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EDITORIAL

Ethics in Science

This editorial is being written at the end of 2006, and it is good at the ending of all years to reflect on all sorts of things about life. In particular, we have had continued cause to consider multiple issues that generally can be grouped under the heading of ethics. Scientists are human, and like the rest of our species, they come in all varieties. One type, of which there are thankfully relatively few, is the individual who is less than honorable, who does not ultimately appreciate that science is about discovering the truth about some part of nature; the reason that science and scientists hold a special place, and trust, in civilized societies.

Unfortunately, the news, both general and in scientific journals/magazines, over the past few years has included multiple egregious stories on scientific fraud. Some that quickly come to mind are the case of Dr. Woo Suk Hwang, who fabricated data for a paper published in *Science* on stem cells, the case of Dr. Jon Sudbo, who fabricated data for papers purportedly showing the efficacy of NSAIDs in preventing oral cancers, the case of the Merck company withholding adverse cardiovascular event data for Vioxx during the drug review process, and the case of Dr. Trey Sunderland, who took large consulting fees improperly from a major pharmaceutical company, while improperly supplying the company with patient biopsies. The issue of ethics in science has been on our minds for some time now (see editorial, *Oral Dis* **12**:357; 2006).

All of these cases led to public outcries over the behavior in question, and elicited varying degrees of introspection from the scientific community. Recently, in the November 29, 2006 issue of the *Washington Post*, there was a story that followed from the Hwang case investigation (p. 3). The headline of the story read, "Journal editors are urged to demand more evidence". That headline caught our attention.

As academic editors, however, there is not much we can do to detect deliberate fraud, such as apparently occurred in the Hwang and Sudbo cases. We are dependent on expert reviewers, who generously donate their time and knowledge, to assess the data presented in every submitted manuscript. How likely are editors, editorial boards and reviewers going to be able to detect outright fraud? If the fraud is deliberate, and skilled, it is unlikely to be easy to detect. Indeed, in the same *Post* article, one scientist, Dr. Adil Shamoo, who is editor-in-chief of the journal *Accountability in Research*, is quoted as stating, "It's ridiculous to think editorial boards can do all this", and he rather calls for required training in research ethics for scientists and audits of raw data by their peers. The former is readily achievable at small cost (and which we enthusiastically endorse to our readership), while the latter would be an enormous and expensive endeavor.

Not so long ago, *Nature* published a commentary called "Scientists behaving badly" (**435**:737–738, 2005). The article was about a self-reported survey of several thousand early- and mid-career scientists in the United States and who received funding from the National Institutes of Health. The frequency of bad behavior by these scientists was generally low, but ranged from the anonymous admission of falsifying data and ignoring human subjects research requirements (both ~0.3%) to publishing the same data twice (~5%) and dropping data points because they were felt to be inaccurate (~15%). This is a commentary that we recommend every reader of Oral Diseases examine, and consider in that context Dr. Shamoo's call for mandatory training in ethics for scientists. We strongly support the need and value of such training.

Like all humans, we make mistakes and sometimes behave in less than ideal ways. One useful way to minimize such aberrant and (hopefully) infrequent behaviors is to be educated about them so that they can be prospectively recognized and eliminated. Most universities and research institutions have some level of research training, but it should be continual and reinforcing. There will always be a few people in human society who will behave in an egregious manner, however, most of us want to do good. Thus, we can use the aids of training sessions and courses in ethics to learn about what are acceptable behaviors in science and to help us achieve them. One particularly useful way is to study cases, either real or fictionalized, involving questions about data, manuscript writing, sharing reagents with colleagues, conflicts of interest, etc., and then discussing them with colleagues, both junior and senior. Many such case-based learning examples can easily be found on the Internet, and there are many excellent texts, as well. Some issues are black and white, e.g., you don't make up data and you don't take advantage of patients in a clinical study; these have clear demarcations between right and wrong. Many, many other issues are less clear, more gray, e.g., who should be a co-author of a paper and what types of reagents should be shared with colleagues, that are without simple codified answers.

As editors, we have done a few things to help ensure that *Oral Diseases* publishes high quality research conducted in an ethical manner. Starting in 2007, we are only publishing papers involving clinical trials that are registered in publicly available sites (see editorial, *Oral Dis* **12**: 217–218, 2006). We have also recently required that the email address of all co-authors of submitted manuscripts be listed, so that we can contact the co-author and let them know we have received a manuscript with their name on it. Amazingly, we already have had several episodes where co-authors were unaware of the submission! Additionally, we want to call our readers' attention to our Publisher's efforts to address ethical concerns in scientific journals (see http://www.blackwellpublishing.com/press/pressitem.asp?ref=988). Finally, we urge all of our readers to speak of these concerns with their colleagues, in their schools and at conferences. We, who are engaged in scientific research, owe the public, and the human scientific endeavor, that much.

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