Vanderbilt Institute for Integrative Biosystems Research and Education

Background Information for Guidelines for Authorship

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BACKGROUND:

These guidelines were initially designed to address the definition of authorship and the allocation of responsibility among multiple authors of research publications. They have been updated to include conflict of interest, overlapping publications, and self-plagiarism; however, other ethical issues of content and general publication practice are not considered. Responsible conduct in reporting results and citing the work of others is assumed. The "Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication" of the International Committee of Medical Journal Editors (ICMJE)[1] was the chief source for the "Ethical Obligations" section of the VIIBRE guidelines.

Authorship guidelines reviewed include those of the Harvard Medical School, the University of Michigan Medical School, the University of North Carolina at Chapel Hill, the American Physical Society, and the American Chemical Society. Also investigated were the sites of the Biomedical Engineering societies, the IEEE, the Biophysical Society, the NSF, and the NIH. Notes on the NIH 2003 symposium on "Catalyzing Team Science" included recommendations for handling credit, ownership, and dissemination of "team research" and recommended using the ICMJE criteria for authorship when uncertainty arises about individual contributions to general publications of a team. The ICMJE's recommendations are reflected in the draft policy. Five institutional policies are cited in the following notes:

Harvard Medical School
University of Michigan Medical School
American Physical Society
American Chemical Society
International Committee of Medical Journal Editors

One laboratory policy was reviewed and is cited, that of Dr. Robert Dennis's Functional Muscle Tissue Engineering Laboratory at the University of Michigan. Dr. Dennis's personal homepage (http://www-personal.umich.edu/~bobden/index.htm) includes a link to the Michigan Medical School guidelines as well as to his lab's criteria (he has now moved to North Carolina, but is maintaining the Michigan page).

[1] http://www.icmje.org/

Five categories of interest emerged in my survey of policies and serve as the organizational basis for the VIIBRE policy on authorship credit.

1. Criteria for authorship

There was general agreement among the institutional sources with Harvard's statement that a "substantial, direct, intellectual contribution to the work" was a necessary criterion for inclusion as an author, and that contributions such as "acquisition of funding, provision of technical services, patients, or materials" do not meet the criteria.[2]

The American Physical Society (APS) leaves undefined the notion of "significant contribution": "Authorship should be limited to those who have made a significant contribution to the concept, design, execution or interpretation of the research study."[3]

More useful are Michigan's guidelines, which amplify both the inclusive and exclusive criteria:

"Significant contributions affecting the direction, scope or depth of research; long term guidance and development of the project; creative contributions to the project with clear understanding of its goals; development of methodologies necessary for timely completion of the project; data analysis or interpretation vital to conclusions of the project" qualify, *but*

"Provision of lab space; use of instrumentation; provision of funding; services, consulting, or materials provided for a fee or reimbursement; provision of patient samples; routine technical work; administrative status; proofreading or editing; advice on narrowly defined problems or those unrelated to the project objective"[4] do not.

While most policies discuss the responsibilities of authors (see below), the American Chemical Society (ACS) includes responsibility for the results reported as a criterion for authorship: "The co-authors of a paper should be all those persons who have made significant scientific contributions to the work reported and who share responsibility and accountability for the results."[5]

The International Committee of Medical Journal Editors (ICMJE) states that authorship credit should be based on three conditions, all of which must be met:

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[2] Authorship Guidelines, Harvard University Medical School (adopted December 17, 1999) http://www.hms.harvard.edu/integrity/authorship.html

[3] American Physical Society Guidelines for Professional Conduct (updated and expanded by APS Council, November 2002) http://www.aps.org/memb/guide/prbook-guidelines.cfm

[4] University of Michigan Medical School Guidelines for the Responsible Conduct of Research (1989) http://www.responsibility.research.umich.edu/UMMSauthor.html

[5] American Chemical Society Ethical Guidelines to Publication of Chemical Research (revised January 2000) https://paragon.acs.org/paragon/ShowDocServlet?contentId=paragon/menu_content/newtothissite/eg_ethic2000.pdf

"(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; (3) final approval of the version to be published."[6]
Harvard agrees that "all authors should participate in writing the manuscript by reviewing drafts and approving the final version."[7]

Dr. Robert Dennis's straightforward method of "authorship determination" for his lab requires meeting two out of five criteria. The statement from his personal webpage is quoted in full:

