



## Stop misbehaving!

**Scientists are usually thought to be beyond reproach, but with the recent spate of high-profile ethical transgressions by scientists, the public's trust in science and scientists is deteriorating. The numerous cases of scientific misconduct that have crossed my desk in the last year leave me disenchanted, disappointed, and disillusioned.**

When I last commented on scientific naughtiness (1), I closed the editorial with a note that by and large, our authors are an honest bunch. While this is still true, a few rotten eggs are spoiling things for the rest of you. I am continually aghast at the amount of time I spend policing misconduct and at the different ways some authors have found to manipulate data, undermine colleagues, and push the limits of respectability. I'm writing this sequel to the earlier editorial to reinforce our rules and to underscore that we're still watching.

Blot doctoring continues to occur with regularity. Photoshop is a powerful image analysis tool. Most of us can use it to get rid of red-eye or to adjust the contrast in our personal photographs — but that is where image manipulations should end. Let me be clear: you should not alter the contrast, rub out extraneous bands or background noise, or present the same bands to represent multiple proteins/mRNAs, etc. Mike Rossner, managing editor of the *Journal of Cell Biology*, has written articles about how a skilled production editor can detect such manipulations (2, 3). Our eagle-eyed production editors have indeed caught several authors trying to pass off a flipped and/or contrast-adjusted Western blot as a distinct image; for example, a blot of ERK identified as eNOS in the next figure. Examples of doctored images can be found in Figure 1. Though several of the articles had successfully passed through the peer review process, we did not publish those papers, as the intent clearly was to deceive — and there was no way to tell whether other data had been similarly contrived.

Fussing with figures is not limited to blots. Another rule that we would have thought could go unsaid: you may not paste images of cells (fluorescently marked cells on a black background, for example) from multiple fields of view into one image. You are also not allowed to reuse figures that were previously published (unless they are specifically indicated as such): that is copyright infringement. In addition, you're not allowed to represent as new previously pub-

lished, but now rotated and/or cropped, images (Figure 1).

A recommendation: take high-resolution pictures from the start, label them clearly, and keep the files well organized. Several authors have claimed, when faced with an investigation into why they tried to pass off a previously used image as representing another field, that their faulty labeling and organization of the files led to the mix-up. I find this argument hard to believe. Further, the *JCI* requires high-resolution pictures for publication. If you do not have high-resolution pictures suitable for printing, I will make you redo your experiments and retake the photos and will subject your manuscript to re-review by the Editors and reviewers.

If you have a paper containing newly obtained microarray data, you must submit it to a public database where others can download and access the raw data. You may not simply post it on your own website. We trust that authors will do this without our policing, and not doing so will incur the wrath of your colleagues and of the Editors. Though perhaps not fraudulent, this certainly falls in the realm of misbehavior. Two other rules that some authors have recently forgotten: you must reveal the structure of your new inhibitors/agonists/compounds if it is the first time their function has been tested. And you must make your reagents/cells/animals available to all readers if it is the first time they have been introduced in the literature. In addition to incurring our wrath, failure to comply with these policies and practices could result in a retraction of the paper. These and other rules are clearly outlined in our instructions to authors (available at [www.jci.org](http://www.jci.org)).

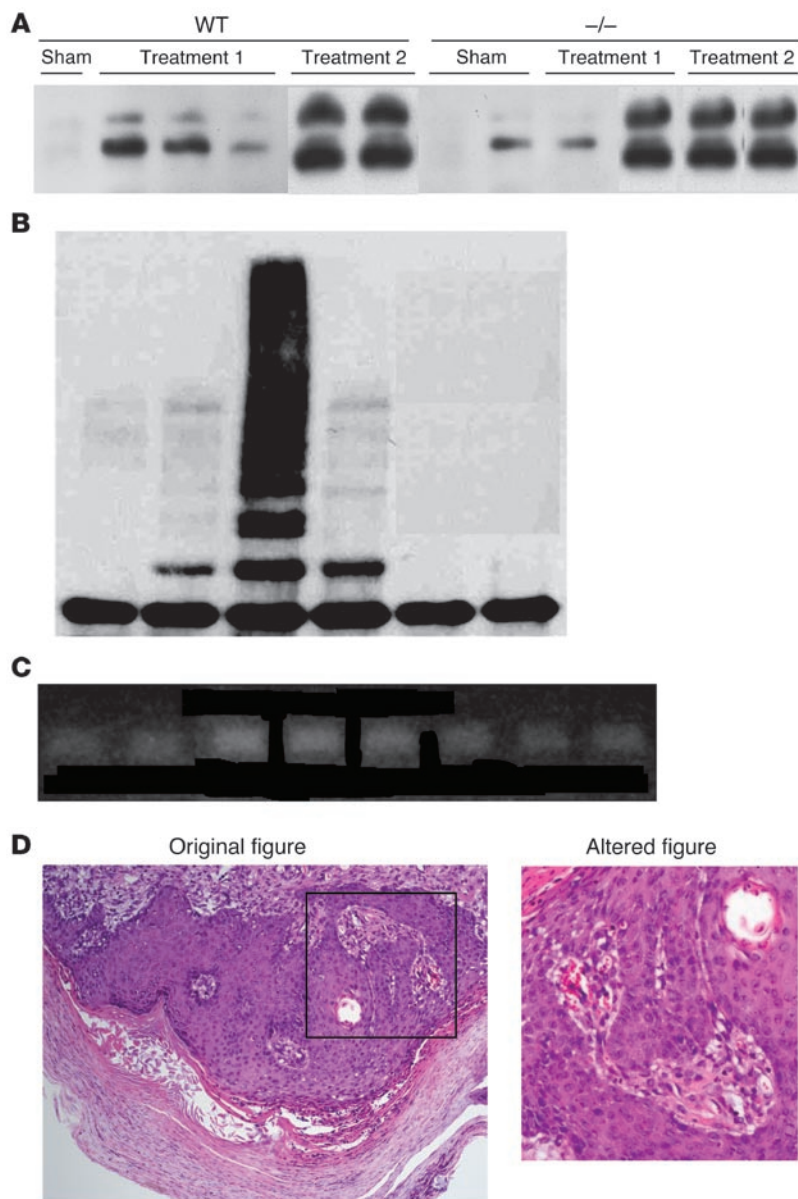
Do not submit your article to more than one journal at a time. If you are not sure of whether we still have your manuscript under consideration (after submission of a rebuttal, for example), check with us prior to sending your work elsewhere. Neither we nor other journals take kindly to double submission.

