

Regulation and self-regulation of ethical practices in scientific publication

Liliana Mondragón Barrios,¹ José Alberto Jiménez Tapia,¹ Denize Maday Meza Mercado,¹ Liz Sosa Mora¹

¹ Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz. Ciudad de México, México.

Correspondence:

Liliana Mondragón
Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz.
Calz. México-Xochimilco 101, Col. San Lorenzo Huipulco, Del. Tlalpan, C.P. 14370, Ciudad de México, México.
Phone: +52 (55) 4160-5333
Fax: (52 55) 5513-3446
Email: lilian@imp.edu.mx

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ABSTRACT

Introduction. The process of publication is influenced by a pressure on researchers to demonstrate their competence and productivity by publishing large numbers of articles in indexed journals. But there is a great deal of ignorance regarding the ethical obligations in scientific publication; worse, ethical considerations are often seen as mere formalities in the process of publishing an article. **Objective.** This article discusses the ethical practices related to the publication of a scientific article. It encompasses those defined by forms of external regulation and those that might be identified as forms of self-regulation, and it argues for the greater effectiveness of the latter in scientific publication. **Method.** We performed a literature review and a critical analysis of the information. **Results.** There are negative factors that range from plagiarism and the duplication of articles to the fabrication and falsification of data. Researchers look for convenient solutions, taking refuge in practices condoned, paradoxically, by the very scientific community that condemns them. Rather than avoiding these forms of misconduct, the scientific community even justifies them at times, which means that the practices continue. **Discussion and conclusion.** Self-regulation in scientific publication is a preferable goal: it allows participants in the process to assume their obligations freely and with a greater sense of responsibility.

Keywords: Ethics, research, publications, authorship.

RESUMEN

Introducción. Resulta necesario reconocer que el proceso de publicación está influenciado por factores como la presión institucional que se ejerce sobre los investigadores para que publiquen mayor cantidad de artículos en revistas indexadas, lo cual se usa como parámetro de productividad y capacidad. Pero existe un desconocimiento amplio en relación con las obligaciones éticas de la publicación o, peor aún, muchas veces la ética es vista como mero requisito para la aceptación y publicación de un artículo. **Objetivo.** Este trabajo expone las prácticas éticas implicadas en el proceso de publicación de un texto científico, tanto las que se consideran actualmente regulación externa como aquellas que podrían ser identificadas como autorregulativas, a fin de que éstas últimas puedan imperar dentro de las publicaciones. **Método.** Se realizó una revisión de la literatura sobre la materia y un análisis crítico sobre la información. **Resultados.** Existen efectos negativos que van desde la duplicación de artículos y el plagio hasta la fabricación o falsificación de datos. Incluso, se ha buscado una solución cómoda ante las reglas impuestas por la ética de la publicación, pero algunos investigadores han encontrado amparo en prácticas consensuadas dentro de la propia comunidad científica que, paradójicamente, las condena, y a pesar de ello no evita las vejaciones, incluso las llega a "justificar", por lo que siguen presentándose. **Discusión y conclusión.** La autorregulación debería ser razón suficiente para asumir las obligaciones libremente y con mayor responsabilidad dentro del ámbito de la publicación científica.

Palabras clave: Ética, investigación, publicación, autoría.

INTRODUCTION

The publication of scientific texts is fundamental to science as a “system of communication and dissemination” (Lolas, 2000): it is a valuable part of knowledge and essential to the success of scientists. However, for some researchers, publication has become an exchange of knowledge for purposes of prestige and promotion (Lolas & Outomuro, 2006), because it has scientific importance, but also political, economic, social, and ethical implications.

Researchers have a commitment to truth in the dissemination of their work, and they must show the intellectual capacity to generate knowledge in the service of scientific progress and the benefit of humanity (Lolas, 2000). However, there are potential problems that can impede the fulfillment of this ethical imperative. One is when researchers do not fully understand their ethical obligations, or consider them as a mere formality required by journals. Another is the pressure to publish a large number of articles in high-impact journals (Reyes, Kauffmann, & Andresen, 2000; Terán, 2011; Targino, 2011), which have become an indicator of productivity, ability, and quality.

