

## The Title Says It All

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Crafting a good title is like bending a straight line into a seamless connected circle. Let me explain. Titles are the first thing readers see, yet they are often the final part of writing a manuscript, and just as often given the least attention. Guides on writing scientific papers recommend starting with the Methods section, followed by Results, Discussion, Introduction, Abstract, and Title. There is a certain degree of logic to this linear order, since authors already have detailed notes and documentation on the methods used, the results obtained, and the interpretation of the results when they begin to write a paper. The title, however, is the component that closes the circle. The title draws from the other sections of the paper and becomes the face of the paper—the descriptor, the advertisement, the pitch. Like a billboard, it is your 10-second opportunity to connect with the passerby (the reader). So it is important to make the title count. Here I provide some tips and examples to help you reach this goal.

### Be Concise

When asked “How long should a title be?” my response is that the length should be just right. This is not to avoid the question, but to tell the author that a title should balance the number of words needed to describe the content of the article against losing or confusing the reader with too many words. How a title looks to the eye can mean as much as what it says. In most cases, titles end up being better if words are removed rather than added. Avoid using wasted words such as “a study of,” “investigation of,” “development of,” or “observations on.” Readers understand that you would not be writing the paper unless you had studied, investigated, developed, or observed something. Similarly, avoid including adjectives such as “new,” “improved,” “novel,” “validated,” and “sensitive.” Why would a journal want to consider a study that was not new, not validated, or not sensitive? Many journals have strict limits on the number of words or characters that can be included in the title, so it always helps to

look for words that can be removed from a title without affecting the clarity or message.

### Be Clear

Consider the following titles:

- H1N1 Virus Testing on Mice Using Polymerase Chain Reaction
- Blood from Bone Marrow Donors Stored on Ice Yields Higher HLA-Match Percentages
- Treatment of Pediatric Melanoma Patients with Lasers
- Value of Amniotic Fluid Sphingomyelin Quantification in Fetuses with G1- $\alpha$  Gene Mutations of Unclear Significance

Those must be extraordinary mice in the first paper if they are capable of performing polymerase chain reaction analyses. I have donated blood in the past for a bone marrow drive, but I am thinking of dropping out in the future if the agencies are going to store me on ice just so they can get a better result. If I were a pediatrician, I would demand that someone disarm the lasers from those children before I would enter the treatment room. Finally, is the value of amniotic fluid sphingomyelin of unclear significance, or are the gene mutations of unclear significance? It is likely that readers will figure out the true meaning of an unclear title, but their subsequent mindset when reading of the remainder of the article (if they do not quit here) may already be negatively affected.

Now consider alternatives to the above titles:

- Polymerase Chain Reaction Testing of Mice for the H1N1 Virus
- Increased Bone Marrow Donor HLA-Match Percentages for Blood Stored on Ice
- Laser Treatment for Pediatric Melanoma
- Amniotic Fluid Sphingomyelin Quantification Identifies G1- $\alpha$  Gene Mutations of Unclear Significance

These hypothetical examples of odd titles and their modifications illustrate that the syntax (word order) in a title deserves more attention than it often receives. There should only be one meaning to your title. A good practice is to show the title to colleagues who are not coauthors and ask them to tell you what message they take away from your words.

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Received December 1, 2009; accepted December 8, 2009.  
Previously published online at DOI: 10.1373/clinchem.2009.141523

**Table 1. Varying effectiveness of titles in providing information.**

A New Method for Sirolimus
Analysis of Sirolimus by High-Performance Liquid Chromatography–Mass Spectrometry
Rapid Analysis of Whole-Blood Sirolimus by High-Performance Liquid Chromatography–Mass Spectrometry
Statins and Cholesterol
Effect of Statins on Serum Cholesterol
Reduction of Serum Cholesterol with Statin Therapy
Statin Therapy Reduces Serum Cholesterol in Patients with Cardiovascular Disease
Animal Testing for Flu Viruses
Animal Testing for the H1N1 Virus
Testing of Dogs for the H1N1 Virus
Polymerase Chain Reaction Testing of Dogs for the H1N1 Virus

