



EDITORIAL

Publishing confirming and non-confirming data [version 1; referees: not peer reviewed]

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v1 First published: 04 Feb 2016, 5:135 (doi: [10.12688/f1000research.7847.1](https://doi.org/10.12688/f1000research.7847.1))
Latest published: 04 Feb 2016, 5:135 (doi: [10.12688/f1000research.7847.1](https://doi.org/10.12688/f1000research.7847.1))

Abstract

This editorial introduces the Preclinical Reproducibility and Robustness channel on *F1000Research*, which has been created to encourage and facilitate open and transparent publication and discussion of confirmatory and non-confirmatory studies in biomedical research.

Not Peer Reviewed

This article is an Editorial and has not been subject to external peer review.

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This article is included in the **Preclinical Reproducibility and Robustness** channel.

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How to cite this article: Alberts B and Kamb A. **Publishing confirming and non-confirming data [version 1; referees: not peer reviewed]** *F1000Research* 2016, 5:135 (doi: [10.12688/f1000research.7847.1](https://doi.org/10.12688/f1000research.7847.1))

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Grant information: The author(s) declared that no grants were involved in supporting this work.

Competing interests: BA is an International Advisory Board member of F1000.

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Editorial

In 2012 Begley and Ellis shocked the academic community by reporting that scientists at Amgen, a major biotech company, could not replicate the findings of nearly 90% of 53 high-profile oncology publications¹. This study followed other, less publicized disclosures questioning the reliability of conclusions in the biomedical literature²⁻⁵. Today, scientific leaders, patient advocates—even economists—are coming forward in greater numbers to challenge the quality and efficiency of medical research. New efforts have begun to explicitly repeat a sample of the research reported in high-profile publications. For the psychology field, a recent paper in *Science* magazine reports that “a large portion of replications produced weaker evidence for the original findings”⁶, and a contract research organization has been funded to begin a systematic effort to reproduce experiments from 50 high-impact oncology publications⁷. We write to promote an additional effort to improve scientific standards—one aimed at strengthening the self-correcting nature of science through the widespread, rapid publication of the failures (as well as the successes) of attempts to reproduce published scientific findings.

Scientific publication has long been the critical mechanism for conveying scientific data to the world, allowing the conclusions of one team of scientists to be tested by others and, if confirmed, to be extended into the unknown. The model of nature that science has erected is thereby built up detail by detail, layer upon layer, on a foundation of self-consistent logic and experiment. Because science depends on observations that are verifiable, science is at its core self-correcting. But the process of self-correction in science must be improved. Today, many intriguing, but non-robust conclusions that remain unchallenged in the biomedical literature create opportunity costs for drug development, forcing both the biopharmaceutical industry and academic scientists to devote major resources to validating, rather than extending, results.

The vast majority of scientists are well-intentioned, and they want to achieve, discover and invent. They strive to uncover the truth about nature and to get the credit for doing so. But science is a human endeavor. Although intellect, diligence, aspiration and passion drive inexorable progress, ego and unconscious bias are also involved. All scientists have encountered non-robust findings in the literature. We know that deliberate fraud is rare, but wishful thinking is common, and potentially dangerous.

Writers, readers, reviewers, granters, and editors all prefer a good story. This automatically introduces a bias into the publication process favoring positive results. Non-confirming data are communicated much less frequently and effectively than are provisional,

positive results. For this reason, energetic steps must be taken to make the publication of scientific results more balanced. Scientists must create new paths and rewards that lead to much more efficient, rapid publication of failures to reproduce published results. The scientific community urgently requires unobstructed visibility of non-confirming datasets, with clear expositions of the materials used and experiments conducted. Scientists can then compare the datasets to form their own conclusions. We cannot require perfection prior to publication, which would be at best impractical, and at worst disastrous. But we can make the inevitable imperfections easier to identify.

