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## Supplementary information

# Population diversity in immuno-oncology trials

In the format provided by the authors

**Supplementary Table 1 | List of 92 IO drugs and combinations approved**

| Approval Date (press release /media link) | Type of approval | Pivotal trial NTC ID | Drug name(s) | Approval Indication |
|---|---|---|---|---|
| Apr-10 | regular | NCT00065442 | Sipuleucel-T | Prostate Cancer |
| Mar-11 | regular | NCT00324155 | Ipilimumab | Melanoma |
| Apr-11 | regular | NCT00006249 | Peginterferon alfa-2b | Melanoma |
| Sep-14 | accelerated | NCT01295827 (melanoma cohorts) | Pembrolizumab | Melanoma |
| Dec-14 | accelerated | NCT01721746 | Nivolumab | Melanoma |
| Mar-15 | regular | NCT01642004<br>NCT01721759 | Nivolumab | Non Small Cell Lung Cancer |
| Oct-15 | regular | NCT00636168 | Ipilimumab | Melanoma |
| Oct-15 | regular | NCT00769704 | Talimogene laherparepvec | Melanoma |
| Oct-15 | accelerated | NCT01927419 | Ipilimumab + Nivolumab | Melanoma |
| Oct-15 | accelerated | NCT01295827 (NSCLC cohorts) | Pembrolizumab | Non Small Cell Lung Cancer |
| Oct-15 | regular | NCT01673867 | Nivolumab | Non Small Cell Lung Cancer |
| Nov-15 | accelerated | NCT01668784 | Nivolumab | Renal Cell Carcinoma |
| Dec-15 | regular | NCT01866319<br>NCT01704287 | Pembrolizumab | Melanoma |
| Jan-16 | accelerated | NCT01844505 | Ipilimumab + Nivolumab | Melanoma |
| May-16 | accelerated | NCT02181738<br>NCT01592370 | Nivolumab | Hodgkin's Lymphoma |
| May-16 | regular | NCT02108652 | atezolizumab | Bladder Cancer |
| Aug-16 | accelerated | NCT01848834 (HNSCC cohort only) | Pembrolizumab | Head and neck squamous cell carcinoma |
| Oct-16 | regular | NCT02008227<br>NCT01903993 | Atezolizumab | Non Small Cell Lung Cancer |
| Oct-16 | regular | NCT02142738 | Pembrolizumab | Non Small Cell Lung Cancer |
| Nov-16 | regular | NCT02105636 | Nivolumab | Head and neck squamous cell carcinoma |
| Feb-17 | accelerated | NCT02387996 | Nivolumab | Bladder Cancer |
| Mar-17 | accelerated | NCT02453594 | Pembrolizumab | Hodgkin's Lymphoma |
| Mar-17 | accelerated | NCT02155647 | avelumab | Merkel cell carcinoma |
| Apr-17 | accelerated | NCT02951767 | atezolizumab | Bladder Cancer |
| May-17 | accelerated | NCT01693562 | Durvalumab | Bladder Cancer |
| May-17 | accelerated | NCT01772004 | Avelumab | Bladder Cancer |

| | | | | |
|---|---|---|---|---|
| May-17 | accelerated | NCT02039674 | Pembrolizumab + chemotherapy | Non Small Cell Lung Cancer |
| May-17 | regular | NCT02256436 | Pembrolizumab | Bladder Cancer |
| May-17 | accelerated | NCT02335424 | Pembrolizumab | Bladder Cancer |
| May-17 | accelerated | NCT02628067 | Pembrolizumab | MSI-H or dMMR cancer (solid tumors) |
| | | NCT02460198 | | MSI-H or dMMR cancer (colorectal cancer) |
| | | NCT02054806 | | MSI-H or dMMR cancer (mesothelioma) |
| | | NCT01848834 (multiple cohorts) | | MSI-H or dMMR cancer (Solid tumors) |
| | | NCT01876511 | | MSI-H or dMMR cancer (colorectal cancer and others) |
| Jul-17 | regular | NCT02013167 | Blinatumomab | Leukemia |
| Jul-17 | regular | NCT01696045 | Ipilimumab | Melanoma |
| | | NCT01445379 | | |
| Aug-17 | regular | NCT02435849 | Tisagenlecleucel | Leukemia |
| Sep-17 | accelerated | NCT02335411 | Pembrolizumab | Gastric cancer |
| Oct-17 | regular | NCT02348216 | axicabtagene ciloleucel | Non-Hodgkin's Lymphoma |
| Dec-17 | regular | NCT02388906 | Nivolumab | Melanoma |
| Feb-18 | regular | NCT02125461 | Durvalumab | Non Small Cell Lung Cancer |
| Mar-18 | accelerated | NCT01207388 | Blinatumomab | Leukemia |
| Apr-18 | regular | NCT02231749 | Ipilimumab + Nivolumab | Renal Cell Carcinoma |
| May-18 | regular | NCT02445248 | Tisagenlecleucel | Non-Hodgkin's Lymphoma |
| Jun-18 | accelerated | NCT02576990 | Pembrolizumab | Non-Hodgkin's Lymphoma |
| Jul-18 | accelerated | NCT02060188 | Ipilimumab + Nivolumab | Colorectal Cancer |
| Aug-18 | regular | NCT01728805 | Mogamulizumab | Non-Hodgkin's Lymphoma |
| Aug-18 | accelerated | NCT01928394 | Nivolumab | Small Cell Lung Cancer |
| Aug-18 | regular | NCT02578680 | Pembrolizumab + chemo | Non Small Cell Lung Cancer |
| Sep-18 | regular | NCT02760498 | Cemiplimab | Cutaneous squamous-cell carcinoma |
| Oct-18 | regular | NCT02775435 | Pembrolizumab + chemo | Non Small Cell Lung Cancer |
| Nov-18 | accelerated | NCT02702414 | Pembrolizumab | Hepatocellular carcinoma |
| Dec-18 | regular | NCT02366143 | Atezolizumab + chemo + bevacizumab | Non Small Cell Lung Cancer |
| Dec-18 | accelerated | NCT02267603 | Pembrolizumab | Merkel cell carcinoma |
| Feb-19 | regular | NCT02362594 | Pembrolizumab | Melanoma |
| Mar-19 | accelerated | NCT02425891 | Atezolizumab + chemo | Breast cancer |
| Mar-19 | regular | NCT02763579 | Atezolizumab + chemo | Small Cell Lung Cancer |
| Apr-19 | regular | NCT02220894 | Pembrolizumab | Non Small Cell Lung Cancer |
| Apr-19 | regular | NCT02853331 | Pembrolizumab + axitinib | Renal Cell Carcinoma |
| May-19 | regular | NCT02684006 | Avelumab + axitinib | Renal Cell Carcinoma |

