

# Under suspicion

When *Nature* or its sister journals receive serious allegations about data or author conduct, they follow a clear procedure to work out whether the published record needs to be revised.

A particularly exciting research paper catches your eye. You start to read it in detail, carefully studying the methods, figures, data and logic. To your growing horror, you realize that a few of the blots and gel images look as though they have been digitally manipulated. You immediately inform the journal of your suspicions and are told that the editors will 'look into it'. But after months of silence, you begin to wonder if that phrase is just a euphemism for inaction.

It isn't — certainly not at *Nature* or any of the other Nature-branded journals. We make a concerted effort to forestall such problems by spot-checking the images in at least two papers of each issue before publication. Even so, Nature journals that publish a substantial number of gels and blots still receive up to five reports of image manipulation per journal per year — and few of these cases can be handled quickly.

When we receive a complaint, we first do our own tests on the figures to see whether the charges have merit. We also take a careful look at the paper as a whole. Some claims of fraudulent image manipulation turn out to be mistaken. Others we suspect of being clumsy attempts to slur the reputations of others.

Occasionally, our examination suggests that something may be amiss. We then ask the authors for the original data and an explanation of what has happened. This is to help us understand whether the images really were manipulated and, if so, why. This request for authors to provide us with explanations holds true for almost all other types of allegations, from authors not sharing materials as expected to charges of fabricated data or plagiarism.

Intent is key — we often find that no data have been fabricated, but that poor practice and a lack of education have allowed unexplained gel splices, for example, to slip past co-authors before submission or during the revision process. Taking into account the authors' response, together with our comparison of the original images with the published figures, we will hopefully find that the apparent problems are either nonexistent or easily remedied. If we conclude otherwise, we will then contact the authors' home institution. This step is necessary because, unlike universities and other such institutions, journals don't have the resources or the legal authority to investigate allegations fully, or to make formal findings of research misconduct.

At *Nature*, we usually wait for the results of a formal inquiry before correcting the record — hence the seeming inaction. Institutions vary in their practices, and some are more efficient than others. Institutions that accept government grants in the United States must have a research-integrity officer to handle such allegations, but they are not obliged to share their information with us. We urge institutions to produce a redacted version of their final report that protects the innocent, but that indicates the extent of the investigation and the findings on each allegation. Because this is not general practice, we are not always sure that we concur with the actions suggested by the institution's investigating committee. To see exactly what was examined, we are forced to request clarifications, which delays revisions to the public record further.

At times, we have to resort to the US Freedom of Information Act to obtain enough information to correct the literature appropriately.

If the institute is not in the United States, lines of responsibility are less clear. Determining whom to contact is not straightforward and convincing parties that an investigation is needed and getting useful information back is not a reliable process. Sometimes, this means it can be difficult to judge if the investigation has been thorough and fair.

The complexity of a case, which is not always readily apparent, also has a bearing on how quickly a verdict can be reached. If an institution's report concludes that misconduct occurred, we usually insist on a retraction — and will issue the retraction ourselves if the authors refuse to comply. But when an institution's investigation cites lesser problems such as 'beautification' of the images, 'sloppy science' or 'inadequate record-keeping' — sometimes misconduct is suspected but cannot be proven — we will base our response on the specifics of the case.

If there were no data fraud and no intent to deceive, for example, and if only one or two images were involved, we would allow the authors to publish an erratum and supply appropriate data, figures, original gels or images as supplementary information. Such an erratum can enhance the authors' reputation for honesty. But if most of the figures are problematic, we will strongly urge the authors to retract the paper, even if they were cleared of misconduct and even if the paper's main conclusions have been verified independently by other labs. The logic is that the published paper did not accurately reflect the data as they were collected.

We urge all readers or reviewers who think that images or other information have been inappropriately handled to bring your concerns to the attention of the editors. By doing so you help increase the reliability of the literature, and so prevent the waste of both time and money following up fraudulent leads and fabricated insights. We strongly believe that it is in our best interest to correct errors that we have published, once we have as much information as we are likely to get — a practice that all journals should embrace. ■

## Time to adapt

A new generation of clinical trials could yield breakthroughs, but must be handled with care.

At the American Association for Cancer Research annual meeting in Washington DC last week, a recurrent theme was complexity. The deeper scientists have delved into the fundamental nature of cancer, the more they have come to recognize its vast genetic diversity, which can make even tumours of the same cancer type seem unrelated.

It is encouraging to see researchers embracing new methods to deal