CMVM Authorship principles and guidance

This document is designed to provide the basic principles of authorship in the life sciences, and offer some guidance on what does and does not merit inclusion as an author, as well as the responsibilities attached to being an author. Authorship disputes frequently arise as a result of lack of communication and transparency, and a lack of familiarity with guidelines. Please use the guidance below to understand the responsibilities of different authorship positions, and as a discussion tool for conversations about inclusion/exclusion or position in an authorship list. We have provided a summary, but recommend you read the full guidance provided on pages 3-8 for full information.

Summary (full guidance is provided below)

The International Committee of Medical Journal Editors (ICMJE) defines an author as someone who:

- Makes substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; **AND**

- Drafts the work or reviews it critically for important intellectual content; **AND**

- Contributes to the final approval of the version to be published; **AND**

- Agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Who is not an author?

- Guest, gift, or honorary authorship is defined as when someone who hasn't met the criteria for authorship are listed as an author. For e.g. including a respected/well known researcher, or listing senior researchers (such as department heads, etc.) by custom or on request.

- Generative AI does not merit authorship. Moreover, AI and AI-assisted technologies should only be implemented to improve the 'readability' of the manuscript, and not used to write the manuscript per se, nor draw scientific conclusions, or provide clinical recommendations from work included.

Authorship Order

- In laboratory-based science, the order of authors listed has significance, with the first and last carrying a special weight.

- *First authors* are usually understood to have performed the majority of the work (in terms of experiments presented, and in intellectually driving the work forward), and also usually undertake major writing responsibilities, working with the last/senior/corresponding author on assembling all requirements for submission, leading necessary revisions, and reviewing proofs prior to publication. It is becoming increasingly common to have publications listing 2 or more co/joint-first authors, arising from contributions deemed equally meriting of this designation.

- *The corresponding author* holds a different but equally important role on the publication. The ICMJE defines a corresponding author as someone who takes primary responsibility for communication with the journal during the manuscript submission, peer review, and publication, process. They are also deemed responsible for ensuring that all of the administrative requirements of the journal are fulfilled, potentially including provision of documents related to ethics approval, data and signatures from all authors, and conflict of interest statements. As corresponding author, they take on the responsibility of ensuring that the submitted manuscript meets the requirements

of the journal (including ensuring data/resources are made available as appropriate), and being available for enquiries whilst the manuscript is in review, and published.

Publication Disputes and Misconduct

- Given the high importance placed on publications for career advancement by biomedical researchers, it is not surprising that a significant number of disputes encountered are around authorship and order.

- Where possible, disputes around authorship and order should be addressed prior to publication. It is also worth bearing in mind that resolution to disputes need to be approached in an evidence-based way, as there can be a biased perception of individuals' contributions to a body of work.

- In situations where an individual wishes to dispute either their inclusion/exclusion as an author, or the order in which their name appears in the list, this should be discussed in the first instance with their line manager/supervisor/thesis committee. However, it may be that the individual does not feel comfortable in discussing the matter with their line manager, in which case it is advisable that they approach either their second supervisor (students), PG Director, technical lead for the school (technicians), or research champion (researchers). If the matter cannot be resolved, then an informal chat with their Head of Centre or Institute, or a formal chat with Dean for Research Integrity may be warranted.

Research Misconduct (as defined by UKRIO, ORI)

- **Misrepresentation** – such as inappropriate claims to authorship or attribution of work, and

- **Failure to meet ethical, legal, and professional obligations** – including misrepresentation of involvement or authorship.

CMVM Authorship Principles and Guidance

Background

Publishing and disseminating your research outcomes is a vital part of the research process, ensuring that those that could build on or use your work are aware of it and can implement it. The authorship of research and publications is evidence of the contributions an individual has made to advancing science, and demonstrates their responsibility for the integrity of that work. Ensuring an author list is correct, both to ensure appropriate credit for the work and to assign accountability, is important. Defining who is eligible to be an author is not straightforward, nor universally agreed between different disciplines. The order in which authors are listed can also differ between disciplines. The guidance here conforms with our published statements on Good conduct in authorship and publication practice, the CMVM FAIR publications policy, and the Edinburgh Clinical Trials: Publication and Acknowledgement policy

Guidance

There are many resources available to help guide decision-making in defining authorship, and determining contribution and order. The College of Medicine and Veterinary Medicine (CMVM) recognises that even within the college, a number of different conventions for publication are likely to be encountered. However, the guidance here attempts to provide good practice advice, as well as resources to assist researchers.

