



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Achieving Health Equity Through Digestive Diseases Research and Scientific Workforce Diversity



In recent years, the COVID-19 pandemic, economic instability, and tragic cases of race-based violence and injustice have brought to light deep-seated inequalities with profound impacts on health. These events have served as a clarion call to confront health disparities related to race, ethnicity, and gender. This moment compels us to listen, reflect, and take collective action in a meaningful way within our spheres of influence in research and medicine, including the field of gastroenterology. We applaud the American Gastroenterological Association (AGA) on its efforts to address disparities in digestive diseases and ensure health equity, including its Equity Project and this “DEI in GI” column in *Gastroenterology*, emphasizing diversity, equity, and inclusion activities. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) is actively working, together with the AGA and other partners, to create more disparities-focused research programs with engaged participants, inclusive training opportunities, and diverse scientific workforces, ultimately aimed at achieving health equity for all.

Health Disparities in Digestive Diseases

Health disparities can be found in many of the chronic diseases within the NIDDK’s mission, and digestive diseases are no exception. Several forms of digestive disease, whether common or rare, are more predominant in some racial, ethnic, or gender groups. These groups can also face greater barriers to participating in clinical research and to receiving the

care they need, in terms of access to high-quality treatment and preventive services, issues of health literacy and trust, and health care providers’ biases.

Examples of digestive conditions that disproportionately affect one or more ethnic or racial minority populations, often correlated with more severe or advanced disease, include constipation, *Helicobacter pylori* infection and associated gastritis, hepatitis B and C, nonalcoholic fatty liver disease and nonalcoholic steatohepatitis, gallbladder disease, pancreatitis, and obesity.^{1–3} Health care-related inequities resulting in poorer outcomes have been noted for people from racial and ethnic minority groups with irritable bowel syndrome and inflammatory bowel disease, though these groups remain understudied.^{4,5} Women are disproportionately affected by some gastrointestinal (GI) conditions, such as constipation and irritable bowel syndrome.¹ Racial and gender-based health disparities exist in accessing life-saving liver transplants.⁶ Many digestive diseases in the NIDDK’s mission with greater impacts on some ethnic or racial groups can heighten the risk of cancers, such as *H. pylori*-related gastritis and gastric cancer, inflammatory bowel disease and colon cancer, pancreatitis and pancreatic cancer, and cirrhosis and liver cancer.

Tracing the origins of these health disparities requires consideration of the social determinants of health (SDoH)—the conditions in which people live that influence a broad range of health outcomes.^{7,8} Many of these SDoH are relevant to GI conditions, such as access to health care and medications, education and health literacy, and food and nutrition, some of which are shown in [Supplementary Figure 1](#). COVID-19—through its hard-hitting impacts on many people from racial and ethnic minority groups, direct GI manifestations, increased risk of severe illness in people with underlying conditions such as obesity and chronic liver disease, and effects on SDoH such as food insecurity and delayed care—represents a potent amplifier of health disparities in GI-related conditions.^{9,10}

The National Institute of Diabetes and Digestive and Kidney Diseases Approaches to Alleviating Digestive Health Disparities

Many institutes, centers, and offices at the National Institutes of Health (NIH), including the NIDDK, fund research on digestive diseases and on health disparities.¹¹ The NIDDK often cofunds digestive diseases research with the NIH Office of Research on Women’s Health, Office of Dietary Supplements, Office of Disease Prevention, and Office of Behavioral and Social Sciences Research. Ongoing collaborative research programs and partnerships demonstrate the NIDDK’s enduring commitment to supporting research on digestive diseases where health disparities exist, such as in pancreatitis, liver cirrhosis, and GI symptoms associated with neurodegenerative diseases.^{12–16} Additionally, research efforts focused on nutrition and obesity in children and adults are supported by the NIDDK and others at the NIH, in coordination with the NIH Office of Nutrition Research. The NIDDK’s efforts in this area include studies of bariatric surgery and new treatments for people with obesity based in part on NIDDK-funded research and work related to metabolic effects of the gut microbiome on both over- and undernutrition.^{17–20}

Broader, trans-NIH efforts in which the NIDDK participates include the following^{21–25}:

- the NIH Obesity Research Task Force and its *Strategic Plan for NIH Obesity Research*, which identifies health disparities as a cross-cutting issue (the NIDDK co-leads the task force together with other NIH institutes);
- the *Strategic Plan for NIH Nutrition Research*, which was co-led by the NIDDK and other NIH institutes, with ongoing NIDDK participation in the Plan’s Nutrition and Health Disparities Implementation Working Group; and

DIVERSITY, EQUITY, AND INCLUSION IN GI

- the NIDDK's COVID-19 related programs, which are part of trans-NIH efforts relating to people who are medically underserved and individuals with long-term symptoms, including those affecting the digestive system.

