National Centre for the Replacement Refinement & Reduction of Animals in Research

NC3Rs gateway – Guidance for preparing a Method Article

The aim of this guidance document is to guide NC3Rs funded researchers through the process of preparing a Method Article for the gateway. This document should be used in conjunction with the guidance for authors provided by F1000Research on 'Preparing a Method Article'.

Scope

Method articles should be written with a target audience in mind, typically mammalian/ vertebrate model users. The 3Rs model/ tool/ technology should be described in sufficient detail to demonstrate the utility of the 3Rs approach and to encourage adoption by the target audience and wider scientific community. The article should include methodological and technical details, performance characteristics, and where possible comparison(s) against the current state-of-the-art or gold standard models. The 3Rs relevance and impact of the model/ tool/ technology should be embedded throughout the article; from the abstract through to the discussion, and where appropriate, be supported by metrics.

Format

For most Method Articles, the following standard format will be the most appropriate:

- Abstract
- Introduction
- Materials and Methods
- Results
- Discussion
- Research highlights (this will be a stand-alone box)

Important details to include

Abstract:

Abstracts should be up to 300 words long and provide a succinct summary of the article. In addition, summarise in two sentences; 1) who the target end-user(s) are, and 2) why they should adopt your 3Rs approach both from a scientific and a 3Rs perspective.

Introduction:

- Describe the alternative *in vitro/ in vivo/ in silico* approaches that are available.
- For each of the alternative models/ approaches available, discuss the advantages and limitations of each. Describe the pros and cons of each model/ approach, with regards to the scientific outcomes, the 3Rs implications and practical aspects.
- Clearly describe the 3Rs relevance of your approach, and how it fits in with the current state of affairs.
- Clearly define who the potential end-users of your 3Rs approach are.
- Where appropriate, include metrics that support the need for 3Rs research in this area. Consider the following questions:

1. How many animals are used locally for this work, and how many would be affected/ no longer used?
2. How many groups in the UK or overseas use the animal model and could benefit from the approach?
3. How many papers published annually use this model, and how many animals are used in a typical publication.
4. What is the severity classification of the procedure as defined under the EU Directive (2010/63/EU); non-recovery, mild, moderate or severe?

Materials and Methods:

This section should be split into two parts:

1. Materials and Methods
   Provide a short summary of the materials and methods used. The content of this section should be akin to a conventional materials and methods section in a research article. It will appear in the main body of the Method article.
   If appropriate, consider including subsections; 1) Methods for the model development, and 2) Methods for the characterisation and validation of the model.

2. Protocol(s)
   Provide full details of the materials and methods used in a step wise manner so that the work can be reproduced/ repeated by others. As above, if appropriate, consider splitting the protocol(s) into subsections; 1) Protocol for the model development, and 2) Protocol for the characterisation and validation of the model.

- Include supporting images and videos, where appropriate.
- Provide details of equipment used in the Protocol(s) section.
- Consider including a 'Notes' section to supplement the 'Materials and Methods' and 'Protocol(s)' with practical considerations or tips for implementation.
- If you are presenting any comparative data, consider addressing the following points about experimental design:
  - Include a discussion of allowances made (if any) for controlling bias or unwanted sources of variability. Any limitations of the datasets should be discussed.
  - Include the number of experimental and control groups, and sample size per group.
  - State how the same size was calculated; showing power calculations and including justification of effect size. Mention circumstances in which power calculations were not appropriate in determining sample size.
  - Provide a description of the statistical analyses used in relation to the primary outcomes that were assessed.
- Where applicable, we also encourage authors to deposit a step-by-step description of their protocols on protocols.io, where they obtain a persistent digital object identifier (DOI), which can be included in the Methods section of the article, using https://doi.org/10.17504/protocols.io.[PROTOCOL DOI] as the format (e.g. https://doi.org/10.17504/protocols.io.hrkb54w). Authors should note that the protocol is only made public once they select "Publish" on protocols.io.

