



We must be open about our mistakes

Greater transparency about the scientific process and a closer focus on correcting defective data are the way forward, says **Jim Woodgett**.

There is increasing unrest in global science. The number of retractions is rising, new examples of poor oversight or practice are being uncovered and anxiety is building among researchers. Those of us who work in the life sciences are discovering that some of our basic premises are flawed or inaccurate — cell lines have been misidentified and drug metabolism in animal models misjudged. Even high-profile findings have been questioned. Building on solid foundations was an architectural principle understood by the ancient Greeks and Egyptians, yet we may be constructing our castles on swampland. Is it a surprise that clinical translation fails so often?

Although most mistakes are unintentional and sometimes unavoidable, there are also deliberate efforts to deceive. Scientists (especially those of us in biomedical research) must do more to detect and be seen to correct errors as an on-going imperative.

We scientists must recognize that, to the public and politicians, we are a privileged and elite group. The products of our work are largely incomprehensible to non-experts — and even to colleagues on the periphery of the same field. Like an iconoclastic gentlemen's club, our community has developed rules and etiquette to maintain order. But, unlike a club, our sponsorship fees are paid by taxpayers and philanthropic donations.

The scientific community must be diligent in highlighting abuses, develop greater transparency and accessibility for its work, police research more effectively and exemplify laudable behaviour. This includes encouraging more open debate about misconduct and malpractice, exposing our dirty laundry and welcoming external examination. A good example of this, the website Retraction Watch (retractionwatch.wordpress.com), shines light on problems with papers and, by doing so, educates and celebrates research ethics and good practice. Peer pressure is a powerful tool — but only if peers are aware of infractions and bad practice.

We might also better foster and acknowledge aspects of research that are often overlooked. Efficient reagent exchange and sharing, for example, protects against cheats and can help to correct more common, unintentional errors.

The inherent uncertainty of research provides a safe haven for data omission, manipulation or exaggeration. Because interpretation of data is an imperfect science, there are few consequences for those tempted to oversell their findings. On the contrary, such faulty embellishment can help to determine whether a study is published — and where. Moreover, because failure to reproduce a published finding can be due to innocent factors, significant errors or falsehoods may be overlooked or simply pass unchallenged. As a result, modern science can churn out a flotsam of

dead-end data that pollute the literature and waste precious resources.

To counter this, barriers to correction of the public record should be low but rigorous. Publication of refutations or modifications should be encouraged by journals and funding agencies. One may argue that if a study is ignored it does no harm, but superfluous publication clutter is not benign. Minimally, it adds chaff to the wheat, but it also promotes mediocrity by example. More importantly, it provides meticulously documented evidence of apparent waste to funders and the public.

In a culture of publish or perish, the continuing growth in the number of scientific journals is hardly a surprise. But does this proliferation of papers reflect better science, or merely dilution? When a third of all papers are never cited, it is reasonable to question why so many are published. If the answer is simply as a form of accepted currency to

indicate productivity, then our evaluative systems must become less reliant on publication quanta.

Before we complain legitimately about grant success rates and funding pressures, we must ensure that our own house is in order. The act of publishing takes significant effort, yet we still publish low-impact studies as the required unit of research. We must learn to stop publishing everything and find other ways to document and recognize our studies, such as searchable publication of theses, meeting proceedings and posters.

And take the way most scientists access money from the public purse. Despite being the conduit to research funds, grant proposals undergo limited vetting of their content. Unlike manuscripts that pass peer review, these documents are treated as confidential, so their writers are difficult to hold to account. There are legitimate concerns about

intellectual property and fear of being scooped by competitors, but why not make such documents public after a period of time? Indeed, some scientists are already publishing their grant applications on the Internet, ostensibly to help educate new researchers. But this also allows validation and cross-checking and sets a new bar for transparency.

Other searchable Internet technologies, such as social media, blogs, slide-sharing sites and even video-sharing sites such as YouTube, are helping to lift the veil of secrecy over science. This increased transparency, associated with wider access and discussion, is a powerful weapon to reduce scientific misinformation of all sorts — and one that all honest and careful scientists should embrace. Transgressions and errors will be more quickly detected and more widely communicated when more of what we do is exposed to scrutiny. As security professionals know, the surveillance camera does not need to be turned on to deter. ■

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Jim Woodgett studies signalling pathways at the Samuel Lunenfeld Research Institute in Toronto, Canada.
e-mail: woodgett@lunenfeld.ca