NSF OIG CORNER

Maintaining Research Integrity

By Lisa Vonder Haar

Maintaining research integrity is the shared responsibility of institutions, funding agencies, journal editors, and principal investigators. In this article, we'll discuss three tips to help institutions deter research misconduct, particularly data fabrication and falsification.

Tip 1: Manage Data Effectively

We often find that researchers do not adequately preserve their data. For example, we have seen data maintained on university research equipment overwritten because of data storage limitations or improper equipment settings. Some researchers have inappropriately stored original research data on personal computers instead of university computers. And, some universities have allowed graduating students and postdoctoral researchers to leave with the original—and sometimes the only—copy of research data.

Inadequate or non-existent data records make supporting and defending research results difficult when questions arise. To avoid such situations, institutions should ensure departments and individual labs maintain robust data management protocols. Such protocols should encompass a written data management plan, including secure storage of raw and processed data, regular and routine data reviews, and research documentation and reporting practices. Additionally, universities should implement policies to ensure they remain compliant with NSF's requirement to maintain original data records for three years after an award closes.

Tip 2: Ensure Lab Records are Meaningful

Ensuring laboratory records are meaningful — i.e., that they're high-quality, complete, accurate, and secure — is an important component of data management. Our research misconduct investigations invariably involve an examination of laboratory records, including notebooks, instrument logs, and measurements stored in electronic form. The quality and completeness of these records varies widely from lab to lab. In one case, a post-doctoral researcher kept voluminous laboratory records at one institution, and sparse and incomplete records at another, reflecting the different emphases of the faculty members in charge. Even when an individual's laboratory notebook appears adequate, linkages to instrument records and electronic data stored on computer systems are often incomplete. We typically consider the following in our assessments of laboratory notebooks and records:

Completeness: The record should describe all research activities, not just the "successful" ones.

Linkage: Laboratory notebooks should reference electronic records by name and location.

Review: A regular (weekly or monthly) documented review of laboratory notebooks by a supervisor or a faculty advisor can help ensure quality laboratory records.

Accuracy: Records should be a contemporaneous chronology of all pertinent laboratory activity and results — successful or not — and be sufficient to support the reconstruction of activities by another researcher.

Safekeeping: All records should be maintained securely and backed up with copies stored in an alternate location.

Tip 3: Mentor and Train

In our experience, students who commit research misconduct often attribute their actions to a lack of faculty oversight and review of their work. Proper mentoring can help prevent research misconduct by reinforcing professional standards and ethics in real life situations.

Others who committed research misconduct sometimes claimed they simply did not understand what constitutes misconduct. Institutions can help prevent this by providing high-quality Responsible Conduct of Research (RCR) training for all NSF-supported undergraduate students, graduate students, and postdoctoral researchers.

Where can I find more examples of research misconduct cases?

We post summaries of closed research misconduct cases on our website, https://nsf.gov/oig/case-closeout. We also report on research misconduct cases and outcomes in our Semiannual Reports to Congress https://www.nsf.gov/oig/reports.

How can I report research misconduct or other forms of fraud, waste, abuse, or whistleblower reprisal?

- **Web:** www.nsf.gov/oig/report-fraud/form.jsp
- **Anonymous Hotline:** 1-800-428-2189
- **Email:** oig@nsf.gov
- **Mail:** 2415 Eisenhower Avenue, Alexandria, VA 22314
  ATTN: OIG HOTLINE

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