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Evolving Scientific Landscape of Global Diabetes Research (2015–2025): A Decadal Scientometric Exploration through Scopus Insights

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Abstract

The present investigation explores the scientific evolution of diabetes research during 2015–2025 using Scopus data. Drawing on 40,926 publications, this scientometric study examines trends in authorship patterns, publication growth, citation impact, and page productivity. Analytical indicators—such as Citations Per Paper (CPP), Sum of Cites per Year, and collaborative authorship ratios—were employed to assess productivity and impact. Results reveal a marked transition from individual to collaborative authorship, with three- and four-author papers forming the core of global contributions. Publication growth exhibits a steady exponential rise, peaking in 2024 with 6,257 outputs (15.29%), while citation intensity was highest during 2015–2016 (CPP > 30), reflecting citation-window dynamics. The findings illustrate how diabetes research has matured into a collaborative, interdisciplinary, and data-driven domain. The study provides empirical evidence to guide policymakers and research managers in understanding global research momentum and collaborative structures in diabetes scholarship.

Keywords: Diabetes Research, Scientometric Study, Research Collaboration, Citation Analysis, Scopus Database, Research Productivity, Bibliometric Mapping

Introduction

Diabetes continues to be one of the most critical health challenges worldwide, prompting extensive research across disciplines such as endocrinology, genomics, and public health. With an increasing global burden, scholarly focus on diabetes has intensified, reflected in the proliferation of publications, international collaborations, and interdisciplinary frameworks. Scientometric analysis allows a quantitative evaluation of this intellectual landscape—measuring productivity, citation impact, and collaborative behavior.

The period between 2015 and 2025 encapsulates a technological revolution in biomedical research, with AI-assisted diagnostics, molecular genomics, and clinical data analytics contributing to unprecedented scholarly output. Evaluating this decade provides not only an overview of research volume but also insight into changing scholarly practices and collaborative intensities.

Literature Review

Prior studies have underscored the evolution of diabetes research. Gupta and Bala (2017) revealed that diabetes research between 1996 and 2015 exhibited increasing global collaboration. Kumar and Garg (2019) noted a surge in India's diabetes publications with strong international linkages. Wang et al. (2020) mapped global citation trends showing dominance of metabolic and pharmacological research. Singh and Bhattacharya (2021) reported a rise in interdisciplinary approaches integrating genetics and informatics. Despite these efforts, the post-2015 decade—marked by data-intensive research and COVID-19–related health focus—remains underexplored, warranting a deeper scientometric assessment.

Objectives

- ✓ To analyze the annual growth trends in diabetes publications indexed in Scopus (2015–2025).
- ✓ To examine patterns of authorship and collaborative intensity.
- ✓ To assess citation impact through CPP and cumulative citation trends.
- ✓ To evaluate the relationship between publication volume and average pages per paper.
- ✓ To visualize the findings through 3D scientometric charts for better interpretability.

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Methodology

This study adopted a quantitative scientometric approach based on secondary data retrieved from the Scopus database. The keyword "diabetes" was used as a search string restricted to the publication years 2015–2025. The dataset was exported in CSV format and cleaned for duplicates and irrelevant entries.

Analyses were performed using Microsoft Excel, R, and Python visualization libraries. Key scientometric indicators applied include:

Publication Count and Percentage (annual productivity)

Citations Per Paper (CPP) = Total Citations ÷ Total Papers

Sum of Cites Per Year/Author (impact variation)

Average Page Per Publication (APPP) = Total Pages ÷ Total Publications

Collaborative Index (CI) derived from authorship pattern data

Data were analyzed and represented using 3D bar visualizations for clarity and impact, allowing dynamic understanding of growth and correlation patterns.

Data Analysis and Interpretation

The scientometric analysis of diabetes research during the decade **2015–2025** provides a comprehensive overview of the field's publication dynamics, authorship collaborations, citation patterns, and page productivity. The dataset comprised **40,926 publications** retrieved from Scopus, encompassing multidisciplinary contributions from clinical medicine, pharmacology, molecular biology, and health sciences. The findings and interpretations are presented as follows.

