

***Supplementary material to*** A bibliometric study on mathematical oncology: interdisciplinarity, internationality, collaboration and trending topics

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## S1 Journal selection

We start our journal selection procedure by searching the Web of Science Core Collection (WoSCC) database for articles that match the topic search (TS) keywords below.

TS = ((cancer\* OR tumour\* OR tumor\* OR oncolog\* OR oncogen\* OR carcinogen\*) AND mathematic\*).

Journal-level frequencies of keyword matches are available in Table S1.1, for all journals with 100 or more matches. The table also includes journal classification codes based on the Quacquarelli Symonds (QS) system, identifying four journals categorised as mathematics and life sciences journals (underlined) as well as two journals categorised as journals with mathematics, life sciences, and other content (italicised). To supplement the journal classification results, we list the self-authored journal descriptions in Table S1.2, where we make judgements about which journals focus on mathematical biology (underlined). Based on the information in the two tables we classify the following five as our mathematical biology focus journals (in alphabetical order):

1. the Bulletin of Mathematical Biology (BMB),
2. the Journal of Mathematical Biology (JMB),
3. the Journal of Theoretical Biology (JTB),
4. Mathematical Biosciences (MB),
5. Mathematical Biosciences and Engineering (MBE).

Table S1.1: **Journals with more than 100 articles on the WoSCC database that match the TS keywords in the title, abstract, and/or author keywords.** Journals belonging to the QS subject area *mathematics*; the QS broad faculty area *life sciences and medicine*; and any other QS subject or faculty areas are check-marked.

| Journal                                                                         | Keyword matching article count | Mathematics subject area | Life sciences and medicine faculty area | Other |
|---------------------------------------------------------------------------------|--------------------------------|--------------------------|-----------------------------------------|-------|
| <u>Journal of Theoretical Biology</u>                                           | 455                            | ✓                        | ✓                                       |       |
| PLOS One                                                                        | 313                            |                          |                                         | ✓     |
| <u>Bulletin of Mathematical Biology</u>                                         | 276                            | ✓                        | ✓                                       | ✓     |
| Scientific Reports                                                              | 244                            |                          |                                         | ✓     |
| Cancer Research                                                                 | 239                            |                          | ✓                                       |       |
| <u>PLOS Computational Biology</u>                                               | 236                            | ✓                        | ✓                                       | ✓     |
| <u>Mathematical Biosciences</u>                                                 | 222                            | ✓                        | ✓                                       |       |
| <u>Mathematical Biosciences and Engineering</u>                                 | 160                            | ✓                        | ✓                                       |       |
| Medical Physics                                                                 | 160                            |                          | ✓                                       |       |
| Physics in Medicine and Biology                                                 | 155                            |                          | ✓                                       |       |
| Proceedings of SPIE                                                             | 140                            |                          |                                         |       |
| Cancers                                                                         | 126                            |                          | ✓                                       |       |
| Proceedings of the National Academy of Sciences of the United States of America | 121                            |                          |                                         | ✓     |
| International Journal of Radiation Oncology Biology Physics                     | 120                            |                          | ✓                                       |       |
| <u>Journal of Mathematical Biology</u>                                          | 119                            | ✓                        | ✓                                       |       |

Table S1.2: **Self-authored descriptions of the journals listed in Table S1.** The descriptions are pasted from the journals' websites. Journals that explicitly highlight both mathematics and biology are underlined.

| Journal name                                                                    | Summary of aims and scope                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Journal of Theoretical Biology</u>                                           | The Journal of Theoretical Biology is the leading forum for theoretical perspectives that give insight into biological processes. Acceptable papers are those that bear significant importance on the biology per se being presented, and not on the mathematical analysis.                                                                                                                                                                     |
| PLOS One                                                                        | PLOS ONE welcomes original research submissions from the natural sciences, medical research, engineering, as well as the related social sciences and humanities.                                                                                                                                                                                                                                                                                |
| <u>Bulletin of Mathematical Biology</u>                                         | As the official journal of the Society for Mathematical Biology, this journal shares research at the biology-mathematics interface. It publishes original research, mathematical biology education, reviews, commentaries, and perspectives.                                                                                                                                                                                                    |
| Scientific Reports                                                              | We publish original research from all areas of the natural sciences, psychology, medicine and engineering.                                                                                                                                                                                                                                                                                                                                      |
| Cancer Research                                                                 | Cancer Research seeks manuscripts that offer conceptual or technological advances leading to basic and translational insights into cancer biology. Manuscripts that focus on convergence science, the bridging of two or more distinct areas of cancer research, are of particular interest.                                                                                                                                                    |
| PLOS Computational Biology                                                      | By making connections through the application of computational methods among disparate areas of biology, PLOS Computational Biology provides substantial new insight into living systems at all scales, from the nano to the macro, and across multiple disciplines, from molecular science, neuroscience and physiology to ecology and population biology.                                                                                     |
| <u>Mathematical Biosciences</u>                                                 | Mathematical Biosciences publishes work providing new concepts or new understanding of biological systems using mathematical models, or methodological articles likely to find application to multiple biological systems.                                                                                                                                                                                                                      |
| <u>Mathematical Biosciences and Engineering</u>                                 | MBE focuses on new developments in the fast-growing fields of mathematical biosciences and engineering. Areas covered include most areas of mathematical and computational biology, medicine and engineering with an emphasis on integrative and interdisciplinary research bridging mathematics, biology and engineering.                                                                                                                      |
| Medical Physics                                                                 | Medical Physics publishes high-quality articles across radiological imaging, nuclear medicine, radiation oncology, and clinical radiation effects. Topics include new methodologies, imaging or treatment device development, artificial intelligence applications, and clinical or theoretical studies. Radiological imaging covers modalities like CT, MRI, and ultrasound, with a focus on computational analysis such as radiomics and CAD. |
| Physics in Medicine and Biology                                                 | The novel and impactful development and application of theoretical, computational and experimental physics to medicine, physiology and biology.                                                                                                                                                                                                                                                                                                 |
| Proceedings of SPIE                                                             | Conference where proceedings are published in the SPIE Digital Library which features more than 600,000 publications in optics and photonics.                                                                                                                                                                                                                                                                                                   |
| Cancers                                                                         | Cancers (ISSN 2072-6694) is an international, peer-reviewed open access journal on oncology.                                                                                                                                                                                                                                                                                                                                                    |
| Proceedings of the National Academy of Sciences of the United States of America | PNAS publishes exceptional research across all areas of the biological, physical, and social sciences. Innovation often happens at the margins of disciplines, and we are especially interested in research that crosses disciplinary bounds, answers questions with broad scientific impact, or breaks new ground.                                                                                                                             |
| International Journal of Radiation Oncology Biology Physics                     | International Journal of Radiation Oncology - Biology - Physics (IJROBP), known in the field as the Red Journal, publishes original laboratory and clinical investigations related to radiation oncology, radiation biology, medical physics, and both education and health policy as it relates to the field.                                                                                                                                  |
| <u>Journal of Mathematical Biology</u>                                          | The Journal of Mathematical Biology (JOMB) focuses on scientific advancements in mathematical modelling and analysis of biological systems.                                                                                                                                                                                                                                                                                                     |

Links to journal descriptions are listed below and were accessed on 2025-06-21.

- Journal of Theoretical Biology: <https://www.sciencedirect.com/journal/journal-of-theoretical-biology/about/aims-and-scope>
- PLOS One: <https://journals.plos.org/plosone/s/journal-information>
- Bulletin of Mathematical Biology: <https://link.springer.com/journal/11538/aims-and-scope>
- Scientific Reports: <https://www.nature.com/srep/about>
- Cancer Research: <https://aacrjournals.org/cancerres/pages/about>
- PLOS Computational Biology: <https://journals.plos.org/ploscompbiol/s/journal-information>
- Mathematical Biosciences: <https://www.sciencedirect.com/journal/mathematical-biosciences/about/aims-and-scope>
- Mathematical Biosciences and Engineering: <https://www.aimspress.com/mbe/news/solo-detail/aimandscope>
- Medical Physics: <https://aapm.onlinelibrary.wiley.com/hub/journal/24734209/overview>
- Physics in Medicine and Biology: <https://publishingsupport.iopscience.iop.org/journals/physics-in-medicine-biology/about-physics-medicine-biology>
- Proceedings of SPIE: <https://www.spiedigitallibrary.org/conference-proceedings-of-spie>
- Cancers: <https://www.mdpi.com/journal/cancers/about>
- Proceedings of the National Academy of Sciences of the United States of America: <https://www.pnas.org/author-center>
- International Journal of Radiation Oncology Biology Physics: <https://www.sciencedirect.com/journal/international-journal-of-radiation-oncology-biology-physics/about/aims-and-scope>
- Journal of Mathematical Biology: <https://link.springer.com/journal/285/aims-and-scope>

## S2 Journal classification

In this study we classify journals as belonging to one of seven categories:

1. *focus journal*,
2. *mathematics*,
3. *life sciences*,
4. *multidisciplinary*,
5. *mathematics and life sciences*,
6. *STEM and life sciences*,
7. *other*.

