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Practical strategies for creating diversity, equity, inclusion, and access in cancer clinical research: DRIVE

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Abstract:

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Practical strategies for creating diversity, equity, inclusion, and access in cancer clinical research: **DRIVE**

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Introduction

Cancer is a leading cause of mortality in the United States (US). In 2021, 1,898,160 new cases and 608,570 deaths will occur in the US. Increasing rates of cancer mortality in the US occurred until 1991, but decreased through 2018 from its peak by 31%, with 3.2 million fewer cancer deaths in this period. However, these improvements are not equally applicable to all races, with significant differences in cancer mortality between Blacks and Whites¹. The 5-year relative survival rates for all cancers diagnosed between 2010-2016 were 68% (Whites) and 63% (Blacks), respectively².

Wealth inequalities contribute to disparities in racial cancer mortality due to differences in risk factor exposure and barriers to cancer care.^{3,4} However ultimately, these stem from hundreds of years of structural racism, including residential, educational, occupational segregation, and discriminatory policies in criminal justice and housing, which have altered the balance of prosperity, security, and health⁵.

Disparities in cancer treatment, a major contributor to decreasing outcomes in cancer mortality, can be related to the underrepresentation of Blacks and other racial minorities in clinical trials. Race

reporting is frequently omitted in clinical trials, resulting in regulatory approval, but is worse in studies outside regulatory purview. Between 2008-2018, only 7.8% of 230 trials (recruiting 112,293 patients) documented the four major races in the US, and 25.2% reported racial subgroup analyses. The actual representation of trial participants was 76.3%: Whites, 18.3%: Asians, 3.1%: Blacks, and 6.1%: Hispanics, largely underrepresenting their proportion of US cancer incidence, for Blacks and Hispanics (22% and 44%, respectively) compared with Whites and Asians (98% and 43.8%, respectively)⁶. This gap in representation is worse for specific tumor types, particularly in prevalence-adjusted participation for cancers that are more common in African Americans⁷. Pooled data from nine large cooperative group clinical trials in newly diagnosed multiple myeloma (MM) over two decades, showed only 18% of participants were non-White⁸, shockingly for a disease with incidence rates in Blacks more than double those seen in Whites (15.9 vs. 7.5 cases per 100,000), a trend that also extends to mortality (5.6 vs. 2.4 MM deaths per 100,000 for African Americans compared with Whites^{9,10}. Additionally, in pivotal trials leading to US regulatory approval of immune checkpoint inhibitors, Blacks constituted less than 4% of enrollees in lung cancer trials, with similar underrepresentation observed in renal cell carcinoma and other tumor types. This issue is particularly problematic because clinical responses to immunotherapeutic agents are dependent on unique, individual, frequently racially determined, genetically mediated host and tumor biological interactions¹¹. A study of 358 trials (pharmaceutical company-sponsored trials, 85; Southwest Oncology Group (SWOG) Cancer Research Network trials, 273) comprising 93,825 patients (pharmaceutical company-sponsored trials, 46,313; SWOG trials, 47,512) for 15 cancer types between 2008-2018, also found significant underrepresentation of Blacks in pharmaceutical company-sponsored trials compared with SWOG trials (2.9% vs. 9.0%), which was consistent across individual cancer types¹². Furthermore, this indicates and debunks the myth that Black underrepresentation in clinical trials is due a “refusal of African American patients to participate in clinical research” and argues for appropriate steps to be taken to promote research racial diversity.

The absence of diversity in genomic trials designed to establish potential benefits in breast cancer therapy has also been shown to result in an underestimation of the risk of relapse in Black women with breast cancer, further confirming the pervasiveness and clinical implications of the lack of minority representation in treatment and non-treatment cancer research¹³.