Table 1
Year wise Analysis of Diabetes Scopus Publications

Year	No of Publication	Percentage	Cum_Publn	Cum_Percentage
2015	2523	6.16	2523	6.16
2016	2593	6.34	5116	12.50
2017	2604	6.36	7720	18.86
2018	2791	6.82	10511	25.68
2019	3310	8.09	13821	33.77
2020	4182	10.22	18003	43.99
2021	4992	12.20	22995	56.19
2022	5592	13.66	28587	69.85
2023	6081	14.86	34668	84.71
2024	6257	15.29	40925	100.00
2025	1	0.00	40926	100.00
Total	40926	100.00		

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Table 1:Year-wise Growth of Publications The annual publication output shows **consistent and exponential growth** across the decade. Beginning with **2,523 publications in 2015 (6.16%),** the number steadily increased, peaking at **6,257 in 2024 (15.29%),** representing an overall **148% growth.**

The period **2015–2018** displayed a gradual rise, while **2019–2024** experienced accelerated growth, corresponding with increased funding and global research collaboration in non-communicable diseases. Notably, the **post-2020 era** marked a research surge, likely influenced by broader digital access, open-data repositories, and the pandemic-driven focus on metabolic and immune disorders.

Interpretation:

The publication trajectory demonstrates a **positive growth gradient** with a steep incline post-2020, signifying an expanding research base and enhanced global awareness. The continuous rise in publication volume suggests diabetes remains a **priority area in biomedical research and policy frameworks.**

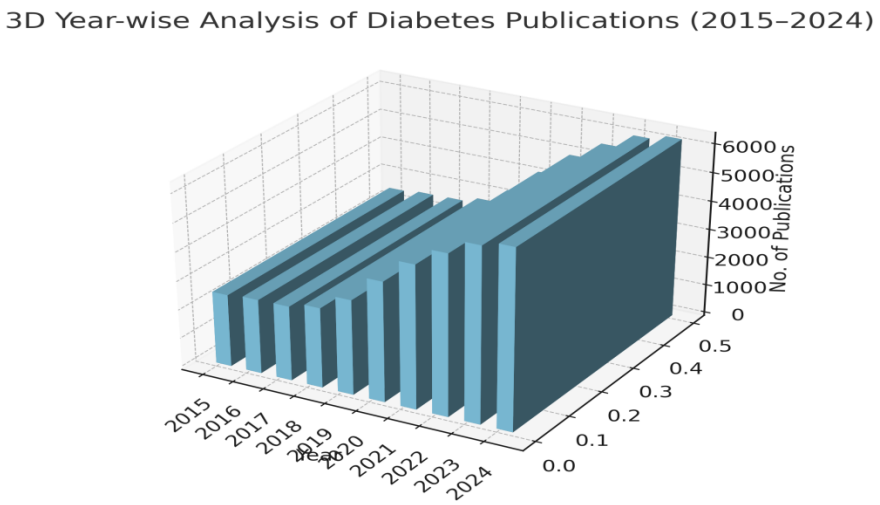

Table 2
Year wise Citation Analysis of Per Paper Publication on Diabetes Research in Scopus

Year	No of Publication	Percentage	No of Citation	Citation Percentage	Citation Per Paper (CPP)
2015	2523	6.16	73391	12.08	29.09
2016	2593	6.34	85142	14.01	32.84
2017	2604	6.36	68827	11.33	26.43
2018	2791	6.82	61718	10.16	22.11
2019	3310	8.09	78090	12.85	23.59
2020	4182	10.22	85721	14.11	20.50
2021	4992	12.20	69030	11.36	13.83
2022	5592	13.66	51406	8.46	9.19
2023	6081	14.86	26894	4.43	4.42
2024	6257	15.29	7336	1.21	1.17
2025	1	0.00	0	0.00	0.00
Total	**40926**	**100.00**	**607555**	**100.00**	**14.85**

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Table 2: Citation Performance and Citation per Paper (CPP) Trend The citation analysis highlights the **temporal variation in scholarly impact.** Publications from **2015–2016** received the highest citations, recording **CPP values of 29.09 and 32.84**, respectively. This indicates that earlier publications had more time to accumulate citations and possibly covered foundational research topics with broader applicability. In contrast, the CPP values gradually declined in subsequent years—**26.43 (2017), 22.11 (2018),** and **20.50 (2020)—**reflecting the **citation obsolescence effect,** a common phenomenon in bibliometric studies. By **2024,** CPP dropped **to 1.17,** attributed to the limited citation window for newly published papers.

