A Beginner's Guide to Evaluating Research

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Credits

A Beginner's Guide to Evaluating Research

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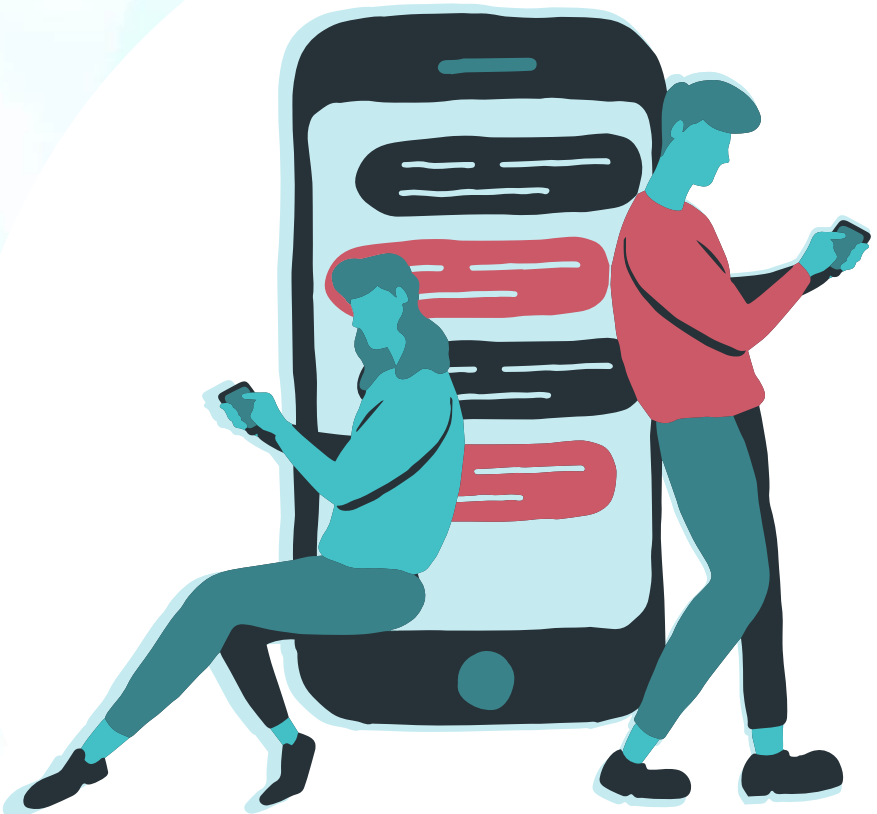

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Dysautonomia Support Network

How to Use This Guide

Dear Reader,

This guide was compiled by Dysautonomia Support Network (DSN) to provide the general public with the framework to read and evaluate scientific research, especially as it relates to dysautonomia and comorbid conditions.

Scientific articles can range from general overviews of a single topic to highly specialized studies investigating new therapeutics. Understanding scientific literature is no easy task; scientists, physicians, pharmacists, and engineers spend years in school honing the skills necessary to evaluate publications critically. However, as more and more journals are committing to publishing open-access articles, groundbreaking research is at the public's fingertips. In order to prevent the spread of misinformation, it is imperative that the people reading, summarizing, and sharing information gleaned from these articles are well-equipped to evaluate them critically.

A Beginner's Guide to Evaluating Research is designed to be read cover-to-cover. It is complete with the vocabulary, step-by-step instructions, and examples needed to begin critically evaluating scientific literature. It is written and structured for individuals who have little to no experience with reading this type of writing.

We hope this guide will serve as a launching point for individuals interested in medical research and help prevent the spread of medical misinformation.

All the best,

Dysautonomia Support Network

Step 1: Identify the Source

An important first step in understanding research articles is to identify the type of research that it is. There are four types of articles that you may come across in research - primary, secondary, tertiary, and gray.

Understanding the types of articles provides insight into the content you are reading and can help you identify any bias in the writing. The next few pages will go over each type of article as well as examples.

Types of Sources: Primary

Primary articles provide data, evidence, or encounters that were experienced first-hand by the authors. Primary articles can be thought of as the original source of information. Numerous writings can be classified as primary articles. Scientific research articles, newspapers, magazines, memoirs, dissertations, and clinical reports are just a few examples.

Primary articles, especially scientific research articles, are the go-to publications for doctors and researchers. While you may know that magazines, newspapers, and memoirs can easily be found at a library or bookstore, you may be less familiar with where to find scientific research articles, dissertations, or clinical reports. Google Scholar, PubMed, and Web of Science are three excellent search engines to find primary scientific articles.

Memoirs & Dissertations

- Becoming by Michelle Obama
- *Recherches sur les substances radioactives* by Marie Curie

Newspapers

- *The New York Times*
- *The Chicago Tribune*
- *The Boston Globe*

Scientific Articles & Clinical Reports

- *Nature*
- *Science*
- *Journal of the American Medical Association*

Magazines

- *National Geographic*
- *Forbes*
- *Time*

Types of Sources: Secondary

Secondary articles summarize and review information that was previously published as a primary article. Books and scientific review articles fit into this category.