Recent worldwide social events have highlighted the need to remove structural barriers to diversity and equity in all spheres of life, leading to the publication of position papers from all major cancer societies and organizations¹⁴: American Society of Clinical Oncology (ASCO)¹⁵, American Association for Cancer Research (AACR)¹⁶, American Cancer Society (ACS)¹⁷, American Society of Hematology (ASH)¹⁸, the Food and Drug Administration (FDA),¹⁹ and the pharmaceutical

industry (PHARMA)²⁰. However, despite this, plenary and podium presentations at the 2020 and 2021 annual meetings of ASCO and ASH have continued to highlight studies with significant underrepresentation of racial minorities, particularly African Americans, Native Americans, and Hispanics, clearly indicating a lack of progress. An important example, is the ZUMA-7 trial of chimeric antibody T-cell (CAR-T) therapy in relapsed diffuse large cell lymphoma presented in the plenary session of the ASH 2021 conference and simultaneously published²¹, which enrolled less than 1% African Americans but with a declaratory conclusion of a “new standard of care” notwithstanding HLA polymorphisms across racial groups that could affect results across races and potentially render these results invalid and thus precludes the broad conclusion reached. This study and similar studies not only fail in DEIA but are scientifically invalid in their conclusions, which have major implications for the patients we all care for. Other consequences are an inability to evaluate treatment-related severe adverse effects (SAEs) that could differ between races and immunologically diverse ethnicities. Additional examples include studies of Bruton’s tyrosine kinase inhibitors in hematologic malignancies, with hypertension being a major SAE, but with minimal representation of Blacks, who have a higher prevalence of hypertension or checkpoint inhibitors that are associated with diabetes but with significant Hispanic, and Native American underrepresentation, who have a higher incidence of diabetes, thus underreporting the potential risks in these populations with significant human and economic consequences. Such deleterious effects are borne by both the excluded minorities and the broader population, who are ultimately saddled with the cost and economic burden engendered as a result. The coronavirus disease (COVID-19) pandemic has further exacerbated these disparities in the US and globally particularly in racial and ethnic minorities and socioeconomically disadvantaged groups whom have borne a disproportionate burden of illness and death²².

Recommendations for obtaining post marketing data in minority groups may be considered by many as “step in the right direction”, but as a stand-alone solution, creates a “separate but equal” outcome, an unacceptable doctrine prohibited by the US Supreme Court in *Brown v. Board of Education* in 1954²³.

Methods:

DRIVE: PRACTICAL STEPS TO PROMOTE DEIA IN CANCER CLINICAL RESEARCH

As a result of these poor outcomes with their resultant implications and an understanding of the need for grassroots and community action, Indy Hematology Education, Inc., a 501(c) non-profit organization incorporated to promote education and advocacy, has established a practical 5-step initiative to promote DEIA in cancer research.

DRIVE:

D: Diversity officer for clinical research studies

R: Ranking of clinical studies for diversity

I: Individual diversity, equity, inclusion and access plan

V: Verification of study diversity

E: Elevate and Enhanced training of minority investigators and research team members

D: DIVERSITY OFFICER FOR CLINICAL RESEARCH STUDIES

Currently, most clinical trials include an obligatory statement on diversity with targets that are frequently not reached. A major contributor to this is that these studies do not have an official tasked with ensuring that goals are prospectively established, monitored, and when necessary, modified, adjusted, or amended to reach the intended target. The safety of human subjects is recognized as essential and paramount, resulting in the Greenberg report of 1967, leading to the mandatory establishment of data safety and monitoring boards (DSMBs) that are required to provide independent oversight of major studies²⁴ with the achievement of the objectives of the report, except for ensuring that clinical data results are applicable to all mankind. Good clinical studies, as defined by the Greenberg report, include the following: the problem to be studied is an important one that must be resolved (a) from a purely scientific point of view, and or (b) for the benefit of mankind through improved methods of prevention, diagnosis and or therapy²⁵.

Major corporations have chief diversity officers as strategists to promote their DEIA efforts, a concept that can be applied in clinical cancer research. We recommend that all clinical trials in cancer appoint a Diversity Officer with the responsibility of ensuring that diversity goals are reached.

Responsibilities of Diversity Officer

1. Prospectively develop an achievable, flexible and monitorable DEIA plan with accrual goals for diverse populations in cancer clinical research trials as required in NIH trials.
2. Establish an infrastructure to monitor and adjust recruitment efforts in a prospectively, including, when necessary, countries outside the US to promote diversity goals, particularly in African countries where the infrastructure may not already exist.

