

# Writing a peer review: a primer for junior researchers

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## 1. Peer review is an essential skill for junior researchers

The process of peer review is undoubtedly the lifeblood of scholarly publishing.<sup>1,2</sup> The value of a detailed, thorough and fair assessment is threefold: for the quality of articles published in the Journal itself, the authors who will (in the most part) use the feedback to improve the quality of their work and for the wider issue of scientific integrity and reproducibility.<sup>3,4</sup> However, the ability to write an insightful peer review is a skill unto itself, which some junior researchers can find intimidating. In addition, a lack of standardization can be frustrating for inexperienced peer reviewers trying to hone their skills and for authors who receive below-par appraisal of their hard work. In 2018, the Publons Global State of Peer Review reported that more than half of the participants questioned believed that scholarly publishers or Journals themselves should provide training on peer review (<https://publons.com/community/gspr>, accessed 28 November 2018). Here, we provide a primer that the *Cardiovascular Research* young community<sup>5–7</sup> may use as a starting point for their peer review report.

## 2. How to write a peer review

Firstly, it is pertinent to check that the manuscript is formatted correctly and according to the Journals' Guidelines for Authors.<sup>8</sup> This can be an indication of how careful the authors have been in their approach to compiling the paper. Reviewers should only accept reviews that are within their area of expertise. It is helpful to keep the title in mind as the reviewer reads the paper, does it accurately describe the key message of the manuscript to the reader?

Considering the authors of the paper, acknowledge and address any unconscious bias and do not be influenced to think a paper is better or worse than it is because of the author or institution. In addition, if there is a conflict of interest, report it to the Journal directly *before* beginning your review. The Community on Publication Ethics (COPE) has recently updated their Ethical Guidelines for Peer Reviewers, which *Cardiovascular Research* adheres to regarding the definition of a 'conflict'.

### 2.1 Abstract

The abstract is the reviewer's first impression of the paper's methods and its key findings. Different Journals have different guidelines for writing abstracts (e.g. structured vs. non-structured) so make sure to know the Journal's current requirements. Initially, the abstract should briefly introduce and contextualize the subject of the paper and make the aim of the study clear. The abstract should describe the key methodologies applied to test the given hypothesis. Key results should then be summarized, and a strong scientific abstract should include data and appropriate statistics that support the main finding of the paper. Finally, the outcomes of the paper and how this work has added to the body of knowledge should be succinctly written. The reviewer should consider if the abstract faithfully summarizes all main findings of the paper. In addition, is the conclusion accurate or over-reaching? It is useful to go back and reread the abstract after reading the full manuscript.

### 2.2 Introduction

The introduction of the manuscript must justify why the study has been undertaken and why it is novel. The hypothesis being tested, and the aim of the work should be clearly defined. It is not necessary for the introduction to act as a literature review of the topic, but it should introduce all concepts and previous work necessary to understand the present study.

### 2.3 Experimental approach and data presentation

Reviewing the 'Materials and Methods' section will require some specialist knowledge; however, some general points to consider are:

- In living subjects (humans or animals) was the correct ethical approval in place?
- Was the choice of pre-clinical model justified in the text?
- Are the techniques used appropriate? Can the results be called into question because of the experimental approach taken?
- Do the assays measure what the authors have set out to measure? For example, 'reactive oxygen species' production is a key example of this.
- Is there a more reliable or more accurate assay that supersedes what has been used by the authors?

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- Is the work reproducible? Do the authors provide enough information, for example, product codes for the work to be validated by an independent group?
- Were datasets deposited in a publicly available repository?

When assessing the 'Results' section, it is helpful to take each figure in turn and then to ask: (i) Does the data shown in the figures support the text in the manuscript?, (ii) Is the data displayed in the appropriate way and labelled correctly?, and (iii) Are the appropriate control groups shown? Look out for discrepancies in *N* numbers stated in the legend and what is shown in the figures. In addition, it is vital for reviewers to familiarize themselves with appropriate vs. excessive image manipulation.<sup>9</sup> Be realistic in the appraisal of results and only request additional experiments that are either essential to support the main conclusions of the paper or to probe further into the mechanism, thereby improving the paper's scientific priority. If there is a serious methodological flaw that the authors cannot address unless they repeat the entire study—you should reject the paper. Asking the authors to, for example, generate a new transgenic mouse is rarely appropriate.