In addition to these collaborative efforts, the NIDDK stands together with all of NIH in actively supporting the UNITE initiative to address structural racism in science, with a funding opportunity on understanding and addressing the impact of structural racism and discrimination on minority health and health disparities, and the Transformative Research to Address Health Disparities and Advance Health Equity Common Fund program.^{26–28}

The NIDDK's activities also extend to interagency partnerships, such as its leadership of the Digestive Diseases Interagency Coordinating Committee with other NIH and federal partners.²⁹ The Digestive Diseases Interagency Coordinating Committee most recently convened a meeting on gallstones, which highlighted the higher prevalence in American Indians. The NIDDK partners on interagency liver disease-related efforts, exemplified by a collaboration with the Centers for Disease Control and Prevention tracking the prevalence of nonalcoholic fatty liver disease across racial, ethnic, and gender groups through the National Health and Nutrition Examination Survey and through participation in the US Department of Health and Human Services *Viral Hepatitis National Strategic Plan for the United States*, featuring a goal to reduce viral hepatitis-related disparities and health inequities.^{30,31}

Promoting Diversity and Inclusion in Digestive Disease Research

The NIDDK is guided by a vision statement that emphasizes the importance of diversity and inclusion—of women, people from racial and ethnic minority groups, and other people who are underrepresented in biomedical research—in the clinical studies we support and in the scientific workforce through opportunities for training,

mentoring, and career development.³² These efforts are aimed at making our study populations and research community reflective of the diverse experiences of the nation as a whole, resulting in the highest-quality science. Recent NIDDK Advisory Council meetings featured a 3-part forum on fostering investigators, as well as areas of science, that are underrepresented and a forum on patient and community engagement in NIDDK research, with presentations by representatives of patient advocacy groups, including the Crohn's and Colitis Foundation.³³ These commitments to diversity and inclusion in research are critical, particularly in the context of the COVID-19 pandemic and the threat it has posed to the careers of scientists, including those who are early-career, from a racial or ethnic minority group, and/or women.

To help increase diversity in the GI research workforce, the Institute supports training and career development opportunities at each stage (see [Table 1](#)).³⁴ For example, the NIDDK Office of Minority Health Research Coordination manages the Short-Term Research Experience Program to Unlock Potential (STEP-UP), providing summer internships in laboratories for high school and undergraduate students. Undergraduates are also eligible for the NIDDK Diversity Summer Research Training Program. Additionally, the NIDDK offers travel awards for undergraduates, residents, and fellows to attend national conferences focusing on populations who are medically underserved. The NIDDK's Network of Minority Health Research Investigators provides postdoctoral-level researchers and higher with access to mentoring opportunities, workshops, and travel awards. The NIDDK also participates in NIH-wide training programs, such as the Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) Postdoctoral Career Transition Award to Promote Diversity, and funds NIH research supplements to promote diversity in the research workforce and to support career re-entry after an extended absence.^{35–37}

For many years, the NIDDK has partnered with the AGA to support

diversity-related research training and mentoring activities through the R25 program. Currently, the NIDDK supports the AGA's Fostering Opportunities Resulting in Workforce and Research Diversity (FORWARD) program, which matches early-stage physician-scientists with top GI investigators to help develop leadership, research, and management skills.³⁸ This program has resulted in successful outcomes for participants, such as high rates of grant awards and selection for leadership positions within AGA.

Future Plans for Enhancing Digestive Health Equity and Community Engagement

Although the NIDDK has demonstrated its commitment to combatting health disparities in its mission-area diseases through past and ongoing initiatives and programs,^{39,40} there is more work to be done, and now is the time for matching our values with further action. Looking forward, the *NIDDK Strategic Plan for Research: Pathways to Health for All*, released in December 2021, reaffirms this commitment with an emphasis on health equity, workforce diversity, and stakeholder engagement as major, cross-cutting themes (see [Figure 1](#)).⁴¹ This strategic plan was developed with extensive stakeholder input, including from the AGA and other professional and patient advocacy groups in digestive diseases, and complements disease-specific research plans, such as past planning efforts related to digestive diseases.

