Lab notebooks and Data management

BCDB PW 1/31/14

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Outline of today's discussion

- Lab notebooks
  - Importance
  - What should be in a notebook?
  - Content for each experiment
  - Commonly forgotten items
  - Maintenance
- Data backup
  - Intro to digital storage
  - Options for backup
  - VPN reminder
- Software
  - Useful resources
  - Free software
  - Discounts

Lab notebooks

- Should be a complete record of your methods and results.
  - If there is a fire you should only have to grab your lab notebook!
- If you don't keep a proper lab notebook then you might as well have not been in the lab.
  - "The only difference between screwing around and science is writing it down." –Adam Savage

Importance of good records

- Washington State University and the NIH agree that good records are needed:
  - To avoid fraud
  - To defend patents
  - To validate your research
  - To allow work to be reproduced by others

Lab notebooks

- Should be clear and thorough
  - The notebook should be packed with clues to help you troubleshoot a problem
    - Was your buffer made incorrectly?
    - Did you use old cells?
    - Did the sample incubate too long?
  - **Very important:** another scientist should be able to interpret your notes *without your input*.
  - Lab notebooks are proof of your experiments and who you are as a scientist!

Experimental content

- Date, Title and a brief statement of purpose.
- Description of experiment
  - The protocol should be referenced/written out in the notebook **BEFORE** you begin
    - Always give a reference to the protocol being used
- Note: A table of contents at the beginning of the lab notebook is a great way to keep track of multiple experiments.

What should you write down as you go?

- Everything that happens and DOESN'T happen is data
- Include all controls in your observations
- Include all of your calculations.
- Add comments and observations as you go
- Tape figures and papers into your notebook and keep the rest organized and file them appropriately
- After the experiment write a one-sentence summation of the results.
- Note any oddities or irregularities

Nothing is to minor to record

Information commonly omitted that you might need later	
Serum lot number	Buffer pH
Growth medium used	Calculations
Other people involved	Initial number of cells
Centrifuge model, speed, temp	Age and passage number
Condition of cells used (sparse/overgrown)	Agarose or acrylamide percentage
Floating cells in an adherent culture	Growth stage of bacteria
Tube type and sizes	Incubation time
Unanticipated delays	Number of washes

Maintenance

- Record everything as soon as you can!

- Weekly checkups (usually Friday)
  - Attach all data and printouts to the appropriate experiment
  - Make tables and graphs of data
  - Write summaries for all the weeks experiments
  - Record the experiment in your table of contents
  - Make a plan for the following week

References

- Lab notebook guides
  - http://ori.hhs.gov/education/products/wsu/data_lab.html
  - https://www.training.nih.gov/assets/Lab_Notebook_508_%28new%29.pdf
  - http://sourcebook.od.nih.gov/ethic-conduct/RECORDKEEPING.pdf
  - https://www.hhmi.org/sites/default/files/Educational%20Materials/Lab%20Management/Making%20the%20Right%20Moves/moves2_ch8.pdf
  - Baker, C. At the Bench: a laboratory survival guide. CSH press 2005

Data Backup and software

- Records of all federally funded research must be kept for a minimum of 3 years *after* the funding ends. (circular A-110)

- Keeping a back of your data should be at least a weekly routine.

Protecting your data

- Save your experimental data onto a server
  - Talk to your PI or Emory's OIT about lab or departmental servers
- If you use a personal computer for lab work then keep a backup hard drive in the lab.
  - **NEVER** store the only copy of raw data on your personal computer!
- Some laptop hard drives can scratch easily so don't store anything on them that you would miss!

File names and sorting

- Come up with a file naming system and stick with it throughout your time at Emory.
  - Use year/month/day to tag all your file creation dates (140131)
  - Use tags to organize files by project
  - Make the file name descriptive so you can easily identify it
  - 140131_PW_notebooks_data.pptx
- Organize your files in a consistent manner and cite in your notebook
  - Biochem2/…/Eric/results/gels/2014/filename.lol

References

- NIH data management guidelines
  - http://sourcebook.od.nih.gov/ethic-conduct/Conduct%20Research%206-11-07.pdf
- Federal funded research guidelines
  - http://www.whitehouse.gov/omb/circulars_a110

Virtual private network

- Use Emory's VPN to access departmental servers and computers to work with data at home.

- There are two ways to access the VPN
  - Use your browser and go to http://vpn.emory.edu
    - Follow instructions on the page to access
  - Use the desktop version
    - Download at http://it.emory.edu/vpntools/

LibX browser extension

- Access journal articles off campus without going through the library
  - Works with most journals
- Go to http://www.library.emory.edu/libx/
  - Follow instructions
  - Compatible with Firefox and Chrome
- Uses a proxy extension to load the blocked page through Emory's network!
  - VPN access not required

Other resources

- Interested in programs to help increase your productivity?
  - http://guides.main.library.emory.edu/productivity-tools
- Want to learn more about digital resource management?
  - http://guides.main.library.emory.edu/digitalassets
- Guide for data management
  - http://guides.main.library.emory.edu/datamgmt
- Want to learn all of the advanced features of commonly used software like word and illustrator?
  - Lynda.com
    - Emory has three computers that have access to all of the tutorials
      - One in the school of public health library
      - Two in the woodruff library

Free software!

- As an Emory student, you have access to certain software for free:
  - Endnote (X5, X6 and X7)
  - McAfee virus scan software
  - DNASTAR/Lasergene (very useful DNA/protein analysis software)
  - Jmp10pro (stat software)

- You can access these at: https://software.emory.edu/express

Software discounts!

- Many brand-name software suites are available at a discount to Emory students
  - $80 for Windows 8.1 pro student
    - Normally $200
  - $80 for **4 year** subscription to Office 365
    - The latest versions of Word, Excel, PowerPoint, Outlook, OneNote, Publisher, and Access.
    - Normally $100 for **1 year** subscription
  - $20 monthly subscription to Adobe Creative cloud
    - Contains every application in CS6
    - Normally $50 dollars a month

- Find where to purchase at: http://it.emory.edu/software/software_distribution.html