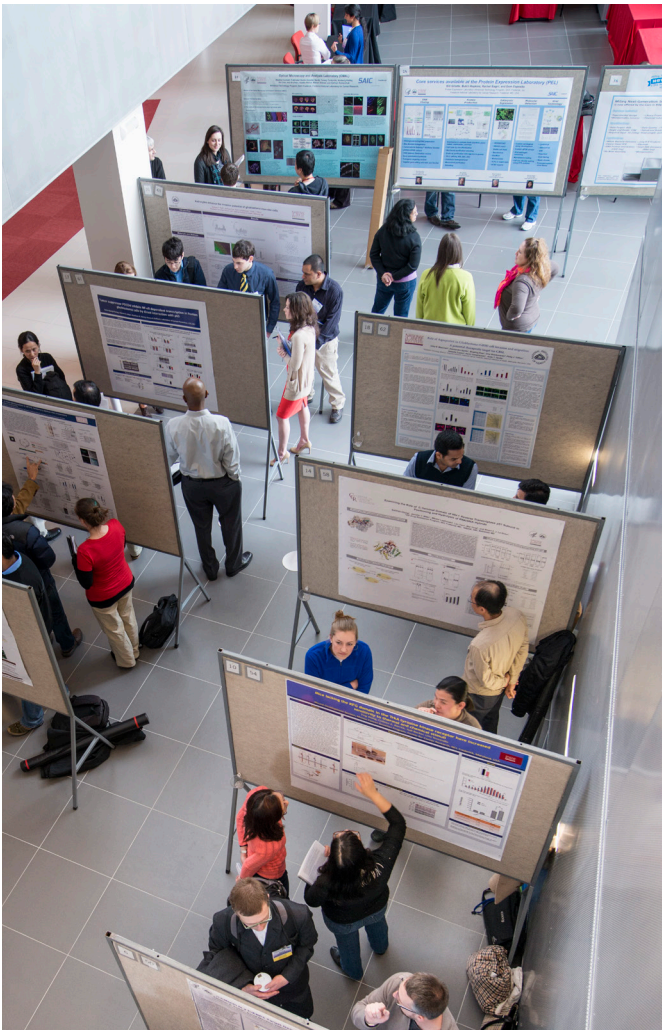
Scientific Publications, Graphics & Media
presents:

Best Practices for Effective Scientific Posters



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Contents

At Scientific Publications, Graphics & Media,
our mission is to help both scientists and non-scientists
at the National Cancer Institute at Frederick
communicate effectively.

Introduction

Participating in a poster session is one of the most effective means you have to communicate your research findings and their potential benefits to others. This format offers a unique combination of both formal and informal interaction. As a stand-alone exhibit, the poster communicates information to the reader. In combination with you as a presenter, it provides a means to initiate dialog with interested parties.

Purpose for Presenting

To communicate your science as effectively as possible, you must gain the attention of an audience. Thus, determining in advance who the audience members are and why you are targeting them is an essential part of the communication process. How you craft everything—from the abstract to the figures you include—should support reaching that audience. The table below outlines some tactics.

Desired result	Tactic to reach that outcome
Raise awareness	Answer the question, "Why is this important?"
Publicize your findings	Support your viewpoint with strong evidence
Seek collaborators	Focus on where the project is going—the vision
Seek feedback	Frame content as dialog; use open-ended statements
	Make sure you provide enough information for the poster to stand on its own
Sell your services	Demonstrate the unique benefits you offer potential consumers and differentiate yourself from competitors

Concentrate on the Conclusions

Many viewers read the conclusions of a poster first, and then the remainder, if the material piques their interest. Writing the conclusions first will provide you with direction for your poster and guide the writing of the abstract and title.

Write the conclusions first, then the abstract, and then the title!

Parts of the Scientific Poster

1. Title

The title should be prominently displayed in banner fashion across the top. It identifies the topic, the authors, and the authors' institutional affiliations. The title should not be too general or lengthy, and should not contain jargon. If there are multiple contributors, normal publication guidelines apply to the order in which authors are listed, except that a corresponding author is not designated for a scientific poster. Be sure to spell out abbreviations that are not commonly known, such as the program or laboratory name.