3. Identifying impediments to meeting accrual goals at the micro-and macro-levels with the proposed solutions, including removal of exclusion criteria which disproportionately affect minorities but may not affect clinical trial results
4. Develop culturally appropriate study materials to promote minority accrual.
5. Identify potential scientific questions and study design solutions to answer for mankind and improve methods of prevention, diagnosis, and therapy in keeping with Greenberg principles.
6. Advise the study sponsor(s) and principal investigators (PI) and study the steering committee on potential challenges and solutions.

Qualifications of Diversity Officer

1. Training in cancer research.
2. Training in cultural awareness, sensitivity, appropriateness and diversity
3. An understanding of historical factors precluding potential enrollment in clinical trials including, but not limited to, the Tuskegee syphilis study²⁶, Nuremberg code²⁷
4. Leadership.

Training of Diversity officers

Training programs must be developed, established, and funded by study sponsors for diversity officers at academic centers or organizations promoting the principles of DEIA in clinical research in the core areas of:

1. Clinical study design and statistics.
2. Historical issues relating to diversity: slavery, racism, sexism, gender, and sexuality, with particular attention paid to understanding the Tuskegee syphilis study and the Nuremberg human experiments.
3. Regulatory law and practice.
4. Cultural sensitivity and awareness training.
5. Understanding the interplay between safety and diversity and an understanding of the Greenberg report.
6. Understanding the economic impact and implications of clinical research diversity.
7. Understanding the social construction including cultural factors and drivers in diverse communities.

8. Understanding economic promoters and inhibitors of research participation in diverse communities.
9. Leadership.

Elements of the diversity plan in cancer research,²⁸ as established in the AACR recommendations for myeloma clinical research, should include concrete epidemiologically based accrual targets, with well-designed post-approval studies where data gaps exist, with modeling to reach scientifically valid conclusions.

R: RANKING OF CLINICAL STUDIES FOR DIVERSITY (DRIVE RANK AND COMPOSITE RANK)

The world is not governed by force, but by moral persuasion, with information being the currency. Ranking is the informational tool for measuring and comparing groups in most endeavors of humankind but is also used to encourage positive change for a desired goal. Global Performance Indicators (GPIs), which rate and rank states relative to one another, shape decisions. This power has been used by the World Bank (WB), which has marshaled the Ease of Doing Business (EDB) index to influence global regulatory policies, a domain over which it has no explicit mandate and there is ideological contestation. GPI rankings have been used by the WB to effectuate positive changes among nation-states and international institutions. GPI creators also aim to set standards of appropriate behavior, change policy outputs, and ultimately, outcomes. As a result, the WB's EDB Index motivates reforms, even above and beyond what is expected from consulting with or borrowing alone has been demonstrated²⁹.

A single rank is easily understood and creates pressure for reform. As in sports, once you start keeping score, everyone wants to win³⁰.

The ranking of clinical studies for diversity (**DRIVE RANK**), based on the achievement of minority participant representation relative to the epidemiology of disease, is an informational tool to evaluate DEIA efforts and provide a readily accessible measurement of the applicability of clinical data to all patient subgroups with the potential to force positive changes to promote DEIA and the health of mankind. We propose a standardized ranking of 0-5 for diversity, as follows:

Table 1.

Utility and reporting of rankings

1. Rankings should be reported by authors and required for all abstracts presented at major medical meetings and required for publication in peer-reviewed journals and favorably

included in each journal impact factor assessment³¹ when these proposed rankings of clinical studies are used as a factor in the review of manuscripts for possible publication.

2. Establish a reportable corporate ranking system (**DRIVE SCORE**) for pharmaceutical companies based on the diversity of clinical data from the totality of studies from each company, which can inform the choice of ethical investors.

I: INDIVIDUAL STRATEGY FOR PROMOTING DEIA IN CANCER CLINICAL RESEARCH

The modern Hippocratic oath begins with “I”, and similarly diversity can only be achieved with each individual team member embracing DEIA efforts. An individual’s diversity plan is central to this altruistic and self-preserving desire. Achieving diversity in medical research is beneficial for minority and majority persons both for individual economic and scientific reasons. The individual diversity plan should include the following.