From journal titles in our metadata, we use a previously developed lookup table (Himmelstein, 2024) to map journal titles to one or more ASJC codes (Elsevier, 2025) via Scopus IDs. Next, we use the QS scheme (QS Quacquarelli Symonds, 2025) which classifies each ASJC code as belonging to one “broad faculty area” and one “subject area”. From a combination of Scopus IDs, ASJC codes, QS broad faculty areas, and QS subject areas we customise the journal classification used in this study, following Algorithm 1.

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**Algorithm 1** Journal classification.

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**Input:** Journal name  
**if** Journal **is** focus journal **then**  
    Classify as *focus journal*  
**else if** subject area **is only** mathematics **then**  
    Classify as *mathematics*  
**else if** broad faculty area **is only** life sciences and medicine **then**  
    Classify as *life sciences*  
**else if** ASJC code **is only** multidisciplinary **then**  
    Classify as *multidisciplinary*  
**else if** subject area **includes only** mathematics **and** a subject area from the broad faculty area life sciences and medicine **then**  
    Classify as *mathematics and life sciences*  
**else if** broad faculty area **includes only** (life sciences and medicine) **and** (natural sciences **and/or** engineering and technology) **then**  
    Classify as *STEM and life sciences*  
**else**  
    Classify as *other*  
**end if**  
**Output:** Journal class

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Codes to map journals to our customised classes are available on the study’s GitHub repository.

### S3 Journal coverage on the WoSCC database

In Table S3.1 we list the coverage of our focus journals on the WoSCC database. The coverage is approximated as

$$\frac{\text{\#articles on the WoSCC}}{\text{\#articles on journal website}} \times 100\%,$$

where editorials and indexing publications have been omitted. The JTB coverage of over 100% results from retracted publication and addendums being included on the WoSCC.

Table S3.1: The WoSCC coverage of the focus journals.

| Journal           | #of articles on the WoSCC | #of articles on journal website | WoSCC coverage |
|-------------------|---------------------------|---------------------------------|----------------|
| Bull. Math. Biol. | 4102                      | 4355                            | 94.19%         |
| J. Math. Biol.    | 3689                      | 3744                            | 98.53%         |
| J. Theor. Biol.   | 16759                     | 16728                           | 100.19%        |
| Math. Biosci.     | 5037                      | 5329                            | 94.00%         |
| Math. Biosci. Eng | 3946                      | 4188                            | 94.22%         |

## S4 Article classification

In Figure 1 of the main manuscript, we illustrate the procedure of classifying whether an article belongs to the mathematical oncology\* or mathematical biology\* (excluding mathematical oncology\*) dataset. This classification is based on keyword matches, and the choice of keywords are based on their predictive performance. The list of words used in candidate word groups (WG) 1-3 are shown in Figure S4.1, where the words in WG2 include all cancer types that are listed by the National Cancer Institute (2025), Cancer Research UK (2024), the American Cancer Society (2025), Wikipedia (2025), and WebMD (2025); and have subsequently been confirmed as cancer types by the authors. To assess the accuracy resulting from classification with WG1, WG2\WG1, WG3\WG1, WG3\WG2, authors KP and SH reviewed 100 randomly selected articles (20 per focus journal) predicted to be true (in mathematical oncology\*), and 100 predicted to be false. From the confusion matrix in Table S4.1, we compute that the accuracy is 0.985 for WG1, 0.925 for WG2\WG1, and 0.505 for WG3\WG2. From these results, we decide to use WG1\WG2 in the cancer-article classification.

|                      |                                    |                                  |                                        |           |
|----------------------|------------------------------------|----------------------------------|----------------------------------------|-----------|
| <b>Word group 1</b>  |                                    |                                  |                                        |           |
| • Cancer             | • Tumour                           | • Tumor                          | • Oncolog                              | • Oncogen |
| <b>Word group 2</b>  |                                    |                                  |                                        |           |
| • Melanoma           | • Chordoma                         | • Myelofibrosis                  | • Essential thrombocythaemia           |           |
| • Leukemia           | • Ependymoma                       | • Neurofibroma                   | • Essential thrombocythemia            |           |
| • Leukaemia          | • Epithelioid hemangioendothelioma | • Somatostatinoma                | • Ganglioneuroma                       |           |
| • Carcinoma          | • Glucagonoma                      | • Teratoma                       | • Gastrinoma                           |           |
| • Lymphoma           | • Insulioma                        | • Thymoma                        | • Gestational trophoblastic            |           |
| • Blastoma           | • Keratoacanthoma                  | • VIPoma                         | • Pheochromocytoma                     |           |
| • Glioma             | • Linitis plastica                 | • Waldenstrom macroglobulinaemia | • Plasmacytoma                         |           |
| • Sarcoma            | • Meningioma                       | • Waldenstrom macroglobulinemia  | • Recurrent respiratory papillomatosis |           |
| • Myeloma            | • Mesothelioma                     | • Polycythaemia vera             | • Acoustic neuroma                     |           |
| • Adamantinoma       | • Multiple endocrine neoplasia     | • Polycythemia vera              | • Mastocytoma                          |           |
| • Adenoma            | • Mycosis fungoide                 | • Oseudomyxoma peritonei         | • Pineocytoma                          |           |
| • Astrocytoma        | • Myelodysplastic                  | • Schwannoma                     | • Gangliocytoma                        |           |
| • Birt-hogg-dubé     | • Myelodysplasia                   | • Seminoma                       |                                        |           |
| • Histiocytoma       | • Myeloproliferative               | • Sézary                         |                                        |           |
| • Carcinoid          |                                    |                                  |                                        |           |
| • Craniopharyngioma  |                                    |                                  |                                        |           |
| <b>Word group 3</b>  |                                    |                                  |                                        |           |
| • Chemotherapy       | • Immunotherapy                    | • Metaplasia                     | • Neoplastic                           |           |
| • Radiotherapy       | • Targeted therapy                 | • Dysplasia                      | • Angiogenesis                         |           |
| • Radiation therapy  | • Stem cell therapy                | • Neoplasia                      | • Biopsy                               |           |
| • Ionizing radiation | • Hyperplasia                      | • Neoplasm                       | • Malignan                             |           |
| • Ionising radiation | • Atypia                           | • Metasta                        |                                        |           |

Figure S4.1: **Analysis of cancer-class-keywords.** A list of all cancer-class-keywords included in the candidate keyword groups WG1, WG2, and WG3.

|                    | True Positive                        | True Negative                         |
|--------------------|--------------------------------------|---------------------------------------|
| Predicted Positive | WG1: 99<br>WG2\WG1: 88<br>WG3\WG1: 4 | WG1: 1<br>WG2\WG1: 12<br>WG3\WG1: 96  |
| Predicted Negative | WG1: 2<br>WG2\WG1: 3<br>WG3\WG1: 3   | WG1: 98<br>WG2\WG1: 97<br>WG3\WG1: 97 |

Table S4.1: **Confusion matrix for candidate cancer-class-keywords.**

## S5 Supporting information on interdisciplinarity

|                |                          | Citing journals          |                       |                         |                      |                           |
|----------------|--------------------------|--------------------------|-----------------------|-------------------------|----------------------|---------------------------|
|                |                          | Bull. Math. Biol. (3630) | J. Math. Biol. (2967) | J. Theor. Biol. (13432) | Math. Biosci. (4778) | Math. Biosci. Eng. (3881) |
| Cited journals | Bull. Math. Biol. (337)  | <b>0.1468</b>            | 0.0772                | 0.0485                  | 0.0525               | 0.0618                    |
|                | J. Math. Biol. (178)     | 0.0636                   | <b>0.0863</b>         | 0.0288                  | 0.0213               | 0.0348                    |
|                | J. Theor. Biol. (814)    | <b>0.1603</b>            | 0.1207                | 0.1230                  | 0.0682               | 0.0773                    |
|                | Math. Biosci. (379)      | 0.0678                   | 0.0455                | 0.0248                  | <b>0.1153</b>        | 0.0366                    |
|                | Math. Biosci. Eng. (442) | 0.0168                   | 0.0148                | 0.0062                  | 0.0098               | <b>0.0523</b>             |

Figure S5.1: **Normalised citation matrix.** The citation matrix shows how often mathematical oncology\* articles in the focus journals (rows) are cited by other focus journals (columns). To account for differences in journal size, the citation counts are normalised by the number of articles in the citing journals (within the mathematical biology\* dataset). The total number of articles per journal are shown in parentheses. The maximum number of citations per row are red and underlined.