The negative effects of this situation are reflected in a less than responsible conduct that diminishes the ethical integrity of a publication. These lapses are due not only to the pressure to publish, but also to the authors’ interests and the absence of oversight in the publishing process (Rodríguez et al., 2006); they affect the reliable dissemination of scientific work and the individuals involved: authors, editors, reviewers, and funding sources (Ángeles, 2010; Avanzas, Bayes-Genis, Pérez de Isla, Sanchis, & Heras, 2011).

Responsibility for the ethical aspects of a publication and its authorship are in the hands of editors, who strive to develop a consensus on ethical standards as an underlying premise in research. Since some authors resist familiarizing themselves with interpreting or applying the professional norms of scientific publication (Camps, 2006)—that is, they refuse to regulate themselves—editors have become guarantors of the ethical compliance of articles and the prosecutors of research misconduct (Committee on Publication Ethics, 2005; Wager, Fiack, Graf, Robinson, & Rowlands, 2009), which makes them representatives of an external regulation of the scientific community.

Self-regulation could generate a balanced ethical culture with respect to academic and financial survival and the integrity of the author (Candilis, 2011). Researchers cannot allow themselves to engage in questionable behavior that threatens not only the integrity of science, but inflicts a direct harm on subjects and on society by producing false or fraudulent information that could lead to misleading decision-making (Martinson, Anderson, & De Vries, 2005; Wiedermann, 2016). The scientific community must familiarize itself with the ethical aspects of publication so that ignorance and omission are not used as justifications for a

lack of self-regulation. If researchers learn about the ethical issues and consider their role in self-regulation, they will also be able to address other factors behind the need to publish, as well as other aspects of the honest dissemination of scientific findings.

In this article, we describe the ethical practices involved in the preparation, review, and publication of a scientific text that constitute external regulation. We recast these practices as forms of self-regulation and propose their conception and elaboration in scientific publication.

METHOD

We conducted a review of the literature to identify the main topics of scientific publication practices, through consultations in the internet using different search engines (EBSCO, Web of Science, Elsevier and Google Scholar) for scientific articles on the topic. We reviewed the information and found that the practices were divided in the preparation of a manuscript, the revision of the article, and the peer review, as well as their respective ethical implications: authorship, the role of the journal editor and reviewers. We analyzed the information from the regulation and self-regulation of the ethical practices perspective.

RESULTS

Preparation of the scientific manuscript

Two elemental ethical components underlie the publication of scientific work: legality and legitimacy. The first has to do with the content and scientific rigor of the study. The second is concerned with protecting the safety and integrity of the study population, the community, the environment, or science itself. Legitimacy is a restriction external to the scientific community, represented by other researchers or by society in general (Lolas, 2000).

These components represent an ethical uniqueness in publication. Any study using solid methods and procedures should have legitimacy, just as research embodying the best intentions and benefits for its study population must count on the scientific skill and knowledge of those who carry it out.

Legality and legitimacy are central to the ethical integrity of publication and should be explicitly understood, as they indicate external regulation. Legality can be understood as self-regulation since it arises from the actions of the researcher. However, the ethical dimensions in presenting research findings are not always specified, in spite of being regulated. Some are defined as institutional policy; others are established in ethical codes, and still others in non-binding guidelines. There is a general ignorance of these ethical issues; the most common responsible practices

are those accepted by the majority of researchers, but they are not codified in any form (Steneck, 2007).

The presentation of ethical practices in publication is based on the idea that the scientific knowledge generated in research is intrinsically good, because it seeks to solve practical problems and create technologies (Sagols, Linares, & de la Garza, 2005); the assumption is that the testing of new ideas takes place within ethical boundaries and that researchers are honest. But the evidence shows that these practices of consensus among researchers do not necessarily reinforce traditional values, such as honesty (Kottow, 2005).

The duplication of publications is one example. An article that overlaps substantially with other publications constitutes redundancy or self-plagiarism (Sagols et al., 2005; Alfonso, Bermejo, & Segovia, 2005; Graf et al., 2007; International Committee of Medical Journal Editors, 2012; Zhang, 2010; Matías-Guiu & García-Ramos, 2010). The article may be in the same language or a different one, include new data or simply reproduce those of the initial publication without citation, or appear in indexed journals or those that are not (Alfonso et al., 2005). There may be variations in the language or journal in which it appears, in the order of authors' names, or in the title. These alterations affect the information and data about a given phenomenon, as they suggest that data in each paper are different rather than simply reported again (Steneck, 2007). This form of duplicate publication is common and has three types: a) groups of publications that are identical, with identical results; b) groups of publications that are identical, with different results; and c) groups of publications that are different, with identical results (Matías-Guiu & García-Ramos, 2010). This practice is deceptive because it makes a researcher appear more prolific. It is an obvious means of corrupting science because more than one article presents the same information (Collaborative Institutional Training Initiative, 2010). Such a situation could be the consequence of a lack of ethical norms and the absence of controls on the irresponsible conduct of researchers.

