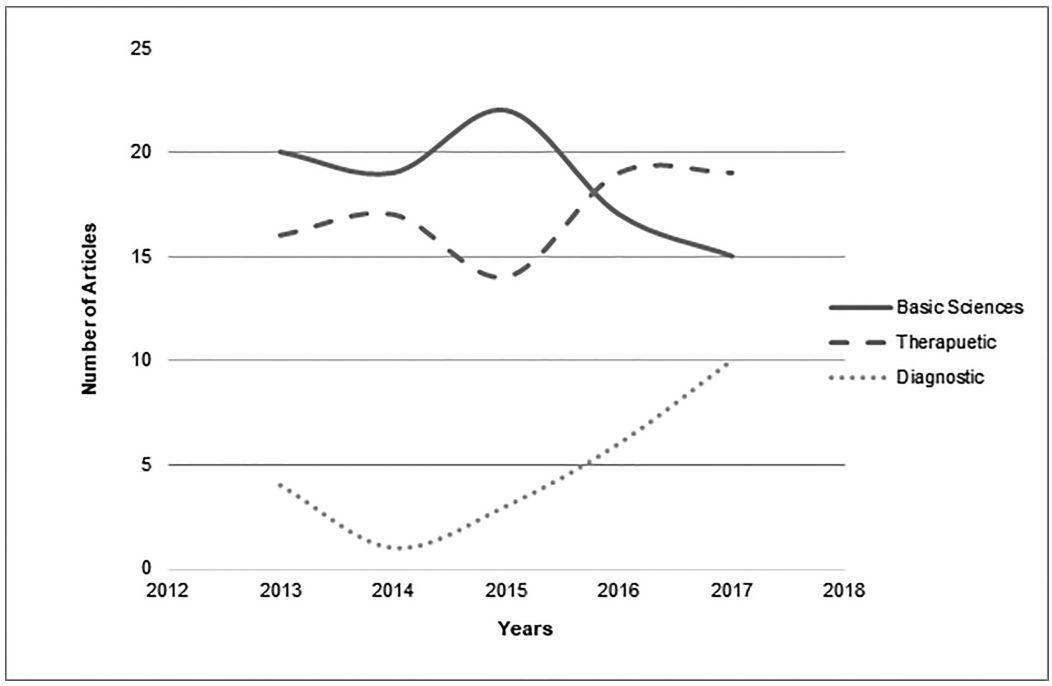

FIGURE 6: Number of articles in each subject area published from 2013 to date.

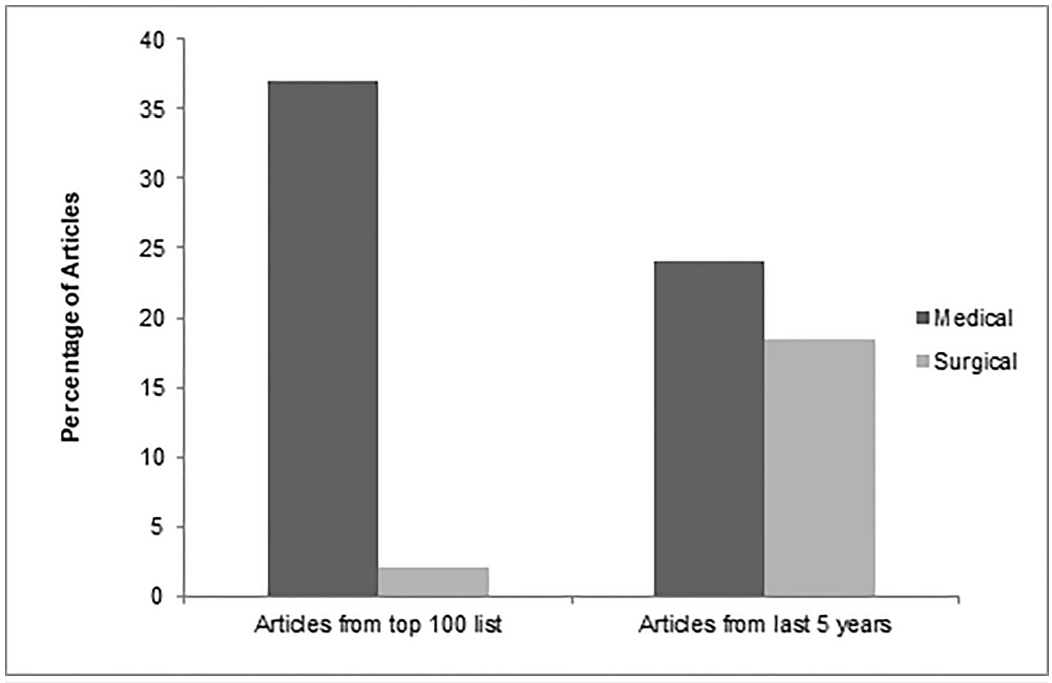

FIGURE 7: Percentages of therapeutic articles published.

Although efforts were made to eliminate any bias, certain limitations must be considered. Firstly, a major limitation was possible citation bias, including in-house citations, negative citations and incomplete citations. Secondly, only one database was used to extract the list which may have resulted in overlooking of some articles that were not recognized by Scopus. Scopus has been reported to miss older citations, which results in the omission of researches conducted and published prior to 1980[27,28]. Our list may have missed some Citation Classics, it can be explained as 'obliteration by incorporation'[17], which in simple terms states that the content of some classic articles has become such common knowledge that they no longer require citation.

Conclusions

A bibliometric analysis on GIST helped in identifying it as an escalating topic of discussion. The last two decades have shown a significant increase in the relevant GIST studies in comparison to the scarce and wide-spread publications in the entire twentieth century. Citation count of the articles remained uninfluenced by the journal's Citescore and the article type. Areas pertaining to basic sciences and genetics have shown great progress whereas surgical management and advances in diagnostic aspects of GIST have yet to reach the same level of success.

