





Resonate: Reaching Excellence Through Equity, Diversity, and Inclusion in ISMRM

Esther A.H. Warnert, PhD,¹  Lars Kasper, PhD,^{2,3,4}  Carolyn C Meltzer, MD,⁵ Johnson B Lightfoote, MD, MBA,^{6,7} Matthew D Bucknor, MD,⁸ Hamied Haroon, PhD,⁹ Gavin Duggan, PhD,¹⁰ Penny Gowland, PhD,¹¹ Larry Wald, PhD,¹² Karla L. Miller, PhD,¹³ Elizabeth A. Morris, MD,¹⁴  and Udunna C Anazodo, PhD^{15,16*} 

Equity, Diversity, and Inclusion (EDI) in ISMRM: It Is Time to Act

To solve complex medical problems in an increasingly global environment, inclusion of diverse ideas and populations are vital. EDI (defined in Fig. 1) have long been recognized as important strategic tools that enable institutions and organizations to excel.¹ Yet many groups—particularly ethnic minorities—remain disproportionately underrepresented in medical imaging training, practice, and research and continue to face barriers to entry, participation, and advancement.¹ This disparity is reflected in ISMRM membership and leadership composition, where members from the Global South represented >20% of the overall ISMRM membership in 2017, although 82% of the world's population reside in these regions. These regions have the lowest density of MRI scanners (compare <1 unit/million inhabitants in Africa to up to 37 units/million in the USA) and the lowest capacity to use MRI to solve the burden of chronic diseases rising rapidly in these

regions.^{2,3} With the heightened awareness of long-standing health inequities during the COVID-19 pandemic,⁴ it is now time to collectively act to reduce disparities in imaging.

Building on efforts in 2018 to address implicit bias within ISMRM,⁵ here we highlight approaches for reaching excellence in MRI through striving for inclusive representation of diverse groups in research teams and study populations. These approaches were discussed in a Member-Initiated Symposium entitled *Resonate: Practical Approaches for Implementing Diversity, Equity and Inclusion in MRI Research* and the inaugural Equity, Diversity and Inclusion Forum during the 27th Annual Meeting of the ISMRM (May 2019).

Achieving Excellence Through Diversity of Research Teams

Demonstrated actions that lead to long-term equitable outcomes adopted by partner organizations, such as the American College of Radiology, with a decade-long history of addressing

View this article online at wileyonlinelibrary.com. DOI: 10.1002/jmri.27476

Received Nov 30, 2020, Accepted for publication Dec 1, 2020.

*Address reprint requests to: U.C.A., Department of Medical Biophysics, Western University, London, ON, N6A4V2, Canada.

E-mail: uanazodo@lawsonimaging.ca

Level of Evidence: 5

Technical Efficacy Stage: 2

From the ¹Department of Radiology & Nuclear Medicine, Erasmus Medical Center Rotterdam, Rotterdam, The Netherlands; ²Techna Institute, University Health Network, Toronto, Ontario, Canada; ³Institute for Biomedical Engineering, ETH Zurich and University of Zurich, Zurich, Switzerland; ⁴Translational Neuromodeling Unit, Institute for Biomedical Engineering, University of Zurich and ETH Zurich, Zurich, Switzerland; ⁵Departments of Radiology and Imaging Sciences, Neurology, and Psychiatry and Behavioral Science, Emory University School of Medicine, Atlanta, Georgia, USA; ⁶Chair, Commission for Women and Diversity, American College of Radiology, Reston, Virginia, USA; ⁷Pomona Valley Hospital Medical Center, Pomona, California, USA; ⁸Department of Radiology and Biomedical Imaging, University of California San Francisco, San Francisco, California, USA; ⁹Division of Neuroscience & Experimental Psychology, The University of Manchester, Manchester, UK; ¹⁰Google Health, Palo Alto, California, USA; ¹¹School of Physics and Astronomy, University of Nottingham, Nottingham, UK; ¹²A.A. Martinos Center, Department of Radiology, Massachusetts General Hospital, Boston, Massachusetts, USA; ¹³Nuffield Department of Clinical Neurosciences University of Oxford, Wellcome Centre for Integrative Neuroimaging, FMRIB, Oxford, UK; ¹⁴Department of Radiology, Memorial Sloan Kettering Cancer Center New York, New York, USA; ¹⁵Department of Medical Biophysics, Western University, London, Ontario, Canada; and ¹⁶Lawson Health Research Institute, St Joseph's Health Care, London, Ontario, Canada



FIGURE 1: Operational definition of the diversity, equity, and inclusion objective and examples of initiatives to advance each objective, noting that excellence is a superset of diversity, equity, and inclusion.

EDI gaps in radiology, are highlighted here.^{1,6} These actions operate at three organizational levels: our scientific society, the institutions we work in, and our own research groups.

At the level of the scientific society, ISMRM leadership have shown a commitment to equity through creation of the EDI committee to help guide ISMRM policies and practices and provide EDI resources to the community.¹ To accelerate a transformation in equity, education, and research specific to understanding and addressing inequities is essential. Immediate actions (Fig. 1) with a strong focus on financial assistance and mentorship that allow underrepresented scientists to participate in meetings and attain leadership roles—understanding that vulnerable groups (eg, low-income countries, disabled people,

or early career investigators) may require more mentorship/ assistance—and regular publication of EDI outcomes will lead to long-term equity improvements at ISMRM. Improving open access dissemination of MRI research in society journals and minimizing publication bias are also immediate society-level actions to advance research excellence through diversity.