> You must make a significant contribution in at least 2 of the following 5 categories to be considered an author on any manuscript that comes from this laboratory:
>
> 1. Contribute to the Conceptualization and Design of the study that is the basis for the manuscript
> 2. Provide the Supervision, Resources, and/or Materials required for the completion of the study
> 3. Create or Design a Method, Device, System, or Process Essential for the completion of the study
> 4. Perform the Data Collection, Data Processing, Data Analysis, and/or Data Interpretation
> 5. Contribute to the Literature Review, Writing, and Critical Review of the manuscript
>
> If you feel that you have contributed to work in accordance to the guidelines listed above and are not recognized please contact me immediately. In cases where no agreement can be reached between two parties, a third party – non-partial – arbiter will be used. This person will be selected in agreement of all the parties involved.[8]

2. Responsibilities of Authors

As noted above, the ACS guidelines consider sharing responsibility and accountability for research results a criterion for credit as an author. Other sources discuss the responsibilities of authors, including but not limited to accountability, as a separate issue, and there is some disagreement about assigning overall accountability to the primary author or a subset of authors, or divvying up responsibility for discrete contributions among the appropriate individuals.

"When research is done by teams whose members are highly specialized, individual contributions and responsibility may be limited to specific aspects of the work. One author

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[6] International Committee of Medical Journal Editors Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (updated October 2004) http://www.icmje.org/#author

[7] Authorship Guidelines, Harvard University Medical School (adopted December 17, 1999) http://www.hms.harvard.edu/integrity/authorship.html

[8] Personal homepage of Dr. Robert Dennis http://www-personal.umich.edu/~bobden/index.htm

should take primary responsibility for the work even if lacking an in-depth understanding of every part of the work."[9]

"The primary author "inform[s] all authors and contributors as to how their contributions will be acknowledged; [is] able to identify the specific contribution of each author; understand[s] the general principles of all work included in a paper; [is] willing to share openly the data obtained and methodology utilized in the investigation. All authors [are] able to defend the methodology and data pertinent to their specific contributions to the project and agree with the general conclusions and interpretations of the paper."[10]

"When a large, multi-center group has conducted the work, the group should identify the individuals who accept direct responsibility for the manuscript. . . .Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. Some journals now also request that one or more authors, referred to as 'guarantors,' be identified as the persons who take responsibility for the integrity of the work as a whole, from inception to published article, and publish that information."[11]

"All collaborators share some degree of responsibility for any paper they coauthor. Some coauthors have responsibility for the entire paper as an accurate, verifiable, report of the research. These include, for example, coauthors who are accountable for the integrity of the critical data reported in the paper, carry out the analysis, write the manuscript, present major findings at conferences, or provide scientific leadership for junior colleagues. Coauthors who make specific, limited, contributions to a paper are responsible for them, but may have only limited responsibility for other results. While not all coauthors may be familiar with all aspects of the research presented in their paper, all collaborations should have in place an appropriate process for reviewing and ensuring the accuracy and validity of the reported results, and all coauthors should be aware of this process. . . .Anyone unwilling or unable to accept appropriate responsibility for a paper should not be a coauthor."[12]

3. Acknowledgment of other contributions

All sources agreed that it is important to acknowledge in some fashion everyone who has made other substantial contributions, either in a special section or in a footnote. The ICMJE provides examples:

"All who do not meet authorship criteria should be listed in an acknowledgments section, e.g. under headings such as 'clinical investigators' or 'participating investigators,' and their function

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[9] Authorship Guidelines, Harvard University Medical School (adopted December 17, 1999) http://www.hms.harvard.edu/integrity/authorship.html

[10] University of Michigan Medical School Guidelines for the Responsible Conduct of Research (1989) http://www.responsibility.research.umich.edu/UMMSauthor.html

[11] International Committee of Medical Journal Editors Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (updated October 2004) http://www.icmje.org/#author

[12] American Physical Society Guidelines for Professional Conduct (updated and expanded by APS Council, November 2002) http://www.aps.org/memb/guide/prbook-guidelines.cfm

or contribution should be described, e.g., 'served as scientific advisors,' 'critically reviewed the study proposal,' 'collected data,' or 'provided and cared for study patients.'"[13]

4. Order of Authorship

The consensus is that order of authorship has no universally understood meaning, and therefore authors must decide the order and provide in the manuscript an explanation of each author's contribution and how the order was assigned.

