Bethesda,
We have a problem

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NCATS

NIH National Center for Advancing Translational Sciences

The Problem

Pre-clinical research findings are not reproducible

- NIH - $30B/year
- Big pharma $4-5B per drug
- Small pharma $350M* per drug

Forbes Pharma & Healthcare 8/11/13

The contributors

- Publish or perish culture
  - Number of publications is incentivised
- Poorly described materials and methods
  - Journals that restrict the length
- Poor research design – inadequate training
  - Studies are often unblinded
  - Statistically underpowered
- Negative results are not published
  - No venue to report inability to reproduce a published finding
- Poor quality of materials
  - Contamination or mislabelling

Principles and Guidelines for Reporting Preclinical Research

- Rigorous statistical analysis
- Transparency in Reporting
  - Standards
  - Replicates
  - Statistics
  - Randomization
  - Blinding
  - Sample size
  - Inclusion/Exclusion cireteria
- Data and material sharing
- Consideration of refutations

Consider establishing best practice guidelines for:

- Image based data (image screening for manipulation, Western blots, for example)

- Description of biological material with enough information to uniquely identify the reagents (for example unique accession number in repository), in particular for:

  - antibodies: also report source, characteristics, dilutions and how they were validated
  - cell lines: also report source, authentication and mycoplasma contamination status
  - animals: also report source, species, strain, sex, age, husbandry, inbred and strain characteristics of transgenic animals

Training

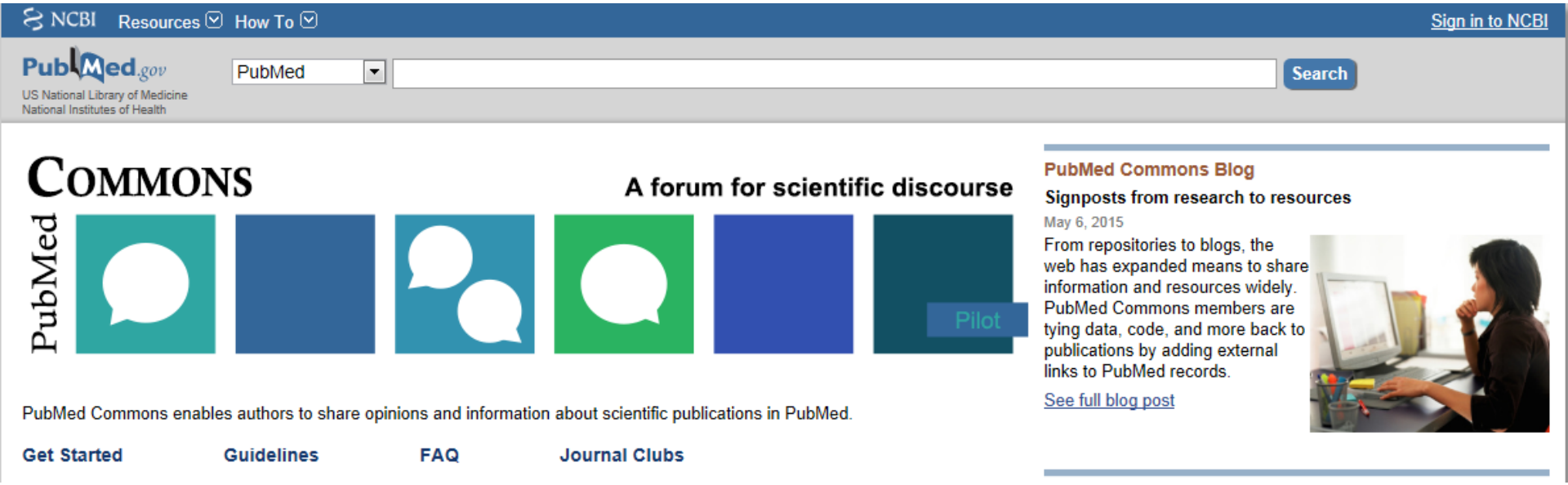
Department of Health and Human Services

Part 1. Overview Information

Participating Organization(s)	National Institutes of Health (NIH)
Components of Participating Organizations	National Institute of General Medical Sciences (NIGMS) National Cancer Institute (NCI) National Eye Institute (NEI) National Institute on Aging (NIA) National Institute on Alcohol Abuse and Alcoholism (NIAAA) National Institute of Dental and Craniofacial Research (NIDCR) National Institute on Drug Abuse (NIDA) National Institute of Neurological Disorders and Stroke (NINDS) National Center for Complementary and Alternative Medicine (NCCAM) Office of Research Infrastructure Programs (ORIP)
Funding Opportunity Title	Training Modules to Enhance Data Reproducibility (R25)
Activity Code	R25 Education Projects

This RFA will support creative educational activities with a primary focus on developing courses for skills development to enhance data reproducibility.