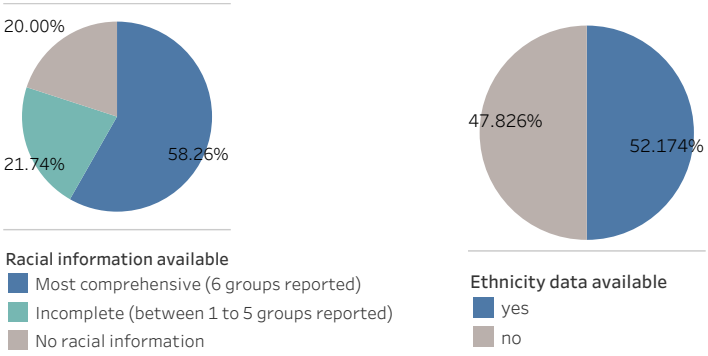
| | | | | |
|---|---|---|---|---|
| Jun-19 | regular | NCT02358031 | Pembrolizumab + chemo | Head and neck squamous cell carcinoma |
| Jul-19 | regular | NCT02564263<br>NCT02559687 | Pembrolizumab | Esophagus cancer |
| Aug-19 | regular | NCT02371369 | pexidartinib hydrochloride | Rare tumor |
| Dec-19 | regular | NCT02367781 | Atezolizumab + chemo | Non Small Cell Lung Cancer |
| Jan-20 | regular | NCT02625961 | Pembrolizumab | Bladder Cancer |
| Mar-20 | accelerated | NCT01658878 | Ipilimumab + Nivolumab | Hepatocellular carcinoma |
| Mar-20 | regular | NCT03043872 | Durvalumab + chemo | Small Cell Lung Cancer |
| May-20 | regular | NCT02477826 | Ipilimumab + Nivolumab | Non Small Cell Lung Cancer |
| May-20 | regular | NCT02409342 | Atezolizumab | Non Small Cell Lung Cancer |
| May-20 | regular | NCT03215706 | Ipilimumab + Nivolumab + chemo | Non Small Cell Lung Cancer |
| May-20 | regular | NCT03434379 | Atezolizumab + bevacizumab | Hepatocellular carcinoma |
| Jun-20 | regular | NCT02569242 | Nivolumab | Esophagus cancer |
| Jun-20 | regular | NCT03284424 | Pembrolizumab | Cutaneous squamous-cell carcinoma |
| Jun-20 | regular | NCT02563002 | Pembrolizumab | Colorectal cancer |
| Jun-20 | regular | NCT02603432 | Avelumab | Bladder Cancer |
| Jul-20 | accelerated | NCT02601313 | brexucabtagene autoleucel | Non-Hodgkin's Lymphoma |
| Jul-20 | regular | NCT02908672 | Atezolizumab + cobimetinib + vemurafenib | Melanoma |
| Oct-20 | regular | NCT02899299 | Ipilimumab + Nivolumab | Mesothelioma |
| Oct-20 | regular | NCT02684292 | Pembrolizumab | Hodgkin's Lymphoma |
| Jan-21 | regular | NCT03141177 | Nivolumab + chemo | Renal Cell Carcinoma |
| Feb-21 | regular | NCT02631044 | Lisocabtagene maraleucel | Non-Hodgkin's Lymphoma |
| Feb-21 | regular | NCT03132636 | Cemiplimab | Basal Cell Carcinoma |
| Feb-21 | regular | NCT03088540 | Cemiplimab | Non Small Cell Lung Cancer |
| Mar-21 | accelerated | NCT03105336 | axicabtagene ciloleucel | Non-Hodgkin's Lymphoma |
| Mar-21 | regular | NCT03189719 | Pembrolizumab + chemo | Gastric cancer |
| Mar-21 | regular | NCT03361748 | idecabtagene vicleucel | Multiple Myeloma |
| Apr-21 | regular | NCT02872116 | Nivolumab + chemo | Gastric cancer |
| Apr-21 | accelerated | NCT02715284 | Dostarlimab | Endometrial Carcinoma |
| May-21 | accelerated | NCT03615326 | Pembrolizumab + trastuzumab + chemo | Gastric cancer |
| May-21 | regular | NCT02743494 | Nivolumab + chemo | Esophagus cancer |
| Jul-21 | regular | NCT03517449 | Pembrolizumab + lenvatinib | Endometrial Carcinoma |
| Jul-21 | regular | NCT02819518<br>NCT03036488 | Pembrolizumab + chemo | Breast cancer |

| | | | | |
|---|---|---|---|---|
| Aug-21 | regular | NCT02811861 | Pembrolizumab + lenvatinib | Renal Cell Carcinoma |
| Aug-21 | regular | NCT02632409 | Nivolumab | Bladder Cancer |
| Aug-21 | regular | NCT02853305 | Pembrolizumab | Bladder Cancer |
| Oct-21 | regular | NCT02614066 | brexucabtagene autoleucel | Leukemia |
| Oct-21 | regular | NCT02486718 | Atezolizumab | Non Small Cell Lung Cancer |
| Nov-21 | regular | NCT03142334 | Pembrolizumab | Renal Cell Carcinoma |
| Dec-21 | regular | NCT03412565 | Daratumumab + carfilzomib + dexamethasone | Multiple Myeloma |
| Dec-21 | regular | NCT03553836 | Pembrolizumab | Melanoma |
| Feb-22 | regular | NCT03548207 | ciltacabtagene autoleucel | Multiple Myeloma |
| Mar-22 | regular | NCT02998528 | Nivolumab + chemo | Non Small Cell Lung Cancer |
| Mar-22 | regular | NCT03470922 | Nivolumab + Relatlimab double formulation | Melanoma |
| Apr-22 | regular | NCT03391466 | axicabtagene ciloleucel | Non-Hodgkin's Lymphoma |
| May-22 | regular | NCT03143153 | Nivolumab + chemo/ Nivolumab + Ipilimumab | Esophagus cancer |
| May-22 | accelerated | NCT03568461 | Tisagenlecleucel | Non-Hodgkin's Lymphoma |
| Jun-22 | regular | NCT03575351 | Lisocabtagene maraleucel | Non-Hodgkin's Lymphoma |
| | | NCT03483103 | | |

