

## Norecopa: A database of global 3R resources for better Science

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### Abstract

Norecopa is Norway's National Consensus Platform for the 3Rs (*Replacement, Reduction and Refinement of animal experiments*). Founded in 2007, it has a comprehensive website of global 3R resources: <https://norecopa.no>

### Introduction

Norecopa is an independent member organisation, with a Board representing all four major stakeholders in animal research: regulators, industry, research and animal welfare. Norecopa is a member of *ecopa* (<https://www.ecopa.eu>), the umbrella organisation for national consensus platforms. Norecopa's Annual Meeting is its highest organ. Norecopa receives core funding for its Secretariat from two Norwegian Ministries.

### Materials and Methods

Norecopa's current website, launched in 2016, contains a collection of (at present) 8 datasets with 3R resources, as well as several hundred webpages. Several of these have been in existence since the early 1990s, when members of Norecopa's staff worked for the Norwegian School of Veterinary Medicine, and others have been produced by the EU Commission's Joint Research Centre (JRC). The contents of the site are updated many times each week. The task of identifying broken internal or external links is automated. The site also features an intelligent search engine, which uses a synonym list created especially for Norecopa. All the approx. 8,500 pages on the website are searched simultaneously by the search engine. Users can then apply a large range of filters to optimise their search results.

The datasets embedded in the website include: i) 3R Guide - an overview of approx. 400 guidelines for animal research and testing, collected in collaboration with AWIC (Animal Welfare Information Center) at the National Agriculture Library, USA; ii) NORINA - an overview of approx. 2,500 audiovisual alternatives and supple-

ments to the use of animals in education and training, at all levels from school dissections, through preclinical undergraduate classes, to courses in Laboratory Animal Science for scientists, technicians and other animal care staff; iii) TextBase - a collection of information on approx. 1,500 textbooks and other literature of relevance to Laboratory Animal Science and Welfare; iv) An EU dataset of advanced non-animal models for basic and applied research into respiratory diseases.

In 2018, Norecopa published the PREPARE guidelines for planning animal experiments, in collaboration with UK specialists. PREPARE consists of a two-page checklist (see Figure 1), currently available in 25 languages, and a website where each of the topics on the checklist is explained in detail, with links to quality references from international centres and from the scientific literature (<https://norecopa.no/PREPARE>).

The PREPARE website is updated many times a week, as new resources are published.

Three more recent additions to the website can also be mentioned: i) Norecopa hosts the website of the International Culture of Care Network (<https://norecopa.no/coc>). The Network aims to help animal facilities improve their standards of animal welfare, scientific quality, care of the staff and transparency for the stakeholders. The site contains a Quick Start Guide and links to a large number of additional

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Key words: Norecopa; 3Rs; resources; database.

Acknowledgments: Norecopa is grateful to many organisations for financial support. These are acknowledged on the Norecopa website: <https://norecopa.no/Sponsors>

Disclosures: The author is Secretary of Norecopa and lead author of the PREPARE guidelines.

Conference presentation: This paper was presented at the Third Centro 3R Annual Meeting - L'era delle 3R: modelli *in silico*, *in vitro* e *in vivo* per promuovere la ricerca traslazionale - 30 September - 1 October 2021, Evento online organizzato dal Politecnico di Torino.

Received for publication: 9 July 2021.

Accepted for publication: 7 September 2021.

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Biomedical Science and Engineering 2021; 4(s1):144  
doi:10.4081/bse.2021.144

**PREPARE**

**The PREPARE Guidelines Checklist**  
Planning research and experimental procedures on animals: Recommendations for excellence

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PREPARE consists of planning guidelines which are complementary to reporting guidelines such as ARRIVE.  
PREPARE covers the three broad areas which determine the quality of the preparation for animal studies:

1. Formulation of the study
2. Dialogue between scientists and the animal facility
3. Quality control of the components in the study

The topics will not always be addressed in the order in which they are presented here, and some topics overlap. The PREPARE checklist can be adapted to meet special needs, such as field studies. PREPARE includes guidance on the management of animal facilities, since in-house experiments are dependent upon their quality. The full version of the guidelines is available on the Norwegian website, with links to global resources, at <https://norecopa.no/PREPARE>.  
The PREPARE guidelines are a dynamic list which will evolve as more species- and situation-specific guidelines are produced, and as best practice within Laboratory Animal Science progresses.

