ARTICLE WRITING GUIDE FOR MOLECULAR BIOLOGY

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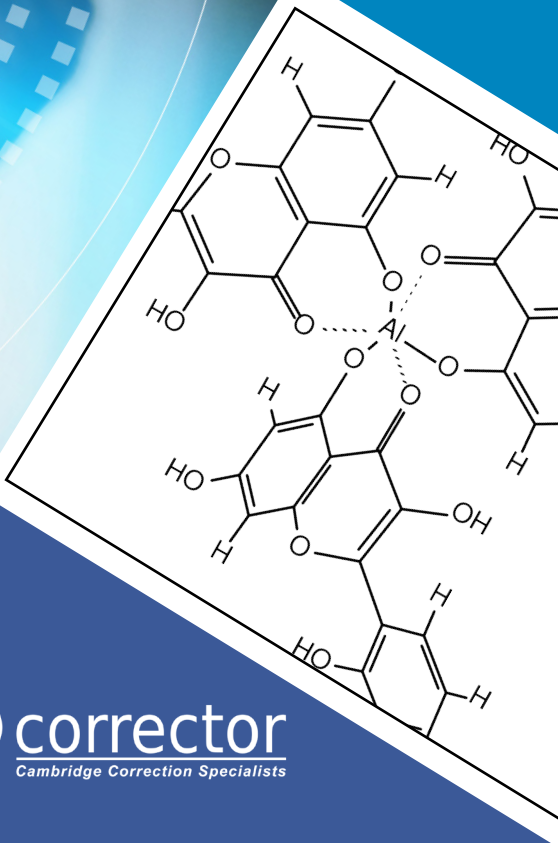

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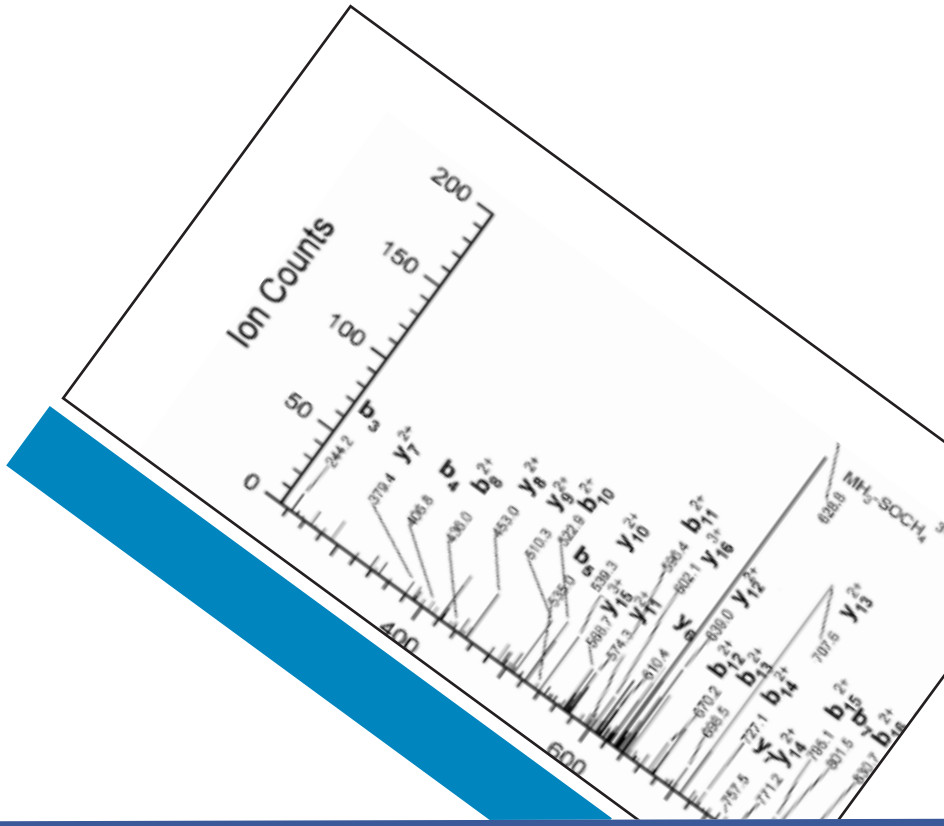
EDITORIAL

This guide is designed for authors intending to submit their work for publication in international peer-reviewed journals. This edition of the guide focuses on molecular biology and provides useful information that will assist authors as they prepare their manuscripts for submission. This guide provides an overview of the main sections of a standard manuscript (abstract, introduction, methods, results, figures and discussion). Advice on how each section should be arranged, as well as certain things to avoid, can be found in the guide.



