Fraud Advisory Panel

Fraud in Research
Is it new or just not true?

Occasional Paper: **01/07**

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'From that day, I understood, as I never had before, the frauds that creep into science every now and then. Sometimes they must be quite unconscious: the not-seeing of facts because they are inconvenient, the delusion of one's own senses. As though in my case I had not seen, because my unconscious self chose not to see…. Sometimes, more rarely, the fraud must be nearer to consciousness; that is, the fraud must be realised, even though the man cannot control it. That was the point of my temptation. It could only be committed by a man in whom the scientific passion was weaker for the time than the ordinary desires for place or money. Sometimes it would be done, impulsively, by men in whom no faith was strong; and they could forget it cheerfully themselves and go on to do good and honest work. Sometimes it would be done by a man who reproached himself all his life. I think I could pick out most kinds of fraud from among the mistakes I have seen; after that afternoon I could not help being tolerant towards them.'[1]

The Search by C P Snow

[1] C P Snow (1934) *The Search*. First published (1934) by Gollancz; reprinted (1972) by Penguin Books, 93-94. Reproduced with permission of Curtis Brown Group Ltd, London on behalf of the Estate of CP Snow. Copyright © CP Snow 1934

Introduction

The issue of fraud and misconduct in research is not generally a subject at the forefront of most people's minds. However, the effects of misconduct can be serious and, at its very worse, have damaging implications for society as a whole. Consider for a moment the possible ramifications of a new drug brought to market on the basis of fraudulent findings or the suppression of important information pertaining to its side-effects.

Misconduct not only wastes public and private funds, but it can also damage the research record, compromise public policy and endanger the well-being of whole sectors of society. For those associated with the research, either directly or indirectly, the consequences can be severe, ruining reputations and careers.

Prevention is the most effective means of addressing the problem rather than having to withdraw or retract research papers already published and in the public domain. Therefore, authors, journals and institutions all have a critical role to play in safeguarding the integrity of research from fraud and misconduct.

This paper outlines the proceedings of a conference held by the Fraud Advisory Panel on 8 May 2007 on fraud and misconduct in research. The views expressed by all speakers at this event were their own and did not necessarily reflect the views of their organisations or the Fraud Advisory Panel.

Speakers included experts from the scientific, biomedical and academic fields including Dr Jane Barrett (MedicoLegal Investigations Ltd), Dr Philip Campbell (*Nature*), Guy Dehn (Public Concern at Work), Professor Ian Diamond (Economic and Social Research Council), Dr Sabine Kleinert (Committee on Publication Ethics; *The Lancet*), Professor Nicholas Steneck (US Office of Research Integrity; Professor Emeritus of History at University of Michigan), and Dr David Wright (Emeritus Reader in Microbiology at Imperial College London). The conference was chaired by Professor Sir Ian Kennedy (Emeritus Professor of Health Law, Ethics and Policy at University College London).

Defining fraud and misconduct

Official definitions of misconduct vary considerably across jurisdictions. However there is a general consensus that it must involve a deliberate or intentional act or omission which is designed to deceive regardless of any pecuniary gain.

In the United States the definition of research misconduct that applies to all federally-funded research is:

> *'…fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results'*[2]

[2] Federal Register (2000) *Research Misconduct Policy* [online] 65(235). Available from http://ori.dhhs.gov/.

The United Kingdom has yet to adopt a common definition of fraud and misconduct, but it is envisaged that the UK Research Integrity Office (UKRIO) will develop a code of practice which will include a definition that can be used by academia and the health sector.

Fraudulent behaviour is one of the most serious forms of misconduct. Under the Fraud Act 2006 a fraud is committed when a person dishonestly makes a false representation, wrongfully fails to disclose information or abuses a position of trust with the intent to make a gain or to cause loss or to expose another to the risk of loss.[3]

Case Study 1: Jan Hendrik Schön (Physicist)

Claim: To have created a transistor using organic molecules.

Misconduct: Schön used duplicate data (particularly 'noise') in a number of experiments. An independent committee found that Schön had fabricated and falsified data between 1998 and 2001.

Verdict: Dismissed by Lucent Technologies (Bell Laboratories); eight-year sanctions imposed by the German Research Foundation (DFG) including denial of right to apply for funding, to act as a peer reviewer and to vote in DFG elections; papers retracted from journals including *Nature* and *Science*.[4]

Common types of misconduct

There is a broad spectrum of activities that could be viewed as misconduct in research ranging from minor infringements such as failing to carry out adequate literature searches and 'gift authorship' (see below) to more serious breaches such as fabrication, falsification and plagiarism.

