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SPECIAL SERIES

Good Scientific Practice

Part IV. Authorship/Coauthorship

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"…the cornerstone of the philosophy of science is based on the fundamental assumption that original research must be published; only thus can new scientific knowledge be authenticated and then added to the existing database that we call scientific knowledge."

Robert Day [1]

"The guidelines stress not only ***a right*** *to authorship when certain conditions are fulfilled, but also* ***a duty*** *to authorship …The duty to authorship …should be taken as seriously as the right to authorship".*

Daniel Andersen [2]

The word "must" is not used by chance in the first of the above citations: without being communicated, research simply does not exist. The most important way to communicate information is scientific publication. Therefore, to publish the results of research is a working obligation of all scientists. For biomedical researchers, it is also an ethical obligation, since the publication of clinical research is the ultimate basis for treatment decisions and the development of comprehensive guidelines [3].

However, publication is not only the credit for creative work. It is also the most important basis for academic advancement. This close relationship between authorship and academic reward provides ample room for abuses.

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Authorship

An author is the originator of a written work. In single-author articles, both credit and criticism are addressed to him. However, in medical sciences multiauthored articles prevail greatly, and the term "author" has additional meanings.

In multiauthored articles, the term "authorship" refers to the listing of names of participants in all communications of experimental results and their interpretation [4]. In either instance, authorship means the attribution of both credit *and* responsibility. In multiauthored articles[1] the responsibility and accountability are too often obscured and severely diluted[2], and many ethical problems may arise thereof [5,6].

Multiauthorship

The mean number of authors per article increased steadily in the past century in both large [7,8] and small [9-11] medical journals; at the same time, the single-author papers became extremely rare, especially in such complex and interdiscipline fields like oncology (Figure 1). In such a situation, a new problem has emerged: the problem of false authorship.

Multiauthorship and false authorship are connected issues: the percentage of undeserved authors increased from 0% in two-authored papers to 74% in papers with seven and more coauthors [12]. The high prevalence of undeserved authorship is confirmed in all studies dealing with this phenomenon [13,14], thus indicating that the assignment of authorship has been, and still is, abused[3].

[1] *"The expansion in numbers of authors per article has tended to dilute accountability, while scarcely seeming to diminish credit" [5].*
[2] *"There have been too many cases of fraudulent research where nobody accepts responsibility" [6].*

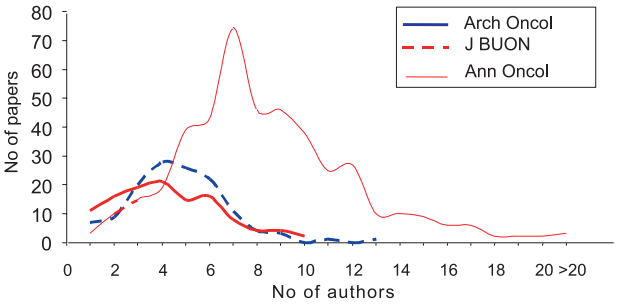

Figure 1. The number of single and multiauthored papers in three oncologic scientific journals.
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False authorship

Many ethical problems involved in publishing biomedical research stem from intense pressure to publish ("Publish or perish syndrome"). Since the credit for one's research is ultimately allocated through the authorship, it is of extreme importance for a successful scientific carreer: academic promotion is more dependent on publications than on clinical activity or teaching excellence [12]. It also affects future research funding and recruitment opportunities [15]. This is the main cause for many false authorships, even in articles published in the most reputable medical journals [12-14,16].

Various forms of false authorship are defined:

- *Honorary authorship* is the practice of assigning authorship to persons because of their authority or prestige, in the hope that it might increase the chances for publication.
- *Gratuitous authorship* is including in byline the persons as a gift, or simple courtesy, or because this person is the member of research team (croniysm).

Completely different and equally unethical forms of false authorship are:

- *Ghost authorship,* where the person who actually wrote the article is not included in byline.This person may be hired by someone else who either does not know or does not have time to write the paper. A variant of this practice is some drug manufacturers' practice to hire academics to communicate the results of research done by their own staff.
- *Denial of authorship* is excluding from the coauthors list the persons that meet the authorship criteria. Most often, the victims of devoiding of authorship are the graduate students or junior researchers, which makes this unethical behaviour even more serious.

The specific reasons for conferring authorship to undeserving persons are sense of obligation, fear of offending someone, pressure from another coauthor, or explicit demand-all in hopes of reciprocation, or gaining favor. Such an unethical behavior is motivated primarily by academic promotion policies [12]. The same reasons motivate otherwise honest people to accept such an unearned gift, just to inflate their bibliographies.

"Misappropriation of authorship (i.e., awarding honorary authorship and concealing ghost authorship) is incompatible with the principles, duties, and ethical responsibilities involved in scientific publication" [13]. Authorship cannot be conferred but must be earned. This is why the misapplication of authorship criteria and inappropriate assignment of authorship are classified in the central area of dishonesty [2].

For help to determine how attribution should be acknowledged, several guidelines are available. The most recognized are those of the International Committee of Medical Journal Editors (ICMJE), so-called Vancouver criteria [17] (Table 1).

However, the ICMJE criteria for authorship are insufficiently known [18-20] or ignored [21,22]. A considerable proportion of authors do not fulfill these criteria; the percentage of undeserved authorship increases along with the increase in the number of authors listed on the byline.

