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GUEST EDITORIAL

Promoting good research practices in neuroscience: A foundation for integrity

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Neuroscience, as a rapidly advancing interdisciplinary field, holds immense potential for both clinical applications and the development of brain-inspired technologies. However, this potential fundamentally depends on the integrity of the research processes that generate foundational knowledge. In this editorial, I aim to discuss the principles of research integrity and good research practice within the context of neuroscience.

One of the most fundamental questions in neuroscience research concerns the rationale behind conducting scientific inquiry in this field. Beyond the pursuit of knowledge, the primary objectives often include elucidating the pathophysiology of neurological disorders, identifying and developing therapeutic targets, and advancing our understanding of the brain's complex functional architecture. These aims not only serve clinical interests but also provide essential knowledge for the development of novel technologies, such as advanced artificial intelligence systems inspired by neural computation.

Given the translational potential of neuroscience research, it is imperative that scientific endeavors be conducted with the highest standards of honesty, transparency, and reproducibility. These principles are encapsulated within the concept of research integrity, which serves as the cornerstone of scientific credibility. Closely related is the framework of Good Research Practice (GRP) (1), which operationalizes integrity through rigorous methodological and ethical standards. Adherence to these principles ensures that research outcomes can be reliably translated into therapeutic innovations and technological advancements.

Research integrity is defined by Imperial College London (2) as "conducting research in a way that allows others to have trust and confidence in the methods used and the findings that result." It reflects not only the quality of individual research projects but also the reputation of the institution, its researchers, and the broader research community. Therefore, scientific integrity constitutes a cornerstone of credible academic inquiry. Beyond safeguarding the professional reputation of researchers, it fosters public confidence in science and underpins broader socio-economic advancement (3).

The European Code of Conduct for Research Integrity (2023 revision) defines the core principles of research integrity as: reliability, honesty, respect, and accountability (4). According to ALLEA (All European Academies), these principles encompass research quality, transparency, fairness, respect for all stakeholders (researchers, society, the ecosystem), and good practices throughout the research cycle—from idea generation to data collection, supervision, and publication.

It is evident that research integrity and good practices are essential for neuroscience. Therefore, it is crucial to understand the components of research integrity and foster a culture that fully embraces them. This culture will ultimately benefit researchers, patients, funding agencies, governments, and the public. Clear and transparent research grounded in honest data enables the development of effective and well-founded diagnostic and treatment approaches for neurological disorders.

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One critical component of research integrity is the research environment. While this often refers to capacity building, it also involves much more. Bland and Ruffin (5) analyzed the literature to identify characteristics of successful research environments. Key elements include a clear research strategy, an organization that values research, research-oriented leadership, and access to resources. In today's context, data management and data protection should be added to this list.

Another essential component of good research practice is training, supervision, and mentoring. Research institutions should provide comprehensive training in research design and methodology, offer ethics- and integrity-focused education, and ensure that researchers at all career stages receive ongoing guidance. Mentorship, particularly from senior researchers, plays a crucial role. Good mentors foster good researchers. In practice, early-career researchers often learn through the day-to-day conduct of their mentors. For master's and PhD programs, structured training steps and regular supervision should be clearly defined. Supervisors should enable students and postdoctoral researchers to conduct all stages of research with rigor, honesty, and transparency. Training on transparency, ethics, reproducibility, and integrity must be incorporated throughout. Organizations like ORPHEUS (Organisation for PhD Education in Biomedicine and Health Sciences in the European System), in collaboration with the Association of Medical Schools in Europe (AMSE) and the World Federation for Medical Education (WFME), have developed best practices for PhD training (6).

Publication and dissemination of research results are equally critical, as they can influence future clinical practices. Researchers must take responsibility for their data, making it publicly available and reporting both positive and negative results with honesty. Authorship disputes are another concern. Most journals now require a detailed contribution statement to prevent issues such as ghost, guest, or gift authorship. Organizations such as the Committee on Publication Ethics (COPE), the International Committee of Medical Journal Editors (ICMJE), and the World Health Organization (WHO) provide guidelines to promote transparency, open data, and ethical publishing practices.

An additional issue in the discussion of good practices is research misconduct, which remains relatively common. Misconduct includes data fabrication, falsification, image manipulation, plagiarism, undisclosed conflicts of interest, and result misinterpretation. Bonn and Pinxten (7) identified potential causes of misconduct, including unrealistic expectations, hyper-competitive research cultures, limited resources and mentoring, and lack of time for proper research.

As neuroscience continues to intersect with clinical practice and emerging technologies, the need for trustworthy, reproducible, and ethically sound research becomes increasingly urgent. Research integrity and good research practice are not peripheral—they are central to advancing both scientific understanding and technological innovation.

Establishing a culture of integrity requires institutional commitment, researcher education, and systemic reforms in funding, publication, and evaluation. Only through such comprehensive efforts can neuroscience realize its potential to transform medicine and society.

In summary, research integrity and good research practices are not merely procedural—they are the foundation of credible, impactful science. Neuroscience, a discipline bridging biology, psychology, medicine, and technology, has both the opportunity and the responsibility to lead in ethical and rigorous research. Through transparency, accountability, and ongoing education, the neuroscience community can foster trust, drive innovation, and make meaningful contributions to both science and society.

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Yasemin Gursoy Ozdemir, M.D., Ph.D., graduated from Hacettepe University Faculty of Medicine in 1992. She completed her neurology residency at the same faculty between 1992 and 1997. She also completed her Ph.D. in Neuroscience between 1997 and 2001. She conducted postdoctoral research at Harvard University from 2001 to 2004. She received a Fulbright scholarship in 2000 and an International Brain Research Organization scholarship in 2001. In 2005, she was awarded the TUBA GEBIP prize, and in 2006 she received the Eczacibasi Science Encouragement Award. In 2007, she won the I. Aysun Temizel Science Award from Guven Hospital, and in 2008 she received the TUBITAK Encouragement Prize.

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