You need to be as transparent as possible when it comes to conflicts of interest. We

recently had a reader contact us indicating that he was aware of a published author's undeclared (and substantial) conflict. We contacted the authors and issued a correction, but why wasn't the conflict declared initially? If you have an affiliation or agreement or deal, financial or otherwise, that could potentially be construed as a conflict, then declare it. Better to be transparent than to erode your colleagues' trust in your motivations.

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I continue to consult the Office of Research Integrity (ORI) within the US Department of Health and Human Services for guidance on matters of scientific misconduct. Rossner has suggested that this is excessive (2); however, in most cases, the scope of the misconduct is beyond what we would be able to investigate from afar. It is rare that the cases we come across are so straightforward as to be dealt with in the course of a phone call or an after-



**Figure 1**

Examples of blot and image doctored. **(A)** The 3 rightmost bands were clearly copied and pasted; also, the bands for WT treatment 2 were pasted on top of the original bands. **(B)** An exercise in excessive contrast adjustment. In addition, in the rightmost 2 rows, the background was replaced with background from another area of the blot in order to obscure bands underneath. **(C)** The eraser tool was used to remove duplicate bands and background noise. **(D)** Authors have submitted subsections of previously published figures as original images, as in this hypothetical example. Note: The images have been intentionally manipulated for illustrative purposes.

Germany, and the US) originally published in 2004. The investigation began a year ago with an anonymous whistle-blower e-mail alleging that an author had reused the same RT-PCR gels in multiple publications. A committee of deans, chancellors, and professors at the author's institution started an investigation at my behest and determined that indeed the author had fraudulently misrepresented his data. Obviously, the conclusions drawn from these faulty data cannot stand, and the work is therefore retracted.

As I stated before, by and large, most of our authors are honest scientists who are indeed beyond reproach, but the pressure to "publish or perish" is felt by all researchers. It is your responsibility to consistently act ethically when performing and presenting your research. You need to be vigilant about what is being done in your laboratories, and you must foster honest and open lines of communication with your students, colleagues, and peers. Failure to do so only hinders our ability to gain true insight into physiologic and pathophysiologic processes, which is what we're all striving to achieve.

**Ushma S. Neill**  
Executive Editor

1. Savla, U. 2004. When did everyone become so naughty? *J. Clin. Invest.* **113**:1072.
2. Rossner, M. 2006. How to guard against image fraud. *Scientist.* **20**:24.
3. Rossner, M., and Yamada, K.M. 2004. What's in a picture? The temptation of image manipulation. *J. Cell Biol.* **166**:11–15.

noon. The ORI works with a research integrity officer at the relevant US institution to further assess any allegations of scientific misconduct in order to determine whether further inquiries, investigation, and oversight are warranted. Their assistance has been invaluable when the situation requires investigation of data collected from multicenter research groups. Further, it is unfortunate that many other countries do not have an oversight body like the ORI to help police ethical trans-

gressions (Canada, the United Kingdom, Germany, Denmark, Finland, and India, among others, do have investigative organizations). The last year has given us cause to investigate authors in Switzerland, France, Italy, Japan, and China, and I have spent numerous hours trying to determine whom it is best to contact for guidance in investigating the allegations.

As a case in point, in the current issue we are running a retraction of an article by Italian authors (with collaborators in Canada,