Even when aware of the ICMJE criteria, authors often avoid to apply them. These authors think that these criteria are too restrictive [19], and that the strict adherence to them might be unfair, especially to young scientists [21]. Clearly, the ideas of researchers and editors on authorship differ substantially, thus suggesting that a new definition of authorship is warranted.

Illness, prevention, and remedies

The authorship abuses cause steadily increasing disputes among scientists [15,19,20,23,24]. Such an unhealthy atmosphere is dangerous, since it destroys the group harmony and mutual trust, without which the research, being a multidisciplinary and multiprofessional work *par excellence*, is impossible. Many think that the best way to avoid such conflicts is to address authorship issues prior to writing the initial draft of a manuscript, or even prior to initiating a collaborative research [21,23]. An open discussion among the members of a research group often helps to resolve any conflict or misunderstanding that otherwise might arise [25][4].

Since it seriously undermines the integrity of the

[3] *"Nowhere does one see the imbalance between personal credit and accountability typified more starkly than in the case of authorship, where responsibility has declined as numbers of authors have risen" [5].*

Table 1. Vancouver Criteria on Authorship [17]

All persons designated as authors should qualify for authorship, and all those who qualify should be listed. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. One or more authors should take responsibility for the integrity of the work as a whole, from inception to published article.

Authorship credit should be based only on: 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. Conditions 1, 2, and 3 must all be met. Acquisition of funding, the collection of data, or general supervision of the research group, by themselves, do not justify authorship.

Authors should provide a description of what each contributed, and editors should publish that information. All others who contributed to the work who are not authors should be named in the Acknowledgements, and what they did should be described (see Acknowledgements).

Increasingly, authorship of multicenter trials is attributed to a group. All members of the group who are named as authors should fully meet the above criteria for authorship. Group members who do not meet these criteria should be listed, with their permission, in the Acknowledgements or in an appendix (see Acknowledgements).

The order of authorship on the byline should be a joint decision of the co-authors. Authors should be prepared to explain the order in which authors are listed.

authorship system [13], the misappropriation of authorship is now recognized as unethical and therefore unacceptable (Table 1) [2,26,27]. In order to prevent the high incidence of undeserved authorship, several systems of self-regulating authorship rules are proposed [28-30].

Contributionship instead of authorship?

Since it is thought that the current concept of authorship is irreparably corrupt, its replacement by the contributor-guarantor system is proposed [5]. Instead of simple listing the (co)authors names, the specific contribution of each of them (that is, who did what) should be clearly stated at the end of the article [6,31]; at least one person should take the responsibility for the whole published research (guarantor). As the author has anticipated, this proposal met both approval and opposition in the scientific community.

Proponents of the proposal, many journal editors that are members of ICMJE, hope that authors/contributors required to specify (and sign) their real contribution to the research, thus accept full responsibility for their contribution. This express requirement is based on bitter experience that coauthors of fraudulent scientists defend themselves by denying knowledge of fraud. Such editorial policy should maintain and improve the integrity of the scientific record [6,31]. It hopefully could eliminate questionable research practices, ensure fair allocation of authorship, and minimise the abuse of power, status and reputation of seniors. Thus, it would ensure the justice to the young researchers, who are a particularly vulnerable population[5] in this regard [15,32].

The opponents think that abandoning the concept of author is too revolutionary; besides, they express their skepticism regarding the prevention of bad habits-abuses of the authorship [28][6]-anticipating that the authorship problem will not be resolved soon [33].

Both sides agree that the authorship problem, being a real issue, deserves the current attention it is getting. Because of its importance, ethical standards and guidelines for authorship have been developed in many institutions of science [4,34,35], as recommended by an international commission (Table 2) [36].

Finally, let's finish this text by its very beginning: publishing in the medical profession is simply a *must*. But when preparing the manuscript, any author should be aware that strict adherence to the principles of publication ethics is also an *imperative* [37]. Much better than any bureaucratic intervention, the self-restraint of the researchers is the proper prevention of any misconduct including the authorship abuse - the endemic disease called ironically *polyauthoritis giftosa* [38].

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[4] *"Scientific integrity may withstand deep conflict, but not buried conflict" [25].*

[5] *"The following are some typical authorship issues brought to the Ombuds office: "Though listed as an author, I never reviewed the article, saw the reviewers, feedback, or signed off on the final document"; "I was promised first authorship when I completed a project. When the work was done, and without informing me, the principal investigator added the work of someone else who was made first author"; "A fellow is demanding first author position but the contribution was primarily in implementing the experiments, not in creating the design or writing"; "After I left my lab, I got no credit for the projects and articles that used my work" [15].*

[6] *"Individual researchers or groups who accept a false co-author cannot be controlled by signing solemn statements, even when their roles are explicitly described in the contributor section. Those who lie can lie at any time, and asking for signatures or contribution descriptions would not change this fact" [28].*

Table 2. Some recommendations for ethical standards and guidelines for authorship [36]

Recommendation 11. Authors of scientific publications are always jointly responsible for their content. A so-called "honorary authorship" is inadmissible.

Recommendation 12. Scientific journals shall make it clear in their guidelines for authors that they are commited to best international practice with regard to the originality of submitted papers and criteria for authorship.

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