

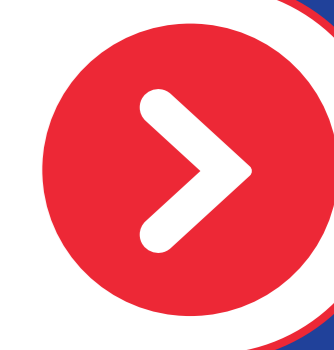
# How openly accessible is pharma-sponsored research? An informatics approach

Tim Koder<sup>a\*</sup>, Harry Freeman<sup>a†</sup>, Steph Macdonald<sup>a†</sup>, Slávka Baróniková<sup>b</sup>, Larisa Miller<sup>c</sup>, Valérie Philippon<sup>d</sup> and Tom Rees<sup>a</sup>

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## WHY WAS THIS NEEDED?

- Previous investigations into the open access rates of industry-sponsored research either come from individual company assessments of proprietary data, using different methods to detect the open access status of publications, or from manual analyses of pre-existing cross-company data sets (such as the Good Pharma Scorecard).<sup>1</sup>
- Direct comparison of open access publishing rates between pharmaceutical companies has therefore not been possible.

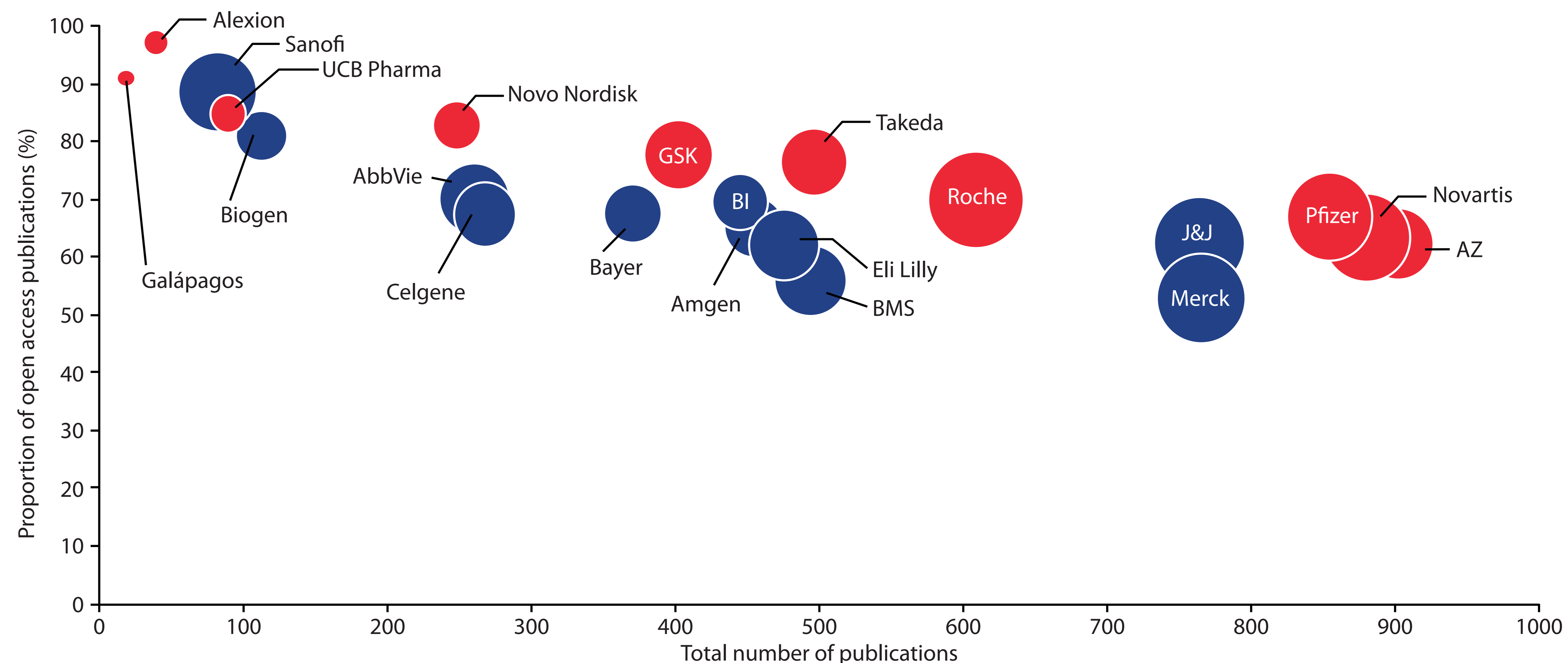
## WHAT DID WE DO?

- Here, we present an automated and reproducible method to assess the 2019 open access rates of company-sponsored publications across the pharmaceutical industry, using informatic technology and publicly available data.

## WHAT DID WE FIND?

- The mean (minimum, maximum) open access rate for 6452 publications across 21 companies was 61% (53%, 97%; Spearman's rank: -0.721,  $p = 0.0002$ ; **Figure 1**).
- Companies with the highest expenditure for research and development (R&D) tended to produce:
  - a lower proportion of open access publications than those with low R&D expenditure
  - a larger number of publications than those with low R&D expenditure
  - a large number of preclinical and country-level publications (data not shown).

