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Improving the publication standards of research involving animals

Systematic analysis has revealed that a significant proportion of publications reporting research involving animals lack information on study planning, study executionⁱ, and/or statistical analysis. This situation can potentially lead to negative consequences such as unnecessary animal experiments. A number of initiatives aimed at improving the standards of publishing research involving animal models have recently been initiated and led to several sets of guidelines for authors, reviewers and journal editors. The most commonly known guidelines are ARRIVEⁱⁱ, the GSPCⁱⁱⁱ, ILAR^{iv} and most recently ICLAS guidelines^v.

In particular, the ARRIVE guidelines (published in 2010) have been endorsed by over 300 journals worldwide^{vi}. While this represents a significant step toward the implementation of general rules for the publication of animal research, more needs to be done to arrive at universal and uniform standards for the information to be included in publications.

The following issues need discussion and/or improvement:

1. Different guidelines exist while many journals have not yet adopted any of these. The involved organisations (see above) and journals should join effort to establish a common set of guidelines and requirements concerning the reporting of design, execution and analysis of studies involving animals in publications. Such a unified set of guidelines should then be implemented by all journals. Universal standards would be the most effective measure to prevent seriously flawed studies from being published.
2. Journals should provide authors with sufficient space to describe all relevant details of research and analysis such that studies can be judged with respect to their planning, methodology, statistical verification and reproducibility of all results. The necessary space can be provided in the context of the methods section and/or supplemental online sections. In addition, authors should be requested to describe efforts to implement the 3Rs^{vii}, comment on the severity and state under which permits and in which legal framework the experiments were performed. Methods to avoid bias, such as blinding and randomization should be reported where appropriate.
3. Scientists and editors should develop a culture of vigorous and critical assessment of animal studies; the peer review system is an essential component of any control mechanism. Journals should provide reviewers with clear guidelines and every review report should contain one specific section dedicated to this evaluation. Experts in the design and analysis of animal studies must be involved in the peer review process.
4. Authors should be encouraged to publish and/or at least include a paragraph in their manuscripts describing experiments of robust design and conduct that failed to advance the working hypothesis (so-called “negative” results). This will be an effective measure

to avoid unjustified duplication by others, which in the worst case may result in unnecessary use of animals and resources.

5. Authors should make all robust primary data (published and so-called “negative” results) available in curated databases, which should be open access and searchable by keywords (see workshop 2).
6. Life-science students should be trained in best experimental practice and the ethics of animal research consistent with publication guidelines to facilitate high standards in reporting. In fact, researchers must be fully aware of the publication guidelines at the planning stage to facilitate meaningful and accurate reporting at the end of their studies.

To instigate change, international best practice guidelines governing animal studies must be endorsed by scientists, universities, research institutions, learned societies, animal welfare officers, granting agencies and journals. The implementation of best practice publication standards requires cooperation of all stakeholders.

References

ⁱ Sena et al 2007, Tins. Vesterinen et al 2010 MS. Frantzas et al 2011 Ann Neurol

ⁱⁱ <http://www.nc3rs.org.uk/ARRIVE>

ⁱⁱⁱ Gold Standard Publication Checklist: <http://www.ncbi.nlm.nih.gov/pubmed/20507187>

^{iv} <http://dels.nas.edu/ilar>

^v International Council for Laboratory Animal Science Guidelines: <http://iclas.org/committees/ethics-and-animal-welfare-committee>

^{vi} Animal Research: Reporting In Vivo Experiments: <http://www.nc3rs.org.uk/ARRIVEjournals>

^{vii} „Replace, Reduce, Refine“ – reference to Basel Declaration paper