

Write it Down!
Getting Away from Paper Napkins in Research Documentation

Avery August
Associate Professor of Immunology
Department of Veterinary & Biomedical Sciences

Why is proper note keeping important?

- Ensures that records are kept for reproducibility of your data.
 - > changes in protocol are recorded which might be important
 - > Others who need to repeat experiments can do so
- Ensures a record for eventual publication and writing of theses
- Saves time and effort
 - > Recording all experiments prevent you from having to repeat them

Components of a good notebook

1. Table of Contents
2. Title of each experiment
3. Description of the purpose and even hypothesis behind an experiment
4. Details of experimental protocols
5. Results of experiments
6. Conclusion
7. Witnessing of notebooks

Table of Contents

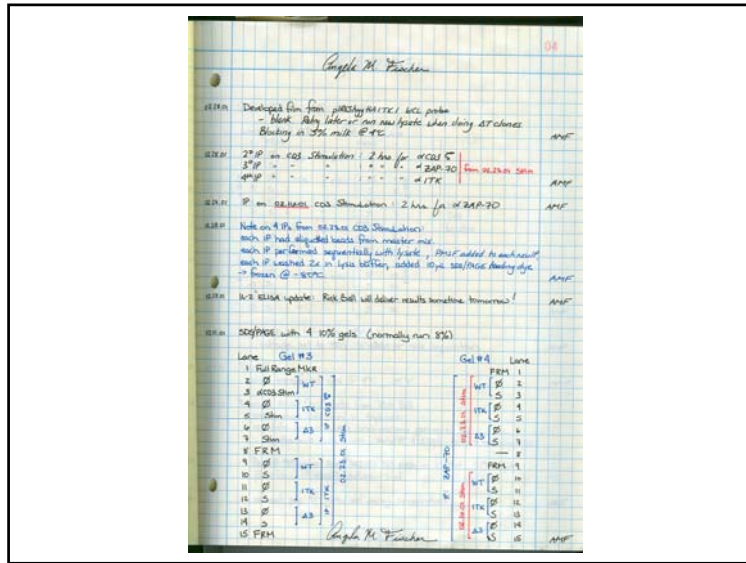
- > **Should include enough information so that experiments can be found**
e.g. "To clone the cDNA for the tyrosine kinase BMX into the lentiviral vector pLXP"
- > **Should have inclusive page numbers (which may not be sequential)**
- > **First 5-10 pages of the notebook should be reserved for this Table**

Description of Experiment

- > Describe the purpose of the experiment, and any thoughts or hypotheses that led to the experiment.
- > Experimental details should be included with as much detail as possible
 - e.g. amounts of material used, lot number of antibodies or reagents, all parameters of any animals used (cage card, DOB, sex etc).
- > If you are using a standard operating procedure, you can refer to the page number of any notebook that includes, as well as state whether it was followed exactly, or if there were deviations.
 - > Can have a separate Notebook with all commonly used methods
 - e.g. plasmid prep, isolation of cells etc.

Description of Experiment

- > Include all details on observations of the results of the experiments. Include any data print outs (original), ECL film exposures etc. Note on these external items, the date, the title of the experiment and page number of the notebook where it is inserted. Proper labeling of these items are critical.
- > State a conclusion to the experiment. Did it work or not, why, and what you can conclude.



Witnessing Notebooks

- > In industrial situations, all notebooks have to be witnessed by Someone who did not participate in the experiments
- > This entails signing and dating each page with any writing on it, and getting it countersigned and dated by someone not involved in the experiments
- > Any blank pages should be crossed out and signed

Types of notebooks

- > **Paper**
 - > with or without carbon copies.
- > **Electronic (Electronic Laboratory Notebook, ELN)**

Advantages of Electronic Laboratory Notebook

- > **Lab productivity**
 - Saves time compared to hand writing
- > **Paper reduction**
 - > **Ability to quickly search for experiments**
- > **Allows for easier collaboration and sharing of notebook**
- > **Improved data quality (in some cases).** Items can be scanned in, electronic data can be easily incorporated. Others can integrate Word and Excel documents
- > **Electronic signatures using passwords.**

Challenges of Electronic Laboratory Notebook

- > Some experiments files will be difficult to store electronically
- > Security of files
- > Long-term storage and retrieval. Changes in computers, operating systems etc.
- > Corruption or loss of data

Examples of Electronic Laboratory Notebook

- > Infotrieve
- > Cambridge Soft.
- > Waters

Sample Electronic Laboratory Notebook (Cambridge Software)

The screenshot displays the Cambridge Software interface for an Electronic Laboratory Notebook. On the left, a 'User's Collection Tree' lists various folders and files. The main workspace shows a chemical reaction scheme and a table with columns for Name, Yield, and other parameters. At the bottom, an 'Audit trail/Version history' window shows a list of changes with timestamps.

