Strategies to Efficiently and Critically Read Research Articles

Science & Technology
Okayama University
20 February 2017
Researchers need continued help on the path to publication success

**Preparation**
- Training in reading papers, ethics, writing, presenting
- Training in journal selection & submission strategy

**Journal Selection**
- Expert Scientific Review
- Journal selection & submission strategy

**Writing**
- Training in ethics, writing, presenting
- Revising
- Editing
- Reformatting

**Submission**
- Training in ethics, writing
- Editing
- Abstract Development
- Cover Letter Development
- Reviewer Recommendation
- Review Editing
- Point-by-point checking
- Response Letter Development
- Reformatting

**Peer Review**
- Training in navigating peer review
- Review Editing
- Point-by-point checking
- Response Letter Development
- Reformatting

**Publication Success**
- Press release, news writing
- Media & presentation training
- Training for early and mid career researchers
- Training in writing grant proposals
- Grant proposal editing
Your goal is not only to research and publish, but also to read and learn from your peers

Be an effective and critical reader

- Search the literature; develop reading strategies
- Read efficiently; make notes and discuss
- Understand whole research articles
Section 1

Searching the literature
Importance of reading

Read often!

- Stay up-to-date, identify trends
- Identify knowledge gaps, research ideas
- Critical thinking & peer review practice
- Notice article/journal quality, writing styles

Discuss with colleagues
Importance of reading

Read often!

- Learn how native English speakers write
- Learn effective argument structure
- Learn manuscript structures & genres
- Learn new words & concepts

Discuss with colleagues
Searching the literature

What should I read?

What do you already know?

Understanding

Basic → Advanced

What do you want to know?

Latest developments; answer specific questions; find target journals

Review articles

Primary literature

- Find a method (Your Methods)
- Compare your results (Your Discussion)

Understand a new topic (Your Introduction)
## What should I read?

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Article</td>
<td>Most common; full-length paper</td>
</tr>
<tr>
<td>Short Communication</td>
<td>Brief report about a specific finding</td>
</tr>
<tr>
<td>Case Study</td>
<td>Brief report about a specific situation</td>
</tr>
<tr>
<td>Technical Note</td>
<td>Brief report about a new methodology</td>
</tr>
<tr>
<td>Review Article</td>
<td>Summary of recent advances in a field</td>
</tr>
<tr>
<td>Editorial</td>
<td>Brief discussion about an interesting topic</td>
</tr>
<tr>
<td>Letter to the Editor</td>
<td>Brief discussion about a published article</td>
</tr>
</tbody>
</table>
Finding articles

Databases
- Preprints: arXiv, bioRxiv, PeerJ
- Repository: PubMedCentral

Journal websites
- Recently published, most viewed, alerts, editorials

Review articles
- Primary articles discussed in review articles

Tip: Search XXX and YYY, XXX or YYY, XXX not YYY, (XXX or AAA) and (YYY or BBB), (XXX or YYY) and AAA not BBB, “XXX”, “define:XXX”
Searching the literature

Databases

Search term: adcebris

Sorting:

Filters:
- Article types
- Clinical Trial
- Review
- More...
- Text availability
- Abstract
- Free full text
- Full text
- Publication dates
- 5 years
- 10 years
- Custom range...
- Species
- Humans
- Other Animals

Other info:
- [Antibody-targeted drugs and drug resistance: Challenges and solutions](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4678205/)
- [The growing field of immunoconjugates in oncology: A successful link between antibodies and small cytotoxic molecules](https://pubmed.ncbi.nlm.nih.gov/30290756/)
- [Next generation maleimides enable the controlled assembly of antibody-drug conjugates via native disulfide bond bridging](https://pubmed.ncbi.nlm.nih.gov/27459332/)
Phase I/II study of brentuximab vedotin in Japanese patients with relapsed or refractory CD30-positive Hodgkin’s lymphoma or systemic anaplastic large-cell lymphoma.