Some of the more common and widely reported types of misconduct include:

- **Application/grant fraud** Applications for funding are made for one purpose but used for another. This may also include inaccurate or misleading applications for ethical approval.

- **Breach of confidentiality** Divulging information which identifies subjects who have been guaranteed confidentiality.

- **Collusion and concealment** Colluding or knowingly concealing the misconduct of other researchers and/or authors.

[3] *See* Fraud Act 2006. Available from www.opsi.gov.uk.

[4] Alcatel-Lucent (2002) *Bell Labs announces results of inquiry into research misconduct* [press release], 25 September. Available from www.alcatel-lucent.com; Deutsche Forschungsgemeinschaft (2004) *DFG imposes sanctions against Jan Hendrik Schön* [news archive], 15 October. Available from www.dfg.de; Campbell, P. (2007) Misconduct in research: who is responsible for what? *Fraud in Research Conference*, London, 8 May 2007.

- **Falsification** Altering or adjusting the results or selectively choosing to report findings that better fit with a predefined hypothesis. This may include ignoring outliers or not providing data on side-effects (e.g. Eric Poehlman).

- **Fabrication** Inventing or topping-up raw data in a survey or experimental research (e.g. Jon Sudbø).

- **Lack of consent or ethics approval** Failing to obtain informed consent from subjects or failing to obtain ethics approval to conduct the research (e.g. Hwang Woo-Suk).[5]

- **Misrepresentation** Providing false credentials such as qualifications, experience or citations of work. This may also include selective citation of research results or false citation of interview material.

- **Plagiarism** Presenting another person's text, data, images or ideas as one's own. This may include unreferenced use of another person's published or unpublished work.

A Special Case: Gift Authorship

Gift authorship refers to the practice of 'gifting' a person, often a senior researcher or head of department, an authorship on a research paper for which they have had little or no intellectual input.

Recipients of gift authorships receive the accolades associated with well-received and/or groundbreaking research but can also have their careers and reputations damaged by association with research found to be fraudulent or misleading.

Many journals have sought to eliminate gift authorship through publication guidelines, including the International Committee of Medical Journal Editors (ICMJE) and Committee on Publication Ethics (COPE).[6]

[5] *Also see* United States Department of Health and Human Services' Office for Human Research Protections which reviews compliance with federal regulations on the protection of human subjects in HHS-sponsored research. It publishes findings of non-compliance in determination letters. Available from www.hhs.gov.

[6] *See* International Committee of Medical Journal Editors (2006) *Uniform requirements for manuscripts submitted to biomedical journals: writing and editing for biomedical publication.* Available from www.icmje.org; *also see* Committee on Publication Ethics *Guidelines on good publication practice*. Available from www.publicationethics.org.uk.

How widespread is misconduct in research?

The true extent of fraud and misconduct in research is largely unknown. However studies of research behaviour suggest that fraud and misconduct occurs more frequently than implied by the small number of high-profile cases which receive coverage in the mainstream media.

- Minor misconduct appears to be a more common occurrence than fraud. It has been estimated that fraud constitutes approximately 0.1-1.0% of the total research output while questionable practices occur in 10-50% of all publications.[7]

- Over the last 10 years only 26 cases of alleged fraud (including plagiarism or misrepresentation) have been reported to Research Councils UK, and of these only two have been substantiated.[8]

- COPE has considered 285 cases of alleged misconduct in the last 10 years and in 219 cases there was evidence of some form of misconduct as presented by the editor involved (77%).[9]

- In 2006 COPE considered 26 cases which contained evidence of misconduct.[10] Also in 2006 the US National Science Foundation (NSF) reported seven cases (March to October)[11] and Office of Research Integrity (ORI) 14 cases of research misconduct.[12]

One of the difficulties in quantifying fraud and misconduct in research is determining what constitutes poor research practice as opposed to deliberate acts of fraud and misconduct. A recent survey of early and mid-career scientists found that overall 33% had engaged in at least one questionable research practice during the last three years.[13] It also found that over 12% of respondents had overlooked others' use of flawed data or questionable interpretation of data.[14]

When fraud and misconduct is discovered it is most often through peer review and independent verification or replication of research findings. Fraudsters often make elementary mistakes and errors. For example, Jon Sudbø and Jan Hendrick Schön both used duplicate data (dates of birth; noise).