### Be Informative

Although it is considered a virtue for titles to be concise, sometimes titles are so short and incomplete that they tell the reader very little about the topic of the article. Table 1 illustrates variations in 3 titles, ranging from least to most informative. In the first example, the most informative title includes the specific advantage of the method (rapid), the specimen used (whole blood), the compound analyzed (sirolimus), and the method used (high-performance liquid chromatography–mass spectrometry). This complete description of the topic of the paper used 13 words (99 characters). The second example starts with a general statement that the paper is about statins and cholesterol, giving the reader little information. There is more information when the reader is told that statins affect cholesterol, but even more information when readers learn that statins reduce cholesterol. The most informative title tells readers the independent variable (statin therapy), the dependent variable (cholesterol), the observed effect (reduction), and the patient population studied (cardiovascular disease) using just 10 words (80 characters). In biomedical journals, the species studied is typically assumed to be humans unless otherwise specified. For all other studies (e.g., animals, bacteria, cell cultures), the title should clearly state the specific organism or biological system studied (e.g., dogs, *E. coli*, HeLa cells), as shown in the third example in Table 1.

### Use Key Words and Terms Wisely

Key words and terms play an important role and should be chosen carefully. Since many readers first see

**Table 2. Change in emphasis through rearrangement of titles.**

Amniotic-Fluid Sphingomyelin Quantification Can Identify G1- $\alpha$ Gene Mutations of Unclear Significance Emphasis: <i>Amniotic fluid, sphingomyelin</i>
G1- $\alpha$ Gene Mutations of Unclear Significance Can Be Identified by Amniotic-Fluid Sphingomyelin Quantification Emphasis: <i>G1-<math>\alpha</math> gene mutations</i>
Blood Stored on Ice Yields Increased HLA-Match Percentages for Bone Marrow Donors Emphasis: <i>Blood processing and storage</i>
Increased Bone Marrow Donor HLA-Match Percentages for Blood Stored on Ice Emphasis: <i>Bone marrow HLA matching</i>
First-Trimester Maternal Pregnancy-Associated Plasma Protein A Is Influenced by Smoking Emphasis: <i>First trimester maternal screening</i>
Smoking Influences First-Trimester Maternal Pregnancy-Associated Plasma Protein A Emphasis: <i>Effect of smoking</i>
Proficiency Testing of Dried Blood Spot Trypsin for Newborn Screening for Cystic Fibrosis Emphasis: <i>Proficiency testing, dried blood</i>
Newborn Screening for Cystic Fibrosis: Proficiency Testing of Dried Blood Spot Trypsin Emphasis: <i>Newborn screening, cystic fibrosis</i>

your paper by scanning through a table of contents, as an author you want to capture the reader's attention with words and terms that highlight the content (or message) of the paper.

The key words or terms used in a title should also be the same ones used throughout the article. Using the titles in Tables 1 and 2 as examples, if you use *human leukocyte antigen (HLA) match* in the title, do not substitute other terms in the abstract or main text such as *histocompatibility match* or *major histocompatibility complex (MHC) match*. If you use *high-performance liquid chromatography* in the title, do not switch to *chromatographic assay* at various points in the article.

Key words and terms in a title are also important because they are the same terms that indexing services (e.g., PubMed) and search engines (e.g., Google) key on. Again, avoid using generic terms such as *animal*, *bacteria*, or *antibiotic* as your key words, each of which can carry several meanings. A potential reader seeking information on *Salmonella* poisoning will likely not enter *bacteria* as a search term in PubMed, since more than 1 million articles will show up. Your paper will be lost as a proverbial raindrop in the ocean of papers.

Search engines such as Google typically show only the first 6–7 words of a title, so there is a benefit to

placing the terms you most want associated with your paper early in the title (Table 2). This is also another reason to remove unnecessary phrases such as “development and validation of a sensitive” which already uses up the first 6 words.

### Know the Journal and the Target Audience

A common error of authors is a failure to read the explicit instructions that outline formatting, style, word limits, etc., required by a given journal. In spite of access to this information, authors frequently submit papers with titles that do not meet the requirements of the journal. Some journals have a limit on the number of words or characters in a title, or may request that titles be written as phrases, not sentences (e.g., “Reduction in Cholesterol with Statin Treatment” vs “Cholesterol Concentrations Are Lowered with Statin Treatment”). Other journals prohibit subtitles or the designation of articles as part 1 or part 2. A good tip is to read past issues of the journal of interest to see titles that have been published.

