Classic articles in cervical cancer research : A bibliometric analysis

Ourlad Alzeus G. Tantengco
Yuh-Shan Ho

Background: Analyzing classic articles or research papers that received total citations of 1000 or more has helped study the evolution of research trends and identify research gaps and future directions in a particular field. This study used a bibliometric approach to analyzing classic articles in cervical cancer research.

Method: Classic articles in cervical cancer research with 1,000 or more citations from the Web of Science Core Collection from publication to the end of 2020 were analyzed using bibliometric analysis. These methods determine the document types, most productive countries, institutions, and journals for classic articles in cervical cancer research. Moreover, it also determined their research impact through the years by analyzing their citation histories.

Result: We documented 46 classic cervical cancer research papers published in the Web of Science from 1983 until 2019. The CA-A Cancer Journal for Clinicians and the New England Journal of Medicine were the most productive journals that published seven classic cervical cancer articles. The USA was the most productive country, with 28 classic cervical cancer articles. The International Agency for Research on Cancer in France and the American Cancer Society in the USA were the most effective and impactful institutions in cervical cancer research. Citation histories revealed that the most important and cited papers in recent years were cancer statistics that report incidence and mortality from cervical cancer worldwide. The most impactful studies include articles on HPV as a necessary cause of cervical cancer, the discovery and development of HPV vaccines to prevent cervical cancer, and the development of chemotherapy, radiotherapy, and surgical treatment for cervical cancer.

Conclusion: This study showed cervical cancer research's most productive countries, institutions, and journals. It also demonstrated the citation history of these classic articles, which showed influential studies still relevant to cervical cancer research until recently.

Keywords: *Front page, Cervical carcinoma, Classic articles, Gynecology, Web of Science core collection.*

Ourlad Alzeus G. Tantengco[†]
Department of Physiology
College of Medicine
University of the Philippines
  Manila
Manila
Philippines

and

Department of Biology
College of Science
De La Salle University
Manila
Philippines

[†] `ogtantengco@up.edu.ph`

Yuh-Shan Ho*
Trend Research Centre
Asia University
No. 500, Lioufeng Road
Wufeng
Taichung 41354
Taiwan, R.O.C.

* `ysho@asia.edu.tw`

* (Corresponding Author)

1. Introduction

Cervical cancer is one of the most common cancers among women worldwide (Sung et al., 2021). In 2018, 570,000 cases and 311,000 deaths from cervical cancer were recorded (Bray et al., 2018; Zhao et al., 2021). The trend continues to go down in developed countries due to the introduction of cervical cancer screening and human papillomavirus vaccines (Markowitz & Schiller, 2021; Zhang et al., 2021). However, low cervical cancer screening and HPV vaccination coverage remain challenges in several low- and middle-income countries (LMICs) (Hull et al., 2020; Zhang et al., 2021). Hence, cervical cancer continues to be a pressing problem in developing regions. Approximately 85% of deaths due to cervical cancers were in developing regions (Brisson et al., 2020). Without proper interventions, policies, and programs to control and prevent cervical cancer, it was estimated that approximately 11 million women from LMICs will be diagnosed with cervical cancer in the next two decades (Hull et al., 2020). Thus, evidence-based interventions from published research on cervical cancer should be used in developing strategies to control and eliminate cervical cancer.

Citation classic is a highly cited publication, as shown by research databases such as Web of Science, Scopus, OVID Medline, etc. (Garfield, 1987; Kadic et al., 2020). The number of citations needed to classify a publication as a classic article differs in each discipline. A publication cited more than 400 times should be considered a classic. Several papers even used a higher threshold of 1,000 total citations (Y. S. Ho, 2014; Y. S. Ho & Hartley, 2016). However, in some specialized fields with fewer researchers, 100 citations might qualify as a classic (Eugene Garfield, n.d.). Classic papers gain much attention from different researchers and receive a very high number of citations. Receiving citations shows that other researchers acknowledge the importance and contribution of a publication to advance knowledge (Eyre-Walker & Stoletzki, 2013). Knowing these classic papers in a particular field is helpful for researchers who want to learn more about the field's highly cited and influential articles. Analyzing these publications through a bibliometric analysis can give insights into the research areas that have marked specific disciplines.

This study identified the classic cervical cancer publications with at least 1,000 total citations from publication until the end of 2020 in Web of Core Collection. We discussed the citation histories, recent impact, journals, Web of Science categories, and publication performance of countries, institutions, and authors. We described the characteristics of these classic articles based on the type of publications (Table-1) and the Web of Science categories. We also showed the most productive countries, institutions, and journals that published classic articles on cervical cancer.

2. Methodology

Bibliometric information on research articles was obtained from the Science Citation Index Expanded (SCI-EXPANDED) database in the Web of Science Core Collection of Clarivate Analytics (updated on 01 March 2022). After our pre-study, keywords such as "cervical cancer", "cervical cancers", "cervical carcinoma", "cervical carcinomas",

(Refer all tables at the end of the paper)

"cervix cancer", "cervix cancers", "cancer of the cervix", "cervical neoplasm", "cervical neoplasms", "cervix neoplasm", and "cervix neoplasms" were selected and searched in terms of Topic (including title, abstract, author keywords, and *KeyWords Plus*) within the publication years from 1900 to 2020. *KeyWords Plus* is an application for citation indexing using terms extracted from the titles of publications cited by authors in the ISI (now Clarivate Analytics) to be focused on (Eugene Garfield, 1990). In total, 67,125 documents, including 49,506 articles, were obtained.

Two citation indicators, TC_{year} and C_{year} were applied to characterize the classic articles. TC_{year} is the total number of citations from the Web of Science Core Collection from publication year to the end of the most recent year (Wang et al., 2011). C_{year} is the number of citations in the most recent year (Ho, Y. S. (2012)). C_{2020} means the number of citations in 2020 only. TC_{year} of 1,000 or more was used to retrieve the classic articles (Long et al., 2014). We inserted all the data for each article for each year into spreadsheet software and manipulated them **using Excel Microsoft 365** (Jallow et al., 2021; Li & Ho, 2008). The functions in **Excel Microsoft 365**, for example, Counta, Concatenate, Match, Vlookup, Proper, Rank, Replace, Freeze Panes, Sort, Sum, and Len were applied. The journal impact factors (IF_{2020}) were taken from the Journal Citation Reports (JCR) published in 2020. In addition, all hard copies of the 35 classic articles were obtained to determine the studies' results and conclusions.

Affiliations such as England and Northern Ireland were reclassified as part of the United Kingdom (the UK). Affiliations in Fed Rep Ger (Federal Republic of Germany) were reclassified as part of Germany (Y. S. Ho, 2012).