TITLE

■ The article title should be self-explanatory.

■ The title should make the work clear without having to read the paper itself.

■ The title should be a firm, declarative statement. Avoid using phrases such as “Studies of…” or “Investigation of…”.

An example of a good title is as follows: “The Effects of Light and Temperature on the Growth of Populations of the Bacterium, Escherichia coli”.

The title reports what the author has done by addressing three things:

1. The environmental factors that were manipulated (light, temperature).
2. The parameter that was measured (growth).
3. The specific organism that was studied (Escherichia coli).

■ If the title had been only “Effects of Light and Temperature on Escherichia coli”, the reader would have to guess which parameters were measured. (Were the effects on reproduction, survival, dry weight or something else?)

■ If the title had been “Effect of Environmental Factors on Growth of Escherichia coli”, the reader would not know which environmental factors were manipulated.

■ If the title had been “Effects of Light and Temperature on the Growth of an Organism”, then the reader would not know which organism was studied.

ABSTRACT 1

In general, an abstract addresses the following questions:

■ **What is the importance of the manuscript?** (potential connection to human interest, disease, process discovery, long-standing questions, etc.)

■ **What is the question being posed in the article?** This will be related to the introduction. Make sure to clearly state the purpose in the first or second sentence.

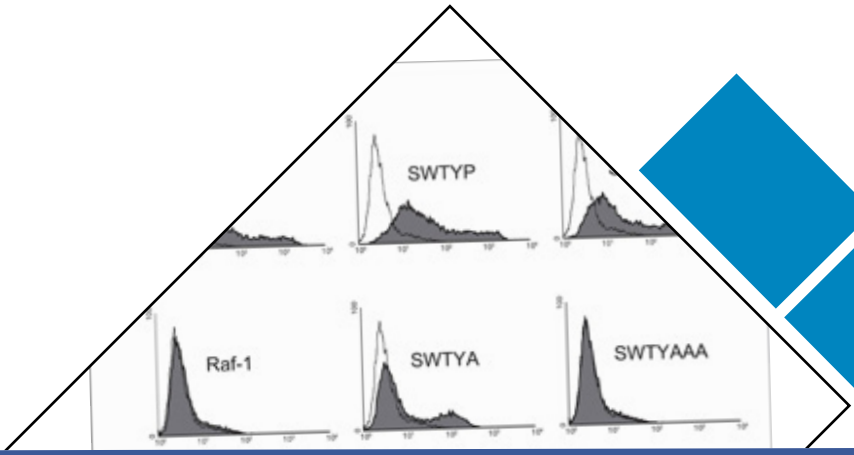
■ **What approaches were taken to answer the question?** This will be further expanded in the methods section. Name or briefly describe the key methodology without going into excessive detail.

■ **What are the results?** Report the results related to the question that was asked.

■ **Why do the results matter?** (connection to the big picture)

An abstract **should not** contain:

- Lengthy background information
- References to other literature
- Abbreviations or terms that would be confusing to the reader
- Any form of illustrations, figures, tables, or references to them