How to Plan and Produce an Effective Scientific Poster

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2. Abstract/Introduction

The abstract and/or introduction is usually the starting point for a poster presentation. It should describe, in broad brush strokes, what the poster is about and lead the reader into your topic. Usually, it will be no more than two paragraphs of three to four sentences each.

An abstract for a poster about planning and making posters might read something like this:

> The scientific poster has emerged in recent years as one of the most effective methods of communicating science. The technique of placing your science on public display during a poster session greatly facilitates the discovery of, and interaction with, others who share your scientific interests. As is true with all modes of communication, the impact of a scientific poster can be optimized by adhering to tried and true guidelines. This poster presents some of those guidelines and describes the process of creating a poster from planning to presentation.

3. Hypothesis/Objectives

This part of the poster provides more detail about what the investigators originally set out to do with the study or experiment reported. It may include an overview of previous work upon which the present work is based. The abstract and objectives might be thought of as "the appetizers" for the poster. For example:

> The objectives of this poster are to provide readers with generally accepted guidelines that the communications professionals in Scientific Publications, Graphics & Media at NCI at Frederick endorse and to offer helpful hints for the production of poster presentations.

4. Materials and Methods/Procedures

This section may be considered the poster's "main course." It describes such things as experimental design, setting, and resources and/or limitations, and tells the story of what was done to prove or disprove the hypothesis, or to achieve the objectives described.

This section should be succinct, with minimal use of references. Use of flow diagrams or illustrations aids the reader in quickly understanding your procedures and minimizes the need for lengthy descriptions. Interested readers will ask for greater detail, if it is desired.

5. Results/Observations

This may also be a substantial portion of the poster, perhaps even the most substantial. Often, the results presented represent a snapshot of work in progress and only the most relevant data should be presented. In contrast to a published manuscript, posters tend to rely more heavily on figures and tables than text to present research results.

Results and observations should be presented as factually and objectively as possible in order to clearly differentiate them from conclusions. Two investigators might, on occasion, view the same results (data), yet arrive at different conclusions.

6. Discussion

The discussion section is an important portion of the poster because it applies scientific interpretation to the facts described in the results section. Often, the results reported can be interpreted in more than one way, and it is the discussion section that allows you to explore the various ways that the factual results might be interpreted. It also gives you an opportunity to compare and contrast your findings with those in the field (be sure to list any cited material in the references section).

7. Summary/Conclusions

The summary or conclusions will usually be the final panel on most posters. It sums up the most important information presented on the poster. If an experiment was conclusive, the conclusion is presented here. If the test or experiment was inconclusive, this section may suggest additional work to be done or other pathways that may be pursued. A summary paragraph might read:

> The scientific poster can be an effective method for connecting with other investigators who share similar research interests and for sharing information. Regardless of the project budget or available resources, the most effective posters are characterized by:
>
> - Sound science
> - Proper planning
> - Sound graphic/informational design
> - Care in preparation and presentation

8. References/Acknowledgment

To avoid plagiarism, it is important to formally acknowledge the ideas of others on which your work is based and that you have used in the poster (even material obtained from the Internet). Provide a numerical citation within the text and then list each sequentially in the references. This section also provides a place to recognize the contributions of senior scientists and/or project mentors.

Planning a Scientific Poster

Develop your content

Scientists define problems and then seek solutions. To communicate science effectively, however, you need to concentrate on the solution being offered and the relevance that solution has to the reader. Remember, your audience is the most important element in presenting!

To develop effective content for your poster audience:

- ***Answer the question "So what?"*** By doing so, you engage the reader and retain the reader's attention by building a bridge between the content and your audience.
- ***Use the "BLUF" principle***—placing the Bottom Line Up Front. By starting with the conclusion (the bottom line) and then developing the content (text and data) to support that conclusion, you remain focused on what the audience needs to know—and why they, too, should become as excited as you are about the importance of this topic.
- ***Put your content into context.*** Work from the global to the specific (from the "big" picture to what you discovered). This provides the necessary context that the audience needs to interpret the material being presented.
- ***Reveal information like a story.*** Storytelling is an excellent mode of communication because it provides a logical progression in which information is revealed—a beginning, middle, and end (your abstract, your findings, your conclusions).
- ***Be brief.*** Complete sentences aren't always necessary. Bulleted lists are often more effective and relieve the monotony of uninterrupted blocks of text. Posters should contain more text than an oral presentation, but not as much as a written paper.
- ***Concentrate on the conclusions***—what message do you want your audience to take home? As previously stated, many viewers read the conclusions first, then the remainder of the material if it piques their interest. Use your conclusions as a reference to guide what content belongs in your poster, and what does not belong. Ask the question, "Does this information lead the reader to my conclusions or distract them from it?"
- ***Look for holes or potholes.*** From the reader's perspective, does the content flow logically from the abstract to the conclusions? Are there any gaps in the story? Are there any distractions? If so, fix them.

