

Publication rate and publication probability of abstracts presented at the German Cancer Congress in 2000 and 2010

Publikationsrate und Publikationswahrscheinlichkeit von Abstracts, die in den Jahren 2000 und 2010 auf den Deutschen Krebskongressen präsentiert wurden

Abstract

Background: Scientific results as presented at conferences need to be published in journals so that the scientific community can become aware of the results. The aim of our study was to analyze the peer-review publication rate of abstracts presented at two German Cancer Congresses, based on various factors.

Methods: We investigated 1,086 abstracts published by the German Cancer Congress in 2000 and 2010 in relation to the publication in peer-reviewed journals (PubMed publication) within the subsequent 6 years. Furthermore, we studied potential determinants of PubMed publications. For statistical analysis we used Kaplan-Meier estimates and Cox regression (hazard ratios, HR, and 95% confidence intervals).

Results: Overall 456 abstracts (42%) were published as PubMed publications, 86 (8%) before the congresses and 370 (34%) after the congresses. The median time to PubMed publication was 16.2 months among 370 post-published abstracts. Abstracts presented as oral presentations had a shorter time to PubMed publication than abstracts presented as posters (14.2 months vs. 16.8 months respectively). In comparison to cell experiments, randomized controlled trials and animal experiments had a higher PubMed publication rate (HR=2.2, 95%CI 1.4–3.4 and HR=2.6, 95%CI 1.6–4.4 respectively). In comparison to abstracts including work in progress, abstracts that included finalized study results had a higher publication rate (HR=1.6, 95%CI 1.2–2.3).

Discussion: Our study is the largest study of oncology congresses examining the publication rates and associated determinants. The publication rate was similar to other congresses. There is a considerable potential of publication bias as 58% of congress abstracts were not followed by a peer-reviewed full paper publication within 6 years.

Keywords: German Cancer Congress, publication rate, peer review

Zusammenfassung

Hintergrund: Die auf Konferenzen präsentierten wissenschaftlichen Ergebnisse müssen in Fachzeitschriften veröffentlicht werden, damit das wissenschaftliche Fachpublikum über die Ergebnisse informiert wird. Ziel unserer Studie war es, Abstracts, die auf zwei Deutschen Krebskongressen präsentiert wurden, auf die Wahrscheinlichkeit ihrer anschließenden Peer-Review-Publikation und mögliche Einflussfaktoren hin zu analysieren.

Methoden: Wir haben 1.086 Abstracts in Bezug auf ihre Veröffentlichung in Journalen mit Peer-Review-Verfahren (PubMed-Publikation) innerhalb der folgenden 6 Jahre nach ihrer Präsentation auf dem Deutschen Krebskongress in den Jahren 2000 und 2010 untersucht. Darüber hinaus untersuchten wir mögliche Determinanten für PubMed-Publika-

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tionen. Für die statistische Analyse verwendeten wir Kaplan-Meier-Schätzungen und die Cox-Regression (Hazard Ratios, HR und 95%-Konfidenzintervalle).

Ergebnisse: Insgesamt wurden 456 Abstracts (42%) als PubMed-Publikationen veröffentlicht, 86 (8%) vor den Kongressen und 370 (34%) nach den Kongressen. Im Median betrug die Zeit bis zur Veröffentlichung von PubMed-Publikationen 16,2 Monate. Abstracts, die als Vortrag präsentiert wurden, wurden schneller als PubMed-Publikation veröffentlicht als Abstracts, die als Poster präsentiert wurden (14,2 Monate vs. 16,8 Monaten). Randomisierte kontrollierte Studien und Tierversuche wiesen im Vergleich zu Zellexperimenten eine höhere PubMed-Publikationsrate auf (HR=2,2, 95%CI 1,4–3,4 bzw. HR=2,6, 95%CI 1,6–4,4). Im Vergleich zu Abstracts, die noch laufende Untersuchungen beinhalteten, war die Veröffentlichungsrate bei denjenigen Abstracts mit abgeschlossene Studienergebnissen höher (HR=1,6, 95%CI 1,2–2,3).

Diskussion: Unsere Studie ist die größte Studie zu onkologischen Kongressen, in der die Publikationsraten und die damit verbundenen Determinanten untersucht werden. Die Publikationsrate glich der anderer Kongresse. Die Publikationsneigung weist allerdings noch ein erhebliches Potenzial auf, da 58% der Kongress-Abstracts nicht innerhalb von 6 Jahren als Artikel in einem peer-reviewed Journal veröffentlicht wurden.