**Figure 1:** The proportion of pharma-sponsored publications open access publications in 2019.



Bubbles represent total company research and development expenditure (US\$9.8–0.3 billion) in 2018.<sup>2,3</sup> Publications included original research articles and systematic reviews. Open Pharma Members and Supporters are marked in red. BI, Boehringer Ingelheim; BMS, Bristol Myers Squibb; J&J, Johnson & Johnson.

## WHAT IS THE IMPACT OF OUR RESEARCH?

- To our knowledge, this is the first comprehensive analysis of pharma-funded and pharma-authored publications using publicly available data that, in combination with informatic technologies, allows for an unbiased assessment of how open pharmaceutical publication practices are.
- Overall, almost two-thirds of the pharma-funded research included in our analysis were published open access – an increase of almost 20% from the last cross-company analysis, which assessed publications between 2009 and 2016.<sup>4</sup>
- Open access publishing rates increased from 2017 to 2018 and from 2018 to 2019 for the 10 Open Pharma Member and Supporter companies included in our analysis (**Figure 2**).
- Our method provides a reproducible benchmark for the industry and for individual companies and could be used to encourage further uptake of open access publishing.

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## FUNDING

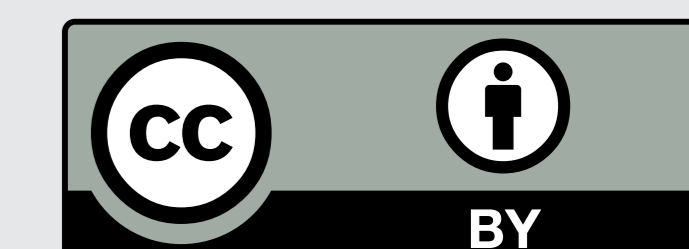
This study was funded by Open Pharma, a collaborative, multi-sponsor, not-for-profit project at Oxford PharmaGenesis. We are grateful to Alexion, AstraZeneca, Galápagos NV, Gilead, GSK, Novartis, Novo Nordisk, Pfizer, Roche, Takeda, UCB Pharma and Wiley for their financial support.

## ACKNOWLEDGEMENTS

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## DISCLOSURES

HF (<https://orcid.org/0000-0002-5110-389X>) and SM (<https://orcid.org/0000-0002-9691-0652>) are former employees of Oxford PharmaGenesis. TK (<https://orcid.org/0000-0001-6152-7365>) and TR (<https://orcid.org/0000-0003-0221-0098>) are employees of Oxford PharmaGenesis. SB (<https://orcid.org/0000-0001-8072-5690>) is an employee of Galápagos NV. LM (<https://orcid.org/0000-0003-4555-8123>) is an employee of Alexion Pharmaceuticals and VP (<https://orcid.org/0000-0002-7444-6027>) is an employee of Takeda.





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## METHODS

Microsoft Academic's application programming interface was used to report the digital object identifiers (DOIs) for the articles for which any author had an affiliation address at any of the 11 Open Pharma Member and Supporter pharmaceutical companies<sup>5</sup> and any of the top 20 global pharmaceutical companies by 2019 revenue<sup>6</sup> using the search term '[Company Name] Medicine [Year]'

Any companies not recognized by Microsoft Academic were removed from the analysis (i.e. Open Pharma Member Gilead Sciences and Teva Pharmaceuticals)

Any companies with < 10 publications were removed from the analysis (i.e. Allergan)

The remaining DOIs were inputted into Unpaywall<sup>8</sup> to obtain the journal names and the publications' open access status

