

NIH Rigor and Reproducibility: Use of Animals in Research

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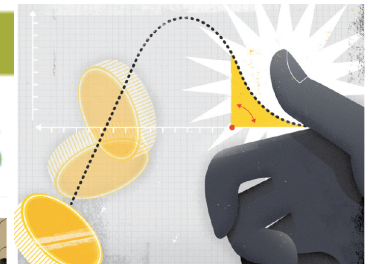


Rigor and Reproducibility of Research

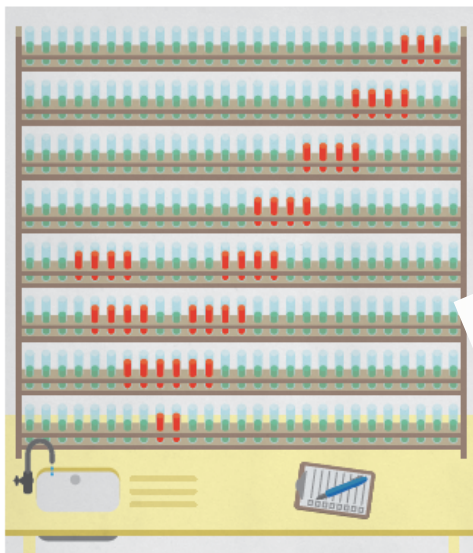
Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis



STATISTICAL ERRORS



NIH plans to enhance reproducibility

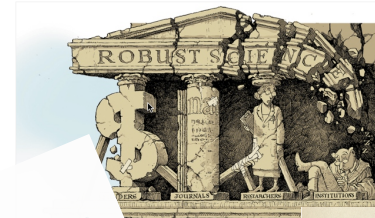
BLAME IT ON THE ANTIBODIES

Antibodies are the workhorses of biological experiments, but they are littering the field with false findings. A few evangelists are pushing for change.

BY MORTY BAKER



Raise standards for preclinical cancer research
C. Glenn Begley and Lee M. Ellis propose how methods, publications and incentives must change if patients are to benefit.



NIH to balance sex in cell and animal studies

Validation BY THE SCIENCE EXCHANGE NETWORK

Reproducibility Initiative

Reproducibility: changing the policies and culture of cell line authentication



ANIMAL BIOMEDICAL RESEARCH Shaky basis for predicting human benefits

NIH Review Criteria

- **Scientific Premise**
- **Rigorous Experimental Design**
- **Consideration of Sex and Other Relevant Biological Variables**
- **Authentication of Key Biological and/or Chemical Resources**

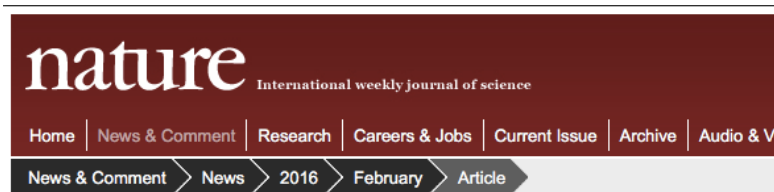
From: NIH Notice – Enhancing Reproducibility through Rigor and Transparency (NOT-OD-15-103)



Recent Publications and Comments

Make mouse studies work

More investment to characterize animal models can boost the ability of preclinical work to predict drug effects in humans, says **Steve Perrin**.



NATURE | NEWS

Animal studies produce many false positives

Examination of neurological disease research shows pervasive 'significance bias'.

Heidi Ledford

16 July 2013

NIH to balance sex in cell and animal studies

Janine A. Clayton and Francis S. Collins unveil policies to ensure that preclinical research funded by the US National Institutes of Health considers females and males.

BMJ



BMJ 2014;348:g3719 doi: 10.1136/bmj.g3719 (Published 5 June 2014)

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EDITOR'S CHOICE

How predictive and productive is animal research?