Schlüsselwörter: Deutscher Krebskongress, Publikationsrate, Peer Review

Introduction

Scientific results as presented at conferences need to be published in journals so that the scientific community can become aware of the results. The presentation of results at congresses is an important first step in publishing new findings [1]. The following peer-reviewed full paper publication of the results certifies the quality of the results [2] and emphasizes its validity and reliability [3]. A peer-reviewed publication of a scientific report also allows a verification of the presented methods, results and interpretations and thus enhancements of the topic [4]. In oncology, several congresses take place in different countries, for which the publication rates and their determinants influencing the publication probability were identified [5], [6], [7], [8], [9]. The German Cancer Congress is the largest oncological conference in German-speaking countries. It takes place every two years and is a good opportunity to present new research results to a large number of experts and to enter into discussion with them.

The aim of our study was to analyze the peer-reviewed publication rate and publication probability of the abstracts published at the German Cancer Congress in 2000 and 2010. Furthermore, we studied potential determinants of the publication probability and time to publication including form of the presentation, presenting p-values and the year in which the congress was held.

Methods

Data basis and collection

The basis for this follow-up study was provided by the abstracts published at the German Cancer Congress in 2000 and 2010, which were published in the respective abstract manuals [10], [11]. These abstracts were presented either as a poster or an oral presentation at the congress and were recorded in the abstract manuals. We identified all congress abstracts that were peer-reviewed published as full papers or reports in PubMed and thus allowed a more detailed presentation of the research (called "PubMed publication" throughout the manuscript) before each congress and within 6 years after each congress. Uncertainties in the coding of individual variables from the abstracts and publications were discussed with the last author who has a research experience of more than 20 years. The relevant data of each abstract and publication were electronically stored in Microsoft Access 2013. Both the date of the electronic publication and the print version according to PubMed were recorded. Since there were fewer electronic publications for the year 2000 than for the year 2010, the date of the print publication was decisive for the further investigation. If there was only an electronic paper for publication, this date was equivalent to a print publication. Pre-publications were coded as publications whose publication date was before or on the first day of the respective congress. We categorized all reported p-values into $p \leq 0.05$ and $p > 0.05$. P-values ≤ 0.05 were classified as statistically significant.

If several p-values had been specified in the congress abstracts, we documented the smallest p-value.

Research and inclusion criteria of data

The search for the appropriate publications of the abstracts was conducted using the names of the first three authors and the last author, the described tumor and keywords from the abstract title. Criteria for the recognition of a full paper were as follows: at least one author identified in the congress abstract and in the publication, the same problem, the same intervention or observation, the same study object and the same outcome in the abstract and in the publication. These criteria included the presentation or publication of partial results.

Data processing and analysis

We used the full date specification: day, month and year. If the day was missing, we replaced the missing value with the 15th of a month. If the journal published less than 12 issues a year, we noted the 15th of the first month covered by the issue. If only the year of publication was available, we set the date of publication to June 30 for the given year. We used causal diagrams to identify minimally sufficient adjustment sets [12]. All publications belonging to an abstract were recorded, but only the earliest PubMed publication was considered in the further evaluation and time to event analysis. At first the data were analyzed exploratively and presented descriptively. Kaplan-Meier estimates and hazard ratios (HR) and corresponding 95% confidence intervals (95%CI) estimated by the Cox Proportional Hazards model were used to analyze the influence of predictors on publication probability and time to publication. In addition, we reported median time to publication among abstracts that have been published within 6 years after the congress. All statistical analysis was performed with SAS, version 9.4.

Results

Overall

In total 1,086 abstracts were published by the German Cancer Congress in 2000 and 2010. Figure 1 shows the flowchart of paper selection. We could not find a publication in PubMed for 622 congress abstracts. 9 PubMed publications were considered as not published because they appeared more than 6 years after the respective congress. For 34 abstracts several PubMed publications were found, i.e. 31 abstracts had 2 full papers and 3 abstracts had 3 full papers in PubMed. In these cases, for further analysis the earliest PubMed publication was considered, and 37 PubMed publications were discounted. Finally, 456 abstracts were included into the further description with their earliest full paper publication in PubMed.