Scientific Review Articles

Books

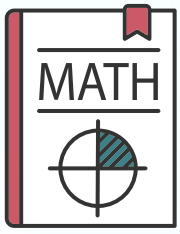
Secondary articles are a great way to introduce yourself to a new topic of interest. Unlike primary articles that have a brief introduction section, secondary articles can be thought of as one long introduction section.

They cover the history of a topic, major findings in the field, discrepancies or areas of disagreement in the field, research trends, and future outlook. Like primary articles, they will often include an abstract as well as a long list of references.

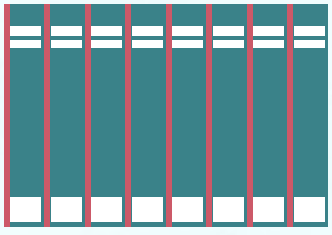
Types of Sources: Tertiary

Tertiary sources of information go one step further than secondary sources and compile summarized information into larger bodies of work. Handbooks, textbooks, and encyclopedias are examples of tertiary sources.

Handbooks



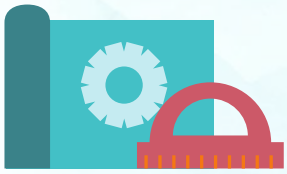
Textbooks



Encyclopedias

Type of Sources: Gray

Gray sources are the fourth and final type of literature sources. Examples of gray sources include technical reports, white papers, urban plans, etc. White papers include in-depth, research-based information on a specific topic issued by a company. Other examples of gray literature you may be more familiar with are newsletters and patents. It's important to note that gray sources are not peer-reviewed, a topic that will be discussed in the next section.



Urban Plans

White Papers

Technical Reports

This concludes the section on types of literary sources. At this point, you should be able to identify the four types of sources and provide examples of each. As previously discussed, Google Scholar, PubMed, and Web of Science are excellent databases to search for primary, secondary, and tertiary sources. Google Patents and your local library are also reputable sources for information.

The upcoming sections will focus on primary sources, specifically scientific articles. We will discuss the peer-review process, the key components of an article, and how to critically evaluate scientific writing.

Step 2: Understanding Peer Review

Peer review is a critical process used to evaluate and critique primary scientific writings. When researchers submit an article to a journal for publication, the journal editors assign the article to a team of peer-reviewers for evaluation; this team usually consists of 2-4 experts in the field. To prevent unintended bias, the authors of the article are permitted to submit a list of reviewers to the journal who may have a conflict of interest.

Reviewers are tasked with reading the article and assessing its validity or quality of accuracy. During their review process, they will:

- Read the article for clarity and cohesiveness
- Scrutinize the methods used in experiments
- Evaluate the graphs and figures
- Assess the authors' conclusions
- Pose questions and suggested edits to the authors

The review process can take anywhere from 2-6 weeks, depending on the journal. After the reviewers complete their assessment, they will recommend that the article be published, published after edits have been made, or be rejected. If it is determined that the article can be published after edits have been made, the questions and suggested edits from all reviewers are collected and sent to the authors. The authors then have a set amount of time to respond and submit an updated version to the journal.

Peer-review is essential to ensuring precise, accurate, and valid data is published. However, the process is not infallible. Sometimes reviewers do not catch errors. Other times, knowledge in the field advances so quickly that an article is inaccurate soon after publication. Because of this, it is important to understand how scientific data is generated and published and how to review it with a critical eye.

Step 3: Recognizing Pre-Print Servers

As the name implies, pre-print articles are an early publication draft. Therefore, the most important thing to know about pre-print articles is that they have not yet been peer-reviewed. However, this does not make the content any less valuable; it simply means that extra caution must be used when reading and evaluating the article.

Pre-print servers are an excellent source of information. They allow authors to publish groundbreaking research immediately while they continue to search for the perfect journal to publish formally. For example, during the peak of the COVID-19 pandemic, researchers relied heavily on pre-print servers to make critical data publicly available instantaneously.

While some pre-print servers are general science archives, others focus on a specific subject matter. Examples of pre-print servers include bioRxiv (pronounced bio-archive), AAS Open Research, Gates Open Research, ChemRxiv, Preprints with The Lancet, and Surgery Open Science First Look.

