

# **Interpreting data in journal articles**

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# Why read journal articles?

- Current
- Text books can be years of date by the time they are published
- Journal articles tell you what is happening right now
- Contain the actual data and how it was obtained
- You can evaluate the authors conclusions and determine whether you believe them or not

# Sections in journal articles

- Abstract
  - Tells you briefly what experiments were done and what was found
  - Helps you decide whether to read the whole paper or not

# Sections in journal articles

- Introduction
  - Provides motivation and importance of research
  - Provides background information
  - Explains prior research
  - Do you understand background information? – you may need to look up references for more information

# Sections in journal articles

- Methods
  - Details of how experiment was done
  - provides sufficient detail for other scientists to reproduce the experiments presented in the paper
  - Explanation of statistical analysis
  - Hardest section to understand since it contains specialised techniques

# Sections in journal articles

- Results
  - Provide the raw data
  - Figures and tables provide data in a compact format for easy viewing
  - Understanding figures/tables is essential to understanding the paper

# Sections in journal articles

- Discussion
  - Author should connect the dots
  - Explain what the data means
- References
  - List of resources referenced by the author
  - Allows you to go back to those sources

# Process leading to publication of a research article

- Choose a journal
- Submit manuscript to journal
- Journal editor selects reviewers - experts in field
- Peer review
- Editorial decision – accept, accept with revision, reject



# Types of journals

- Research journals:
  - report original investigations in the biomedical and health sciences
  - eg research in the basic sciences; clinical trials of therapeutic agents; effectiveness of diagnostic or therapeutic techniques; or studies relating to the behavioral, epidemiological, or educational aspects of medicine.
- Clinical or practice journals:
  - document the state of current practice
  - provide background for those in training, or the continuing education of practitioners.
  - eg case reports, discussions and illustrations of new techniques, evaluations of current practices, and commentaries.
- Review journals:
  - current state of knowledge or practice
  - integrate recent advances with accepted principles and practice
  - summarize and analyze the consensus view of controversial issues in knowledge or practice.
- General or all-purpose journals:
  - contain elements of all the above and frequently contain commentary and analysis of important social, political, and economic issues.
  - designed for a broad audience and not limited to a specialty.

# **Searchable databases of journal articles (medical sciences)**




- Medline – PubMed
- Google scholar




# Medline

- a huge database of more than 22 million articles published in ~5,600 biomedical journals
- a database you can search free using the US National Library of Medicine PubMed system at <http://www.ncbi.nlm.nih.gov/pubmed/>
- medical, nursing, dental, veterinary, health care, and preclinical sciences journals and selected life sciences journals
- Adds new citations daily



# PubMed basic search


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**Featured comment - Mar 1**  
A snapshot of RNA splicing: Salzman Lab Journal Club highlights recent complex structure. [1.usa.gov/1nYQi1p](https://www.usa.gov/1nYQi1p)

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<a href="#">#9</a>	<a href="#">Add</a>	Search <b>blastocyst AND proline</b>	<a href="#">42</a>	05:21:57
<a href="#">#8</a>	<a href="#">Add</a>	Search <b>blastocyst proline</b>	<a href="#">42</a>	05:20:41

# Selection for journals for inclusion in Medline

- Not all journals included in Medline
- Quality of content - Scientific merit of a journal  
validity, importance, originality
- Quality of editorial work – objectivity, quality of  
contents, adherence to ethical guidelines
- Production quality – graphics, layout
- English language abstract
- Provide broad international coverage

# Google Scholar

- <https://scholar.google.com.au/>
- Search journal articles, books, conference proceedings, patents
- Includes foreign language journals and others not included in Medline
- Searches the full-text of articles



# Google scholar advanced search

×

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where my words occur

anywhere in the article ⬆

Return articles **authored by**

e.g., "PJ Hayes" or McCarthy


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e.g., J Biol Chem or Nature

Return articles **dated between**


—

e.g., 1996





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☒ Articles (☒ include patents) ☐ Case law



blastocyst proline



Scholar

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Articles

Case law

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Any time

Since 2016

Since 2015

Since 2012

Custom range...