1. To understand and address unconscious bias and develop strategies to overcome these issues in the immediate environment, community, and practice.
2. Implement a cultural competency plan and remove communication barriers. Cultural competency is defined as healthcare providers’ ability to function effectively in the context of cultural differences^{32, 33}
3. Self-education on the historical, structural, and systemic effects of racism, redlining, and economic factors precluding or preventing enrollment in clinical trials with their applicability to the community.
4. Develop a diverse workforce and research teams and enhance your organizational DEIA plans.

V: VERIFICATION OF DIVERSITY IN CLINICAL RESEARCH STUDIES

Diversity reporting should be based on self-reporting by the clinical research team; however, robust strategies for auditing data should be in place, as would be used by internal organizations, institutional review boards (IRB), DSMB, and regulatory agencies to review safety with robust sanctions for malfeasance³⁴.

Verification that studies with a minimal threshold **DRIVE SCORE** ≥ 3 are a requirement for podium presentation at major medical meetings and publications in journals with a high impact factor.

E: ELEVATE AND ENHANCED TRAINING OF A DIVERSE RESEARCH AND CLINICAL TEAM

Medical and research team diversity has been shown to improve the likelihood of achieving diversity goals in clinical research³⁵. Clinical team diversity improves outcomes and compliance, as a result the Liaison Committee on Medical Education (LCME) of US Department of Education, which accredits US and Canadian allopathic medical schools has diversity accreditation standards which mandate students from diverse backgrounds and programs to broaden diversity amongst qualified applicants³⁶. In contrast, accreditation of clinical research sites does not require diversity of investigators, research coordinators, navigators, and team members; thus, most study sites do not meet the lofty goals of the LCME.

Scholarships, grants, and funding mechanisms should be established to train minority/diverse investigators and non-minority investigators practicing in minority communities. Training should include physicians, advanced providers, nurses, social workers, pharmacists, navigators, medical assistants, students, and other members of the clinical and research team, with enhanced funding and training of potential investigators in historical Black colleges and medical schools ensuring that various cultures and voices are included at the point of recruitment.

The funding sources for training could be from the establishment of a research diversity fund by PHARMA, philanthropy, and government agencies. Examples of these, are emerging as collaborations between the pharmaceutical industry and major medical societies³⁷.

Study leadership should be diverse for race, gender, cultural, and economic status, using the same principles as elucidated by the LCME³⁸ and in determining membership of study steering committees, DSMB, PIs, IRBs, authorships, medical journal peer reviewers, editorial board members, and editors-in-chief.

Finally, the requirement of diversity from regulatory agencies, journal editors-in-chief, major medical societies studying PIs, and study teams will further promote this goal. In the US, FDA regulatory enhancements will certainly promote research diversity and the current guidance³⁹ is a step in the right direction but requires more to achieve these goals.

DISCUSSION AND CONCLUSION

Global issues associated with DEIA have long been identified across healthcare; however, research studies have shown little quantitative progress. Impactful change lies in deliberate actions, as suggested by the **DRIVE** initiative. Each practical step has been outlined to illustrate and emphasize problems within the current system, while simultaneously offering directives to achieve the long-established but not yet reached DEIA goals of the medical field.

Continuing to discuss and analyze these issues rather than actively working to solve them produces dangers that are evident in the adverse outcomes experienced by minority groups excluded from therapy studies. However, actions directed at the improvement of DEIA across clinical research are important for the improvement of all people. The **DRIVE** initiative offers a comprehensive approach to lead the field of cancer research towards more significant and widely applicable solutions. The emphasis on cancer research allows providers serving this population to be trailblazers and examples to other specialties, concretely demonstrating the positive outcomes associated with making the changes outlined in **DRIVE**. The action items outlined in the initiative value creating long-term permanent shifts in behavior, enacting **DRIVE** will have a ripple effect on medical research, education, and treatment. Informed, care providers will practice with a greater intention to provide their patients with superior, more individualized treatment.

DRIVE is an initiative based on data and evidence obtained from other successful groups/agencies. The infrastructure necessary for the type of structural remodeling cancer research needs exists already, but in part; therefore, structural change cannot be fully enacted without the implementation of each part together. While the individual action items **DRIVE** consists of are valuable on their own, when executed concurrently, they have the power to elevate DEIA in clinical cancer research. Similarly, the **DRIVE** initiative can be impactful on a small scale, but the magnitude of change it is intended to bring is not possible without the direct commitment from the major cancer societies and FDA. The implementation of **DRIVE** to an appropriate scale requires significant, consistent funding to be received which is possible with tangible collaboration efforts as well as financial and intellectual investments.