Other forms of misconduct that affect the integrity of scientific publication are plagiarism and the fabrication or falsification of data. Plagiarism is using ideas, words, results, or material generated by others, without proper citation. The use of procedures, techniques, or results of other researchers without permission or citation is a form of intellectual theft (Sanjuanelo et al., 2007; Cameron, Zhao, & McHugh, 2012). In turn, fabrication means the publication of invented data. The fabrication of a statistical measurement or result means the presentation of false data that renders a scientific publication worthless because it contains no authentic information. This may be done intentionally to improve the results (Sanjuanelo et al., 2007). Falsification is the manipulation of data or research procedures to produce desired results or omit mention of their limitations. It

dilutes the integrity of the work and the authors and has a negative effect on scientific advances, as it leads to erroneous conclusions that threaten the state of knowledge (Sanjuanelo et al., 2007).

Such forms of deception generate false beliefs in readers regarding scientific work (Collaborative Institutional Training Initiative, 2010). Scientific publications must be based on responsible conduct (National Research Council, 2002), which calls for intellectual honesty in the proposal, execution, and dissemination of research. There is a clear regulation of what may be published, but scientific misconduct is more common than is generally believed. It appears that a consensus regarding common practices is being taken as the norm, rather than the legitimacy defined by science and ethics. It has been noted that scientists engage in questionable behavior that goes beyond scientific misconduct and damages scientific integrity; scientists in a study admitted having participated in at least one of the ten forms of ethical misconduct. The scientific community must therefore consider the issues relevant to research and those most susceptible to change in order to guarantee its integrity (Martinson et al., 2005). Self-regulation must include an understanding of the ethical consequences of misconduct.

Authorship

The reliable dissemination of scientific results involves two fundamental elements: the vehicle by which they are made public and the figure of the author. One is a product, and the other the discursive entity that gives it personality and that possesses a social status. The authorship of a scientific work means academic recognition and advantage, as it facilitates obtaining additional financial support for research (Matías-Guiu & García-Ramos, 2010). "The credit derived from publication is used to determine the value of a researcher. Researchers are evaluated and promoted according to the quality and quantity of their research publications" (Steneck, 2007).

The identity of the author or co-author of a scientific publication has ethical importance; for this reason, authorship is defined by a significant contribution to the research in question. The International Committee of Medical Journal Editors (ICMJE) defines an author as someone who contributes substantially to a study, specifically to the conception, design, data collection, analysis, interpretation, and preparation and critical review of the manuscript (International Committee of Medical Journal Editors, 1997).

In collective authorship, involving multi-center projects carried out by a group of researchers, the group determines the collaborators responsible for the manuscript, based on these criteria. Those who do not meet the criteria may appear in the acknowledgements or in an appendix. This process occurs prior to submitting the article to a journal, since it is not the role of the editors to determine author-

ship. Most of the journals require contributors to identify a principal and a corresponding author. These assume responsibility for the integrity of the work as a whole (veracity of the data, order of authorship, correct citation, approval of the final product, handling of correspondence, response to inquiries, and declaring conflicts of interest). With this responsibility, they act in the name of their collaborators, and the decisions they make will affect their colleagues.

Authors appear in order according to their participation in the manuscript. This order is assigned in different ways according to each research group. The determination of the first author or the order in which authors appear is not defined by any clear set of rules. The requirements of the ICMJE provide only that the order should be a collective decision of the co-authors and that they should explain their criteria (Steneck, 2007).