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### Blastocyst metabolism

DK Gardner, [AJ Harvey](#) - *Reproduction, Fertility and Development*, 2015 - CSIRO

... **Blastocyst** metabolism. David K. Gardner A B and Alexandra J. Harvey A A School of Biosciences, University of Melbourne, Parkville, Vic. ... The mammalian **blastocyst** exhibits an idiosyncratic metabolism, reflecting its unique physiology and its ability to undergo implantation. ...

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@ University of Sydney

### A novel autoregulatory loop between the Gcn2-Atf4 pathway and L-Proline metabolism controls stem cell identity

C D'Aniello, A Fico, [L Casalino](#), O Guardiola... - *Cell Death & ...*, 2015 - nature.com

... 2 Moreover, exogenously provided L-**Proline** (L-Pro), a non-essential amino acid (NEAA), induces mouse ESCs towards an embryonic stem cell-to ... PrE) in the time window when the pluripotent epiblast precursors are specified within the inner cell mass (ICM) of the **blastocyst**. ...

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### Low female birth weight and advanced maternal age programme alterations in next-generation **blastocyst** development

JS Master, [GA Thouas](#), [AJ Harvey](#), JR Sheedy... - ..., 2015 - Soc Reprod Fertility

... 24 h of incubation in vitro, F2 restricted **blastocysts**, from 4-month-old females, displayed accelerated development, with a higher proportion of **blastocysts** developing to both the hatching and fully hatched **blastocyst** stages compared with control **blastocysts**, which remained at ...

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[PDF] from researchgate.net

### Methods of growing an embryo to a **blastocyst** stage of development

S Hamamah, [S Assou](#) - *US Patent 8,956,865*, 2015 - Google Patents

... fertilization, and development (Gardner D, Lane M 1998 Culture of viable human **blastocysts** in defined ... that support the development of 8-cell embryos up to the **blastocyst** stage contain ... to 8-cells are supplemented with non essential amino acids such as **proline**, serine, alanine ...

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# • BAD SCIENCE •

## 1. SENSATIONALISED HEADLINES



Headlines of articles are commonly designed to entice viewers into clicking on and reading the article. At best, they over-simplify the findings of research. At worst, they sensationalise and misrepresent them.

## 2. MISINTERPRETED RESULTS



News articles sometimes distort or misinterpret the findings of research for the sake of a good story, intentionally or otherwise. If possible, try to read the original research, rather than relying on the article based on it for information.

## 3. CONFLICT OF INTERESTS



Many companies employ scientists to carry out and publish research - whilst this does not necessarily invalidate research, it should be analysed with this in mind. Research can also be misrepresented for personal or financial gain.

## 4. CORRELATION & CAUSATION



Be wary of confusion of correlation & causation. Correlation between two variables doesn't automatically mean one causes the other. Global warming has increased since the 1800s, and pirate numbers decreased, but lack of pirates doesn't cause global warming.

## 5. SPECULATIVE LANGUAGE



Speculations from research are just that - speculation. Be on the look out for words such as 'may', 'could', 'might', and others, as it is unlikely the research provides hard evidence for any conclusions they precede.

## 6. SAMPLE SIZE TOO SMALL



In trials, the smaller a sample size, the lower the confidence in the results from that sample. Conclusions drawn should be considered with this in mind, though in some cases small samples are unavoidable. It may be cause for suspicion if a large sample was possible but avoided.

## 7. UNREPRESENTATIVE SAMPLES



In human trials, researchers will try to select individuals that are representative of a larger population. If the sample is different from the population as a whole, then the conclusions may well also be different.

## 8. NO CONTROL GROUP USED



In clinical trials, results from test subjects should be compared to a 'control group' not given the substance being tested. Groups should also be allocated randomly. In general experiments, a control test should be used where all variables are controlled.

## 9. NO BLIND TESTING USED



To prevent any bias, subjects should not know if they are in the test or the control group. In double-blind testing, even researchers don't know which group subjects are in until after testing. Note, blind testing isn't always feasible, or ethical.

## 10. 'CHERRY-PICKED' RESULTS



This involves selecting data from experiments which supports the conclusion of the research, whilst ignoring those that do not. If a research paper draws conclusions from a selection of its results, not all, it may be cherry-picking.