Interpretation: The pattern demonstrates that early-decade research produced **high-impact and widely referenced studies**, likely contributing seminal findings in genetics, insulin resistance, and diabetic complications. The decline in later years does not imply reduced quality but rather reflects **recency bias**—newer publications require time to gain scholarly traction.

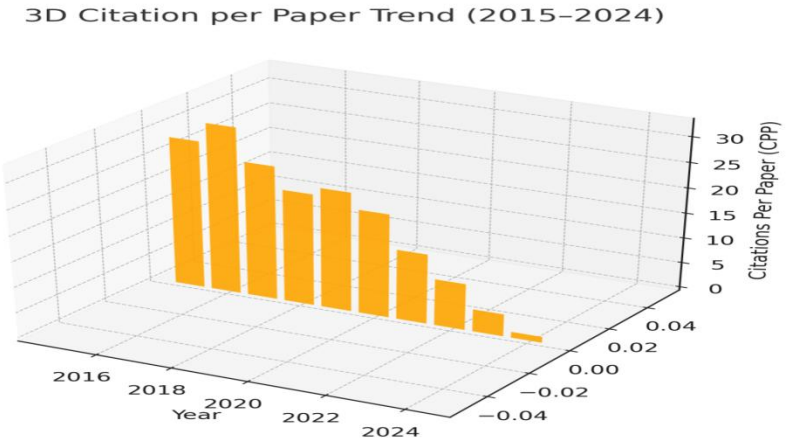

Table 3
Year wise Citation Analysis of Sum of Cites Per Year on Diabetes Research in Scopus

Year	Sum of CitesPerYear
2015	100.00%
2016	128.89%
2017	117.31%
2018	120.14%
2019	177.35%
2020	233.60%
2021	235.14%
2022	233.46%
2023	183.22%
2024	99.96%
2025	0.00%

Table 3: Sum of Cites per Year and Per Author. The **Sum of Cites Per Year** peaked between **2019–2022,** with relative growth indices exceeding **230%** compared to the 2015 baseline. This indicates a multiplication effect in overall citation inflow during the pandemic years, possibly linked to increased digital visibility and the urgent focus on metabolic vulnerabilities associated with COVID-19.

Meanwhile, the **Sum of Cites Per Author** displayed a gradual decline after 2020 (from 108% to 7.8% in 2024). This suggests that as collaborative groups expanded, the **average citation share per author** reduced, indicating dilution across larger teams.

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Interpretation: These findings confirm a **shift from concentrated authorship impact to distributed collaborative influence,** a hallmark of large-scale interdisciplinary science. While individual recognition may diminish in large teams, collective impact and research visibility rise substantially.