86 (8% of 1,086) of all PubMed publication were published before the presentation at the respective congress with a median of 7.3 months before the congress. They were divided into 33 oral presentations and 53 poster presentations. Overall 31 abstracts of oral presentations and 50 abstracts of the poster presentations were published as PubMed publication within two years before the respective congress. The earliest pre-publication of the oral presentation was 32 months before the congress at which the study was presented; the earliest PubMed pre-publication of the poster presentations was about 86 months before the presentation at the respective congress.

After discounting PubMed publications that occurred before the congress, 1,000 abstracts remained for further analysis. These abstracts were compounded by 333 oral presentations (33%) and 667 poster presentations (67%). In total 370 (37%) of the remaining abstracts were published as PubMed publications after the respective congress, they were divided into 42% of the oral presentations and 35% of the poster presentations. The cohort study was the most common study design (46.6%). Meta-analyses and animal experiments had the highest probability of being published as a full paper in PubMed (67% and 65%, respectively) and systematic reviews had the lowest probability of being published as PubMed publications (11%). 30% of 145 unfinished studies and 38% of 854 finished studies were published in PubMed. The probability of being published in PubMed increased with the number of authors involved in the study. Significance terminology was used in congress abstracts of all study types except studies categorized as “miscellaneous” and “systematic review” and in 193 abstracts significance terminology was used without reporting of p-values and confidence intervals (Table 1). The ratio between oral presentation and poster presentation was 1:2. Abstracts that reported significant p-values were presented more often as a poster (70% of 159 abstracts) than as an oral presentation (30% of 230 abstracts), for abstracts specifying p-values the PubMed publication probability was 10 percentage points higher than for abstracts not reporting p-values. 95% of the presented p-values were ≤ 0.05 and the publication probability was identical for abstracts containing at least one p-value ≤ 0.05 compared to abstracts containing only p-values > 0.05 (about 45%). 23% of congress abstracts reported at least one p-value and among these, 95% reported at least one p-value ≤ 0.05 . Furthermore, only 11 abstracts (5%) exclusively reported p-values above 5%. Congress abstracts that reported p-values had a higher PubMed publication probability (45%) than congress abstracts not reporting p-values (35%). Overall 158 out of 370 (43%) PubMed publications were published within one year after the respective congress, 125 abstracts (27%) were published in PubMed 2 to 6 years after the congress. The median time to publication was 16.2 months.