Determine specifications

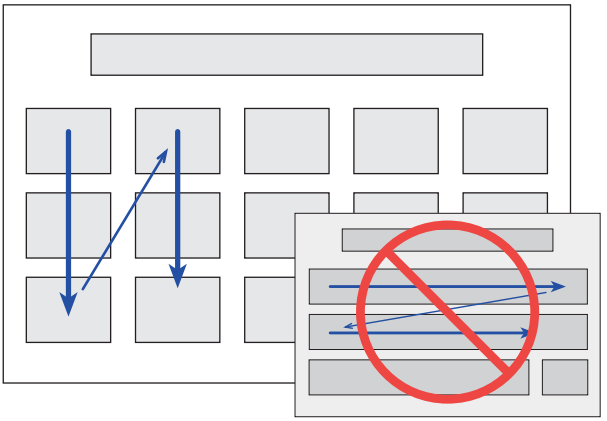
Poster specifications will be provided by the meeting organizers, including the size and type of display board. Pay careful attention to the details, especially the overall dimensions. Remember that not all posters are horizontal. If your poster is oriented incorrectly, the ends may hang off the display board, which will look unprofessional and likely infringe upon neighboring displays. Display boards are usually 4' x 6' or smaller, and will accept either VELCRO® or push pins for mounting display pieces. We recommend undersizing poster presentations by a few inches in both dimensions, to accommodate unusable areas (such as the board's metal frame).

Plan use of space

Start by sketching a layout on paper. Use graph paper to do an accurate scale drawing. Or for a quick approximation, turn a letter-sized piece of paper sideways to represent a display board of about 6' x 4'. Use the smallest-size Post-it® note (2" x 1.5") to represent each letter-size piece of paper, or use two of them to represent a tabloid sheet of paper. Allow space at the top for a title strip.

A common guideline is to have 40% graphics, 20% text, and 40% open space.

Information flow



Scientific posters are typically organized into columns, so that information flows from top to bottom and from left to right.

Designing an Effective Poster

Choose software

Numerous software applications are available to develop the content. These range from science-specific software, to business software, to professional graphic layout applications. Authors often use more than one program to generate their materials. For example, they might use Microsoft Excel to prepare charts and graphs, Microsoft Word for composing the text, and Microsoft PowerPoint, Adobe Illustrator, or InDesign for illustrations and final arrangement of the poster.

Legibility

To communicate effectively, your poster must engage the passing viewer from a distance. We recommend following the "five-foot rule": important elements should be legible from a distance of five feet.

The following techniques are useful for engaging the casual reader:

- ***Establish a hierarchy of information.*** Establish a visual scheme by using combinations of color, style, size, and weight to differentiate headings, subheads, body text, figure titles and text, and graph labeling.
- ***Provide multiple entry points.*** Your conclusions, headings, data tables and figures, and images all provide places for the casual viewer to jump into your presentation. Be sure to include sufficient space around these elements so they are not lost in visual clutter.
- ***Place important information at eye level.*** As with web sites and printed pages, certain areas of the poster typically receive more of the viewer's attention. If practical, place your more important information (such as your conclusion) in the top half of the poster.