ABSTRACT 2

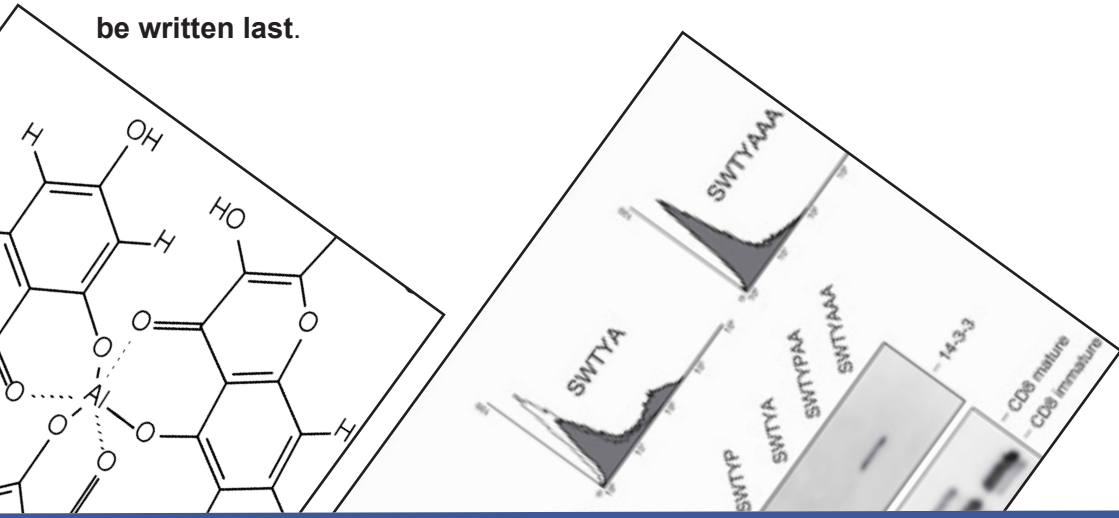
Since the abstract can have a word limit, it is important for it to be succinct while providing the most information possible. Below is an example of how to keep the information direct and easy to understand.

■ ***Problem example***: Taken together, these results represent the first demonstration of silencing of a metabolic gene central to pathogenesis by aberrant DNA methylation, offering a possible explanation for the less malignant phenotype of XX cells relative to YY-dependent cells.

■ ***Improved example***: Our results demonstrate silencing of a metabolic gene central to pathogenesis by aberrant DNA methylation, offering a possible explanation for the less malignant growth phenotype of XX cells relative to YY-dependent cells.

■ ***Best example***: Here we provide the first direct link between metabolic gene silencing by aberrant DNA methylation and pathogenesis. Importantly, these findings offer a possible molecular explanation for the less malignant phenotype of XX cells relative to YY-dependent cells.

Since **the abstract** is a precise summary of the manuscript, it **should be written last**.



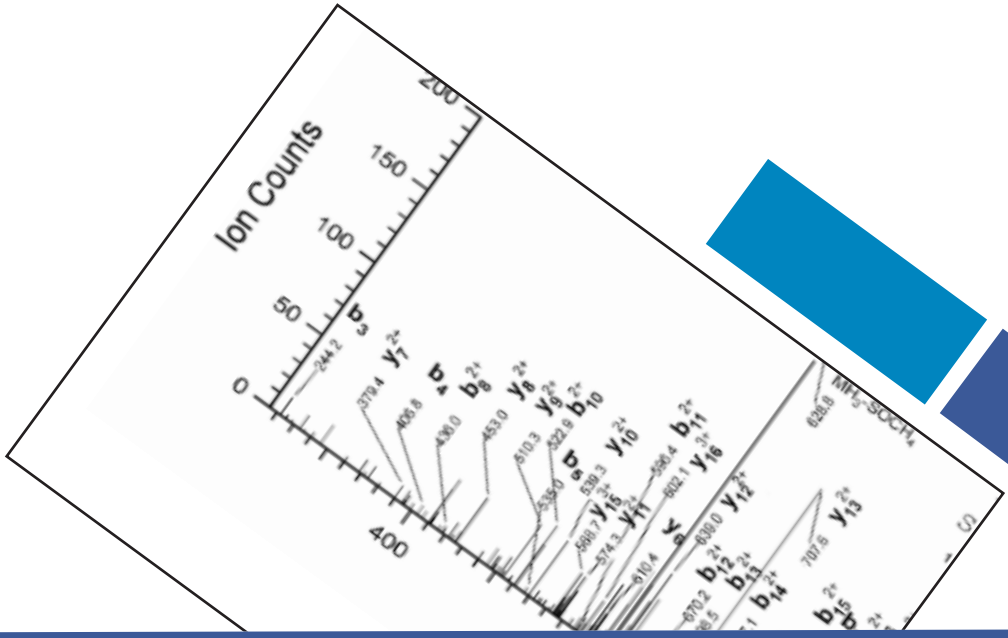
INTRODUCTION 1

The manuscript introduction serves several functions.