Discuss authorship early and often

The best way to avoid disputes at publication stage is to ensure that discussions between everyone contributing to a body of work happen early and often. As soon as a project is devised, or a body of work shaped toward publication, there should be a free and open discussion with everyone involved to talk about authorship, contribution, and order. Once in place, this should not be seen as static, but regularly discussed as new work is created, new people join, people leave, and the publication drafted/revised, etc. Ideally, the contributions each individual has made will be recorded in a centralised location, but each individual should undertake to keep their own records as well as demonstrate contribution at a later date. An open conversation between all who have contributed to the work contained within the publication should be updated/reviewed with each draft, so there is transparency as to the criterion for authorship, and the order they appear. There are tools listed in "Resources" which may help define who merits inclusion as author, based on contribution, and potentially assist with determining order.

1. Who is an author?

Definitions for who qualifies for authorship are not universal, but the two minimum requirements in common are:
* Substantial contribution to the work, *and*
* Accountability for the work that was done, and its presentation in a publication.

The International Committee of Medical Journal Editors (ICMJE) recommends that authorship requires meeting all of the 4 following criteria:
* Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; **AND**
* Drafting the work or reviewing it critically for important intellectual content; **AND**
* Final approval of the version to be published; **AND**
* Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

The ICMJE also states the expectation that in addition to being accountable for the parts of the work done, an author should be able to identify which co-authors are responsible for specific parts of the work, and should have confidence in the integrity of their co-authors. **Anyone** meeting the first criterion should have the opportunity to participate in the review, drafting, and final approval of the manuscript, thus making them potentially eligible for authorship.

In recent years, there has been a push toward demonstrating the contribution that each author listed has made to the publication, using the Contributor Roles Taxonomy, or CRediT (https://credit.niso.org/). This taxonomy includes 14 different roles that individuals may have performed within the work presented, and many journals now require a statement of author contributions. Even if the journal does not require this, and the word count precludes, it is advisable to work through this attribution process in drafts of the manuscript for internal records. With the move to narrative CVs in many facets of research (e.g. many funders now require narrative CVs rather than the traditional resume), CRediT can help with describing contributions to code, datasets, software, as well as the role played in different publications.

It is important that authorship is democratic, and includes all those meeting the required criteria, regardless of their title or status, including students, technicians, trial managers etc. The CMVM fair publication policy specifically addresses the inclusion of technicians and core facilities in either the author list or the acknowledgements, depending on their contribution. This is consistent with the Technician Commitment, which aims to ensure visibility, recognition, career development and sustainability for technicians, to which the University is a signatory. Ultimately it is the provision of *significant* intellectual contribution that merits inclusion as an author. A situation where this is often unclear is when work is performed for under a paid service agreement, often by research technical professionals. The criteria for inclusion as an author remain the same: if an individual has contributed intellectually to the project; for example, significantly helped with the design of the experiments, modified techniques, equipment, software, analyses, to be able to best answer the question, etc., then they may qualify for authorship. Another way of thinking about it might be to ask whether questions regarding the experiment could be answered if the individual who performed the work were not included.

Sometimes there are consortia or teams who are listed as contributors in addition to individual authors, and in these cases, the authors within a consortium must be listed at the end of the paper (it is possible for an individual to be listed both as an author, and as a member of a consortium). The journal Nature has instructions on inclusion of consortia, which can be used as a general guideline. For teams, such as the Edinburgh Clinical Trial Unit, authorship should still be based on the criteria pertaining to contribution, but additional details have been published in their Publication and Acknowledgement Policy. Shared research facilities used should also be appropriately acknowledged in publications, allowing the facility to evidence their contribution to the research undertaken. Many of CMVMs facilities are registered on Pure (the University's Current Research Information System), and should be cited using the correct name, and records on Pure updated for inclusion.

1.1 Contributors to publications, who aren't authors

Those who have contributed, but don't meet the criteria for an author, should be acknowledged for their work in the acknowledgements section of the publication. This might include individuals involved in proof reading, technical and language editing, facilitating peer review, providing administrative support for the underpinning project. Similarly, if no intellectual contribution was made during the course of the following, then these additional tasks may also warrant acknowledgement rather than authorship: data collection, data processing, fieldwork, performing experiments which were instruction led, paid consultation or services, funding the project or acquiring the funds, leading or being a member of the group that conducted the work. This infographic gives another way of displaying guidelines for authorship contributions.

