

Author's Commentary on "Truth or Consequences"

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Truth or Consequences

The main goal of this case is to stimulate discussion of activities that fall into the category of questionable research practices. The National Academy of Sciences states:

Questionable research practices are actions that violate traditional values of the research enterprise and that may be detrimental to the research process. . . . Questionable research practices include activities such as the following: Failing to retain significant research data for a reasonable period; Maintaining inadequate research records, especially for results that are published or relied on by others; . . . Inadequately supervising research subordinates or exploiting them. (National Academy of Science 1992, 1-16)

While questionable research practices do not endanger the research process as critically as outright scientific misconduct, they do erode the integrity of the scientific institution as a whole.

Part 1 of this case attempts to present a scenario that is difficult to interpret definitively as a questionable research practice. Rather than a blatant statement of scientific misconduct, the reader is presented with a suspicion of inappropriate behavior. The intent is to mimic potential real-life situations where, quite frequently, there is no initial concrete evidence to support the decisions that must be made by the parties involved. Additionally, this case attempts to establish an environment where there is intense pressure on graduate students to produce publishable results quickly. This type of pressure is often encountered in labs conducting biomedical research, and it arises not only from the principal investigator, but from the graduate students themselves.

In this case, several factors contribute to the stressful environment in Dr. Larson's lab. For example, it is stated that neither Peter nor Sally had managed to publish a paper, which caused them both to worry about obtaining postdoctoral positions. It is also stated that other labs were attempting to develop the same knockout mouse. Dr. Larson's assertion that Peter and Sally have the chance to publish in *Nature* only adds to the pressure. In such an environment, even normally careful researchers can be tempted to cut corners, and thus engage in inappropriate scientific conduct.

Questions 1-3

These questions focus on the decisions Peter must make. Although he has no solid evidence that Sally has done anything inappropriate, his suspicions are aroused by their phone conversation in which Sally states that her data deviate from the previous trend observed, the fact that she disposed of remaining cells so that their identity could not be determined in an unbiased manner, and the absence of sufficient documentation in her lab notebook. There is no evidence that Sally has falsified data, which would constitute scientific misconduct. However, Sally's work behavior does fall into the category of questionable research practice.

Peter should first attempt to initiate better communication with his potential co-author by asking her to review her data with him, not accusing her of wrongdoing. If this conversation does not alleviate his suspicions, he should approach Dr. Larson with his concerns. As first author of the manuscript, Peter is ultimately responsible for its entire content. It is imperative that he feel confident in the data. The scientific process relies upon the publication of unbiased data generated via sound experimental designs.

Question 4

As a contributing author, Sally has a responsibility to maintain her lab notebook in such a way that her experimental procedures and raw data are easily located and identified. She is responsible for retaining any raw data or samples until the lab is reasonably confident that they are no longer needed. She also has a responsibility to honestly communicate any procedural problems to her co-authors. In situations where multiple researchers contribute to a final manuscript, each must be able to assume the honesty of the others and the unbiased nature of their results. There are many situations in which it is almost impossible to identify data that have been obtained in error or altered on purpose. In Sally's defense, she could well have the

raw data in another notebook, and she may have thrown out the remaining cells by mistake, but her behavior raises suspicions about her scientific conduct.

Question 5

Dr. Larson's actions contributed to the problem in several ways. First, although it may be a reality that other labs are competing to produce the same results, he should attempt to set an example as a mentor in which strict adherence to careful lab practices is of utmost importance. His statement that Peter and Sally may be able to publish in *Nature* if they beat the competition went a long way toward establishing a stressful working environment, where inappropriate conduct is more likely to occur. Secondly, he tells Sally that she will be included on Peter's paper only if her results are informative. That may well encourage Sally to falsify data to produce the desired results. A better approach would have been to tell Sally that her efforts would be rewarded with a second author status, even if the results were not what was predicted. As Sally's research adviser, Dr. Larson should be stressing that honesty in science is required and expected of his students. After all, "Graduate school is the place to learn that one does not publish research results and conclusions until one is certain of their accuracy." (Sigma Xi, 1994, 6)

Thus, even Dr. Larson's behavior could be classified as a questionable research practice in that his supervision of his students was inadequate. He appeared more interested in the results than in the methods used to obtain them.

Part 2 introduces more evidence that Sally had actually engaged in scientific misconduct. Although Peter does not find concrete evidence that her graphed data was falsified, circumstantial evidence is gained from the results of the competing labs. At this point, after his paper has already been published, the best course of action would be first to discuss his concerns with Dr. Larson (whose reputation is also at stake). After that, it may be possible for Peter to repeat key experiments done by Sally. If that indicates that the initial published results were in error, the best course of action would be for Dr. Larson and Peter to notify Sally and then submit a retraction or correction to the journal.

References

- National Academy of Sciences. *Responsible Science: Ensuring the Integrity of the Research Process*. Washington, D. C.: National Academy Press, 1992, pp. 1-16.

- Sigma Xi, The Scientific Research Society. *Honor in Science*. Sigma Xi, Research Triangle Park, N.C.: Sigma Xi, 1994.