Below are examples of pre-print servers:

bioRxiv
THE PREPRINT SERVER FOR BIOLOGY

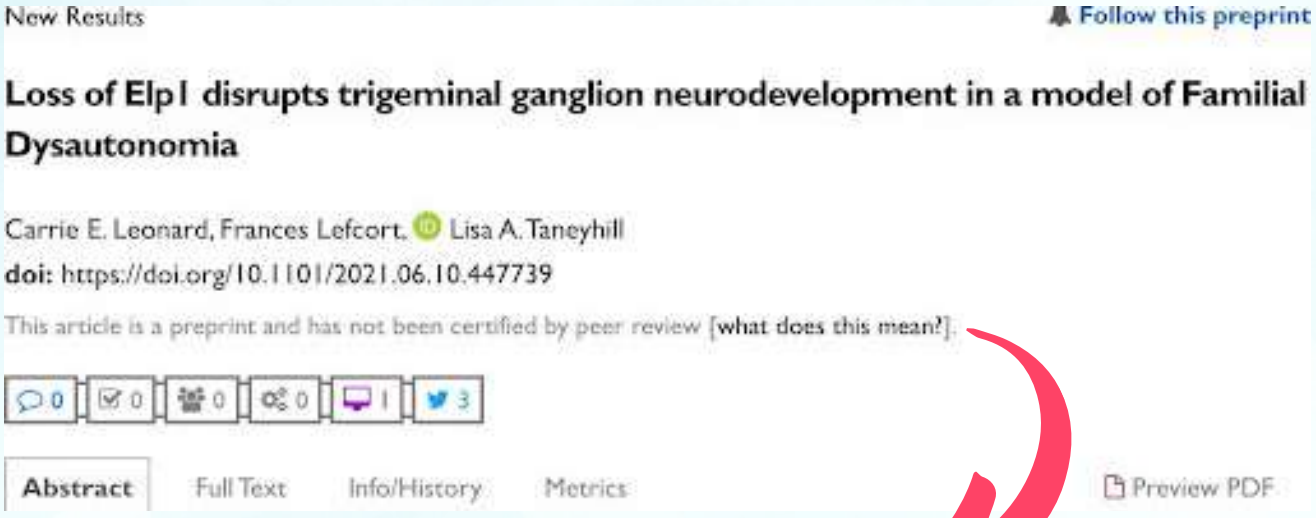
SURGERY OPEN SCIENCE First Look Surgery Open Science

Gates Open Research

Preprints with THE LANCET

ChemRxiv™

The screenshot below is from bioRxiv. Note the disclaimer regarding peer-review.

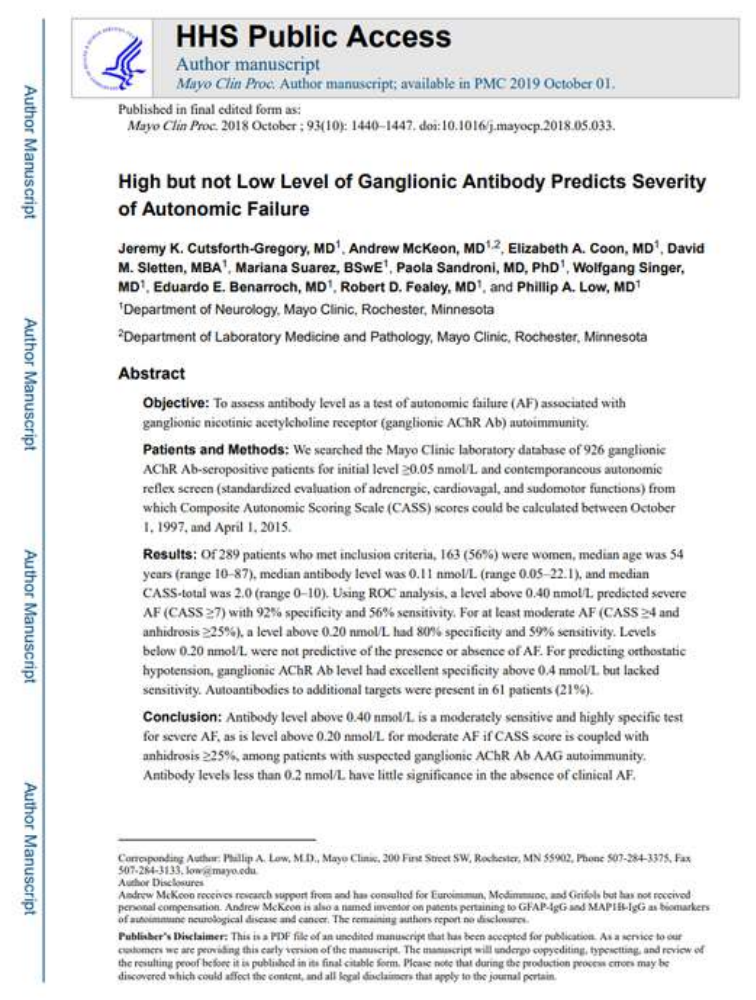


This article is a preprint and has not been certified by peer review.

Step 4: Understanding Components of an Article

To understand the components of a primary research article, we will use the article "Ganglionic Antibody Level as a Predictor of Severity of Autonomic Failure" by Jeremy K Cutsforth-Gregory, MD et al. (2018).