Indy Hematology Education, Inc (IHE), the corporation responsible for the **DRIVE** initiative plans to require all data presented at its annual hematology review include rankings and to host a summit of stakeholders in September of 2022 to formally adopt the initiative's steps and inaugurate “The Indianapolis Black Paper” based on these principles to establish scale and promote DEIA in cancer

research, with measurable goals and ultimately eradicate inequalities of cancer care in keeping with the Greenberg principles.

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Maya Nicole Birhiray, BS: No conflicts of interest. REB is the father of MNB.

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REFERENCES

- ¹ CA Cancer J Clin. 2021 Jan;71(1):7-33. doi: 10.3322/caac.21654. Epub 2021 Jan 12.
- ² Howlader N, Noone AM, Krapcho M, et al. SEER Cancer Statistics Review, 1975-2017. National Cancer Institute; 2020.
- ³ Ward E, Jemal A, Cokkinides V, et al. Cancer disparities by race/ethnicity and socioeconomic status. CA Cancer J Clin. 2004;54:78-93
- ⁵ Bailey ZD, Krieger N, Agenor M, Graves J, Linos N, Bassett MT. Structural racism and health inequities in the USA: evidence and interventions. Lancet. 2017;389:1453-1463.
- ⁶ Habr D, Ferdinand R. Addressing racial/ethnic disparities in cancer clinical trials: Everyone has a role to play. Cancer. 2021 Sep 15;127(18):3282-3289. doi: 10.1002/cncr.33600. Epub 2021 Apr 27. PMID: 33904590.
- ⁷ Al Hadidi S, Mims M, Miller-Chism CN, Kamble R. Participation of African American persons in clinical trials supporting U.S. Food and Drug Administration approval of cancer drugs. Ann Intern Med. 2020;173:320-322. doi:10.7326/M20-0410
- ⁸ Ailawadhi S, Jacobus S, Sexton R, et al. Disease and outcome disparities in multiple myeloma: exploring the role of race/ethnicity in the cooperative group clinical trials. Blood Cancer J. 2018;8:67. doi:10.1038/s41408-018-0102-7
- ⁹ DeSantis CE, Miller KD, Goding Sauer A, Jemal A, Siegel RL. Cancer statistics for African Americans, 2019. CA Cancer J Clin 2019;69:211–33.
- ¹⁰ Bhatnagar V, Gormley N, Kazandjian D, Goldberg K, McKee AE, Blumenthal G, et al. FDA analysis of racial demographics in multiple myeloma trials. Blood 2017;130:4352.
- ¹¹ Nazha B, Mishra M, Pentz R, Owonikoko TK. Enrollment of racial minorities in clinical trials: old problem assumes new urgency in the age of immunotherapy. Am Soc Clin Oncol Educ Book. 2019;39:3-10.
- ¹² Unger JM, Hershman DL, Osarogiagbon RU, et al. Representativeness of Black patients in cancer clinical trials sponsored by the National Cancer Institute compared with pharmaceutical companies. JNCI Cancer Spectr. 2020;4:pkaa034. doi:10.1093/jncics/pkaa034
- ¹³ Hoskins KF, Danciu OC, Ko NY, Calip GS. Association of Race/Ethnicity and the 21-Gene Recurrence Score With Breast Cancer-Specific Mortality Among US Women. JAMA Oncol. 2021 Mar 1;7(3):370-378. doi: 10.1001/jamaoncol.2020.7320. PMID: 33475714; PMCID: PMC7821091.
- ¹⁴ Polite BN, Adams-Campbell LL, Brawley OW, et al. Charting the future of cancer health disparities research: a position statement from the American Association for Cancer Research, the American Cancer Society, the American Society of Clinical Oncology, and the National Cancer Institute. J Clin Oncol. 2017;35:3075-3082. doi:10.1200/JCO.2017.73.6546
- ¹⁵ Patel MI, Lopez AM, Blackstock W, et al. Cancer disparities and health equity: a policy statement from the American Society of Clinical Oncology. J Clin Oncol. 2020;38:3439-3448. doi:10.1200/JCO.20.00642
- ¹⁶ Gormley N, Fashoyin-Aje L, Locke T, Unger J, Little RF, Nooka A, Mezzi K, Popa-McKiver M, Kobos R, Biru Y, Williams TH, Anderson KC. Recommendations on eliminating racial disparities in multiple myeloma therapies: a step toward achieving equity in healthcare. Blood Cancer Discov. 2021 Mar;2(2):119-124. doi: 10.1158/2643-3230.bcd-20-0123. PMID: 34179821; PMCID: PMC8224821.
- ¹⁷ American Cancer Society. The American Cancer Society and Pfizer launch community grants focused on addressing systemic race-related barriers that contribute to disparities in care among Black men and women with cancer. Published online November 17, 2020. Accessed February 19, 2021. <http://pressroom.cancer.org/2020-11>
- ¹⁸ Christopher R. Flowers, MD, MS, Chancellor E. Donald, MD. A Look Into ASH's Diversity, Equity, and Inclusion Efforts, The Hematologist (2021) 18 (2)
- ¹⁹ US Food and Drug Administration. Enhancing the diversity of clinical trial populations—eligibility criteria, enrollment practices, and trial designs guidance for industry. Updated November, 2020. Accessed November 22, 2020. <https://www.fda.gov/media/127712/download>
- ²⁰ Pharmaceutical Research and Manufacturers of America (PhRMA). PhRMA's principles on conduct of clinical trials and communication of clinical trial results. Accessed February 19, 2021. <https://www.phrma.org/-/media/Project/PhRMA/PhRMA-Org/PhRMA-Org/PDF/P-R/PhRMAPrinciples-of-Clinical-Trials-FINAL.pdf>
- ²¹ Locke FL, Miklos DB, Jacobson CA, Perales MA, Kersten MJ, Oluwole OO, Ghobadi A, Rapoport AP, McGuirk J, Pagel JM, Muñoz J, Farooq U, van Meerten T, Reagan PM, Sureda A, Flinn IW, Vandenberghe P, Song KW,

