RESPONSIBLE CONDUCT OF RESEARCH (RCR)

BIOMEDICAL GRADUATE STUDIES

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RESPONSIBLE CONDUCT OF RESEARCH IS...

...A code of ethics and procedures that emanate from this code, as applied to scientific endeavor!
RESPONSIBLE CONDUCT OF RESEARCH – A STATEMENT OF VALUES

✓ HONESTY — conveying information truthfully and honoring commitments,

✓ ACCURACY — reporting findings precisely and taking care to avoid errors

✓ EFFICIENCY — using resources wisely and avoiding waste, and

✓ OBJECTIVITY — letting the facts speak for themselves and avoiding improper bias

From: ORI Introduction to the Responsible Conduct of Research
RESPONSIBLE CONDUCT OF RESEARCH: SOME IMPORTANT AREAS

- Acquisition and Management of Data
- Collaborative Science
- Conflicts of Interest and Time
- Mentoring
- Peer Review
- Research Misconduct
- Responsible Authorship and Publication
- Scientists as Responsible Members of Society
- Use of Animals in Research
- Use of Humans in Research
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TRAINING IN RCR

• NIH requires training in RCR.
• BGS meets requirements for training through the following mechanisms:
  • On-line instruction in Years 1–4 via Knowledgelink
  • Case study-based workshops in Years 2–4
    • Year 2: Research misconduct and data management
    • Year 3: Mentor/mentee relationships, collaborative science, animal and human subjects
    • Year 4: Conflict of interest, responsible authorship/publication, peer review
  • RCR-focused lab meetings (formally) in Years 3–5
TRAINING IN RIGOROUS EXPERIMENTAL DESIGN AND TRANSPARENCY

- Closely related to RCR but considered distinct
- NIH requires this training.

- BGS meets requirements for training through the following mechanisms:
  - BIOM 611 in Year 1 – ‘Statistical Methods in Experimental Design and Analysis’
  - Lecture in Year 2 – ‘Resource Authentication and Transparency’
  - Candidacy exam in Year 2 – satisfactory incorporation of elements of premise, experimental design, variables, and resources into research proposal
  - Experimental design/transparency-focused lab meetings in (formally) Years 3–5
SPECIFIC RCR GUIDANCE: A FOCUS ON THE 1ST YEAR

- **Website:**
  - http://www.med.upenn.edu/bgs/rcr.shtml

- **Who in BGS can help:**
  - Anne-Cara Apple (annecara@mail.med.upenn.edu)

- **Do now:**
  - Read chapter 5, At the Bench.
  - Read through definitions of RCR topics in the BGS handbook Responsible Conduct of Research (download from above website).

- **Complete by the end of the year:**
  - The on-line course Responsible Conduct of Research BGS 1st Year (via KnowledgeLink; we keep track!)
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book and page numbers make indexing your work easier, just enter the page title and number in the table of contents.

Pages that are sewn together are tamper evident.

Sign and date each entry using a consistent format and legible writing for each date, also have each entry signed and dated by a witness.

Initial and date each insert both on and over the edge of the insert to discourage removal.
It is **imperative** to keep a good lab notebook. A good notebook provides:

- A **detailed, day-by-day accounting** of how experiments were performed, which is essential to you and to your principal investigator;
- An **infallible repository of data** for reports, manuscripts, and so on;
- A **means of authentication** of work by outside parties;
- A **record of action** in the event of allegations of research misconduct or other problems;
- And a **record of ownership** of legal claims related to patent and copyrights.

See *Responsible Conduct of Research* (Shamoo & Resnick)
ACQUISITION AND MANAGEMENT OF DATA: LAB NOTEBOOK

Some guidelines:

• Entries should be made on a **daily basis**, in chronological order, and dated. No page should be skipped.
• Entries should be clear and legible. They should be made with **permanent, non-erasable ink**.
• Entries for single experiment should include **date, purpose, materials, protocol, results, discussion, and next steps**.
• If word-processing is used in place of handwritten entries, printouts should be affixed **permanently** to pages of the notebook. Printouts from other software programs should be treated likewise.
• If data are deposited in files, physical or electronic, provide **clear identification of location** in the notebook.

See *Responsible Conduct of Research* (Shamoo & Resnick) and *Scientific Integrity* (Macrina)
And finally – very important – know to:

- Document everything – you cannot remember it all.
- Document everything ASAP – acts and details kept ‘in your head’ are quickly lost.
- Document everything whether it’s ‘good’ or ‘bad’, ‘right’ or ‘wrong’. Omitting data is dishonest.
- If data are discarded in a subsequent analysis, clearly note the reason for it. Not infrequently this will require statistical validation.
Research misconduct is defined as **fabrication**, **falsification**, **plagiarism**, or other serious deviation from accepted practices in...”

- Proposing
- Performing
- Reviewing
- Reporting

...research or research results.
RESEARCH MISCONDUCT CAUSES SERIOUS HARM

- It undermines efforts by scientists to replicate and build sensibly on scientific results
- It undermines the credibility of the scientific process itself within and beyond the scientific community
RESEARCH MISCONDUCT: SOME OF THE DETAILS

• Fabrication
  • making up data or results and recording or reporting them

• Falsification
  • manipulating research materials, equipment, or processes
  • changing or omitting data or results such that the research is not accurately represented in the research record
  • includes published material, presentations at conferences, lab group meetings, lab notebooks, etc.

• Plagiarism
  • appropriation of another person's ideas, processes, or results, or works without giving appropriate credit
    • Even internet sources need to be cited.

• Serious deviation from accepted practices
  • includes but is not limited to stealing, destroying, or damaging the research property of others with the intent to alter the research record;
  • directing or encouraging others to engage in fabrication, falsification or plagiarism.
WHAT IS NOT RESEARCH MISCONDUCT?

Research misconduct is *not*:

• An honest mistake, with no intention of deception.
• A difference of opinion or different interpretation of experimental data.
Mike is a 4th-year graduate student whose work is coming along well. But time is pressing, and he’s nervous that the minor data aren’t falling into place, specifically that a few of the controls he knows should work are not working. It’s a matter of time, he thinks, and doesn’t want to bother his advisor or thesis committee with what are really just details. When asked about the controls at a lab meeting, Mike says he’s done them, and that they’ve worked. The advisor is happy that everything is in place and asks that the all the experiments now be incorporated into a poster presentation for a meeting in two weeks. Mike does so, but doesn’t incorporate the (nonexistent) controls. At the meeting, moreover, Mike intentionally steers interested investigators away from any requests for these controls. When Mike returns, he finds that the advisor has incorporated his data into a manuscript just submitted to a journal, with the controls mentioned in the text. It’s time to fess up, Mike realizes, and he does. The advisor requests that the journal’s editorial staff return the manuscript. He asks to review Mike’s notebook, which to his relief he finds doesn’t contain falsified entries. He sits Mike down for a very long conversation regarding research misconduct. Mike returns to work, not entirely happy, but at least his transgressions didn’t go further.

1. Did Mike commit research misconduct? If so, when? If not, why?
2. Were (all) the actions of his advisor correct?
3. What is the sequence of reporting events, if used?
BGS Policies:
- Expectations of Students in Biomedical Graduate Studies
- Responsible Conduct of Research
- Compact Between Students and Research Advisers (AAMC)
- Authorship Policy

University Policies
- Academic integrity
- Procedures Regarding Misconduct in Research for Non-faculty
- Members of Penn
- Sexual Harassment Policy
- Consensual Sexual Relations Between Faculty and Students