A Guide to Storing Laboratory Records: Lab Notebooks

Basic principles

The binding rules for the acquisition and storage of records of research activities are built upon the following elementary principles:

- All the Palacký University Olomouc (UPOL) employees and students, in all types/forms of study, including interns and visiting students whose supervisor or tutor is an UPOL employee, are obliged to acquire and store the records of research activities.
- All information that arises in connection with research organized by UPOL (i.e., directly on the premises of UPOL, as well as outside (e.g., during service measurements performed in external facilities, internships in other laboratories, etc.)) must be recorded.
- The recorded information must be complete, accurate, sufficiently detailed, and comprehensible so that it can be used to repeat results.
- Records must be kept either in Czech or English.
- Records must be kept in a form and quality that allows them to be retraced and processed again in a long-term perspective (10 years and more).
- Lab notebooks are used for recording the activities of scientific results. The notebook's form, manner of checking, and further storing is determined by the managing employee of the given research team i.e., Research Group Leader or Core Facility Head (hereinafter referred to as "managing employee").
- Lab notebooks can be in a handwritten as well as electronic form.
- Each member of the team bears full responsibility for keeping records of their everyday research activities in the agreed-upon form of a lab notebook, which is regularly submitted to their managing employee for inspection (at least one per month).
- The completed lab notebooks must be submitted to the relevant managing employee that is responsible for their storage and keeping a list of the notebooks.
- All research activity records, other than contractual research, are in possession of UPOL. Upon the termination of employment or studies of a particular employee, all lab notebooks must be submitted to their managing employee. Upon request, a particular employee may obtain a copy of such notebooks.

Note: The good quality of records for all research activities is essential for the processing, analysis, and publication of research data. This is fundamental for scientific cooperation and follow-up research activities. The disclosure of records may also be requested by editors during the review process when publishing scientific results and proves the validity of published information in the event of allegations of falsification or other types of unethical behavior. Recording scientific activities can also help to prove the origin of copyright in results with commercial potential, and is very important, especially in research involving human entities, as it prevents the disclosure of sensitive or personal data.

TIP: Do you want to be sure that your laboratory record keeping system is working? As a rule of thumb, go through your old lab notebook and evaluate whether it would be possible to repeat specific experiments, according to the individual records.

Lab Notebook

A lab notebook is used to record all activities related to research at UPOL. It contains both material things (e.g., gels, photographs, computer records, etc.), and non-material things, such as observations, hypotheses, conclusions, discussions, etc. The aim of the record is to monitor the development of the project reliably and completely, including the train of thoughts that determined the direction of development. It is also used so that it is possible to follow the direction of development at any point in the project so that it is not necessary to repeat previously performed experiments or to repeat any part of the project based on the recorded parameters.

The lab notebook can be realized in the form of a record book or a workbook with hard or ringed binding, an electronic notebook, or a combination of written and electronic notebooks. Individual pages or records must be numbered in a continuous series of numbers. Records must be acquired and managed in such a way that prevents their destruction, loss, or any modifications. For electronic notebooks that do not use software that enables the daily validation of records, they must be stored in UPOL's institutional repository (private repositories are not allowed), which is secure and allows for regular automatic backup (ACH repository).

The record form may vary according to the specific needs of the project that is recorded, and according to field practices, nevertheless all records must be legible, clearly worded, complete, and thorough so that any repetition of the described activity is possible.

A lab notebook includes the following information: Identification of the researcher; Identification of the project (e.g., acronym); Identification of the lab notebook within a continuous series of lab notebooks managed by the research team, and Folder for materials that cannot be inserted directly into the lab notebooks (e.g., gels, records on various measurements, etc.). Such materials must be sufficiently described in the part of the lab notebook.

A lab notebook is comprised of individual records that describe research activities that take place during a particular time period (usually one full day), which must follow each other continuously. It is not possible to skip pages in the notebook and then insert new entries into free spaces. Corrections should be made by crossing out the text with a horizontal line and then completing the correct information, making sure to include the date and your signature. Do not erase or make any existing text in the record invisible in any way.

For the electronic form of a notebook, it is possible to use standard text files or any applications for recordings, including those that use audio recordings. The electronic notebook contains the same information that would be recorded in the paper version of the notebook (i.e., all activities that took place during the project must be recorded). Once a record is created, it cannot be deleted. The electronic notebook must be regularly converted to PDF form and backed up.

Generally, the record should include the following information: Identification of the researcher; Detailed description of the experiment (i.e., what, when, and why something was done); Identification of the material used (there is no need to provide complete information on commercial products or methods; a relevant link should be sufficient); Experiment findings/results; Interpretation of the experiment findings/results, and Suggestions for further steps.

As part of the experiments within a project, electronic data must often be kept together with the record of the experiment when it is created. The data must be kept in the original form in which it was obtained (i.e., raw data), as well as subsequent data that resulted from processing the original data. Long-term data storage is based on the FAIR principles, in which data must be *findable*, *accessible*, *interoperable,* and *reusable*. If data are in an unusual format, software that enables the data to be read must be attached as well. If access to the data is secure, the access passwords must be included in the lab notebook.

For the data that have been obtained in connection with contractual research or as part of the services provided to external entities by the Core Facilities, the property rights, as well as their management, storage, and disclosure, are specified in the terms of the contract. Typically, their owner is not UPOL, but the research sponsor. Unless otherwise agreed, the Research Group Leader or Head of Core Facility shall be responsible for the management and protection of the data until the complete transfer of the data to the research sponsor.

Although clinical, preclinical, and translational research are not typically conducted within our lab, human entities are sometimes included in our studies, and therefore this research subject to a strict handling of records and data from the implemented project. This type of record must then be processed and stored in a way that maximally protects the privacy and personal information of the subjects examined. It is recommended to completely anonymize the records (i.e., to remove all personal identification data and, only in justified cases, re-identification using unique codes). The key for the records and re-identification must be kept separately and in case of electronic records protected by a good quality system against possible publication. The draft project, involving human entities, should be approved by the UPOL Ethics Committee, and must include the manner of handling the records and the data.

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