For this exercise, screenshots of the article will be used to highlight key components that every reader should be familiar with. For reference, the screenshot below is the first page of this article.



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Author manuscript

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High but not Low Level of Ganglionic Antibody Predicts Severity of Autonomic Failure

Jeremy K. Cutsforth-Gregory, MD[1], Andrew McKeon, MD[1,2], Elizabeth A. Coon, MD[1], David M. Sletten, MBA[1], Mariana Suarez, BSwE[1], Paola Sandroni, MD, PhD[1], Wolfgang Singer, MD[1], Eduardo E. Benarroch, MD[1], Robert D. Fealey, MD[1], and Phillip A. Low, MD[1]

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[2]Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, Minnesota

Abstract

Objective: To assess antibody level as a test of autonomic failure (AF) associated with ganglionic nicotinic acetylcholine receptor (ganglionic AChR Ab) autoimmunity.

Patients and Methods: We searched the Mayo Clinic laboratory database of 926 ganglionic AChR Ab-seropositive patients for initial level ≥0.05 nmol/L and contemporaneous autonomic reflex screen (standardized evaluation of adrenergic, cardiovagal, and sudomotor functions) from which Composite Autonomic Scoring Scale (CASS) scores could be calculated between October 1, 1997, and April 1, 2015.

Results: Of 289 patients who met inclusion criteria, 163 (56%) were women, median age was 54 years (range 10–87), median antibody level was 0.11 nmol/L (range 0.05–22.1), and median CASS-total was 2.0 (range 0–10). Using ROC analysis, a level above 0.40 nmol/L predicted severe AF (CASS ≥7) with 92% specificity and 56% sensitivity. For at least moderate AF (CASS ≥4 and anhidrosis ≥25%), a level above 0.20 nmol/L had 80% specificity and 59% sensitivity. Levels below 0.20 nmol/L were not predictive of the presence or absence of AF. For predicting orthostatic hypotension, ganglionic AChR Ab level had excellent specificity above 0.4 nmol/L but lacked sensitivity. Autoantibodies to additional targets were present in 61 patients (21%).

Conclusion: Antibody level above 0.40 nmol/L is a moderately sensitive and highly specific test for severe AF, as is level above 0.20 nmol/L for moderate AF if CASS score is coupled with anhidrosis ≥25%, among patients with suspected ganglionic AChR Ab AAG autoimmunity. Antibody levels less than 0.2 nmol/L have little significance in the absence of clinical AF.

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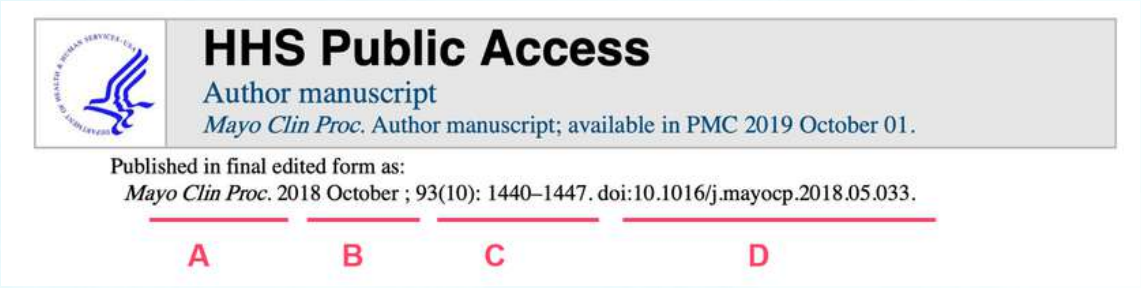
Author Disclosures

Andrew McKeon receives research support from and has consulted for Euroimmun, Medimmune, and Grifols but has not received personal compensation. Andrew McKeon is also a named inventor on patents pertaining to GFAP-IgG and MAP1B-IgG as biomarkers of autoimmune neurological disease and cancer. The remaining authors report no disclosures.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

This article is available to the public for free at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6173625/pdf/nihms-1505637.pdf

We'll start by reviewing the components at the top of the first page of the article:



A) Journal

In this example, the article is published in the journal, *Mayo Clinic Proceedings*. Journal names will often be abbreviated, as seen above.

B) Publication Date

This article was published in October 2018. Although not seen here, some journals may also include the exact date the article was published online.

