

## OPINION



JAY TAYLOR

## Tie funding to research integrity

A change in institutional culture is needed to promote responsible scientific behaviour and prevent misconduct. That's unlikely to happen unless money is involved, say **Sandra Titus** and **Xavier Bosch**.

Despite attention to research misconduct and other issues of research integrity, efforts to promote responsible behaviour remain ineffective. Misconduct continues, and evidence suggests that increasingly stressful competition for funds and the rush to publish may further erode ethical behaviour<sup>1</sup>. We believe that real change requires a fundamental shift: to be taken seriously, standards of ethical conduct must be linked to funding.

Improvement is badly needed. We know from a meta-analysis of seven major studies that 2% of scientists have reported committing research misconduct at least once<sup>2</sup>. Many draw comfort from this observation because they conclude that there are only a few bad apples. Yet if we extrapolate this finding to the 400,000 US federally supported researchers and team members, 8,000 of them will commit research misconduct during their career and most of the instances will go undetected. In addition, many believe that there is a more serious erosion of science, beyond official misconduct. On the basis of six pooled studies, up to 34% of scientists admitted to one or more questionable research practices such as inappropriate analysis, over-interpretation of findings and changing study design<sup>2</sup>. And a survey demonstrated another dimension of the problem: only 24% of the researchers who had observed possible research misconduct

### SUMMARY

- New oversight process would boost responsible institutional behaviour
- Requirements would go beyond standardized responsible-research courses to values, policies and rules
- Centres of excellence would gain right to compete for additional funds

reported it to their institutional official<sup>3</sup>. This strongly suggests that researchers do not feel duty-bound or safe enough to come forward.

Undergraduate cheating is pervasive, with students adopting the behaviour of their peers<sup>4</sup>. The millennial generation (in college since 2000) spends innumerable hours in communication with others; sharing becomes central to their lives and this socialization teaches them how to cut and paste inappropriately or cheat on exams<sup>5</sup>. Their inability to make independent decisions, along with misunderstandings about academic integrity, suggests that this generation may cheat throughout their lives, whether they are scientists, builders or bankers.

Responsible conduct of research (RCR) programmes have developed slowly in the United States over the past 20 years. A lack of comprehensive national regulation has created an inconsistent approach to promoting integrity.

There has been pervasive lobbying by scientists claiming that such efforts are unnecessary and obstructive, stymieing the development of standards to protect data integrity.

The National Science Foundation (NSF) and National Institutes of Health (NIH) both issued new directives in 2009, instructing applicants for federal research training funds to provide RCR training to their trainees. The NSF didn't set requirements for the content of the training, leaving it up to institutions; the NIH established a list of a dozen required focus areas, from laboratory management to responsible authorship. The NIH directed that programmes must include eight hours of face-to-face training, preferably with faculty involvement, specifically prohibiting exclusively web-based training. The NSF did not specify or suggest format issues. As a consequence, universities that struggle to pay for RCR programmes are likely to triage students receiving NIH funding to staff-directed programmes, and those with NSF support to less-intense online training.

Institutions must create RCR plans to receive certification to provide training for the NSF, and attach RCR plans of action to each NIH proposal. The NIH has not set standards for assessing and reviewing the quality of RCR plans in the past 20 years<sup>6</sup>. Currently, the NIH says that future scientific reviewers will

evaluate RCR components, but will not use these evaluations in advising whether to fund scientific proposals. No standards have been announced for these evaluations. Rather, the NIH seems to rely on institutional and researcher self-regulation to ensure research integrity.

We recommend a new oversight process, in which institutions are judged on their plans and performances in what we call 'responsible institutional behaviour' (RIB) — a broad term that encompasses much more than RCR courses. Whole institutions, rather than individual researchers, should be rewarded or penalized, to encourage campus-wide reinforcement of good practice. We envisage a system in which centres demonstrating the most commitment and effort would receive 'centre of excellence' status. Researchers associated with these centres would have access to additional competitive NIH and NSF funds, in a similar way to the National Cancer Institute's centres-of-excellence programme.