Topic	Recommendation
<b>(A) Formulation of the study</b>	
1. Literature searches	<input type="checkbox"/> Form a clear hypothesis, with primary and secondary outcomes. <input type="checkbox"/> Consider the use of systematic reviews. <input type="checkbox"/> Decide upon databases and information specialists to be consulted, and construct search terms. <input type="checkbox"/> Assess the relevance of the species to be used, its biology and suitability to answer the experimental questions with the least suffering, and its welfare needs. <input type="checkbox"/> Assess the reproducibility and translatability of the project.
2. Legal issues	<input type="checkbox"/> Consider how the research is affected by relevant legislation for animal research and other areas, e.g. animal transport, occupational health and safety. <input type="checkbox"/> Locate relevant guidance documents (e.g. EU guidance on project evaluation).
3. Ethical issues, harm-benefit and humane endpoints	<input type="checkbox"/> Construct a lay summary. <input type="checkbox"/> In dialogue with ethics committees, consider whether statements about this type of research have already been produced. <input type="checkbox"/> Address the 3Rs (replacement, reduction, refinement) and the 5S (aged species, good genes, good sensibility). <input type="checkbox"/> Consider pre-registration and the publication of negative results. <input type="checkbox"/> Perform a harm-benefit assessment and justify any study animal harm. <input type="checkbox"/> Discuss the learning objectives, if the animal use is for educational or training purposes. <input type="checkbox"/> Allocate a severity classification to the project. <input type="checkbox"/> Define objective, easily measurable and unambiguous humane endpoints. <input type="checkbox"/> Discuss the justification, if any, for death as an end-point.
4. Experimental design and statistical analysis	<input type="checkbox"/> Consider pilot studies, statistical power and significance levels. <input type="checkbox"/> Define the experimental unit and decide upon animal numbers. <input type="checkbox"/> Choose methods of randomisation, prevent observer bias, and decide upon inclusion and exclusion criteria.
<b>(B) Dialogue between scientists and the animal facility</b>	
5. Objectives and timelines, funding and division of labour	<input type="checkbox"/> Arrange meetings with all relevant staff when early plans for the project meet. <input type="checkbox"/> Construct an approximate timeline for the project, indicating the need for assistance with preparation, animal care, procedures and waste disposal/decontamination. <input type="checkbox"/> Discuss and document all expected and potential costs. <input type="checkbox"/> Construct a detailed plan for division of labour and expenses of all stages of the study.
6. Facility evaluation	<input type="checkbox"/> Conduct a physical inspection of the facilities, to evaluate building and equipment standards and needs. <input type="checkbox"/> Discuss staffing levels at times of entry.
7. Education and training	<input type="checkbox"/> Assess the current competence of staff members and the need for further education or training prior to the study.
8. Health risks, waste disposal and decontamination	<input type="checkbox"/> Perform a risk assessment, in collaboration with the animal facility, for all persons and animals affected directly or indirectly by the study. <input type="checkbox"/> Assess, and if necessary produce, specific guidance for all stages of the project. <input type="checkbox"/> Discuss means for containment, decontamination, and disposal of all items in the study.
<b>(C) Quality control of the components in the study</b>	
9. Test substances and procedures	<input type="checkbox"/> Provide as much information as possible about test substances. <input type="checkbox"/> Consider the feasibility and validity of test procedures and the skills needed to perform them.
10. Experimental animals	<input type="checkbox"/> Decide upon the characteristics of the animals that are essential for the study and for reporting. <input type="checkbox"/> Avoid generation of surplus animals.
11. Quarantine and health monitoring	<input type="checkbox"/> Discuss the animals' likely health status, any needs for transport, quarantine and isolation, health monitoring and consequences for the personnel.
12. Housing and husbandry	<input type="checkbox"/> Attend to the animals' specific instincts and needs, in collaboration with expert staff. <input type="checkbox"/> Discuss acclimatisation, optimal housing conditions and procedures, environmental factors and any experimental limitations on these (e.g. food deprivation, solitary housing).
13. Experimental procedures	<input type="checkbox"/> Develop refined procedures for capture, immobilisation, marking, and release or rehoming. <input type="checkbox"/> Develop refined procedures for substance administration, sampling, sedation and anaesthesia, surgery and other techniques.
14. Humane killing, release, reuse or rehoming	<input type="checkbox"/> Consult relevant legislation and guidelines well in advance of the study. <input type="checkbox"/> Define primary and emergency methods for humane killing. <input type="checkbox"/> Assess the competence of those who may have to perform these tasks.
15. Necropsy	<input type="checkbox"/> Construct a systematic plan for all stages of necropsy, including location, and identification of all animals and samples.

**References**

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**Further information**  
<https://norecopa.no/PREPARE> | [prepn@norecopa.no](mailto:prepn@norecopa.no) | [@norecopa](https://twitter.com/norecopa)

Figure 1. The PREPARE checklist. Reprinted with permission from Laboratory Animals, published in Smith et al. (2018). Available in 25 languages at <https://norecopa.no/PREPARE/prepare-checklist>

norecopa.no / global3R



**Figure 2.** Norecopa's interactive map of 3R Centres and networks within Laboratory Animal Science and alternatives: <https://norecopa.no/global3r>

resources; ii) Norecopa has launched a Refinement Wiki (<https://norecopa.no/wiki>), where scientists or animal care staff can publish large or small changes they have made to protocols which improve the quality of animal care, research and testing. The Wiki is designed

to be a “halfway house” between full scientific publications and the discussions which take place on electronic forums (where important information is often not permanently recorded); iii) Norecopa has produced an interactive global map of 3R centres and networks (<https://norecopa.no/global3r>).

The map makes it easier to identify centres or activities in a given country, and it contains links to more information about each item.

## Discussion and Conclusions

Norecopa aims to provide a global overview of quality guidelines and other resources about Laboratory Animal Science and alternatives, not only for scientists but also for regulators, animal care staff and the general public.

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