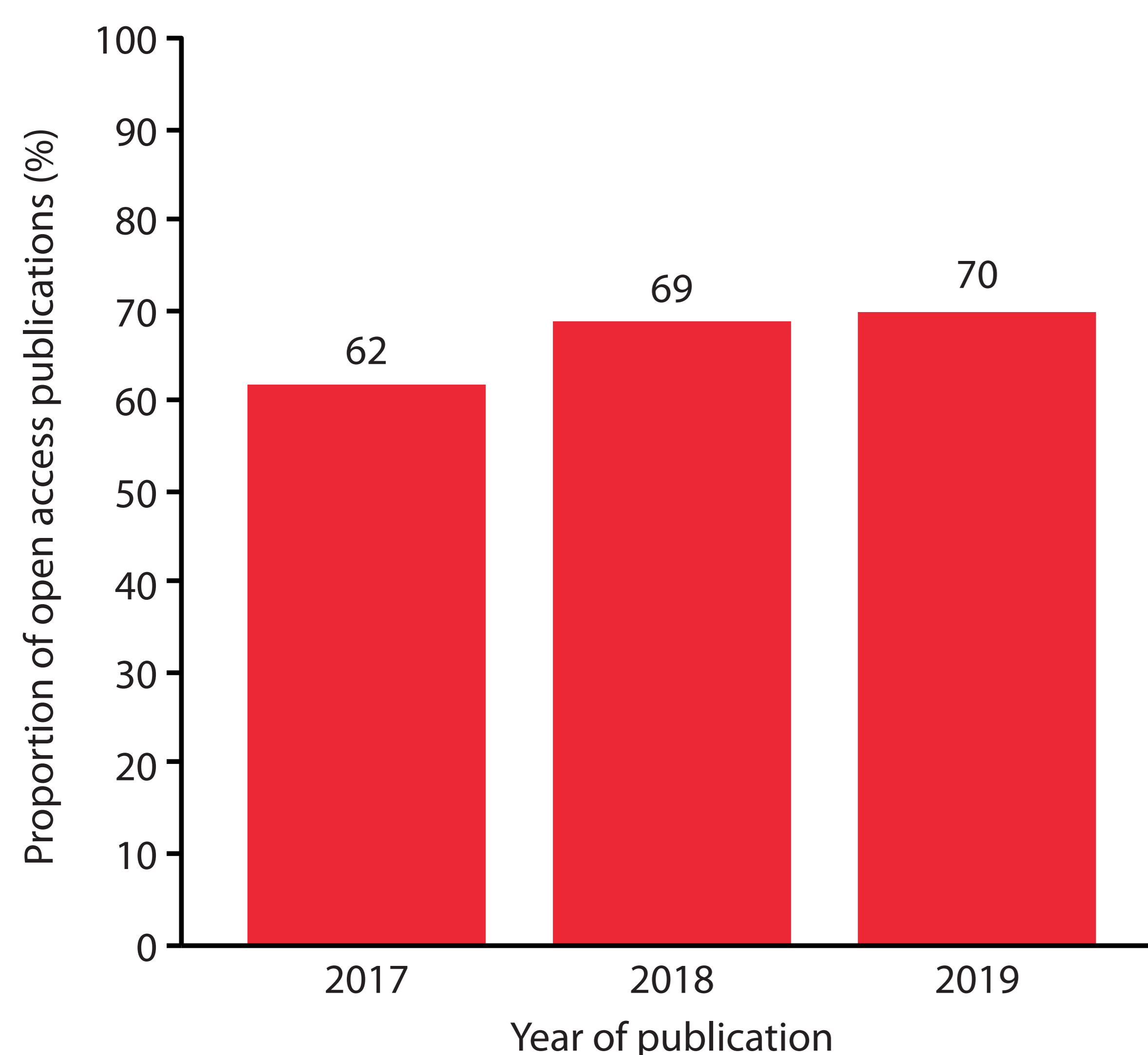
PlumX Metrics<sup>9</sup> was used to obtain the publication type of each DOI, and DOIs that did not identify 'original research article' or 'systematic review' were removed from the analysis

The analysis was repeated for Open Pharma Member and Supporter companies for 2017 and 2018

## SECONDARY FINDINGS

- For the 10 Open Pharma Member and Supporter companies analysed, the mean open access rate increased from 2017 (62%) to 2019 (70%).

**Figure 2:** The mean open access rate for Open Pharma Member and Supporter companies between 2017 and 2019.



## STRENGTHS

- Our automated approach provides an objective overview of the proportion of open access publications from 21 pharmaceutical companies.
- The analysis uses public data and a simple, easily reproducible method.
- The analysis can be reproduced over time to track changes in open access rates across the industry and within individual companies.

## GENERAL LIMITATIONS

- Our analysis included affiliate, investigator-initiated and non-company-sponsored publications that had at least one author affiliated with one of the companies analysed, even if the article was otherwise not the responsibility of the company.
- This type of research included some database studies run by external vendors and academic collaborators.
  - Company-sponsored publications that did not have at least one author with a pharmaceutical company affiliation were excluded.
- The Microsoft Academic AI is not open source, meaning that we cannot know exactly how the tag 'Medicine' is generated or how that changes over time.
  - Manual checks against proprietary data from several companies revealed that few publications were missed.
- Manual checks also revealed that some publication types were incorrectly tagged by PlumX Metrics, potentially influencing open access rates of pharma-funded research.
  - Some congress abstracts published in journal supplements were counted as articles but not as open access publications by Unpaywall because there was no full article associated with the abstract.
  - The rates of errors appeared to be low; however, they varied by company.
- Publications with a 12-month embargo may not have been captured as open access, which means that our analysis may have underestimated the proportion of open access publications in 2019.
- Listed dates of publication varied across Microsoft Academic, PubMed, Unpaywall, the journals' records and the companies' internal records.

## FUTURE DIRECTIONS

- Subsequent analyses will investigate possible factors associated with pharmaceutical company open access rates, including:
  - therapy area
  - journal type and impact factor
  - presence/absence of open access policies in the pharmaceutical industry
  - private versus public ownership of companies
  - membership in trade associations (such as the European Federation of Pharmaceutical Industries and Associations).
- Companies can use the raw data from this analysis to identify publication trends and take action when appropriate to improve open access publishing rates.