1.2 Who is *not* an author

In most instances today, it takes a team of people to produce a publication. However, only a subset of those will meet the criteria for authorship. Defining who does NOT merit authorship is equally important.

Guest, gift, or honorary authorship is defined as when someone who hasn't met the criteria for authorship are listed as an author. There are reasons this is undertaken, including 'you scratch my back, I'll scratch yours', hoping to gain favours at a future time from the included individual, hoping to increase the chances of acceptance by including a respected/well known researcher, or listing senior researchers (such as department heads, etc.) by custom or on request. It should be pointed out that ALL authors on the paper are deemed to have responsibility for the work presented within the paper, and thus there is a risk associated with this behaviour, in addition to it being considered a form of research misconduct.

It should be noted that even using the minimum requirements for authorship, that generative AI does not merit authorship. Moreover, AI and AI-assisted technologies should only be implemented to improve the 'readability' of the manuscript, and not used to write the manuscript per se, nor draw scientific conclusions, or provide clinical recommendations from work included. Use of the AI tool/s should be undertaken with extreme caution, due to its ability to generate authoritative-sounding material which is incorrect, incomplete, or biased, and where the source material is unknown and un-referenced nor cited appropriately. Given that the requirements for authorship include accepting responsibility for ALL of the work presented and the conclusions made therein, utilising AI to write any portion of the manuscript is a risky and potentially irresponsible act. Similarly, using AI to create or alter images in a manuscript is not permitted by many journals. Nature and Elsevier have both released policies pertaining to AI use in writing and image creation/alteration.

2. The order of authors listed, and responsibilities of corresponding author

2.1 First author/s

In laboratory-based science, the order of authors listed has significance, with the first and last carrying a special weight. Often, the author listed first is understood to have performed the vast majority of the work (both in terms of the experiments presented, and in terms of intellectually driving the work forward, and who has often written the first draft of the manuscript). Traditionally, *first authors* are also responsible for major writing responsibilities, working with the last/senior/corresponding author on assembling all requirements for submission, leading necessary revisions, and reviewing proofs prior to publication. However, it is becoming increasingly common to have publications listing 2 or more co/joint- first authors. This can arise when once the contributions have been assessed, it isn't possible to assign one individual first authorship over the others, and thus ascribing the individuals as equal first is the most appropriate (listed in the tools below is an option for trying to find the 'tie-breaker' if for some reason a single first author is required). It might also be the case that the publication contains cross-disciplinary work, each of which is recognised with first authorship for the individual who undertook most of the work within that discipline. In either of the cases above, the contributions made by each person should be clearly defined, and the joint designation clearly indicated in the author list. Although formatting requires that only one name can physically be listed first, each of the individuals sharing the first authorship can claim this in their CV (citing the publication as it appears in the journal), where it may be useful to add a visual aid to indicate the contribution individuals have made to publications they've worked on over time (such as this example, with an additional line or two showing first (including joint) and last/senior/corresponding).

2.2 Corresponding Author

Another role with additional responsibilities is the *corresponding author*, who holds a different but equally important role on the publication. The ICMJE defines a corresponding author as someone who takes primary responsibility for communication with the journal during the manuscript submission, peer review, and publication, process. They are also deemed responsible for ensuring that all of the administrative requirements of the journal are fulfilled, potentially including provision of documents related to ethics approval, data and signatures from all authors, and conflict of interest statements. As corresponding author, they take on the responsibility of ensuring that the submitted manuscript meets the requirements of the journal (including ensuring data/resources are made available as appropriate), and being available for enquiries whilst the manuscript is in review, and published. Determining who should be the corresponding author can be tricky decision, particularly on multi-disciplinary submissions, where having a single author required to answer questions on disciplines outwith their expertise is not straightforward. However, the corresponding author should be in a position to direct queries in the correct direction for rapid responses where required.