5. Implementation of Guidelines

Harvard's policy best addresses implementation and resolution of disputes:

1. Research teams should discuss authorship issues frankly early in the course of their work together.
2. Disputes over authorship are best settled at the local level by the authors themselves or the laboratory chief. If local efforts fail, the Faculty of Medicine can assist in resolving grievances through its Ombuds Office.
3. Laboratories, departments, educational programs, and other organizations sponsoring scholarly work should post, and also include in their procedure manuals, both this statement and a description of their own customary ways of deciding who should be an author and the order in which they are listed. They should include authorship policies in their orientation of new members.
4. Authorship should be a component of the research ethics course that is required for all research fellows at Harvard Medical School.
5. These policies should be reviewed periodically because both scientific investigation and authorship practices are changing.[14]

[13] International Committee of Medical Journal Editors Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (updated October 2004) http://www.icmje.org/#author

[14] Authorship Guidelines, Harvard University Medical School (adopted December 17, 1999) http://www.hms.harvard.edu/integrity/authorship.html

APPENDIX I
GUIDELINES FOR AUTHORSHIP: OTHER INSTITUTIONS

Statement endorsed by the Faculty Council of Harvard Medical School:

Authorship

1. Everyone who is listed as an author should have made a substantial, direct, intellectual contribution to the work. For example (in the case of a research report) they should have contributed to the conception, design, analysis and/or interpretation of data. Honorary or guest authorship is not acceptable. Acquisition of funding and provision of technical services, patients, or materials, while they may be essential to the work, are not in themselves sufficient contributions to justify authorship.
2. Everyone who has made substantial intellectual contributions to the work should be an author. Everyone who has made other substantial contributions should be acknowledged.
3. When research is done by teams whose members are highly specialized, individual's contributions and responsibility may be limited to specific aspects of the work.
4. All authors should participate in writing the manuscript by reviewing drafts and approving the final version.
5. One author should take primary responsibility for the work even if he or she does not have an in-depth understanding of every part of the work.
6. This primary author should assure that all authors meet basic standards for authorship and should prepare a concise, written description of their contributions to the work, which has been approved by all authors. This record should remain with the sponsoring department.

Order of Authorship

Many different ways of determining order of authorship exist across disciplines, research groups, and countries. . . . While the significance of a particular order may be understood in a given setting, order of authorship has no generally agreed upon meaning.

As a result, it is not possible to interpret from order of authorship the respective contributions of individual authors. Promotion committees, granting agencies, readers, and others who seek to understand how individual authors have contributed to the work should not read into order of authorship their own meaning, which may not be shared by the authors themselves.

1. The authors should decide the order of authorship together.
2. Authors should specify in their manuscript a description of the contributions of each author and how they have assigned the order in which they are listed so that readers can interpret their roles correctly.
3. The primary author should prepare a concise, written description of how order of authorship was decided.

Implementation

1. Research teams should discuss authorship issues frankly early in the course of their work together.
2. Disputes over authorship are best settled at the local level by the authors themselves or the laboratory chief. If local efforts fail, the Faculty of Medicine can assist in resolving grievances through its Ombuds Office.
3. Laboratories, departments, educational programs, and other organizations sponsoring scholarly work should post, and also include in their procedure manuals, both this statement and a description of their own customary ways of deciding who should be an author and the order in which they are listed. They should include authorship policies in their orientation of new members.
4. Authorship should be a component of the research ethics course that is required for all research fellows at Harvard Medical School.
5. These policies should be reviewed periodically because both scientific investigation and authorship practices are changing.

University of Michigan Medical School Guidelines for the Responsible Conduct of Research

Guidelines for Authorship

1. Individuals should be considered for inclusion as authors on work submitted for publications if they have provided:

a) significant contributions affecting the direction, scope or depth of research
b) long term guidance and development of the project
c) creative contributions to the project with clear understanding of its goals
d) development of methodologies necessary for timely completion of the project
e) data analysis or interpretation vital to conclusions of the project

2. Individuals should not be included as authors for contributions strictly limited to:

a) providing lab space or use of instrumentation
b) providing funding
c) services, consulting, or materials provided for a fee or reimbursement
d) involvement in patient care or providing patient samples
e) routine technical work (as provided by any individual in the lab)
f) status as a supervisor, section head, department chairperson
g) proofreading or editing of manuscripts
h) advice given to solve problems that are narrowly defined or unrelated to the project objective

3. Responsibilities

a) Primary author: i) Inform all authors and contributors as to how their contributions will be acknowledged. ii) Be able to identify the specific contribution of each author. iii) Understand the

general principles of all work included in a paper. iv) Be willing to share openly the data obtained and methodology utilized in the investigation.

b) All authors: i) Be able to defend the methodology and data pertinent to their specific contributions to the project. ii) Agree with the general conclusions and interpretations of the paper.