## 11. UNREPLICABLE RESULTS



Results should be replicable by independent research, and tested over a wide range of conditions (where possible) to ensure they are generalisable. Extraordinary claims require extraordinary evidence - that is, much more than one independent study!

## 12. JOURNALS & CITATIONS



Research published to major journals will have undergone a review process, but can still be flawed, so should still be evaluated with these points in mind. Similarly, large numbers of citations do not always indicate that research is highly regarded.

# **Persistence of bad science eg “The MMR vaccine causes autism”**

- Fraudulent 1998 research paper by Andrew Wakefield
- Publicly withdrawn, but the damage still persists
- Follow-up studies have shown no connection between any vaccine and childhood autism
- Millions of parents have come to fear life-saving childhood vaccines as a result
- Causing a resurgence of measles in developed countries (eg UK)
- Measles is one of the leading causes of death among young children even though a safe and cost-effective vaccine is available.
- In 2015, there were 134 200 measles deaths globally – about 367 deaths every day or 15 deaths every hour.
- number of deaths in each country is directly correlated to vaccination rates

Nature | Editorial

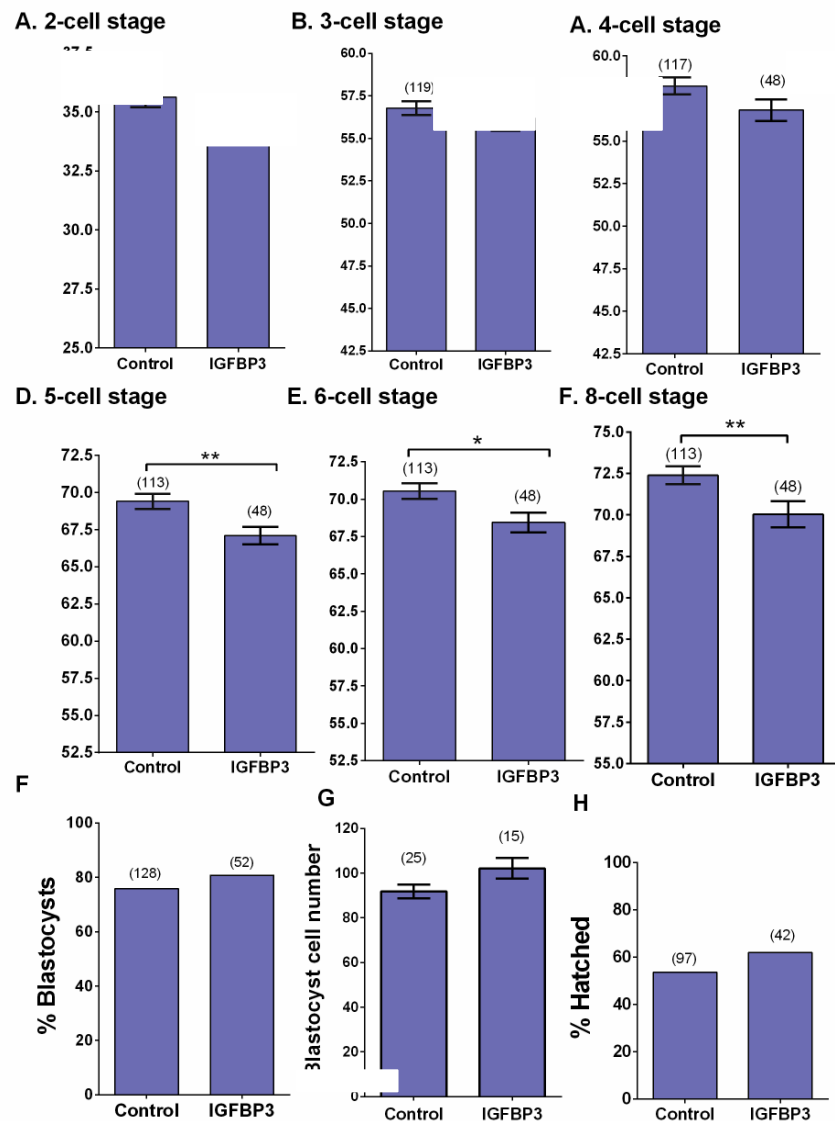
17 January 2017

## **Trump's vaccine-commission idea is biased and dangerous**

- Scientists must fight back with the truth about the debunked link between vaccines and autism.
- Trump may put together a commission to study “vaccine safety and scientific integrity”.
- If Trump moves ahead with his vaccine commission, he will give a sense of legitimacy to opponents of childhood vaccination. This could undercut efforts in some states, such as Texas and Michigan, to strengthen vaccination requirements for schoolchildren.