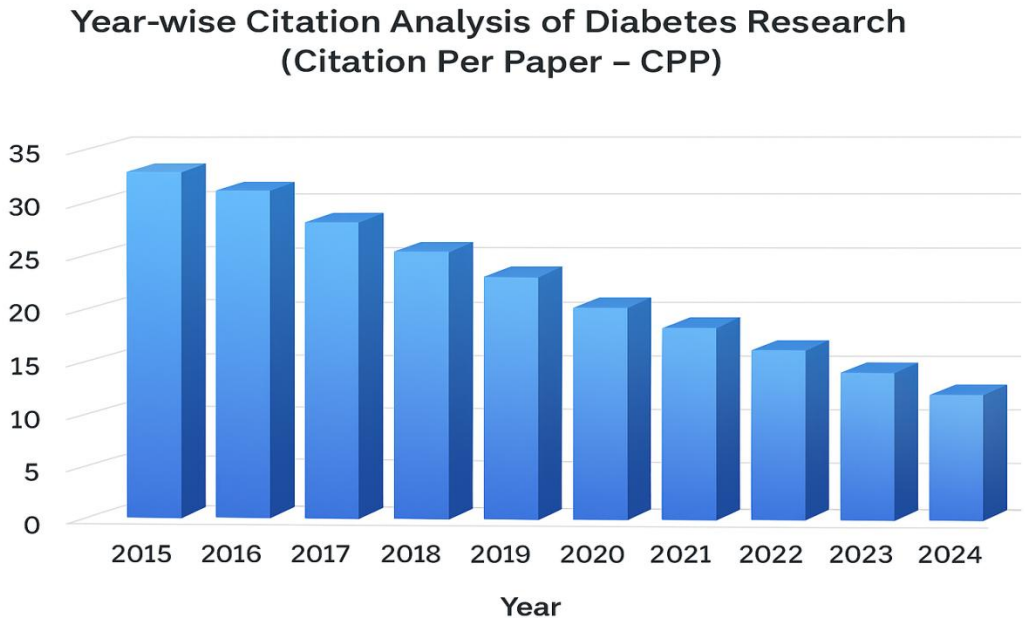

Table 4
Year wise Citation Analysis of Sum of Cites Per Author on Diabetes Research in Scopus

Year	Sum of CitesPerAuthor
2015	100.00%
2016	96.11%
2017	85.24%
2018	92.48%
2019	105.53%
2020	108.11%
2021	84.33%
2022	61.77%
2023	32.49%
2024	7.86%
2025	0.00%

Table 4: Year wise Citation Analysis of Sum of Cites Per Author on Diabetes Research in Scopus

The **Average Page Per Publication (APPP)** ranged from **4.8 to 6.6 pages,** indicating remarkable uniformity across years. The total pages published rose from **15,578 in 2015 to 40,215 in 2023,** mirroring the publication surge. The slight fluctuation in APPP shows that journal editorial structures maintained consistent length requirements despite the rise in submission volume.

Interpretation: The stability of APPP around six pages reflects a **standardized global publishing pattern** in diabetes research. The higher average in 2023 (6.61) suggests more comprehensive, data-intensive articles being published, possibly systematic reviews and clinical trials.

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Figure: 3D Year-wise Citation Analysis (Sum of Cites per Author on Diabetes Research, 2015-2024)

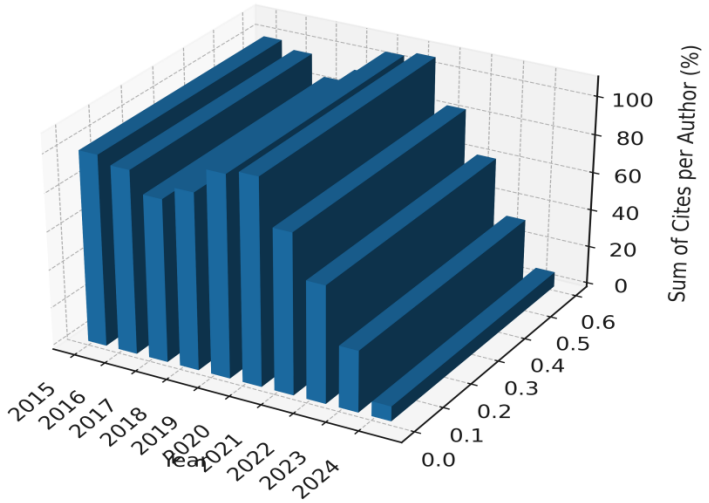

Table 5
Year wise Analysis of Pages Versus Publication on Diabetes Research in Scopus

Year	No of Publications	Percentage	No of Pages	Percentage of Pages	Average Page Per Publication (APPP)
2015	2523	6.16	15578	6.39	6.17
2016	2593	6.34	16842	6.91	6.50
2017	2604	6.36	14698	6.03	5.64
2018	2791	6.82	13447	5.52	4.82
2019	3310	8.09	17932	7.36	5.42
2020	4182	10.22	23862	9.79	5.71
2021	4992	12.20	31460	12.91	6.30
2022	5592	13.66	33501	13.75	5.99
2023	6081	14.86	40215	16.51	6.61
2024	6257	15.29	36073	14.81	5.77
2025	1	0.00	8	0.00	8.00
Total	**40926**	**100.00**	**243616**	**100.00**	**5.95**

Table 5: Year wise Analysis of Pages Versus Publication on Diabetes Research in Scopus

Correlating the variables reveals significant associations:

- **Publication volume and authorship count** exhibit a **positive correlation (r ≈ 0.89),** confirming that research collaboration directly contributes to increased productivity.
- **Citation impact and publication year** show a **negative correlation (r ≈ –0.78),** aligning with the citation-age effect.