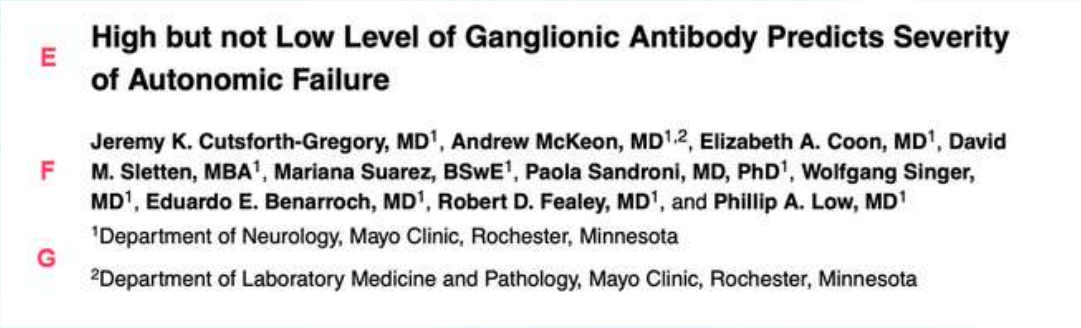
C)Volume, Issue, & Page Numbers

The volume of the journal in which the article appears is the first number, 93.
The issue is the number in parentheses, 10.
The numbers 1440-1447 indicate the page range for the article.

D)Digital Object Identifier (DOI)

The DOI is a string of alphanumeric characters that is unique to each article. The DOI may be found in the format **doi:** followed by a string of letters and numbers, or it may be a link starting with **https://doi.org/** followed by a string of letters and numbers. This string of characters also serves as a link to the article. Both formats are the same. Not all journals or articles will use the DOI system.

*When citing a digital article, it is important to include the DOI, if available. If a DOI is not available, it is appropriate to use the article's URL.



E **High but not Low Level of Ganglionic Antibody Predicts Severity of Autonomic Failure**

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G [1]Department of Neurology, Mayo Clinic, Rochester, Minnesota

[2]Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, Minnesota

E) Article Title

The title of the article should be one of the easiest components to identify. It is almost always a bolder and larger font than the rest of the article.

F) Authors

The authors of the article will appear as a long string just below the title. Some journals will include the authors' title (MD, PhD, etc.), as seen above. For scientific articles, the order in which an author's name appears is important; this provides information on their role in the study. The first author is the one who contributed the most data for the study and the one who wrote the majority of the article. In this example, Jeremy K. Cutsforth-Gregory, MD, is the first author.

The middle authors contribute varying amounts to the completion and publication of the article. These individuals may have only collected data, analyzed results, drafted sections of the article, or all of the above. Many journals require authors to disclose each person's contributions in a specific section of the article.

The last author is the principal investigator (PI) of the study. The PI can be thought of as the 'leader' of the study. They are the ones who likely received funding to conduct the study. The last author is often the corresponding author, i.e., whom to contact if you have specific questions regarding the study. In our example, Phillip A. Low, MD, is the last author.

E **High but not Low Level of Ganglionic Antibody Predicts Severity of Autonomic Failure**

F **Jeremy K. Cutsforth-Gregory, MD[1], Andrew McKeon, MD[1,2], Elizabeth A. Coon, MD[1], David M. Sletten, MBA[1], Mariana Suarez, BSwE[1], Paola Sandroni, MD, PhD[1], Wolfgang Singer, MD[1], Eduardo E. Benarroch, MD[1], Robert D. Fealey, MD[1], and Phillip A. Low, MD[1]**

G [1]Department of Neurology, Mayo Clinic, Rochester, Minnesota

[2]Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, Minnesota

G)Author Affiliations

Superscript numbers and symbols are used to denote the authors' affiliation(s). Here, you can see that Andrew McKeon, MD, is affiliated with both the Department of Neurology and the Department of Laboratory Medicine and Pathology while all other authors are only affiliated with the Department of Neurology.

Abstract

Objective: To assess antibody level as a test of autonomic failure (AF) associated with ganglionic nicotinic acetylcholine receptor (ganglionic AChR Ab) autoimmunity.

Patients and Methods: We searched the Mayo Clinic laboratory database of 926 ganglionic AChR Ab-seropositive patients for initial level ≥0.05 nmol/L and contemporaneous autonomic reflex screen (standardized evaluation of adrenergic, cardiovagal, and sudomotor functions) from which Composite Autonomic Scoring Scale (CASS) scores could be calculated between October 1, 1997, and April 1, 2015.

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Conclusion: Antibody level above 0.40 nmol/L is a moderately sensitive and highly specific test for severe AF, as is level above 0.20 nmol/L for moderate AF if CASS score is coupled with anhidrosis ≥25%, among patients with suspected ganglionic AChR Ab AAG autoimmunity. Antibody levels less than 0.2 nmol/L have little significance in the absence of clinical AF.

H

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Author Disclosures

Andrew McKeon receives research support from and has consulted for Euroimmun, Medimmune, and Grifols but has not received personal compensation. Andrew McKeon is also a named inventor on patents pertaining to GFAP-IgG and MAP1B-IgG as biomarkers of autoimmune neurological disease and cancer. The remaining authors report no disclosures.

I

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

H) Abstract

The abstract is the one-paragraph summary of the article. Although the format and length will vary from journal to journal, every abstract will include a brief background, the goal of the study, methods, key findings, and conclusions drawn from the findings. The points highlighted in the abstract are what the authors want you to remember and what they feel are most important about the study.