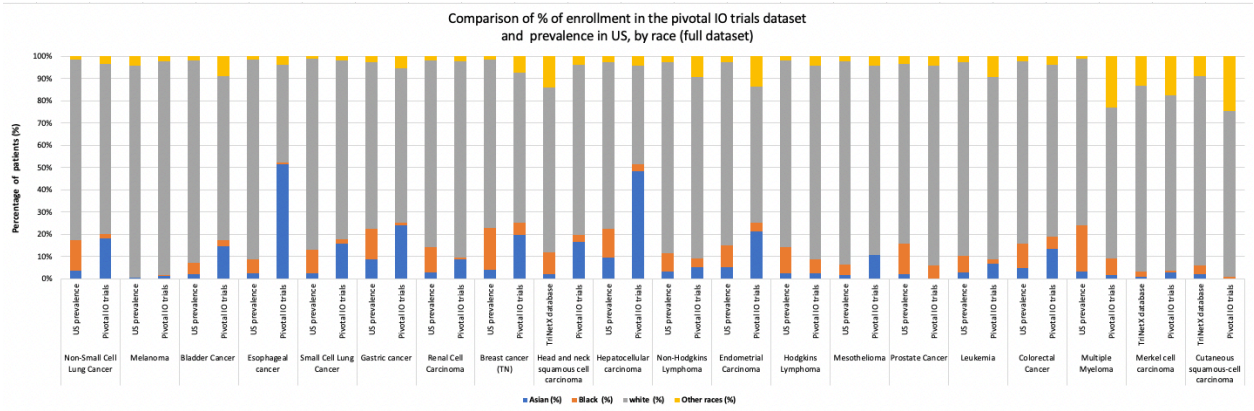
**Supplementary Table 2 | List of NCT IDs of trials included in the retrospective analysis of pivotal IO trials.**

| | | | |
|---|---|---|---|
| NCT00065442 | NCT02039674 | NCT02425891 | NCT03105336 |
| NCT00324155 | NCT02256436 | NCT02763579 | NCT03189719 |
| NCT00006249 | NCT02335424 | NCT02220894 | NCT03361748 |
| NCT01295827 | NCT02628067 | NCT02853331 | NCT02872116 |
| NCT01721746 | NCT02460198 | NCT02684006 | NCT02715284 |
| NCT01642004 | NCT02054806 | NCT02358031 | NCT03615326 |
| NCT01721759 | NCT01876511 | NCT02564263 | NCT02743494 |
| NCT00636168 | NCT02013167 | NCT02559687 | NCT03517449 |
| NCT00769704 | NCT01696045 | NCT02371369 | NCT02819518 |
| NCT01927419 | NCT01445379 | NCT02367781 | NCT03036488 |
| NCT01673867 | NCT02435849 | NCT02625961 | NCT02811861 |
| NCT01668784 | NCT02335411 | NCT01658878 | NCT02632409 |
| NCT01866319 | NCT02348216 | NCT03043872 | NCT02853305 |
| NCT01704287 | NCT02388906 | NCT02477826 | NCT02614066 |
| NCT01844505 | NCT02125461 | NCT02409342 | NCT02486718 |
| NCT02181738 | NCT01207388 | NCT03215706 | NCT03142334 |
| NCT01592370 | NCT02231749 | NCT03434379 | NCT03412565 |
| NCT02108652 | NCT02445248 | NCT02569242 | NCT03553836 |
| NCT01848834 | NCT02576990 | NCT03284424 | NCT03548207 |
| NCT02008227 | NCT02060188 | NCT02563002 | NCT02998528 |
| NCT01903993 | NCT01728805 | NCT02603432 | NCT03470922 |
| NCT02142738 | NCT01928394 | NCT02601313 | NCT03391466 |
| NCT02105636 | NCT02578680 | NCT02908672 | NCT03143153 |
| NCT02387996 | NCT02760498 | NCT02899299 | NCT03568461 |
| NCT02453594 | NCT02775435 | NCT02684292 | NCT03575351 |
| NCT02155647 | NCT02702401 | NCT03141177 | NCT03483103 |
| NCT02951767 | NCT02366143 | NCT02631044 | |
| NCT01693562 | NCT02267603 | NCT03132636 | |
| NCT01772004 | NCT02362594 | NCT03088540 | |

**Supplementary Figure 1: A fraction of clinical trials leading to FDA approvals of immuno-oncology assets fail to report racial and ethnic information on enrolled patients.**
Figure 1a: Percentage of trials reporting racial information (dataset: pivotal IO trials leading to FDA approval from 2010 to August 2022).
Figure 1b: Percentage of trials reporting ethnicity information (dataset: pivotal IO trials leading to FDA approval from 2010 to August 2022).



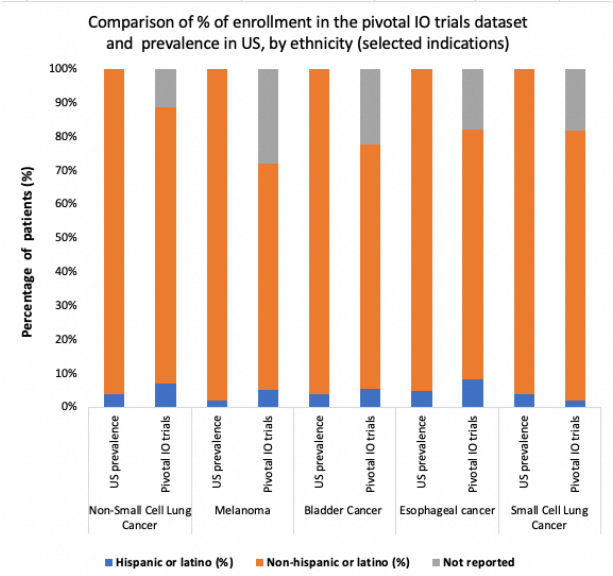

**Supplementary Figure 2**: Comparison of relative enrolment and disease prevalence, by race (full list of indications in the pivotal IO trials dataset). For those indications for which SEER prevalence data was not available, TriNetX real-world dataset was used for comparison.