3. Results and Discussion

3.1 *Document type*

We found 46 classic cervical cancer publications with TC_{2020} of 1,000 or more within four document types indexed in the Web of Science (Table 1). Among the document types, articles received 35 publications (76% of 46 publications) with total citations of TC_{2020} = 131,919, and reviews had 10 (22%) publications with TC_{2020} = 16,232. The CPP_{2020} of the document type of articles was 2.3 times of reviews. It is higher than other classic publications in medical fields, for example, neurosciences (1.0) (20 neurosciences (1.0) (Kan Yeung & Ho, 2018) and *Helicobacter pylori* (1.2) (Suk et al., 2019).

3.2 *Publication outputs*

The document of articles was further studied. All the classic cervical cancer articles in SCI-EXPANDED were published in English. The classic articles were published between 1983 and 2019. The average TC_{2020} was 3,769, with a maximum of 257,511. The article entitled "A papillomavirus DNA from a cervical carcinoma and its prevalence in cancer biopsy samples from different geographic regions" (Durst et al., 1983), published by Dürst et. al. from the University of Freiburg in Germany, was the earliest and the only classic article published in 1983. This article showed the regular presence of HPV DNA in cervical

cancer biopsy and the low presence in benign papillomas. This classic article provided evidence of the specificity of HPV 16 infections for malignant tissue. Moreover, this article also reported the geographic differences in the presence of HPV 16 DNA, which showed that it is more common among cancer biopsy samples from German patients (61.1%) than from samples from Kenya and Brazil (34.8%) (Durst et al., 1983). This article served as a basis for more investigations on the etiologic role of HPV infections in cervical cancer. The characterization of HPV 18 followed this publication in 1984 (Boshart et al., 1984). The article entitled "Cancer statistics, 2019" (Siegel et al., 2019), published by Siegel et. al. from the American Cancer Society in the USA, was the latest and only classic article published in 2019. This article is an annual report published by the American Cancer Society regarding the new cancer cases and deaths in the United States.

3.3 *Web of Science categories and Journals*

Journal Citation Reports (JCR) indexes 9,531 journals with citation references across 178 Web of Science categories in the SCI-EXPANDED in 2020. The 35 classic cervical cancer articles were published in 15 journals across nine Web of Science categories in SCI-EXPANDED, including oncology (19 articles; 54% of 35 articles), general and internal medicine (11; 31%), multidisciplinary sciences (2; 5.7%), and one article in each of biology, pathology, cell biology, biochemistry, and molecular biology, and genetics and heredity.

Of the 15 journals, nine (60% of 15) contained one classic article. A positive relationship between IF_{2020} and classic articles was found (Fig. 1). The *CA-A Cancer Journal for Clinicians* (IF_{2020} = 508.702) ranked not only top in SCI-EXPANDED but also the top in the Web of Science category of oncology and the top journal in the Web of Science category of general and internal medicine, the *New England Journal of Medicine* (IF_{2020} = 91.245) published the most seven classic cervical cancer articles respectively (Table 2). The *CA-A*
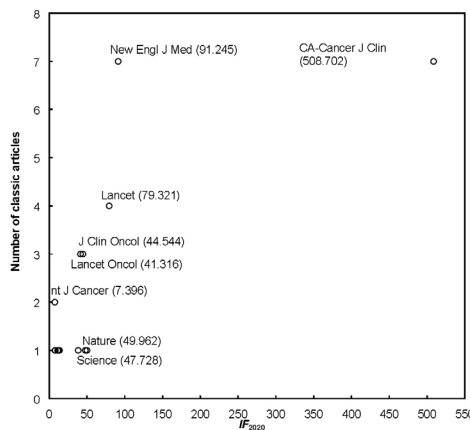

Figure 1

Relation between journal impact factor and number of classic articles published in journals with IF_{2020}.

Cancer Journal for Clinicians had the highest CPP_{2020} of 12,351, followed distantly by the *Journal of Pathology* (IF_{2020} = 7.996), with a CPP_{2020} of 5,802. In addition, the top journal in the category of multidisciplinary sciences, *Nature* (IF_{2020} = 49.962), published one classic cervical cancer article.

3.4 *Publication Performances: Countries and Institutions*

To compare the publication performance of countries and institutions, Ho's group proposed six publication indicators, including the total number of publications (*TP*), independent publications (*IP*), collaborative publications (*CP*), first-author publications (*FP*), corresponding-author publications (*RP*), and single-author publications (*SP*) (Y.-S. Ho & Kahn, 2013). It was applied to the classic articles in the Web of Science categories of psychology (Y. S. Ho & Hartley, 2016) and neurosciences (Kan Yeung & Ho, 2018). The first and the corresponding authors are considered the most contributed authors in a research article (Riesenberg & Lundberg, 1990). At the institutional level, the determined institution of the corresponding author might be a home base of the study or origin of the paper (Y. S. Ho, 2012). Of the 35 classic cervical cancer articles that were all not single-author articles from 56 countries, 20 (57% of 35 articles) were single-country articles by authors from four countries with CPP_{2020} of 2,279, and 15 (43%) were internationally collaborative articles by authors from 56 countries with CPP_{2020} of 5,756. The top 12 productive countries that published three classic articles or more were listed in Table 3 with the five publication indicators. The USA dominated in the five publication indicators with a *TP* of 28 articles (80% of 35 articles), an *IP* of 13 articles (65% of 20 single-country articles), a *CP* of 15 articles (100% of 15 internationally collaborative articles), an *FP* of 20 articles (57% of 35 first-author articles), and an *RP* of 20 articles (57% of 35 corresponding-author articles).

Seven classic articles (20% of 35 articles) were single-institute articles with a CPP_{2020} of 2,690, and 28 (80%) were inter-institutionally collaborative articles with a CPP_{2020} of 4,039. The five publication indicators (Hsu & Ho, 2014) of the classic cervical cancer articles from the 15 most productive institutions whose authors published no less than three classic articles were compared and presented in Table 4. Twelve of the top 15 productive institutes are in the USA, and one is in France, Canada, and Belgium. This result shows the regional imbalance in the highly cited articles on cervical cancer. There were few published studies from developing countries where the burden of cervical cancer remains high, included in the classic articles on cervical cancer. This emphasizes the need to conduct more high-quality studies on cervical in developing countries. The International Agency for Research on Cancer in France dominated in three of the five publication indicators with a *TP* of nine classic articles (26% of 35 classic articles), an *IP* of two articles (29% of 7 single-institute articles), a *CP* of seven articles (25% of 28 inter-institutionally collaborative articles). The American Cancer Society in the USA also ranked top in three publication indicators with a *CP* of seven articles (25% of 28 inter-institutionally collaborative articles), an *FP* of six articles (17% of 35 first-author articles), and an *RP* of six articles (17% of 35 corresponding-author articles).
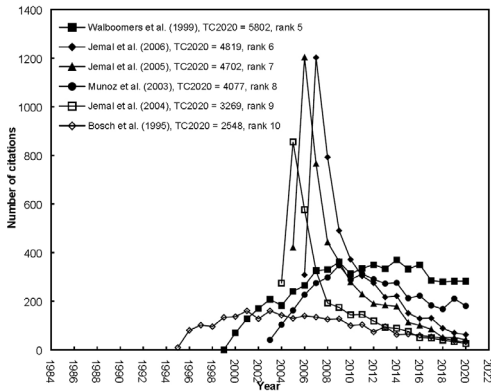
Figure 2

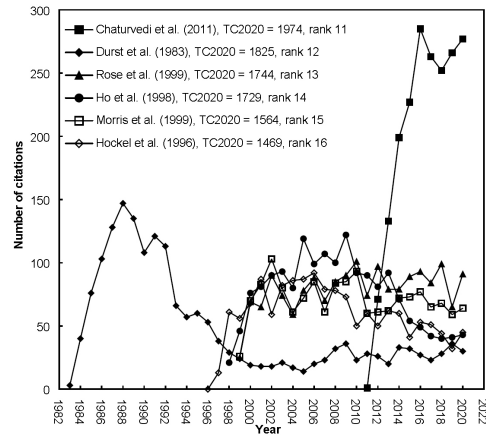**The citation histories of the four classic articles with TC_{2020} > 10,000.**

Figure 3

The citation histories of the top 11-16 classic articles.

