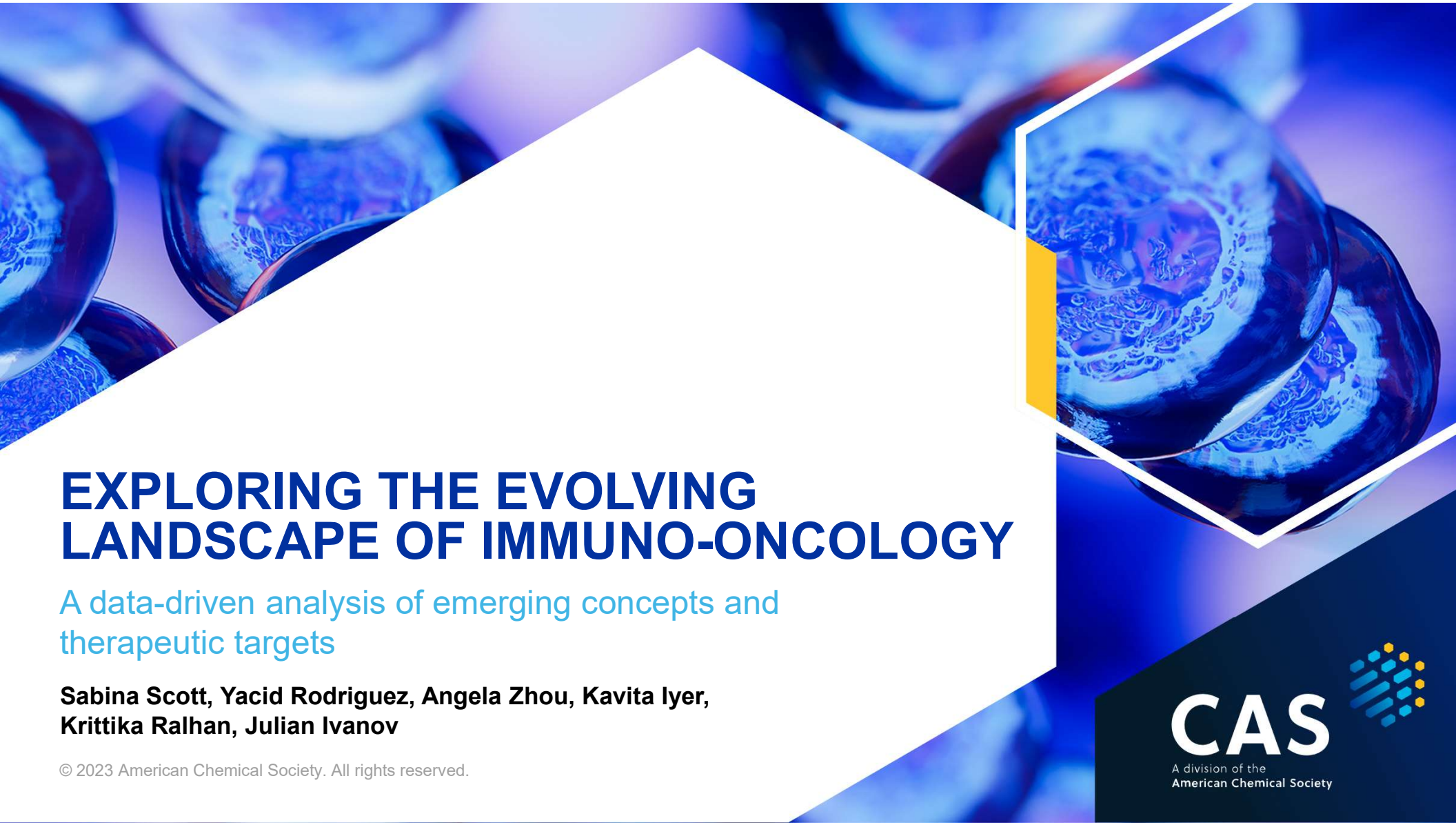

EXPLORING THE EVOLVING LANDSCAPE OF IMMUNO-ONCOLOGY

A data-driven analysis of emerging concepts and therapeutic targets

Sabina Scott, Yacid Rodriguez, Angela Zhou, Kavita Iyer, Krittika Ralhan, Julian Ivanov

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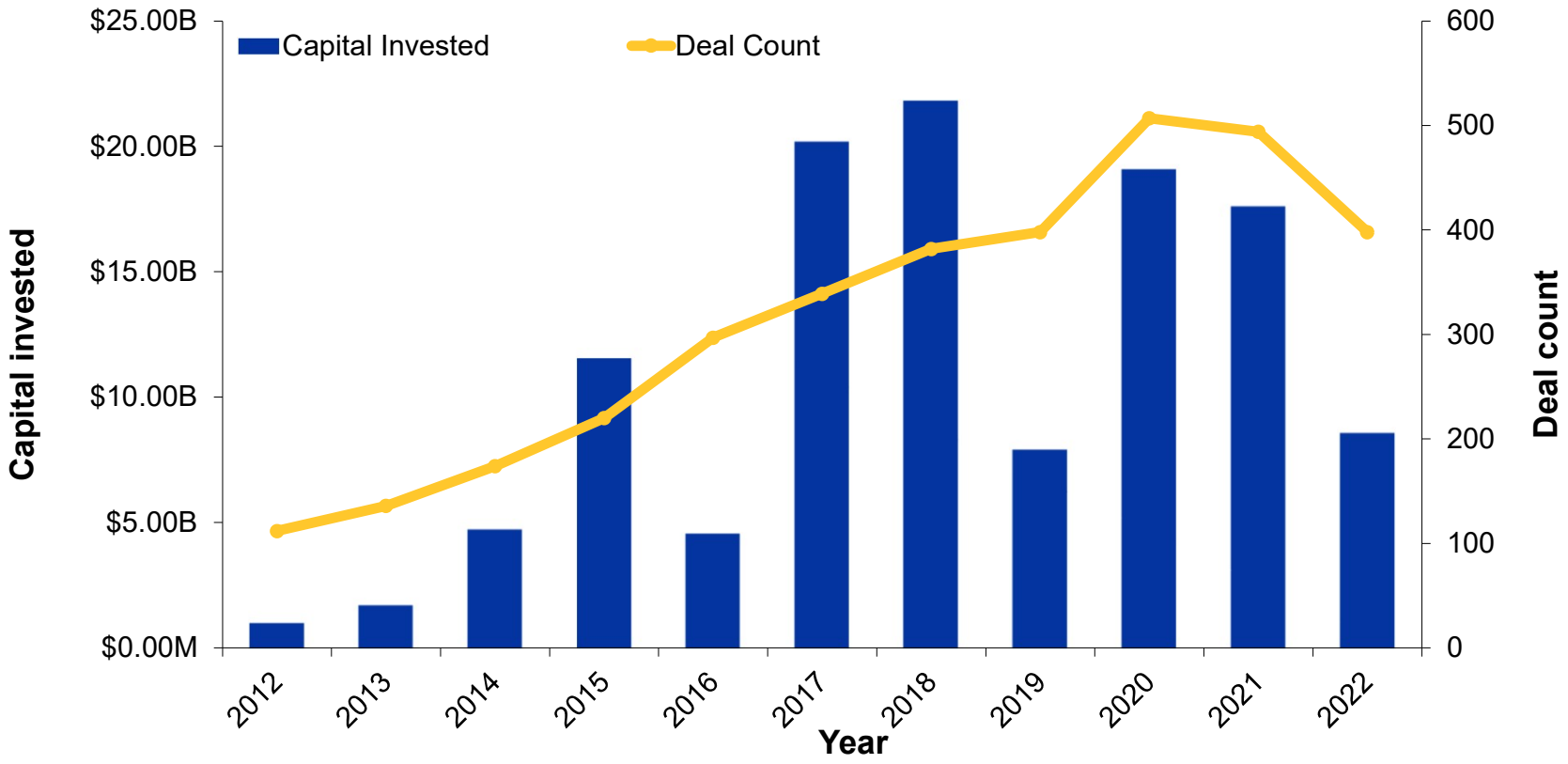
Capital investment in immuno-oncology field



Source: Pitchbook Data, Inc.