1. **To establish the context of the work.** It is important to discuss relevant primary research literature, including proper citations, and summarizing the current understanding of the investigated problem.

2. States the purpose in **the form of a hypothesis**.

3. **Explains the rationale, approach, and possible outcomes** that the study provides.



INTRODUCTION 2

The information contained in the introduction should flow in a logical manner that is easy for the reader to process. An example structure is as follows

1. **Begin the introduction by clearly identifying the subject area of interest.**

■ Use key words from the title in the first few sentences of the introduction to focus the topic. This allows for focus on the manuscript subject without becoming too general.

■ *For example*, in an animal behavior paper, the words behavior and hormone would appear in the first few sentences of the introduction.

2. Provide a brief review of relevant, published literature.

■ Give a general review of the primary research literature with citations. However, do not include lengthy background explanations.

■ Begin with a general idea then narrow the focus to the specific topic. For example, use the literature to start broadly (hormonal modulation of behaviors) to the specific topic of interest (effect of studied reproductive hormone on mating behavior in mice).

■ Cite articles specific to the study and not general background references.

3. Clearly state the hypothesis/purpose of the manuscript.

4. Give a clear rationale for your approach to the problem presented.

■ *For example*, state briefly how you approached the problem. This typically follows the hypothesis statement. The rationale for the study can address why you chose this type of experimental design, the scientific merits of your particular model system, and the advantages of using your system to explore the issue.

■ Do not include specific techniques in the introduction as they will be discussed in the materials and methods section.

MATERIALS & METHODS 1

This section serves as a guideline to experimental design and execution. It should be written in such a way that other researchers can repeat your experiments with little difficulty.

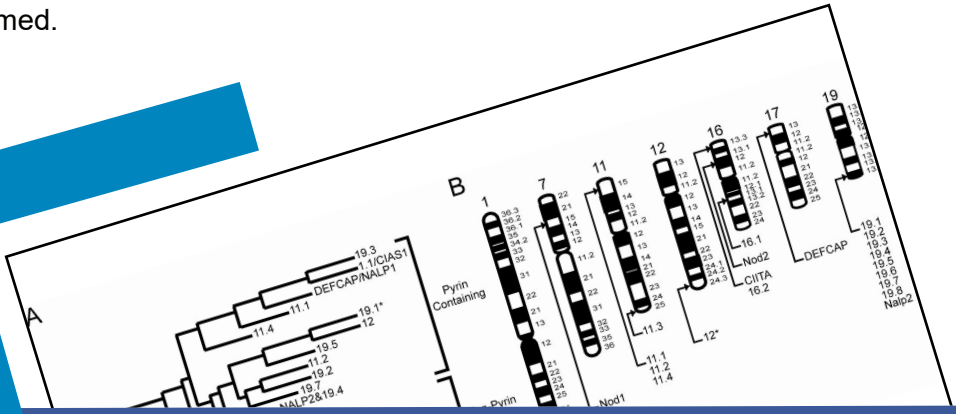
The materials and methods section follows a general structure and organization.

1. It discusses the organism(s) studied (human, animal, etc.) and their pre-experiment handling and care.

2. It gives experimental/sample design. For example, list how the experiment was structured. Give controls, treatment conditions, the measured variable, the number of samples collected, replicates, etc.

3. List the protocol used for data collection and explain how the experimental procedures were carried out.

4. Report how the data were analyzed. This can be qualitative analyses, statistical procedures, or whatever is applicable for the experiments performed.



