

# From Darsee to Sudbø: NLM's role in the retraction process

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Today, virtually all biomedical scientists, many health practitioners, and an increasing number of patients search the MEDLINE database using PubMed to learn about published research findings. MEDLINE has evolved over the decades to become a service that is not only indispensable to medical research and practice, but one that is consulted millions of times each day. Anyone with access to the Web can search an immense database of references and abstracts to more than 16 million journal articles.

Since 1984, the *National Library of Medicine (NLM)* has played a major role in informing the users of MEDLINE of indexed journal articles that have been subsequently revealed as fraudulent (1). Far fewer than 1 % of more than 600 000 articles indexed annually are retracted. However, the potential impact can be great if inaccurate information forms the basis for subsequent research or is used in the treatment of patients. By NLM's definition, a retraction states that an article previously published, was based on deliberately falsified or unsubstantiated data (2).

There have been examples of scientific fraud throughout history (3). But it was not until the early 1980s when John Darsee, a researcher at Harvard University, admitted to systematically falsifying data in several experiments, that fraud began to attract the concern of many scientists and of NLM. As the compiler of the world's largest biomedical database, NLM staff realized that if we did not help to bring this behavior to the attention of users, we could be guilty of contributing to the dissemination of incorrect information. Prior to this, printed retraction notices existed in journals but there was no way to link users from these notices back to the original article and visa versa.

## Retractions

For NLM to label something a retraction, the notice must be cited on a numbered page in a journal indexed in MEDLINE and generally, the retraction notice must appear in the same journal title that published the retracted article (2). Only statements that are specifically labeled retraction or withdrawal are considered to be retractions. If the statement is headed “Questionable Science” or something similar, it is labeled as a ‘comment’ by NLM. Comments are substantive articles, letters, or editorials that challenge, refute, support, or expand upon a previously published article.

Before I continue with more information about NLM’s role in retractions, let me mention some ways we alert users to other types of publication practices. Corrections or error notices, whether originating in the publication process or due to errors in scientific logic or methodology, are labeled as ‘Errata’. If the correction is part of the NLM citation or abstract, we will update the citation to its corrected form and will indicate in brackets that the citation has been corrected.

Other notifications include ‘Corrected and Republished Articles’ where an entire article is reprinted, usually rectifying an editorial or printing error in the original article. In MEDLINE the original article citation remains with a reciprocal link to the republished article citation. ‘Duplicate Publication’ is used to identify an article that substantially duplicates another article without acknowledgement. Usually the duplicate article will appear in a lesser known publication or in a more esoteric language. It is important to note that NLM does not use this label for acknowledged simultaneous publications such as joint editorials of the *International Committee of Medical Journal Editors* or the simultaneous publication of a practice guideline by two societies. Plagiarism, in which one author reproduces another author’s work without acknowledgement, is a form of scientific misconduct and is covered by NLM as a ‘Retraction’.

How many reports of fraud in science are there each year? Retractions remain an incredibly small portion of the 623 000 articles we index but the numbers are increasing as the amount of indexed articles rises each year. A huge jump occurred in 2006 when we increased from 67 retractions to 97. Since the policy began more than 20 years ago, through the end of the government fiscal year in September 30, 2006, we have entered 691 retractions of publication that retracted 738 articles. A few general observations are in order. The top tier journals issue more retractions than other journals. This may be a result of higher ethical standards or because their editors are more willing to risk law suits, or that more of their authors crave success even at any cost of falsifying research. It takes a long time to publish a retraction –

often 24 months – so that users may innocently retrieve citations to articles that we already know to be fabricated or at least questionable, but still lack any statement from the journal.

## Misconduct

Why do we continue to see misconduct in science? The simple answer is that it is difficult to protect against it. It is difficult to challenge the integrity of an author, more difficult when several authors, whom you assume have shared their data, collaborate. When an author is well-known researcher in the field, it is even more difficult.

It is ironic, as Arnold Relman the former editor of *The New England Journal of Medicine* pointed out years ago, that scientific research, in many ways one of the most questioning and skeptical of human activities, should be so dependent on personal trust (4). We trust the scientist that her research is pure and unadulterated; we trust the young researcher that he has not plagiarized another's intellectual output and claimed it as his own. We trust editors and others who can act to control these actions to act swiftly.

Violations of trust, as Relman pointed out, are probably not as common as the publicity that they receive suggests, but whatever their frequency, they are always a reason for serious concern and soul-searching. As the Report of the Investigation Commission chaired by Prof. Ekbom pointed out, they can threaten the very foundations of scientific research.