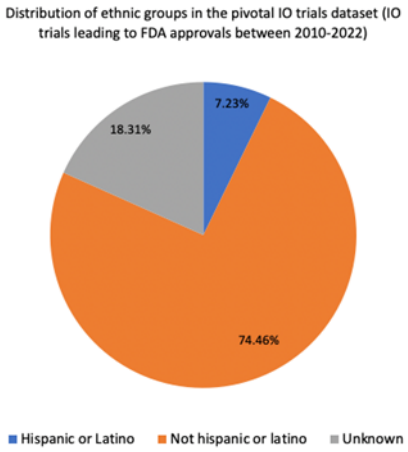


**Supplementary Figure 3: Ethnic distribution in the pivotal IO trials dataset and comparison to disease prevalence in US.**

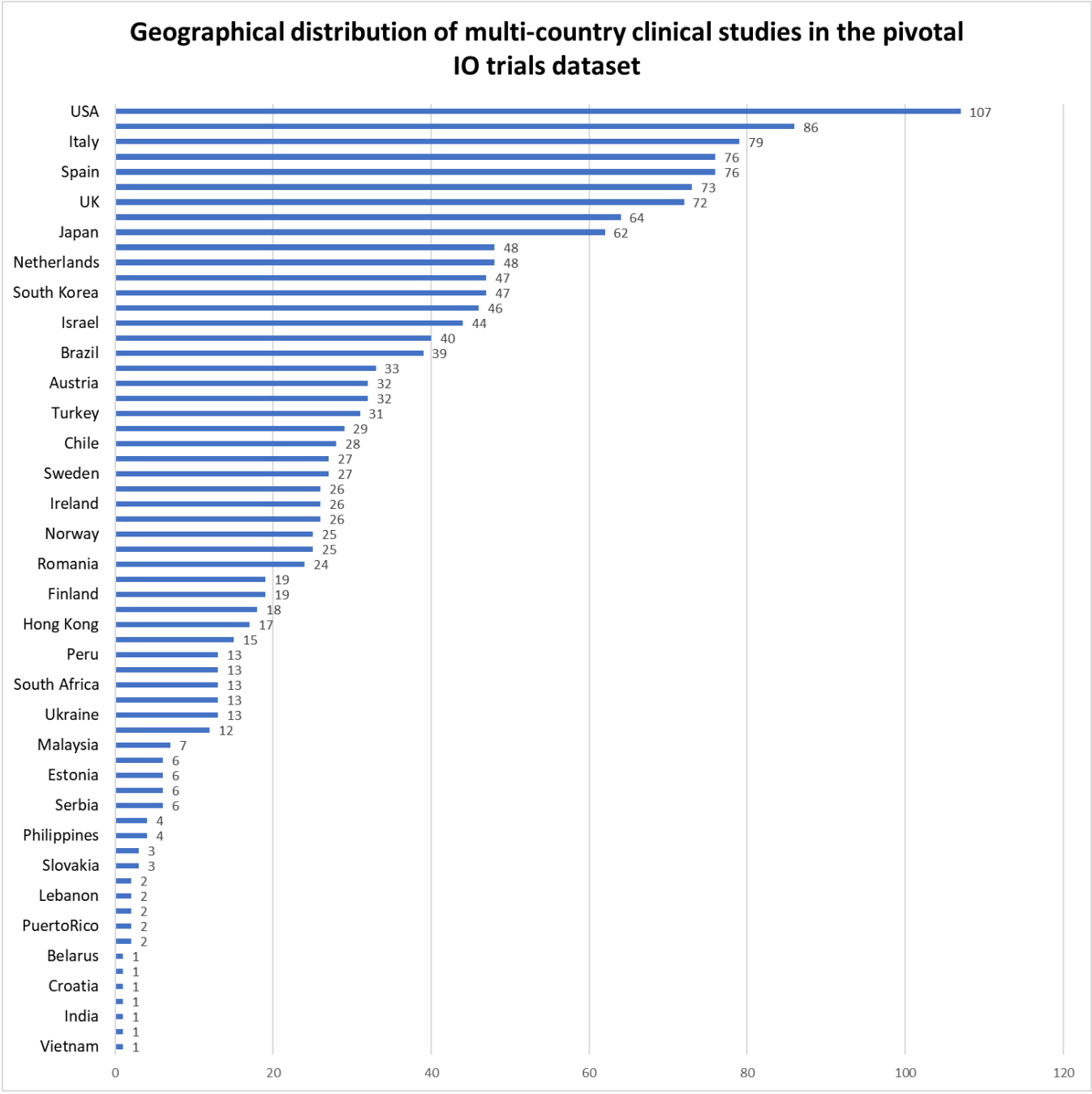
Figure 3a: Comparison of relative enrolment and disease prevalence, by ethnicity, in the trials for the five indications gathering the most IO approvals in this dataset. US prevalence according to SEER 2019 data.

Figure 3b: Percentage of each ethnic group in the pivotal IO trials dataset.