The prevalence of GIST is highest in China, regardless of which, the country and institution with the highest number of citation contribution are the USA and Harvard Medical College, respectively. Furthermore, our analysis suggests that greater amount of time and attention towards research focusing on advances in diagnostic investigations, surgical treatment, and target therapy is required in order to improve the overall prognosis of the disease.

Appendices

Appendix A

Rank	Article	Total Citation	Citation Density	Most Cited in (year)
1	Hirota S, Isozaki K, Moriyama Y, et al.: Gain-of-function mutations of c-kit in human gastrointestinal stromal tumors. Science 1998, 279:577-580.	3,076	161.895	2006
2	Demetri GD, Von Mehren M, Blanke CD, et al.: Efficacy and safety of imatinib mesylate in advanced gastrointestinal stromal tumors. N Engl J Med 2002, 347:472-480.	3,047	203.133	2006
3	Fletcher CD, Berman JJ, Corless C, et al.: Diagnosis of gastrointestinal stromal tumors: A consensus approach. Hum Pathol 2002, 33:459-465.	2,278	151.867	2009
4	DeMatteo RP, Lewis JJ, Leung D, et al.: Two hundred gastrointestinal stromal tumors: Recurrence patterns and prognostic factors for survival. Ann Surg 2000, 231:251.	1,746	102.706	2006
	Joensuu H, Roberts PJ, Sarlomo-Rikala M, et al.: Effect of the tyrosine			

5	kinase inhibitor sti571 in a patient with a metastatic gastrointestinal stromal tumor. N Engl J Med 2001, 344:1052-1056.	1,601	100.663	2003
6	Heinrich MC, Corless CL, Demetri GD, et al.: Kinase mutations and imatinib response in patients with metastatic gastrointestinal stromal tumor. J Clin Oncol 2003, 21:4342-4349.	1,599	114.214	2006
7	Demetri GD, van Oosterom AT, Garrett CR, et al.: Efficacy and safety of sunitinib in patients with advanced gastrointestinal stromal tumour after failure of imatinib: A randomised controlled trial. Lancet 2006, 368:1329-1338.	1,571	142.818	2009
8	Heinrich MC, Corless CL, Duensing A, et al.: Pdgfra activating mutations in gastrointestinal stromal tumors. Science 2003, 299:708-710.	1,561	111.5	2010
9	Wahl RL, Jacene H, Kasamon Y, et al.: From recist to percist: Evolving considerations for pet response criteria in solid tumors. J Nucl Med 2009, 50:122S-150S.	1,340	167.5	2015
10	Miettinen M, Lasota J. Gastrointestinal stromal tumors-definition, clinical, histological, immunohistochemical, and molecular genetic features and differential diagnosis. Virchows Arch 2001, 438:1-12.	1,265	79.063	2005
11	Kindblom L-G, Remotti HE, Aldenborg F, et al.: Gastrointestinal pacemaker cell tumor (gipact): Gastrointestinal stromal tumors show phenotypic characteristics of the interstitial cells of cajal. Am J Pathol 1998, 152:1259.	1,262	66.421	2002
12	Verweij J, Casali PG, Zalcberg J, et al.: Progression-free survival in gastrointestinal stromal tumours with high-dose imatinib: Randomised trial. Lancet 2004, 364:1127-1134.	1,146	88.154	2008
13	van Oosterom AT, Judson I, Verweij J, et al.: Safety and efficacy of imatinib (sti571) in metastatic gastrointestinal stromal tumours: A phase i study. Lancet 2001, 358:1421-1423.	1,109	69.313	2003
14	Miettinen M, Lasota J. Gastrointestinal stromal tumors: Pathology and prognosis at different sites. Semin Diagn Pathol 2006, 23:70-83.	848	94.222	2015
15	Corless CL, Fletcher JA, Heinrich MC. Biology of gastrointestinal stromal tumors. J Clin Oncol 2004, 22:3813-3825.	834	64.154	2008
16	Choi H, Charnsangavej C, Faria SC, et al.: Correlation of computed tomography and positron emission tomography in patients with metastatic gastrointestinal stromal tumor treated at a single institution with imatinib mesylate: Proposal of new computed tomography response criteria. J Clin Oncol 2007, 25:1753-1759.	814	81.4	2014
17	Miettinen M, Lasota J. Gastrointestinal stromal tumors: Review on morphology, molecular pathology, prognosis, and differential diagnosis. Arch Pathol Lab Med 2006, 130:1466-1478.	787	71.546	2010
18	Miettinen M, Sobin LH, Lasota J. Gastrointestinal stromal tumors of the stomach: A clinicopathologic, immunohistochemical, and molecular genetic study of 1765 cases with long-term follow-up. Am J	787	65.583	2009

	Surg Pathol 2005, 29:52-68.			
19	Rubin BP, Singer S, Tsao C, et al.: Kit activation is a ubiquitous feature of gastrointestinal stromal tumors. Cancer Res 2001, 61:8118-8121.	781	48.813	2003
20	Jain RK, Duda DG, Clark JW, et al.: Lessons from phase iii clinical trials on anti-vegf therapy for cancer. Nat Clin Pract Oncol 2006, 3:24-40.	764	69.455	2007
21	Nilsson B, Bümming P, Meis-Kindblom JM, et al.: Gastrointestinal stromal tumors: The incidence, prevalence, clinical course, and prognostication in the preimatinib mesylate era. Cancer 2005, 103:821-829.	754	62.833	2015
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TABLE 5: Top 100 articles on gastrointestinal stromal tumors (GISTs).

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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