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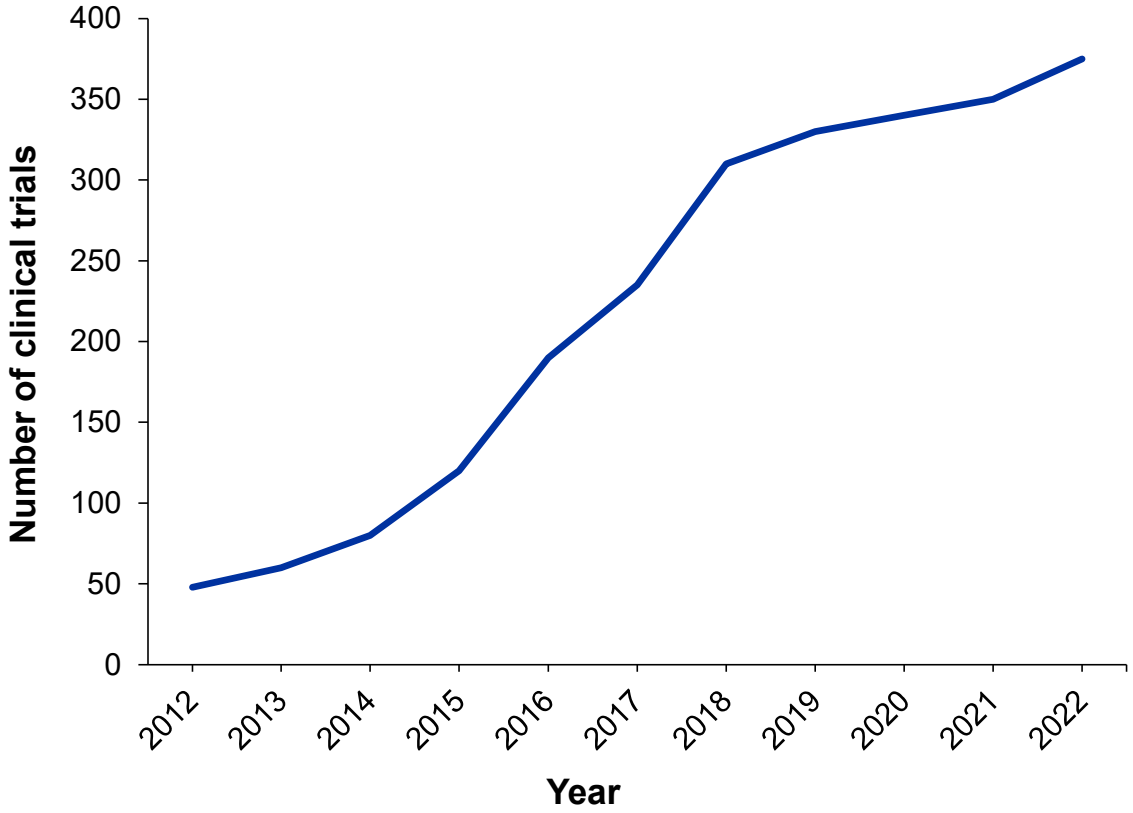
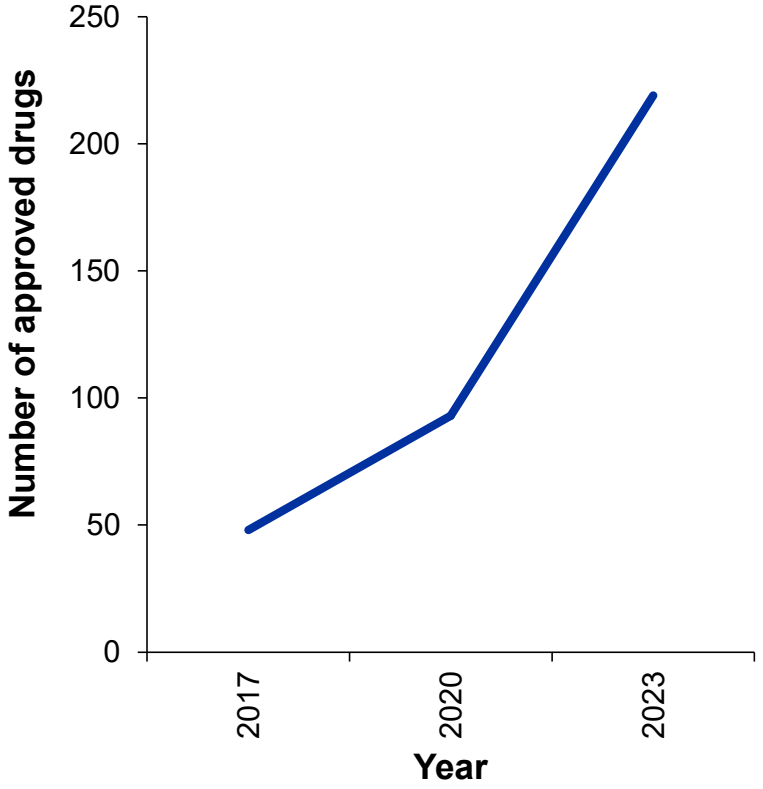
Cancer immunotherapy clinical trials trend



Source: NIH ClinicalTrial.gov



Source: Cancer research institute, Pharmaprojects

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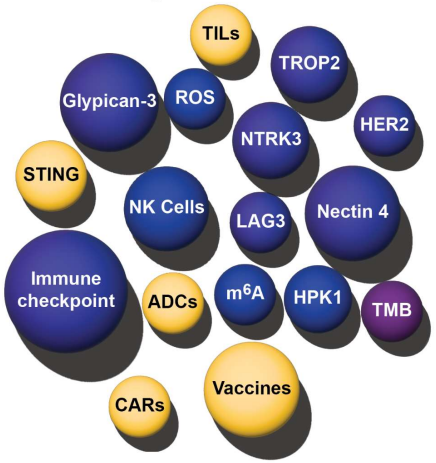
How did we identify the connections?

Expert scientists combined with a wide range of ML tools to optimize connections

CAS Content Collection™ ⟶ **Curated, modeled data**

Deep dive into the Immuno-oncology space → **Data Extraction** → **NLP and Human expertise integration** → **Journals, patents, emerging concepts**

Mining of CAS Database



DATA EXTRACTION

Title

Abstract

Year of Publication

Type of Document

Citations

Natural Language Processing and Curation by SMEs

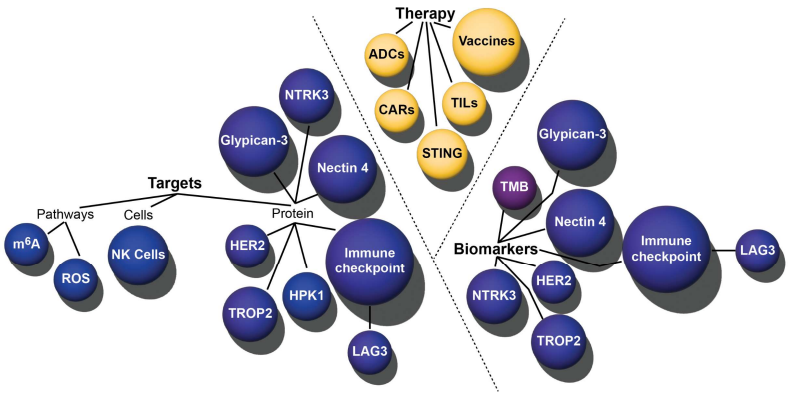
Pick up phrases that are 1-6 words in length