The NIDDK is increasing attention on this critically important area through a recently established Health Disparities and Health Equity Working Group of our Advisory Council. This Working Group is charged with developing an implementation plan based on the NIDDK strategic plan that will provide a guiding framework for enhancing and enmeshing health disparity and health equity throughout the research portfolio. With the participation of external scientific experts, nonscientist community experts,

DIVERSITY, EQUITY, AND INCLUSION IN GI

Table 1. Examples of NIDDK Sponsorship and Participation in Training/Career Development Programs for Underrepresented Groups Helping to Increase Diversity in the Digestive Diseases Research Workforce

Program	Eligible individuals	For more information
Short-Term Research Experience Program to Unlock Potential (STEP-UP)	High school and undergraduate students	https://www.niddk.nih.gov/research-funding/research-programs/diversity-programs/research-training-opportunities-students/step-up
Diversity Summer Research Training Program (DSRTP)	Undergraduate students	https://www.niddk.nih.gov/research-funding/research-programs/diversity-programs/research-training-opportunities-students/diversity-summer-research-training-program-dsrtp
Travel and Scholarship Awards	Undergraduates, residents, and fellows	https://www.niddk.nih.gov/research-funding/research-programs/diversity-programs/travel-scholarship-awards
NIDDK Support for Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) Postdoctoral Career Transition Award to Promote Diversity	Postdoctoral investigators	https://grants.nih.gov/grants/guide/pa-files/PAR-21-271.html https://grants.nih.gov/grants/guide/pa-files/PAR-21-272.html
Network of Minority Health Research Investigators (NMRI)	Postdoctoral level or higher investigators	https://www.niddk.nih.gov/research-funding/research-programs/diversity-programs/network-minority-health-research-investigators-nmri
Small Grants for New Investigators to Promote Diversity in Health-Related Research	New investigators	https://grants.nih.gov/grants/guide/pa-files/par-21-313.html
NIDDK Support for Research Supplements to Promote Diversity in Health-Related Research	Principal investigators submit to support candidates at the high school, undergraduate, pre-/postdoctoral, or early investigator stages	https://www.niddk.nih.gov/research-funding/process/apply/funding-mechanisms/administrative-supplements-research-grants/research-supplements-promote-diversity-health-related-research

NIDDK, National Institute of Diabetes and Digestive and Kidney Diseases.

and NIDDK staff, the Working Group's subgroups are focusing on 4 main themes for the implementation plan:

- engaging communities and building sustainable partnerships that include health care providers,

researchers, individuals living with or at risk of disease, their caregivers, and others interested in the health of our communities;

- understanding SDoH effects on the biology of health and disease;

- mitigating the effects of SDoH to improve health and eliminate disparities; and

- addressing upstream causes of SDoH and health disparities from an NIDDK perspective.



Figure 1. The National Institute of Diabetes and Digestive and Kidney Diseases strategic plan major themes.

Reinforcing the importance of hearing and valuing the voices of those experiencing disparate outcomes, part of this effort entails incorporating input from individuals living with or at risk for NIDDK-related diseases and their caregivers to help shape research recommendations to eliminate health disparities and promote health equity. Through community engagement listening sessions, the NIDDK will gather input and suggestions from community members, patients, and caregivers about what we should be researching and how. Information that participants share will be provided to the subgroups and will directly contribute to the development

DIVERSITY, EQUITY, AND INCLUSION IN GI

of the NIDDK Health Disparities/Health Equity Research Implementation Plan by reflecting the research needs, values, and priorities of the individuals and communities that the NIDDK serves. These activities will be part of broader ongoing efforts to engage community stakeholders at each step of the research process, as articulated in the NIDDK strategic plan. The Working Group held its first meeting in December 2021 and will convene for meetings through the summer of 2022. A draft of the report and recommendations is planned to be presented to the NIDDK Advisory Council early next year.

Conclusions

The NIDDK continues to make advancing health equity and diversity issues a central part of its mission going forward to optimally promote research on diseases such as GI and liver conditions. With the recent *NIDDK Strategic Plan for Research* and efforts by the new Health Disparities and Health Equity Working Group, the Institute is building upon past progress made in this area. Through future-looking programs and partnership efforts, including those with the AGA and other professional and patient advocacy organizations, we continue to work toward realizing health equity for all those affected by digestive diseases.

MEGAN E. SINGH
STEPHEN P. JAMES
GREGORY G. GERMINO
GRIFFIN P. RODGERS

National Institute of Diabetes and Digestive and Kidney Diseases
National Institutes of Health
Bethesda, Maryland

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Gastroenterology* at www.gastrojournal.org, and at <https://doi.org/10.1053/j.gastro.2022.01.005>.