Table S5.1: **Top ten journals in each journal category that are cited by and cite mathematical oncology\*.** Total article counts are shown in parentheses.

| Category                      | Journal name (cited by mathematical oncology*)           | Journal name (citing mathematical oncology*)                       |
|-------------------------------|----------------------------------------------------------|--------------------------------------------------------------------|
| Mathematics and life sciences | Biometrics (148)                                         | Computational and Mathematical Methods in Medicine (300)           |
| Mathematics and life sciences | Computational and Mathematical Methods in Medicine (133) | Theoretical Biology and Medical Modelling (206)                    |
| Mathematics and life sciences | Biology Direct (133)                                     | Biosystems (194)                                                   |
| Mathematics and life sciences | Theoretical Biology and Medical Modelling (114)          | Biology Direct (103)                                               |
| Mathematics and life sciences | Biosystems (85)                                          | IET Systems Biology (82)                                           |
| Mathematics and life sciences | Statistics in Medicine (71)                              | Statistics in Medicine (70)                                        |
| Mathematics and life sciences | CPT: Pharmacometrics & Systems Pharmacology (60)         | Biometrics (65)                                                    |
| Mathematics and life sciences | IET Systems Biology (40)                                 | CPT-Pharmacometrics & Systems Pharmacology (62)                    |
| Mathematics and life sciences | Statistical Methods in Medical Research (23)             | Current Bioinformatics (60)                                        |
| Mathematics and life sciences | Cellular and Molecular Bioengineering (19)               | Cellular and Molecular Bioengineering (52)                         |
| Mathematics                   | Mathematical Models & Methods in Applied Sciences (393)  | Discrete and Continuous Dynamical Systems-Series B (641)           |
| Mathematics                   | Discrete and Continuous Dynamical Systems-Series B (307) | Mathematical Models & Methods in Applied Sciences (489)            |
| Mathematics                   | SIAM Journal on Applied Mathematics (297)                | Mathematical Modelling of Natural Phenomena (465)                  |
| Mathematics                   | Mathematical Modelling of Natural Phenomena (173)        | Communications in Nonlinear Science and Numerical Simulation (314) |

Table S5.1 continued.

|                        |                                                                                        |                                                                                       |
|------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Mathematics            | SIAM Review (129)                                                                      | International Journal of Biomathematics (244)                                         |
| Mathematics            | Journal of Mathematical Analysis and Applications (114)                                | Journal of Mathematical Analysis and Applications (212)                               |
| Mathematics            | Applied Mathematics Letters (108)                                                      | Applied Mathematical Modelling (208)                                                  |
| Mathematics            | European Journal of Applied Mathematics (93)                                           | SIAM Journal on Applied Mathematics (202)                                             |
| Mathematics            | SIAM Journal on Mathematical Analysis (78)                                             | Journal of Differential Equations (163)                                               |
| Mathematics            | Studies in Applied Mathematics (70)                                                    | AIMS Mathematics (143)                                                                |
| Life sciences          | Cancer Research (3371)                                                                 | Cancer Research (371)                                                                 |
| Life sciences          | Cell (1233)                                                                            | Cancers (351)                                                                         |
| Life sciences          | Nature Reviews Cancer (1032)                                                           | Frontiers in Oncology (298)                                                           |
| Life sciences          | British Journal of Cancer (859)                                                        | Physics in Medicine and Biology (207)                                                 |
| Life sciences          | Biophysical Journal (749)                                                              | Biophysical Journal (190)                                                             |
| Life sciences          | Journal of Biological Chemistry (695)                                                  | Wiley Interdisciplinary Reviews-Systems Biology and Medicine (171)                    |
| Life sciences          | Blood (626)                                                                            | Cell Proliferation (154)                                                              |
| Life sciences          | Clinical Cancer Research (558)                                                         | Physical Biology (149)                                                                |
| Life sciences          | New England Journal of Medicine (514)                                                  | Frontiers in Immunology (142)                                                         |
| Life sciences          | Journal of Immunology (494)                                                            | Seminars in Cancer Biology (126)                                                      |
| Multidisciplinary      | Proceedings of the National Academy of Sciences of the United States of America (2280) | PLOS One (1134)                                                                       |
| Multidisciplinary      | Nature (2170)                                                                          | Scientific Reports (692)                                                              |
| Multidisciplinary      | Science (1490)                                                                         | Proceedings of the National Academy of Sciences of the United States of America (191) |
| Multidisciplinary      | PLOS One (1182)                                                                        | Royal Society Open Science (166)                                                      |
| Multidisciplinary      | Scientific Reports (465)                                                               | iScience (112)                                                                        |
| Multidisciplinary      | Scientific American (62)                                                               | Heliyon (76)                                                                          |
| Multidisciplinary      | Science Advances (36)                                                                  | Nature (26)                                                                           |
| Multidisciplinary      | Royal Society Open Science (29)                                                        | Science Advances (17)                                                                 |
| Multidisciplinary      | iScience (14)                                                                          | Comptes Rendus de L'Academie Bulgare des Sciences (15)                                |
| Multidisciplinary      | Chinese Science Bulletin (8)                                                           | Science (14)                                                                          |
| STEM and life sciences | PLOS Computational Biology (751)                                                       | PLOS Computational Biology (879)                                                      |
| STEM and life sciences | Nature Communications (346)                                                            | Journal of the Royal Society Interface (354)                                          |
| STEM and life sciences | Radiation Research (344)                                                               | Journal of Biological Systems (238)                                                   |
| STEM and life sciences | Journal of the Royal Society Interface (314)                                           | Computers in Biology and Medicine (226)                                               |
| STEM and life sciences | International Journal of Radiation Oncology Biology Physics (294)                      | International Journal of Molecular Sciences (226)                                     |
| STEM and life sciences | International Journal of Molecular Sciences (179)                                      | Biomechanics and Modeling in Mechanobiology (174)                                     |
| STEM and life sciences | Nature Biotechnology (168)                                                             | BMC Systems Biology (156)                                                             |
| STEM and life sciences | Risk Analysis (157)                                                                    | Biomedical Signal Processing and Control (121)                                        |

Table S5.1 continued.

|                        |                                                              |                                                                             |
|------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------|
| STEM and life sciences | BMC Systems Biology (142)                                    | International Journal for Numerical Methods in Biomedical Engineering (119) |
| STEM and life sciences | Proceedings of the Royal Society B-Biological Sciences (140) | NPJ Systems Biology and Applications (114)                                  |
| Other                  | Mathematical and Computer Modelling (523)                    | Physical Review E (488)                                                     |
| Other                  | Physical Review E (513)                                      | Mathematical and Computer Modelling (413)                                   |
| Other                  | Physical Review Letters (250)                                | Chaos Solitons & Fractals (392)                                             |
| Other                  | Journal of Computational Physics (186)                       | Mathematical Methods in the Applied Sciences (348)                          |
| Other                  | Development (130)                                            | Mathematics (321)                                                           |
| Other                  | Nonlinearity (97)                                            | Nonlinear Analysis-Real World Applications (305)                            |
| Other                  | Journal of Chemical Physics (96)                             | Computers & Mathematics with Applications (198)                             |
| Other                  | Journal of the American Statistical Association (83)         | Nonlinearity (197)                                                          |
| Other                  | IEEE Access (79)                                             | European Physical Journal Plus (150)                                        |
| Other                  | Multiscale Modeling & Simulation (79)                        | IEEE Access (119)                                                           |