Callout boxes identify the following components:

- User's Collection Tree
- Notebook
- Experiments
- Experiment Templates
- Audit trail/Version history

Components of a good notebook

1. Table of Contents
2. Title of each experiment
3. Description of the purpose and even hypothesis behind an experiment
4. Details of experimental protocols
5. Results of experiments
6. Conclusion
7. Witnessing of notebooks

Write it Down! Getting Away from Paper Napkins in Research Documentation

Avery August, Associate Professor of Immunology
Candice Yekel, Director of Research Protections

Penn State's Policy on Research Misconduct

- Penn State Policy RA10, "Handling Inquiries/Investigations Into Questions of Ethics in Research and in Other Scholarly Activities"



Research Misconduct: Definition

- fabrication, falsification, plagiarism or other practices that seriously deviate from accepted practices within the scientific community for proposing, conducting, or reporting research or other scholarly activities;

Definition (continued)

- material failure to comply with applicable federal requirements for protection of researchers, human participants, or the public; or for ensuring the welfare of laboratory animals;

Definition (continued)

- failure to disclose all real or perceived conflict of interests; or,
- failure to comply with other applicable legal requirements governing research or other scholarly activities.

RA10 Process

- Allegation
 - Anyone can make an allegation
 - Allegations may be a misunderstanding and therefore, they may be subject to resolution on a collegial basis
 - If there is still a concern, the matter should be reported, in writing, to the Vice President for Research.
 - A copy of the written allegation will be provided to the department head and dean of the area in which the accused individual is primarily employed, and to the Director of Research Protections.
 - In addition, the Vice President for Research will notify the accused individual of the allegations.

RA10 Process

- Inquiry
 - Fact-finding, not a determination of guilty
 - Take all necessary steps to protect government or industrial research funds and insure that the purpose of the Federal and industrial support are being carried out.
 - **Relevant research records, documents, and/or materials shall be immediately sequestered.**
 - The VP for Research will provide written notice to the accused individual that an inquiry into the specified allegations will be conducted.
 - 60 days to complete

RA10 Process

- Investigation
 - 120 days to complete
 - VP for Research appoints 5 tenured faculty member to investigate
 - **Involves the examination of all documentation**
 - Interviews are conducted of all individuals involved, including the accused and the accuser(s)
 - Summaries of these interviews are prepared, provided to the interviewed party for comment or revision, and included as part of the investigatory record.
 - A preliminary investigation report prepared
 - A final investigation report is prepared and submitted to the VP for Research.

The examination of all documentation

- Data have been sequestered during the inquiry – WHY?
- Used to prove or disprove the allegation
- Lab notebooks are closely examined for validity
 - Committee looks for pages that have been added or removed
 - Pencil marks erased (use pen and initial/date changes)
- Important to avoid “he said-she said” battle

RA10 Process

- Recommendations and sanctions
 - Majority of the Committee must find based on the preponderance of the evidence that the accused committed research misconduct
 - recommend an appropriate course of action to the VP for Research
 - The VP for Research will prepare a written decision upholding or rejecting, in whole or in part, the findings and recommendations in the Committee's final investigation report.
 - The VP for Research shall provide a copy of the written decision to the accused individual.

RA 10 Process

- Reporting
 - VP for Research will take all appropriate actions to ensure that the University meets its obligations to all parties affected by the violation
 - VP for Research will notify the Dean and Department Head of the area in which the accused individual is primarily employed, in writing, of the actions to be taken and will notify all affected parties.

RA10 Process

- Reporting (continued)
 - Research sponsors will be notified at the inquiry stage and kept informed throughout the process
 - Any indication of possible criminal violation will be forwarded to the proper authorities within 24 hours of obtaining that information.
 - The VP for Research will notify others such as publishers or institutions with whom the individual found to have committed research misconduct is now or has been professionally affiliated.

Consequences



Misconduct Sanctions

- Federal
 - Debarment from receipt of federal funding
 - Prohibited from serving in advisory capacity
 - Supervision of research
 - Retraction or correction of publication
 - Certification of data
 - Certification of proper citation & attribution
- Institutional (PSU)
 - Termination
 - Formal reprimand
 - Ethical training
 - Rescission of degree
 - Formal Apology
 - Suspension with pay
 - Community service
 - Withholding pay
 - Notifying new employer
 - Probation

PSU Research Misconduct Cases (2000-2004)

- 11 allegations went to full investigation
- 4 cases involved plagiarism
- 2 cases involved fabrication and falsification
- 2 cases involved human participant research
- 1 case involved a breach of confidentiality in a grant proposal review
- 2 cases involved non-recognition of the contribution of others in publication

PSU Research Misconduct Cases (2000-2004)

- Only 2 of the above involved individuals were graduate students at the time of the misconduct. One of the individuals had his/her PhD revoked.
- 10 out of 11 investigations resulted in a decision of misconduct.
- 2 of the 10 misconduct findings led to a recommendation of dismissal from the University
- Penalties imposed ranged from letter of reprimand to dismissal from the University.

**For additional
information, contact:**

Office for Research Protections
201 Kern Building
(814) 865-1775
<http://www.research.psu.edu/orp/>