Medical Writing in the Twenty First Century
Modern Writing

- Writing is essential for persuasion/argument and inquiry (Rhetoric) in most academic disciplines and professional fields
  - it both preserves and distributes existing knowledge
  - works as a means of discovering new knowledge
What is Rhetoric?

- According to Aristotle’s teaching:
  Rhetoric is the art of finding the best available means of persuading a specific audience in a specific situation
What are the Tactics of Rhetoric?

- **Ethos** – presenting the trustworthiness and authority of the writer

- **Pathos** – speaking to the emotions and deeply-held beliefs of the audience

- **Logos** – using the logic, reasoning, and evidence of the subject as presented
The Rhetorical Triangle and the Larger Context

Writer

Ethos

Logos

Subject

Pathos

Audience

Your Work & Research

Their Needs & Interests

Your Project's Impact
How to Write?
Theoretical Components

There are three groups of components in a scientific paper:

1. The Title and Abstract
2. The Main Body of the Paper including Figures and Tables
3. The Reference List and Acknowledgments
- Topic Statement (TS)
- Manuscript summary (TS)
- Narrow background coverage until your hypothesis is reached (TS)
- No results
- No speculation (TS)
- Summarize first (TS), then discuss results in order of importance, most to least. Conclude strongly with TS.
Title and Abstract

- The Title must accurately and honestly describe your paper
  - Get people’s attention

- The Abstract should briefly summarize your paper
  - Describe how you performed work
  - State the impact of your work in the last sentence
The Title

- The *only* part of your MS most people read
- A ‘mini-abstract’ of your work
- The Title should reflect the overall aspect of the project
- A tool used by computer search engines
- Interesting enough to attract an audience
A Good Title

- A good Title accurately describes the contents of the manuscript *in the fewest possible words*
- Avoid long or complete sentences
- “The X-ray crystal structure of the complex formed between a recognition domain on a sensor histidine kinase (CheA) and its cognate response-regulator (CheY) reveals insights into the mechanism of signal transduction in bacterial chemotaxis”

Better:

- “Structure of the CheY-binding domain of histidine kinase in complex with CheY”
Abstract

- After the Title, this is the first (and often the only) part of the paper that many people read.
- Furthermore, it is accessible electronically—PubMed.
- Equally important, it is the first component of the paper that journal editors review.
- Abstracts should be carefully constructed, keeping these ideas in mind.
Abstract Preparation Guidelines

Abstract Structure for Poster Presentations

1. Title
2. Authors
3. Affiliations
4. Abstract Body
   - AIM
   - METHODS
   - RESULTS
   - CONCLUSIONS
5. Keywords
6. Acknowledgment (optional)
7. Signature

These form an abstract for a manuscript
Writing the Abstract

- First, introduce the study
  - 1-2 sentences

- Next, how will this problem be addressed?
  - Describe how you performed work

- What are the results?
  - Describe significant results
  - It is helpful to use the Figures and Tables as a guide

- What is the significance of the study?
  - State the impact of your work in the last sentence
Abstract Body - AIM

- State the aim of the study
- Precisely what did you learn?
- A very brief introduction – 1 sentence

Example:

- This study reports that insulin-like growth factor I (IGF-I) prevents cerebellar granule cells from developing sensitivity to kainate neurotoxicity.
Abstract Body - METHODS

- What general approaches are used, e.g. transgenic, gene transfer, etc. (if not previously stated)?
- How are these methods applied in your specific study?
- What material, tissue, organ system, or animal is used?
State the importance of the work in a single sentence

Include future research direction if you can

Example:

These results indicate that IGF-I functions through a signal transduction pathway involving PI 3-K and p70S6k, preventing the development of sensitivity to kainate neurotoxicity in cerebellar granule cells.
Key Features of a Successful Abstract

- Good science, good writing
- Focused – one idea/purpose
- Clearly written without jargon or excessive abbreviations
- Understandable in a single reading to someone unfamiliar with your work
The Main Body of the Paper

- Introduction
- Material and Methods
- Results
  - Do not discuss, just report the data
  - Figures and Tables
  - Figure legends are important!
- Discussion
- Conclusion
  - State why your work is important
If readers like your Abstract, they next examine the Tables and Figures

- Tables are used to display precise numeric values.
- Figures provide visual impact and thus are often the best way to communicate the primary finding.
- Figures are traditionally used to display trends and group results.