- For articles that describe the use of animal models, including invertebrate models (such as *Drosophila* or *C. elegans*) or non-protected immature forms of vertebrates (such as embryonic or foetal forms), the article must comply with the ARRIVE guidelines.
- For articles that describe the use of animal tissues following a schedule 1 procedure, the article must comply with the 'Housing and husbandry' section of the ARRIVE checklist.
- Abbreviations, if needed, should be spelled out.
- Add Research Resource Identifiers (RRIDs), where available, to unambiguously identify the following types of resources: antibodies, genetically modified organisms, software tools, data, databases and services. More information on this project is available from the Resource Identification Initiative and RRIDs can be obtained from the portal.

Results:

This section should be split into two parts:

1. Characterisation studies
   Demonstrate how the 3Rs model/ tool/ technology was characterised (conceptual validation). For example, what studies/ assays were used to describe the distinctive features of the model (such as biochemical, histological, pharmacological, genetic, etc. characteristics).

2. Validation studies
   If available, demonstrate how the 3Rs model/ tool/ technology was validated against the current state-of-the-art or gold standard? (A like-for-like comparison).
   For example, what studies were used to prove the validity and utility of the model (such as comparison against a commonly used animal model)?

- Supporting videos and the use of interactive figures, where appropriate, is encouraged.

Supporting data:

- All articles reporting new research findings must be accompanied by the underlying source data, together with details of any software used to process the results. Please include details of how the data were analysed to produce the various results (tables, graphs, etc.) shown (i.e. what statistical tests were used). If a piece of software code was used, please provide details of how to access this code (if not proprietary). See also F1000Research Data Preparation guidelines for further guidance on data presentation and formatting.
- If you have already deposited your datasets or used data that are already available online or elsewhere, please include a 'Data Availability' section, providing full details of how and where the data can be accessed, including the DOI. Please also provide details of the license under which the data can be used.
- If you are describing new software, please make the source code available on a Version Control System (VCS) such as GitHub, BitBucket or SourceForge, and provide details of the repository and the license under which the software can be used in the article.
- The F1000Research team will assist with data and/or software deposition and help generate this section, where needed F1000Research will be happy to advise.

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Discussion:

- Describe the transferability of your 3Rs model/ tool/ technology. Include a careful consideration of the barriers to uptake for other potential end-users and the potential solutions to address/ overcome these.
- Describe the translatability of your 3Rs model/ tool/ technology. To which types of scientific question/ remit/ discipline could the 3Rs approach be (or not be) applied?
- Consider the measure(s) of success/ acceptance test that could be used by another end-user of the 3Rs model/ tool/ technology to demonstrate that it is fit for purpose. For example, what performance characteristics are needed in order to demonstrate utility and confidence in using the 3Rs model/ tool/ technology to address scientific questions?
- Address why it is important for your 3Rs approach to be adopted by others; summarise the scientific and 3Rs benefits of taking up your 3Rs model/tool/technology.
- Quantify the 3Rs impact of the model/tool/technology described, where appropriate. For example, how many animals have been affected/ are no longer used locally (e.g. in your laboratory, department or institution)/ in the UK/ internationally? Has the severity classification of the procedure or model been affected (e.g. from severe to moderate)?

Research highlights (stand-alone box)**:**

In the manuscript, include a separate section called 'Research highlights'. This feature will provide the reader with a quick, structured overview of the 3Rs approach described in your article and will illustrate why they should adopt your 3Rs approach both from a scientific and a 3Rs perspective.

Provide concise bullet-point responses to the following questions (multiple bullet-points can be listed for each question, and, if some questions are not applicable to your article they may be omitted):

- What are the scientific benefits?
- What are the 3Rs benefits?
- Are there any practical benefits? For example; cost effective, time, difficulty/ complexity, etc.
- What can the approach be applied to currently?
- What are the potential future applications?

Box template:

Research highlights	
Scientific benefit(s):	
3Rs benefit(s):	
Practical benefit(s):	
Current applications:	
Potential applications:	