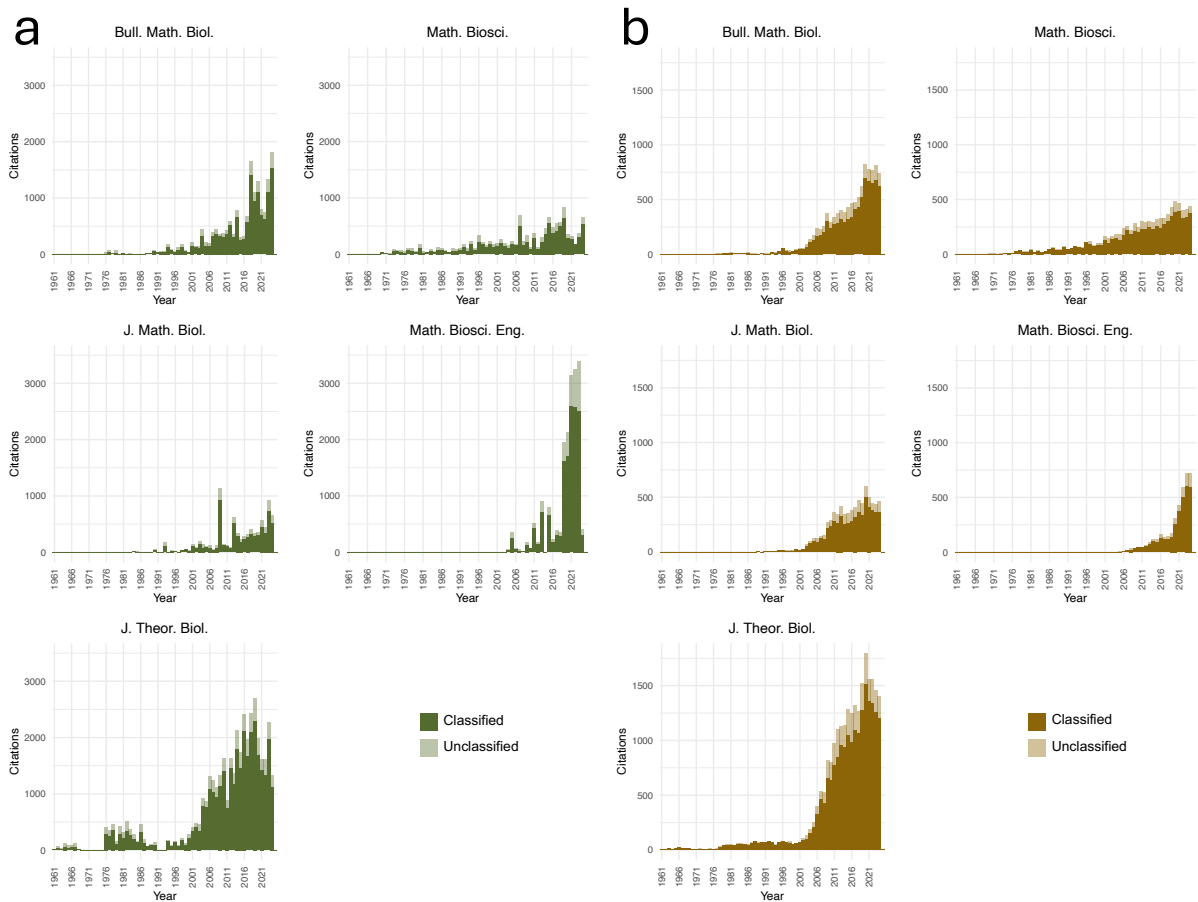


Figure S5.2: Annual counts for articles that are cited by (left) and that cite (bottom) mathematical oncology\*. Counts for both discipline-classified and unclassified journals are shown.

## S6 Supporting information on internationality

We have affiliation-county metadata for 94.5% of the articles in the mathematical oncology\* dataset, and 87.7% of the mathematical biology\* (excluding mathematical oncology\*) dataset. Of the 2150 mathematical oncology\* articles, 118 articles have unspecified country affiliations. Among these, 101 articles have no affiliation information available when article metadata is downloaded from WoSCC (9 from BMB, 3 from JMB, 49 from JTB, and 40 from MB), with only 2 published in or after 2000. The remaining 17 articles, all published before 2000, contain unrecognised country names. Therefore, per time era the country coverage of the mathematical oncology\* dataset is 64.5% (1961-1999), 99.8% (2000-2019), and 100% (2020-2024).

Figure S6.1 displays the Pearson correlation coefficients for Q1, Q2, and Q3 over time (1961-2024), as well as for the three time eras we consider in our study, corresponding to the box plots in Figure 3. For the three time eras, country-wise article counts are listed in Tables S6.1-S6.3; and pairwise collaboration counts are listed in Tables S6.4-S6.6.

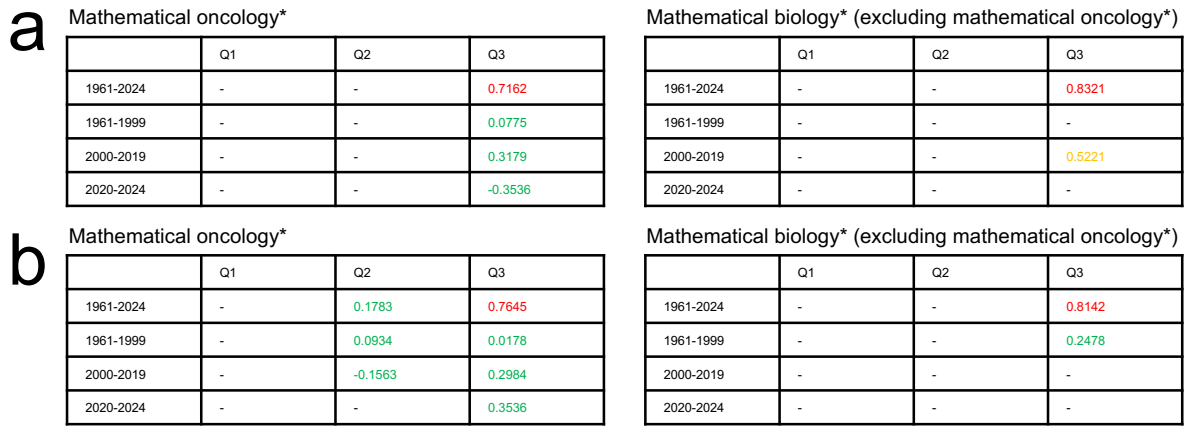


Figure S6.1: **Pearson Correlation Coefficients for number of unique author affiliation-countries per article over time.** Values were computed for the lower quartile (Q1), median (Q2), and upper quartile (Q3) over different time periods for (a) all articles in the datasets and (b) those with above-average citations in the corresponding year. Values in red, orange, and green denote strong ( $0.7 < r \leq 1$ ), moderate ( $0.5 \leq r < 0.7$ ), and no or weak ( $r < 0.5$ ) Pearson correlation coefficients  $r$ , respectively. When a tabulated quantity shows no variation across years, the Pearson correlation coefficient is not defined, as is indicated by ‘-’.

Table S6.1: **Number of articles (N) in the mathematical oncology\* dataset between 1961 and 1999.**

| Country   | N   | Country     | N | Country  | N | Country            | N   |
|-----------|-----|-------------|---|----------|---|--------------------|-----|
| USA       | 218 | Sweden      | 7 | Russia   | 4 | Croatia            | 1   |
| UK        | 42  | Italy       | 6 | India    | 3 | Denmark            | 1   |
| Australia | 18  | Israel      | 5 | Poland   | 3 | Nigeria            | 1   |
| Canada    | 18  | Brazil      | 4 | Austria  | 2 | Norway             | 1   |
| Germany   | 15  | Finland     | 4 | Czechia  | 2 | Slovakia           | 1   |
| Japan     | 15  | France      | 4 | Bulgaria | 1 | Sri Lanka          | 1   |
| Belgium   | 8   | Netherlands | 4 | China    | 1 | <i>Unspecified</i> | 116 |

Table S6.2: Number of articles (N) in the mathematical oncology\* dataset between 2000 and 2019.