**Supplementary Figure 4: Geographical distribution of multi-country clinical studies in the pivotal IO trials dataset.**

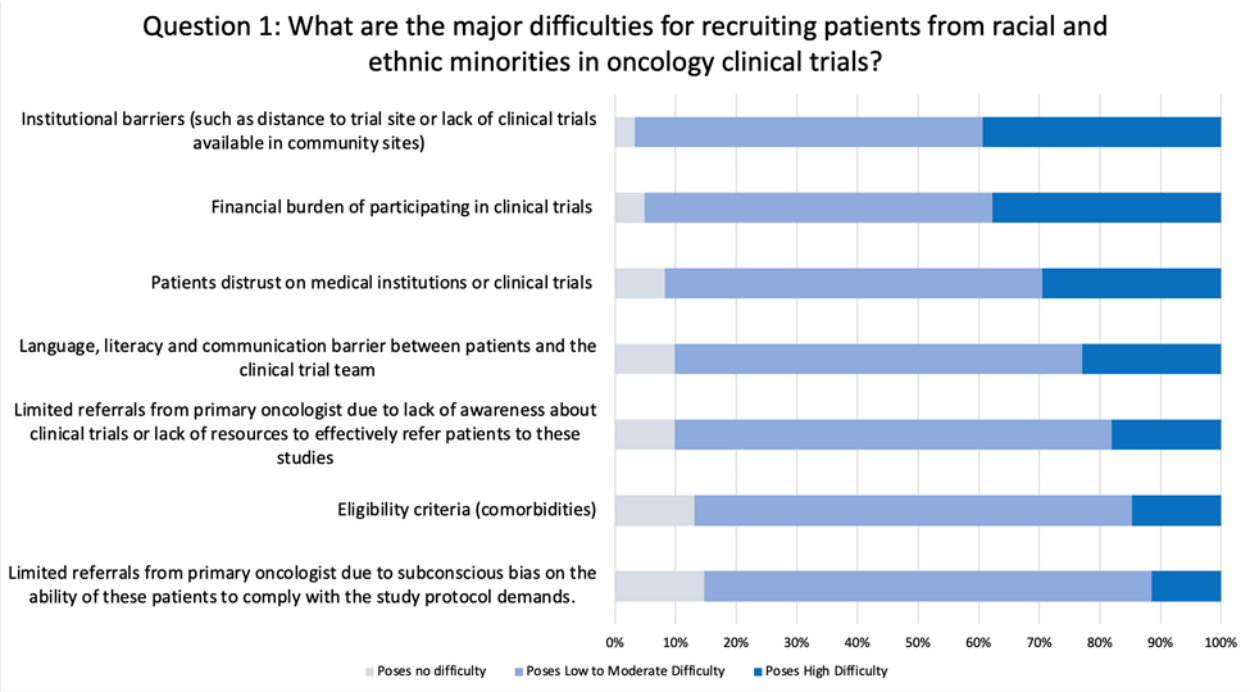


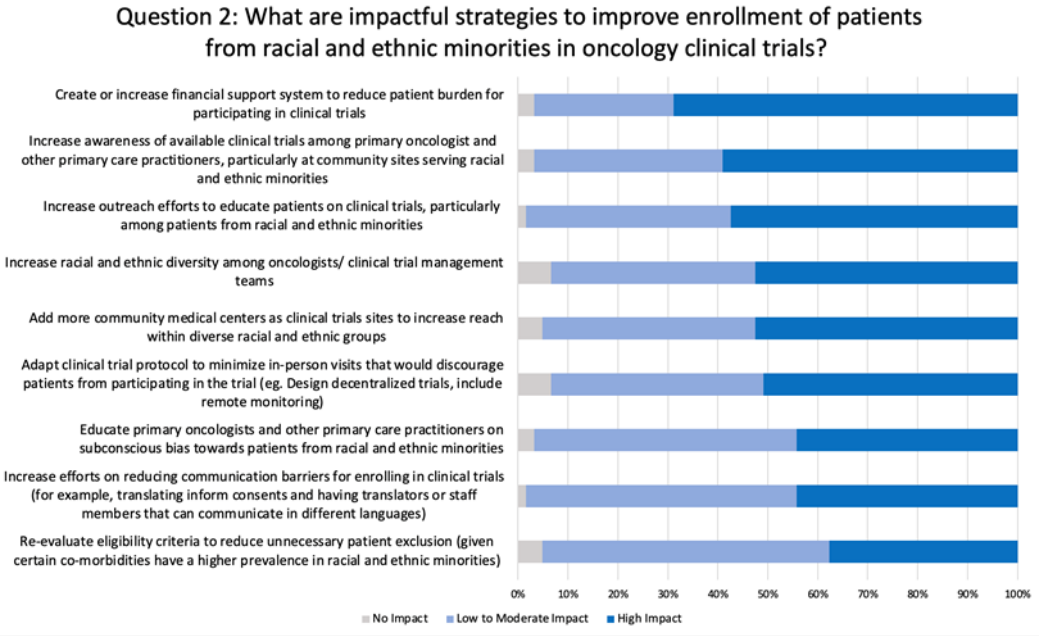
**Supplementary Table 3 | Percentage of patient recruitment in clinical trials by race in the different US states, according to IQVIA's proprietary clinical trial database.**