3.5 *The most frequently cited articles and high impact articles in the most recent year*

Highly cited articles provide interesting and valuable insight into which authors and topics influence a research discipline over time (D. R. Smith, 2008). The most frequently cited classic articles with citation indicator TC_{year} in a Web of Science surgery category were first presented (Long et al., 2014). However, classic publications might not always have a high impact (Y.-S. Ho & Kahn, 2013). The use of the citation indicator C_{year} to indicate the most influential classic articles in the most recent year was first reported in psychology (Y. S. Ho & Hartley, 2016). Several total citations from the Web of Science Core Collection were updated from time to time and applied widely in most studies. The citation indicators TC_{2020} and C_{2020} were used to evaluate the top-cited articles and the articles with the highest citations in 2020. The advantage of TC_{2020} and C_{2020} over the standard measure of total citations in the Web of Science Core Collection lies in its invariance, which is not updated over time (Y. S. Ho & Hartley, 2016).

The citations of an article are not always high (Y. S. Ho, 2014). It is necessary to understand the citation history of a highly cited paper. The citation histories of the 35 classic cervical cancer articles with TC_{2020} of 1,000 or more (Table 5) are shown in Figs. 2-6. Figure 2 shows the citation histories of the top 6 to top 10 cited classic articles in cervical cancer. The publications from Jemal and colleagues published in 2004, 2005, and 2006 were all cancer statistics publications (Jemal et al., 2004, 2005, 2006). The total citations peaked the year after their publications and drastically dropped three years after their publication year. Cancer statistics change annually, so it was expected that citations skyrocket immediately after publication and plummet drastically when the new annual cancer statistics were published. On the other hand, the other publications were epidemiologic studies on the prevalence and classification of HPV in cervical

cancer patients (Bosch et al., 1995; Muñoz et al., 2003). These articles had a gradual and sustained increase in citations after publication. Even decades after their publications, the annual citations remain high.

Figure 3 shows the citation histories of the top 11 to the top 16 cited classic articles in cervical cancer. The oldest classic article in this group was from Durst, et. al. (Durst et al., 1983), which reported the prevalence of HPV DNA in cervical cancer patients from different countries. The citations remained high for a decade and then went down. The most recent classic article in this group was from Chaturvedi and colleagues, which reported the involvement of human papillomavirus in oropharyngeal cancer (Chaturvedi et al., 2011). The rest of the classic articles regarding the natural history of HPV infection in the cervix, concurrent chemotherapy and radiotherapy for cervical cancer, and the role of tumor hypoxia in cervical carcinogenesis had a sustained high annual citation even decades after their publication (Durst et al., 1983; G. Y. F. Ho et al., 1998; Höckel et al., 1996; Morris et al., 1999; Rose et al., 1999) 14 and 15 and showed no homology with DNA of other human HPV types. We, therefore, propose to designate it tentatively as HPV 16. HPV 16 DNA was used as a probe to test additional cancer biopsy samples from cervical, vulval, and penile cancer, as well as benign genital warts (condylomata acuminata. Concurrent chemotherapy and radiotherapy are still the mainstay treatment for cervical cancer. The inclusion of these topics in the highly cited articles serve as an indicator of their importance in managing cervical cancer. This also shows that physicians and scientists are still actively doing high-quality research in this field. This can help in determining optimized chemotherapy and radiotherapy to improve the prognosis of cervical cancer patients.

Figure 4 shows the citation histories of 17th to 22nd top-cited classic articles in cervical cancer. The paper of Villa and colleagues on a quadrivalent vaccine against HPV
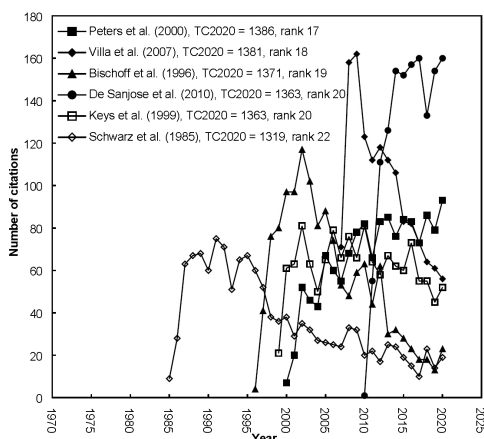

Figure 4

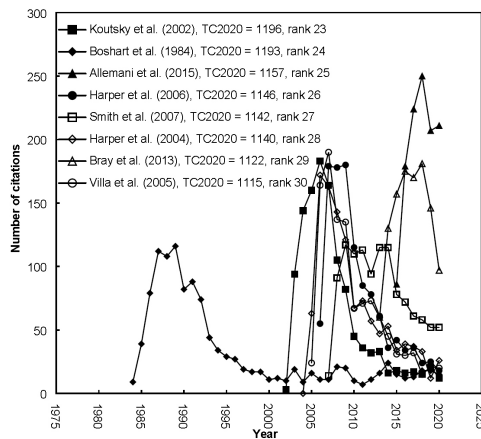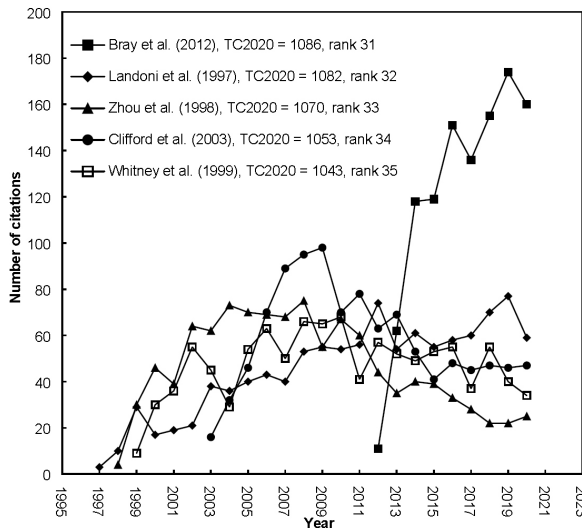**The citation histories of the top 17-22 classic articles.**

Figure 5

The citation histories of the top 23-30 classic articles.

to prevent high-grade cervical lesions received the highest annual citations in 2009, which gradually decreased a few years after publication (Villa et al., 2005). Similarly, the other classic papers on the prevalence and distribution of HPV genotypes (de Sanjose et al., 2010) and different treatment modalities for cervical cancer patients (Keys et al., 1999; Peters et al., 2000) received persistently high annual citations until recent years. These epidemiologic and clinical studies on cervical cancer remain relevant regardless of time. These articles get cited by newer epidemiologic and clinical studies, narrative reviews, and meta-analyses.