Generate publication and citation rates, as well as relative growth

~8,000 results

Manual processing by SMEs

Grouping of similar concepts and hierarchical classification



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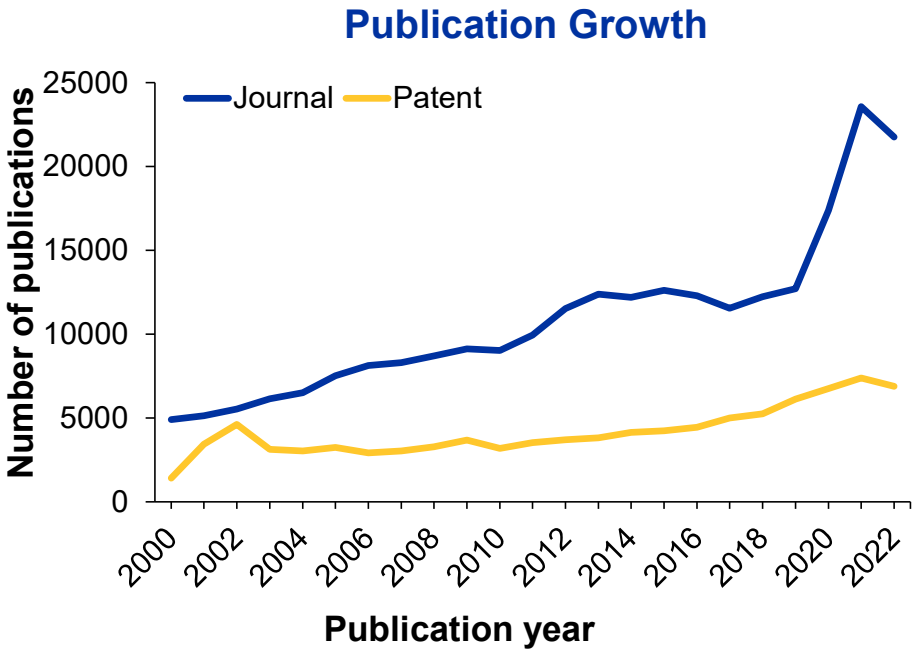
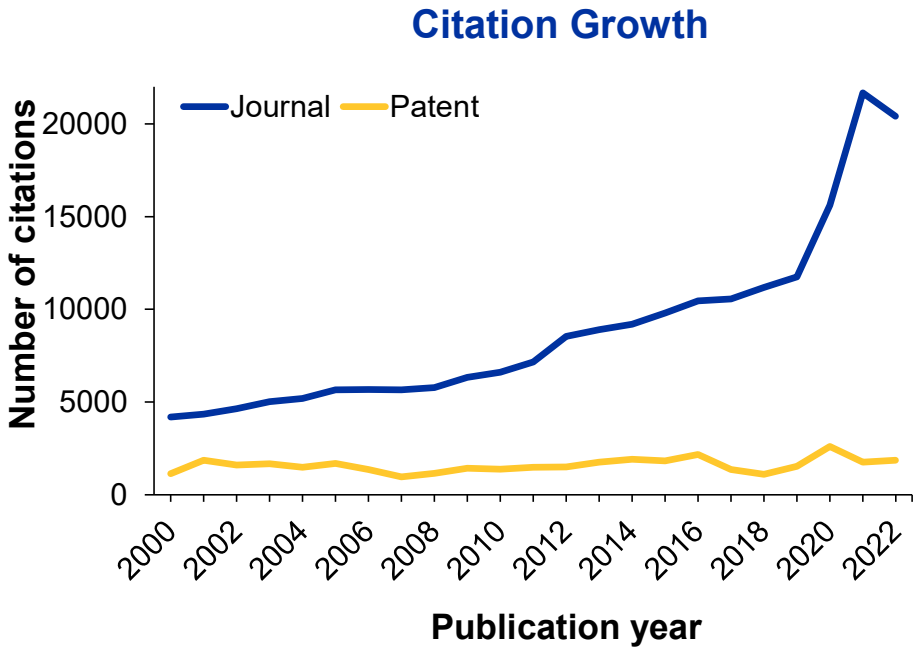
The rapidly evolving field of cancer immunotherapy

Overall publication and citation trends





Source: CAS Content Collection

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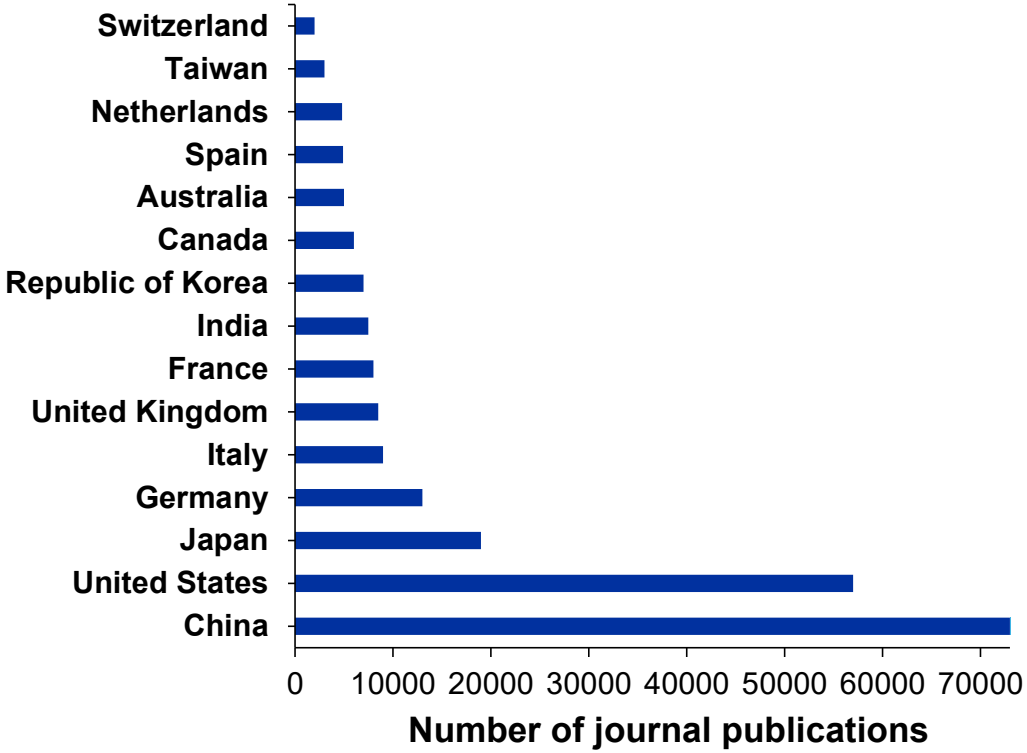
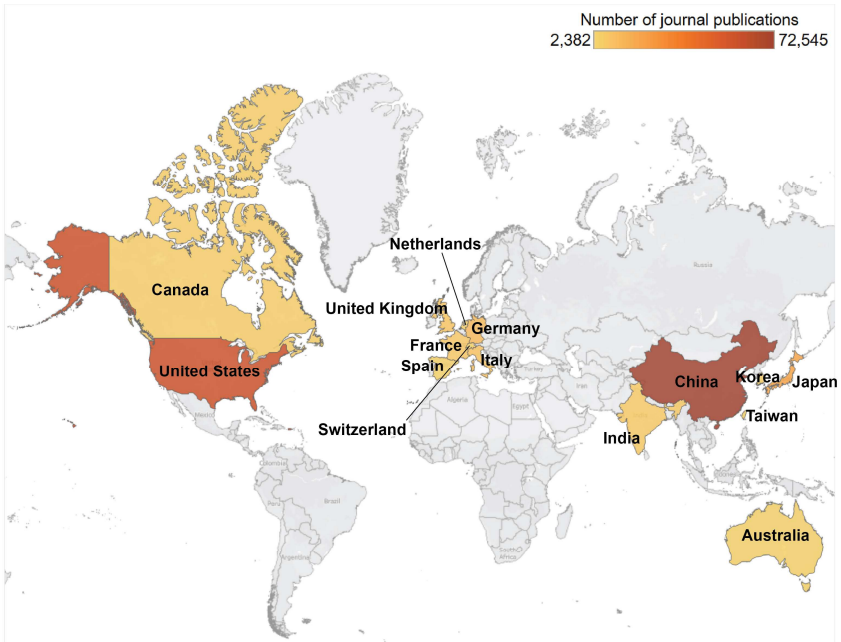
Journal publication trends by country/ region