At present very little is known about the motives of researchers who engage in fraud and misconduct. Is it due to pressure from employers or funding agencies

[7] Steneck, N. (2006) 'Fostering integrity in research: definitions, current knowledge, and future directions' *Science and Engineering Ethics*, 12, 53-74.

[8] Diamond, I. (2007) Good research governance in the United Kingdom, *Fraud in Research Conference*, London, 8 May 2007.

[9] Kleinert, S. (2007) The role of editors in fostering research integrity, *Fraud in Research Conference*, London, 8 May 2007.

[10] As above.

[11] National Science Foundation & Office of Inspector General. (2007) *Semiannual report to congress: March 2007*. Arlington: National Science Foundation & Office of Inspector General.

[12] Office of Research Integrity (2007) *Handling misconduct – case summaries*. Available from http://ori.dhhs.gov [Accessed 11 July 2007].

[13] Martinson, B.C., Anderson, M.S., & de Vries, R. (2005) 'Scientists behaving badly' *Nature*, 435, 737-738.

[14] As above.

to publish research findings quickly, a desire for professional acclaim or recognition, to enhance one's reputation, or for financial benefit? Further research is required to better understand the factors which lead to the commission of such behaviours.

The victims

A variety of individuals or organisations may fall victim to fraudulent research and misconduct, depending upon the type of research being conducted and the intended end-user or audience.

- **Volunteers** When informed consent is not obtained. This may include patients or individuals recruited through various means.
- **Research community** The industry as a whole may suffer reputational damage and suspicion as a consequence of the actions of a minority. Public confidence in the integrity of research may be undermined as a result.
- **Funding agencies** Private and public sector organisations that provide grants and/or funds based upon fraudulent applications or results.
- **Co-authors** Innocent co-authors who are implicated in fraudulent or questionable research may suffer irreparable reputational damage through association.
- **Wider society** Consider for example the doctor who makes up data in drug trials which are then used by a pharmaceutical company to bring a product to market, or the researcher who selectively chooses not to report the adverse side-affects of a particular drug.

Case Study 2: Jon Sudbø (Physician, Dentist)

Claim: That long-term use of non-steroidal anti-inflammatory drugs (NSAIDS) was associated with a lower risk of oral cancer.

Misconduct: Sudbø based research findings on fictitious patients. An independent commission found Sudbø had fabricated and manipulated data.

Verdict: Authorisation as physician and dentist revoked by the Norwegian Board of Health; PhD revoked from University of Oslo; papers retracted from journals including *The Lancet*.[15]

[15] Investigation Commission (2006) *Report from the Investigation Commission appointed by Rikshospitalet – Radiumhospitalet MC and the University of Oslo January 18 2006*. Available from www.radium.no; Norwegian Radium Hospital (2006) *Researcher and hospital criticized by Commission of Inquiry* [press release], 30 June. Available from www.radium.no; Norwegian Board of Health Supervision (2006) *Case involving scientific fraud 2005 – 2006*. Available from www.helsetilsynet.no.

Reporting misconduct

Whistleblowing is an important mechanism in detecting and deterring fraud and misconduct in research.

According to Public Concern at Work (PCAW) an independent authority on public interest whistleblowing which promotes compliance with the law and good practice in organisations across all sectors:

> *'Someone blows the whistle when they tell their employer, a regulator, customers, the police or the media about a dangerous or illegal activity that they are aware of through their work.*
>
> *Whistleblowing can inform those who need to know about health and safety risks, potential environmental problems, fraud, corruption, deficiencies in the care of vulnerable people, cover-ups and many other problems. Often it is only through whistleblowing that this information comes to light and can be addressed before real damage is done.'*[16]

Reports can be made internally or externally to a variety of organisations dependent upon the nature of research, the risks involved and the status of the person who is making the report. For example, journal editors may report incidences of serious misconduct to the author(s)' employer or funding agency, or to an appropriate independent authority (e.g. doctors to the General Medical Council).[17] University employees may also have the option of reporting to the person nominated under the university's formal whistleblowing policy.

Information about misconduct may be received from a variety of sources including colleagues, research assistants or participants, health authorities, and/or drug companies. In a small minority of cases allegations may be false. Therefore an assessment may need to be made of the whistleblower's evidence, motivation and credibility.