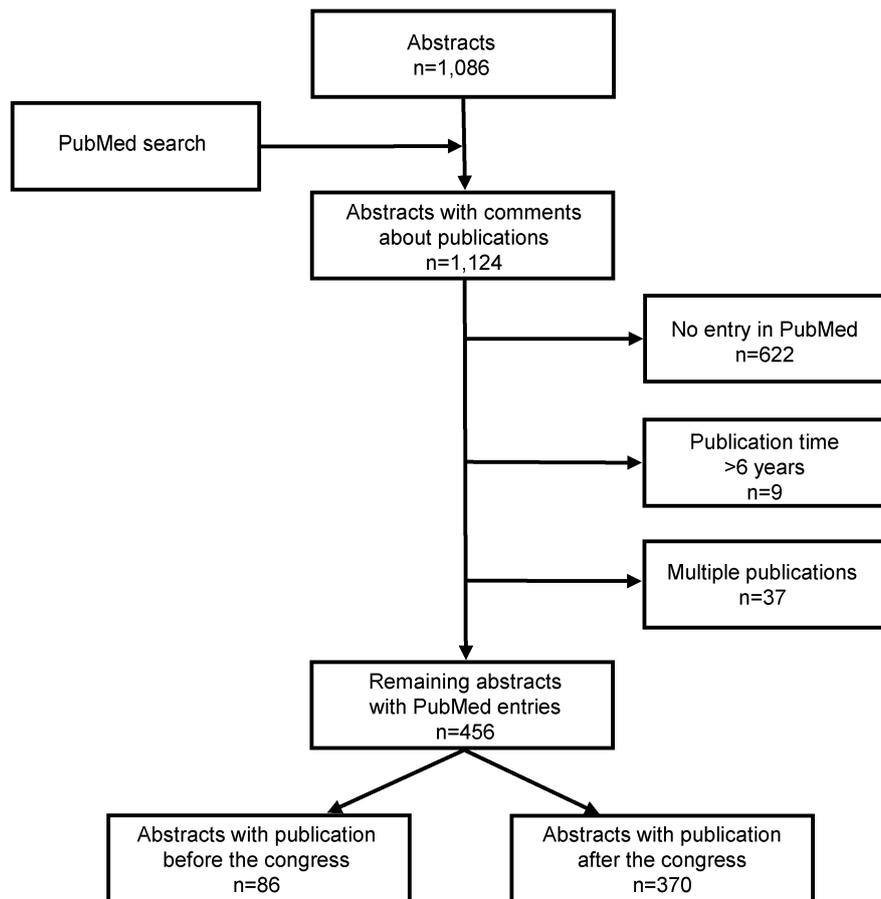


Figure 1: Flowchart of paper selection

Determinants for full paper publication

In comparison to cell experiments, randomized controlled trials and animal experiments had a higher PubMed publication rate (HR=2.3, 95%CI 1.5–3.5 and HR=2.7, 95%CI 1.6–4.5, respectively). In comparison to abstracts reporting ongoing studies, abstracts that reported final study results had a higher publication rate (HR=1.7, 95%CI 1.2–2.3). With each increment of one author, the publication rate increased by 11% (HR=1.11, 95%CI 1.08–1.14). The presence of p-values in the congress abstracts was associated with a higher publication rate (HR=1.4, 95%CI 1.1–1.8), as well as the presentation of significant p-values (HR=1.7, 95%CI 0.5–5.5) (Table 2). An oral presentation at the congress led to a higher probability and faster rate of PubMed publication than a poster presentation at the congress (median time 14.2 months vs. 16.8 months among abstracts that have been published within 6 years after the congress). Abstracts containing p-values ≤ 0.05 (significant) had a higher PubMed publication rate than abstract that contained only non-significant p-values (median time 12.2 months vs. 19.0 months) (Figure 2).

Comparison of the congresses 2000 and 2010

The total of 1,086 abstracts published in abstract manuals of the German Cancer Congresses were divided among the years as follows: 467 abstracts belonged to the congress year 2000 and 610 to the congress year 2010, out of these abstracts 40 and 46 abstracts, respectively, had already been published before the congress as PubMed publications. These pre-publications are unconsidered in the further evaluation and in Table 3. 154 out of the remaining 436 (35%) congress abstracts of the congress in 2000 were published in PubMed and 216 out of 564 (38%) congress abstracts of the congress in 2010 were published in PubMed. In 2000 the ratio of oral to poster presentation was 1:1, in 2010 this ratio dropped to 1:4. The proportion of randomized clinical trials (RCTs) and animal/cell experiments in congress abstracts increased by 1.5 to 2 percentage points, whereas the relative proportion of PubMed publications in these study types increased by about 30 and 20 percentage points, respectively. In 2010, more abstracts were submitted for ongoing studies and subsequently published in PubMed. In 2000, one study had more than 10 involved authors, but this study was not published. In 2010, 29 studies reported a two-digit number of involved authors, and more than half of these studies were published. The presentation of p-values in congress abstracts

Table 1: Characteristics of all abstracts published in abstract manuals of the German Cancer Congresses in 2000 and 2010 compared to those who have a PubMed publication before or after the respective congress

