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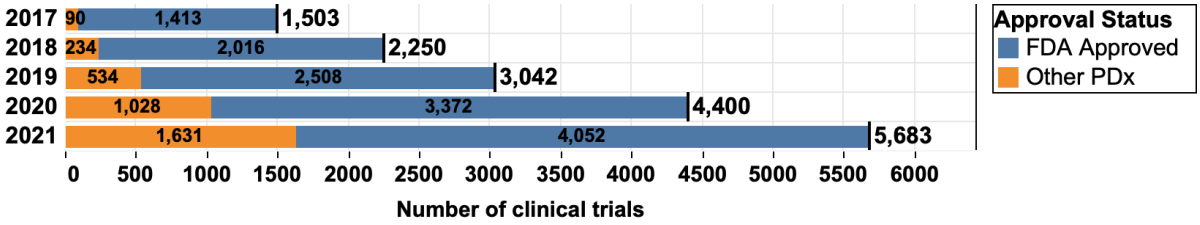
Supplementary information

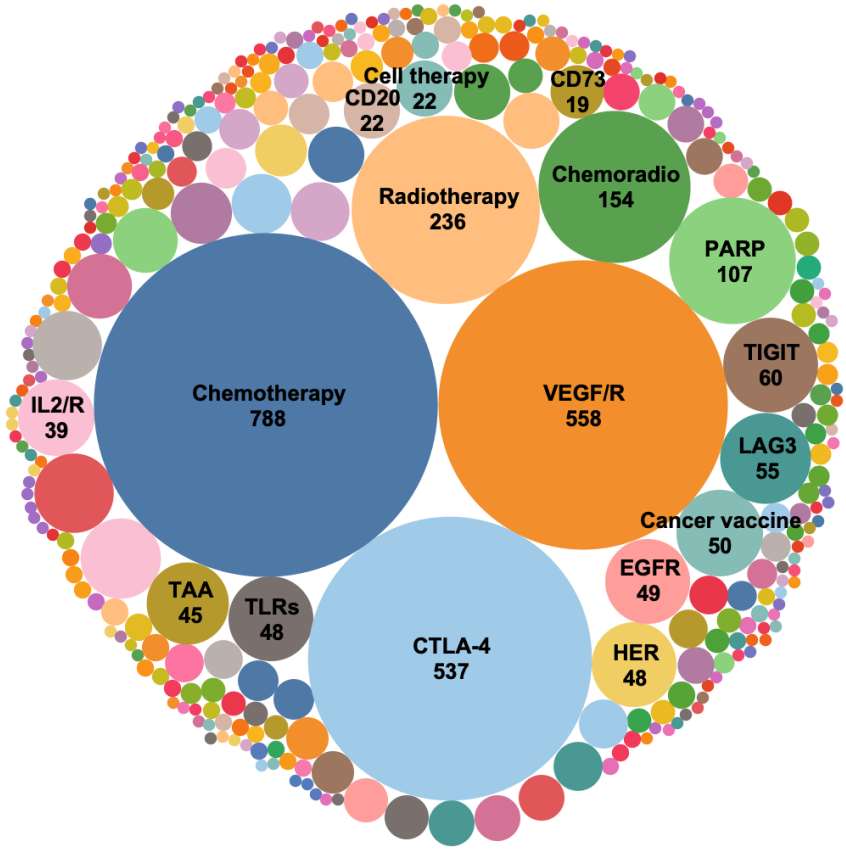
Challenges and opportunities in the PD1/PDL1 inhibitor clinical trial landscape