In the UK whistleblowers are protected from dismissal and victimisation by the Public Interest and Disclosure Act 1998 (PIDA).

Case Study 3: Hwang Woo-Suk (Biomedical Scientist)

Claim: To have cloned human embryonic stem cells.

Misconduct: Hwang fabricated data and pressured female staff to donate eggs. Other professors were implicated in the misconduct.

Verdict: Dismissed by Seoul National University; expelled from the Korean Society for Molecular and Cellular Biology; licence on embryonic stem cell research revoked by South Korean Government; charged with fraud and embezzlement; papers retracted from *Science*.[18]

[16] Public Concern at Work (2006) *What is whistleblowing?* Available from www.pcaw.co.uk [Accessed on 15 August 2007].

[17] Committee on Publication Ethics *Guidelines on Good Publication Practice*. Available from www.publicationethics.org.uk.

[18] The Register (2006) *South Korea sacks cloning prof*, 20 March. Available from www.theregister.co.uk; BBC News (2006) *Profile: Hwang Woo-suk*, 12 May. Available from www.bbc.co.uk; China View (2006) *S Korean university dismisses professorship of stem cell researcher*, 20 March. Available from www.chinaview.cn.

Preventing fraud and misconduct

As with all other forms of crime, prevention is better than cure.

Key to the successful prevention of fraud and misconduct is the creation of a zero-tolerance culture within the research community which is supported by clearly communicated whistleblowing and anti-fraud policies, awareness raising activities, educational initiatives and the encouragement of secondary analysis and independent verification of research findings.

For example, one key method of helping to avoid fraud is to require open publication of, and access to, all anonymised data used in published research and papers. This immediately allows secondary analysis and review, both providing a major deterrent to poor research practice as well as a means of independent secondary verification. In addition, existing safeguards and controls must be robust, regularly reviewed and enforced.

Fraud and misconduct in research can be prevented. Co-authors, journal editors, research employers and funding agencies all have a vital role to play in protecting the integrity of research from fraud and misconduct.

Co-authors

All collaborators must share some degree of responsibility for ensuring the integrity of a research paper of which they are a co-author, although the relative responsibility may vary depending upon the nature of their expertise and the centrality of individual contributions.

Shared credit for the accomplishment of a paper must be matched with shared responsibility. Therefore it is in the interests of all co-authors to make a formal author contribution statement in which they declare their scope of involvement and understanding of the data.

The consequences of being associated with a paper found to be misleading or fraudulent can have devastating effects on the professional credibility of co-authors, as was evidenced in the cases of Malcolm Pearce and Hwang Woo-Suk.

Journal editors

Most academic and scientific journals rely upon peer review for an assessment of the quality, importance and possible inclusion of fraudulent results in articles submitted for publication. Where serious concerns exist, editors may commission scientists to independently verify the results.

COPE also provides a forum for editors to anonymously discuss and receive advice on cases of suspected fraud and misconduct before and after publication. COPE has produced a Code of Conduct for Editors which includes an obligation on editors to take allegations and/or suspicions of misconduct seriously.[19]

[19] Committee on Publication Ethics *Guidelines on Good Publication Practice*. Available from www.publicaitonethics.org.uk. *Also see* Committee on Publication Ethics *Code of Conduct for Editors of Biomedical Journals*. Available from www.publicationethics.org.uk.

Some of the common difficulties experienced by journal editors who suspect misconduct include:

- A lack of, or insufficient response from, the submitting author(s)
- Identifying who can investigate the allegations when no institution is associated with the research (i.e. it is independent research)
- What to do when an institution undertakes an inadequate investigation of allegations
- How to manage the analysis of raw data, and finally
- What to do if the alleged misconduct remains unproven at the end of enquiries.

Journals respond to fraudulent and misleading research in a variety of ways. Allegations that are substantiated prior to publication are likely to result in the journal rejecting a paper, whilst post publication a paper may be retracted and withdrawn. However, the problem of fraud and misconduct in research is often exacerbated by the continued citation (or inclusion in reviews) of retracted papers and their continued availability in electronic format on the internet.

Journals may also change their criteria for the submission of papers for particular types of research. For example, as a consequence of the Hwang case, *Nature* began to ask authors to provide both nuclear and mitochondrial DNA fingerprints for all cloning papers submitted to it.