Variable	Total no. of abstracts		Abstracts without pre-published articles		Post-published	
	No.	%	No.	%	No.	%
Total	1,086	100	1,000	100	370	37.0
Presentation type						
Oral	366	33.7	333	33.3	140	42.0
Poster	720	66.3	667	66.7	230	34.5
Study design						
Cohort study	496	45.7	466	46.6	173	37.1
Randomized controlled trial (RCT)	61	5.6	52	5.2	32	61.5
Case study	156	14.4	147	14.7	49	33.3
Cell experiment	189	17.4	172	17.2	53	30.8
Animal experiment	39	3.6	31	3.1	20	64.5
Animal/cell experiment	30	2.8	29	2.9	15	51.7
Meta-analysis	4	0.4	3	0.3	2	66.7
Systematic review	10	0.9	9	0.9	1	11.1
Ecological study	2	0.2	1	0.1	0	0.0
Diagnostic study	7	0.6	7	0.7	2	28.6
Case control study	12	1.1	10	1.0	5	50.0
Case report	32	3.0	30	30.0	6	20.0
Miscellaneous	47	4.3	42	4.2	12	28.6
No declaration	1	0.1	1	0.1	0	0.0
Study status						
Work in progress	151	13.9	145	14.5	44	30.3
Finished	934	86.0	854	85.4	325	38.1
Being planned	1	0.1	1	0.1	1	100
Number of authors						
1 or 2	84	7.7	73	7.3	13	17.8
3 to 5	497	45.8	462	46.2	135	29.2
6 to 10	472	43.5	435	43.5	204	46.9
11 to 15	26	2.4	25	2.5	14	56.0
>15	7	0.6	5	0.5	4	80.0
Presence of significance terminology only						
Yes	193	17.8	177	17.7	67	37.9
Not significant	43	22.3	40	22.6	18	26.9
Significant	122	63.2	110	62.2	38	56.7
Both	27	14.0	26	14.7	11	16.4
Use in other context	1	0.5	1	0.6	0	0.0
No	893	82.2	823	82.3	303	36.8

Due to rounding, the percentages may differ from 100.0. The selection of the study design is not global, in "miscellaneous", all designs not mentioned in the selection are subsumed. The percentages of abstracts with post-published articles in the right column refer to the reduced abstracts without pre-publications from the middle column. Presence of significance terminology only = abstracts without p-values and confidence intervals. The percentage of the subgroup "yes" represents 100% and represents the distribution of the answer "yes".

increased by 7 percentage points from 2000 to 2010. The proportion of congress abstracts containing significant p-values among all abstracts containing p-values was very high at both congresses (in 2000: 96%, in 2010: 95%). The probability of PubMed publication for abstracts containing significant p-values increased from 38% in

2000 to 49% in 2010. The number of congress abstracts containing only p-values >0.05 was too low for a meaningful interpretation. Figure 3 shows the Kaplan-Meier curves for PubMed publications for the congress year 2000 and 2010. Although the PubMed publication probability of congress abstracts was higher in 2010 than

Table 2: Variables associated with time to publication of congress abstracts of the German Cancer Congresses in 2000 and 2010

Variable	Adjustment variables	No.	n	HR (95%CI)
Presentation type	Number of authors, sample size			
Oral		333	140	1.23 (0.97–1.55)
Poster		667	230	1.00
Study design	none			
Cohort study		466	173	1.25 (0.92–1.70)
Randomized controlled trial (RCT)		52	32	2.25 (1.45–3.49)
Case study		147	49	1.07 (0.72–1.57)
Animal experiment		31	20	2.69 (1.61–4.50)
Cell experiment		172	53	1.00
Study status	Study design			
Finished		854	325	1.65 (1.16–2.34)
Work in progress		145	44	1.00
Number of authors	Study design			
Increment of 1				1.11 (1.08–1.15)
Presence of p-value	Sample size, study design			
Yes		230	104	1.37 (1.07–1.76)
No		770	266	1.00
Significance of p-value	Sample size, study design			
Significant		219	99	1.72 (0.54–5.53)
Not significant		12	5	1.00

No. = number of abstracts without pre-published articles; n = number of abstracts that have been published within 6 years after the congress; study designs with less than 20 PubMed publications were excluded for further calculation in this table; adjusted hazard ratios (HR) and 95% confidence intervals (95% CI); "significant": $p \leq 0.05$, "not significant": $p > 0.05$.