Classic articles included in Figure 5 were randomized controlled trials on HPV vaccines (Harper et al., 2004, 2006; Koutsky et al., 1997; Villa et al., 2005), global estimates of cancer prevalence (Allemani et al., 2015; Bray et al., 2013), and HPV genotype distribution among cervical cancer patients (Boshart et al., 1984; J. S. Smith et al., 2007). The total citations for these articles peaked within ten years after publication and gradually declined to reach a nadir around 20 years after publication. In recent years, these classic articles have only gotten a few citations. The global cancer estimates get higher citations immediately after publication and significantly decline upon publication of newer cancer statistics. On the other hand, citations of randomized controlled trials on HPV vaccines gradually declined. These studies remain relevant and get cited by the same research group when they publish the subsequent phases of RCT. Other research groups working on HPV vaccine development also cite these RCTs.

Like the previous figures on citation histories, classic cancer statistics articles received significant citations immediately after publication (Bray et al., 2012). The other classic articles in Figure 6 were a randomized study on radical surgery for cervical cancer

Figure 6

The citation histories of the top 31-35 classic articles.

(Landoni et al., 1997), a randomized trial of chemotherapeutic drugs for late-stage cervical cancer (Whitney et al., 1999), and a meta-analysis on HPV genotypes in invasive cervical cancer (Clifford et al., 2003) had a gradual increase in the number of citations. It received citations until recent years (approximately 20 years after publication).

Classic articles that ranked top 10 in TC_{2020} as the most frequently cited articles and C_{2020} as the articles with the highest impact in 2020 were the most important in this field. Researchers in the area continue to cite these classic articles in recent years. These important classic articles include global cancer statistics published in recent years (Bray et al., 2018; Jemal et al., 1999; Siegel et al., 2019; Torre et al., 2015). These publications are significant because they report the global epidemiology of cervical cancer. This information helps control and prevent the disease, especially in regions with high incidence, morbidity, and mortality. Global prevalence studies also guide local authorities in developing public health programs and policies related to cervical cancer. It is not surprising that these cancer statistics receive higher citations because they were just published recently. Moreover, a previous bibliometric study showed that international collaborative studies, such as the global cancer statistics paper in cervical cancer, are more highly cited than single-nation studies (Breugelmans et al., 2018). Moreover, global cancer statistics studies are usually cited in the introduction and discussion of cervical cancer papers. The epidemiology of cervical cancer is always included to introduce the disease in the manuscript. Total citations will eventually decrease as newer cancer statistics are published. The other classic articles that still receive high citations in the recent year include the study of Walboomers and colleagues in 1999 that reported that HPV is a necessary cause of cervical cancer and the study of Munoz and colleagues in 2003 on the epidemiologic classification of HPV genotypes in cervical cancer (Muñoz et al., 2003; Walboomers et al., 1999). These classic papers were used as evidence to control and prevent HPV infection and cervical cancer. This discovery improved our understanding of the pathophysiology of cervical cancer. This also led to the development of vaccines against HPV, which eventually led to a significant decrease in the burden of cervical cancer. Recent cervical cancer articles continue to cite these papers in reporting HPV as a necessary cause of cervical cancer.

4. Conclusion

This bibliometric analysis showed 46 influential research from 1983 until 2019 that influenced and shaped cervical cancer research and clinical practice. This study showed cervical cancer research's most productive countries, institutions, and journals. It also reported influential cervical cancer studies, including investigations on identifying HPV as a necessary cause of cervical cancer, the discovery and development of HPV vaccines to prevent cervical cancer, and the development of chemotherapy, radiotherapy, and surgical treatment for cervical cancer. These research topics can guide in generating future research agendas for cervical cancer.

Tables

Table 1

Characteristics of document types

Document type	TP	%	AU	APP	TC_{2020}	CPP_{2020}
Article	35	76	528	15	131,919	3,769
Review	10	22	168	17	16,232	1,623
Proceedings paper	2	4.3	13	6.5	3,092	1,546
Meeting abstract	1	2.2	3	3.0	1,176	1,176

TP: number of classic publications; *AU*: number of authors; *APP*: number of authors per publication; TC_{2020}: the total number of citations from Web of Science Core Collection since publication year to the end of 2020; CPP_{2020}: number of citations (TC_{2020}) per publication (*TP*).

Table 2

The 15 journals published classic cervical cancer articles.

Journal	*TP* (%)	IF_{2020}	APP	CPP_{2020}	Web of Science category
CA-A Cancer Journal for Clinicians	7 (20)	508.702	6.3	12,351	oncology
New England Journal of Medicine	7 (20)	91.245	27	1,865	general and internal medicine
Lancet	4 (11)	79.321	15	1,131	general and internal medicine
Journal of Clinical Oncology	3 (8.6)	44.544	12	1,468	oncology
Lancet Oncology	3 (8.6)	41.316	32	1,188	oncology
International Journal of Cancer	2 (5.7)	7.396	5.5	1,132	oncology
Nature	1 (2.9)	49.962	7.0	1,319	multidisciplinary sciences
Science	1 (2.9)	47.728	11	1,371	multidisciplinary sciences
Nature Genetics	1 (2.9)	38.33	8.0	1,070	genetics and heredity
JNCI-Journal of the National Cancer Institute	1 (2.9)	13.506	37	2,548	oncology
Cancer Research	1 (2.9)	12.701	6.0	1,469	oncology
EMBO Journal	1 (2.9)	11.598	6.0	1,193	biochemistry and molecular biology cell biology
Proceedings of the National Academy of Sciences of the United States of America-Biological Sciences	1 (2.9)	11.205	4.0	1,825	biology
Journal of Pathology	1 (2.9)	7.996	10	5,802	oncology pathology
British Journal of Cancer	1 (2.9)	7.640	5.0	1,053	oncology

TP (%): rank and the percentage of number of classic articles; IF_{2020}: journal impact factor in 2020; *APP*: number of authors per publication; CPP_{2020}: number of citations (TC_{2020}) per publication (*TP*).