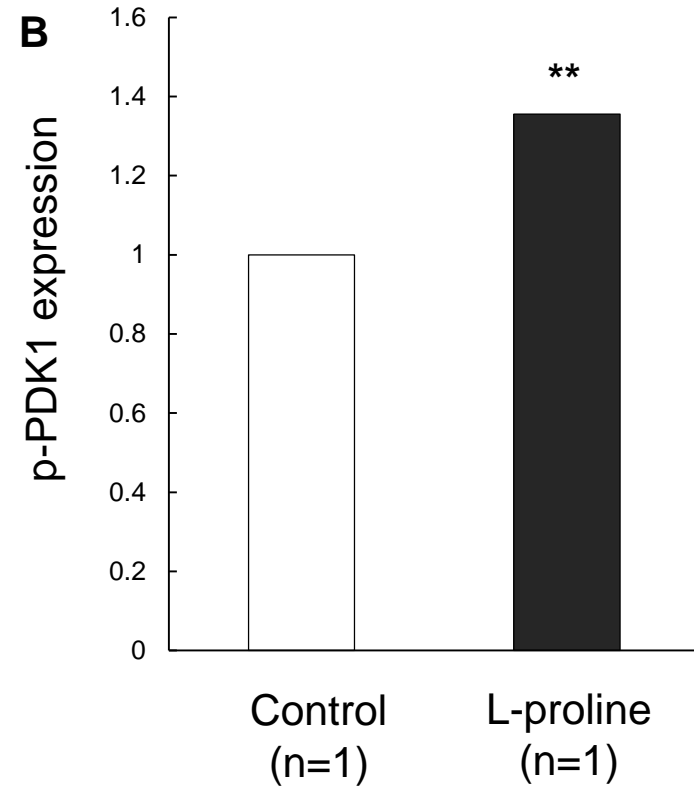
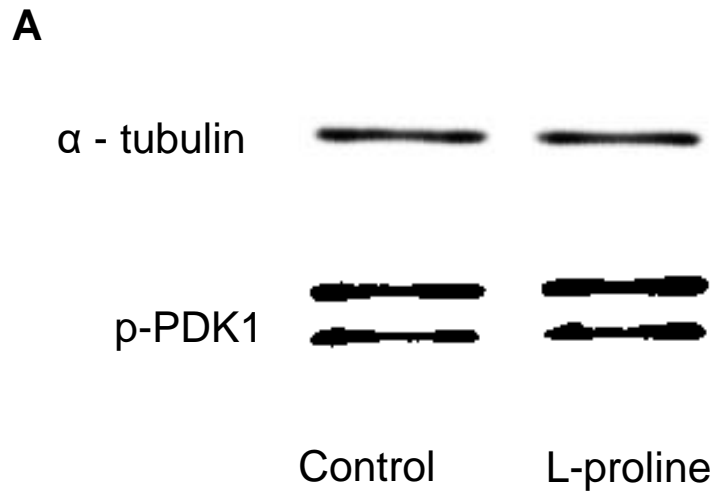
# More bad science: Predatory journals

- open-access journals that allegedly sidestep publishing standards in order to make money from article processing charges
- dramatically expanded in recent years
- three-quarters of authors are based in either Asia or Africa
- No. of articles published went from 53,000 in 2010 to around 420,000 in 2014
- approx 8,000 journals
- Authors pay \$1200 to publish an article