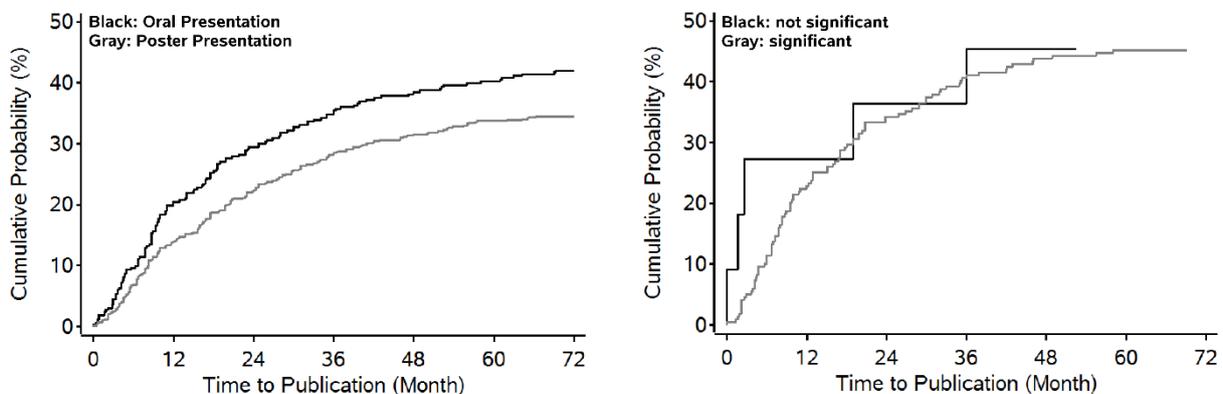


Figure 2: Kaplan-Meier curves showing time to PubMed publication of congress abstracts of the German Cancer Congress 2000 and 2010 by a) presentation type and b) use of significant or not significant p-values in the congress abstracts

2000, the median time interval among abstracts that have been published within 6 years after the congress was larger by 3 months. Whereas 8 out of 154 PubMed publications of the congress 2000 included both, an electronic and a print resource and 167 out of 216 PubMed publications of the congress 2010 included both resources. The electronic resource appeared before the print version in 165 PubMed publications, 160 in the year 2010 and 5 in the year 2000. The median time interval between the electronic and print resource was 3.7 months.

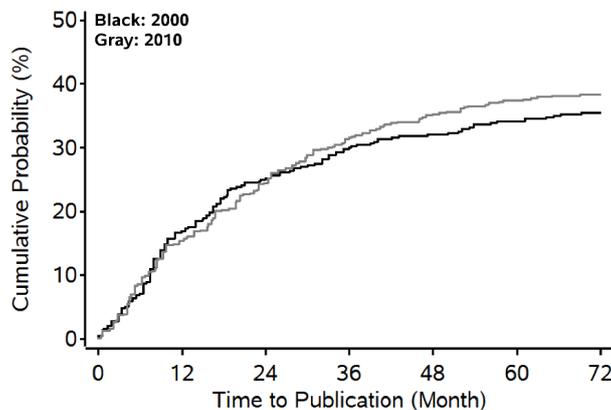
Discussion

We investigated 1,086 abstracts published by the German Cancer Congress in 2000 and 2010 in relation to the publication in peer-reviewed journals (PubMed publication) within the subsequent 6 years. Overall, 456 abstracts (42%) were published as PubMed publications. Our study is the largest survey of oncology congresses examining the PubMed publication probability and rate and their determinants.

The present study had a few limitations that must be acknowledged. First, the validity of our results depends on the complete retrieval of PubMed publications for the

Table 3: Characteristics of abstracts published in abstract manuals separated for the German Cancer Congress in 2000 and 2010 and published within 6 years after the respective congress

Variable	2000				2010			
	No.	%	Published	%	No.	%	Published	%
Total	436	100	154	35.3	564	100	216	38.3
Presentation type								
Oral	222	50.9	87	39.2	111	19.7	53	47.8
Poster	214	49.1	67	31.3	453	80.3	163	36.0
Study design								
Cohort study	206	47.3	77	37.4	260	46.1	96	37.0
Randomized controlled trial (RCT)	19	4.4	8	42.1	33	5.9	24	72.7
Case study	73	16.7	20	27.4	74	13.1	29	39.2
Cell experiment	78	17.9	23	29.5	94	16.7	30	31.9
Animal experiment	12	2.8	8	66.7	19	3.4	12	63.2
Animal/cell experiment	8	1.8	3	37.5	21	3.7	12	57.1
Meta-analysis	1	0.2	0	0	2	0.4	2	100
Systematic review	3	0.7	0	0	6	1.1	1	16.7
Ecological study	–	–	–	–	1	0.2	0	0
Diagnostic study	5	1.2	2	40.0	2	0.4	0	0
Case control study	7	1.6	3	42.9	3	0.5	2	66.7
Case report	13	3.0	4	30.8	17	3.0	2	11.8
Miscellaneous	11	2.5	6	54.6	31	5.5	6	19.4
No declaration	–	–	–	–	1	0.2	0	0
Study status								
Work in progress	53	12.2	15	28.3	92	16.3	29	31.5
Finished	382	87.6	138	36.1	472	83.7	187	39.6
Being planned	1	0.2	1	100	–	–	–	–
Number of authors								
1 or 2	26	6.0	5	19.2	47	8.3	8	17.0
3 to 5	227	52.1	70	30.8	235	41.7	65	27.7
6 to 10	182	41.7	79	43.4	253	44.9	125	49.4
11 to 15	1	0.2	0	0	24	4.3	14	58.3
>15	–	–	–	–	5	0.9	4	80.0
Presence of p-value								
Yes	82	18.8	31	37.8	148	26.2	73	49.3
p≤0.05	79	96.3	30	38.0	140	94.6	69	49.3
p>0.05	3	3.7	1	33.3	8	5.4	4	50.0
No	354	81.2	123	34.7	416	73.8	143	34.4

