



Scientists' Views on the Three Rs: Comparison of Canadian and UK Scientists

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Summary

We surveyed Canadian animal-based scientists to benchmark their current understanding of the Three Rs and to identify where our organization's Three Rs resources should be focused. A similar survey was conducted in the United Kingdom (UK). Both surveys found that refinement is the least understood "R" and that neither country's scientists view replacement as achievable. Many participants said they could not replace because animals are the subject of the research (e.g. field research) or because they "need to look at whole animal systems." Canadian participants feel they already reduce as much as possible and further reduction may compromise experimental protocols. Applying reduction strategies to research programs has support from scientists: 77% of UK participants identified data sharing or collaboration as a way to reduce. Both surveys found that Three Rs training can be successfully delivered and/or mandated by national animal use regulators. Comparing survey findings between countries is a useful, empirical way to identify ways to support the Three Rs.

Keywords: Three Rs, survey

1 Introduction

Policy development for animal use in science can benefit from greater understanding of how scientists view the Three Rs (replacement, reduction and refinement). In this context, "views" refers to an individual's personal perceptions about the Three Rs, which may be "correct" or "incorrect." Two organizations recently have conducted surveys to gather the Three Rs views of scientists. In 2007, the National Centre for Replacement, Refinement and Reduction of Animals in Research (NC3Rs) of the United Kingdom (UK) collected the views of UK scientists (NC3Rs, 2008). Following the UK example, the Canadian Council on Animal Care (CCAC) conducted a similar survey of Canadian scientists in collaboration with the research team of Peter Danielson at the University of British Columbia (Fenwick et al., 2011). For both organizations, the surveys provided 1) benchmark data on scientists' understanding of the Three Rs and 2) information about opportunities and obstacles for the Three Rs. The goal of this paper is to compare survey findings and identify ways that policy-makers can further support Three Rs implementation.

2 Survey methods and participants

Data collection occurred for the UK survey in 2007 and for the Canadian survey in 2010. UK participants were recruited with the assistance of the Home Office. In Canada, participants were recruited with the assistance of institutional animal ethics committees (AECs), university research offices, and the national granting agencies. Both surveys were administered via online platforms.

Formats of the questions differed between the two surveys. The UK survey used questions accompanied by a list of possible answers, and participants were asked either to choose all that apply or to select one answer. It also used lists of statements and asked participants to indicate their level of agreement with each statement. This survey gathered quantitative data. The Canadian survey used questions prefaced with brief research scenarios and asked participants to respond by choosing yes, no, or neutral and to provide a reason for their choice in a text box. It also used open-ended questions, requiring participants to enter responses in a text box. The Canadian survey collected both quantitative and qualitative data.

The UK survey had 1,995 participants: 76% were scientists (personal & project license holders) and 24% were animal care staff. The Canadian survey had 414 participants. Of these 72% were "principal investigators" (the Canadian designation applied to scientists who are permitted to submit animal use protocols). The remaining 28% were graduate students, post-doctoral researchers, research associates, and animal care staff. In both surveys the majority of participants conducted research in an academic institution. In Canada, 37% of participants indicated that they were past or present members of an animal ethics committee. For greater detail on the methods used in these surveys see NC3Rs (2008) and Fenwick et al. (2011).

3 Comparison of survey findings and discussion

The comparisons are based on published data from each survey as well as some previously unpublished data from the Canadian survey. The comparisons also take into account several key differences between animal use regulations in Canada and in the



UK. These include the following features of UK regulation: the legislated requirement to implement the Three Rs; government licensing of scientific animal users; and ethical review of both research programs and individual experiments. In Canada there is no legislation requiring implementation of the Three Rs, regulation and review of animal use is peer-based, and individual experiments are reviewed by institutional animal ethics committees. Currently, there is no Three Rs review of Canadian research programs.

In both Canada and the UK, the terms replacement and reduction were well understood by survey participants, while the term refinement was less well understood. In the Canadian survey, participants were asked to define refinement using their own words. Just 49% of Canadian participants included the concept of “minimizing pain and distress” in their refinement definitions. The UK survey provided a range of definitions for refinement and participants were asked to choose all that apply. Eighty-two percent of scientists said refinement includes “improving procedures so that animals experience less pain and suffering.” However, UK participants held several misconceptions about refinements: 72% indicated that using fewer animals was a refinement and 52% indicated that obtaining better data was also part of refinement.

