

# nature medicine

## Truth in numbers

The evaluation of science should be straightforward. You read a paper and you either agree or disagree with the conclusions derived from the data presented. Perhaps you'll cite the paper in your future publications—in order to refute, support or extend the findings. But you assume, in this process, that you have all the information necessary to judge the legitimacy of the authors' claims.

Why wouldn't you? Today, with the availability of online supplementary information, and public databases providing repositories for large datasets, the reader can often repeat the authors' experiments *in silico*, or at the very least scrutinize on screen each and every result.

Thanks to the ability to manipulate figures online, to magnify and to cross-compare, readers can often identify errors that authors, referees and editors may all have missed. Similarly, authors may notice mistakes in the published versions of their articles that went unnoticed in the course of its final production.

*Nature Medicine* is no stranger to these sorts of issues, which we address in a case-by-case manner. If the error can be legitimately explained and corrected, and the true data restored to the paper, readers will once again be able to evaluate for themselves the validity of the work.

A darker possibility here is that of fraud, but even in such instances there may be a trail visible to the canny reader. A recent high-profile case in point is an article on patient-specific embryonic stem cells published in *Science* in May 2005 by Woo Suk Hwang and his colleagues. What started as an instance of duplicated images has quickly turned into a far more serious problem following accusations of data fabrication. An investigation into what actually occurred is under way at the authors' institution.

In the meantime, Hwang has decided to retract the paper while firmly denying the allegations.

The problem with trusting what you read in the scientific literature acquires a whole new dimension in the case of clinical trials. In 2000, *New England Journal of Medicine (NEJM)* published the VIGOR study, which was designed to monitor gastrointestinal side effects in individuals with rheumatoid arthritis treated with the drugs Vioxx (rofecoxib) or Naprosyn (naproxen). The authors reported an incidence of 17 heart attacks in individuals taking Vioxx, resulting in a relative risk of myocardial infarction of 4.25. On 8 December 2005, the journal's editors published an expression of concern over these results upon learning that three additional heart attacks had been omitted from the published data, which translates to a fivefold greater relative risk of heart attacks associated with Vioxx treatment. The relevant data were removed from the manuscript before its submission to the journal.

Although the researchers reported the additional data to the US Food and Drug Administration, the conclusions published in *NEJM*, and derived from the restricted number of heart attacks, understate the risk of Vioxx use and misinform the reader.

Although evaluating scientific data is arguably straightforward, evaluating the integrity of those data can be a thornier issue. Peer review is one tool for judging the data in hand. Despite instances of misrepresentation of basic research data, or simply faulty conclusions, efforts to replicate published results—albeit time-consuming and frustrating—can often correct the scientific record. But clinical trial data are less amenable to independent verification owing to the enormous cost, effort and restrictions involved in obtaining them. In view of the impact on human health and lives, the scrupulous treatment of clinical results is therefore essential. The numbers, and not their interpretation, must speak for themselves.

## What it takes to make an impact

Scientific publishing has become a lot like Lewis Carroll's Red Queen's race—you need to run as fast as you can just to stay where you are. It is therefore not surprising that many journals try to remain competitive by constantly offering new content and services—from the promise of a quick editorial decision to the chance of receiving the latest scientific headlines in a podcast.

*Nature Medicine* is no exception. But in looking for new ways to engage our readers, we wanted to think slightly out of the box. So, we decided to take a research field (metabolic syndrome, in this case) and try to find out what makes it tick. We identified the papers that have captured the attention of the research community using both a subjective and an objective measure—asking leaders in the

field for their opinion and looking at citation figures, respectively. We then invited authors well versed in scientific policy to tell us how different countries invest in this discipline. We rounded out the project with the inclusion of a news section, brief profiles of people making headlines in the field, an article on the epidemiology of the condition and an analysis of the drug market. The result begins on page 23.

We wanted the project to be cutting edge, without falling off the edge entirely. So, we would welcome your feedback on how useful this information is and how to improve our next installment; we're prepared to run the Red Queen's race, but a little coaching might help us pick up the pace and stay ahead of the pack.