| State | Black African-American Percentage | Asian Percentage | White / Caucasian Percentage | Hawaiian/ Pacific Islander Percentage | Native American/ Alaska Native Percentage | Multiracial Percentage | Others/ Unannotated Percentage |
|---|---|---|---|---|---|---|---|
| Georgia | 38.7% | 1.3% | 48.4% | 0.1% | 0.5% | 0.0% | 11.0% |
| Arkansas | 36.2% | 0.6% | 51.2% | 0.1% | 0.6% | 0.0% | 11.4% |
| Mississippi | 33.5% | 0.4% | 43.2% | 0.1% | 0.0% | 0.0% | 22.7% |
| Louisiana | 28.9% | 1.0% | 52.4% | 0.1% | 0.5% | 0.0% | 17.1% |
| Maryland | 26.6% | 3.9% | 54.9% | 0.2% | 0.6% | 0.0% | 13.7% |
| Illinois | 25.6% | 4.3% | 60.6% | 0.6% | 1.6% | 0.0% | 7.4% |
| District of Columbia | 24.4% | 1.8% | 56.9% | 0.0% | 0.4% | 0.0% | 16.6% |
| Alabama | 23.8% | 0.4% | 60.7% | 0.1% | 0.4% | 0.0% | 14.7% |
| Missouri | 23.7% | 1.0% | 60.9% | 0.2% | 0.4% | 0.0% | 13.7% |
| Virginia | 23.4% | 2.2% | 56.2% | 0.3% | 0.4% | 0.0% | 17.5% |
| New Jersey | 22.1% | 3.8% | 64.5% | 0.2% | 0.4% | 0.0% | 9.1% |
| New York | 19.4% | 3.9% | 60.2% | 0.3% | 0.9% | 0.0% | 15.3% |
| South Carolina | 19.1% | 0.8% | 70.7% | 0.1% | 0.4% | 0.0% | 8.9% |
| California | 18.6% | 6.8% | 49.3% | 0.6% | 1.0% | 0.0% | 23.7% |
| Ohio | 18.4% | 1.2% | 65.2% | 0.1% | 0.4% | 0.0% | 14.7% |
| North Carolina | 18.3% | 1.2% | 64.5% | 0.2% | 0.5% | 0.0% | 15.4% |
| Delaware | 18.1% | 0.0% | 20.8% | 0.0% | 0.4% | 0.0% | 60.8% |
| Nevada | 17.5% | 2.6% | 54.9% | 0.5% | 0.9% | 0.0% | 23.5% |
| Michigan | 16.1% | 2.9% | 59.6% | 0.1% | 1.0% | 0.0% | 20.4% |
| Texas | 15.2% | 2.1% | 60.3% | 0.2% | 0.5% | 0.0% | 21.6% |
| Pennsylvania | 14.6% | 1.8% | 62.3% | 0.3% | 0.3% | 0.0% | 20.7% |
| Tennessee | 14.5% | 0.6% | 66.0% | 0.1% | 0.4% | 0.0% | 18.4% |
| Florida | 13.1% | 0.9% | 66.9% | 0.2% | 0.5% | 0.0% | 18.5% |
| Oklahoma | 11.9% | 0.7% | 58.3% | 0.3% | 4.3% | 0.0% | 24.4% |
| Nebraska | 10.7% | 0.5% | 69.9% | 0.4% | 1.1% | 0.0% | 17.5% |
| Connecticut | 10.0% | 0.7% | 59.5% | 0.1% | 0.4% | 0.0% | 29.3% |
| Massachusetts | 8.8% | 4.3% | 70.7% | 0.1% | 0.7% | 0.0% | 15.5% |
| Puerto Rico | 8.8% | 0.0% | 15.7% | 0.0% | 0.0% | 0.0% | 75.5% |
| Kentucky | 8.6% | 1.5% | 73.6% | 0.1% | 0.5% | 0.0% | 15.6% |
| Kansas | 8.3% | 1.4% | 76.6% | 0.2% | 1.4% | 0.0% | 12.2% |
| Indiana | 6.4% | 0.7% | 74.4% | 0.2% | 0.1% | 0.0% | 18.0% |
| Colorado | 5.7% | 1.9% | 75.1% | 0.3% | 1.1% | 0.0% | 15.9% |
| Arizona | 5.5% | 1.9% | 78.8% | 0.4% | 1.6% | 0.0% | 11.9% |
| West Virginia | 5.5% | 1.1% | 87.0% | 0.0% | 0.6% | 0.0% | 5.8% |
| Washington | 5.2% | 4.0% | 57.8% | 0.8% | 1.8% | 0.0% | 30.5% |
| Minnesota | 5.1% | 5.0% | 74.5% | 0.3% | 1.6% | 0.0% | 13.4% |
| Alaska | 4.7% | 0.0% | 14.0% | 0.0% | 0.0% | 0.0% | 81.4% |
| Wisconsin | 4.4% | 1.2% | 73.4% | 0.1% | 0.5% | 0.0% | 20.3% |
| Rhode Island | 3.8% | 0.8% | 79.9% | 0.1% | 0.5% | 0.0% | 15.0% |
| Oregon | 3.5% | 3.5% | 74.6% | 0.4% | 1.8% | 0.0% | 16.3% |
| New Mexico | 3.2% | 0.8% | 59.6% | 0.1% | 8.3% | 0.0% | 27.9% |
| North Dakota | 2.2% | 0.0% | 15.4% | 0.0% | 0.8% | 0.0% | 81.7% |
| Iowa | 2.1% | 1.5% | 78.3% | 0.2% | 0.3% | 0.0% | 17.6% |
| Hawaii | 1.4% | 26.2% | 25.2% | 7.8% | 0.0% | 0.0% | 39.5% |
| Maine | 1.3% | 0.0% | 61.4% | 0.2% | 0.2% | 0.0% | 37.0% |
| Utah | 1.0% | 1.3% | 81.8% | 0.4% | 0.6% | 0.0% | 14.8% |
| Vermont | 1.0% | 1.0% | 91.4% | 0.1% | 1.3% | 0.0% | 5.2% |
| Idaho | 0.3% | 0.7% | 86.6% | 0.2% | 0.5% | 0.0% | 11.7% |
| New Hampshire | 0.3% | 1.3% | 89.1% | 0.3% | 0.2% | 0.0% | 8.7% |
| Montana | 0.2% | 0.2% | 80.0% | 0.1% | 2.1% | 0.0% | 17.3% |
| South Dakota | 0.2% | 0.3% | 79.7% | 0.0% | 3.5% | 0.0% | 16.3% |
| CA | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% |
| MA | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% |
| Wyoming | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% |