The order in which words and terms are used in a title can also influence readers’ interest in your paper. Therefore it is important to decide what you want to emphasize as the primary subject matter. Table 2 contains 4 pairs of titles in which the first half of the title in each pair emphasizes a different subject. The hypothesis of the study and the results are the same, but each of the 4 papers in the table will be seen in a different light and appeal to different audiences depending on how the words in the title are arranged.

### Avoid Abbreviations

Abbreviations can cause several problems and should be avoided in a title. First, abbreviations confuse and lose readers if they are not experts in the subject matter of your paper. Second, unless an abbreviation in the title is an accepted standard abbreviation used by indexing services, your article may not get indexed properly and be missed by potential readers. Third, even if it is a standard abbreviation, indexing services generally provide readers with access to titles and abstracts only, not the main text of the paper, where abbreviations are defined.

In rare situations, the abbreviations for some nouns have become more widely used than the actual spelled-out names used in common speech. For example, the average person does not say that their family has longevity because of their good deoxyribonucleic acid—they say “DNA” instead. Similar common terms include RNA, AIDS, CDC, and FDA. In these circumstances, using the abbreviation instead of the full name

may be clearer to the reader. When in question, however, check with the specific journal or seek out reference materials or style guides.

### Learning Exercise

Knowing about their importance, you should be able to write clear, succinct, informative titles. The first 3 titles listed below can all be improved. Try to rewrite them using the tips and caveats discussed in this article. For the fourth title, try creating a running title. Some possible new titles are provided in a box after the list of selected additional reading materials.

- Development and Evaluation of a New ELISA for the Improved Detection of Lupus-Specific Antinuclear Antibodies
- A Validated Method for the Sensitive Quantification of Sirolimus in Whole Blood by the Use of Online Extraction Connected to Liquid Chromatography–Mass Spectrometry
- Evaluation of siRNA Molecules Reveals Them to Be Sensitive and Specific Biomarkers of Sepsis
- Reduction of Viral Load in Blood after Albinovir Treatment of HIV-Infected Patients

### Final Thoughts

There is an old saying, “You don’t get a second chance to make a first impression.” The title of an article has the power to influence the first impression of your work by a reader, reviewer, or editor. The words selected for inclusion in a title describing the content of your paper must be clear, concise, informative, and relevant to the target audience. Scan the table of contents for several prominent journals and decide on the wording and style of titles that captured your attention. You will soon gain an appreciation for the importance of the title when you write your next paper for publication.

### Additional Reading

Day RA, Gastel B. How to write and publish a scientific paper. Westport, CT: Greenwood Press, 2006.  
Zeiger M. Essentials of writing biomedical research papers. New York: McGraw Hill, 2000.

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**Author Contributions:** All authors confirmed they have contributed to the intellectual content of this paper and have met the following 3 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; and (c) final approval of the published article.

**Authors' Disclosures of Potential Conflicts of Interest:** *Upon manuscript submission, all authors completed the Disclosures of Potential Conflict of Interest form. Potential conflicts of interest:*

**Employment or Leadership:** T.M. Annesley, *Clinical Chemistry*, AACC.

**Consultant or Advisory Role:** None declared.

**Stock Ownership:** None declared.

**Honoraria:** None declared.

**Research Funding:** None declared.

**Expert Testimony:** None declared.

**Role of Sponsor:** The funding organizations played no role in the design of study, choice of enrolled patients, review and interpretation of data, or preparation or approval of manuscript.

## Answers to Learning Exercise

Development and Evaluation of a New ELISA for the Improved Detection of Lupus-Specific Antinuclear Antibodies

Revised title:

ELISA with Improved Detection of Lupus-Specific Antinuclear Antibodies

A Validated Method for the Sensitive Quantification of Sirolimus in Whole Blood by the Use of Online Extraction Connected to Liquid Chromatography–Mass Spectrometry

Revised title:

Quantification of Whole-Blood Sirolimus by On-line Extraction Liquid Chromatography–Mass Spectrometry

Evaluation of siRNA Molecules Reveals Them to Be Sensitive and Specific Biomarkers of Sepsis

Revised title:

Plasma siRNA Are Biomarkers of Sepsis

Reduction of Viral Load in Blood after Albinovir Treatment of HIV-Infected Patients

Running title:

HIV Viral Load Reduction with Albinovir Treatment (49 characters)

Albinovir Treatment and HIV Viral Load (38 characters)

HIV Treatment with Albinovir (28 characters)