

Writing Manuscripts for Publication in Scientific Journals

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INTRODUCTION

The objective of a scientific paper is to communicate the motivation for performing the investigation or experiment, and to explain the study design, method of execution, results obtained, and meaning of the results. Distinguishing features of scientific papers are clear and concise writing to inform other scientists about the subject, and documentation of the processes involved in reaching the conclusion. Thus, correct English, free of typographical errors, is critical in a finished manuscript. Contrary to some notions, the composition of a well-written scientific paper should be more clear and precise than that of work in other disciplines. A standard format, with some variations, is often used in scientific journals. Although the following discussions are especially formulated to help authors writing manuscripts for publication in the *Bioelectromagnetics* journal, the information provided should also be helpful for those writing scientific papers for publication in other journals.

TYPES OF MANUSCRIPTS

The *Bioelectromagnetics* journal publishes Research Articles, Reviews, Brief Communications, Comments and Letters to the Editor. The length of papers can vary from 8 to 15 journal pages for Research Articles, to more than 15 journal pages for Review Articles. While the shorter Brief Communications, Comments and Letters to the Editor do not include section headings, Reviews and Research Articles should be organized into sections appropriate to the subject material. For this discussion, the longer Research Article will serve as an example, showing the accepted standard format.

ORGANIZATION OF RESEARCH ARTICLES RESULTS

Research Articles reporting experimental, clinical, epidemiological, or theoretical investigation should include the following sections in the paper: Title, Abstract, Introduction, Materials and Methods, Results, Discussion, Conclusion and References. Other sections such as an Acknowledgment section may be included as necessary. The differences between these sections, and guidelines for appropriate information to provide in each, are described below.

Title. The title describes the subject matter of the article and should be appropriate for the intended reader. It should be sufficiently specific to convey the contents of the paper, but not so technical that only specialists will understand.

Abstract. The abstract should be a brief summary that contains the essential elements of the article: approach, data or theory, and conclusions. It introduces the article, informs the reader of the article's content and helps the reader to decide whether or not to read the paper.

Introduction. The main text of a scientific paper should begin with an introduction that explains the motivation or objective for conducting the research. The introduction should be organized to move from general information to more specific information. It should summarize the relevant literature so that the reader will understand why the topic is of interest or importance, and therefore, worthy of investigation. The results and conclusions of

previously published studies should be succinctly summarized as background and support, but should not be itemized.

Materials and Methods. Methodological details applied to accomplish the objectives should be provided in this section. It should contain all necessary information to allow other scientists to repeat the study or experiment. It is reasonable to assume that other scientists have the basic knowledge and skills required of the study or experiment, but they will need to know the specific details in order to repeat or critique the study. The style should be a narrative of the steps involved in the experiment or study, not a list of instructions such as one might find in a technical manual. In the case of theoretical studies, the basic principle relied upon to formulate the problem, and methods used to obtain the solution, should be provided instead. Similarly, for numerical simulation, the computational algorithm should be described here. For the *Bioelectromagnetics* journal, clear description of methods and instruments used to characterize exposure and dosimetry should be included. Results should not be placed in this section. However, a preliminary result that was used to design the main experiment being reported maybe included here. For experimental studies, the last paragraph in this section should provide a brief description of the statistical tests used.

Results. This section presents the results obtained using summary tables and figures, but not the raw data collected. It is better to show the data in a table unless there is visual information that can be gained by using a figure. Each table or figure should stand alone and be accompanied by a text legend (or caption) that explains the information that is being shown. The legend should not repeat information already in the table or figure itself. It should be clear but concise without a need for the reader to examine the text for the basic information conveyed. The principal findings should be described in the text, referring to the tables and figures, where readers can see the details for themselves. Do not attempt to discuss or evaluate the results; this belongs in the Discussion section. For the *Bioelectromagnetics* journal, relevant exposure and dosimetry data, consistent with experimental and/or numerical uncertainties, should be clearly presented.

Discussion. The function of the Discussion is to interpret the results in light of what is already known about the subject of the investigation from other published results. Results should be discussed in the same sequence as presented. It should explain what the results mean, and relate them back to the objectives presented in the Introduction. It should assess how the results fit into the big picture by integrating all the evidence, including previous work and the current research, for any new understanding of the problem. Both positive and negative results should be explained and may represent something important—adding to the accumulated knowledge of the field or perhaps suggesting a new or changed focus or methodology for the research.

Conclusion. This section should simply be a few sentences that summarize the most significant results and conclusions the data support; refrain from making statements that are too broad and do not offer any reasons for the conclusions. Also, it should not just repeat what is written in the Results and Discussion sections. In fact, it can be combined with the Discussion section, by ending it with a conclusion.