MATERIALS & METHODS 2

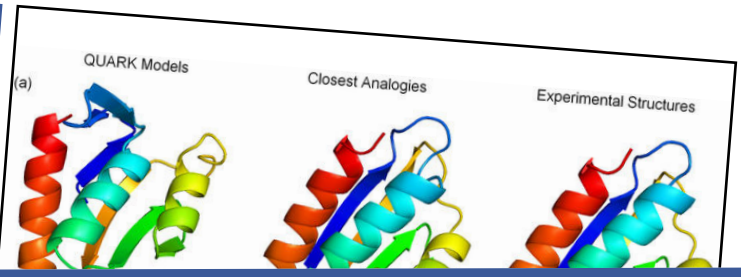
It is common for the materials and methods section to be too wordy. It is important to avoid repeatedly using a single sentence to describe a single action. There are simple ways to make your method descriptions more concise but still easily understandable.

■ *Problem example*: The petri dish was placed on the turntable. The lid was then raised slightly. An inoculating loop was used to transfer culture to the agar surface. The turntable was rotated 90 degrees by hand. The loop was moved lightly back and forth over the agar to spread the culture. The bacteria were then incubated at 37o C for 24 hr.

■ *Improved Example*: Each plate was placed on a turntable and streaked at opposing angles with fresh overnight E. coli culture using an inoculating loop. The bacteria were then incubated at 37o C for 24 hr.

■ *Best example*: Each plate was streaked with fresh overnight E. coli culture and incubated at 37°C for 24 hr.

Include the company information (company, location) for uncommon, purchased reagents.



RESULTS

The body of the results section is a text-based presentation of the key findings which includes references to each of the figures and/or tables.

It is easiest to write the results based off of figures and/or tables. The structure of the text should follow the sequence of the figures and/or tables.

Present the experimental results in a sequence that will logically support the hypothesis.

The results are essential for the discussion, so only present the data. It will be further expanded in the discussion section.

The key results that are presented depend on the questions that were asked. They may include obvious trends, critical differences, similarities, correlations, etc.

Easy ways to keep the results understandable and simple for the reader:

■ Do not reiterate the exact values from a figure or table. Only convey the key result or trend.

■ Do not report raw data values when they can be generalized in the text.

It's important to include negative results even if they don't support your hypothesis.

FIGURES & TABLES

As a general rule, figures are used for comparison of experimental results while tables give actual experimental results.

Figures and tables should be self-explanatory and able to be understood without reference to the text.

Figures and table should be sequentially numbered.

Figures and tables are assigned numbers separately and in the sequence they are referred to in the text.

Each figure or table must include a brief description of the results being presented in a legend.

- Figure legends are positioned below the figure.
- Table legends are positioned above the table.

Appearance is critical.

- Avoid crowded plots and use well-selected graph scales.
- Use an appropriate axis label size for easy readability.
- Include clear symbols and data sets that are easy to distinguish.
- Do not add extensive, cumbersome tables as they can be included in the supplementary material.

DISCUSSION 1

The point of the discussion is to interpret your results in light of what was already known about the investigation subject and to explain how your results give a new understanding of the problem.

The discussion will connect to the introduction through the hypothesis but will not repeat the introduction. Instead, it tells how your particular study has moved the field forward from what was known in the introduction.

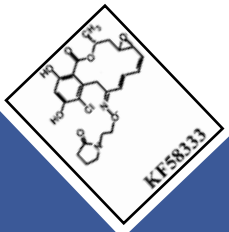
There are fundamental questions that can be addressed in the discussion.

1. **Do your results provide answers to your hypothesis?** How do you interpret those findings?

2. **Do your findings agree with the published literature?** If not, do they suggest an alternative explanation?