Let me illustrate this by briefly examining four egregious examples of misconduct to see what we can learn from John Darsee, Robert Slutsky, Eric Poehlman, and Jon Sudbø. They seem to have elements in common that are found in all well-known cases: high profile researchers; popular scientists; powerful supporters; and claims of misjudgment or stress. Each of the well-publicized incidents of scientific fraud brought unprecedented attention to these men for a short period of time. Unfortunately, this attention rarely results in lasting change.

John Darsee committed scientific fraud for years at Harvard and Emory universities. At Harvard he was in the lab of the esteemed physician Eugene Braunwald whose work as well as Darsee's was funded by large NIH grants. Darsee's first known act of fraud in 1981 involved labeling data that had been obtained over a period of a few hours to make it look as if the data had been recorded over two weeks. Darsee said it was a single, isolated, foolish act of misconduct. As writer Barbara Culliton reports in her summary of the Darsee case in *Science* (5), Eugene Braunwald unfortunately believed Darsee. Braunwald said he didn't want to damage Darsee's career and he probably did not wish to damage the reputation of his institution. In the

end, 8 papers and 21 abstracts given at scientific meetings, had to be retracted. In hindsight, Braunwald and Harvard admitted they should have acted more promptly to conduct an audit and should not have believed Darsee's claim that his 1981 fraud was an isolated case.

In 1983, Robert Slutsky published 34 articles in journals indexed in MEDLINE and in 1984, he published another 31. He slowed down in 1985 publishing only 15 articles when his output ceased in August of that year. Many of these articles were eventually retracted. In hindsight one can ask why the editors to which he submitted papers didn't question how often he sent them manuscripts. Thirteen of his articles were published in the *American Heart Journal*; ten each in *Radiology and Investigative Radiology*; and nine in the *American Journal of Cardiology*—all top tier journals in their field. Why didn't one of these editors question Slutsky's ability to be so prolific in a relatively short period of time?

Eric Poehlman is considered by some to be the American version of Jon Sudbø. Poehlman agreed to retract or correct ten scientific articles which he authored between 1992-2002, because of falsified or fabricated data. Nine of these are indexed in MEDLINE; one is from an Indian publication not indexed. Poehlman came under suspicion in 2000 when a young research assistant found inconsistencies in spreadsheets used in a longitudinal study on aging. In an effort to portray worsening health in his subjects, Poehlman would switch the data points. In his 1995 paper published in the *Annals of Internal Medicine*, Poehlman presented metabolic data on 35 women. Most of the women did not exist, according to a statement he later signed. Poehlman was among the most notorious fabricators of data, having authored or co-authored 204 articles cited in MEDLINE through March 2005. By then, the NLM policy of updating citations with retracted notices and linking them to retractions of publication was a well-known feature of MEDLINE. However, we suspected it was not routinely noticed by many users. There is really no way to tell how many MEDLINE users failed to notice the information; but it was possible to tell how many authors cited Poehlman's works before the official retractions were published in 2005. Moreover, because the *Annals of Internal Medicine* took the bold step of unilaterally retracting the 1995 article in 2003 before the NIH findings were complete, we can even tell how many authors cited this article after the retraction notice appeared.

### **Retracted articles continue to be cited**

In an analysis we undertook using Web of Science, we determined that nearly every one of Poehlman's 204 articles was cited by others. The nine

MEDLINE articles Poehlman retracted were cited from 10 to 151 times through March 2005. Ironically, the *Annals* publication retracted in 2003 was cited the most of all the retracted articles – a total of 151 times, including sixteen times in 2004 and 2005 after the retraction notice was issued by *Annals* and added to the MEDLINE record. Worse yet, in August 2006, we examined the nine retracted citations again to see if any had been cited since our previous March 2005 analysis. Even after eliminating the citations to Poehlman’s own retraction notices, all nine articles were cited by authors writing new, original papers. The *Annals* article, retracted in 2003, was cited 23 more times since 2005 with only three of the papers writing about Poehlman’s scientific misconduct and 20 writing about obesity and post-menopausal women, Poehlman’s research topic.

I have read most of the English translation of the incredibly thorough Sudbø Report from the Investigation Commission chaired by Prof. Ekbohm. The report contains many excellent recommendations for the institutions, co-authors, and journals involved. There is little that I can add to the Sudbø story that has not already been documented. However, it does give me the opportunity to comment on two issues – the continued citing of Sudbø articles by innocent and unknowing authors and the use of the so-called ‘Expression of Concern’ by journal editors.

