MATERNAL AND PEDIATRIC NUTRITION HIGHLIGHTS EDITORIAL

Hypotheses and ethos of publication

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Science is about verifying or falsifying hypotheses. But why do we need a hypothesis? A hypothesis lays the groundwork for a specific research question. Based on a hypothesis, this research question leads up to defining the primary end point of a study. For all studies, a primary end point needs to be defined, as a basis for a case estimate in order to define the size of the study to be conducted. These and many other aspects of designing, conducting and reporting a study on food have recently been formalized in 'Guidelines for the Design, Conduct and Reporting of Human Intervention Studies to Evaluate the Health Benefits of Foods'.¹ However, case estimates need to be performed for epidemiologic and other studies as well. Otherwise, in case of a neutral result, by definition, it remains unclear whether the effect observed was too small for a significant result, or whether the study performed was too small to detect the effect. In this context, it is perplexing that animal studies usually have no case estimate.

From the perspective of 18th century mathematician Bayes, almost all studies or experiments in medicine are tests. Of course, performing a test, when there is a 100% chance of predicting the results, is nonsensical. According to Bayes, pre-test probability impacts on post-test probability, meaning that any test is as good as the situation in which it is performed. Therefore, a hypothesis needs to be well founded for the study to produce relevant results. A poorly founded hypothesis will lead to results with less relevance. In keeping, research with no hypothesis (exploratory research) can only generate a hypothesis to be tested. It should be kept in mind, however, that any intervention trial stands a 5% chance of providing a significant result, even erroneously, since the conventionally accepted level of significance (or possibility of error) is 5%. Taken together, building a hypothesis is a fundamental and important task for the scientist, and not to be taken lightly.

Thus, a sound and well-founded hypothesis has a central role in science. Nevertheless, as a reader of scientific literature and as a reviewer, I come across what I call twisting of hypotheses: when a hypothesis was or appears to be rewritten or edited after the data were obtained in order to better suit the results of the trial or experiment. Some scientists consider this a minor breach of scientific conduct. Owing to the importance of the hypothesis in the process of science, I consider twisting of hypothesis a major breach of scientific conduct. As a reviewer, if I find suggestions of twisting of hypothesis, I suggest rejection of this manuscript.

It is unknown how frequent twisting of hypotheses is. However, a similar problem was found to be fairly wide-spread: When comparing the primary end point of a published study with the primary end point reported in a trial registry, it was found that an

alarming third did not match.² Since twisting of hypotheses is very hard to detect, I tend to think that it occurs even more frequently, especially in the areas of research less formalized by guidelines.

How do we deal with this problem? One solution would be the deposition of a hypothesis in a 'bank' of hypotheses. Such 'banks' could be run by scientific societies, and be based on the internet. At completion of the study protocol, authors 'deposit' their hypothesis, and maybe an abstract of the study protocol, in a 'safe deposit box' of the 'bank'. Responsibility for accuracy and completeness of the deposit can rest with the authors. After deposition of the hypothesis, the 'bank' then provides the scientist with a 'receipt' for the deposit. Banker's discretion is mandatory. At submission of the manuscript to a scientific journal, the authors then can produce their receipt, and thus document their scientific rigour. In cases of doubt, the journal could ask the authors for permission, contact the bank and match the information with the information in the 'safe deposit box'. There would be no need for this mechanism to be mandatory, since journals would learn rather quickly that the more important manuscripts would come with such a receipt.

In general, scientists work with the strictest scientific rigour. Unfortunately, some scientists twist hypotheses in order to advance their careers. The possibility of depositing hypotheses in a bank would give rigorous scientists a competitive advantage over hypothesis twisters. Scientific fraud would become easier to detect. The administrative effort would be minimal, as would be the related cost. Depositing of hypotheses would substantially improve the quality and thus the impact of our scientific work, and reduce the amount of low-quality publications.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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