I) Disclosures

This section may appear on the first page or later in the article. Here, you can find the corresponding author's contact information as well as any disclosed conflicts of interest (COIs). COIs are important when evaluating research as they provide insight into the authors and any bias they may have.

The remaining components of an article are outlined below in the order in which they typically appear. Keep in mind that the format will vary from journal to journal, but the same content will almost always be present.

Keywords

This is a short list of important and often repeated words used in the article. This list helps when researchers are looking for articles in online databases.

Introduction

This section provides the reader with the necessary background information on the topic. It often includes facts on the disease(s) being studied and key findings from previous studies. In addition, the authors will typically highlight unknowns in current research and how their study will help fill in knowledge gaps.

Materials, Methods, & Statistical Analysis

The methods section is arguably the most important but may be the most difficult to understand. It provides crucial information on how the authors procured supplies, conducted the study, and analyzed their findings. Further interpretation and explanations will be included in further detail later on in the article.

Results

In this section, the authors disclose the findings of their study. You will often see a variety of graphs and figures to aid in the viewer's understanding. These figures help summarize a large amount of data in a visually appealing and more straightforward manner.

Discussion

While the Results section lists all the key findings, the authors interpret their results in the discussion section. They will draw on known facts in

the field, previous studies, and their own intuition to make meaning of the results. In this section, the authors may also disclose any shortcomings of their study to readers.

Conclusion

The conclusion section is a short synopsis of the study. It will often include the authors' opinions on what the next steps should be or what the authors are planning to study moving forward.

Supplementary Material

If the journal limited authors to what could be included in the main body of the article, a Supplementary Material section might also be included. This allows the authors to provide additional data or text to support their findings.

Acknowledgments

In the Acknowledgments section, the authors will thank any individuals or organizations that assisted them in the study. This section may also include information on the funding source that sponsored the study. Author contributions may also appear in this section or may be outlined separately.

References

The last section of the article will always be the references. If you want to learn more about the topic or desire to dive deeper into a subtopic mentioned in the article, this is the best place to start. The References section will provide you with all of the information the authors used to design and execute the study.

Now that you have an understanding of the components of a primary research article, in the next section, we will discuss strategies to read and critically evaluate an article.

Step 5: Critically Reading a Primary Article

Reading a primary research article is no easy task. Researchers will often spend hours combing through an article - reading it multiple times to understand every aspect of the study. Therefore, you cannot expect to fully understand an article the first time you read it, and you cannot expect to develop breakthrough ideas immediately. Reading, understanding, evaluating, and utilizing research effectively takes time and practice.

The process outlined below is meant to serve as a starting point for those who are new to scientific literature. In order to make the most of this guide, it is best to start using an article on a topic you are familiar with. Then, as you become more comfortable with the critical thinking process, move on to articles outside of your comfort zone.

1. Read the Article

On your first read of the article, the goal is not complete understanding; the goal is to familiarize yourself with the material.

If you are reading a physical copy of the article, we suggest having pencils, pens, and/or highlighters nearby. If you are reading the article on a computer, you could use a PDF viewer that has a text highlight function.

As you read, highlight the word you are unfamiliar with, look up its definition, and write the definition in the margin of the article.

This method of active reading will help prepare you for a more in-depth analysis of the paper later.

Apart from learning new vocabulary words, after reading the article once, you should be able to answer the following questions:

- What disease(s) or condition(s) are the authors interested in learning more about?
- What is the goal of the study? What are the authors hoping to understand better?
- How did the authors conduct their study? Did they use cells, animals, or human patients?
- What are three key findings the authors highlight?

2. Read the Article Again

Now that you have a general understanding of the article, it's time to go back and do a more critical review. Read the article again in the order outlined below. The information and questions posed in each section below will help you evaluate the article through a more critical lens and highlight the strengths and weaknesses of the article.

3. Take Note of the Authors and their Credentials

First, note the authors; their credentials (MD, Ph.D., etc.) if provided; and what companies, universities, or organizations they belong to. Here, we are looking to see if the authors are equipped with the knowledge and skills to be conducting the study.

For example, if you are reading an article on the impact of vitamins in cancer patient blood samples, and you see that one of the authors is a Doctor of Dental Surgery, you should ask yourself, "What expertise is this individual providing for this study?" and "Are they the best person to provide information on this subject?" On the other hand, if the same article had a Medical Doctor (MD) who works in the Department of Hematology, it's more than likely that they are well equipped to work on the study, but you should ask yourself the same questions! By scrutinizing on this level, you are less likely to miss an important fact or potential bias.

Affiliations

Also, check to see if they have any apparent conflict of interest - such as being paid by a drug company to research their drug. More information about this will be provided later in the acknowledgments, conflicts of interest, and Funding sections.