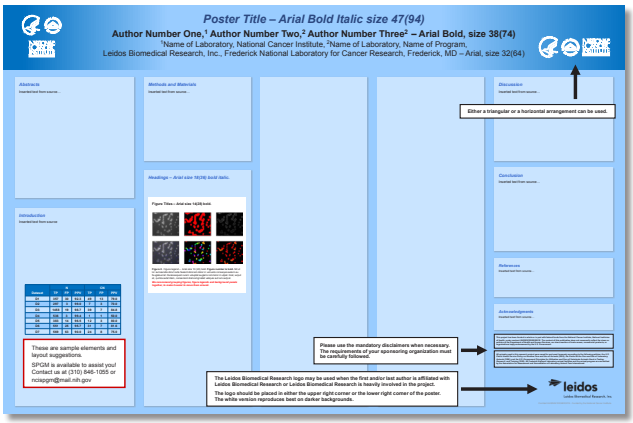
Appearance

Use each graphic element with a purpose, such as to increase prominence, emphasize important information, or to group or contrast ideas. Providing the viewer with a visual path to follow is called "leading the viewer's eye." The order and spacing of panels, relative size and color of text, and other graphic choices should all work together to lead the viewer through your poster. The goal is to get the viewer to read—or at least skim—the entire poster.

Consider the following when designing the appearance of your poster:

- ***Provide visual cues.*** Color, text style and size, and proximity of elements can be used to help clarify the relationship between elements and to group ideas. In addition to simple black and white, deep colors on light neutrals, bright colors with black, and different intensities of the same color (hue) work well to provide the viewer with the necessary visual cues to show relationships.
- ***Make effective use of available space.*** A poster looks best when the information comfortably fits the space available without appearing tightly packed or overly enlarged. It's easier for a viewer to find interesting starting points for reading your poster if there is sufficient white space between paragraphs and within figures, and around them. In addition to space around each figure, leaving extra white space at the bottom of each panel creates balance that is pleasing to the eye.
- ***Use color and effects with restraint.*** Two or three colors used consistently are better than a riot of colors and special effects that add no information.

Poster Templates

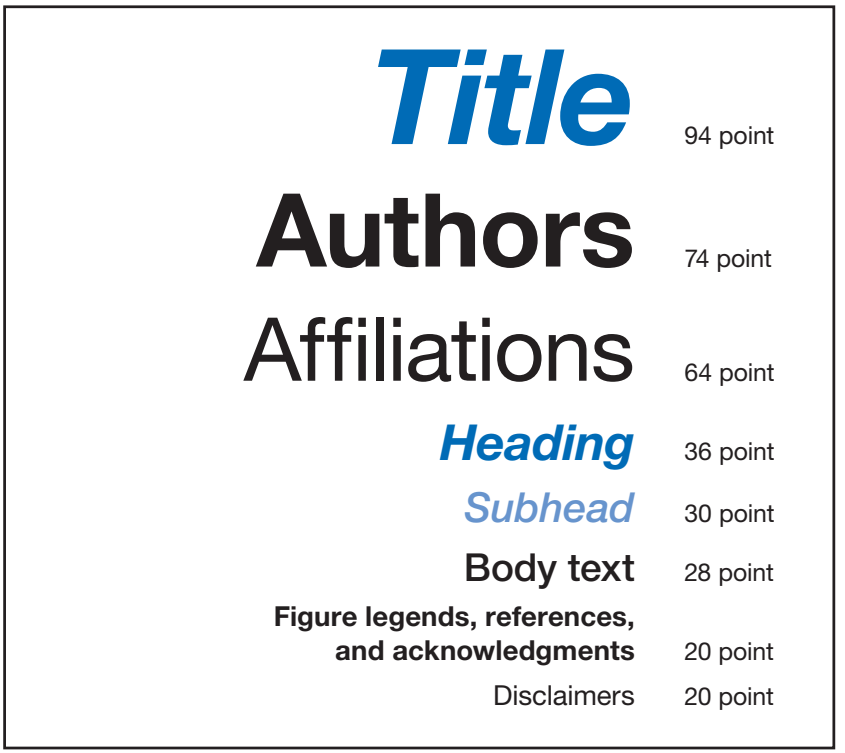


To get you started, templates are available through SPGM's website.