In the format provided by the authors

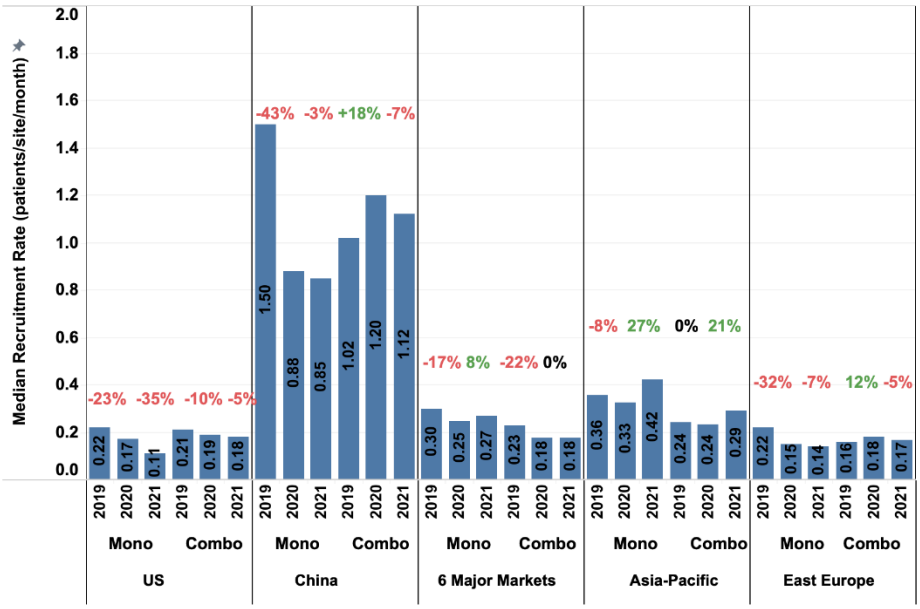
Supplemental Figures



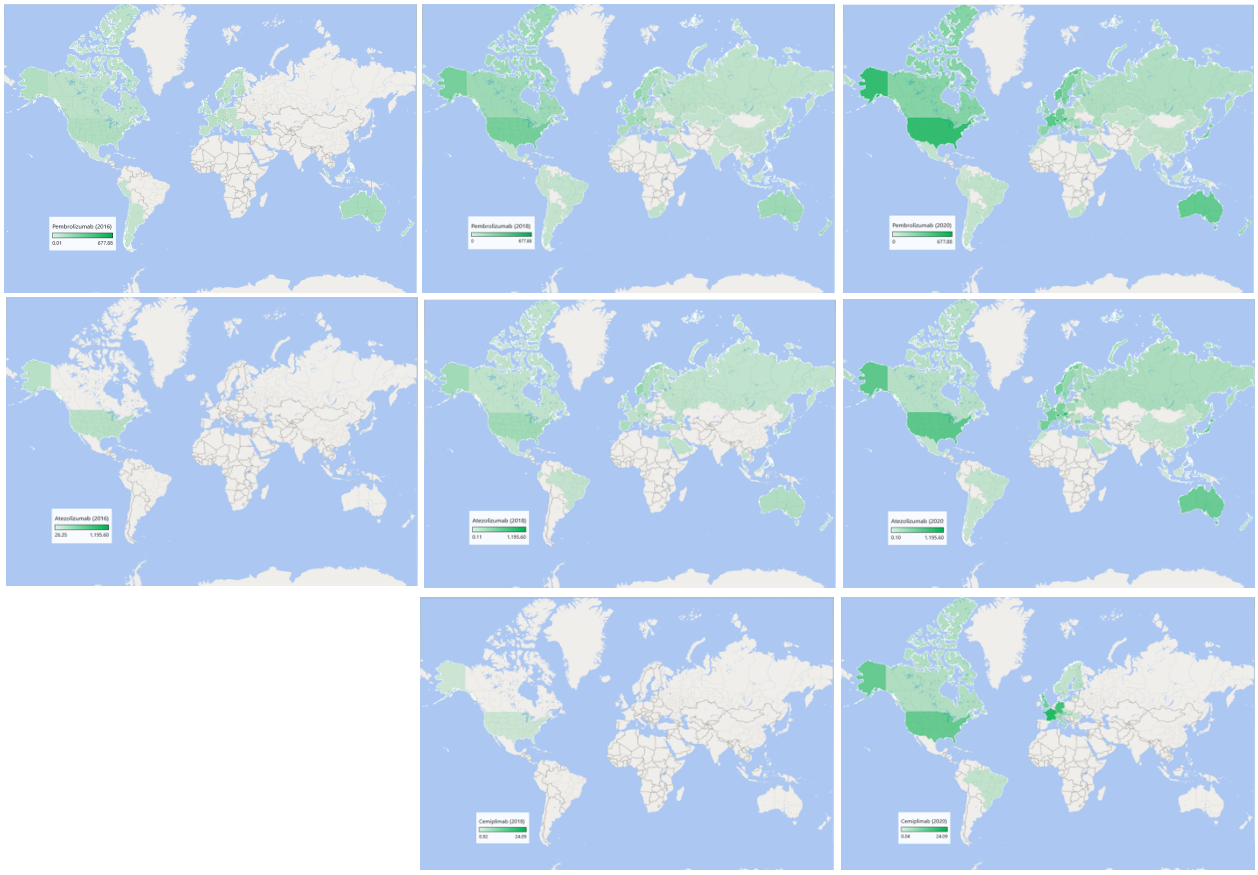
Supplementary Figure 1. The growth of landscape of anti-PD1/PDL1 monoclonal antibodies (mAbs) clinical trials from 2017 to 2021. FDA-approved mAbs include pembrolizumab, nivolumab, durvalumab, atezolizumab, avelumab, cemiplimab, and dostarlimab. Other PDx include mAbs approved by regulatory agencies other than the FDA, such as the EMA, as well as those in clinical development and not yet approved.