Table 3

Top 12 most productive countries

Country	TP	TPR (%)	IPR (%)	CPR (%)	FPR (%)	RPR (%)
USA	28	1 (80)	1 (65)	1 (100)	1 (57)	1 (57)
France	12	2 (34)	3 (10)	2 (67)	2 (11)	2 (14)
Brazil	7	3 (20)	N/A	3 (47)	5 (2.9)	5 (2.9)
Spain	6	4 (17)	N/A	4 (40)	4 (8.6)	4 (5.7)
Canada	5	5 (14)	N/A	5 (33)	N/A	N/A
Germany	5	5 (14)	2 (20)	28 (6.7)	2 (11)	3 (11)
Netherlands	4	7 (11)	N/A	6 (27)	5 (2.9)	5 (2.9)
Poland	4	7 (11)	N/A	6 (27)	N/A	N/A
Australia	3	9 (8.6)	N/A	8 (20)	N/A	N/A
Belgium	3	9 (8.6)	N/A	8 (20)	N/A	N/A
Colombia	3	9 (8.6)	N/A	8 (20)	N/A	N/A
UK	3	9 (8.6)	N/A	8 (20)	5 (2.9)	5 (2.9)

TP: number of classic articles; TPR (%): rank and percentage of the total number of articles; IPR (%), rank and the percentage of the single-country articles in all single-country articles; CPR (%), rank and the percentage of the internationally collaborative articles in all internationally collaborative articles; FPR (%), rank and the percentage of the first-author articles in all first-author articles; RPR (%), rank and the percentage of the corresponding-authored articles in all corresponding-authored articles; N/A: not available.

Table 4

Top 15 most productive institutions

Institute	TP	TPR (%)	IPR (%)	CPR (%)	FPR (%)	RPR (%)
International Agency for Research on Cancer, France	9	1 (26)	1 (29)	1 (25)	2 (11)	2 (11)
American Cancer Society, USA	8	2 (23)	2 (14)	1 (25)	1 (17)	1 (17)
Johns Hopkins University, USA	5	3 (14)	N/A	3 (18)	N/A	N/A
University of New Mexico, USA	5	3 (14)	N/A	3 (18)	N/A	N/A
University of Washington, USA	5	3 (14)	N/A	3 (18)	4 (2.9)	5 (2.9)
Indiana University, USA	4	6 (11)	N/A	6 (14)	N/A	N/A
McGill University, Canada	4	6 (11)	N/A	6 (14)	N/A	N/A
University of California, San Francisco, USA	4	6 (11)	N/A	6 (14)	N/A	N/A
Duke University, USA	3	9 (8.6)	N/A	9 (11)	N/A	N/A
GlaxoSmithKline Biologicals, Belgium	3	9 (8.6)	N/A	9 (11)	N/A	N/A
Merck Research Laboratories, USA	3	9 (8.6)	N/A	9 (11)	N/A	N/A
National Cancer Institute (NCI), USA	3	9 (8.6)	N/A	9 (11)	4 (2.9)	5 (2.9)

Contd...

Roswell Park Cancer Institute, USA	3	9 (8.6)	N/A	9 (11)	N/A	N/A
University of Iowa, USA	3	9 (8.6)	N/A	9 (11)	N/A	N/A
University of Texas, USA	3	9 (8.6)	N/A	9 (11)	3 (5.7)	3 (5.7)

TP: total number of classic articles; *TPR* (%): total number of articles and the percentage of total articles; *IPR* (%): rank and percentage of the single-institute articles in all single-institute articles; *CPR* (%): rank and percentage of the inter-institutionally collaborative articles in all inter-institutionally collaborative articles; *FPR* (%), rank and the percentage of first-author articles in all first-author articles, *RPR* (%), rank and the percentage of corresponding-authored articles in all corresponding-authored articles; N/A: not available.

Table 5

Top 10 most frequently cited classic articles with $TC_{2020} > 2,500$

Rank (TC_{2020})	Rank (C_{2020})	Article title	Reference
1 (27,511)	4 (1,356)	Global cancer statistics	Jemal et. al. (2011)
2 (20,181)	1 (14,680)	Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries	Bray et. al. (2018)
3 (15,303)	3 (1,744)	Global cancer statistics, 2012	Torre et. al. (2015)
4 (10,674)	2 (6961)	Cancer statistics, 2019	Siegel et. al. (2019)
5 (5,802)	5 (283)	Human papillomavirus is a necessary cause of invasive cervical cancer worldwide	Walboomers et. al. (1999)
6 (4,819)	15 (63)	Cancer statistics, 2006	Jemal et. al. (2006)
7 (4,702)	23 (42)	Cancer statistics, 2005	Jemal et. al. (2005)
8 (4,077)	8 (181)	Epidemiologic classification of human papillomavirus types associated with cervical cancer	Munoz et. al. (2003)
9 (3,269)	27 (26)	Cancer statistics, 2004	Jemal et. al. (2004)
10 (2,548)	25 (33)	Prevalence of human papillomavirus in cervical cancer: A worldwide perspective	Bosch et. al. (1995)
11 (1,974)	9 (197)	Human papillomavirus and rising oropharyngeal cancer incidence in the United States	Chaturvedi et. al. (2011)
12 (1,825)	30 (48)	A papillomavirus DNA from a cervical-carcinoma and its prevalence in cancer biopsy samples from different geographic regions	Durst et. al. (1983)
13 (1,744)	18 (79)	Concurrent cisplatin-based radiotherapy and chemotherapy for locally advanced cervical cancer	Rose et. al. (1999)

Contd...

14 (1,729)	20 (75)	Natural history of cervicovaginal papillomavirus infection in young women	Ho et. al. (1998)
15 (1,564)	21 (71)	Pelvic radiation with concurrent chemotherapy compared with pelvic and para-aortic radiation for high-risk cervical cancer	Morris et. al. (1999)
16 (1,469)	27 (59)	Association between tumor hypoxia and Malignant progression in advanced cancer of the uterine cervix	Hockel et. al. (1996)
17 (1,386)	24 (66)	Concurrent chemotherapy and pelvic radiation therapy compared with pelvic radiation therapy alone as adjuvant therapy after radical surgery in high-risk early-stage cancer of the cervix	Peters et. al. (2000)
18 (1,381)	15 (99)	Quadrivalent vaccine against human papillomavirus to prevent high-grade cervical lesions	Villa et. al. (2007)
19 (1,371)	29 (55)	An adenovirus mutant that replicates selectively in p53-deficient human tumor cells	Bischoff et. al. (1996)
20 (1,363)	13 (124)	Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study	De Sanjose et. al. (2010)
20 (1,363)	26 (62)	Cisplatin, radiation, and adjuvant hysterectomy compared with radiation and adjuvant hysterectomy for bulky stage IB cervical carcinoma	Keys et. al. (1999)
22 (1,319)	34 (37)	Structure and transcription of human papillomavirus sequences in cervical carcinoma cells	Schwarz et. al. (1985)
23 (1,196)	25 (63)	A controlled trial of a human papillomavirus type 16 vaccine	Koutsky et. al. (2002)
24 (1,193)	35 (32)	A new type of papillomavirus DNA, its presence in genital cancer biopsies and in cell lines derived from cervical cancer	Boshart et. al. (1984)
25 (1,157)	10 (193)	Global surveillance of cancer survival 1995-2009: analysis of individual data for 25 676 887 patients from 279 population-based registries in 67 countries (CONCORD-2)	Allemani et. al. (2015)
26 (1,146)	19 (76)	Sustained efficacy up to 4-5 years of a bivalent L1 virus-like particle vaccine against human papillomavirus types 16 and 18: follow-up from a randomised control trial	Harper et. al. (2006)
27 (1,142)	17 (82)	Human papillomavirus type distribution in invasive cervical cancer and high-grade cervical lesions: A meta-analysis update	Smith et. al. (2007)
28 (1,140)	23 (67)	Efficacy of a bivalent L1 virus-like particle vaccine in prevention of infection with human papillomavirus types 16 and 18 in young women: a randomised controlled trial	Harper et. al. (2004)
29 (1,122)	12 (140)	Global estimates of cancer prevalence for 27 sites in the adult population in 2008	Bray et. al. (2013)