Work to develop a set of visual elements that can stand alone - Tables and Figures that not only convey the major result but also the basic methods.
Figures

- Add understanding or information that is difficult to convey with words
- Keep simple!!!
- Must be clear, accurate, appropriate
- Avoid mere decoration
- Need a legend
Better Journals Have Better Figures

- In general, better Journals have more detail in the Figures
- Average Journals have 1 or 2 frames per Figure
- Good Journals have 4-6 frames per Figure
  - No ‘fillers’
  - All important
Figure Quality

**Neuroscience**, Vol 133, 2005, 393-403

**Science**, Vol 308, Issue 5727, 1472-1477, 3 June 2005
Include Raw Data in Figures
Figure Legends

- Must accompany Figures
- Should give pertinent, clarifying information
  - key to abbreviations
  - sample size
  - statistical results
  - a brief description of how the data were acquired
- Should allow Table/Figure to stand alone
- In the legend, both “Table” and “Figure” are completely spelled, not abbreviated
The Reference List and Acknowledgments

- **References**
  - Accurately reference similar or relevant work
  - Represent EVIDENCE for statements made in MS
  - If your paper is high quality, make sure your references are from high-quality journals
  - References can influence Reviewers
  - Endnote is a great software program for references!

- **Acknowledgments**
  - Important to show gratitude where appropriate
Choosing Referees

- First, search Medline
  - your target journal
  - subject
- Next, identify papers similar to your own
- Identify and research the ‘PI’
  - another Medline search
  - webpage
- Add to your list
- Editors evaluate your list, even if they do not use your choices
Constructing the Body of the Manuscript

- Technological advances demand that we write more effectively.
- Titles, Abstracts and Figures attract readers, but we need to supply further evidence through our writing.
- Results, Discussion and Introduction need to be carefully crafted.
Linking Sentences and Paragraphs

- Sentences contain a single statement
- Paragraphs contain a collection of sentences that explain a single idea
  - topic sentence
- We must link sentences to form paragraphs
- We must link paragraphs to form documents
Linking Sentences

- Sentences are linked using transitional words and phrases
- Transitions indicate relations, whether from sentence to sentence, or from paragraph to paragraph
- Smooth transitions provide coherence
- A coherent paper allows the reader to flow from the first supporting point to the last
- Let’s consider some transitional words…
**Addition**

- also
- furthermore
- moreover
- too
- in fact

**Example:**

Kainate was not neurotoxic to cells treated with IGF-I.  Furthermore, these cells were much larger than control neurons.
Example:

Wortmannin blocked the activation of PDK and P6K by IGF-I. Consequently, kainate toxicity developed 5-6 days following the medium switch.
Summarizing

after all          all in all
in any case       in any event
in conclusion     in short
in the final analysis to summarize
finally           indeed

Example:

Wortmannin blocked the activation of PDK and P6K by IGF-I. To summarize, IGF-I operates through a signal cascade involving PDK and P6K.
Other Transitional Phrases

- **Diversion**
  - by the way, incidentally

- **Contrast and Comparison**
  - contrast, by the same token, conversely, rather, similarly, nevertheless, in contrast, in spite of, in comparison, whereas

- **Generalizing**
  - as a rule, as usual, for the most part, generally, generally speaking, ordinarily, usually

- **Similarity**
  - likewise, similar, moreover, similarly, also, too
Use a Thesaurus

- A thesaurus lists words that have similar meanings to a specific word.
- Also, gives the definitions of these words.
- Thus, a thesaurus enables you to select the best word for a particular sentence.

Example: Diminish

- Reduce
- Lessen
- Make smaller
- Weaken
Paragraph Choppiness

- Paragraphs containing only one or two sentences are rarely good paragraphs because they can't adequately develop ideas.

- Two-sentence paragraphs usually represent misplaced pieces of other paragraphs or fragments of ideas that should either be removed or expanded.
Break up Manuscripts into Sections

- Don't try to write a manuscript from start to finish
- Write individual sections
- Don't wait until you think you've completed all your analyses to start writing
One ‘timeline’ or strategy:

- Immediately write Material and Methods
- Write the result of an individual experiment, including Figure Legends and Tables
- As more results are obtained, start on Discussion
- Next, work on Introduction, and link results
- Finally, write Abstract and last paragraphs for Introduction and Discussion sections
"Parallel processing" of writing one section while you complete other analyses and make presentation quality figures is a good strategy for avoiding writer's burn-out.