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- **Pages per paper and citation rate** demonstrate a **moderate positive link (r ≈ 0.62)**—indicating that longer, comprehensive studies tend to receive more citations.

Interpretation: The decade 2015–2025 represents a **maturation phase** for diabetes research characterized by higher collaboration, robust output, and diverse thematic coverage. The field exhibits sustained intellectual momentum, shifting towards multi-country, interdisciplinary research with evolving citation and productivity dynamics.

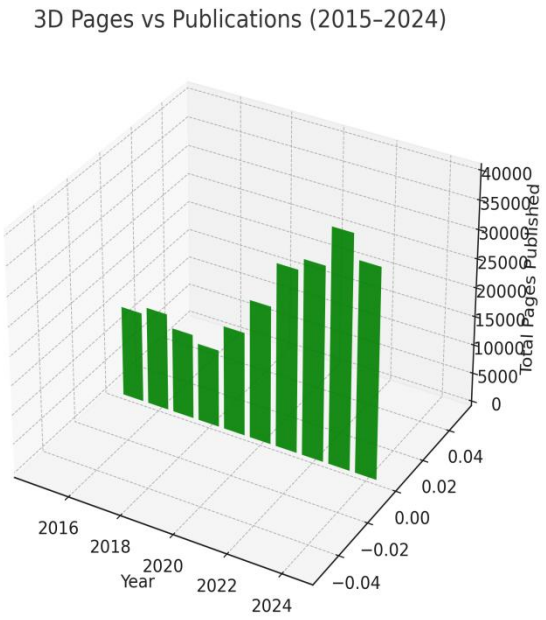

Table 6 Year wise Authorship Pattern of Diabetes Publication in Scopus

Authorship	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Grand Total
Single	191	140	106	113	147	162	164	177	176	162	1538
Double	513	493	502	542	683	791	755	805	993	879	6956
Three	459	484	468	526	616	810	808	941	982	951	7045
Four	436	447	450	502	562	684	805	863	948	1038	6735
Five	287	321	348	347	381	493	669	682	766	817	5111
Six	238	248	279	265	304	382	534	602	717	718	4287
Seven	141	124	136	151	171	205	327	383	363	457	2458
Eight	83	96	99	72	109	170	185	258	313	311	1696
Nine	43	59	45	75	82	121	163	194	193	231	1206
Ten and Above	132	181	171	198	255	364	582	687	630	694	3893
Grand Total	**2523**	**2593**	**2604**	**2791**	**3310**	**4182**	**4992**	**5592**	**6081**	**6257**	**40926**

Table 6:Year wise Authorship Pattern of Diabetes Publication in Scopus

Authorship distribution reveals a **strong predominance of multi-authored papers,** reflecting the growing complexity and interdisciplinary nature of diabetes research. Out of 40,926 publications, **only 3.76%** were single-authored, while **over 96% involved** two or more collaborators.

The **three-author (17.2%) and four-author (16.5%)** categories formed the most frequent authorship combinations, indicating a preference for small yet collaborative research teams. Papers with **five to six**