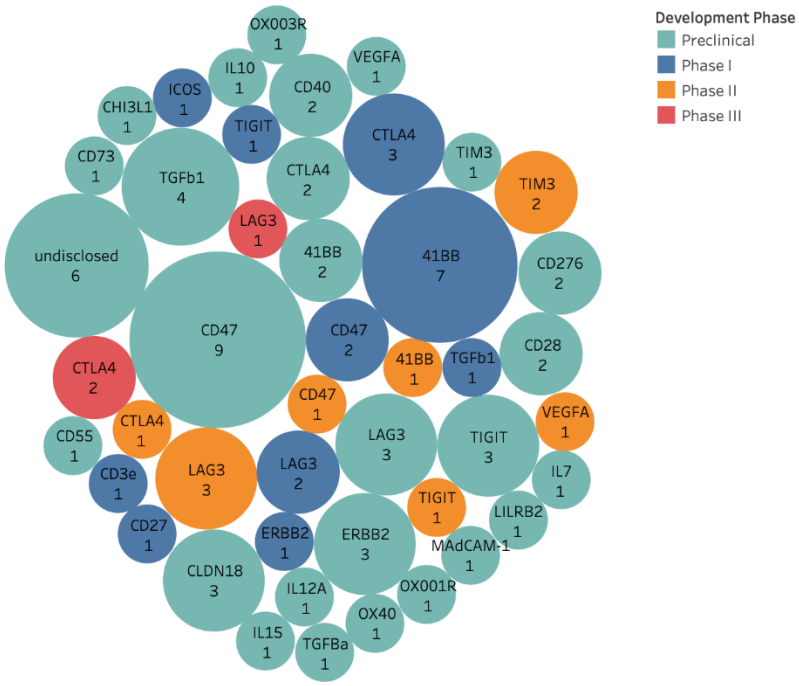
Supplementary Figure 2. Target landscape of combination trials in 2021. Similar targets are grouped together to better identify trends in year-to-year analyses.



Supplementary Figure 3. The median patient recruitment rate (RR) in different countries or regions in 2019 and 2020 compared to 2021 and the percent change between consecutive years. Data from three consecutive years are included to provide a comparative analysis of potential effects of COVID-19 pandemic on patient RR (A detailed analyses on the impact of COVID-19 on oncology clinical trials can be found in our previous publication https://www.nature.com/articles/d41573-021-00086-8). Six major markets are France, Germany, Italy, Japan, Spain and United Kingdom. The Asia-Pacific (APAC) area includes Australia, Hong Kong, Korea, New Zealand, Taiwan, and Thailand, while excluding China and Japan. Mono and Combo denote monotherapy and combination therapy trials respectively.



Supplementary Figure 4. Heatmaps showing change (increase) in the use of three generations of anti-PD1/PDL1 mAbs pembrolizumab (top), atezolizumab (middle), and cemiplimab (bottom) in grams of active substance on country level over time (2016, 2018, and 2020). Data is normalized in grams per million country population to represent the relative use per capita. The color scales have been synchronized across the heatmaps on drug level so that the same shade of green is associated with the same quantity active substance. The time period of 2 years was decided to give best ratio between number of heatmaps and visible difference (growth) of the utilization.



Supplementary Figure 5. Landscape of PD-1/PDL1 bispecific antibodies. Shown are targets and number of clinical programs with colors representing different development stages. (56 preclinical, 27 targets; 20 phase I, 10 targets; 10 phase II, 7 targets; 3 phase III, 2 targets)

Supplementary Methods

Dataset and analysis

The clinical trial information was collected in December 2021 from clinicaltrials.gov. The classification of combination trial type and the identification of combination targets was based on CRI IO Analytics. The actual clinical trial recruitment information was collected from IQVIA internal database that tracks the real-time status of clinical trials managed by IQVIA. This patient recruitment analysis included information from 960 unique clinical trial sites from 147 clinical trials for the period 2015 – 2021 YTD. These data only reflect a small fraction of the 5,500 anti-PD1/L1 clinical trials, and the results are therefore limited in reflecting the real actual patient recruitment rate of all ongoing PD1/PDL1 trials.