| Country     | N    | Country      | N  | Country      | N | Country     | N |
|-------------|------|--------------|----|--------------|---|-------------|---|
| USA         | 1126 | India        | 30 | Austria      | 9 | Indonesia   | 3 |
| United UK   | 395  | Netherlands  | 28 | Norway       | 9 | Kuwait      | 3 |
| China       | 229  | Portugal     | 23 | Turkey       | 9 | Qatar       | 3 |
| France      | 217  | Russia       | 23 | Romania      | 8 | Algeria     | 2 |
| Italy       | 168  | Cuba         | 16 | Finland      | 7 | Bulgaria    | 2 |
| Canada      | 133  | Pakistan     | 16 | Saudi Arabia | 6 | Morocco     | 2 |
| Germany     | 116  | Argentina    | 15 | Hungary      | 5 | Bangladesh  | 1 |
| Spain       | 82   | Belgium      | 15 | Singapore    | 5 | Botswana    | 1 |
| Australia   | 81   | Switzerland  | 15 | Egypt        | 4 | Colombia    | 1 |
| Iran        | 61   | Sweden       | 12 | Serbia       | 4 | Czechia     | 1 |
| Japan       | 52   | Ireland      | 11 | Slovakia     | 4 | Kenya       | 1 |
| Poland      | 38   | South Korea  | 11 | Tunisia      | 4 | Lebanon     | 1 |
| Israel      | 37   | Denmark      | 10 | Venezuela    | 4 | Malaysia    | 1 |
| Brazil      | 32   | Mexico       | 10 | Chile        | 3 | Eswatini    | 1 |
| New Zealand | 32   | South Africa | 10 | Greece       | 3 | Unspecified | 2 |

Table S6.3: Number of articles (N) in the mathematical oncology\* dataset between 2020 and 2024.

| Country      | N   | Country     | N  | Country    | N | Country     | N |
|--------------|-----|-------------|----|------------|---|-------------|---|
| China        | 533 | Turkey      | 10 | Cyprus     | 4 | Tunisia     | 2 |
| USA          | 406 | Chile       | 9  | Iraq       | 4 | Azerbaijan  | 1 |
| UK           | 116 | Brazil      | 8  | Morocco    | 4 | Belgium     | 1 |
| France       | 71  | Indonesia   | 8  | Hungary    | 3 | Cuba        | 1 |
| Italy        | 70  | Netherlands | 8  | Ireland    | 3 | Kazakhstan  | 1 |
| Germany      | 52  | New Zealand | 8  | Israel     | 3 | Luxembourg  | 1 |
| Canada       | 51  | Portugal    | 8  | Lesotho    | 3 | Nigeria     | 1 |
| Australia    | 49  | South Korea | 8  | Poland     | 3 | Oman        | 1 |
| Spain        | 44  | Greece      | 7  | Slovakia   | 3 | Philippines | 1 |
| India        | 39  | Malaysia    | 7  | Uganda     | 3 | Senegal     | 1 |
| Sweden       | 27  | Russia      | 7  | Algeria    | 2 | Serbia      | 1 |
| Norway       | 22  | Switzerland | 7  | Argentina  | 2 | Singapore   | 1 |
| Iran         | 20  | Colombia    | 6  | Bangladesh | 2 | Ukraine     | 1 |
| Pakistan     | 18  | Denmark     | 6  | Benin      | 2 | Yemen       | 1 |
| Finland      | 17  | Egypt       | 6  | Lebanon    | 2 | Zimbabwe    | 1 |
| Saudi Arabia | 16  | Japan       | 6  | Romania    | 2 | Unspecified | 0 |
| Mexico       | 12  | Vietnam     | 6  | Rwanda     | 2 |             |   |
| South Africa | 11  | Austria     | 4  | Thailand   | 2 |             |   |

Table S6.4: Number of shared articles (N) in the mathematical oncology\* dataset between 1961 and 1999.

| Country 1 | Country 2 | N | Country 1 | Country 2 | N | Country 1 | Country 2 | N |
|-----------|-----------|---|-----------|-----------|---|-----------|-----------|---|
| USA       | Canada    | 2 | Finland   | Russia    | 1 | USA       | Italy     | 1 |
| USA       | Israel    | 2 | Germany   | Russia    | 1 | USA       | Japan     | 1 |
| USA       | Poland    | 2 | Sweden    | Norway    | 1 | USA       | Russia    | 1 |
| USA       | Sweden    | 2 | USA       | Australia | 1 |           |           |   |

Table S6.5: Number of shared articles (N) in the mathematical oncology\* dataset between 2000 and 2019.

| Country 1 | Country 2    | N  | Country 1 | Country 2    | N | Country 1    | Country 2    | N |
|-----------|--------------|----|-----------|--------------|---|--------------|--------------|---|
| USA       | UK           | 41 | Poland    | Israel       | 2 | Italy        | Venezuela    | 1 |
| USA       | China        | 34 | Spain     | Brazil       | 2 | Japan        | Austria      | 1 |
| USA       | France       | 18 | UK        | Austria      | 2 | Japan        | Ireland      | 1 |
| USA       | Germany      | 16 | UK        | Portugal     | 2 | Netherlands  | Austria      | 1 |
| USA       | Canada       | 15 | USA       | Argentina    | 2 | Netherlands  | Finland      | 1 |
| UK        | Australia    | 13 | USA       | Pakistan     | 2 | Netherlands  | Sweden       | 1 |
| UK        | France       | 13 | USA       | Singapore    | 2 | New Zealand  | Singapore    | 1 |
| UK        | Germany      | 13 | USA       | Switzerland  | 2 | Pakistan     | Korea        | 1 |
| UK        | Canada       | 10 | Argentina | Belgium      | 1 | Pakistan     | Saudi Arabia | 1 |
| Italy     | Spain        | 9  | Australia | India        | 1 | Poland       | Egypt        | 1 |
| USA       | Italy        | 9  | Australia | Mexico       | 1 | Poland       | South Africa | 1 |
| USA       | Japan        | 9  | Australia | Netherlands  | 1 | Poland       | Switzerland  | 1 |
| UK        | Italy        | 7  | Australia | New Zealand  | 1 | Portugal     | Argentina    | 1 |
| France    | Italy        | 6  | Belgium   | Austria      | 1 | Portugal     | Belgium      | 1 |
| USA       | Australia    | 6  | Belgium   | Greece       | 1 | Portugal     | Cuba         | 1 |
| USA       | India        | 6  | Belgium   | Ireland      | 1 | Portugal     | Mexico       | 1 |
| USA       | Poland       | 6  | Brazil    | Cuba         | 1 | Portugal     | South Africa | 1 |
| USA       | Russia       | 6  | Brazil    | Mexico       | 1 | Russia       | Mexico       | 1 |
| USA       | Spain        | 6  | Brazil    | Portugal     | 1 | Saudi Arabia | Egypt        | 1 |
| Germany   | Russia       | 5  | Brazil    | Switzerland  | 1 | South Africa | Bulgaria     | 1 |
| Italy     | Germany      | 5  | Canada    | Denmark      | 1 | South Africa | Swaziland    | 1 |
| UK        | Ireland      | 5  | Canada    | Ireland      | 1 | Spain        | Argentina    | 1 |
| UK        | Spain        | 5  | Canada    | Israel       | 1 | Spain        | Australia    | 1 |
| USA       | Israel       | 5  | Canada    | Japan        | 1 | Spain        | Bulgaria     | 1 |
| USA       | Netherlands  | 5  | Canada    | Netherlands  | 1 | Spain        | Cuba         | 1 |
| Australia | Korea        | 4  | Canada    | UAE          | 1 | Spain        | Norway       | 1 |
| Canada    | Australia    | 4  | Chile     | Colombia     | 1 | Spain        | Poland       | 1 |
| China     | Japan        | 4  | China     | Austria      | 1 | Spain        | Russia       | 1 |
| France    | Germany      | 4  | China     | Egypt        | 1 | Spain        | Serbia       | 1 |
| UK        | China        | 4  | China     | Germany      | 1 | Spain        | South Africa | 1 |
| USA       | Brazil       | 4  | China     | Italy        | 1 | Spain        | Switzerland  | 1 |
| USA       | Denmark      | 4  | China     | Kenya        | 1 | Sweden       | Finland      | 1 |
| USA       | Iran         | 4  | China     | New Zealand  | 1 | UK           | Argentina    | 1 |
| USA       | Korea        | 4  | China     | Spain        | 1 | UK           | Bangladesh   | 1 |
| USA       | Saudi Arabia | 4  | Cuba      | Mexico       | 1 | UK           | Belgium      | 1 |
| USA       | South Africa | 4  | France    | Argentina    | 1 | UK           | Brazil       | 1 |
| Australia | Poland       | 3  | France    | Brazil       | 1 | UK           | Finland      | 1 |
| France    | Israel       | 3  | France    | Canada       | 1 | UK           | Greece       | 1 |
| France    | Spain        | 3  | France    | Lebanon      | 1 | UK           | Japan        | 1 |
| France    | Switzerland  | 3  | France    | Netherlands  | 1 | UK           | Netherlands  | 1 |
| Germany   | Hungary      | 3  | France    | Poland       | 1 | UK           | New Zealand  | 1 |
| Germany   | Poland       | 3  | France    | Russia       | 1 | UK           | Poland       | 1 |
| Germany   | Spain        | 3  | France    | Saudi Arabia | 1 | UK           | Qatar        | 1 |
| Spain     | Mexico       | 3  | France    | South Africa | 1 | UK           | Russia       | 1 |
| Spain     | Portugal     | 3  | Germany   | Australia    | 1 | UK           | Saudi Arabia | 1 |
| UK        | Israel       | 3  | Germany   | Austria      | 1 | UK           | South Africa | 1 |
| USA       | Austria      | 3  | Germany   | Brazil       | 1 | UK           | Switzerland  | 1 |
| USA       | Portugal     | 3  | Germany   | Bulgaria     | 1 | UK           | Turkey       | 1 |
| USA       | Qatar        | 3  | Germany   | Greece       | 1 | UK           | UAE          | 1 |
| Australia | Romania      | 2  | Germany   | New Zealand  | 1 | USA          | Bangladesh   | 1 |
| Canada    | Germany      | 2  | Germany   | Portugal     | 1 | USA          | Botswana     | 1 |
| China     | Australia    | 2  | Germany   | South Africa | 1 | USA          | Egypt        | 1 |
| China     | Canada       | 2  | Iran      | Sweden       | 1 | USA          | Hungary      | 1 |
| China     | Saudi Arabia | 2  | Ireland   | Austria      | 1 | USA          | Indonesia    | 1 |
| China     | Singapore    | 2  | Israel    | Mexico       | 1 | USA          | Malaysia     | 1 |
| France    | Australia    | 2  | Israel    | Sweden       | 1 | USA          | Mexico       | 1 |
| France    | Austria      | 2  | Italy     | Argentina    | 1 | USA          | New Zealand  | 1 |
| France    | Japan        | 2  | Italy     | Australia    | 1 | USA          | Romania      | 1 |
| France    | Qatar        | 2  | Italy     | Austria      | 1 | USA          | Turkey       | 1 |
| Germany   | Switzerland  | 2  | Italy     | Brazil       | 1 | USA          | UAE          | 1 |
| Italy     | Canada       | 2  | Italy     | Cuba         | 1 | USA          | Venezuela    | 1 |
| Italy     | Mexico       | 2  | Italy     | New Zealand  | 1 |              |              |   |
| Italy     | Netherlands  | 2  | Italy     | Switzerland  | 1 |              |              |   |