Educational institutions

Universities and other educational institutions also have a role to play in maintaining the integrity of the research record, and many have introduced guidelines to discourage misconduct, for example, the use of e-notebooks which can be archived and made available for future scrutiny.

Funding agencies (public and private sector)

Public and private sector funding agencies provide important oversight in respect of research that has been commissioned, sponsored or funded by them.

The seven research councils in the UK have common policies on fraud and issue guidelines for all recipients of research funds. The framework for the prevention of fraud is buttressed by an assurance and audit scheme, and provision of training and whistleblowing procedures required of all funded research organisations. The sanction against fraud is the withdrawal of funding and prohibition of further research applications for up to 10 years, or longer where criminal acts are involved.[20]

[20] Diamond, I. (2007) 'Good research governance in the United Kingdom', *Fraud in Research Conference*, London, 8 May 2007.

In addition, for the last 40 years the Economic and Social Research Council (ESRC) has required all crude data generated by their funding to be deposited, stored and made widely available for scrutiny and secondary analysis. This allows the detection of both unintentional error as well as misconduct, and provides a real incentive for the researcher to ensure that all data is both genuine and valid.[21]

One firm which carries out investigations into allegations of fraud and misconduct in the pharmaceutical and heath sectors is MedicoLegal Investigations Ltd (MLI). Funded by subscriptions from the pharmaceutical industry, MLI also undertake investigations for NHS trusts, health authorities and universities. Cases are referred to the General Medical Council (GMC) for determination with approximately 96% resulting in guilty verdicts for serious misconduct. The GMC may impose a variety of sanctions including removal from the medical register.[22]

Emerging issues

Looking to the future there are a number of emerging issues that require further consideration by the research community as a whole. These include:

- **Carelessness:** Anecdotal evidence suggests that claims of carelessness by authors are on the increase. When does carelessness become misconduct?

- **Image manipulation:** Pictures included in papers submitted to journals are touched up to look better using image editing software such as Photoshop and iPhoto. When does digital enhancement become mispresentation? This is an issue currently being taken seriously by a number of journals. It also raises issues relating to the accessibility of raw data and statistical analysis.

- **Responsibilities of co-authors:** The role of co-authors in ensuring the integrity of research papers on which they have collaborated. To what extent should they be held accountable for the results?

- **Global co-operation:** There is an increasing need for the research community to collaborate and co-operate on a global basis in order to foster greater research integrity. Is the impact of fraudulent or misleading research confined to specific geographical boundaries?

- **Education and training:** Better education and greater awareness of what is considered fraud and misconduct in research. What are the key messages for undergraduates/postgraduates in respect of acceptable/unacceptable research behaviour?

[21] As above.

[22] General Medical Council (2005) *Indicative Sanctions Guidance for Fitness to Practise Panels*. Available from www.gmc-uk.org.

Case Study 4: Malcolm Pearce (Gynaecologist)

Claim: To have relocated an ectopic pregnancy that resulted in a birth.

Misconduct: Pearce fabricated research findings. Discovered by a hospital whistleblower.

Verdict: Struck off the medical register by the General Medical Council; Geoffrey Chamberlain resigned from his posts due to his gift authorship of the paper; papers retracted from journals including the *British Journal of Obstetrics and Gynaecology*.[23]

Useful links

Fraud Advisory Panel
www.fraudadvisorypanel.org

Committee on Publication Ethics
www.publicationethics.org.uk

MedicoLegal Investigations Ltd
www.medicolegal-investigations.com

(US) Office of Research Integrity
www.ori.dhhs.gov

Public Concern at Work
www.pcaw.co.uk

The UK Research Integrity Office (UKRIO)
www.ukrio.org.uk

[23] Committee on Publication Ethics (2004) *COPE Report 2003: Annual Report of the Committee on Publication Ethics*. London, BMJ Books. *[See in particular Session 2: Editorial Accountability (Chair: Richard Smith) Editorial misconduct: time to act.]*; Smith, R. (2006) 'Research misconduct: the poisoning of the well' *Journal of the Royal Society of Medicine*, 99, 232-237.

Acknowledgements

The Fraud Advisory Panel would like to thank the speakers who participated in the Fraud in Research Conference on 8 May 2007 and Mia Campbell for their assistance in the preparation of this publication. Special thanks to Grant Thornton UK LLP for their generous sponsorship of the conference.

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OTHPLN6743 9/07