# The ARRIVE Guidelines Checklist

Animal Research: Reporting In Vivo Experiments

Carol Kilkenny¹, William J Browne², Innes C Cuthill³, Michael Emerson⁴ and Douglas G Altman⁵

¹The National Centre for the Replacement, Refinement and Reduction of Animals in Research, London, UK. ²School of Veterinary Science, University of Bristol, Bristol, UK. ³School of Biological Sciences, University of Bristol, Bristol, UK. ⁴National Heart and Lung Institute, Imperial College London, UK. ⁵Centre for Statistics in Medicine, University of Oxford, Oxford, UK.

| ITEM | RECOMMENDATION | Section/Paragraph |
|------|----------------|-------------------|
| Title | Provide as accurate and concise a description of the content of the article as possible. | S.dysenteriae infection |
| Abstract | Provide an accurate summary of the background, research objectives, including details of the species or strain of animal used, key methods, principal findings and conclusions of the study. | Mentioned in Page 2 |

## INTRODUCTION

### Background

| 3 | a. Include sufficient scientific background (including relevant references to previous work) to understand the motivation and context for the study, and explain the experimental approach and rationale. | Mentioned in Page 3 |
| 3 | b. Explain how and why the animal species and model being used can address the scientific objectives and, where appropriate, the study’s relevance to human biology. | |

### Objectives

| 4 | Clearly describe the primary and any secondary objectives of the study, or specific hypotheses being tested. | Introduction 3rd paragraph |

## METHODS

### Ethical statement

| 5 | Indicate the nature of the ethical review permissions, relevant licences (e.g. Animal [Scientific Procedures] Act 1986), and national or institutional guidelines for the care and use of animals, that cover the research. | Materials and methods section |

### Study design

| 6 | For each experiment, give brief details of the study design including: | Materials and methods section |
| 6 | a. The number of experimental and control groups. | 3rd paragraph |
| 6 | b. Any steps taken to minimise the effects of subjective bias when allocating animals to treatment (e.g. randomisation procedure) and when assessing results (e.g. if done, describe who was blinded and when). | 3rd paragraph |
| 6 | c. The experimental unit (e.g. a single animal, group or cage of animals). | 3rd paragraph |
| 6 | A time-line diagram or flow chart can be useful to illustrate how complex study designs were carried out. | 3rd paragraph |

### Experimental procedures

| 7 | For each experiment and each experimental group, including controls, provide precise details of all procedures carried out. For example: | Materials and methods section |
| 7 | a. How (e.g. drug formulation and dose, site and route of administration, anaesthesia and analgesia used [including monitoring], surgical procedure, method of euthanasia). Provide details of any specialist equipment used, including supplier(s). | 3rd paragraph |
| 7 | b. When (e.g. time of day). | |
| 7 | c. Where (e.g. home cage, laboratory, water maze). | |
| 7 | d. Why (e.g. rationale for choice of specific anaesthetic, route of administration, drug dose used). | |

### Experimental animals

| 8 | a. Provide details of the animals used, including species, strain, sex, developmental stage (e.g. mean or median age plus age range) and weight (e.g. mean or median weight plus weight range). | Materials and methods section |
| 8 | b. Provide further relevant information such as the source of animals, international strain nomenclature, genetic modification status (e.g. knock-out or transgenic), genotype, health/immune status, drug or test naïve, previous procedures, etc. | 3rd paragraph |

The ARRIVE guidelines. Originally published in PLoS Biology, June 2010¹
Animals were found to be healthy prior to treatment and after treatment. Histological changes were observed after sacrificing the animals.

### Sample size

- **Provide details of:**
  - Housing (type of facility e.g. specific pathogen free [SPF]; type of cage or housing; bedding material; number of cage companions; tank shape and material etc. for fish).
  - Husbandry conditions (e.g. breeding programme, light/dark cycle, temperature, quality of water etc for fish, type of food, access to food and water, environmental enrichment).
  - Welfare-related assessments and interventions that were carried out prior to, during, or after the experiment.

- **Specify the total number of animals used in each experiment, and the number of animals in each experimental group.**
- **Explain how the number of animals was arrived at. Provide details of any sample size calculation used.**
- **Indicate the number of independent replications of each experiment, if relevant.**

3 animals in each experimental group.

### Allocating animals to experimental groups

- **Give full details of how animals were allocated to experimental groups, including randomisation or matching if done.**
- **Describe the order in which the animals in the different experimental groups were treated and assessed.**

Materials and methods section 3rd paragraph.

### Experimental outcomes

- **Clearly define the primary and secondary experimental outcomes assessed (e.g. cell death, molecular markers, behavioural changes).**

Wnt and NFκB signaling.

### Statistical methods

- **Provide details of the statistical methods used for each analysis.**
- **Specify the unit of analysis for each dataset (e.g. single animal, group of animals, single neuron).**
- **Describe any methods used to assess whether the data met the assumptions of the statistical approach.**

Data are shown as the mean ± SD. Statistical evaluation.

### RESULTS

#### Baseline data

- For each experimental group, report relevant characteristics and health status of animals (e.g. weight, microbiological status, and drug or test naïve) prior to treatment or testing. (This information can often be tabulated.)

Animals were found to be healthy prior.

#### Numbers analysed

- Report the number of animals in each group included in each analysis.
- Report absolute numbers (e.g. 10/20, not 50%³). If any animals or data were not included in the analysis, explain why.

2 groups control and 8hrs.

#### Outcomes and estimation

- Report the results for each analysis carried out, with a measure of precision (e.g. standard error or confidence interval).

Data shown as mean.

#### Adverse events

- Give details of all important adverse events in each experimental group.
- Describe any modifications to the experimental protocols made to reduce adverse events.

Not Applicable.

### DISCUSSION

#### Interpretation/scientific implications

- Interpret the results, taking into account the study objectives and hypotheses, current theory and other relevant studies in the literature.
- Comment on the study limitations including any potential sources of bias, any limitations of the animal model, and the imprecision associated with the results².
- Describe any implications of your experimental methods or findings for the replacement, refinement or reduction (the 3Rs) of the use of animals in research.

Results and Discussion section NA.

#### Generalisability/translation

- Comment on whether, and how, the findings of this study are likely to translate to other species or systems, including any relevance to human biology.

This study will help in host defense in.

#### Funding

- List all funding sources (including grant number) and the role of the funder(s) in the study.

NIL.

### References:

1. Kilkenny C, Browne WJ, Cuthill IC, Emerson M, Altman DG (2010) Improving Bioscience Research Reporting: The ARRIVE Guidelines for Reporting Animal Research. *PLoS Biol* 8(6): e1000412. doi:10.1371/journal.pbio.1000412
2. Schulz KF, Altman DG, Moher D, the CONSORT Group (2010) CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. *BMJ* 340:c332.