Only a broad scheme like this can really change the culture at research institutions, giving research integrity the importance and respect it needs and deserves. Scientists in the United States receive a total of more than US\$40 billion in research awards each year; the taxpayer expects and deserves accountability. Although money might be tight in coming years, research integrity is too important to neglect.

Fortunately, a culture of research integrity, once established, will be self-perpetuating to some extent. Social science tells us that in groups where everyone knows the rules it is harder for members to deviate, because informal social control within the group acts as an enforcer<sup>7</sup>.

### Mandatory and frequent

Although we envision RIB as a broad policy effort, good RCR courses remain a vital part of the programme. Such courses should teach accepted standards of scientific conduct and include cutting-edge discussions on issues such as image manipulation. Explicit teaching objectives should be developed, implemented and evaluated, as in any course. One inventory that identifies objectives and topics for seven of the nine core RCR teaching areas was developed through an expert elicitation process in 2009 (ref. 8). This is a good start. Other areas, such as ethical decision-making, social responsibility and cultural sensitivity, need to be identified and developed. Teaching style is also important to address: a 2009 study of 26 ethics programmes concluded that case-based and interactive discussions were more successful than lectures in teaching problem-solving behaviour<sup>9</sup>.

Research faculty member, student and support staff participation in these classes should be mandatory and frequent. Students

should have training at the beginning, during and at the end of a PhD or postdoc course. Faculty members should actively participate (as trainer or trainee) annually. Ideally, RCR should be a graduate-level, credit-giving course, such as those provided at Colorado State University in Fort Collins and Duke University in Durham, North Carolina. RCR 'training' needs to be recognized more fully as RCR 'education'.

Faculty members should be taught how to teach RCR. Trainer training is neglected in higher education generally, and particularly in RCR. The Poynter Center for the Study of Ethics and American Institutions at Indiana University in Bloomington provides one of a few such good programmes. Likewise, faculty members should be taught how to advise and mentor their students — a crucial part of the ethical training of young researchers.

Institutional leaders, from provosts, presidents and rectors down, need to establish a cultural expectation for honest and responsible research behaviour. University research-integrity officers, who are officially designated to handle NIH-funded research misconduct cases, should help to build institutional values and standards.

Universities should also establish and post clear rules about authorship, conflicts of interest and data management. For example, when administrators at Johns Hopkins University in Baltimore, Maryland, determined that their faculty members were unaware of standard medical authorship rules, such as not allowing guest or ghost authorship, they posted a good set of rules on the web and circulated it to all faculty members. At the end of a year the university plans to follow up with an assessment to see whether the awareness and behaviour of its faculty members have changed.

Institutions require feedback. Some Scandinavian countries appoint external ombudsmen to evaluate whether social programmes are discriminatory or successful. This is an excellent idea. The US Institute of Medicine also advocates external review to provide an institution with an objective view of their efforts to promote integrity. An editorial in *The Lancet*<sup>10</sup> similarly urged the use of external reviewers to rank European institutions based on whether and how RCR is taught; it argued that the public's trust will be strengthened if RCR is used as a mandatory condition of government funding.

We envision a system in which a group of evaluators — perhaps from a new joint NIH and NSF office — would check each institution's RIB, including the existence and effectiveness of RCR programmes, faculty-member training and involvement, institution-wide policies

on authorship or data stewardship rules, strict anti-cheating rules and regulations, and outreach activities by institutional leaders. This would need to involve audits with site visits and interviews, rather than simply evaluating paperwork. Such a review could be roughly similar to how the US Food and Drug Administration performs oversight of institutional review boards, involving field inspectors capable of occasionally suspending research privileges until defects are corrected. Feedback and coaching should occur after each inspection.

Existing RCR programmes are highly variable in availability and effectiveness. There should be consistency across universities and schools in all areas of research integrity. An RIB plan could help to achieve this.

Over the past few decades, the US government has moved towards deregulating many systems — including the financial sector, which led in part to the fiscal crisis.

Now, new banking rules are being developed, with enforceable standards, to prevent future economic collapse. RCR has a similar degree of non-regulation; action should be taken to change that, and to prevent a future crisis in research integrity.

We propose that our RIB plan serves as a foundation for these efforts. Fundamentally, we believe that research integrity needs to be strengthened and this requires financial incentives. ■

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