What currently exists is an unwritten consensus in the scientific community concerning the designation of authors and co-authors. In some research groups, the customary practice is that the director or research head appears in every scientific manuscript (Terán, 2011). This form of regulation may be damaging to the ethical aspirations of scientific knowledge. Science rewards quality over quantity of publications; however, it is the number of published articles that is used to measure researchers' productivity and ability. These factors, together with competition for funding and recognition and the pressure to publish in certain journals (Steneck, 2007), can generate the following authorship practices:

Honorary or courtesy authorship. This is a kind of conspiracy among prestigious or "useful" authors, an agreement that "I'll include you in my article if you include me in yours" (Collaborative Institutional Training Initiative, 2010). Authorship is understood as a gift to the researcher who did not participate in the preparation of the manuscript. This is a deceptive practice because it damages the credibility of the researchers and the legitimacy of their work (Steneck, 2007; Collaborative Institutional Training Initiative, 2010).

Authorship by authority. This refers to social or institutional leaders who use their authority to impose themselves as authors and whose inclusion follows criteria that differ from their actual contribution to a manuscript (Collaborative Institutional Training Initiative, 2010). Individuals in these positions may make significant contributions to a publication and merit recognition, but they should not appear as authors if their participation does not meet the criteria described (Steneck, 2007).

Authorship for political purposes. This consists of granting authorship to an individual who has not contributed to the manuscript in order to avoid conflict or retaliation against the authors.

Ghost authorship. This includes as author a distinguished scientist whose name can guarantee the credibility of the research and the acceptance of the manuscript for

publication. It is most common in the pharmaceutical industry, which requires recognized researchers with sound intellectual credentials to endorse its products.

There are social factors at play in the determination of authorship, but these must rest on the ethical principles of truthfulness, transparency, and equity (Collaborative Institutional Training Initiative, 2010). The former operating without the latter is an offense against scientific ethics and it should be subject to self-regulation.

Nowadays, electronic publications are as important as printed ones. The ethical considerations should be identical, but the dizzying velocity of electronic publication, its easy access, and possible anonymity, have brought about a change in the conception of authorship that facilitates plagiarism. A lack of editorial rigor, or of vigilance regarding citation and authorship, are conditions that enable fraud and unethical practices (Lolas & Outomuro, 2006). Greater regulation is needed, and ethical regulations in scientific production should be supported independent of the medium of publication.

Guidelines regarding authorship are stipulated by the ICMJE, but these are frequently ignored by researchers. External regulation of ethical behavior has been relegated to a set of practices, accepted by researchers, which facilitate the speed and quantity of publication, but which also allow deception regarding authorship. Self-regulation should balance the necessity for status and prestige with an ethical boundary (Avanzas et al., 2011); combined with intellectual work, and supported by truthfulness, transparency, and equity (Collaborative Institutional Training Initiative, 2010), it should produce ethical decisions committed to quality. This process should be carried out in a climate of understanding and agreement in the scientific community that allows for the negotiation of the contingencies of scientific research.

Review of the scientific manuscript

Journal Editor

Responsibility for ethics in scientific publication has fallen on the editors of journals, who recommend that studies involving human subjects adopt ethical principles. But what is their role as guarantors of ethical compliance in publication, insofar as they represent a form of external regulation of the scientific community? Editors support their opinions and decisions about scientific articles through the process of peer review. What is the relationship of peer review to the ethical issues in scientific publication, and what conflicts of interest are generated in the roles of editor and peer reviewers?

Within editorial guidelines and the editorial process, journal editors check the quality of manuscripts, with respect not only to ethical questions but also to technical and scientific details. This responsibility is a delicate one, as it relates to confidence in the honesty of authors, who are

nonetheless susceptible to certain ethical lapses, generating suspicion and distrust.

Editors have the authority to choose members of the editorial board of their journals and the timing of publication of articles. They must have the freedom to express critical points of view and take responsibility for them without fear of retribution, even when they differ from the commercial objectives of the publisher. No other person must interfere in the evaluation, selection, or editing of articles.

The responsibilities of an editor, according to the Cambridge Journals Ethical Standards and Procedures (2013), are the following:

1. To act objectively.
2. To accept publications based on academic merit and not according to commercial interests.
3. To determine procedures for handling complaints or ethical conflicts.

Editors accept publications that adhere to the objectives of the journal: their selection criteria are the validity of the work and its importance for readers. They also guarantee that published articles follow ethical guidelines. This regulation was once left to the good faith of researchers, but the accusations of Beecher (1966) concerning publications with technical deficiencies allowed journals to include ethical aspects of research in their requirements and consider the obligation to follow them.