Conflicts of Interest

Most journals require authors to disclose any conflicts of interest (COIs). This can include consulting services to companies, other sources of funding, or agreements made with companies or organizations. When reading articles, it is important to be aware of COIs and how they could potentially bias the writing. If a funding source, company, or organization may be a part of the peer-review or other aspects of the study that would benefit from a certain result, which may influence what results are published or otherwise compromise the author's judgment.

Funding

A reputable article will list what organization(s) financially supported the research presented in the article. Common funding sources are non-profit agencies, private organizations, and federal agencies. The funding source should be evaluated for potential conflicts of interest as well. An example could be a study regarding a specific drug where the author is being funded by the company producing the said drug.

4. Read the Abstract

The Abstract is intended to summarize the important facts and findings of the article. The information presented in this section should match what is presented in the main body of the text

5. Analyze the Materials, Methods, & Statistical Analysis

This section is arguably the most challenging to scrutinize as it requires at least a basic understanding of the field and the research techniques used. Important things to identify in this section are:

- Do the authors describe in sufficient detail their methods and procedures?
- Did the authors use a control group, a group that did not receive treatment, to compare outcomes with?
- Was the study blind, or did participants know what treatment they were receiving?
- Did the authors identify where they source their materials and what quality control measures they used?
- What statistical analyses did they use?
- How many subjects (people or animals) participated in the study? What were the criteria for including or excluding individuals?
- If animals were used, do the authors report the strain/species, sex, and?
- What, if anything, is still unclear to me after reading?

6. Review the Results Section

When reviewing the Results section, consider the language used by the authors. Words and phrases such as 'statistically significant,' 'caused,' and 'confirm' demonstrate confidence in the findings. On the other hand, words and phrases like 'trends towards,' 'suggests,' and 'we theorize' often imply uncertainty or a lack of confidence in the results.

The Results section is not meant to discuss the meaning and significance of the findings; its goal is to simply state what the authors observed. A well-written article will describe the following in the Results section: the average, standard deviation of the data (amount of variance within the data, with a low standard deviation indicating that the values fell around the average and a high standard deviation indicating values were spread out in a wider range), the statistical significance of the results (also called the p-value), any unanticipated findings, descriptive explanation of non-numerical (also called qualitative) data.

7. Critique the Discussion Section

Much like the Results section, the language of the Discussion section should be critiqued. Again, look for strong language that is supported by the data. Ask yourself the following questions:

- Do the authors discuss the drawbacks and limitations of their study design?
- What is the extent of the interpretation(s) the authors are making?
- How do the authors explain unanticipated findings?
- Do the authors discuss if their findings support or contradict others' published data?

8. Look at the Conclusions

The Conclusions section is meant to be a short summary. The information presented here should mirror what is written in the prior sections. It may include a few sentences on the proposed next steps for the field.

9. Read the Acknowledgements

When reviewing the Acknowledgments section, carefully look at the authors' contributions to the work. Keep in mind the order in which the authors are listed signifies their contributions to the article. It is also important to note any groups or individuals who are recognized in this section; it is likely that groups that provided services or materials in support of the research will be thanked here.

10. Discuss with Peers or Experts in the Field

The final step is to discuss the article with a peer, including conversations among the DSN community or experts in the field; this could be done with a friend who is also interested in the same topic, a medical expert, or a professor in that field of research. The key here is to openly share your thoughts about the article and potentially gain new, unique insights or feedback from others who may have thought about it differently. Below are a few questions to ask to get the conversation flowing:

- What do you think is the most important finding of this article?
- I did not understand _____in the article. Would you be able to explain it to me?
- Do you think the data the authors provided is enough to support their conclusions?
- What did you find to be the most challenging part of the article to understand?
- What is one thing you wish the authors would have discussed in more detail?
- I am interested in learning more about ____. Do you know of any good resources?

Summary

Having access to journals, articles, and medical studies regarding dysautonomia and other comorbidities can seem daunting at first, but by utilizing the steps laid out here, we can all, no matter what our background, expand our knowledge from research.

Understanding what type of source it is, primary, secondary, tertiary, or gray, can provide information about the approachability and validity of articles. Understanding the difference between peer-review and pre-print works can further your understanding of how articles are released to the public.

Locating and reading the various aspects of articles can make research articles more approachable and easier to locate important information when you are curious to know more about a specific topic. Using the 2 step reading strategy can help promote a more clear understanding of the purpose of research and make the task less overwhelming.

The DSN community is a great space to talk with like-minded individuals about topics that relate to everyday life, so having the ability to read articles and discuss with peers inside and outside the community is a great way to share ideas and gain new insights.

If you want to learn even more about reading and understanding scholarly works, check out the following page for videos and articles about reading scientific articles.