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30 (1,115)	22 (70)	Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: a randomised double-blind placebo-controlled multicentre phase II efficacy trial	Villa et. al. (2005)
31 (1,086)	14 (121)	Global cancer transitions according to the Human Development Index (2008-2030): a population-based study	Bray et. al. (2012)
32 (1,082)	33 (45)	Randomised study of radical surgery versus radiotherapy for stage Ib-IIa cervical cancer	Landoni et. al. (1997)
33 (1,070)	31 (47)	Tumour amplified kinase STK15/BTAK induces centrosome amplification, aneuploidy and transformation	Zhou et. al. (1998)
34 (1,053)	27 (59)	Human papillomavirus types in invasive cervical cancer worldwide: a meta-analysis	Clifford et. al. (2003)
35 (1,043)	31 (47)	Randomized comparison of fluorouracil plus cisplatin versus hydroxyurea as an adjunct to radiation therapy in stage IIB-IVA carcinoma of the cervix with negative para-aortic lymph nodes: A Gynecologic Oncology Group and Southwest Oncology Group Study	Whitney et. al. (1999)

TC_{2020}: the total number of citations from Web of Science Core Collection since publication to the end of 2020; C_{2020}: the total number of citations in 2020 only.

References

[1] Allemani, C., Weir, H. K., Carreira, H., Harewood, R., Spika, D., Wang, X. S., Bannon, F., Ahn, J. V., Johnson, C. J., Bonaventure, A., Marcos-Gragera, R., Stiller, C., Azevedo E Silva, G., Chen, W. Q., Ogunbiyi, O. J., Rachet, B., Soeberg, M. J., You, H., Matsuda, T., ... Miles, S. A., Global surveillance of cancer survival 1995-2009: Analysis of individual data for 25 676 887 patients from 279 population-based registries in 67 countries (CONCORD-2). *The Lancet*, *385*(9972), 977-1010 (2015). https://doi.org/10.1016/S0140-6736(14)62038-9.

[2] Bosch, F. X., Manos, M. M., Muñoz, N., Sherman, M., Jansen, A. M., Peto, J., Schiffman, M. H., Moreno, V., Kurman, R., & Shan, K. V., Prevalence of human papillomavirus in cervical cancer: A worldwide perspective. *Journal of the National Cancer Institute*, 87(11), 796-802 (1995). https://doi.org/10.1093/jnci/87.11.796.

[3] Boshart, M., Gissman, L., Ikenberg, H., Kleinheinz, A., Scheurlen, W., & zur Hausen, H., A new type of papillomavirus DNA, its presence in genital cancer biopsies and in cell lines derived from cervical cancer. *The EMBO Journal*, 3(5), 1151-1157 (1984).

[4] Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A., Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 68(6), 394-424 (2018). https://doi.org/10.3322/caac.21492.

[5] Bray, F., Jemal, A., Grey, N., Ferlay, J., & Forman, D., Global cancer transitions according to the Human Development Index (2008-2030): A population-based study. *The Lancet Oncology*, 13(8), 790-801 (2012). https://doi.org/10.1016/S1470-2045(12)70211-5.

[6] Bray, F., Ren, J. S., Masuyer, E., & Ferlay, J., Global estimates of cancer prevalence for 27 sites in the adult population in 2008. *International Journal of Cancer*, 132(5), 1133-1145 (2013). https://doi.org/10.1002/ijc.27711.

[7] Breugelmans, J. G., Roberge, G., Tippett, C., Durning, M., Struck, D. B., & Makanga, M. M., Scientific impact increases when researchers publish in open access and international collaboration: A bibliometric analysis on poverty-related disease papers. *PLOS ONE*, 13(9) (2018), e0203156. https://doi.org/10.1371/journal.pone.0203156.

[8] Brisson, M., Kim, J. J., Canfell, K., Drolet, M., Gingras, G., Burger, E. A., Martin, D., Simms, K. T., Bénard, É., Boily, M.-C., Sy, S., Regan, C., Keane, A., Caruana, M., Nguyen, D. T. N., Smith, M. A., Laprise, J.-F., Jit, M., Alary, M., … Hutubessy, R., Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *The Lancet*, 395(10224), 575-590 (2020). https://doi.org/10.1016/S0140-6736(20)30068-4.

[9] Chaturvedi, A. K., Engels, E. A., Pfeiffer, R. M., Hernandez, B. Y., Xiao, W., Kim, E., Jiang, B., Goodman, M. T., Sibug-Saber, M., Cozen, W., Liu, L., Lynch, C. F., Wentzensen, N., Jordan, R. C., Altekruse, S., Anderson, W. F., Rosenberg, P. S., & Gillison, M. L., Human papillomavirus and rising oropharyngeal cancer incidence in the United States. *Journal of Clinical Oncology*, 29(32), 4294-4301 (2011). https://doi.org/10.1200/JCO.2011.36.4596.

[10] Clifford, G. M., Smith, J. S., Plummer, M., Muñoz, N., & Franceschi, S., Human papillomavirus types in invasive cervical cancer worldwide: A meta-analysis. *British Journal of Cancer*, 88(1), 63-69 (2003). https://doi.org/10.1038/sj.bjc.6600688.

[11] de Sanjose, S., Quint, W. G. V., Alemany, L., Geraets, D. T., Klaustermeier, J. E., Lloveras, B., Tous, S., Felix, A., Bravo, L. E., Shin, H. R., Vallejos, C. S., de Ruiz, P. A., Lima, M. A., Guimera, N., Clavero, O., Alejo, M., Llombart-Bosch, A., Cheng-Yang, C., Tatti, S. A., … Bosch, F. X., Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. *The Lancet Oncology*, 11(11), 1048-1056 (2010). https://doi.org/10.1016/S1470-2045(10)70230-8.

[12] Durst, M., Gissmann, L., Ikenberg, H., & Zur Hausen, H., A papillomavirus DNA from a cervical carcinoma and its prevalence in cancer biopsy samples from different geographic regions. *Proceedings of the National Academy of Sciences of the United States of America*, 80(12 I), 3812-3815 (1983). https://doi.org/10.1073/pnas.80.12.3812.