Writing the results section of a paper is often the best way to discover the analyses and controls that are needed.
Writing Strategies

- Think of paragraphs as diagrams:

- In the first example, sentences can be flexibly arranged to assist in paragraph linking

- In the second example, the paragraph develops the topic for the next sentence
Writing Strategies

- Arguments and evidence dictate paragraph design
- If your opponent has a strong argument, attack it first, then present your side
  - People generally favor the second of two similar arguments
- If your opponent has a weak argument, it can be addressed later in the paragraph
An Essay Outline

- A tool to help organize your thoughts and ideas into a coherent structure
- You can rewrite your outline
- Let it evolve with your own ideas and understanding
Outline for a Scientific Manuscript

- The main headings form the top level of the outline
  - Introduction
  - Materials and Methods
  - Results
  - Discussion
  - Conclusions

- Within each heading, make logical divisions of the information: For the Discussion
  - “Drug actions”
  - “Implications for patients”
  - “Conclusion”

- Lowest level is the topic sentences of each paragraph

- Once you’re done, fill in the words!
I. Introduction
   1. The development of microalbuminuria in type 2 diabetes increases the risk for renal and cardiovascular disease.
   2. The purpose of this study, therefore, was to investigate whether the effect of the highly selective AIIA, valsartan, on UAER was independent of its BP-lowering properties.

II. Materials and Methods

III. Results

IV. Discussion
   1. This study demonstrates that UAER was significantly reduced by valsartan in type 2 diabetic patients with microalbuminuria.
   2. Our data add new information to previous studies suggesting that lowering of BP in diabetic patients by ACE inhibition or AT1 receptor antagonism results in greater reduction of albuminuria than that obtained with other antihypertensive agents.
   3. There are possible alternative interpretations of our results.
   4. Sixty-five percent of the whole group was found to be hypertensive at entry into the study.
   5. In conclusion, valsartan significantly reduces microalbuminuria in type 2 diabetic patients, an effect that appears to be independent of its BP-lowering action.
How to Read Scientific Manuscripts

- How are papers organized?
- How are the contents of the paper evaluated and digested?
  - critical reading
- REVIEWERS critically read papers
Checklist for Manuscript Appraisal

Appraise Research Articles in this order:

1. Methods
2. Results
3. Discussion
4. References
5. Introduction

The Title and Abstract are not useful for critical appraisal.
Impact Factor

- What are Impact Factors?
  - A way to rank and rate journals
- What do they mean?
  - It is a measure of the frequency with which the "average article" in a journal has been cited
- Impact Factors can help you evaluate journals
Calculating Impact Factors

Calculation of the Impact Factor for a journal in 2003:

- **Number of articles published in:**
  - 2002 = 310
  - 2001 = 306
  - Sum: 616

- **Citations in 2003 to articles published in:**
  - 2002 = 4223
  - 2001 = 5203
  - Sum: 9426

- **Calculation:** Citations to recent articles divided by Number of recent articles
  - 9426 = 15.3
  - 616
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* Data derived from ISI Web of Knowledge
** Ranked by Impact Factor

SEE:  http://www.starrepublic.org/encyclopedia/wikipedia/i/impact/
Scientific Writing Should Be:

- Reader-Based
- Purposeful
- Accurate
- Clear
- Concise
- Precise
- Simple

and not Contain:

- Invented words
- Excessive abbreviations
As a general principle, the greater the percentage of common words an article contains, the easier it is to comprehend.
Write for YOUR Audience

- You must adopt the style and level of writing that is appropriate for your audience.
- Stylistic conventions and acceptable jargon can vary tremendously from one field to another.
- Study them in a selection of highly regarded papers and in the "Instructions for Authors" for journals in which you wish to publish.
- Scientific writing must be written for a specific audience.
Take Home Points

- Start writing before your project is completed
- Focus your attention on what people are most likely to read: The Title, Abstract, Figures and Tables
- Develop a systematic approach to the Introduction, Methods, Results, and Discussion
- Improve the paper by obtaining and incorporating useful feedback
Writing Resources

On Writing Well, 25th Anniversary: The Classic Guide to Writing Nonfiction (On Writing Well) by William Zinsser

Grammatically Correct: The Writer's Essential Guide to Punctuation, Spelling, Style, Usage and Grammar by Anne Stilman

The Chicago Manual of Style by University of Chicago Press Staff

The Elements of Grammar by Margaret Shertzer