Industry can enhance the self-correcting nature of science by organizing a robust effort to publish both its non-confirming and its confirming results, while simultaneously encouraging publication of such validation experiments by academic scientists. This editorial announces the creation of a special online channel on the open science platform *F1000Research* that will be dedicated to publications of non-confirming and confirming results. The **Preclinical Reproducibility and Robustness channel** will focus on thorough reporting of the methods used, and ensure access to the source data underlying the findings. Amgen scientists have just published three such research articles on this channel as an initial effort to stimulate this process of science self-evaluation.

Each submission to this channel will undergo a fully transparent post-publication peer review following the *F1000Research* publication model. Referee reports from invited named experts will be posted alongside the article, allowing readers to get a full picture of the soundness of the validation experiments. The original authors can provide signed comments on the article, or publish their own full Correspondence article (for peer review) in the channel if they have further (published or new evidence) that adds to the discussion. It is our hope that, both through this format and others, a vigorous new publishing culture can be established to enhance the crucial self-correcting feature of science.

Author contributions

BA and AK both wrote the manuscript.

Competing interests

BA is an International Advisory Board member of F1000.

Grant information

The author(s) declared that no grants were involved in supporting this work.

References

1. Begley CG, Ellis LM: **Drug development: Raise standards for preclinical cancer research.** *Nature*. 2012; **483**(7391): 531–3. [PubMed Abstract](#) | [Publisher Full Text](#)
2. Prinz F, Schlange T, Asadullah K: **Believe it or not: how much can we rely on published data on potential drug targets?** *Nat Rev Drug Discov*. 2011; **10**(9): 712. [PubMed Abstract](#) | [Publisher Full Text](#)

3. Ioannidis JP, Allison DB, Ball CA, *et al.*: **Repeatability of published microarray gene expression analyses.** *Nat Genet.* 2009; **41**(2): 149–55.
[PubMed Abstract](#) | [Publisher Full Text](#)
4. Bell AW, Deutsch EW, Au CE, *et al.*: **A HUPO test sample study reveals common problems in mass spectrometry-based proteomics.** *Nat Methods.* 2009; **6**(6): 423–30.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
5. Ioannidis JP: **Why most published research findings are false.** *PLoS Med.* 2005; **2**(8): e124.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
6. Open Science Collaboration: **PSYCHOLOGY. Estimating the reproducibility of psychological science.** *Science.* 2015; **349**(6251): 943, aac4716.
[PubMed Abstract](#) | [Publisher Full Text](#)
7. Morrison SJ: **Reproducibility Project: Cancer Biology: Time to do something about reproducibility.** *eLife.* 2014; **3**: e03981.
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Discuss this Article

Version 1

Reader Comment 06 Mar 2016

C. Glenn Begley, TetraLogic, USA

Congratulations!

This is a great initiative!

The problem of sloppy science is evident in almost every issue of one of the "top tier journals".

The authors, Amgen and F1000 are to be congratulated for tackling this important issue in this way.

There are many factors that contribute to poor quality publications (laziness, ignorance, exaggeration, desperation), and while ultimately science may be self-correcting, that can be a lengthy process. The opportunity-cost in the interim is substantial.

This initiative has the potential to substantially shorten that process and will, hopefully, be widely embraced.

Congratulations again!

Competing Interests: I have no competing interests.

Reader Comment 10 Feb 2016

Jasper Rine, Department of Molecular and Cell Biology, University of California, Berkeley, USA

Kudos to Kamb and Alberts for launching this mechanism of communicating problems with published data sets to the scientific community. In my experience, studies that provide non-confirmatory results run the gamut from demonstrations that a published result is fundamentally wrong, to demonstrations that a published result is valid in only certain strains or under limited conditions. In either case it is extremely difficult to make people aware of the error, in some cases, or limited robustness in others. Journals are reluctant to publish such studies, and it is often harder to refute a published result than it was for that result to be published. If we all use this new mechanism responsibly, I see the potential for great benefit. I hope we all embrace the "preclinical" part of the channel's title to include even the most basic aspects of research.

Competing Interests: I have no competing interests that would influence my judgement of the article.