3. Given your findings, **what is the new understanding of your investigated hypothesis** presented in the introduction?

4. If warranted, **what are the next experiments in your study**, e.g., what experiments would you perform next?



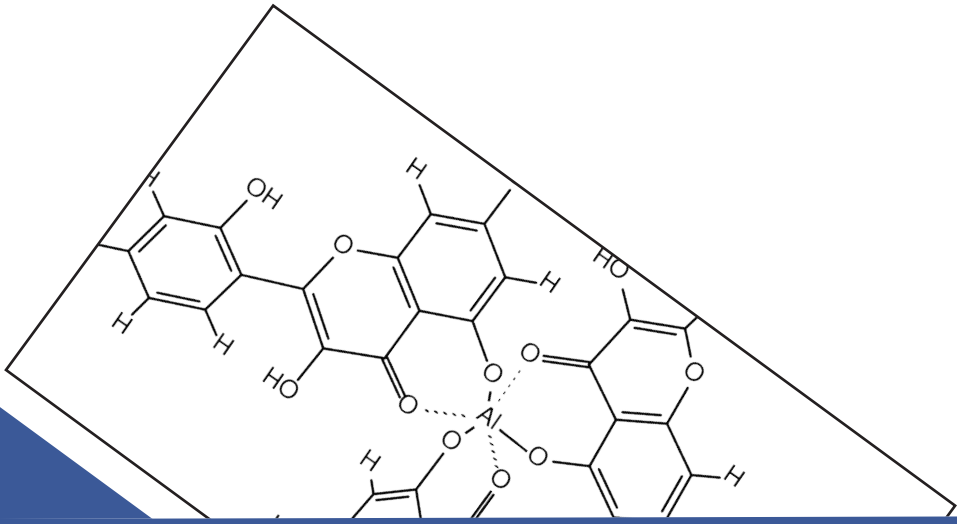
DISCUSSION 2

Do not introduce new results in the discussion section.

However, you can introduce a schematic diagram showing how your findings contribute to the current knowledge. For example, if you were studying a membrane-bound transporter, and you discovered new information about its mechanism, you might present a diagram showing how your findings help to explain the transporter's mechanism.

Don't oversell the future.

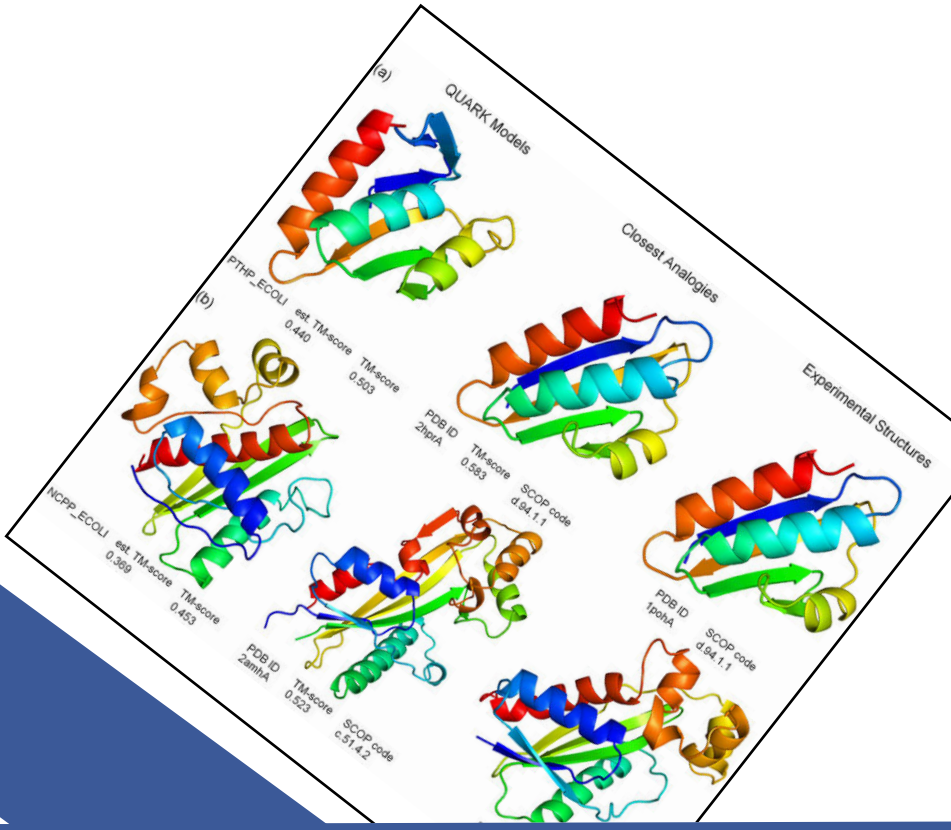
Try not to over-interpret your findings or the implications of the study. This makes it easier for reviewers to find fault with your manuscript.