Abstract
Brentuximab vedotin is an antibody-drug conjugate that selectively delivers the antimicrotubule agent monomethyl auristatin E into CD30-expressing cells. To assess its safety, pharmacokinetics, and efficacy in Japanese patients with refractory or relapsed CD30-positive Hodgkin's lymphoma or systemic anaplastic large-cell lymphoma, we carried out a phase I/II study. Brentuximab vedotin was given i.v. on day 1 of each 21-day cycle up to 16 cycles. In the phase I part of a dose-escalation design, three patients per cohort were treated at doses of 1.2 and 1.8 mg/kg. In the phase II part, a dose of 1.8 mg/kg was given to 14 patients (nine with Hodgkin's lymphoma and five with systemic anaplastic large-cell lymphoma). The median number of treatment cycles was 16 (range, 4-16). In the phase I part, no dose-limiting toxicity event was observed. In the total population, common adverse events included lymphopenia (80%), neutropenia (65%), leukopenia (65%), and peripheral sensory neuropathy (65%). Grade 3/4 adverse events in more than two patients were lymphopenia (50%) and neutropenia (15%). The pharmacokinetic profile was similar to that observed in the previous studies in the USA. In the phase II part, six patients (67%) with Hodgkin's lymphoma achieved an objective response with 56% of complete response rate, and five patients (100%) with systemic anaplastic large-cell lymphoma achieved an objective response with 80% of complete response rate. These results show that brentuximab vedotin has an acceptable safety profile and promising antitumor activity in the Japanese population. This trial was registered in JAPIC Clinical Trials Information (JapCTI-111650).


KEYWORDS: Anaplastic large cell lymphoma; Hodgkin’s lymphoma; Japanese patients; brentuximab vedotin; clinical trial

PMID: 24814852 [PubMed - indexed for MEDLINE]
Searching the literature

Using reviews

Basic background

Since the discovery of the Fujishima-Honda effect in 1972, titanium dioxide (TiO₂) has been used as a typical photoelectrode in water photoelectrolysis to convert solar energy for the production of H₂. [1-3] Currently, anodized TiO₂ nanotubular arrays are one of the most promising architectures, owing to their special features of facile fabrication, tunable structural parameters and high electron collection efficiency. [4-12] A critical drawback of TiO₂ nanotubular arrays is their large band gap, which means that only the ultraviolet (UV) region of the solar spectrum can be utilized. Coupling TiO₂ nanotubular arrays with a low-band-gap semiconductor of CdS nanoparticles to form nanotubular arrays of TiO₂-CdS (TCHNTAs) has been adopted as a method to extend the photoelectrochemical activity from UV to visible light. [13-26]

Current problems

Related review articles

REFERENCES


Modified from: Liu et al. Nanomat Nanotech. 23 November 2015; DOI: 10.5772/61970
## Searching the literature

### Reference management software

**Which one to use?**

<table>
<thead>
<tr>
<th>Software</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EndNote</td>
<td>Most established*, Styles easy to find on journal websites</td>
</tr>
<tr>
<td>RefWorks</td>
<td>Web-based*, Widely used</td>
</tr>
<tr>
<td>Mendeley</td>
<td>Newer (and free!)*, Allows collaborations</td>
</tr>
<tr>
<td>Papers</td>
<td>Easy-to-use interface (like iTunes), Great for article management</td>
</tr>
</tbody>
</table>

*Has plug-in app for MS Word

**Others:** Docear, Zotero, Citavi, ReadCube, colwiz...
**Searching the literature**

"Papers"

Sort articles by authors, titles, journals, or year

Search by keywords, authors, journals, etc.

Read full screen, Email, or print your articles

Organize your articles in folders and "smart folders"
Insert your proposed abstract or keywords
Journal Selector
www.edanzediting.co.jp/journal_selector

Searching the literature

Journal’s aims & scope, IF, and publication frequency
- Author guidelines
- Journal website

Filter/sort by:
- Field of study
- Impact factor
- Indexed in SCI
- Open access
- Publishing frequency

Similar abstracts?
Section 2

Reading strategies
Purposes for reading

- For your research?
- Read around the topic?
- Learn new words/concepts?
- Improve current knowledge?
- Search specific info to write?
- Interpret/formulate arguments?