4. Content

a) All manuscripts should serve to represent an accurate and complete reflection of the methods utilized and the data obtained in the investigative effort.
b) In a publication, all data pertinent to the project should be reported, whether supportive or unsupportive of the thesis or conclusions.
c) Except for review articles, publishing the same material in more than one paper should be avoided.
d) Unnecessary fragmentation of a complete body of work into separate publications should be avoided.
e) When ideas, concepts, or text of others are used, appropriate citations should be made.
f) Prior work in the field should be referenced appropriately.
g) The source of funding should be identified when a work is published.

Guidelines for Authorship

Authorship is the ultimate recognition of the contribution of an investigator to a completed body of scientific work. Authorship is objective evidence of an academician's scholarly activity. There is prestige attached not only to authorship per se but also to the order in which authors appear on a publication. For these reasons, decisions regarding the inclusion and exclusion of authors are of utmost importance and must be made with great care and consideration. It is of importance that the contributions of those who have contributed significantly to a project be appropriately acknowledged in some fashion, if not by authorship itself. In order to avoid conflicts or misunderstandings, the publication policy of each laboratory should be discussed openly and whenever possible the principal author should apprise all contributors to a project of the manner in which their input will be recognized before commencing with their efforts.

Individuals should be included as authors on a work submitted for publication if they have provided significant contributions affecting its direction, scope, or depth. These contributions may take many different forms. Generally, the principal author will have designed many of the experiments, performed much of the work, analyzed most of the data, and written the manuscript. In some cases, a senior author or mentor may have provided much of the work involved in the development of a project and, after it was initiated, provided long-term guidance to its completion. Other advisors may have provided the creative spark or the idea that was carried forward in the work. Some mentors may have developed and performed methodologies without which the project may not have reached a timely completion. It is imperative, as noted below, that this methodological input extend beyond the performance of routine assays by a technician, sometimes for a prearranged fee. The contribution of other authors to a manuscript

may be in the analysis or interpretation of the data. The conclusions of some projects might not have been reached without this vital input.

While it may be difficult in some instances to decide whether specific contributions warrant authorship, there are clear circumstances under which individuals should not be included as authors. The simple provision of resources such as a laboratory space, instrumentation, or even research funding without direct involvement in a project should not of themselves be grounds for authorship. If a "collaborator" provides services, consulting, or materials for a fee or reimbursement under a contractual arrangement, he might not be considered as an author on a scientific project. This principle should also extend to the provision of routine technical work, as may be provided by any paid technician in a laboratory without significant input into the design or conduct of a study. In clinical areas, contributions limited to involvement in the care of a patient or to the provision of specimens from a patient should not be grounds for inclusion as an author on a manuscript. Occasionally, supervisors, section heads, or departmental chairpersons insist upon inclusion as authors simply in recognition of their status, but this is inappropriate unless there are other grounds that warrant such recognition. Simple proofreading or editing of manuscripts should provide no basis for inclusion as an author. Occasionally, a principal investigator on a project may seek advice on narrowly defined problems or on problems unrelated to the project's objective. Provision of such advice should not provide grounds for authorship.

In addition to the benefits of prestige, authorship carries with it the burdens of responsibilities. The responsibilities of authorship should apply not only to written and published documents but also to verbal communications in public fora including the press. The principal author must be responsible for establishing the list and order of authors. He must be able to identify the specific contributions of each author and understand the significance of each contribution to the conclusion of the project. The principal author, representing all of the authors, must be willing to share details of the methodologies and data used in the course of investigation. Currently, it is the policy of many journals that publication also implies a willingness to share reagents such as antisera and recombinant clones, thus it is important that the authors recognized the specific policies of a journal before submitting their work to it for publication. In any case, the unselfish exchange of information and reagents is a basic assumption of science and every effort should be made to adhere to it provided that it does not compromise an individual scientist's research efforts. Each author should be able to defend the methods and data pertinent to his specific contribution. On a larger scale, each author has the responsibility to read the manuscript in which his work is included and understand it sufficiently to be able to agree with the general conclusions and interpretations of the paper. Any disagreements should be resolved prior to submission of the work for review. Ultimately, any individual author has the right and the responsibility to remove his name from a manuscript if he has substantial concerns with its conclusions.

