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Register first, then conduct research

Pre-registration in a database can improve scientific work and make it more transparent

Controversial scientific practices can undermine the quality of research. One way to counteract this and, at the same time, make scientific work more accessible is to pre-register a planned project in a database. This involves storing key information about the project in advance and making it publicly available (after an embargo period has expired).

An international research group involving the German Centre for the Protection of Laboratory Animals (Bf3R) at the German Federal Institute for Risk Assessment (BfR) is now arguing in an article for the journal 'EMBO reports' that biomedical in vitro research ('research in test tubes and with cell cultures') should also be pre-registered in future. This would make such research more transparent, credible and easier to reproduce. High-quality in vitro research could also help to establish alternative methods to animal testing and thus reduce the number of animal experiments.

Link to the publication: https://link.springer.com/article/10.1038/s44319-026-00764-x

One problem the sciences are facing, including in the biomedicine domain, is a lack of reproducibility: published research results often cannot be replicated (reproduced) by other research groups, or can only be partially replicated, and thus cannot be confirmed. A further challenge lies in the tendency to publish 'positive' results, as well as in the perceived pressure to present results as significant as possible, even when the data does not actually support this.

Reducing controversial practices

Pre-registration can prevent such a distortion of research results because, through careful planning and documentation, it increases the transparency and repeatability of the experiments. Pre-registration should include hypotheses regarding the possible outcome of the study as well as details on the collection and evaluation of the data.

Pre-registration is currently mandatory for most clinical trials (such as drug trials), i.e. studies involving human subjects. In addition, there are databases for pre-registration in the social sciences and, more recently, for animal experiments. The Bf3R also operates a database for planned animal experiments at www.animalstudyregistry.org. There is as yet no corresponding forum for research involving cell cultures, although these are also affected by a lack of reproducibility.

What requirements should an in vitro registration fulfil? The authors discuss a number of aspects in this regard:

- Pre-registration should provide information on the assumption to be tested, the possible predictions, the various confounders, the treatment groups being compared (and the control groups), the sample size, and the scientific methods—such as randomisation—used to minimise confounders.
- Pre-registration should take account of the different types of studies. Studies designed to confirm (or refute) existing research findings can be registered in detail, in a manner similar to the registration of regulatory in vitro studies. 'Exploratory' studies that break new scientific ground require a more flexible framework. Registered studies can be subject to a multi-year embargo period prior to publication in order to protect intellectual property.
- Research using cell cultures is an important part of biomedical research. Many researchers use both cell cultures and animal studies in their work. It therefore seems sensible to expand existing platforms for the pre-registration of animal studies rather than creating new registers.
- An internationally standardised 'form' for online pre-registration is desirable. This can then be used across various databases. The registration form should keep the administrative burden to a minimum.
- To limit pre-registration to the essentials, a task force comprising experts from the scientific community, funding bodies, specialist journals, scientific institutions and platform operators should be involved in its development.

Summary: Improved in vitro research can help to ensure that alternative methods to animal testing are used more frequently, thereby reducing the number of animal experiments. A fundamental prerequisite for this is that in vitro data are also transparent, reproducible and reliable (valid). Pre-registration can make an important contribution to this.

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States ('Laender') on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

About the Bf3R

The German Centre for the Protection of Laboratory Animals (Bf3R) was founded in 2015 and is an integral part of the German Federal Institute for Risk Assessment (BfR). It co-ordinates nationwide activities with the goals of restricting animal experiments to only those which are considered essential, and safeguarding the best possible protection for laboratory animals. Moreover, it intends to stimulate research activities and encourage scientific dialogue.

This text version is a translation of the original German text which is the only legally binding version.

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