[13] Eyre-Walker, A., & Stoletzki, N., The assessment of science: the relative merits of post-publication review, the impact factor, and the number of citations. *PLoS Biology*, 11(10) (2013), e1001675. https://doi.org/10.1371/journal.pbio.1001675.

[14] Garfield, E., 100 citation classics from the Journal of the American Medical Association. *JAMA*, *257*(1), 52-59 (1987).

[15] Garfield, Eugene. (n.d.). *What is a Citation Classic?* Retrieved March 25, 2022, from http://garfield.library.upenn.edu/classics.html.

[16] Garfield, Eugene. KeyWords Plus: ISI's Breakthrough Retrieval Method. Part 1. Expanding Your Searching Power on Current Contents on Diskette. *Current Comments*, 13, 295-299 (1990).

[17] Harper, D. M., Franco, E. L., Wheeler, C., Ferris, D. G., Jenkins, D., Schuind, A., Zahaf, T., Innis, B., Naud, P., De Carvalho, N. S., Roteli-Martins, C. M., Teixeira, J., Blatter, M. M., Korn, A. P., Quint, W., & Dubin, G. Efficacy of a bivalent L1 virus-like particle vaccine in prevention of infection with human papillomavirus types 16 and 18 in young women: A randomised controlled trial. *Lancet*, 364(9447), 1757-1765 (2004). https://doi.org/10.1016/S0140-6736(04)17398-4.

[18] Harper, D. M., Franco, E. L., Wheeler, C. M., Moscicki, A. B., Romanowski, B., Roteli-Martins, C. M., Jenkins, D., Schuind, A., Costa Clemens, S. A., & Dubin, G., Sustained efficacy up to 4·5 years of a bivalent L1 virus-like particle vaccine against human papillomavirus types 16 and 18: follow-up from a randomised control trial. *Lancet*, 367(9518), 1247-1255 (2006). https://doi.org/10.1016/S0140-6736(06)68439-0.

[19] Ho, G. Y. F., Bierman, R., Beardsley, L., Chang, C. J., & Burk, R. D. Natural history of cervicovaginal papillomavirus infection in young women. *The New England Journal of Medicine*, 338(7), 423-428 (1998).

[20] Ho, Y.-S., & Kahn, M., A bibliometric study of highly cited reviews in the Science Citation Index Expanded^TM. *Journal of the American Society for Information Science and Technology*, 65(2), 372-385 (2013). https://doi.org/10.1002/asi.

[21] Ho, Y. S., Top-cited articles in chemical engineering in science citation index expanded: A bibliometric analysis. *Chinese Journal of Chemical Engineering*, 20(3), 478-488 (2012). https://doi.org/10.1016/S1004-9541(11)60209-7.

[22] Ho, Y. S., Classic articles on social work field in Social Science Citation Index: A bibliometric analysis. *Scientometrics*, 98(1), 137-155 (2014). https://doi.org/10.1007/s11192-013-1014-8.

[23] Ho, Y. S., & Hartley, J., Classic articles in Psychology in the Science Citation Index Expanded: A bibliometric analysis. *British Journal of Psychology (London, England : 1953)*, 107(4), 768-780 (2016). https://doi.org/10.1111/bjop.12163.

[24] Höckel, M., Schlenger, K., Aral, B., Mitze, M., Schäffer, U., & Vaupel, P., Association between tumor hypoxia and malignant progression in advanced cancer of the uterine cervix. *Cancer Research*, 56(19), 4509-4515 (1996).

[25] Hsu, Y. H. E., & Ho, Y. S., Highly cited articles in health care sciences and services field in science citation index expanded: A bibliometric analysis for 1958 – 2012. *Methods of Information in Medicine*, 53(6), 446-458 (2014). https://doi.org/10.3414/ME14-01-0022.

[26] Hull, R., Mbele, M., Makhafola, T., Hicks, C., Wang, S.-M., Reis, R. M., Mehrotra, R., Mkhize-Kwitshana, Z., Kibiki, G., Bates, D. O., & Dlamini, Z., Cervical cancer in low and middle-income countries. *Oncology Letters*, 20(3), 2058-2074 (2020). https://doi.org/10.3892/ol.2020.11754.

[27] Jallow, A. W., Lee, S.-D., & Ho, Y.-S., Classic articles in apoptotic research : A bibliometric analysis. *COLLNET Journal of Scientometrics and Information Management*, 15(1), 145-162 (2021). https://doi.org/10.1080/09737766.2021.1934605.

[28] Jelicic Kadic, A., Kovacevic, T., Runjic, E., Simicic Majce, A., Markic, J., Polic, B., Mestrovic, J., & Puljak, L., Research methodology used in the 50 most cited articles in the field of pediatrics: types of studies that become citation classics. *BMC Medical Research Methodology*, 20(1), 60 (2020). https://doi.org/10.1186/s12874-020-00940-0.

[29] Jemal, A., Bray, F., & Ferlay, J., Global Cancer Statistics: 2011. *CA Cancer J Clin*, 49(2), 1,33-64 (1999). https://doi.org/10.3322/caac.20107.Available.

[30] Jemal, A., Murray, T., Ward, E., Samuels, A., Tiwari, R. C., Ghafoor, A., Feuer, E. J., Thun, M. J., Manager, M., & Re-, S., Cancer Statistics , 2005. *CA Cancer J Clin*, 55, 10-30 (2005).

[31] Jemal, A., Siegel, R., Ward, E., Murray, T., Xu, J., Smigal, C., & Thun, M. J., Cancer Statistics , 2006. *CA Cancer J Clin*, 56, 106-130 (2006).

[32] Jemal, A., Tiwari, R. C., Murray, T., Ghafoor, A., Samuels, A., Ward, E., Feuer, E. J., & Thun, M. J. (2004). Cancer statistics, *CA: A Cancer Journal for Clinicians*, 54(1), 8-29 (2004). https://doi.org/10.3322/canjclin.54.1.8.

[33] Kan Yeung, A. W., & Ho, Y. S., Identification and analysis of classic articles and sleeping beauties in neurosciences. *Current Science*, 114(10), 2039-2044 (2018). https://doi.org/10.18520/cs/v114/i10/2039-2044.

[34] Keys, H. M., Bundy, B. N., Stehman, F. B., Muderspach, L. I., Chafe, W. E., Suggs III, C. L., Walker, J. L., & Gersell, D., Cisplatin, Radiation, and Adjuvant Hysterectomy Compared with Radiation and Adjuvant Hysterectomy for Bulky Stage IB Cervical Carcinoma. *New England Journal of Medicine*, 341(9), 708-708 (1999). https://doi.org/10.1056/nejm199908263410924.

[35] Koutsky, L. A., Ault, K. A., Wheeler, C. M., Brown, D. R., Barr, E., Alvarez, F. B., Chiacchierini, L. M., & Jansen, K. U., A controlled trial of a human papillomavirus type 16 vaccine. *The New England Journal of Medicine*, 347(21), 1769-1775 (1997).