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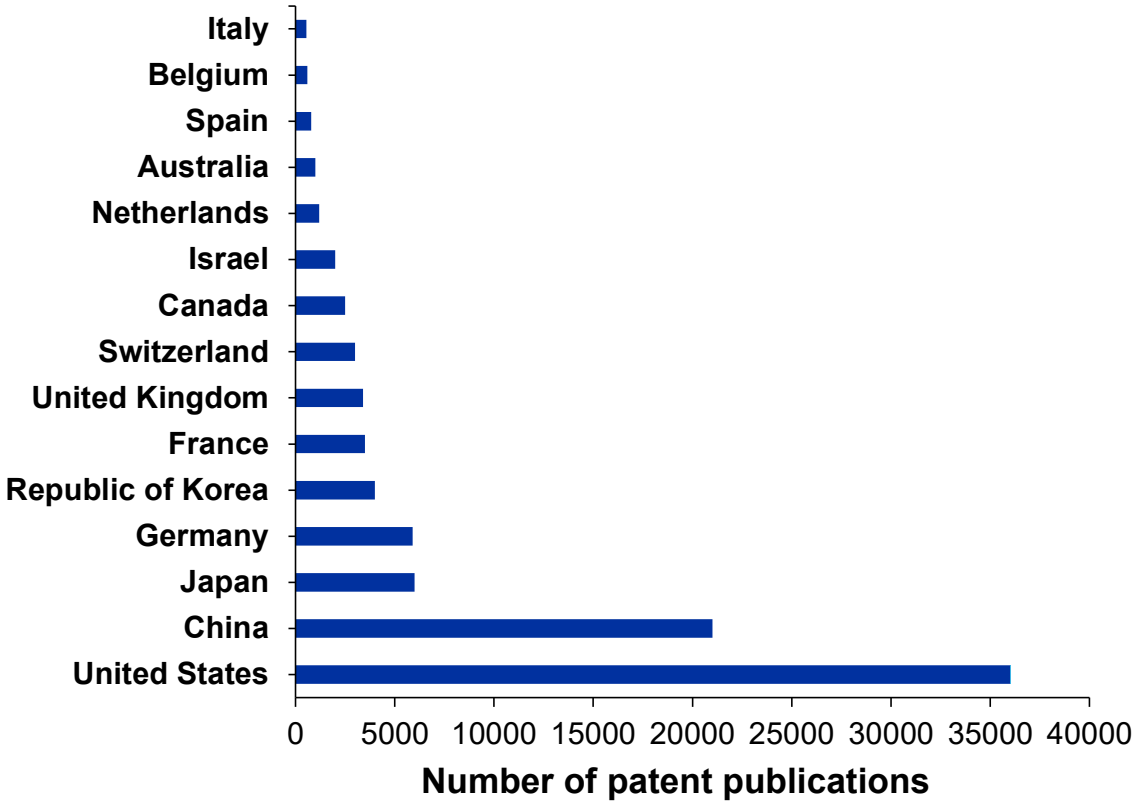
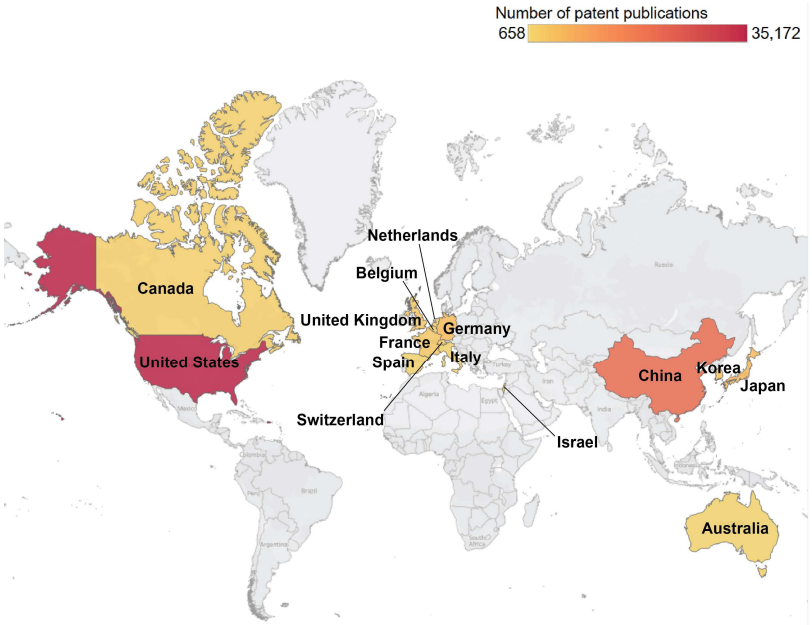
Patent publication trends by country/ region





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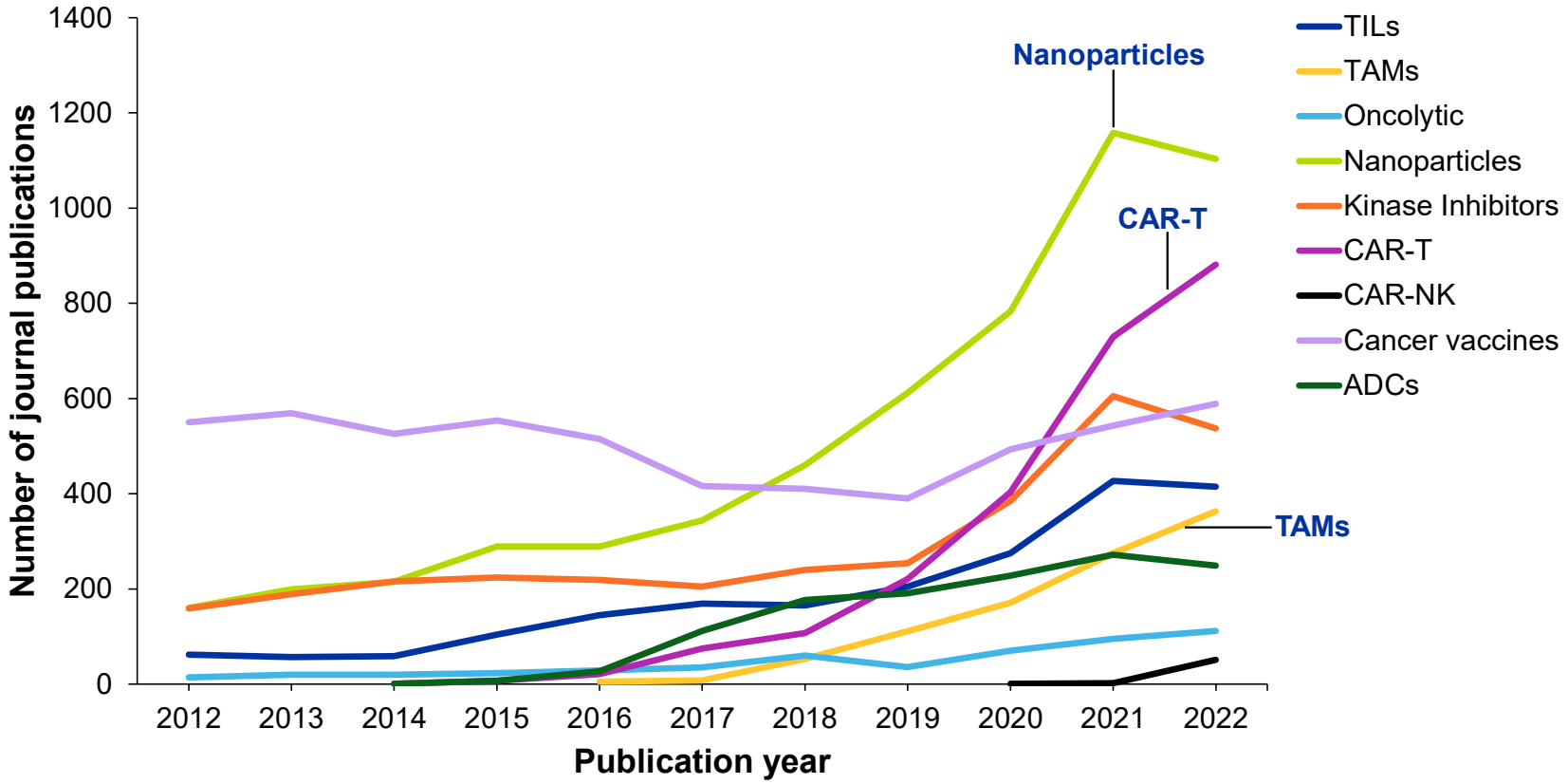
Emerging concepts growth in journal publication



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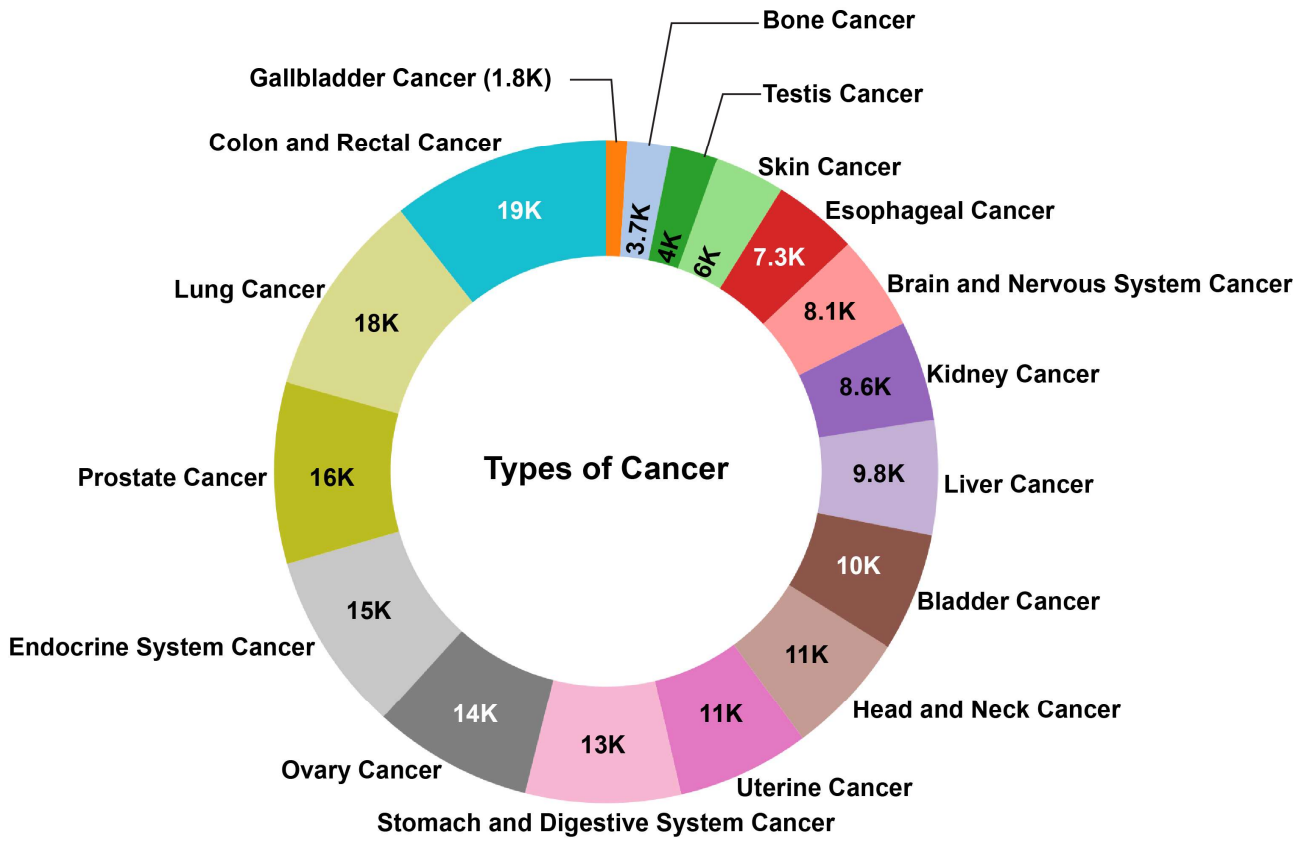
CAS Patent Trend Landscape