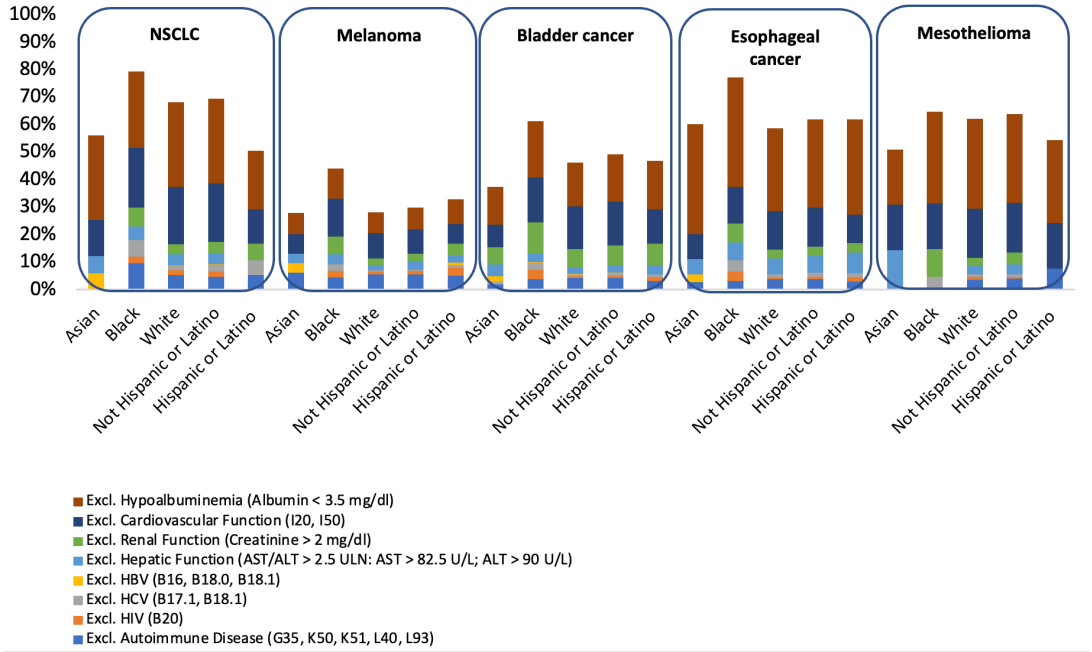
| Country | State | Black / African-American Percentage | Asian Percentage | White / Caucasian Percentage | Hawaiian/ Pacific Islander Percentage | Native American/ Alaska Native Percentage | Multiracial Percentage | Others/ Unannotated Percentage |
|---|---|---|---|---|---|---|---|---|
| United States | Georgia | 38.7% | 1.3% | 48.4% | 0.1% | 0.5% | 0.0% | 11.0% |
| United States | Arkansas | 36.2% | 0.6% | 51.2% | 0.1% | 0.6% | 0.0% | 11.4% |
| United States | Mississippi | 33.5% | 0.4% | 43.2% | 0.1% | 0.0% | 0.0% | 22.7% |
| United States | Louisiana | 28.9% | 1.0% | 52.4% | 0.1% | 0.5% | 0.0% | 17.1% |
| United States | Maryland | 26.6% | 3.9% | 54.9% | 0.2% | 0.6% | 0.0% | 13.7% |
| United States | Illinois | 25.6% | 4.3% | 60.6% | 0.6% | 1.6% | 0.0% | 7.4% |
| United States | District of Columb | 24.4% | 1.8% | 56.9% | 0.0% | 0.4% | 0.0% | 16.6% |
| United States | Alabama | 23.8% | 0.4% | 60.7% | 0.1% | 0.4% | 0.0% | 14.7% |
| United States | Missouri | 23.7% | 1.0% | 60.9% | 0.2% | 0.4% | 0.0% | 13.7% |
| United States | Virginia | 23.4% | 2.2% | 56.2% | 0.3% | 0.4% | 0.0% | 17.5% |
| United States | New Jersey | 22.1% | 3.8% | 64.5% | 0.2% | 0.4% | 0.0% | 9.1% |
| United States | New York | 19.4% | 3.9% | 60.2% | 0.3% | 0.9% | 0.0% | 15.3% |
| United States | South Carolina | 19.1% | 0.8% | 70.7% | 0.1% | 0.4% | 0.0% | 8.9% |
| United States | California | 18.6% | 6.8% | 49.3% | 0.6% | 1.0% | 0.0% | 23.7% |
| United States | Ohio | 18.4% | 1.2% | 65.2% | 0.1% | 0.4% | 0.0% | 14.7% |
| United States | North Carolina | 18.3% | 1.2% | 64.5% | 0.2% | 0.5% | 0.0% | 15.4% |
| United States | Delaware | 18.1% | 0.0% | 20.8% | 0.0% | 0.4% | 0.0% | 60.8% |
| United States | Nevada | 17.5% | 2.6% | 54.9% | 0.5% | 0.9% | 0.0% | 23.5% |
| United States | Michigan | 16.1% | 2.9% | 59.6% | 0.1% | 1.0% | 0.0% | 20.4% |
| United States | Texas | 15.2% | 2.1% | 60.3% | 0.2% | 0.5% | 0.0% | 21.6% |
| United States | Pennsylvania | 14.6% | 1.8% | 62.3% | 0.3% | 0.3% | 0.0% | 20.7% |
| United States | Tennessee | 14.5% | 0.6% | 66.0% | 0.1% | 0.4% | 0.0% | 18.4% |
| United States | Florida | 13.1% | 0.9% | 66.9% | 0.2% | 0.5% | 0.0% | 18.5% |
| United States | Oklahoma | 11.9% | 0.7% | 58.3% | 0.3% | 4.3% | 0.0% | 24.4% |
| United States | Nebraska | 10.7% | 0.5% | 69.9% | 0.4% | 1.1% | 0.0% | 17.5% |
| United States | Connecticut | 10.0% | 0.7% | 59.5% | 0.1% | 0.4% | 0.0% | 29.3% |
| United States | Massachusetts | 8.8% | 4.3% | 70.7% | 0.1% | 0.7% | 0.0% | 15.5% |
| United States | Puerto Rico | 8.8% | 0.0% | 15.7% | 0.0% | 0.0% | 0.0% | 75.5% |
| United States | Kentucky | 8.6% | 1.5% | 73.6% | 0.1% | 0.5% | 0.0% | 15.6% |
| United States | Kansas | 8.3% | 1.4% | 76.6% | 0.2% | 1.4% | 0.0% | 12.2% |
| United States | Indiana | 6.4% | 0.7% | 74.4% | 0.2% | 0.1% | 0.0% | 18.0% |
| United States | Colorado | 5.7% | 1.9% | 75.1% | 0.3% | 1.1% | 0.0% | 15.9% |
| United States | Arizona | 5.5% | 1.9% | 78.8% | 0.4% | 1.6% | 0.0% | 11.9% |
| United States | West Virginia | 5.5% | 1.1% | 87.0% | 0.0% | 0.6% | 0.0% | 5.8% |
| United States | Washington | 5.2% | 4.0% | 57.8% | 0.8% | 1.8% | 0.0% | 30.5% |
| United States | Minnesota | 5.1% | 5.0% | 74.5% | 0.3% | 1.6% | 0.0% | 13.4% |
| United States | Alaska | 4.7% | 0.0% | 14.0% | 0.0% | 0.0% | 0.0% | 81.4% |
| United States | Wisconsin | 4.4% | 1.2% | 73.4% | 0.1% | 0.5% | 0.0% | 20.3% |
| United States | Rhode Island | 3.8% | 0.8% | 79.9% | 0.1% | 0.5% | 0.0% | 15.0% |
| United States | Oregon | 3.5% | 3.5% | 74.6% | 0.4% | 1.8% | 0.0% | 16.3% |
| United States | New Mexico | 3.2% | 0.8% | 59.6% | 0.1% | 8.3% | 0.0% | 27.9% |
| United States | North Dakota | 2.2% | 0.0% | 15.4% | 0.0% | 0.8% | 0.0% | 81.7% |
| United States | Iowa | 2.1% | 1.5% | 78.3% | 0.2% | 0.3% | 0.0% | 17.6% |
| United States | Hawaii | 1.4% | 26.2% | 25.2% | 7.8% | 0.0% | 0.0% | 39.5% |
| United States | Maine | 1.3% | 0.0% | 61.4% | 0.2% | 0.2% | 0.0% | 37.0% |
| United States | Utah | 1.0% | 1.3% | 81.8% | 0.4% | 0.6% | 0.0% | 14.8% |
| United States | Vermont | 1.0% | 1.0% | 91.4% | 0.1% | 1.3% | 0.0% | 5.2% |
| United States | Idaho | 0.3% | 0.7% | 86.6% | 0.2% | 0.5% | 0.0% | 11.7% |
| United States | New Hampshire | 0.3% | 1.3% | 89.1% | 0.3% | 0.2% | 0.0% | 8.7% |
| United States | Montana | 0.2% | 0.2% | 80.0% | 0.1% | 2.1% | 0.0% | 17.3% |
| United States | South Dakota | 0.2% | 0.3% | 79.7% | 0.0% | 3.5% | 0.0% | 16.3% |
| United States | CA | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% |
| United States | MA | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% |
| United States | Wyoming | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Supplementary Figure 5:**
**Figure 5a:** Answers to survey on major difficulties for recruiting patients from racial and ethnic minorities in oncology clinical trials.
**Figure 5b:** Answers to survey on possible strategies to improve enrolment of patients from racial and ethnic minorities in oncology clinical trials.