[36] Landoni, F., Maneo, A., Colombo, A., Placa, F., Milani, R., Perego, P., Favini, G., Ferri, L., & Mangioni, C., Randomised study of radical surgery versus radiotherapy for stage Ib-IIa cervical cancer. *Lancet*, *350*(9077), 535-540 (1997). https://doi.org/10.1016/S0140-6736(97)02250-2.

[37] Li, Z., & Ho, Y. S., Use of citation per publication as an indicator to evaluate contingent valuation research. *Scientometrics*, 75(1), 97-110 (2008). https://doi.org/10.1007/s11192-007-1838-1.

[38] Long, X., Huang, J. Z., & Ho, Y. S., A historical review of classic articles in surgery field. *American Journal of Surgery*, 208(5), 841-849 (2014). https://doi.org/10.1016/j.amjsurg.2014.03.016.

[39] Markowitz, L. E., & Schiller, J. T., Human Papillomavirus Vaccines. *The Journal of Infectious Diseases*, *224*(Supplement_4), S367-S378 (2021). https://doi.org/10.1093/infdis/jiaa621.

[40] Morris, M., Eifel, P. J., Lu, J., Grigsby, P. W., Levenback, C., Stevens, R. E., Rotman, M., Gershenson, D. M., & Mutch, D. G., Pelvic radiation with concurrent chemotherapy compared with pelvic and para-aortic radiation for high-risk cervical cancer. *The New England Journal of Medicine*, 340(15), 1137-1143 (1999). https://doi.org/10.1056/NEJM199904153401501.

[41] Muñoz, N., Bosch, F. X., de Sanjosé, S., Herrero, R., Castellsagué, X., Shah, K. V, Snijders, P. J. F., & Meijer, C. J. L. M., Epidemiologic classification of human papillomavirus types associated with cervical cancer. *The New England Journal of Medicine*, 348(6), 518-527 (2003). https://doi.org/10.1056/NEJMoa021641.

[42] Peters, W. A., Liu, P. Y., Barrett, R. J., Stock, R. J., Monk, B. J., Berek, J. S., Souhami, L., Grigsby, P., Gordon, W., & Alberts, D. S., Concurrent chemotherapy and pelvic radiation therapy compared with pelvic radiation therapy alone as adjuvant therapy after radical surgery in high-risk early-stage cancer of the cervix. *Journal of Clinical Oncology*, 18(8), 1606-1613 (2000). https://doi.org/10.1200/JCO.2000.18.8.1606.

[43] Riesenberg, D., & Lundberg, G. D., The Order of Authorship : Who's on First ? *JAMA*, 264(14), 1857 (1990).

[44] Rose, P. G., Bundy, B. N., Watkins, E. B., Thigpen, J. T., Deppe, G., Maiman, M. A., Clarke-Pearson, D. L., & Insalaco, S., Concurrent cisplatin-based radiotherapy and chemotherapy for locally advanced cervical cancer. *The New England Journal of Medicine*, 340(15), 1144-1153 (1999).

[45] Siegel, R. L., Miller, K. D., & Jemal, A., Cancer statistics, 2019. *CA: A Cancer Journal for Clinicians*, 69(1), 7-34 (2019). https://doi.org/10.3322/caac.21551.

[46] Smith, D. R., Citation indexing and highly cited articles in the Australian Veterinary Journal. *Australian Veterinary Journal*, 86(9), 337-339 (2008). https://doi.org/https://doi.org/10.1111/j.1751-0813.2008.00330.x.

[47] Smith, J. S., Lindsay, L., Hoots, B., Keys, J., Franceschi, S., Winer, R., & Clifford, G. M., Human papillomavirus type distribution in invasive cervical cancer and high-grade cervical lesions: A meta-analysis update. *International Journal of Cancer*, 121(3), 621-632 (2007). https://doi.org/10.1002/ijc.22527.

[48] Suk, F.-M., Wang, M.-H., & Ho, Y.-S., A historical review of classic Helicobacter pylori publications in science citation index expanded. *COLLNET Journal of Scientometrics and Information Management*, 13(2), 313-330 (2019). https://doi.org/10.1080/09737766.2020.1716645.

[49] Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F., Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 71(3), 209-249 (2021). https://doi.org/https://doi.org/10.3322/caac.21660.

[50] Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-Tieulent, J., & Jemal, A., Global cancer statistics, 2012. *CA: A Cancer Journal for Clinicians*, 65(2), 87-108 (2015). https://doi.org/10.3322/caac.21262.

[51] Villa, L. L., Costa, R. L. R., Petta, C. A., Andrade, R. P., Ault, K. A., Giuliano, A. R., Wheeler, C. M., Koutsky, L. A., Malm, C., Lehtinen, M., Skjeldestad, F. E., Olsson, S. E., Steinwall, M., Brown, D. R., Kurman, R. J., Ronnett, B. M., Stoler, M. H., Ferenczy, A., Harper, D. M., … Barr, E. Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: A randomised double-blind placebo-controlled multicentre phase II efficacy trial. *Lancet Oncology*, 6(5), 271-278 (2005). https://doi.org/10.1016/S1470-2045(05)70101-7.

[52] Walboomers, J., Jacobs, M., Manos, M., Bosch, F., Kummer, J., Shah, K., Snijders, Peter, J. F., Peto, J., Meijer, C. J. . L., & Munoz, N., Human Papillomavirus Is a Necessary Cause. *Journal of Pathology*, 189(May), 12-19 (1999).

[53] Wang, M. H., Fu, H. Z., & Ho, Y. S., Comparison of universities' scientific performance using bibliometric indicators. *Malaysian Journal of Library and Information Science*, 16(2), 1-19 (2011).

[54] Whitney, C. W., Sause, W., Bundy, B. N., Malfetano, J. H., Hannigan, E. V, Fowler, W. C. J., Clarke-Pearson, D. L., & Liao, S. Y., Randomized comparison of fluorouracil plus cisplatin versus hydroxyurea as an adjunct to radiation therapy in stage IIB-IVA carcinoma of the cervix with negative para-aortic lymph nodes: a Gynecologic Oncology Group and Southwest Oncology Group study. *Journal of Clinical Oncology : Official Journal of the American Society of Clinical Oncology*, 17(5), 1339-1348 (1999). https://doi.org/10.1200/JCO.1999.17.5.1339.

[55] Zhang, X., Zeng, Q., Cai, W., & Ruan, W., Trends of cervical cancer at global, regional, and national level: data from the Global Burden of Disease study 2019. *BMC Public Health*, 21(1), 894 (2021). https://doi.org/10.1186/s12889-021-10907-5.

[56] Zhao, M., Wu, Q., Hao, Y., Hu, J., Gao, Y., Zhou, S., & Han, L., Global, regional, and national burden of cervical cancer for 195 countries and territories, 2007–2017: findings from the Global Burden of Disease Study 2017. *BMC Women's Health*, 21(1), 419 (2021). https://doi.org/10.1186/s12905-021-01571-3.