Dickinson M, Minnema MC, Riedell PA, Leslie LA, Chaganti S, Yang Y, Filosto S, Shah J, Schupp M, To C, Cheng P, Gordon LI, Westin JR; All ZUMA-7 Investigators and Contributing Kite Members. Axicabtagene Ciloleucel as Second-Line Therapy for Large B-Cell Lymphoma. *N Engl J Med*. 2021 Dec 11. doi: 10.1056/NEJMoa2116133. Epub ahead of print. PMID: 34891224.

²² Azar KMJ, Shen Z, Romanelli RJ, Lockhart SH, Smits K, Robinson S, Brown S, Pressman AR. Disparities In Outcomes Among COVID-19 Patients In A Large Health Care System In California. *Health Aff (Millwood)*. 2020 Jul;39(7):1253-1262. doi: 10.1377/hlthaff.2020.00598. Epub 2020 May 21. PMID: 32437224.

²³ *Brown v. Board of Education*, 347 U.S. 483 (1954)

²⁴ Data Safety Monitoring Board (DSMB Guidelines) - HHS.gov
<https://www.hhs.gov/guidance/document/guidelines-dsmb-0>

²⁵ Greenberg report, 1976, https://sph.unc.edu/wp-content/uploads/sites/112/2013/07/greenberg_report.pdf

²⁶ Kampmeier, R. H. (1974). "Final report on the "Tuskegee syphilis study". *South Med J*. 67 (11): 1349–53. doi:10.1097/00007611-197411000-00019. PMID 4610772

²⁷ "The Doctors Trial: The Medical Case of the Subsequent Nuremberg Proceedings". *Holocaust Encyclopedia*. United States Holocaust Memorial Museum, Washington, D.C

²⁸ Gormley N, Fashoyin-Aje L, Locke T, Unger J, Little RF, Nooka A, Mezzi K, Popa-McKiver M, Kobos R, Biru Y, Williams TH, Anderson KC. Recommendations on eliminating racial disparities in multiple myeloma therapies: a step toward achieving equity in healthcare. *Blood Cancer Discov*. 2021 Mar;2(2):119-124. doi: 10.1158/2643-3230.bcd-20-0123. PMID: 34179821; PMCID: PMC8224821.