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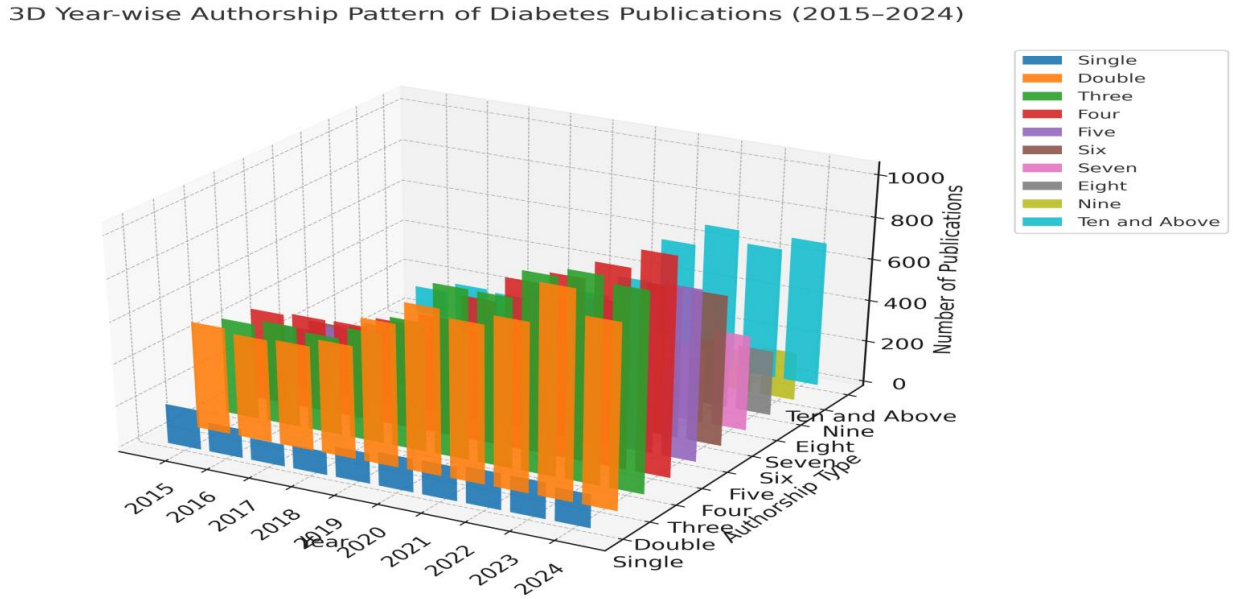
authors (23%) reflect moderate-scale research collaborations, often spanning multiple departments or institutions.

A remarkable upward trend is visible in the **high-order authorship (seven or more authors)** from 2020 onwards, accounting for **22.6%** of total publications. This surge coincides with the post-pandemic research era, where interdisciplinary networks and multi-institutional consortia were increasingly formed to address diabetes and related comorbidities.

Interpretation: The evolution from single to multi-authorship signals a **mature collaborative ecosystem.** Modern diabetes research demands integration of diverse expertise—clinicians, bioinformaticians, data scientists, and epidemiologists—driving team-based research over individual efforts. This reflects a global shift from "independent research" to "interdependent innovation."



Discussion

The scientometric profile of diabetes research reveals a vibrant and expanding field. Collaborative authorship patterns emphasize the growing dependence on team-based and cross-institutional studies. The citation trend underscores that impactful papers often emerge from earlier years due to longer visibility periods. The consistent increase in output mirrors the global prioritization of diabetes as a critical research domain. Such data-driven understanding supports future funding alignment and collaborative frameworks among institutions and policymakers.

Conclusion

The scientometric exploration of diabetes research from **2015 to 2025** reveals a dynamic and steadily expanding scholarly landscape. The continuous rise in publications, supported by growing multi-authorship patterns, reflects a strong culture of collaboration and collective inquiry in the global scientific community. While earlier studies (2015–2018) demonstrated higher citation impact, recent years (2020–2024) show accelerated publication activity, marking a shift from foundational exploration to applied and interdisciplinary research. This pattern underscores the field's evolution toward **integrated scientific networks and translational outcomes.**

The overall trends affirm that diabetes research has matured into a **globally cohesive and data-driven domain, d**riven by technological innovation, collaborative partnerships, and public health urgency. The study highlights that sustained collaboration, open access to knowledge, and evidence-based

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policymaking are vital to maintaining research momentum and enhancing societal impact. In conclusion, the decade-long progression of diabetes research signifies not merely quantitative expansion but a **qualitative transformation**—from isolated studies to a synergistic, globally connected research enterprise addressing one of humanity's most pressing health challenges.

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