

Committee review of stem-cell fraud finds editors followed all rules

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In handling fraudulent stem-cell research articles, journal editors went above and beyond existing procedures to try and verify the findings, but in today's competitive publishing environment, more stringent, less trusting safeguards are now essential, an independent committee has concluded.

Although editors at the journal *Science* "made a serious effort – substantially greater than that for most papers" to scrutinize research submitted by Woo Suk Hwang, the committee found, "the cachet of publishing in *Science* can be an incentive not to follow the rules."

The journal's current procedures, based on an assumption of trust in the basic integrity of the vast majority of researchers, must be revised to acknowledge the risk of misleading, distorted, or fraudulent findings, the committee concluded.

The six-person committee – including leading stem-cell researchers, three members of *Science*'s Senior Editorial Board, and an editor from *Nature* – evaluated the handling of two research articles by Hwang and colleagues:

-- "Evidence of a Pluripotent Human Embryonic Stem Cell Line Derived from a Cloned Blastocyst" (12 February 2004, *Science Express*; 12 March 2004, *Science*); and

-- "Patient-Specific Embryonic Stem Cells Derived from Human SCNT

Blastocysts" (19 May 2005, *Science Express*; 17 June 2005, *Science*).

After examining the original submissions, reviews, revisions, comments, editors' notes, and additional information related to both fraudulent papers, the committee proposed the development of a procedure for identifying "high-risk" papers. Research in the high-risk category might include, for example, counter-intuitive findings, and research likely to generate intense media or political interest. High-risk submissions should then be subjected to an additional level of scrutiny, such as more comprehensive access to primary data, the committee said.

Even so, the committee emphasized: "No realistic set of procedures can be completely immune to deliberate fraud."

Science Editor-in-Chief Donald Kennedy commended the committee's evaluation. "We are committed to accepting the major findings of the report, and to making our new procedures clear to authors, reviewers, and readers as they are developed," Kennedy said in an editorial response scheduled to appear in the 1 December issue of *Science*. "In responding to the recommendations, we are now moving to develop criteria for the 'risk assessment' template described in the Report which should allow us to apply especially stringent attention as needed." In the future, he explained, "Authors may be asked to disclose information about their individual roles in the work and, on occasion, to supply original data, images, or materials when questions are raised."

Kennedy noted further that implementing more stringent safeguards will significantly change the traditionally collegial nature of scholarly publishing, as editors are required to make more demands of potential authors.

"Clearly, we're moving into a new world in which public trust in the scientific enterprise has been a very serious casualty," Kennedy said in

an interview. "There are many more incentives today for over-claiming results, or even for falsifying results, and scientific publishers therefore must develop more stringent new risk-assessment procedures for further scrutinizing high-risk papers. We are in complete agreement with the committee on this point, and we will take steps to comply promptly with the committee's recommendations."

In summary, the committee recommended the following changes in journal procedures:

- Develop a procedure for identifying "high-risk papers," based on criteria such as counter-intuitive findings, potential media interest, political concerns, and other factors, then exercise special scrutiny.
- Establish a method to clarify the contributions and roles of all authors and co-authors.
- Publish more primary data within supporting material, to ensure that all relevant information is available to reviewers and readers.
- Collaborate with other high-profile journals such as *Nature* to establish common standards.

Given the large volume of papers handled by *Science* editors – the journal received roughly 12,000 submissions in 2005, and accepted about eight percent of those papers following peer review – committee members concluded that it would be "essentially impossible" to heighten the level of scrutiny for each paper. But, a template for pinpointing risky submissions might help deter the submission of flawed or intentionally deceptive work, they said.

The committee also proposed audits to ensure proper handling of selected papers, as well as others chosen at random. The journal further was urged to reevaluate policies concerning the treatment of digital images and biological samples, as well as "penalties for authors who knowingly submit distorted or faulty work."

"In the immediate future, examples [of high-risk papers] will likely come from the areas of climate change, human health, and particular issues in commercial biomedicine and nanotechnology," the committee wrote. "Progress in science depends on breakthroughs and in taking risks, both in research and in publishing. Nevertheless, it is essential to develop a process by which papers that have the likelihood of attracting attention are examined particularly closely for errors, misrepresentation, deception, outright fraud. This examination should include especially high standards of providing primary data, a clear understanding of all of the authors' and coauthors' contributions to the paper and a careful examination of data presented in the papers."

Hwang's 2004 paper purported to describe, for the development of versatile "pluripotent" human embryonic stem cells, potentially capable of becoming any cell in the body, from a cloned human blastocyst. The 2005 paper purported to describe the isolation of the first human embryonic stem cell lines specifically tailored to match the nuclear DNA of patients, both male and female of various ages, suffering from disease or spinal cord injury.

On 12 January 2006, *Science* published an editorial retraction of both papers. The full retraction can be found online at <http://www.sciencemag.org/cgi/content/abstract/1124926v1>.

The committee assigned to assess *Science*'s handling of the papers was chaired by John I. Brauman, J.G. Jackson – C.J. Wood Professor of Chemistry at Stanford University, who is chair of the Senior Editorial Board for *Science*. Other committee members included John Gearhart; Douglas Melton; Linda Miller; Linda Partridge; and George Whitesides.

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