Encouraging public discourse



Cancer Res. 2014 Aug 1;74(15):4024-9. doi: 10.1158/0008-5472.CAN-14-0925. Epub 2014 Jul 17.

The increasing urgency for standards in basic biologic research.

Freedman LP[1], Inglese J[2].

Author information

Abstract

Research advances build upon the validity and reproducibility of previously published data and findings. Yet irreproducibility in basic biologic and preclinical research is pervasive in both academic and commercial settings. Lack of reproducibility has led to invalidated research breakthroughs, retracted articles, and aborted clinical trials. Concerns and requirements for transparent, reproducible, and translatable research are accelerated by the rapid growth of "post-publication peer review," open access publishing, and data sharing that facilitate the identification of irreproducible data/studies; they are magnified by the explosion of high-throughput technologies, genomics, and other data-intensive disciplines. Collectively, these changes and challenges are decreasing the effectiveness of traditional research quality mechanisms and are contributing to unacceptable-and unsustainable-levels of irreproducibility. The global oncology and basic biologic research communities can no longer tolerate or afford widespread irreproducible research. This article discusses (i) how irreproducibility in preclinical research can ultimately be traced to an absence of a unifying life science standards framework, and (ii) makes an urgent case for the expanded development and use of consensus-based standards to both enhance reproducibility and drive innovations in cancer research.

Comment in

The increasing urgency for standards in basic biologic research published recently in cancer research--letter. [Cancer Res. 2014]

PMID: 25035389 [PubMed - indexed for MEDLINE]

MeSH Terms

LinkOut - more resources

PubMed Commons

PubMed Commons home

0 comments

Quality of Materials

ICLAC

INTERNATIONAL CELL LINE AUTHENTICATION COMMITTEE

Home | Resources | Databases | Case Studies | References | About ICLAC | Members | Partners | You can Help

Database of Cross-contaminated or Misidentified Cell Lines

This database lists cell lines that are currently known to be cross-contaminated or misidentified. The database was originally developed by Amanda Capes-Davis and Ian Freshney, and published in 2010. It is now curated by the International Cell Line Authentication Committee.

Download the latest version here (version 7.2, released 10 October 2014).

Entries from Table 1 are also hosted on the NCBI BioSample database.
A link to the data can be found on the BioSample home page here.

- The database currently lists 475 cell lines.
- 438 cell lines are misidentified with no known authentic stock, and are listed in Table 1.
- 37 cell lines were initially thought to be misidentified but authentic stock has since been found. These 37 cell lines are listed separately in Table 2.
- Cell lines that legitimately come from the same donor are excluded from the database – for example, if one cell line is known to be derived from another.
- 44 cell lines do not correspond to the original donor, but the contaminant is unknown. 43 cell lines come from a different species.
- 138 different contaminants are listed. The commonest is HeLa, with 113 entries (24%).

Useful Resources

- ICLAC Database of Cross-Contaminated or Misidentified Cell Lines
- Advice to Scientists: Incorporating Authentication into Everyday Culture Practice
- Cell Line Checklist for Manuscripts and Grant Applications
- Guide to Human Cell Line Authentication
- Match Criteria Worksheet for Human Cell Line Authentication
- Naming a Cell Line
- Resources for Authentication Testing Survey
- ICLAC Terms of Reference

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Mitigation of the contributors

- Publish or perish culture
  - NIH revamped the biosketch for applications
- Poorly described materials and methods
  - NPG eliminated limits
- Poor research design – inadequate training
  - NIH published guidelines adopted by 80+ journals
  - NIH is offering support for additional training
- Negative results are not published
  - Articles are now better linked
  - PubMed Commons
- Poor quality of materials
  - International Cell Line Authentication Committee