Cancer types



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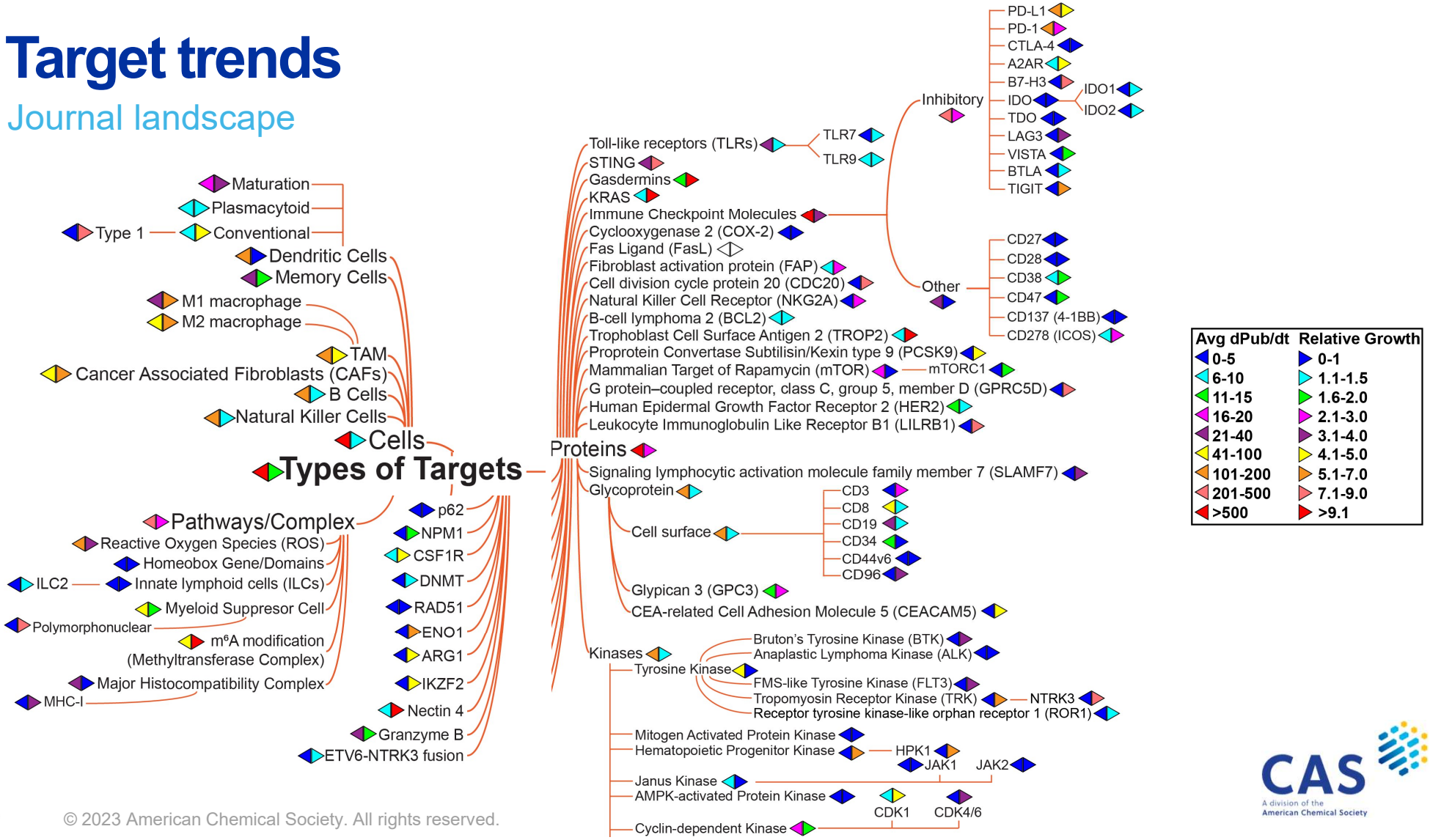
Target trends

Journal landscape



Avg dPub/dt	Relative Growth
0-5	0-1
6-10	1.1-1.5
11-15	1.6-2.0
16-20	2.1-3.0
21-40	3.1-4.0
41-100	4.1-5.0
101-200	5.1-7.0
201-500	7.1-9.0
>500	>9.1

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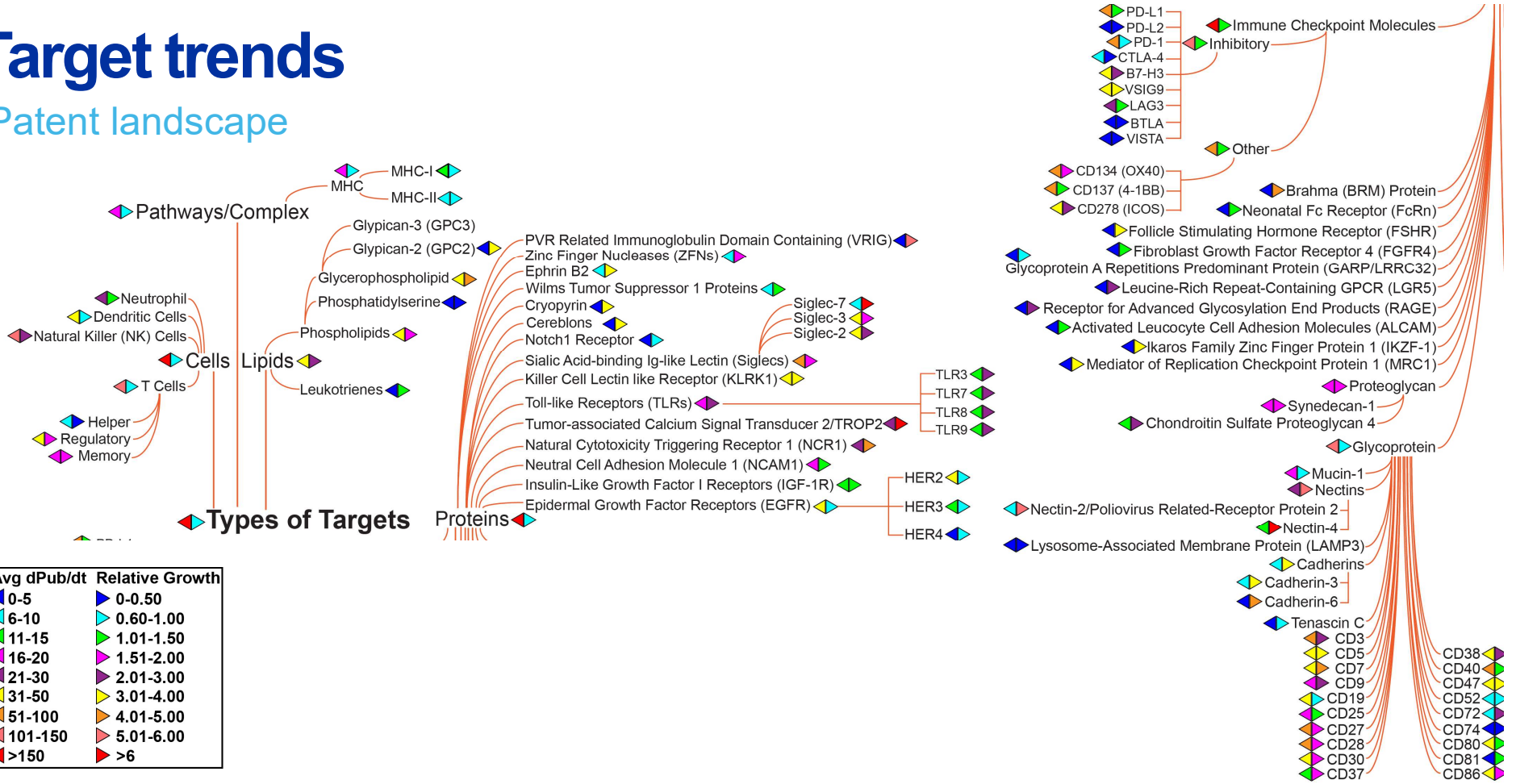
Target trends

