Paper of the Quarter

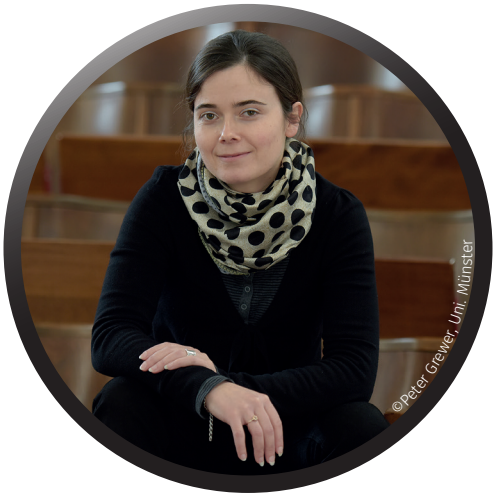
Outstanding 3R-Research from North Rhine-Westphalia
- 2nd Quarter of 2024 -

The quarterly distinction 'Paper of the Quarter' of the 3R-Competence Network NRW recognizes outstanding contributions to the 3R principles. We are delighted to announce the winner for the second quarter of 2024.

Congratulations to

Prof. Dr. Helene Richter

University of Münster



for their publication

"Challenging current scientific practice: how a shift in research methodology could reduce animal use"

The „Paper of the Quarter" award was given to her publication because she strives in a special way to further develop the 3R principle—"Replace, Reduce, Refine"—which has been applied in laboratory animal science for more than 60 years. The aim of her proposed approach is to contribute to **a reduction in the number of laboratory animals used through a new experimental design strategy**.

The most commonly used method for determining the required number of animals is based on power analysis and, therefore, on statistical procedures that prioritize the significance level—the so-called p-value. However, statistical conclusions based on p-values are actually less definitive than generally assumed. Moreover, the estimation of the effect size of an experimental manipulation, which is necessary for a power analysis, is often not reliably predictable, so the resulting number of animals may be inadequate.

As an alternative approach, she proposes **an experimental design involving „mini-experiments" that, in combination with Bayesian statistics**, allows for continuous evaluation of the results. This can lead to an optimized experimental scale and thus to a reduced number of laboratory animals used. The proposed concept is well-suited to improving the implementation of the 3R principle in the planning and execution of animal experiments and, therefore, meets the highest standards set by the scientific advisory board of the 3R Competence Network NRW for a „Paper of the Quarter."

A mini-experiment design utilizing Bayesian updating can allow flexible study adjustments, enhancing reproducibility and promoting reduction in animal use. © Behavioural Biology, University of Münster

This award not only highlights her hard work and expertise but also the potential contribution of her research to reducing animal testing and advancing research methods.

▶ You can read the original article here

Richter S. H. (2024). Challenging current scientific practice: how a shift in research methodology could reduce animal use. Lab animal, 53(1), 9–12.

Q&A with the Winner
- 2nd Quarter of 2024 -

How did this research come about?

For over 15 years, I have been dealing with questions related to experimental design and the conduct of animal experiments. Central to this has always been the question of how to improve the reproducibility of results from animal experiments. Through the systematic consideration of variation in experimental design (keyword: "systematic heterogenization"), we were able to propose a methodological "refinement" that indeed improved the reproducibility of results. Against this background, the so-called "mini-designs" were subsequently developed. These designs split an experiment over time, thereby increasing the robustness of the data in a very simple way. In collaboration with statisticians, the next step was the idea of combining this specific design with Bayesian statistics. This approach allows data to be collected over time and animal numbers to be flexibly adjusted—something not permissible under conventional inferential statistics.

What is the contribution of this research to the 3Rs?

The underlying idea of this contribution is to critically reflect on the common practice of sample size calculation and to achieve a reduction in the number of animals used through changes in experimental design. The focus here is on the principle of "reduction." The standard method for determining the required number of animals is based on a power analysis, which relies on statistical procedures that presuppose certain prior knowledge about the research question. These methods are not only "impractical" because such prior knowledge is not always available but also because they lack flexibility and do not allow for adjustments in animal numbers during the course of an experiment. In contrast, Bayesian statistics enables ongoing data analysis and allows for the potential adjustment of animal numbers during the experiment. This flexibility can be used to better estimate the required number of animals and optimize the validity of individual experiments.

Prof. Dr. Helene Richter and the research team of the Department of Behavioural Biology at the University of Münster ©Behavioural Biology, University of Münster

What is your next 3R research question that you would like to answer?

In the paper, we initially present "only" an idea that now needs to be tested. As a next step, I would like to verify, in a hypothesis-driven approach, whether the proposed experimental design can truly save animals and how significant this reduction might be. Additionally, I am very interested in transferring the behavioral ecological research focus on inter-individual differences into biomedical research. This would allow us to investigate whether systematically considering "animal personalities" in experimental design could improve reproducibility. My general impression is that greater knowledge transfer between disciplines could help develop 3R-relevant strategies and prompt a reevaluation of established methods.

What is “Paper of the Quarter”?

The quarterly distinction „Paper of the Quarter“ serves to recognize outstanding publications in the field of 3R principle of the 3R Competence Network NRW. The aim is to recognize the diversity of research achievements and in particular those publications for which the extraordinary quality cannot be adequately reflected by quantitative evaluation criteria such as the Journal Impact Factor (JIF). A high JIF is not an exclusion criterion, but it is not a selection criterion either.

The award is presented as part of a quarterly open competition. The decision on the publication to be awarded is made by the network‘s Steering Committee which is formed by the representatives of the eight faculties of medicine in NRW. Each location represented on the Steering Committee has one vote, so that the winner is determined by a simple majority of votes. The selection can be made if at least 50% of the site representatives are present at the relevant meeting. The selected paper will be made visible as „Paper of the Quarter“ by the network. The award is also recognized with a certificate.

For more information and submissions for the next round **until February 28th, 2025**, please visit
► **PAPER OF THE QUARTER**

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