**Supplementary Figure 6:** Percentage of cancer patients in the TriNetX real-world dataset, by race and indication, presenting co-morbidities typically listed under exclusion criteria in IO trials. The different exclusion criteria considered for this analysis are depicted in different colours.




**Methods:**

**Information on pivotal trials leading to IO approvals by the FDA between 2010 and August 2022 (used in Table 1, Table 2, Fig. 1a, Fig.1b, Suppl. Fig.1, Suppl. Fig.2, Suppl. Fig.3 and Suppl. Fig.4)**

Patients race and ethnicity information was collected as provided on the clinical trials documentation (associated scientific publication/ trial page in clinicaltrials.gov) from those trials listed in Supplementary figure 1. NIH/OMB reporting guidelines were followed in order to define the racial and ethnic groups considered in this article:
https://prsinfo.clinicaltrials.gov/results_table_layout/DataEntryTable_BaselineRegionRaceEthnicityForm.pdf

Information on clinical sites geographic location for trials in this dataset was also extracted from clinical trials documentation. In Supplementary figure 5, only those trials for which patients enrolled in more than one country are included.

**a. Information on disease prevalence, by race and ethnicity (used in Fig.1a, Suppl. Fig.2 and Suppl. Fig.3)**

US prevalence data for each indication was extracted from SEER data source according to seer.cancer.gov webpage: US 2019 cancer prevalence estimates are based on 2019 cancer prevalence proportions from the SEER 12 Areas and 1/1/2019 US population estimates based on the average of 2018 and 2019 population estimates from the US Bureau of the Census.

Where indicated, TriNetx racial and ethnic data was utilized instead of SEER 2019 prevalence data. In these cases, patient cohorts for the indications of interest were built covering 3 subsequent 3 year periods (patients diagnosed last 3 years, patients diagnosed between 3 and 6 years ago and patients diagnosed between 6 and 9 years ago). Using the built-in explore cohort functionality of TriNetX, the % distributions by race and ethnicity were extracted and analyzed. The TriNetX data covers clinical practice only and is not related to clinical trials.

**b. Survey data (used in Fig.2)**

Survey data were collected between September 2, 2022 to October 4, 2022 in an online survey format consisting of two questions (questionnaire 1 and questionnaire 2). Each question had multiple answer options (listed in fig. 2) that the responders were asked to score. A free text option at the end of each questionnaire was also provided. Collectively, data were collected from 61 responders which comprised 27 clinical leads, 12 medical directors or advisors, 13 medical doctors involved in execution of clinical trials and 9 responders that identified as clinical operations personnel, clinical manager or clinical trial staff.

**c. Patient recruitment by race and US state (used in Suppl. Table 3)**

Aggregated data visualizing the percentage of enrolled patients, by race, in different US states.
Data source: IQVIA proprietary dataset from 1047 clinical trials for all indications (including those beyond cancer) conducted by IQVIA, where population diversity information is accessible.

**d. Analysis on co-morbidities in cancer patients, by race (used in Suppl. Fig.6)**

For this analysis, real-world clinical practice data from TriNetX was used to perform patient attrition funnel analysis. As a starting point, queries by race and ethnicity were created for five solid tumor indications of interest, targeting patients seen by a physician for their disease in the last three years. Subsequently, onto each starting population (patient cohort) we overlayed queries on frequently seen protocol exclusion criteria and evaluated the patient population drop in % by patient cohort. The TriNetX data covers clinical practice only and is not related to clinical trials.