In spite of journals' increased appeal to ethical standards and editors' demands for authors to follow them, such standards are usually limited to written guidelines and rarely require certification of compliance. A survey of 231 editors showed that although editors claim that their journals have adopted policies and systems to promote ethical behavior, some may not be conscious of possible issues, believing that misconduct rarely occurs in their publications (Committee on Publication Ethics, 2005; Wager et al., 2009). This shows a continuing gap between written norms and the application of ethical principles. Ethical norms and the figure of the editor do not foster self-regulation among authors. On the contrary, they subject them to a strict normativity, where compliance is just a formality for the publication of an article.

Peer review

An independent, impartial, and reasoned evaluation is a critical part of every scientific paper submitted for publication (Rockwell, 2006; International Committee of Medical Journal Editors, 2012; Zhang, 2010). Articles published in peer-reviewed journals are sent to readers with knowledge and experience who are required to review them promptly and completely, in a free, constructive, respectful, and confidential manner (Steneck, 2007). This aspect of the process has the purpose of minimizing the conflicts of interest of

editors. Reviewers represent the scientific community and society. They should be aware of this responsibility, taking particular care in their review and their consequences, because "peer review can make or break professional careers and directly influence public policy" (Steneck, 2007). Reviewers are responsible for:

1. Objective review to improve the quality of the publication.
2. Confidentiality with respect to the material provided by the editor or author.
3. Notification of the editor if the content is substantially similar to another publication.
4. Notification of the editor if there is any possible conflict of interest between the reviewer and the author (Cambridge Journals Ethical Standards and Procedures, 2013).

Reviewers should consider the originality and the results of the work and not the reputation of the authors. Peer review should be based on confidentiality of the authors and reviewers (Terán, 2011). The type of confidentiality depends on the journal. Examples are:

1. The identity of authors is revealed to reviewers, but not vice versa (Rennie, 1998; Ware, 2008; Clark, 2012); this allows the reviewers to freely evaluate and comment on submissions. The names and credentials of authors, their institution, country, or area of research can sometimes bias reviews.
2. A double-blind review hides the identity both of authors and of reviewers, so reviewers can focus on the quality and creativity of the manuscript without bias (Godlee, 2002; Scott, 2007; Halder, Ramsay, Tyrer, & Casey, 2011; Walsh, Rooney, Appleby, & Wilkinson, 2000).
3. In open review, authors and reviewers know each other's identities. This approach has ethical advantages, as all parties are informed and take responsibility for the quality of their work, which reduces conflicts of interest (Rennie, 1998; Godlee, 2002; Walsh et al., 2000).
4. Electronic media also allow a new form of review: through a website, researchers can offer their articles; editors can search for those that are most relevant and offer to publish them (Campanario, 2002).

The ICMJE (International Committee of Medical Journal Editors, 2012) recommends that editors do not reveal information about the manuscripts to anyone except authors and reviewers, and that they emphasize that manuscripts are the private property of the authors. Reviewers and editorial staff must therefore respect their rights and not appropriate ideas from manuscripts under review; they must agree not to reproduce or share information without authorization from the author. Reviewers must return or destroy copies of manuscripts after evaluation; editors may not keep copies

of rejected submissions (International Committee of Medical Journal Editors, 2012).

The most common errors made by expert reviewers create ethical conflicts. Examples include publishing articles with statistical errors (Campanario, 2002) and rejecting manuscripts with innovative ideas or significant scientific findings out of ignorance or because they contradict prevailing wisdom or their own research. There is evidence of the following ethical conflicts in peer review: a) the editor chooses reviewers directly, based on experience, prestige, or friendship; b) reviewers learn through experience because they have no prior training in manuscript review; c) reviewer anonymity facilitates criticism that is tendentious, disproportionate, or cruel. It would be beneficial to include specialists in methodology as reviewers, in addition to experts in the field, in order to improve the validity of the review and the reliability among reviewers (Buela-Casal, 2003).

Peer review is an essential part of the external regulation and self-regulation of the professions. It does not fully guarantee improvement of the quality of scientific articles (Buela-Casal, 2003) over their quantity, but it is an area that requires further analysis (Terán, 2011), as it is central to ethical self-regulation in publication.