## 2.4 Statistics

Appropriately applied and analysed statistics are vital to support the conclusions of the manuscript. Is it clear how many *N* numbers are used for each experiment and how they have been analysed? Where relevant, have statistical tests been performed using the number of animals rather than considering cells or gels from the same animals independent?<sup>10</sup> How have the authors defined technical and biological replicates? Individual data points should be shown in the form of a dot plot or box plot rather than being hidden behind summary statistics (mean and standard error). Are the statistical tests clearly stated and are they appropriately used? Are *P* values interpreted sensibly or is it slavishly assumed that  $P < 0.05$  is significant and  $P > 0.05$  is not?<sup>11</sup> Has the power of the study been considered? If no change is found in a measured variable, did the study have enough precision to resolve what could still be an important difference? Some studies require specialist statistical knowledge, such as meta-analyses, clinical trials or health economics. Most Journals will offer the services of a statistical editor and this can be requested.

## 2.5 Discussion

The discussion should provide a summary of the main finding(s) of the manuscript in the context of the wider scientific literature, as well as addressing any limitations of the study or findings that conflict with other published work.

- Did the authors faithfully summarize their findings?
- Do they clearly state what they have added to the body of knowledge? Is this advance justified?
- Are the results discussed in the context of the wider scientific field? Are any key references or studies missing?
- Have the authors identified the limitations in their study?
- Does the author identify future directions of this work and any potential clinical relevance?
- Does the conclusion match the initial objective and is it justified?

## 3. Making your decision and submitting the review

Following completion of their critical appraisal, reviewers are required to make a final decision on the manuscript. Decision terms and policies

**Table 1 Summary and examples of final decision terms**

Decision term	Examples
Minor revision	Edits to the manuscript text only and/or addition of references; 1–2 additional experiments that could be achieved in up to 3 months
Major revision	Up to three additional experiments required that could be achieved in 3–6 months of work; statistical issues that require re-analysis of the data
Reject with <i>de novo</i>	Significant additional experiments needed that would take longer than 6 months to complete
Reject	Methodological flaw that cannot be addressed without repeating the study; does not reach significant scientific priority based on topic and novelty of findings in the article.

vary between journals but to provide some guidance, a non-exhaustive list of examples is given in *Table 1*.

The purpose of the reviewer report is to justify how the reviewer reached their decision. You should be consistent in your confidential comments to the Editor and to the Author. As a guide, the average length of a peer review report is 500–600 words. The key when writing the major and minor comments is to be *specific*, refer to the text and cite examples where necessary. If you refer to other work, give a full reference. Show an awareness of relevant best reporting guidelines such as the EQUATOR network or ARRIVE. If there are issues with the quality of writing, you can say this in one point under your major comments. You do not need to proofread the manuscript. Keep in mind that there is a person behind the manuscript who has worked very hard to bring their research to this point so use professional and respectful language. You can also say what you liked about the study too.

## 4. How to get involved in peer reviewing

The easiest way of getting involved in peer review is to reach out to your seniors and offer to assist them in reviewing papers. You should expect your mentor to state your involvement in the review process to the Journal so that you can be properly acknowledged. An efficient way of keeping track of completed peer reviews is to join a database, such as Publons. You can contact the Editorial Office of Journals in your field of expertise to enquire about being added to their reviewer database or if you are already registered, ensure that your keywords are up-to-date. As well as practical experience, there are several online academies in peer review that are available for young researchers to develop their skills.

## 5. Conclusions

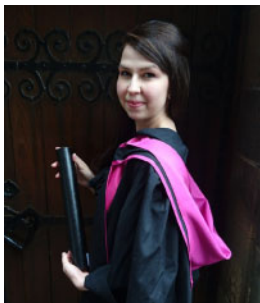
In summary, quality peer review is the basis of scholarly publishing. As well as learning the technical and professional skills to be able to produce their own manuscripts, junior researchers should also prioritize training in the critical appraisal of others' work to strengthen the next generation of peer reviewers.

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## Authors



**Biography:** Dr Heather Y. Small is Senior Managing Editor of *Cardiovascular Research*. She is based in the Journal's Editorial Office within the Institute of Cardiovascular and Medical Sciences at the University of Glasgow, UK.



**Biography:** David Eisner, DPhil, is the British Heart Foundation Professor of Cardiac Physiology at the University of Manchester. David received his B.A. (Natural Sciences) from Cambridge and DPhil (Physiology) from Oxford. His early research focused on the regulation of intracellular sodium in cardiac muscle and the effects on contraction. He then investigated the control of intracellular calcium concentration and its role in the production of arrhythmias. He has worked extensively on the factors that regulate the calcium content of the sarcoplasmic reticulum and how this is altered in disease. His most recent work has been concerned with the regulation of diastolic calcium concentration. He has served as Editor-in-Chief of *The Journal of Molecular and Cellular Cardiology* and *The Journal of Physiology* and is currently an Associate Editor of *Cardiovascular Research*.