

1

Learning Objectives/Conflicts of Interest

1. Identify key components of research paper appraisal.
2. Identify ways in which scientific truth may falsely presented.

NO CONFLICTS OF INTEREST

2



3

Dr. Felicia Wolfe-Simon

- PhD in Oceanography
- NASA Fellowship
- Primary author for, “*A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus*” (Science, 2010)
- Bacteria grew in the Mono Lake, which contains NO phosphorous and it replicated to a bacteria (GFAJ-1) that replaced phosphorous with arsenic



4

Science (aka Science Magazine)

- Peer-reviewed academic journal of the American Association for the Advancement of Science (AAAS)
- First published in 1880
- Currently circulated weekly
- Subscriber base of around 130,000



5

Karolinska Institute(t)

- Ranked amongst the world's best medical schools, ranking 6th worldwide for medicine in 2021
- The Nobel Assembly at the Karolinska Institute awards the Nobel Prize in Physiology or Medicine



6

Dr. Paolo Macchiarini

- Swiss-born Italian thoracic surgeon (since the early 1990's)
- At least 13 tracheal transplants seeded with stem cells
- Published 10 articles in Lancet detailing the novel procedure



7

Lancet

- Weekly peer-reviewed general medical journal
- Founded in 1823
- Impact factor of 59.102, ranking it second after The New England Journal of Medicine in the category "Medicine, General & Internal"



8

Dr. Andrew Wakefield

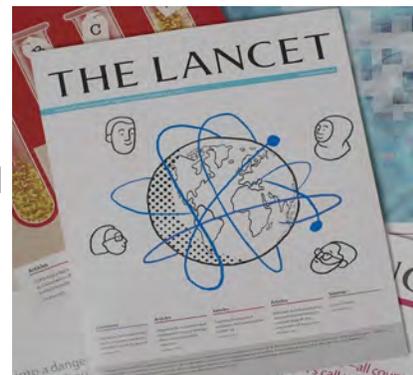
- Surgeon on the liver transplant team at Royal Free Hospital (London)
- In 1998, Lancet published “Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children”



9

Lancet

- Weekly peer-reviewed general medical journal
- Founded in 1823
- Impact factor of 59.102, ranking it second after The New England Journal of Medicine in the category "Medicine, General & Internal"



10

Anna Delvey



11

Anna Delvey

- Russian-born
- Heiress to a German fortune
- Rise to fortune and a bit of fame at a young age



12



13

Anna Sorokin

- Arrested in 2017 after defrauding or intentionally deceiving major financial institutions, banks, hotels, and acquaintances in the US for a total of \$275,000
- Convicted in 2019 in a New York state court of attempted grand larceny, larceny in the second degree, and theft of services
- Sentenced to 4 to 12 years in prison. Currently held in U.S. Immigration and Customs Enforcement custody pending deportation.



14

Dr. Andrew Wakefield

- February 28, 1998
- Study based on 12 children
 - 8 of 12 children had parents that reported changed in behavior within a few weeks of receiving the MMR vaccine
- “We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.”
- Found to have potential windfall 40+ million in funds related to test kits



...ular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

RETRACTED

Dr. Paolo Macchiarini

- “Asked to leave” Karolinska Institute(t) and subsequently moved to Russia and was appointed to a surgical leadership position, he has since been terminated
- Accused of *unethically performing experimental surgeries* (on relatively healthy patients), resulting in fatalities for 7 of 8 synthetic trachea transplants patients
- As of 2020, eight of his research papers retracted, and two have received an expression of concern



Tracheobronchial transplantation with a stem-cell-seeded bioartificial nanocomposite: a proof-of-concept study

RETRACTED

Dr. Felicia Wolfe-Simon

- Scientist were unable to replicate GFAJ-1 without phosphorous
- When samples of the GFAJ-1 were washed, little to no (arsenic) arsenate was found
- NASA retracted it press release and but Science still houses the article
- Side note: What does GFAJ-1 stand for?



17

Is there any “good” research?



18

Critical Appraisal: a randomised controlled trial:

Three broad issues need to be considered when appraising the report of a randomised controlled trial?

- Are the results of the trial valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

Screening Questions	Checklist
(A) Are the results of the trial valid?	
1. Did the trial address a clearly focused issue? Consider: An issue can be 'focused' in terms of <input type="checkbox"/> The population studied <input type="checkbox"/> The intervention given <input type="checkbox"/> The comparator given <input type="checkbox"/> The outcomes considered	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
2. Was the assignment of patients to treatments randomised? Consider: <input type="checkbox"/> How was this carried out, some methods may produce broken allocation concealment <input type="checkbox"/> Was the allocation concealed from researchers?	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
3. Were patients, health workers and study personnel blinded? Consider: <input type="checkbox"/> Health workers could be; clinicians, nurses etc <input type="checkbox"/> Study personnel – especially outcome assessors	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
4. Were the groups similar at the start of the trial? Consider: Look at <input type="checkbox"/> Other factors that might affect the outcome such as age, sex, social class, these may be called baseline characteristics	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
5. Aside from the experimental intervention, were the groups treated equally?	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
6. Were all of the patients who entered the trial properly accounted for at its conclusion? Consider: <input type="checkbox"/> Was the trial stopped early? <input type="checkbox"/> Were patients analysed in the groups to which they were randomised?	<input type="checkbox"/> Yes <input type="checkbox"/> Can't tell <input type="checkbox"/> No
(B) What are the results?	
7. How large was the treatment effect? Consider: • What outcomes were measured? • Is the primary outcome clearly specified? • What results were found for each outcome? • Is there evidence of selective reporting of outcomes?	8. How precise was the estimate of the treatment effect? Consider: • What are the confidence limits? • Were they statistically significant?

19

Key Items to Assess in a Paper

- **Article Characteristics**
 - Author
 - Journal
 - Accessibility of the published literature

20

Key Items to Assess in a Paper

Abstract

- *Use of Positive and Negative Words in Scientific PubMed Abstracts between 1974 and 2014: Respective Analysis* (BMJ, 2015)
 - Examined the proportion of abstracts containing “innovative” “promising” “robust” “groundbreaking” “unique” “unprecedented”, starting in 1974
 - Positive words increased nine-fold
 - If this trend continues, the word “novel” will appear in every abstract by the year 2123
- Scientist are writing papers (or at least abstracts) that are appealing to journals – attracting the need to publish

21

Key Items to Assess in a Paper

• Methodology

- How well is the study designed?
- Can the results be replicated? Have the results been replicated?
- How big was the sample size?
- IRB approvals

22

Key Items to Assess in a Paper

- **Results/Discussion**

- How big was the effect? (p -values < 0.05)
 - Ensure “significance”?
 - *Approached significance*
 - *Fairly significant*
 - *Narrowly eluded statistical significance*
 - *Hovered around significance*
 - Are the inferences (extrapolations) appropriate?
 - Is there bias?

23

Questions?

elizabeth.Bamgbose@usc.edu



24

References

1. Gray, J. & Burns, S. (2020). *Burns and Grove's The Practice of Nursing Research: Appraisal, Synthesis, and Generation of Evidence (9th ed.)*. Elsevier.
2. Polit, & Beck, C. (2014). *Essentials of Nursing Research: Appraising Evidence for Nursing Practice (8th ed.)*. Lippincott Williams & Wilkins.
3. Ritchie, Stuart (2020). *Science Fictions: How Fraud, Bias, Negligence, and Hype Undermine the Search for Truth*. Metropolitan Books.