Dysautonomia Support Network

Additional Resources

Videos

Reading Scientific Papers | Office of Intramural Training & Education, National Institutes of Health | https://www.youtube.com/watch?v=QYRhfW5vvK8 (~28 min)

How to Read a Scholarly Article | University of Tennessee Chattanooga | https://www.youtube.com/watch?v=YyAOTEXL0jw (~9 min)

Correlation and Causality | Khan Academy | https://www.khanacademy.org/math/probability/xa88397b6:scatterplots/estimating-trend-lines/v/correlation-and-causality (~11 min)

Understanding Statistics and Journal Articles in Research with Literature Review | Statistics and Research with Dr. Wendi L. Benson | https://www.youtube.com/watch?v=N0pmt5qynA8 (~1hr 34 min)

Articles

How to (seriously) read a scientific paper | Elisabeth Pain | https://www.science.org/content/article/how-seriously-read-scientific-paper

Art of reading a journal article: Methodically and effectively | R.V. Subramanyam | doi: 10.4103/0973-029X.110733 | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3687192/

How to Read a Paper | S. Keshav (PDF) | https://web.stanford.edu/class/ee384m/Handouts/HowtoReadPaper.pdf

About

Dysautonomia Support Network

Incorporated in 2016, Dysautonomia Support Network (DSN) is a US-based volunteer-run 501(c)(3). Our mission is to provide a COMMUNITY, that EMPOWERS and SUPPORTS those affected by dysautonomia to live their best lives. DSN strives to improve the quality of life of patients worldwide by increasing awareness and understanding of dysautonomia and building a patient-led community that supports each other.

To learn more about DSN or to get involved, please visit our website at www.dysautonomiasupport.org.

Links

Handbooks & Handouts:
www.dysautonomiasupport.org/handbooks/

Medical Provider Map:
www.dysautonomiasupport.org/medical-provider-map/

Dyscovery Education:
www.dysautonomiasupport.org/videos/

Volunteer:
https://www.dysautonomiasupport.org/get-involved-2/

About the Contributors

Joanna Behm, EdD, MS, OTR/L

Editor

Joanna is an occupational therapist and faculty member at Messiah University's Master of Occupational Therapy Program. As a patient with hyperadrenergic POTS, mast cell activation disorder, and hypermobile Ehlers-Danlos syndrome herself, Joanna is passionate about sharing her expertise in her role as Vice President of Dysautonomia Support Network.

Erin Boersma MOT, OTR/L

Editor

Erin is a pediatric occupational therapist in Michigan but has called various states in the Midwest home. Erin began researching dysautonomia while in graduate school and has been a part of DSN since 2020, serving as a Consultant for the Education and Awareness Team, utilizing her OT knowledge to provide education and raise awareness!

Hunter Bomba PhD

Author

Hunter Bomba earned her BS in Biomedical Engineering from North Carolina State University in 2017 and her PhD in Pharmaceutical Sciences from the University of North Carolina-Chapel Hill in 2021. After dealing with POTS and hEDS symptoms throughout childhood, she was finally diagnosed at the age of 25. Since her diagnosis, she has learned a lot about POTS, hEDS, and other comorbidities and has worked with the Dysautonomia Support Network to raise awareness and educate the general public. In her free time, she enjoys reading, cooking, pilates, and spending time with her dog, Willis.

Lindsay Lott, BA, BS (in progress)

Publisher

Lindsay is a data storyteller, specializing in analytics and visualizations, who also happens to have dysautonomia! She completed her BA in Drawing & Painting in 2012 and will receive her BS in Data Management & Data Analytics in 2023. As an avid learner and former educator, Lindsay loves to research and provide learning resources for others. She uses her skills to design and visualize data for infographics and other educational materials. She is a strong advocate for well-informed patients, families, and medical professionals.

Sarah Anne MA, BSc

Editor

Sarah Anne is a self-proclaimed math/science nerd with a BS in Physics and a MA in Geoscience. She is a STEM instructor and tutor but has been an educator and advocate for people with disabilities since childhood when her younger brother Joshua was born. Since her diagnosis of dysautonomia, including convulsive syncope, neurocardiogenic syncope, and several co-occurring conditions, she has become an advocate for herself and for others. To that end, Sarah serves at many local, regional, and virtual events as an accessibility coordinator. She frequently presents to groups on topics related to communication, structures for healthy relationships, self-awareness, thriving despite chronic illness, and relationships and sexuality for individuals with disabilities. She currently serves as an Education & Awareness Team Manager and Network Security Administrator for DSN.

Leslie Wuenstel MSN, RN, LNC

Editor, Publisher

Leslie is a registered nurse who is passionate about dysautonomia education and awareness and health literacy. After waiting 17 years for a diagnosis of dysautonomia, hypermobility, mast cell activation syndrome, and craniocervical instability, giving validation and explanation to her entire life, she desires to cut down that time for others and help dysautonomia patients learn to thrive through her advocacy as the Education and Awareness Team Coordinator. Leslie recently completed a Post-Baccalaureate Legal Nurse Consulting Certificate program and obtained her Master of Science in Nursing Leadership with a concentration in education through Wilmington University.

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