**Figure 1**

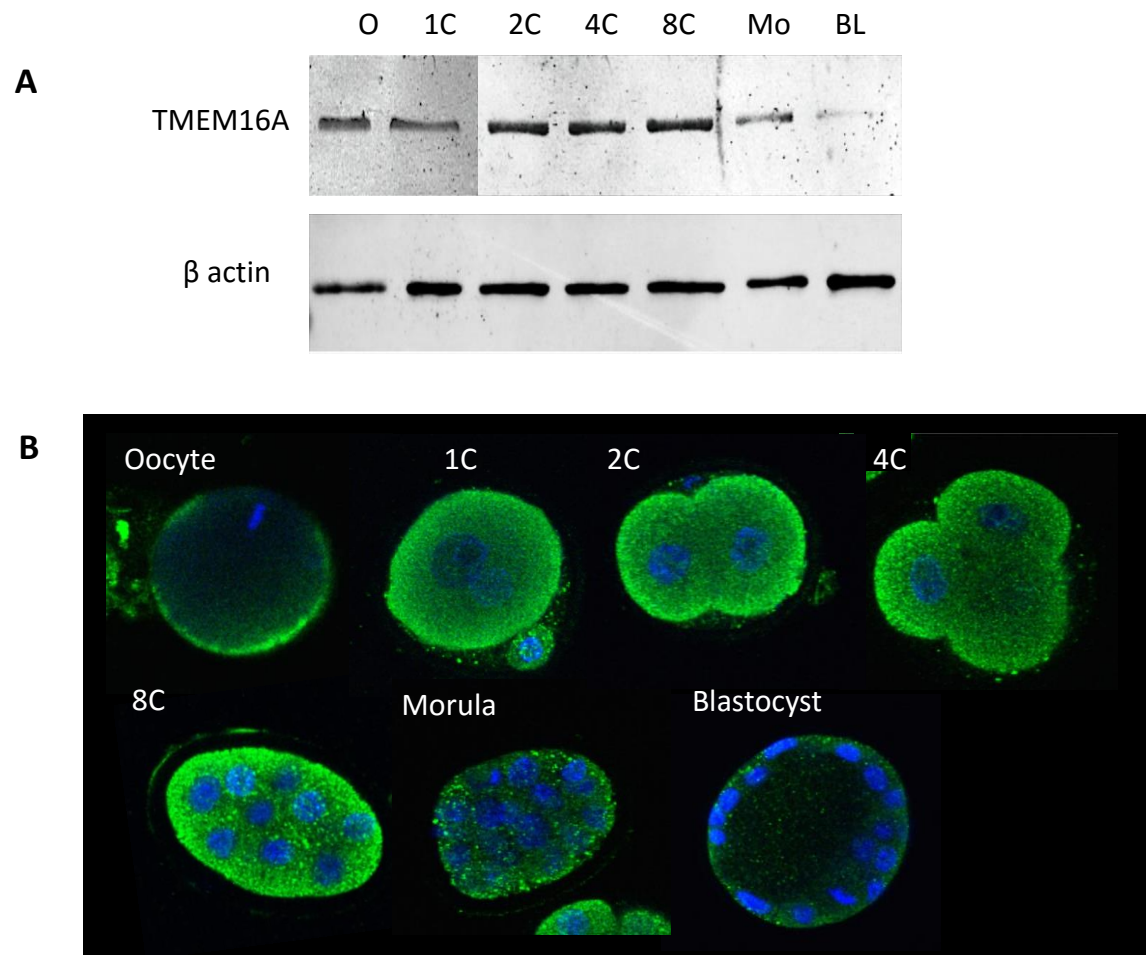
**Effect of IGFBP3 on development.** Zygotes were cultured individually in the presence or absence of IGFBP3. Results show the average time taken for embryos to develop to the (A) 2-cell (B) 3-cell (C) 4-cell (D) 5-cell (E) 6-cell and (F) 8-cell stages.



**Figure 2.**

**The effect of L-proline on the phosphorylation of PDK1 in preimplantation embryos.** Zygotes were cultured in medium alone (control) or with the addition of L-proline for 48 hours and then collected for western blot analysis. (A) Western blots were probed with anti- $\alpha$ -tubulin (upper panel) and anti-p-PDK1 (Ser-241) (lower panel). (B) Expression of p-PDK1 relative to control.





### Figure 3

Expression of TMEM16A protein in mouse pre-implantation embryos. (A) Western blot of TMEM16A protein. (B) Immunofluorescent staining of TMEM16A imaged under confocal microscopy.