References

1. National Institute of Diabetes and Digestive and Kidney Diseases. Digestive diseases. Available at: <https://www.niddk.nih.gov/health-information/digestive-diseases>. Accessed March 9, 2022.
2. National Institute of Diabetes and Digestive and Kidney Diseases. Liver disease. Available at: <https://www.niddk.nih.gov/health-information/liver-disease>. Accessed March 9, 2022.
3. National Institute of Diabetes and Digestive and Kidney Diseases. Understanding adult overweight & obesity. Available at: <https://www.niddk.nih.gov/health-information/weight-management/adult-overweight-obesity>. Accessed March 9, 2022.
4. Sasegbon A, Vasant DH. Understanding racial disparities in the care of patients with irritable bowel syndrome: the need for a unified approach. *Neurogastroenterol Motil* 2021;33(5):e14152.
5. Nguyen GC, Chong CA, Chong RY. National estimates of the burden of inflammatory bowel disease among racial and ethnic groups in the United States. *J Crohns Colitis* 2014;8:288–295.
6. Nephew LD, Serper M. Racial, gender, and socioeconomic disparities in liver transplantation. *Liver Transpl* 2021;27:900–912.
7. US Department of Health & Human Services. Office of Disease Prevention and Health Promotion. Social determinants of health. Healthy People 2030. Available at: <https://health.gov/healthy-people/objectives-and-data/social-determinants-health>. Accessed March 9, 2022.
8. World Health Organization. Social determinants of health. Available at: https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1. Accessed March 9, 2022.
9. Koh C, Liang TJ. Coronavirus disease-19 has come home to roost in gastroenterology. *Gastroenterology* 2020;159:36–38.
10. Rodgers GP, Gibbons GH. Obesity and hypertension in the time of COVID-19. *JAMA* 2020; 324:1163–1165.
11. National Institutes of Health. Estimates of funding for various research, condition, and disease categories (RCDC). Research Portfolio Online Reporting Tools. Available at: <https://report.nih.gov/funding/categorical-spending/>. Accessed March 9, 2022.
12. Consortium for the Study of Chronic Pancreatitis, Diabetes and Pancreatic Cancer. Available at: <https://www.dmscro.org/cpdpc>. Accessed March 9, 2022.
13. National Institutes of Health. Liver cirrhosis network: clinical research centers. Available at: <https://grants.nih.gov/grants/guide/rfa-files/rfa-dk-20-003.html>. Accessed March 9, 2022.
14. National Institute of Diabetes and Digestive and Kidney Diseases. The gut brain axis as a critical element in the development of Parkinson's disease. Available at: <https://www.niddk.nih.gov/news/meetings-workshops/2021/gut-brain-axis-as-critical-element-in-development-of-parkinsons-disease>. Accessed March 9, 2022.
15. National Institute of Diabetes and Digestive and Kidney Diseases. Neurodegenerative disorders and the gut-brain axis: Parkinson's disease. Available at: <https://www.niddk.nih.gov/news/meetings-workshops/2021/brain-gut-axis-neurodegenerative-diseases>. Accessed March 9, 2022.
16. Hemming JP, Gruber-Baldini AL, Anderson KE, et al. Racial and socioeconomic disparities in Parkinsonism. *Arch Neurol* 2011; 68:498–503.
17. National Institute of Diabetes and Digestive and Kidney Diseases. Long-term study of bariatric surgery for obesity: LABS. Available at: <https://www.niddk.nih.gov/about-niddk/research-areas/obesity/longitudinal-assessment-bariatric-surgery>. Accessed March 9, 2022.
18. Wadden TA, Bailey TS, Billings LK, et al. Effect of subcutaneous semaglutide vs placebo as an adjunct to intensive behavioral therapy on body weight in adults with overweight or obesity: the STEP 3 randomized clinical trial. *JAMA* 2021; 325:1403–1413.