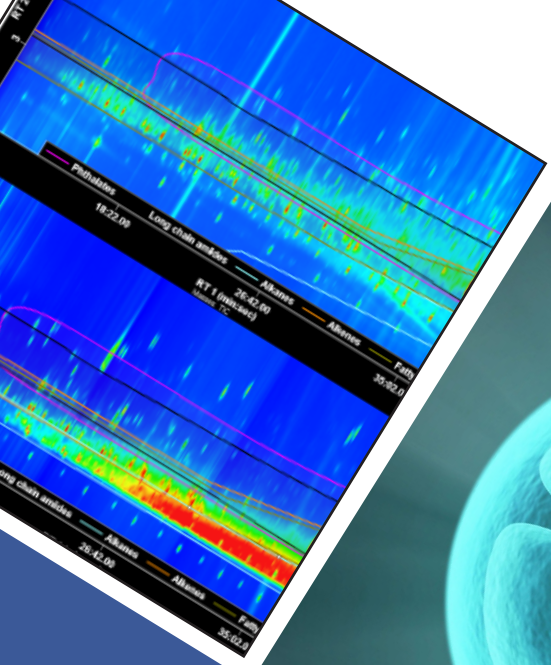


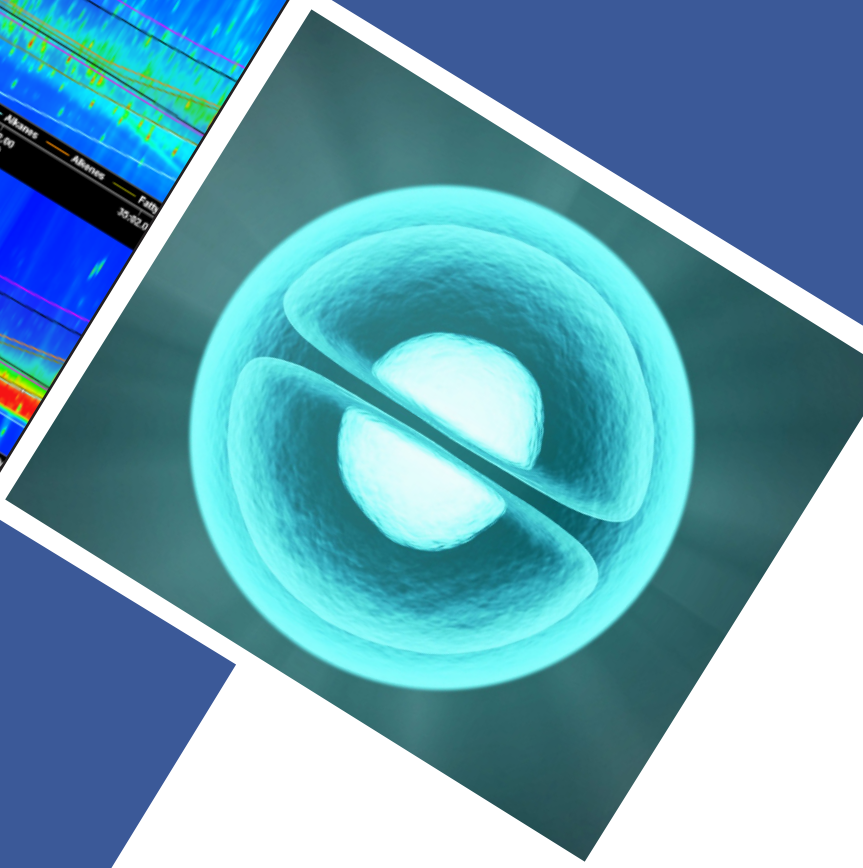
GENERAL

Make sure to know and understand the Instructions to Authors for the your journal of interest. They often give word/page limits, figure guidelines, and reference styles.
It is crucial to adhere to their guidelines.

Have several people (both in your field and out) read over the manuscript. Make sure it is readily understandable to a broader audience.







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