Patent landscape



Avg dPub/dt	Relative Growth
0-5	0-0.50
6-10	0.60-1.00
11-15	1.01-1.50
16-20	1.51-2.00
21-30	2.01-3.00
31-50	3.01-4.00
51-100	4.01-5.00
101-150	5.01-6.00
>150	>6

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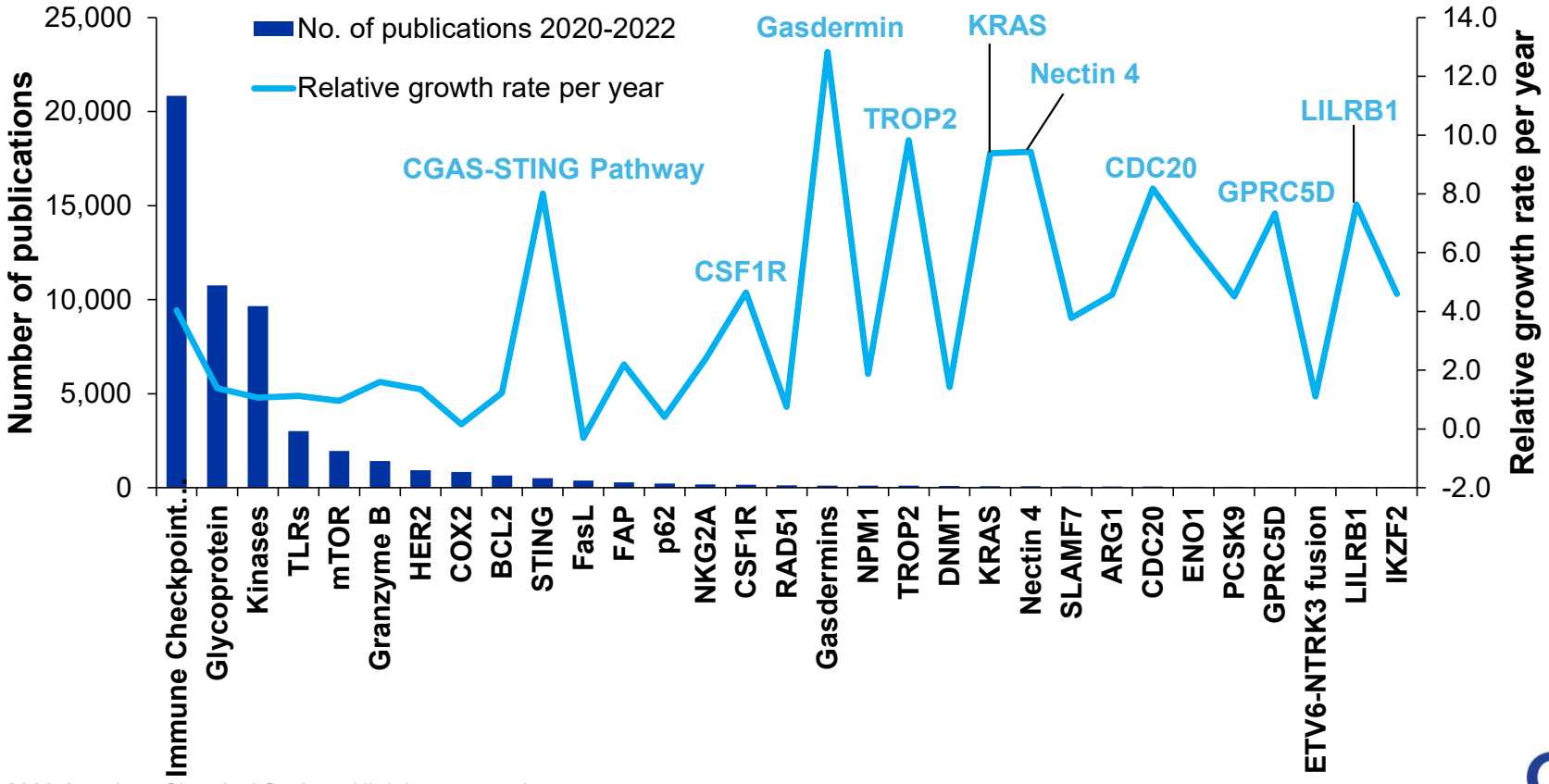
Target proteins

Fast growing while still in early phase



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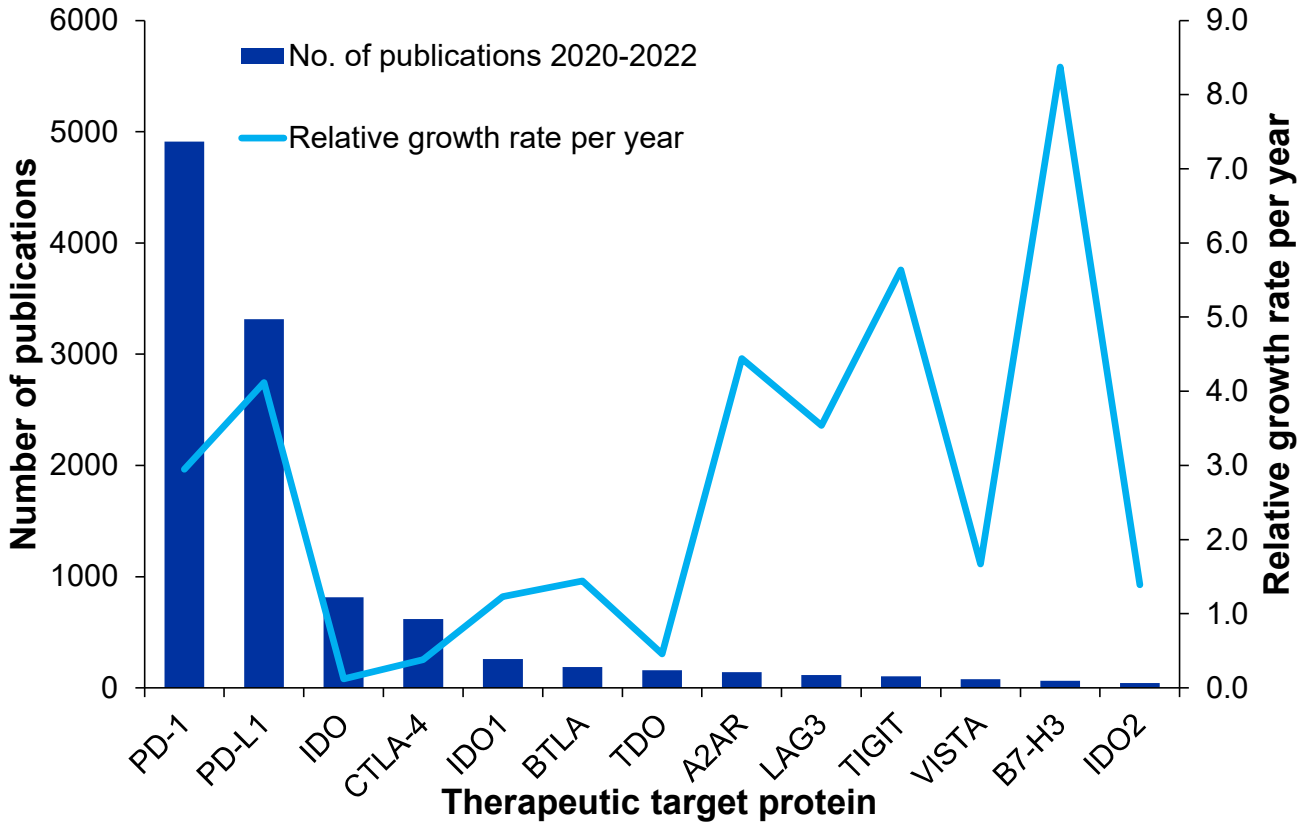
Inhibitory immune checkpoint molecules

Overall publications trends (Title/Abstract)