Fiona Godlee *editor in chief, The BMJ*



Core Reporting Standards: Animal Studies

- **Randomization**
- **Blinding**
- **Sample size estimation**
- **Data handling (inclusion/exclusion criteria)**
 - **Landis, et al *Nature* 490:187-191, 2012**
- **Standards**
- **Replicates**
- **Statistics**



Professional Society Recommendations

Biophysical *Journal*

Guidelines for the
Reproducibility of
Biophysics Research



Enhancing Research
Reproducibility:

Recommendations from the
Federation of American Societies for Experimental Biology



SOCIETY for
NEUROSCIENCE

**How Can Scientists Enhance
Rigor in Conducting Basic
Research and Reporting
Research Results?**

*Research Practices for Scientific
Rigor: A Resource for Discussion,
Training, and Practice*



General Guidelines and Standards

Guidance for the Description of Animal Research in Scientific Publications

Institute for Laboratory Animal Research. Guidance for the Description of Animal Research in Scientific Publications. 2011. The National Academies Press

Improving Bioscience Research Reporting: The ARRIVE Guidelines for Reporting Animal Research

Carol Kilkenny^{1*}, William J. Browne², Innes C. Cuthill³, Michael Emerson⁴, Douglas G. Altman⁵

<http://www.plosbiology.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pbio.1000412&representation=PDF>



Workshops on the Topic

The screenshot shows the APS website's 'Reproducibility in Research' page. At the top, there is a navigation bar with links for 'About', 'Testimonial', 'Jobs', 'Store', and 'FASEB Directory', along with a search box and a 'Support APS' button. Below this is a secondary navigation bar with links for 'Awards', 'Careers', 'Education', 'Meetings', 'Membership', 'Publications', and 'Science Policy'. The main content area features a blue header for 'Reproducibility in Research' and a breadcrumb trail: 'home / science policy / agency policy / reproducibility'. On the left, there is a 'Login' section and a 'In this section' menu with links to 'APS Resources', 'Outside Resources', and 'APS Symposium'. Below that is an 'Information For...' section with various categories like 'Advertising / Marketing', 'Advocacy and Outreach', 'Authors', 'Chapters', 'Committees', 'Early Career Professionals', 'Graduate/Professional Students', 'Groups', 'K-12 Education', 'Minority Scientists', 'Postdoctoral Fellows', and 'Public / Press'. The main text area contains an introductory paragraph about the lack of consistent reproducibility in pre-clinical research. To the right of this text is an illustration of three test tubes: two are green and one is red with a red ribbon tied around it. Below the text are three sections: 'APS Resources', 'Reproducibility Journal Club', and 'APS Advises NIH on Sex as a Biological Variable'. At the bottom right, there is a section for the 'APS Reproducibility Symposium' with a sub-header 'Reproducibility in research: What are the problems? How can we fix them? What happens if we don't?' and a paragraph of text describing the symposium.

<http://www.the-aps.org/mm/SciencePolicy/Agency-Policy/Reproducibility>



Workshops on the Topic



The National Academies of
SCIENCES • ENGINEERING • MEDICINE

ILAR Roundtable

Home About ▾ Roundtable Members *Roundtable Activities* ▾ Related Events

Reproducibility Issues in Research with Animals and Animal Models

The screenshot shows a website header for the ILAR Roundtable. At the top, it reads "The National Academies of SCIENCES • ENGINEERING • MEDICINE". Below this is a banner featuring the text "ILAR Roundtable" in a large, stylized font. To the right of the text is a graphic of a human face in profile, overlaid with a fish, and two real fish are shown to the right. A navigation menu at the bottom of the banner includes "Home", "About ▾", "Roundtable Members", "Roundtable Activities ▾", and "Related Events". Below the banner, the main heading for the workshop is "Reproducibility Issues in Research with Animals and Animal Models".

<http://nas-sites.org/ilar-roundtable/roundtable-activities/reproducibility/>



Discussion of parameters to be considered for in vivo work