At the institutional level, radiology departments with a strong commitment to excellence through diversity have demonstrated that a top-down approach fostering a transformative EDI culture via enhanced recruitment, retention, and education, creates an inclusive workplace environment.⁶ Commitment to hire, network, and promote differently trickle-down to the individual, especially to research team leaders.^{6,7} A *one style fits all* approach is not effective in

¹<https://www.ismrm.org/edi>

creating inclusive research environments or imaging practices. We all should actively expand our research “circle” beyond an intradisciplinary reach to include colleagues from groups historically underrepresented in MRI.¹

Achieving Excellence Through Inclusion of Diverse Study Populations

Mitigating health disparities equally requires purposeful recruitment and retention of diverse study cohorts. Given that the majority (86%) of drug trials performed globally are exclusively on populations of European descent,⁸ diversity in study populations, though critical, is clearly underappreciated. To reach diverse study cohorts, Ejiogu et al⁹ outlined solutions to overcome barriers to research participation unique to underrepresented groups, including challenges at the individual level, collective negative views on research held by a community, and barriers imposed by the research design (*one size fits all*). To illustrate, the selection of a research hypothesis that is directly related to underrepresented community needs through community-based participatory research can help close disparity gaps.⁹ Community-based participatory research involves community members during the design and lifetime of a study, including recruitment and retention of participants, through a sustained and respectful partnership with researcher/research facility. Thus, building strong coalitions for health equity.

Building health equity coalitions in medical imaging is urgently needed with the increasing use of computer-aided diagnosis and machine learning, based on adaptive algorithms that learn patterns from training data. Because obtaining inclusive datasets requires forethought, time, and money (especially for MRI), using datasets of “convenience”—homogenous populations—in lieu can result in biased models and outcomes. In the interim, recent stopgap strategies including generating bias-free prediction with the Adversarial Fairness Network¹⁰ or using open source Facets visualization tools to gain a holistic view of training datasets, can provide immediate solutions to mitigate subconscious and sampling bias and improve equitable clinical outcomes. If done with representative training datasets, machine learning can advance equity in medical imaging. For MRI, this can be facilitated through society-driven efforts to include existing images from emerging regions of the world in open access data sharing initiatives.

Looking Forward: Fostering a Future of Inclusivity at ISMRM

“If you want to go fast, go alone. If you want to go further, go together.”

—Anonymous

The commitment of leadership is critical to the success of diversity initiatives. Nonetheless, all members of ISMRM have an equal responsibility to actively commit to the

diversity, representation, and inclusion mission of the various organizations and institutions we engage with, to sustain inclusive environments. EDI transformation takes time, and continued willful commitment is required to achieve excellence. We should recognize that excellence is a superset of diversity and inclusion; equity serves excellence; diversity is required to reach excellence; and excellence cannot be achieved without inclusion. We have a unique opportunity as an international society to drive the rapid advancements we have made in MRI technology to further heights by working together with all MRI users around the world so we can go further and continue to create new ways of seeing.

Acknowledgments

The authors thank Michael Muelly, who was slated to speak at the Resonate Member-initiated Symposium at the 2019 ISMRM Annual Meeting, but due to unforeseen circumstances was unable to attend but made valuable contributions. We thank John Port, Douglas Noll, Nicole Seiberlich, Matt Bernstein, Mark Schweitzer, Peter Jezzard, Pia Sundgren, and Tim Leiner for their contribution to the Panel discussion at the Equity Forum at the 2019 ISMRM Annual Meeting. The Resonate Member-Initiated Symposium has benefitted from support of the ISMRM Executive Director, Roberta Kravitz, and the ISMRM Central Office. The authors express their gratitude to the members of the ISMRM EDI Committee and to all ISMRM members who participated in the diversity initiatives at the 2019 ISMRM Annual Meeting (Resonate Member-Initiated Symposium and Equity Forum).

References

1. Lightfoote JB, Fielding JR, Deville C, et al. Improving diversity, inclusion, and representation in radiology and radiation oncology, Part 1: Why these matter. *J Am Coll Radiol* 2014;11(7):673-680.
2. Geethanath S, Vaughan JT Jr. Accessible magnetic resonance imaging: A review. *J Magn Reson Imaging* 2019;49:e65-e77.
3. Ezzati M, Pearson-Stuttard J, Bennett JE, Mathers CD. Acting on non-communicable diseases in low- and middle-income tropical countries. *Nature* 2018;559(7715):507-516.
4. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. COVID-19 and racial/ethnic disparities. *JAMA* 2020;323(24):2466-2467 (epub ahead of print).
5. Warnert EA, Nayak K, Menon R, et al. Resonate: Reflections and recommendations on implicit biases within the ISMRM. *J Magn Reson Imaging* 2019;49:1509-1511.
6. Lightfoote JB, Fielding JR, Deville C, et al. Improving diversity, inclusion, and representation in radiology and radiation oncology part 2: Challenges and recommendations. *J Am Coll Radiol* 2014;11(8):764-770.
7. Bucknor MD, Villanueva-Meyer JE, Kumar V, et al. Diversity and inclusion efforts in University of California, San Francisco radiology: Reflections on 3 years of pipeline, selection, and education initiatives. *J Am Coll Radiol* 2019;16(12):1716-1719.

8. U.S. Food & Drug Administration. 2015-2016 Global Participation in Clinical Trials Report. July 2017. Accessed December 18, 2018. Available from: <https://www.fda.gov/media/106725/download>
9. Ejiogu N, Norbeck JH, Mason MA, Cromwell BC, Zonderman AB, Evans MK. Recruitment and retention strategies for minority or poor clinical research participants: Lessons from the healthy aging in neighborhoods of diversity across the life span study. *Gerontologist* 2011;51(S1):S33-S45.
10. Zhang BH, Lemoine B, M Margaret. AIES '18: Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society December 2018. Pages 335-340. <https://doi.org/10.1145/3278721.3278779>.