Table S6.6: Number of shared articles (N) in the mathematical oncology\* dataset between 2020 and 2024.

| Country 1    | Country 2    | N  | Country 1 | Country 2    | N | Country 1    | Country 2   | N |
|--------------|--------------|----|-----------|--------------|---|--------------|-------------|---|
| USA          | UK           | 15 | Canada    | Saudi Arabia | 1 | Italy        | Turkey      | 1 |
| China        | USA          | 11 | Canada    | South Africa | 1 | Korea        | Hungary     | 1 |
| USA          | Canada       | 10 | Canada    | Thailand     | 1 | Korea        | Lebanon     | 1 |
| UK           | France       | 9  | Canada    | Turkey       | 1 | Korea        | Slovakia    | 1 |
| UK           | Italy        | 8  | Canada    | Zimbabwe     | 1 | Korea        | UAE         | 1 |
| UK           | Australia    | 7  | Chile     | Brazil       | 1 | Morocco      | Tunisia     | 1 |
| China        | Australia    | 5  | Chile     | Luxembourg   | 1 | Netherlands  | Belgium     | 1 |
| China        | UK           | 5  | China     | Algeria      | 1 | Netherlands  | Israel      | 1 |
| France       | Italy        | 5  | China     | Azerbaijan   | 1 | Norway       | Austria     | 1 |
| Italy        | Spain        | 5  | China     | Bangladesh   | 1 | Norway       | Korea       | 1 |
| China        | Pakistan     | 4  | China     | France       | 1 | Norway       | Lebanon     | 1 |
| Pakistan     | Saudi Arabia | 4  | China     | Nigeria      | 1 | Norway       | Portugal    | 1 |
| UK           | Spain        | 4  | China     | Philippines  | 1 | Norway       | UAE         | 1 |
| UK           | Switzerland  | 4  | China     | Rwanda       | 1 | Pakistan     | Azerbaijan  | 1 |
| USA          | France       | 4  | China     | Saudi Arabia | 1 | Pakistan     | Egypt       | 1 |
| USA          | Italy        | 4  | China     | Singapore    | 1 | Pakistan     | Hungary     | 1 |
| USA          | Norway       | 4  | China     | South Africa | 1 | Pakistan     | Korea       | 1 |
| USA          | Spain        | 4  | China     | Spain        | 1 | Pakistan     | Slovakia    | 1 |
| Australia    | Saudi Arabia | 3  | China     | Thailand     | 1 | Pakistan     | Thailand    | 1 |
| Canada       | Iran         | 3  | China     | Yemen        | 1 | Russia       | Benin       | 1 |
| China        | Canada       | 3  | Colombia  | Zimbabwe     | 1 | Russia       | Morocco     | 1 |
| Saudi Arabia | Malaysia     | 3  | Egypt     | Algeria      | 1 | Rwanda       | Nigeria     | 1 |
| South Africa | Lesotho      | 3  | Egypt     | Yemen        | 1 | Saudi Arabia | Egypt       | 1 |
| UK           | Germany      | 3  | Finland   | Netherlands  | 1 | Saudi Arabia | Hungary     | 1 |
| UK           | Saudi Arabia | 3  | France    | Chile        | 1 | Saudi Arabia | Indonesia   | 1 |
| USA          | Australia    | 3  | France    | Cyprus       | 1 | Saudi Arabia | Iraq        | 1 |
| USA          | Lesotho      | 3  | France    | Luxembourg   | 1 | Saudi Arabia | Korea       | 1 |
| USA          | South Africa | 3  | France    | Netherlands  | 1 | Saudi Arabia | Slovakia    | 1 |
| USA          | Switzerland  | 3  | France    | Poland       | 1 | South Africa | Algeria     | 1 |
| Australia    | India        | 2  | France    | Senegal      | 1 | South Africa | Colombia    | 1 |
| Australia    | Korea        | 2  | France    | South Africa | 1 | South Africa | Egypt       | 1 |
| Australia    | Malaysia     | 2  | France    | Sweden       | 1 | South Africa | Yemen       | 1 |
| China        | Egypt        | 2  | France    | Tunisia      | 1 | South Africa | Zimbabwe    | 1 |
| China        | Germany      | 2  | France    | Zimbabwe     | 1 | Spain        | Mexico      | 1 |
| China        | Iraq         | 2  | Germany   | Canada       | 1 | Spain        | Serbia      | 1 |
| China        | Italy        | 2  | Germany   | Denmark      | 1 | Sweden       | Austria     | 1 |
| China        | Japan        | 2  | Germany   | Iran         | 1 | Sweden       | Finland     | 1 |
| China        | Norway       | 2  | Germany   | Israel       | 1 | Sweden       | Norway      | 1 |
| Finland      | Austria      | 2  | Germany   | Netherlands  | 1 | Sweden       | Russia      | 1 |
| France       | Canada       | 2  | Germany   | New Zealand  | 1 | Thailand     | Azerbaijan  | 1 |
| France       | Colombia     | 2  | Germany   | Pakistan     | 1 | Turkey       | Japan       | 1 |
| France       | Morocco      | 2  | Germany   | Spain        | 1 | Turkey       | Morocco     | 1 |
| France       | Russia       | 2  | Germany   | Turkey       | 1 | UAE          | Lebanon     | 1 |
| France       | Spain        | 2  | Hungary   | Slovakia     | 1 | UK           | Brazil      | 1 |
| Italy        | Australia    | 2  | India     | Korea        | 1 | UK           | Canada      | 1 |
| Italy        | Brazil       | 2  | India     | Lebanon      | 1 | UK           | Cyprus      | 1 |
| Italy        | Canada       | 2  | India     | Malaysia     | 1 | UK           | Finland     | 1 |
| Norway       | Finland      | 2  | India     | Norway       | 1 | UK           | Greece      | 1 |
| Pakistan     | Iraq         | 2  | India     | Pakistan     | 1 | UK           | India       | 1 |
| Spain        | Brazil       | 2  | India     | Saudi Arabia | 1 | UK           | Nigeria     | 1 |
| Sweden       | Morocco      | 2  | India     | UAE          | 1 | UK           | Norway      | 1 |
| UK           | Ireland      | 2  | Indonesia | Malaysia     | 1 | UK           | Oman        | 1 |
| UK           | Netherlands  | 2  | Indonesia | Ukraine      | 1 | UK           | Rwanda      | 1 |
| USA          | Germany      | 2  | Iran      | Egypt        | 1 | UK           | Sweden      | 1 |
| USA          | Netherlands  | 2  | Iran      | Finland      | 1 | USA          | Algeria     | 1 |
| USA          | Russia       | 2  | Iran      | Pakistan     | 1 | USA          | Brazil      | 1 |
| USA          | Sweden       | 2  | Iran      | Saudi Arabia | 1 | USA          | Finland     | 1 |
| Algeria      | Thailand     | 1  | Iraq      | Azerbaijan   | 1 | USA          | Greece      | 1 |
| Algeria      | Yemen        | 1  | Iraq      | Thailand     | 1 | USA          | Kazakhstan  | 1 |
| Australia    | Indonesia    | 1  | Israel    | Belgium      | 1 | USA          | Korea       | 1 |
| Australia    | New Zealand  | 1  | Italy     | Austria      | 1 | USA          | Mexico      | 1 |
| Canada       | Australia    | 1  | Italy     | Azerbaijan   | 1 | USA          | Morocco     | 1 |
| Canada       | Azerbaijan   | 1  | Italy     | India        | 1 | USA          | New Zealand | 1 |
| Canada       | Colombia     | 1  | Italy     | Iraq         | 1 | USA          | Pakistan    | 1 |
| Canada       | Iraq         | 1  | Italy     | Morocco      | 1 | USA          | Poland      | 1 |
| Canada       | Korea        | 1  | Italy     | New Zealand  | 1 | USA          | Senegal     | 1 |
| Canada       | Malaysia     | 1  | Italy     | Pakistan     | 1 | USA          | Thailand    | 1 |
| Canada       | New Zealand  | 1  | Italy     | Sweden       | 1 |              |             |   |
| Canada       | Pakistan     | 1  | Italy     | Thailand     | 1 |              |             |   |