²⁹ Doshi, R., Kelley, J., & Simmons, B. (2019). The Power of Ranking: The Ease of Doing Business Indicator and Global Regulatory Behavior. *International Organization*, 73(3), 611-643. doi:10.1017/S0020818319000158

³⁰ Simeon Djankov, Darshini Manraj, Caralee McLiesh, Rita Ramalho. 2005. "Doing Business Indicators: Why Aggregate and how to do it," p. 1. (accessed through the WayBack Machine, posting at 19 February 2006. From 2001 to 2005 the Bank did not rank. Data that would eventually form the basis of the rankings were first published in the fall of 2001 on the Bank's website. From the Way Back Machine, <http://web.archive.org/web/20020806155832/http://rru.worldbank.org/DoingBusiness/AboutDoingBusiness.aspx>

³¹ Garfield E. The history and meaning of the journal impact factor. *JAMA*. 2006;295:90–3.

³² Betancourt JR. Improving quality and achieving equity: the role of cultural competence in reducing racial and ethnic health disparities in health care. New York: The Commonwealth Fund; 2006.

³³ Jackson CS, Gracia JN. Addressing health and health-care disparities: the role of a diverse workforce and the social determinants of health. *Public Health Rep*. 2014 Jan-Feb;129 Suppl 2(Suppl 2):57-61. doi: 10.1177/00333549141291S211. PMID: 24385666; PMCID: PMC3863703.

³⁴ Dresser R. Sanctions for research misconduct: a legal perspective. *Acad Med*. 1993 Sep;68(9 Suppl):S39-43. doi: 10.1097/00001888-199309000-00032. PMID: 8396938.

³⁵ Lay P, Paralkar T, Ahmed SH, Ghani M, Muneer S, Jinnah R, Chen C, Zeitz J, Nitsch A, Osier N. A Novel Clinical Research Modality for Enrolling Diverse Participants Using a Diverse Team. *Brain Sci*. 2020 Jul 8;10(7):434. doi: 10.3390/brainsci10070434. PMID: 32650502; PMCID: PMC7408300.

³⁶ Stanford FC. The Importance of Diversity and Inclusion in the Healthcare Workforce. *J Natl Med Assoc*. 2020 Jun;112(3):247-249. doi: 10.1016/j.jnma.2020.03.014. Epub 2020 Apr 23. PMID: 32336480; PMCID: PMC7387183.

³⁷ <https://www.aacr.org/about-the-aacr/newsroom/news-releases/aacr-to-partner-with-the-bristol-myers-squibb-foundation-on-its-diversity-in-clinical-trials-career-development-program/>

³⁸ Liaison Committee on Medical Education (LCME) Standards on Diversity. 2009.

³⁹ <https://www.fda.gov/media/157635/download>

DRIVE RANK SCORE	Study racial or nationality enrollment of the sum of all minority groups relative to the epidemiology of the disease§.
0	≤20% of the sum of all minority groups relative to the epidemiology of the disease.
1	21-40% the sum total of all minority groups relative to the epidemiology of the disease and at least one minority groups* reaching 50% relative to the epidemiology of the disease.
2	21-40% the sum of all minority groups relative to the epidemiology of the disease and at least one minority group* reaching 50% relative to the epidemiology of the disease.
3	41-60% the sum of all minority groups relative to the epidemiology of the disease and at least two minority groups reaching 60% relative to the epidemiology of the disease.
4	61-80% the sum of all minority groups relative to the epidemiology of the disease and at least three minority groups reaching 60% relative to the epidemiology of the disease.
5	80% the sum of all minority groups relative to the epidemiology of the disease and at least three minority groups reaching 80% relative to the epidemiology of the disease.

Table 1

§: Studies will be ranked at the next lower rank if all criteria for next higher rank are not reached.

*Minority groups in the US are self-defined by the participants and are listed as follows: African American or Black, Native American, Asian, Hispanic, and race. In other countries, minorities should be defined as appropriate, based on societal norms and internationally medically acceptable groups/nationalities.