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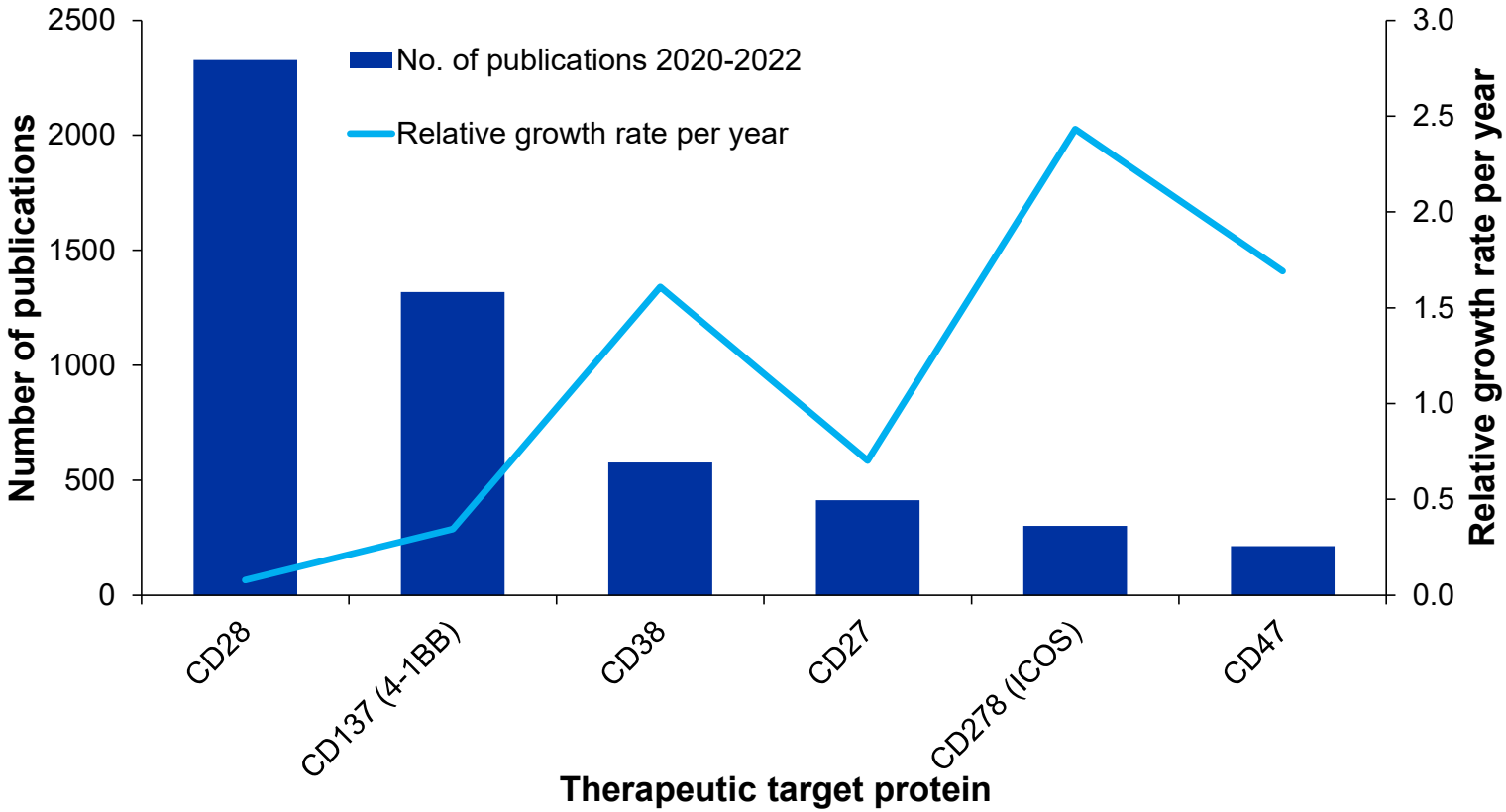
Stimulatory immune checkpoint molecules

Overall publications trends (Title/Abstract)



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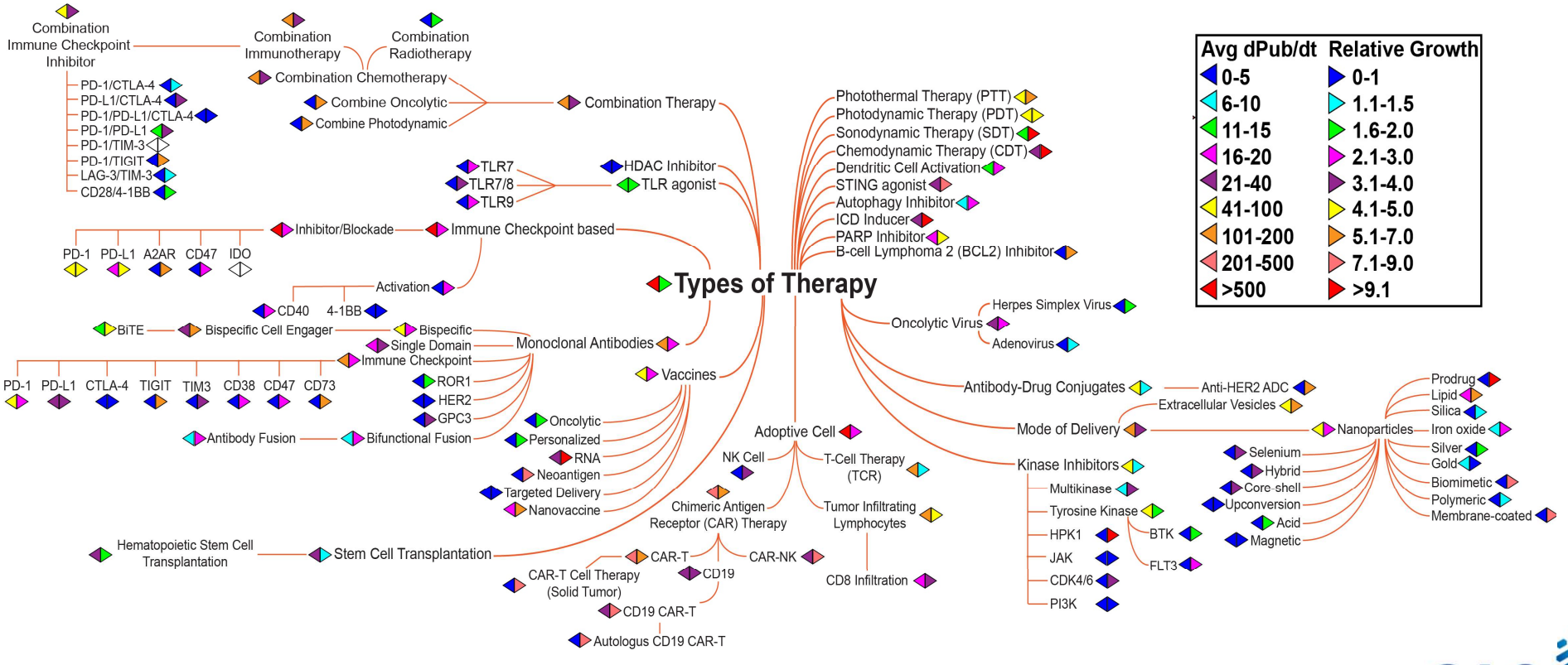
CAS emerging therapy trends