**Tip:** General/specific, slow/fast reading; look up words, find included definitions; Highlight, make notes, paraphrase/summarize with citations
Consider literature type

**Originality/proximity/maturity**

1º literature
Original research

2º Reviews & review journals, databases

3º Accepted facts, e.g., reference books, general textbooks

**Audience**

**Academic**
Journals, monographs, books, preprint servers*, “proceedings” & journal supplements*, conference abstracts#, *+/- peer review; # sometimes not accepted as citations

**General or Lay**
Popular books, leaflets, general/science magazines, newspapers, newsletters, wiki

**Availability**

Gray*
Theses, conference proceedings/abstracts#, working papers, technical/government/NGO reports, society/company publications, patents, speeches, leaflets, posters, seminars/webcasts/multimedia, emails/blogs/memos, data repositories

**Tip:** Judge source, quality, and accuracy (inc. predatory journals)!
Identifying research trends

1. Read the primary literature

2. Identify trends: (systematic) reviews, meta-analyses, editorials, theme issues, Calls for papers, “most read/cited”...organize journal clubs

3. Identify an important question, gap in knowledge/evidence, incomplete answer
   • Does your research group have the expertise/resources?
   • Is the question focused?
   • What is new? How is the study useful?
   • What is the best/most practical study design?
How to read an article

From start to finish?  
Section by section?  

Not efficient!

What do you want to know?  
Where can you find it?  

Tip: Be familiar with types of text structure and styles/conventions for different article types
Manuscript flow

**Introduction**

Why was the study needed?

**Methods**

What was done and found?

**Results**

**Discussion**

How does the study advance the field?

**Tip:** Check journal for section names; extra sections after Introduction; combined sections; Methods at end, in legends, or brief + online...?
Finding specific material

What are you looking for?
Gaps, aims, methods, key findings, implications, opinions

Where is it found?
Introduction, Methods, Results, Discussion

Check journal links to Supplementary Information / Protocols / Repositories

What are signal words?

**Problem:** however, but, nevertheless, despite, still unclear, lacking, unknown

**Objectives:** examined, aimed, investigated, studied, evaluated

**Key findings:** showed, found, identified, stronger, higher

**Conclusions:** In conclusion, In summary, Taken together, Overall, Therefore, suggest, have implications
The study design is not perfect, but you deserve the funding. The grant will be awarded in two stages.

**Tip**: Sentences often have old/given/familiar information before new information.
One method of producing carbon fibre precursors, with the potential of commercial applicability, is electrospinning. It has previously been demonstrated that electrospinning can successfully produce precursor fibres that can be converted into high quality carbon fibres with controlled fibre diameters and morphologies. The majority of electrospun carbon fibre precursors reported in the literature are PAN-based. The high cost of PAN, depleting petroleum resources and the toxicity of its solvent, dimethylformamide, has motivated research to look into alternative electrospinnable materials to produce cheaper and more environmentally friendly carbon fibres. Because petroleum-based carbon resources exhibit negative environmental impacts and are of limited availability further motivates research towards green carbon fibres.

Recently, a wide range of renewable resource-based materials have been investigated for the fabrication of carbon materials. Among them, lignin has been looked at as a very promising candidate...
<table>
<thead>
<tr>
<th><strong>Reading strategies</strong></th>
<th><strong>Types of reading</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning</td>
<td>Search for specific info/words</td>
</tr>
<tr>
<td>Skimming</td>
<td>Sampling/understand segments</td>
</tr>
<tr>
<td>General reading</td>
<td>General comprehension</td>
</tr>
<tr>
<td>Learning</td>
<td>Recognize logic/genre, link content to your knowledge, reread, make inferences</td>
</tr>
<tr>
<td>Memorizing</td>
<td>Reread slowly, think, integrate information, reformulate, critique, summarize, rehearse</td>
</tr>
</tbody>
</table>

Grabe and Stoller, 2002; Teaching and researching reading. Harlow, UK: Pearson Education.
To look for specific information or to see if a passage is relevant

- **Know the structure**
  - Find signal words for Problem, Aim, Results, Conclusion, Limitations, Implications, Future