## S7 Supporting information on collaboration

Figure S7.1 displays the Pearson correlation coefficients for Q1, Q2, and Q3 for all box plots in Figure 4 in the main manuscript.

|          |                        |        |        |         |                                                          |        |         |        |
|----------|------------------------|--------|--------|---------|----------------------------------------------------------|--------|---------|--------|
| <b>a</b> | Mathematical oncology* |        |        |         | Mathematical biology* (excluding mathematical oncology*) |        |         |        |
|          |                        | Q1     | Q2     | Q3      |                                                          | Q1     | Q2      | Q3     |
|          | 1961-2024              | 0.8151 | 0.8618 | 0.8407  | 1961-2024                                                | 0.8425 | 0.9139  | 0.9129 |
|          | 1961-1999              | 0.6984 | 0.5516 | 0.5029  | 1961-1999                                                | 0.3822 | 0.8089  | 0.6846 |
|          | 2000-2019              | 0.4628 | 0.4432 | 0.6162  | 2000-2019                                                | 0.3780 | 0.8453  | 0.8496 |
|          | 2020-2024              | 0      | 0.7071 | -       | 2020-2024                                                | 0.3536 | -       | 0.2887 |
| <b>b</b> | Mathematical oncology* |        |        |         | Mathematical biology* (excluding mathematical oncology*) |        |         |        |
|          |                        | Q1     | Q2     | Q3      |                                                          | Q1     | Q2      | Q3     |
|          | 1961-2024              | 0.6073 | 0.7201 | 0.7702  | 1961-2024                                                | 0.8501 | 0.8917  | 0.9093 |
|          | 1961-1999              | 0.2556 | 0.3466 | 0.3464  | 1961-1999                                                | 0.5227 | 0.6701  | 0.6149 |
|          | 2000-2019              | 0.3860 | 0.5380 | 0.6333  | 2000-2019                                                | -      | 0.7509  | 0.7959 |
|          | 2020-2024              | -      | -      | -0.5773 | 2020-2024                                                | 0.7071 | -0.7071 | -      |

Figure S7.1: **Pearson Correlation Coefficients for the number of authors per article over time.** Values were computed for the lower quartile (Q1), median (Q2), and upper quartile (Q3) over different time periods for (a) all articles in the datasets and (b) those with above-average citations in the corresponding year. Values in red, orange, and green denote strong ( $0.7 < r \leq 1$ ), moderate ( $0.5 \leq r < 0.7$ ), and no or weak ( $r < 0.5$ ) Pearson correlation coefficients  $r$ , respectively. When a tabulated quantity shows no variation across years, the Pearson correlation coefficient is not defined, as is indicated by ‘-’.

## S8 Supporting information on trending topics

The frequency of the word clouds presented in Figures 5 and 6 in the main manuscript are generated with the R-package biblioshiny (Aria and Cuccurullo, 2017). Synonyms are combined in the word clouds as shown in Table S8.1 and for the abstract word clouds we remove the words `cell`, `model`, and `tumour` according to a similarity pruning. For each word cloud, the 25 most frequent words are included; as long as they appear at least 5 times. In cases where multiple words (with frequency of at least 5) are tied for 25th place, they are all included. Complementary to the word clouds, bar charts displaying the frequency of the top 25 words in article titles and abstracts are shown in Figures S8.1 and S8.2 respectively. In the study’s GitHub repository, word cloud frequencies are available in numeric form in the file `word_cloud_data.csv`.

Table S8.1: **A list of synonyms used when generating the word clouds.**

| Term               | Synonyms                                                     |
|--------------------|--------------------------------------------------------------|
| Mathematical model | Mathematical-model; Mathematical models; Mathematical-models |
| Tumour             | Tumor; Tumours; Tumors                                       |
| Cell               | Cells                                                        |
| Modelling          | Modeling                                                     |
| Model              | Models                                                       |
| Effect             | Effects                                                      |