2.3 Last author

Frequently, but not always, the corresponding author is also the *senior or 'last' author*, whose role is usually to provide the original intellectual input, help design the study and protocols to be followed, and often obtain the funding required to undertake the work (however, as detailed below, acquiring the funding is insufficient in itself to merit authorship). The first time a researcher achieves corresponding or last author status is seen as a rite of passage, in that they are no longer the 'producer' of the research for publication, but have achieved responsibility for, and a status of 'directing', the work instead.

2.4 Interdisciplinary publications

Research collaborations that cross disciplinary boundaries, or even national boundaries, can present additional challenges to determining who merits authorship or the order of the authors, as a result of substantial differences in custom, organisational structures, and regulatory systems. In these instances, ultimately it is the journal where the work is being published which will dictate the criteria for authorship and the order, but for researchers involved in such work, the 'early and often' discussions around authorship are important to ensure that contributions are recorded, and if possible, a statement of the contribution of all members of the wider research team should be included in the publication, potentially using one of the visualisation tools at the end of the guidance. The [Montreal Statement on Research Integrity in Cross-boundary Research Collaborations](#) has additional advice.

3. Disputes and misconduct

Given the high importance placed on publications for career advancement by biomedical researchers, it is not surprising that a significant number of disputes encountered are around authorship and order. These result primarily from the loosely defined or interpreted criteria around authorship and intellectual contribution, and in many cases, an unwillingness to implement formal practices/policies to handle such disputes. There are multiple [published strategies for avoiding and overcoming authorship disputes](#) which can be used as a basis for discussions.

Where possible, disputes around authorship and order should be addressed prior to publication. By having regular discussions around authorship during the course of producing the work to be included in the manuscript, it should be possible to identify who merits inclusion as an author, and whose contribution more appropriately sits within the acknowledgements. There are different tools available which can be

used to determine both authorship and order, with additional information in the links at the end of this guidance. It is also worth bearing in mind that resolution to disputes need to be approached in an evidence-based way, as there can be a biased perception of individuals' contributions to a body of work.

In situations where an individual wishes to dispute either their inclusion/exclusion as an author, or the order in which their name appears in the list, this should be discussed in the first instance with their line manager. However, it may be that the individual does not feel comfortable in discussing the matter with their line manager, it is advisable that they approach either their second supervisor (students), technical lead for the school (technicians), or research champion (researchers). If the matter cannot be resolved, then an informal chat with Head of Centre or Institute, or a formal chat with Dean for Research Integrity may be warranted. Different means of resolving authorship disputes by mediation and arbitration can be found here.

There are instances where authorship disputes may constitute misconduct, and the University of Edinburgh's research misconduct definition includes two elements pertaining to authorship:

- **Misrepresentation** – such as inappropriate claims to authorship or attribution of work, and
- **Failure to meet ethical, legal, and professional obligations** – including misrepresentation of involvement or authorship.

The University of Edinburgh has webpages describing research misconduct, as well as a research misconduct policy, and a mechanism for reporting misconduct.

Ultimately, authorship is both a privilege and a responsibility, but one that should be handled fairly and transparently. Discussing early and often is the best way to ensure that everyone involved in the work understands where they stand, and that they have the opportunity to contribute to the best of their abilities.

4. Resources

- In the biomedical sciences, the most common **criteria for authorship** are those defined by the International Committee of Medical Journal Editors, ICMJE, although an adaptation has also been published, which includes:
    - conception/design of the work,
    - Acquisition, analysis or interpretation of the data;
    - Creation of new software used in the work;
    - OR to have drafted OR substantively revised the publication
- A google document has been created as part of a publication by Edsel Ing for **determining authorship order** using the ICMJE criteria.
- The Office of Intramural Research has an infographic for **authorship contributions**.
- The American Psychological Association has created a Scorecard to **determine authorship**, and potentially order of listing
    - As well as a Tie-breaker if 2 (or more) authors have scored the same in the scorecard.
- A nice tool for **documenting contribution** using CRediT has been created, based on the publication by Holcombe, et al..
- Nature Publishing Group has indexed resources on using visual tools to give **fair credit for work** on papers.
- UoE Cardio Vascular Sciences has published **fair authorship guidance**.
- The UK Research Integrity Office has guidance on authorship, with some interesting scenarios to prompt thought and discussion.
- UK Research Integrity Office has additional guidance, including: Good practice in research: authorship and Code of Practice for Research, as well as a Webinar on Responsible, ethical, and fair authorship by Irene Hames, including detailed description on use of CRediT, and contribution matrices.