- **Use finger to scan and look for a statistic, name, fact...**
  - Find specific words in contents, index, references

- **Scan large areas, several sentences at a time, no reading except if text is relevant; keep a specific term in mind to match importance/relevance**
  - Anticipate surrounding words/graphics
  - Use after general skimming if needed
Atherosclerosis is the leading cause of death [1]. Endothelial dysfunction promotes extravasation of lipids and leucocytes, proliferation of smooth muscle cells, and finally the formation of atherosclerotic plaques [2], [3]...Noninvasive identification of unstable plaques prior to rupture is of great clinical importance [5]. Magnetic resonance imaging (MRI) with target-specific contrast agents enables visualization of specific structures and processes in atherosclerotic plaques [6]. Whereas gadolinium-based contrast agents have been used for visualization of extracellular matrix components and endothelial permeability [7]–[10], superparamagnetic iron oxide nanoparticles (SPIOs) have been shown to label plaque macrophages as markers of inflammation [11], [12]. The strongest and fastest plaque labeling has been achieved with a certain type of SPIOs, so-called very small superparamagnetic iron oxide nanoparticles (VSOPs) [13]–[15].

(1) Is the imaging method X-ray or MRI? (2) What is SPIO? (3) What is VSOP?
**Skimming**

*To preread for gist, to review, and to speed read*

- **Important words**
  - Table of contents; headings and subheadings of paper (find relationships)
  - Figure/table titles and captions; sentences with callouts
  - Sentences with bold/italic words, proper nouns, lists, bullets

- **(Graphical) abstracts, highlights, summaries, keywords**

- **Find out who/when/what/why/where/how**

- **Display items (“non-linear text”)**

- **Read Aims (end of Intro), Conclusion (end of Discussion)**

- **Read the whole first and last paragraph; read first and last sentences of first and last paragraphs in each section**
Be an active, critical reader

• Question before and during reading: what are you looking for and why; what do you already know about the topic?

• What is the author trying to do? Is the argument effective/general/weak; any flaws/contradictions?

• What do you agree/disagree with? Why? Is it relevant to your work? Do you need to change your thinking of the topic?

• What are the implications, limitations, alternative explanations?
Simplify the text (esp. “inconsiderate” texts)

- Split sentences joined with conjunctions (and, but)
- Ask WH questions
- Underline unfamiliar words to look up
- Underline pronouns and find their referents
- Underline head nouns you see; ignore pre- and post-modifiers
- Match subjects with verbs
- Find logical connectors (Therefore, However)
- Reread; discuss with colleagues

Grabe and Stoller, 2002; Teaching and researching reading. Harlow, UK: Pearson Education.
Understanding difficult texts

Find logical connectors

**Sequential**
- Until, After, Before, While, Since, When, Then, Next, First/Second/Third,...

**Causal**
- Because (of), To (+verb), Owing to, So that, Therefore, Thus, Hence, Consequently,...

**Adversative**
- Although/Even though/Whereas (+clause), Despite (+noun), However, In contrast,...

**Conditional**
- If, Even if, When, Unless, Whether or not, Provided that, Otherwise,...
Activity 1

Please see Activity 1 in your Workbook
Section 3

Reading efficiently
Manuscript structure

- **Title/Abstract**
- **Introduction**
- **Methods**
- **Results**
- **Discussion**

- Why did they do the study?
- What did they do?
- What did they find?
- How does their study contribute to your field?
Manuscript structure

Title/Abstract
Introduction
Methods
Results & Discussion

Title/Abstract
Introduction
Methods
Results & Discussion

Title/Abstract
Introduction
Methods & Results
Discussion

edanz
Read the title and abstract first

**First impression of a paper**

- Relevance of the aims
- Importance of the results
- Validity of the conclusions

Judge writing style & credibility of author

**Title styles:** Question, Findings, Objective/Topic

**Abstract styles:** Structured, Unstructured

**Tip:** Check what the title promises and what the variables/system are; check abstract to see if promises are kept
Reading abstracts

What are the 5 parts of an abstract?