http://ncifrederick.cancer.gov/Services/Spgm/Templates.aspx

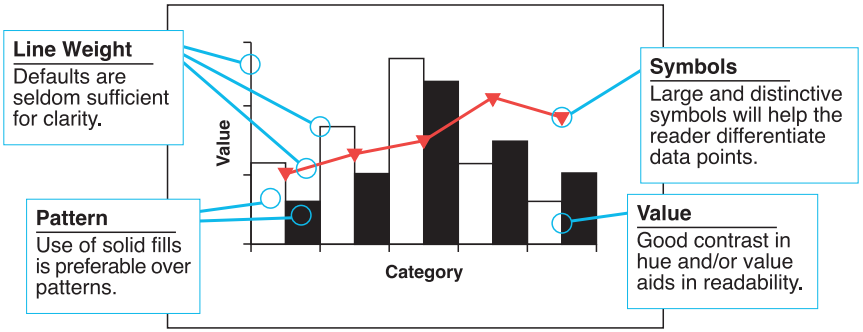
Text

- ***Type style.*** Effective use of typefaces can make your poster visually interesting and provides you the opportunity to express your creativity and personality. Expressive typefaces can be used for headings to gain the reader's attention and are permissible because of their brevity. Legibility, however, should always be the primary consideration for paragraph text, and the use of a simple, easy-to-read font is essential.
- ***TYPE ALIGNMENT.*** AVOID ALL CAPS AND FULLY JUSTIFIED TEXT. IN MOST CASES, THE ADVANTAGE THEY PROVIDE IN NEATNESS COMES AT THE EXPENSE OF LEGIBILITY.
- ***Font size and color.*** Titles and headers need to be legible from at least five feet away. Body text needs to be readable from a comfortable standing distance of about two to three feet. Color can be used to attract readers' attention and to provide a logical reading order to follow. Below is a sample scheme using different combinations of size, color, style, and weight.



Graphic elements

- ***Line weight.*** Lines that convey important information need to be visible; in general, they should be heavier than the default weight of one point.
- ***Symbols.*** The default symbols in graphs sometimes are not as easily visible as they should be. Replace open symbols with closed ones, and make symbols larger, as necessary.
- ***Patterns.*** The default patterns in graphs and charts often are not the best choices. In general, we recommend replacing cross-hatching with solid black, white, or color. Try to choose colors that will maintain contrast if they are reproduced in black and white.



- ***Logos.*** Official logos are an important part of an institution's corporate identity program, and there are very specific rules for how they may and may not be used. When used, logos are typically included in the title section of the poster. SPGM can provide the correct logo files and assist you with their proper placement.

Disclaimers

Standard disclaimer statements are often required by contractual obligation or institutional policy—for example, to acknowledge the source of funding and/or the humane treatment of research animals. The requirements of your sponsoring organization must be carefully followed. SPGM can provide you with the common disclaimer statements.

> This project has been funded in whole or in part with federal funds from the National Cancer Institute, National Institutes of Health, under contract HHSN261200800001E. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Leidos Biomedical Research, Inc., mandatory disclaimer citing the funding contract.

> All animals used in this research project were cared for and used humanely according to the following policies: the *U.S. Public Health Service Policy on Humane Care and Use of Animals* (2000); the *Guide for the Care and Use of Laboratory Animals* (1996); and the *U.S. Government Principles for Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training* (1985). All Frederick National Laboratory for Cancer Research animal facilities and the animal program are accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International.

Mandatory disclaimer for research that includes laboratory animal use.

Finishing the Poster

Final review

- Ask for help, share your ideas, and value critiques.
- Use your software tools to check spelling and grammar.
- Double check your citations and reference list.
- Review all materials with your senior scientist and/or mentor.

Printing

- Print a draft version on the printer you will be using for your final poster print. Look for problems such as elements shifting in position and font or character substitutions—especially in graphics.
- Let SPGM assist you with the final clean up, editing, and printing.

Presenting The Poster

Setting up

- Get a good night's rest.
- Dress appropriately for the event—professionally, but not overdressed, this consideration shows respect for your audience. Avoid distracting accessories.
- Be prepared and arrive early to mount your poster (and be sure to remove your poster by the appointed time).
- Have handouts of your poster available to distribute and be sure they include your full contact information.

Presenting

- Relax!
- Greet people warmly. Allow them to view your poster and be available to answer questions. Offer to walk readers through your poster and be sure to thank them for stopping by.
- Be prepared to field questions:
  – Have a 30-second speech ready to explain your work.
  – Repeat or paraphrase the question to be sure you understood it.
  – Anticipate questions and have answers prepared.
  – Be honest and up front with what you know and do not know.

A Parting Note of Encouragement

Presenting a poster represents a significant investment in time and effort, an investment that will yield dividends in your scientific understanding, professional skills, and self-confidence. Make the most of this opportunity and enjoy the process!

Leidos Biomedical Research, Inc.

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