

Bibliometric and visual analysis of breast cancer-related lymphedema

Knowledge structure, research status, and future trends

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The goal of this paper was to sort out and summarize the relevant studies on BCRL using bibliometric analysis. This paper reflects which authors, papers, institutions and countries contributed the most to the literature base for BCRL and to explore future research trends.

The authors studied 1,000 relevant papers which contributed to this topic. These papers were written by 3830 authors from 2796 institutions in 246 countries and published from 2003 to 2024.

This is a summary of the analysis:

- The Authors:** The MGH Lymphedema Research Program was found to be the most published on BCRL in the world (see Table 3).

Section 3.4 highlights: ***"It can be seen that Taghian AG (MGH's Program Director) is in the first place, and Brunelle C (MGH's Program Associate Director) was in third place. These scholars have high volume of publications indicating that they have conducted more research in this area."***

Table 3 presents a rank of the top 15 authors who contributed to BCRL filed among 3830 (**top 0.4%**). The MGH Lymphedema Research Program occupies 4 positions: #1 (Taghian), #3 (Brunelle), #11 (Naoum) and #12 (Skolny). Naoum and Skolny were both mentees of Dr. Taghian's who rotated through the program. In addition, members of the MGH team were ranked #2, 4, 7 and 13 (Brunelle, Taghian and Naoum) in terms of the centrality (impact) of the research.

Table 3

Top 15 authors with the highest number of publications/highest centrality.

Rank	Count	Authors	Rank	Centrality	Authors
1	27	Taghian AG	1	0.05	McLaughlin SA
2	25	Shah C	2	0.04	Brunelle CL
3	20	Brunelle CL	3	0.04	Vicini F
4	15	Vicini F	4	0.04	Taghian A
5	12	Devoogdt N	5	0.03	Ridner SH
6	11	Schmitz KH	6	0.03	Anglin B
7	11	De Vrieze T	7	0.02	Taghian AG
8	10	Boyages J	8	0.02	Shah C
9	10	Singhal D	9	0.02	Schmitz KH
10	9	Desnyder SM	10	0.02	Desnyder SM
11	9	Naoum GE	11	0.02	Armer JM
12	9	Skolny MN	12	0.01	Boyages J
13	8	Manrique OJ	13	0.01	Naoum GE
14	8	Ciudad P	14	0.01	Barrio AV
15	8	Ridner SH	15	0.01	Boccardo F

3. **The Most Cited References:** Among the 1,000 papers analyzed, the MGH Lymphedema Research Program authored the #2 and #3 most cited papers on BCRL.

Table 7 outlines the most cited papers in BCRL. The #2 author (Gillespie) was one of Dr. Taghian's mentees, and is now a resident at Stanford, and the #3 author (McDuff) was one of Dr. Taghian's previous MGH residents and is now staff at Duke. The top 2 were general reviews and the 3rd (McDuff) was original research from our group. The McDuff paper is therefore the top "original research paper" cited in this field.

Table 7

Top 15 most frequently cited references.

Rank	Count	Centrality	Year	Cited reference
1	82	0	2013	DiSipio et al ^[5]
2	52	0.01	2018	Gillespie et al ^[21]
3	35	0.01	2019	McDuff et al ^[22]
4	30	0.03	2019	Johnson et al ^[23]
5	30	0.01	2018	Rockson ^[24]
6	29	0.02	2017	Ribeiro Pereira et al ^[25]
7	29	0	2018	Zou et al ^[26]
8	29	0.08	2012	Saaristo et al ^[26]
9	27	0	2020	McLaughlin et al ^[28]
10	26	0.04	2016	Kilbreath et al ^[29]
11	25	0.01	2017	McLaughlin et al ^[30]
12	25	0.05	2016	Shah et al ^[31]
13	24	0.1	2019	Michelotti et al ^[31]
14	23	0.05	2021	Byun et al ^[33]
15	23	0	2017	Nguyen et al ^[34]

The McDuff paper was described and cited in the discussion:

The authors described these highly cited papers in section 3.6:

Another highly cited reference shows that the time course of lymphedema development depends on the breast cancer treatment received. ALND was associated with early-onset lymphedema, and local lymph node radiotherapy was associated with late-onset lymphedema.^[22]

McLaughlin et al in *Gland Surgery* (IF: 1.5/Q3), "Breast Cancer-Related Lymphedema: Risk Factors, Precautionary Measures, and Treatments," a study reviewing the evidence on risk factors, prevention guidelines, prospective screening, early intervention, and surgical and nonsurgical treatment techniques for the prevention, prediction, and early intervention of BCRL for researchers and clinicians. The third most cited is a 2019 publication by McDuff et al in the *International Journal of Radiation Oncology Biology Physics* (IF: 6.4/Q1), "Timing of Lymphedema After Treatment for Breast Cancer: When Are Patients Most At Risk?" this study found that the time course of lymphedema development depends on the breast cancer treatment received. ALND was associated with early-onset lymphedema, and local lymph node radiotherapy was associated with late-onset lymphedema. This has implications for lymphedema surveillance and patient education.

The reference ranked #9 in the table was written by the 3 authors: McLaughlin (Mayo), Brunelle (MGH) and Taghian (MGH).

4. **Current Research Hotspots in BCRL:** As mentioned in the discussion section of the paper:

4.2. Current research hotspots in BCRL

We summarize the current research hotspots of BCRL in terms of issuing authors, cited authors and references, and keywords. In terms of issuing authors, Taghian AG, as the most issuing author, has carried out a large number of studies related to BCRL, covering many aspects of the disease. In terms of disease prevention, he analyzed the risk factors of BCRL and concluded that there is a lack of clear predictors of BCRL and that further research should be conducted on the risk factors to obtain high-quality evidence.^[35] In terms of treatment, he suggested that for large lymph node-negative breast tumors, treatment decisions should be evaluated on an individual basis to avoid recurrence after mastectomy.^[36] In a recent study, he assessed the importance of routine reporting of axillary soft tissue involvement in predicting breast cancer outcomes through a large cohort study, proposing that ruling out the presence of axillary soft tissue is imperative before any form of axillary de-escalation, especially regional lymph node radiotherapy omission.^[37] Shah C evaluated the

worrisome outcomes of IORT^[41] Brunelle CL and Taghian AG are part of the same scientific team and have commonalities in their research, which focuses on risk factors, preventive measures, and treatment of BCRL.^[42] The collaborative work of the 2 scholars received a high number of citations, indicating that the research has a high impact on the field.^[21]