- **Background**: Why the study was done
- **Aims**: Objectives/hypothesis
- **Methods**: Approach/methodology
- **Results**: Most important findings
- **Conclusions**: Implications for the field

Reading efficiently

Aims

Methods

Results

Conclusions
In the Tahe oilfield in China, heavy oil is commonly lifted using the light oil blending technology. However, due to the lack of light oil, the production of heavy oil has been seriously limited. Thus, a new compound technology of light oil blending and electric heating is discussed in this paper, which aims to reduce the usage of light oil and maintain heavy oil production. Based on the mass, momentum and energy conservation, a pressure and temperature coupling model is developed. The heat-transfer parameters are calculated by using Hasan–Kabir method and the pressure drop is calculated by using Hagedorn–Brown method. The model also considers the blend effect of light oil and heavy oil, and the heating effect of electric rod. Example calculation shows that only electric heating or light oil blending technology cannot meet the requirement. The amount of light oil used can be reduced by combining the electric heating technology.
In the Tahe oilfield in China, heavy oil is commonly lifted using the light oil blending technology. **However**, owing to the lack of light oil, the production of heavy oil has been seriously limited.

Thus, a new compound technology of light oil blending and electric heating is discussed **in this paper, which aims to** reduce the usage of light oil and maintain heavy oil production.

Based on the mass, momentum and energy conservation, a pressure and temperature coupling model is developed. The heat-transfer parameters are **calculated by** using Hasan–Kabir method and the pressure drop is calculated by using Hagedorn–Brown method. The model also considers the blend effect of light oil and heavy oil, and the heating effect of electric rod. Example calculation **shows that** only electric heating or light oil blending technology cannot meet the requirement.

The amount of light oil used can be reduced by combining the electric heating technology.

Specialist abstract

- **Background**
  - Why the study was done
- **Aims**
  - Objective/hypothesis
- **Methods**
  - Techniques, models
- **Results**
  - Most important findings
- **Conclusion**
  - Conclusion/implications
A model has been developed to predict growth kinetics of the intermetallic phases (IMCs) formed in a reactive diffusion couple between two metals for the case where multiple IMC phases are observed. The model explicitly accounts for the effect of grain boundary diffusion through the IMC layer, and can thus be used to explore the effect of IMC grain size on the thickening of the reaction layer. The model has been applied to the industrially important case of aluminum to magnesium alloy diffusion couples in which several different IMC phases are possible. It is demonstrated that there is a transition from grain boundary-dominated diffusion to lattice-dominated diffusion at a critical grain size, which is different for each IMC phase.

Graphene oxide: A promising nanomaterial for energy and environmental applications

- The progress of graphene oxide application in hydrogen storage and photocatalytic water splitting is summarized.
- The progress of graphene oxide application in lithium batteries and supercapacitors is systematically discussed.
- We summarize the versatile application of graphene oxide in air and water purification.

Graphical abstracts

✓ Visually demonstrate key features of the study
✓ Help readers quickly identify suitable articles

Carbon-layer protected cuprous oxide nanowire arrays for efficient water reduction

Quickly assessing a paper 1

Read Title and Abstract first

Self-assess knowledge of topic

• Have you read similar papers? Is this a relevant paper?
• Are you reading for a general or specific purpose?
• Can you predict contents of sections (…then check your predictions)?
• Are you familiar with the terminology and concepts?
• Do you understand the relevance of the hypothesis and findings in the abstract?
Reading versus writing

Title/Abstract
Introduction
Methods
Results
Discussion

Title/Abstract
Methods
Results
Discussion
Introduction
Abstract/Title

Title/Abstract
Intro: Aim
Figures/Results
{Methods}
Discussion: Conclusion
[Intro / Methods IMRaD]
Quickly assessing a paper 2

1. Read Title and Abstract first
2. Self-assess knowledge of topic
3. Read last paragraph of Introduction for hypothesis/objectives
4. Read Display Items and then Results
5. Read Discussion for interpretation
6. Refer to Introduction and Methods if necessary
Activity 2

Please see Activity 2 in your Workbook