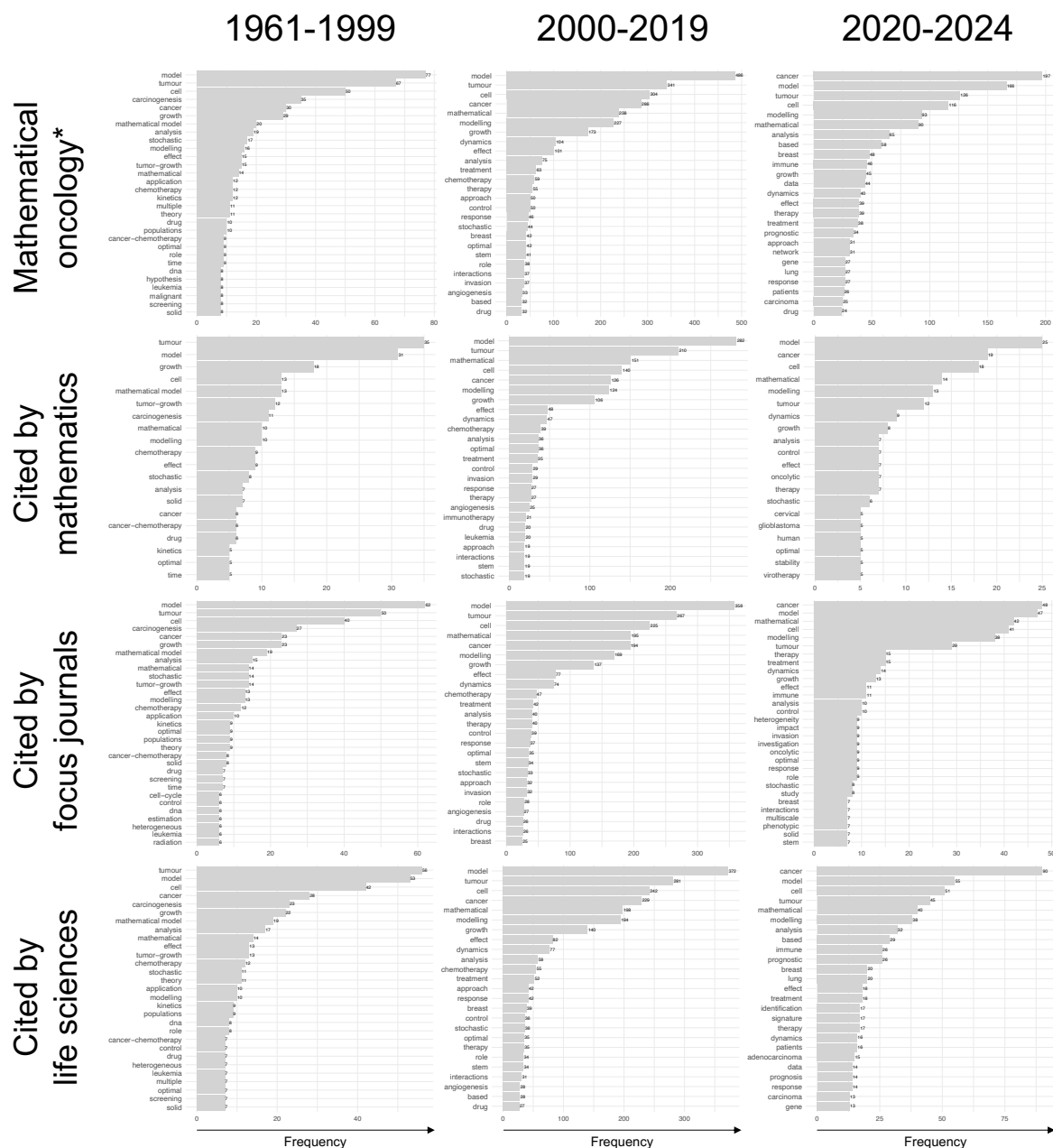


Figure S8.1: **Trending topics in mathematical oncology analysed through title word frequency.** The bar charts contain the 25 most frequent terms, with frequencies next to the bars. Data for all mathematical oncology\* titles, per time period, are shown in the top row. Data for articles with at least one citation in mathematics, focus, and life science journals are shown in the three rows below, respectively.

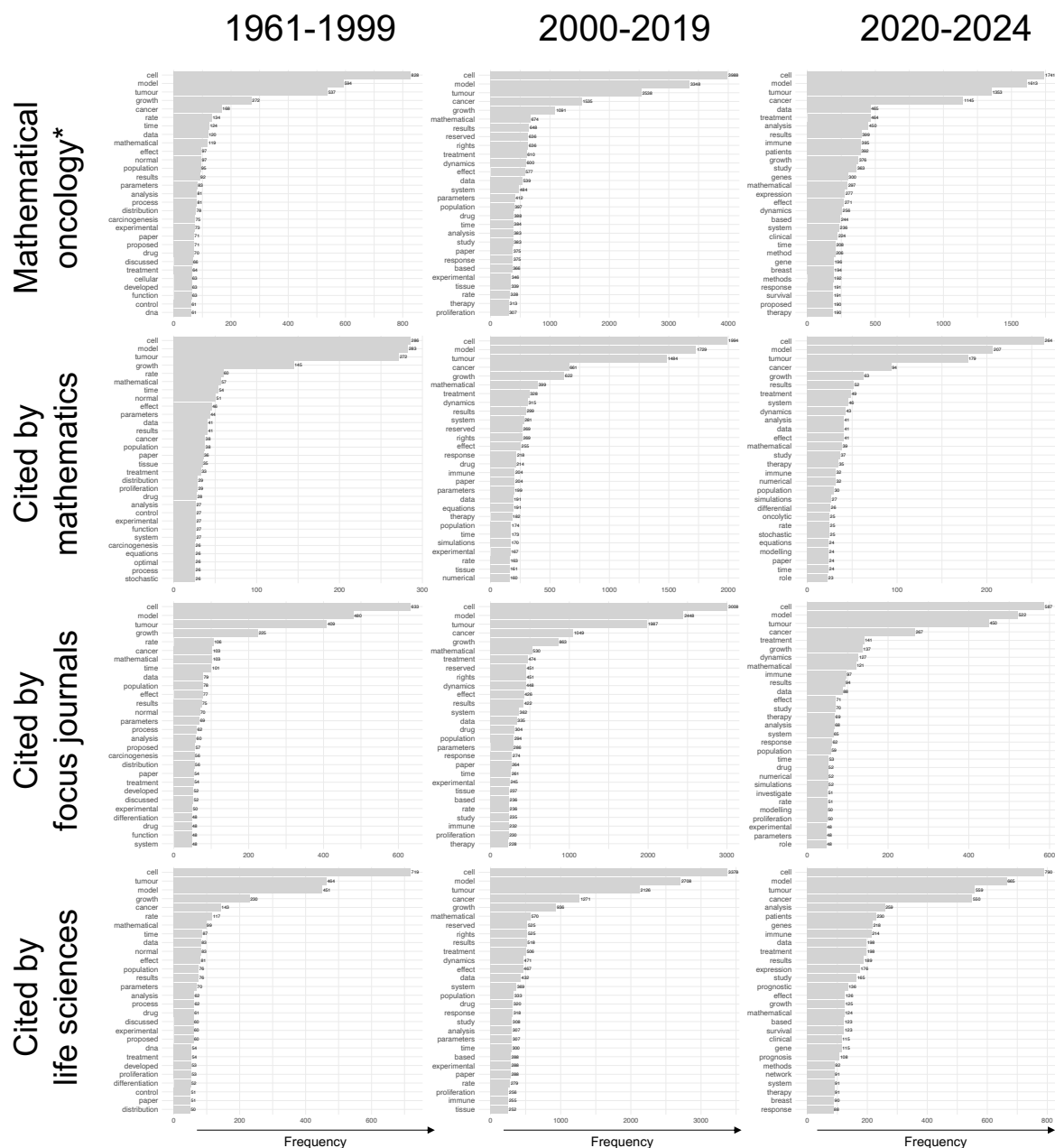


Figure S8.2: **Trending topics in mathematical oncology analysed through abstract word frequency.** The bar charts contain the 25 most frequent terms, with frequencies next to the bars. Data for all mathematical oncology\* abstract, per time period, are shown in the top row. Data for articles with at least one citation in mathematics, focus, and life science journals are shown in the three rows below, respectively.

## S9 Code files

The code files used in this study are available on the public GitHub repository [https://github.com/KiraPugh/Bibliometric\\_Study\\_Mathematical\\_Oncology](https://github.com/KiraPugh/Bibliometric_Study_Mathematical_Oncology). Instructions on how to run the code files are available in the repository's README file.

## References

- American Cancer Society (2025). *Cancer Types*. Accessed: 2025-06-12. URL: <https://www.cancer.org/cancer/types.html>.
- Aria, M. and C. Cuccurullo (2017). “Bibliometrix: An R-tool for comprehensive science mapping analysis”, *Journal of Informetrics* 11.4, pp. 959–975. DOI: 10.1016/j.joi.2017.08.007.
- Cancer Research UK (2024). *Your cancer type*. Accessed: 2025-06-12. URL: <https://www.cancerresearchuk.org/about-cancer/type>.
- Elsevier (2025). *All Science Journal Classifications: ASJC Codes*. Accessed: 2025-06-09. URL: <https://support.qs.com/hc/en-gb/articles/4406036892562-All-Science-Journal-Classifications-ASJC-Codes>.
- Himmelstein, D. S. (2024). *scopus*. Accessed: 2025-06-21. URL: <https://github.com/dhimmel/scopus>.
- National Cancer Institute (2025). *Cancer Types*. Accessed: 2025-06-12. URL: <https://www.cancer.gov/types>.
- QS Quacquarelli Symonds (2025). *QS World University Rankings by Subject*. Accessed: 2025-06-09. URL: <https://support.qs.com/hc/en-gb/articles/4410488025106-QS-World-University-Rankings-by-Subject>.
- WebMD (2025). *Cancer A-Z*. Accessed: 2025-06-12. URL: <https://www.webmd.com/cancer/cancer-a-to-z>.
- Wikipedia (2025). *List of cancer types*. Accessed: 2025-06-12. URL: [https://en.wikipedia.org/wiki/List\\_of\\_cancer\\_types](https://en.wikipedia.org/wiki/List_of_cancer_types).