The surveys also revealed that many scientists received their Three Rs training due to their national animal use regulatory agency. In Canada, 65% of participants said they learned about the Three Rs through CCAC training modules and other resources. In the UK, 57% of scientists learned about the Three Rs from training courses that are required by the Home Office and are delivered through third-party accredited courses. Comparison of the UK and Canadian scientists’ understanding of the Three Rs’ definitions shows that on-going Three Rs educational initiatives are still needed. It also revealed that this type of educational initiative can be successfully delivered and/or mandated by national regulators.

Neither Canadian nor UK survey participants viewed replacement as achievable. In the UK, 73% agreed with the statement that “complete replacement will never be achieved” and 77% agreed that “nothing” would enable them to address their research objectives without using animals. In Canada, half of participants said they could not replace because animals are the subject of their research or they “need to look at whole animal systems.” This finding suggests that policy-makers should focus on determining how to better promote consideration of replacement by the scientific community.

Both surveys also asked about views on reduction. In the UK, 77% of scientists identified data sharing or collaboration between research groups as a possible way to reduce animal numbers. This is a strategy that would be applied/coordinated at the level of research programs (rather than at the individual experimental level). When asked about their views on reduction in Canada, participant responses focused on reduction at the level of individual experiments. Canadian participants said that they 1) prefer to use sufficient numbers of animals to ensure quality data is obtained, rather than using the minimum; 2) they

already reduce as much as possible; and 3) further reductions of animal numbers may compromise experimental protocols. Although these participants did not feel they can reduce further, published analyses of experimental design in research papers has shown that there are opportunities for more reduction in animal experiments (e.g. Kilkenny et al., 2009). Therefore, this information suggests that strategies to promote reduction in individual experiments are still needed in Canada. Reduction findings from the UK survey suggest, however, that strategies to reduce animal numbers at the level of research programs have more support from scientists.

Both surveys also tried to find out when the Three Rs are considered in the research process. The UK survey asked “When do you consider the Three Rs in your work?” It found that 95% of participants consider the Three Rs while designing and carrying out experiments. A further 55% consider the Three Rs when applying for research funding, and 60% when preparing for the ethical review process. The Canadian question was different, asking, “When should assistance with the Three Rs be provided to scientists?” Of Canadian participants, just 9% said offers of assistance with the Three Rs would be acceptable during the research planning stage. Instead, offers of assistance with the Three Rs were viewed more favorably by participants as part of the ethical review process.

It is generally accepted, however, that considering the Three Rs early in the research process is preferable, since this is the stage at which replacements are determined and when it is easier to change proposed experimental design. Correspondingly, in the UK scientists are prompted to consider the Three Rs when applying for a project license. In Canada, Three Rs feedback currently is provided during the ethical review process, but this is the last step before the experiment can proceed. These findings suggest that policy-makers, in Canada in particular, should investigate how to promote use of the Three Rs early in the research planning process. Both surveys also gathered information about how scientists viewed the Three Rs feedback they received from AECs. Of UK survey participants, just 46% found AECs helpful with refining animal use; 42% found AECs helpful with reducing animal use; and 31% found AECs helpful with replacing animal use. Canadian participants disagreed widely about whether AECs have suitable expertise to deliver Three Rs feedback to scientists. These survey findings suggest that policy-makers consider 1) whether AECs are being asked to do too much when mandated to both ethically review experiments and provide constructive Three Rs feedback, and 2) whether additional mechanisms to provide Three Rs feedback are needed.

4 Conclusions

This analysis has demonstrated that comparing survey findings between countries is a useful, empirically-based way to identify ways to support the Three Rs. In particular, Three Rs educational initiatives, such as mandating and/or delivery of



Three Rs training by regulators and promotion of data sharing and collaboration, are supported by data that suggests they would be effective. The comparison also identified differences between scientists' views of the Three Rs and policy goals, and therefore, opportunities for policy initiatives aimed at resolving these differences. These include: measures to improve the likelihood that scientists will seriously consider replacement alternatives; strategies to promote reduction in individual experiments; promotion of the Three Rs early in the research planning process; and assessment of additional mechanisms to provide Three Rs feedback to scientists.

References

- Fenwick, N., Danielson, P., and Griffin, G. (2011). Survey of Canadian animal-based researchers' views on the Three Rs: replacement, reduction and refinement. *PLoS ONE* 6, e22478. doi:10.1371/journal.pone.0022478
- Kilkenny, C., Parsons, N., Kadyszewski, E., et al. (2009). Survey of the quality of experimental design, statistical analysis and reporting of research using animals. *PLoS ONE* 4, e7824. doi:10.1371/journal.pone.000782443:194-201
- NC3Rs – National Centre for Replacement, Refinement and Reduction of Animals in Research (2008). Views on the Three Rs: survey report 2008. <http://www.nc3rs.org.uk/download-doc.asp?id=836&page=726&skin=0>

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