

# Are Citation Statistics Good for Science?

*Moderator:*

**Anna G Trudgett**  
American Physiological Society  
Bethesda, Maryland

*Speakers:*

**Charles Jennings**  
*Nature Research Journals*  
New York, New York

**John Hoey**  
*Canadian Medical Association Journal*  
Ottawa, Ontario

**Glenda Proctor**  
*Canadian Medical Association Journal*  
Ottawa, Ontario

**Martin Frank**  
American Physiological Society,  
*The Physiologist*  
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**Isabel Czech**  
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*Reporter:*

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*Epidemiology*  
Durham, North Carolina

"Everyone knows what impact factors are. We either love them or hate them, depending on what our numbers look like." With that statement, Anna G Trudgett introduced the session on citation statistics, which focused on the Institute for Science Information (ISI) impact factor and its sometimes-controversial interpretation. Is the impact factor a true reflection of a journal's quality and importance? The panelists expressed some doubts and presented arguments as to the limitations of this statistical measure.

The ISI impact factor is the number of citations divided by the number of pub-

lished papers. "But it's not that simple!" asserted Martin Frank. The numerator is the number of citations in a given year of papers published in a journal in the previous 2 years. The denominator is the total number of papers published in those 2 years. However, only papers considered as research or review articles are counted in the denominator. Such marginalia as letters, news articles, book reviews, and abstracts are not included in the denominator, but when these are cited they count in the numerator, adversely skewing the impact factors of journals that do not publish such marginalia.

The impact factor is a measure of the average frequency of citation and therefore can be heavily influenced by a few papers that are cited many times, as illustrated by Charles Jennings in a comparison of several of the *Nature* journals.

How can a journal improve its impact factor? John Hoey suggested several actions: publish more reviews and controversial articles, invite submissions from eminent authors, encourage authors to cite articles in the journal, eliminate sections that generate few citations, and, of course, publish better papers. Editors could also reduce the number of research articles, in favor of other types of papers that would not be counted in the denominator but might be picked up in the numerator (such as meeting abstracts). Many editors reject those measures as manipulative and not in the best interest of science.

Sometimes it is difficult to determine whether a paper should be considered a research or review article. Glenda Proctor showed that for each of 3 years examined, denominator counts by the staff of the *Canadian Medical Association Journal* were lower than the official ISI counts.

Isabel Czech, director of public relations for ISI, urged editors to make it easy for readers to find the information needed for creating accurate citations. She noted that

every year ISI attempts to match 27 million citations to original journal articles; but many citations cannot be matched to the sources, because of missing or erroneous information. Czech also encouraged editors to look at the data on their own journals in ISI's Journal Citation Reports.

In some scientific fields, the majority of citations to an article may occur more than 2 years after publication, but these citations would not be counted in the impact factor. Frank demonstrated that rankings of several subspecialty physiology journals would change dramatically if citations were counted for the 7 years after publication rather than 2.

Furthermore, authors may be more likely to cite papers that they have seen cited elsewhere, according to Jennings. And a paper may be more likely to be cited because it is in a high-impact journal, thus reflecting, rather than contributing to, a qualitative assessment of the journal.

As imperfect as they might be, impact factors play an important role and are used for various purposes. Librarians use them to determine how to allocate scarce dollars for subscriptions, and advertisers use them when considering where to place their ads. Authors consider impact factors when deciding where to submit their papers. Editors and publishers use them as self-evaluation tools. Impact factors are increasingly used by research institutions to evaluate authors' publication records and career prospects.

The title of the Hoey and Proctor talk, "Why Is Impact Factor (un)Important?" reflected their ambivalence regarding impact factors. Frank suggested that when a researcher is being evaluated, nothing substitutes for reading the author's published papers themselves. 🗣️