On September 18, 2006, 7 months after Jon Sudbø’s article in *The Lancet* was retracted, NLM examined all 38 Sudbø articles indexed in MEDLINE to see how many were cited in other articles. As that time, only the *Lancet* article was retracted. The two *New England Journal of Medicine* articles for which the editor issued an ‘Expression of Concern’ were not yet retracted as that journal was still in discussions with Sudbø’s co-authors regarding their retraction statements. The retracted *Lancet* article was cited 15 times, including 12 times after the appearance of the retraction notice. It makes me wonder how many researchers actually read the articles they cite, or if they ever read the popular press in which Sudbø’s indiscretions were described.

The phrase ‘Expression of Concern’ was first used by Jeff Drazen, editor of *The New England Journal of Medicine*, and used since by the *Lancet*, *BMJ*, *Science* and a handful of other journals. It was used effectively in the Sudbø case by the *Lancet* as soon as it was informed by officials of the Radiumhospital that information strongly indicated that Sudbø’s 2005 article was based on manipulated data. However, the *Lancet* knew that a published retraction statement would not be coming immediately so an ‘Expression of Concern’ was used to alert readers to be aware of this article. Any ‘Expression of Concern’ is linked electronically in both directions by

NLM to the original article. Once Professor Ekblom provided written confirmation that the paper was fabricated, the *Lancet* published a retraction notice that superseded the 'Expression of Concern' for the article.

Over the years, editors, deans, ethicists, and others have been quick to elaborate on the lessons learned from the various examples of tainted research. Prevention of fraud is important but so is identifying the damage and minimizing its effect. Full disclosure by all authors of their specific role, and acknowledgement that each has read and takes responsibility for the final paper is a good start. The adherence to established criteria for what constitutes authorship according to the guidelines of the *International Committee of Medical Journal Editors* is another prerequisite. NLM recently developed a new policy that addresses some examples of this lack of full disclosure. In order for the Library to index articles in funded journal supplements, each article must include a statement of full disclosure by its authors. Having disclosure information elsewhere in the publication is not sufficient because our users link to the full-text of the desired article and do not peruse the rest of the publication for this information.

Hal Sox and Drumond Rennie in their 2006 editorial about the Poehlman case (6), called on NLM to go further in trying to prevent the continual citing of retracted articles. They recommend the creation of a web-based program that would take a manuscript's list of references and compare it to NLM's master list of retracted articles, and when a match exists, send a message to the author. It's an intriguing idea but one we have rejected so far as we feel that it doesn't address the potential retrieval of retracted articles in any of the 900 million searches conducted against MEDLINE citations during the past year.

There are still only about 700 retracted publications among MEDLINE's 16 million citations. They can all be retrieved using a simple PubMed query of Retracted Publication [PT]. We also have an easy to use feature on PubMed's Special Queries page that allows a user to examine a list of all retracted articles in chronological order. Finally, we are cooperating with the makers of a major citation matching system used by many publishers. Currently, publishers use software to check the accuracy of references in a manuscript by matching them against MEDLINE citations. Unfortunately, their software does not identify the presence of a retraction notice in the MEDLINE record. If the products can be programmed to recognize this statement, then the journal will be alerted automatically to any citation that has been retracted. If this improvement can be made, it will go a long way towards eliminating the citing of retracted articles.

### **What have we learned?**

What have we learned after more than 20 years of citing retractions and other forms of misconduct? Here are some signs that reviewers and editors can look for that should raise their suspicion about authors. If data seems too good to believe, too neat, too perfect, it probably is. If your scientific intuition makes you suspicious, follow up on it. If an author publishes so frequently that he literally has no time for good research, he probably doesn't practice good research. Co-authors must be familiar with all aspects of the research and must disclose that they are. Lab chiefs and others in supervisory or mentoring roles must oversee the research on an ongoing basis, not avoid responsibility while adding their names as co-authors of papers. If an author contends that her instance of fraud is an isolated, one-time indiscretion, better check further; it usually isn't. You can't afford to give a scientist the benefit of doubt, even someone of Sudbø's status, in any case where some fraud has been admitted. An audit or review must be undertaken and it should be done by persons outside of the immediate lab in which the scientist worked.

There are ways to minimize the damage done by dishonest people – and this is where NLM can help. But we also need to recognize that stringent procedures designed to prevent and detect wrong doing can be counterproductive to the thousands of honest researchers. We cannot afford to damage the free exchange of ideas in trying to prevent the appearance of the next Sudbø. Trust has risks attached, which we must continue to strive to minimize by promoting an atmosphere in which authors, editors, research institutions, and NLM have clear responsibilities. When they are diligent in carrying out their responsibilities, misconduct will be reduced and the innocent use of fraudulent data may begin to disappear.

## References

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