Journal landscape



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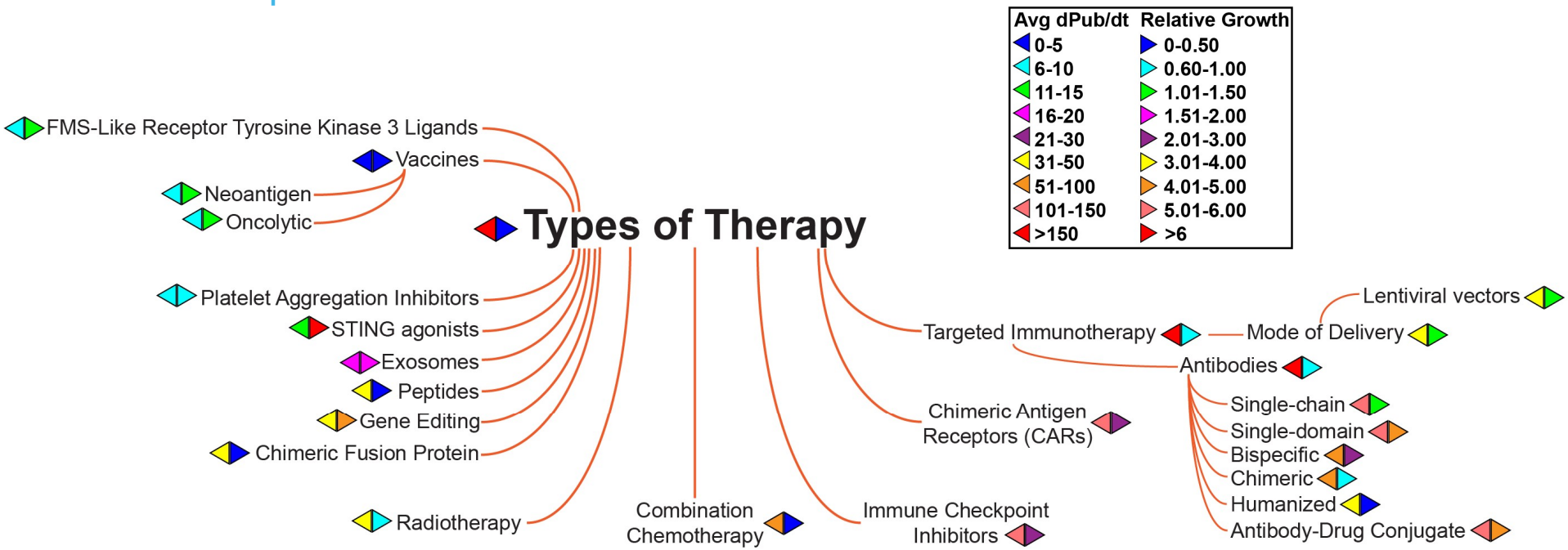
CAS emerging therapy trends

Patent landscape



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CAS TREND LANDSCAPE

Explore emerging trends in immuno-oncology

Where is the field of immuno-oncology headed? We've revealed the fastest growing areas of research among patents and journal publications so you can identify emerging opportunities sooner.

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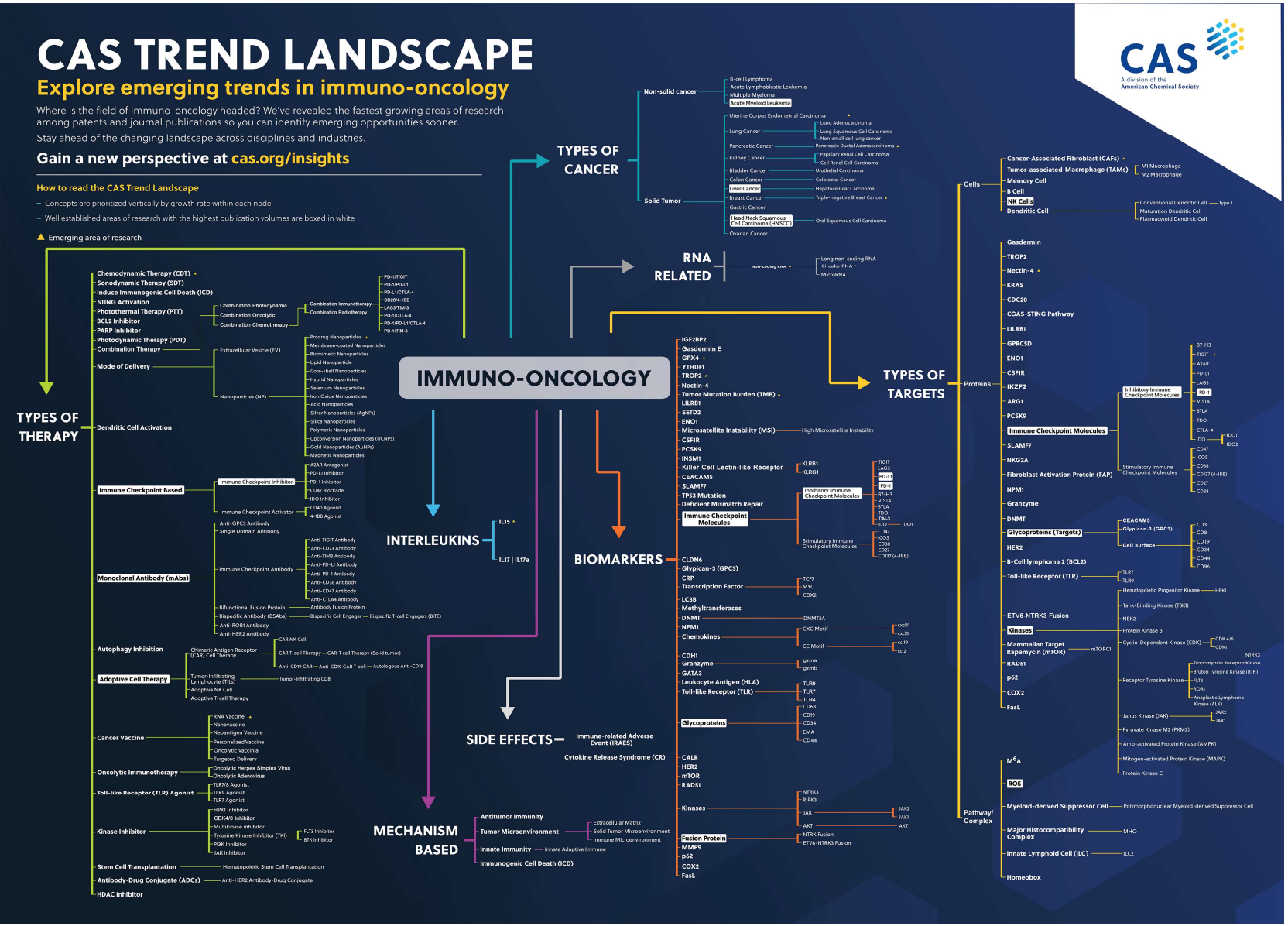
How to read the CAS Trend Landscape

- Concepts are prioritized vertically by growth rate within each node
- Well established areas of research with the highest publication volumes are boxed in white

▲ Emerging area of research



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Acknowledgement

CAS colleagues and teammates

- Kavita Iyer
- Yacid Rodriguez
- Julian Ivanov
- Krittika Ralhan
- Qiongqiong Angela Zhou

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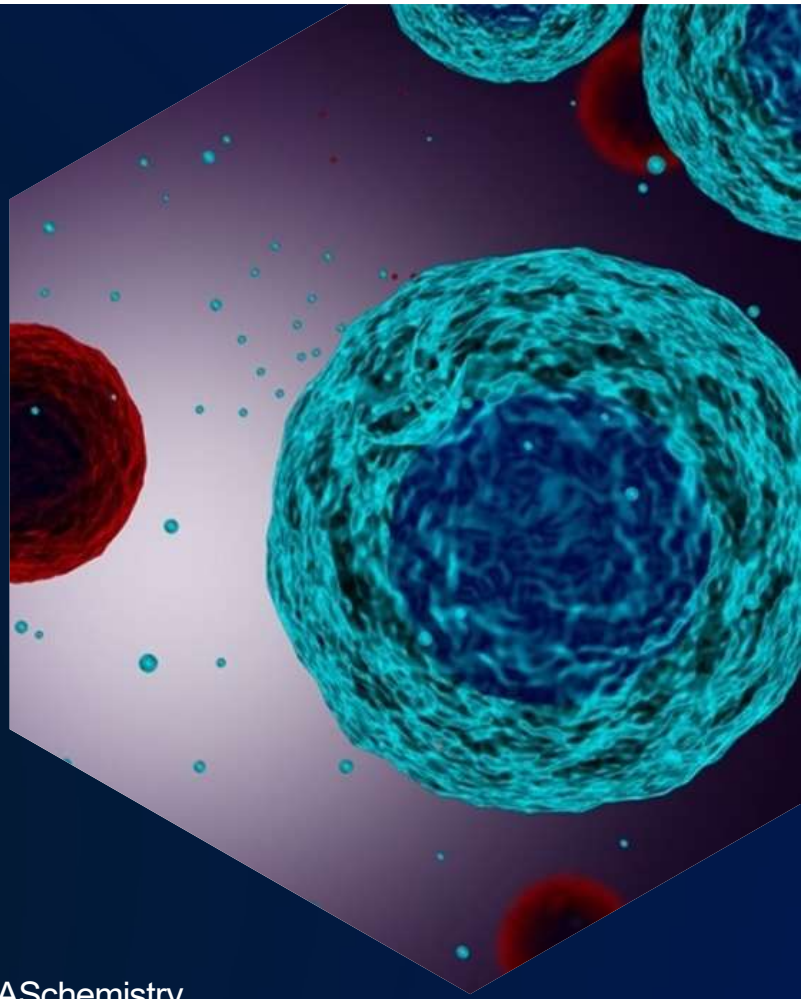
Gain insights on emerging therapies and more

Sabina Scott
LS Capability Owner
sscott2@cas.org



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