Authors have additional responsibilities regarding the content of their manuscripts. Above all, the manuscript must represent an accurate and complete reflection of the methods utilized and the data obtained. Sketchy outlines of methodology make it impossible for others to duplicate important experiments and may lead to unwarranted controversy over the results obtained. It is of importance to report data that are both supportive and unsupportive of the general conclusions

of the paper. Withholding unsupportive data may suggest selection bias in reporting the results of an experiment. Despite the academic pressure, real or imagined, to demonstrate excellence with quantity rather than quality of publications, every effort should be made to avoid fragmentation of a complete body of work into separate publications. Moreover, the practice of publishing the same material in more than one manuscript is inappropriate except in clearly identified review articles with citations of the original work. When ideas, concepts or text of others are used in a manuscript, appropriate citations should be made. Furthermore, prior work that served as the basis for a manuscript must be cited. In their citations, authors must strive to acknowledge data that conflict with their own theories as well as data that are generally supportive. It is important to acknowledge the sources of funding for a publication to ensure that the funding agencies are appropriately credited and, moreover, that any potential conflict of interest is identified. In general, abstracts may be somewhat less detailed because of their brevity; however, they must be considered as scientific publications and, as such, are subject to the same considerations regarding responsibility of authorship as full-length manuscripts.

International Committee of Medical Journal Editors (NIH "Catalyzing Team Science" symposium in June 2003 recommends referring to ICMJE criteria for authorship when there is uncertainty about who should be included):

Authorship credit should be based 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. Authors should meet conditions 1, 2, and 3.

When a large, multi-center group has conducted the work, the group should identify the individuals who accept direct responsibility for the manuscript (3). These individuals should fully meet the criteria for authorship defined above . . . . When submitting a group author manuscript, the corresponding author should clearly indicate the preferred citation and should clearly identify all individual authors as well as the group name. . . .

Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.

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.

Some journals now also request that one or more authors, referred to as "guarantors," be identified as the persons who take responsibility for the integrity of the work as a whole, from inception to published article, and publish that information.

Increasingly, authorship of multi-center trials is attributed to a group. All members of the group who are named as authors should fully meet the above criteria for authorship.

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.

Contributors Listed in Acknowledgments:

All contributors who do not meet the criteria for authorship should be listed in an acknowledgments section. Examples of those who might be acknowledged include a person who provided purely technical help, writing assistance, or a department chair who provided only general support. Financial and material support should also be acknowledged.

Groups of persons who have contributed materially to the paper but whose contributions do not justify authorship may be listed under a heading such as "clinical investigators" or "participating investigators," and their function or contribution should be described—for example, "served as scientific advisors," "critically reviewed the study proposal," "collected data," or "provided and cared for study patients."

American Physical Society Guidelines for Professional Conduct:

Authorship should be limited to those who have made a significant contribution to the concept, design, execution or interpretation of the research study. All those who have made significant contributions should be offered the opportunity to be listed as authors. Other individuals who have contributed to the study should be acknowledged, but not identified as authors. The sources of financial support for the project should be disclosed.

Supplementary Guidelines on Responsibilities of Coauthors and Collaborators:

All collaborators share some degree of responsibility for any paper they coauthor. Some coauthors have responsibility for the entire paper as an accurate, verifiable, report of the research. These include, for example, coauthors who are accountable for the integrity of the critical data reported in the paper, carry out the analysis, write the manuscript, present major findings at conferences, or provide scientific leadership for junior colleagues.

Coauthors who make specific, limited, contributions to a paper are responsible for them, but may have only limited responsibility for other results. While not all coauthors may be familiar with all aspects of the research presented in their paper, all collaborations should have in place an appropriate process for reviewing and ensuring the accuracy and validity of the reported results, and all coauthors should be aware of this process. Every coauthor should have the opportunity to review the manuscript before its submission. All coauthors have an obligation to provide prompt retractions or correction of errors in published works. Any individual unwilling or unable to accept appropriate responsibility for a paper should not be a coauthor.

American Chemical Society (from *Ethical Guidelines to Publication of Chemical Research*, revised by the Editors of the Publications Division of the ACS in January 2000):

The co-authors of a paper should be all those persons who have made significant scientific contributions to the work reported and who share responsibility and accountability for the results.

Other contributions should be indicated in a footnote or an “Acknowledgments” section. An administrative relationship to the investigation does not of itself qualify a person for co-authorship (but occasionally it may be appropriate to acknowledge major administrative assistance). Deceased persons who meet the criterion for inclusion as co-authors should be so included, with a footnote reporting date of death. No fictitious name should be listed as an author or co-author. The author who submits a manuscript for publication accepts the responsibility of having included as co-authors all persons appropriate and none inappropriate. The submitting author should have sent each living co-author a draft copy of the manuscript and have obtained the co-author’s assent to co-authorship of it.