DISCUSSION AND CONCLUSION

Researchers/authors, editors, peer reviewers, the scientific community, and readers all intervene in the publication process (Chen, 2011), each with different responsibilities and demands in a complex relationship in which ethical conflicts arise with significant consequences. The demand to publish often justifies misconduct in the preparation of an article, as the community rewards researchers for publishing as a measure of prestige or success, to obtain funding and to demonstrate productivity in order to maintain academic appointments. These phenomena have generated the negative effects described in this article. The imperative to publish affects relations among scientists: it contributes to abuse students, junior colleagues, and research participants, and causes harm to professional and personal relationships.

The demand should be for greater quality rather than quantity of publications. If evaluation were based on this principle, there would be no justification for deceptive conduct, because researchers should have the intellectual capacity to fulfill their commitment to science and society, with an awareness of ethical norms, and make their observations known through the system for communicating their findings.

It may be necessary to provide for wider dissemination of ethical norms and a system of publication based on the quality of research as the most important factor in evaluating performance and productivity. Scientific research should include other products: publication in blogs, media cover-

age, and download counts as mechanisms for evaluating the quality of studies. Although none of the criteria for measuring academic performance should substitute for a scientific record based on regulation and greater ethical self-correction, it is currently possible to use cybertechnologies and the internet to detect duplicate publishing and prevent inappropriate author practices. In addition to detection, it is necessary to establish consequences for such misconduct (Marcus & Oransky, 2011). The development of information systems for the detection of scientific misconduct in publication is a form of external ethical regulation, as well as a means of monitoring and possibly punish, since public retraction constitutes a moral sanction for researchers.

The idea that scientific activity can supervise itself assumes that it is not necessary for researchers to know or apply specific ethical rules to regulate themselves, and they are therefore unconcerned with the norms of self-regulation. External regulation continues to be something researchers are unfamiliar with or choose to ignore, but mainly it is insufficient, because authorial misconduct is not decreasing and is difficult to detect.

Editors have neither the obligation to supervise researchers' conduct nor the legal ability to sanction those who act unethically (Sox & Rennie, 2006). However, they do have the moral obligation to monitor the legality and the legitimacy of articles they will publish, to protect the confidentiality of authors and reviewers, to provide a fair review process, and to ensure the privacy and welfare of research subjects. If they find evidence of irresponsible conduct, their priority should be to inform readers. Nevertheless, no external regulation can control the structure of hierarchical relationships not related to knowledge, but to the instrumental use of knowledge toward the ends of money, prestige, and power (Lolas, 2002), and that pervert the ethics and virtue of science.

Ethical self-regulation in scientific publication is constrained by the obligatory nature of the moral demand on experts, which explains researchers' resistance to ever-more demanding regulation. A researcher is responsible for a proper conduct according to a standard of honest practices that benefits the community. The problem is that, given the demands and the difficulty of making decisions and establishing priorities, researchers look for a convenient solution based on a consensus regarding practices that do not avoid ethical conflicts in the publication process, but justify and maintain them. It is thus necessary to consider self-regulation as a basis for the ethics of scientific publication.

As the process of self-regulation is exercised through debate about decisions, it would be useful to have organizations that create and facilitate such debate, as well as mechanisms that foster it (Camps, 2006). This process could start easier if research organizations and journals established channels of communication and collaboration to ensure the integrity of research and to monitor sane practices in the

research community, including clear and comprehensive guidelines for those involved (Wager & Kleinert, 2012).

Self-regulation is viable if the parties involved in the process work together to facilitate cooperation and understanding. Researchers need feedback about their manuscripts because science does not emerge in isolation. The participation of the scientific community is necessary for evaluating the quality and importance of research, as many decisions depend on the advice or points of view of colleagues. Peer review is a regulatory form of publication; in spite of its inherent conflicts of interest, it is paramount to analyze and develop it in the direction of self-regulation.

The process of writing an article is dynamic and versatile. It reflects the needs and the reality of the scientific community; its ethical implications require the transparency of an external regulation operating by consensus and a self-regulation that offers freely accepted obligations of greater responsibility. We must consider the ability of the scientific community to regulate itself and the ability of regulatory institutions to guarantee scientific integrity. Otherwise, falsification, fabrication, and plagiarism will continue. It is not possible to formulate scientific policy in the interests of its participants without responsible participation through reflection, deliberation, and dialogue.

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Conflict of interests

The authors declare they have no conflict of interests.

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