DIVERSITY, EQUITY, AND INCLUSION IN GI

19. Delannoy-Bruno O, Desai C, Raman AS, et al. Evaluating microbiome-directed fibre snacks in gnotobiotic mice and humans. *Nature* 2021;595(7865):91–95.
20. Chen RY, Mostafa I, Hibberd MC, et al. A microbiome-directed food intervention for undernourished children. *N Engl J Med* 2021; 384:1517–1528.
21. National Institutes of Health, Obesity Research Task Force. NIH-supported obesity research. Available at: <https://www.obesityresearch.nih.gov>. Accessed March 9, 2022.
22. National Institutes of Health, Office of Nutrition Research. 2020–2030 Strategic plan for NIH nutrition research. Available at: <https://dpcpsi.nih.gov/onr/strategic-plan>. Accessed March 9, 2022.
23. National Institutes of Health. Mechanistic studies of the interaction between SARS-CoV-2/COVID-19 and diseases and organ systems of interest to NIDDK. Available at: <https://grants.nih.gov/grants/guide/rfa-files/RFA-DK-20-021.html>. Accessed March 9, 2022.
24. National Institutes of Health. RECOVER. Continuing the search for answers. Available at: <https://recovercovid.org/funding>. Accessed March 9, 2022.
25. National Institutes of Health. RADx-UP. Available at: <https://radx-up.org>. Accessed March 9, 2022.
26. National Institutes of Health. Ending structural racism. UNITE. Available at: <https://www.nih.gov/ending-structural-racism/unite>. Accessed March 9, 2022.
27. National Institutes of Health. Understanding and addressing the impact of structural racism and discrimination on minority health and health disparities. Available at: <https://grants.nih.gov/grants/guide/rfa-files/rfa-md-21-004.html>. Accessed March 9, 2022.
28. National Institutes of Health. Office of Strategic Coordination. Transformative research to address health disparities and advance health equity. Available at: <https://commonfund.nih.gov/healthdisparities>
29. National Institute of Diabetes and Digestive and Kidney Diseases. Digestive diseases interagency coordinating committee. Available at: <https://www.niddk.nih.gov/about-niddk/advisory-coordinating-committees/digestive-diseases-interagency-coordinating-committee>. Accessed March 9, 2022.
30. Kim D, Cholankeril G, Loomba R, et al. Prevalence of fatty liver disease and fibrosis detected by transient elastography in adults in the United States, 2017–2018. *Clin Gastroenterol Hepatol* 2021; 19:1499–1501.
31. US Department of Health & Human Services. Viral hepatitis national strategic plan overview. Available at: <https://www.hhs.gov/hepatitis/viral-hepatitis-national-strategic-plan/national-viral-hepatitis-action-plan-overview/index.html>. Accessed March 9, 2022.
32. National Institute of Diabetes and Digestive and Kidney Diseases. Mission & vision. Available at: <https://www.niddk.nih.gov/about-niddk/meet-director/mission-vision>. Accessed March 9, 2022.
33. National Institute of Diabetes and Digestive and Kidney Diseases. National diabetes & digestive & kidney diseases advisory council. Available at: <https://www.niddk.nih.gov/about-niddk/advisory-coordinating-committees/national-diabetes-digestive-kidney-diseases-advisory-council>. Accessed March 9, 2022.
34. National Institute of Diabetes and Digestive and Kidney Diseases. Diversity programs. Available at: <https://www.niddk.nih.gov/research-funding/research-programs/diversity-programs>. Accessed March 9, 2022.
35. National Institutes of Health. Maximizing opportunities for scientific and academic independent careers (MOSAIC) postdoctoral career transition award to promote diversity. Available at: <https://grants.nih.gov/grants/guide/pa-files/PAR-21-271.html>. Accessed March 9, 2022.
36. National Institute of Diabetes and Digestive and Kidney Diseases. Research supplements to promote diversity in health-related research. Available at: <https://www.niddk.nih.gov/research-funding/process/apply/funding-mechanisms/administrative-supplements-research-grants/research-supplements-promote-diversity-health-related-research>. Accessed March 9, 2022.
37. National Institutes of Health. Research supplements to promote re-entry into biomedical and behavioral research careers. Available at: <https://grants.nih.gov/grants/guide/pa-files/PA-18-592.html>. Accessed March 9, 2022.
38. American Gastroenterological Association. FORWARD program. Available at: <https://gastro.org/aga-leadership/initiatives-and-programs/forward-program/>. Accessed March 9, 2022.
39. National Institutes of Health. Notice of special interest (NOSI): addressing health disparities in NIDDK diseases. Available at: <https://grants.nih.gov/grants/guide/notice-files/NOT-DK-20-003.html>. Accessed March 9, 2022.
40. Roberts BT, Rodgers GP. NIDDK initiatives addressing health disparities in chronic diseases. *J Clin Invest* 2020;130:5036–5038.
41. National Institute of Diabetes and Digestive and Kidney Diseases. NIDDK strategic plan for research. Available at: <https://www.niddk.nih.gov/about-niddk/strategic-plans-reports/niddk-strategic-plan-for-research>. Accessed March 9, 2022.

Acknowledgments

We thank David Saslowsky, Susan Yanovski, Mary Evans, Frank Hamilton, Lawrence Agodoa, Heather Rieff, Robert Tilghman, and Reaya Reuss for their helpful input.

Conflicts of interest

The authors disclose no conflicts.

Most current article

© 2022 by the AGA Institute
0016-5085/\$36.00

<https://doi.org/10.1053/j.gastro.2022.01.005>

DIVERSITY, EQUITY, AND INCLUSION IN GI



Supplementary Figure 1. A complex interplay of determinants affect digestive health equity.