

# Material and Methods

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- One critical aspect of publishing research is describing the methods used in enough detail that the experiments can be reproduced by others. Some manuscripts are rejected because there is insufficient detail in the methods section.

- In an [editorial](#) for the *American Journal of Roentgenology*, James Provenzale says, “**One of the more common reasons for rejection of a manuscript is that the reviewers cannot fully understand how the study was conducted.**” However, several journals have page limits or page charges, and the Materials and Methods section can take up valuable space.

- What are the most important things to include, and how can you be sure that you're being concise AND sufficiently comprehensive?
- Here are six tips for writing a good Materials and Methods section, which can lead to reproducibility of your results and reliability in the eyes of reviewers and readers.

# 6 Tips for Writing an Effective Materials and Methods Section in Your Research Manuscript:

- **1. Begin writing the Materials and Methods while you are performing your experiments.**
- Writing during the research process will prevent you from forgetting important details and save you time when you begin writing the full manuscript. You can also ask co-authors who performed specific experiments to write the corresponding parts of the Methods section.

- **2. Start with general information that applies to the entire manuscript and then move on to specific experimental details.**
- Examples of general information that you could begin with are characteristics of the study population, sources and genotypes of bacterial strains, or descriptions of samples or sample sites. Then, you could share more details about your experiment.

- **3. Match the order in which methods are described to the order of the results that were generated using those methods.**
- Also, be sure that each method you used is described, even if it is just a quick sentence (e.g., “Toxin assays were performed as described [reference]”). This practice is helpful for transparency, as well as reproducibility.

- **4. Always include citations for procedures that have been described previously.**
- If you made any modifications, be sure to list them.



- **5. Describe statistical tests as fully as possible.**
- Give as much information about the tests as possible; just mentioning a [t-test](#) is not sufficient for the reader to determine if the correct statistical analysis was performed.

- **6. To save space, be concise, yet thorough, when listing the equipment you used.**
- You might consider listing all of your equipment purchased from a single company in one sentence. Or, you could create a flowchart figure of the steps in an important procedure.

- **Before you finish your manuscript, ask yourself the following questions about your Materials and Methods section to ensure that you have included all important information.**
  1. Is there sufficient detail so that the experiments can be reproduced?
  2. Is there excess information that could be removed without affecting the interpretation of the results?
  3. Are all the appropriate controls mentioned?
  4. Are all appropriate citations included?
  5. Is the source of each reagent listed?