**Figure 3: Kaplan-Meier curve showing time to PubMed publication by the years of the German Cancer Congresses 2000 and 2010**

corresponding congress abstracts and we may have missed some of these publications by our search strategy. Second, we restricted our search to PubMed entries and we did not search peer-reviewed publications that are listed somewhere else.

For the German Cancer Congress 2000 and 2010, 19% of all PubMed publications were already published before the corresponding congress which is a higher proportion than observed for other cancer congresses [7], [13], [14]. A potential explanation for this result is the biannual frequency of the congress with most of the pre-publications published within these two years. The PubMed publication probability of abstracts presented at the German Cancer Congresses was 16 percentage points lower than at the American Cancer Meeting ASCO after six years [5]. Even German congress abstracts of RCTs, meta-analyses and animal experiments had lower PubMed publication probabilities within 6 years (62%, 67% and 65%, respectively) than abstracts of these categories presented at the Meeting of the American Society of Clinical Oncology [15], [16], [17]. However, the German Cancer Congress obviously had a shorter median time to publication than other cancer congresses despite the fact that other published studies partly had a shorter follow-up time for assessment (3–6 years) [5], [18], [19]. We and other found that congress abstracts that reported p-values had a higher PubMed publication probability than abstracts that did not contain p-values [15], [20]. However, the very small number of abstracts reporting non-significant p-values required some explanation and led to some assumptions. First, we documented only the smallest p-value, so it could not be ruled out that not significant p-values were described additional when declaring several p-values. Furthermore, it can be supposed that non-significant p-values were not mentioned in the abstract, but in the presentation or later in the PubMed publication. As the number of congress abstracts that only contained p-values >0.05 was too low, we could not study the influence of the presence of significant p-values on the PubMed publication probability. However, we found that the probability of a PubMed publication is higher among congress abstracts containing p-values.

We could identify some predictors for a subsequent PubMed publication including the type of presentation, study design, status of the study (ongoing or finished study), number of authors, reporting of p-values, and reporting of significant p-values. However, the precision of some of the effect estimates (hazard ratios) was quite low. The declaration of significant p-values in the congress abstracts did not lead to a more frequent allocation to oral presentations considered as higher quality. When comparing the Congresses 2000 and 2010, the PubMed publication probability within 6 years increased only slightly by three percentage points. The ratio of oral to poster presentations has considerably changed from 2000 to 2010 in favor of poster presentations. The architecture of the German cancer congresses that we compared differed. In 2010, the proportion of poster presentations was considerably higher than in 2000.

Furthermore, the proportion of ongoing studies and the median number of authors per congress abstract was higher in 2010 than 2000. The increasing number of authors per abstract may reflect a shift of from single institution research towards collaborative research. We found that the median time between electronic and printed PubMed publications was 3 months.

Although we were able to provide many statistics related to the publication probability and rate, we did not study the quality of the presented congress abstracts and subsequent PubMed publications. It is difficult to speculate why 585 of the congress contributions were eventually not published in PubMed listed Journals. De Bellefeuille et al. [5] and Tam et al. [16] found several reasons why congress abstracts were not published thereafter including lack of time, funds or other resources, insufficient priority, article not accepted, study incomplete with eventual intent to publish, modification of data, manuscript in preparation or under review and other reasons. However, the lack of PubMed publication within 6 years after the congresses in 65% (2000) and 62% (2010) is alarming because these results are not available for further research and clinical work and may contribute to publication bias.

Notes

Competing interests

The authors declare that they have no competing interests.

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