

## **Submission to the Strategic Review of Health and Medical Research in Australia**

All three authors are happy for this submission to be made available to the public.

### **Short summary**

The systems used to fund peer review science should themselves be based on peer reviewed science. Rigorous research has a fantastic record at improving health and medicine, but this most valuable tool has rarely been applied to one of the most important health and medical decisions, namely, deciding what research is funded. Current funding processes are based on expert opinion, and reactionary changes to complaints or glitches. Improved funding processes would mean that the best Australian medical research was funded, which then creates the best health outcomes for all Australians. Research into funding can only happen if funding bodies like the ARC and NHMRC are open to conducting research on their own systems. These bodies are currently extremely risk averse and wary of scientific research that applies to them.

To reduce the problem of risk aversion, and to allow funding agencies to innovate and show leadership, we propose a radical refocusing of funding bodies by making them independent of government. Independent bodies would be free to do clever things like: simplify proposals and lower costs; give substantial and unambiguous feedback to researchers who need to improve; be entrepreneurial and engage with the private sector, foreign governments and philanthropists; and use technology and information exchange to revolutionise the way that knowledge is generated. We believe this radical change would lead to less bureaucratic and more research-focused funding agencies that would engage more with the Australian research community. Making these agencies independent would give Australia a significant competitive research advantage compared with the rest of the world. An apposite example is the improvement in fiscal policy since the Reserve Bank of Australia was made independent of government.

### **How might health and medical research be best managed and funded in Australia? (Terms of Reference 2, 3 and 7)**

3. Opportunities to improve coordination and leverage additional national and international support for Australian health and medical research through private sector support and philanthropy, and opportunities for more efficient use, administration and monitoring of investments and the health and economic returns; including relevant comparisons internationally.

Our response focuses on a **more efficient use of investments**. The current grant peer review system is very inefficient because of the large amounts of time that researchers spend writing and reviewing proposals. A simpler system would give researchers more time to focus on research. Australia has the opportunity to provide world leading direction in this area, but this will open happen if the major funding bodies are open to conducting research.

Using data from a survey conducted in March 2012, we estimate that researchers spend a median of 20 days per year writing NHMRC Project grant proposals (inter-quartile range 14, 30 days; based on a sample of 212 researchers nationwide). Multiplying 20 days by the 3,737 NHMRC Project Grant proposals and 3,544 ARC Discovery Grant proposals in the last round gives 606 academics working throughout the year solely writing grant proposals. This huge

figure could easily be reduced with great benefits to Australian researchers and little costs in terms of less information for peer review. This could be achieved by reducing the volume and complexity of proposals, and allowing researchers to focus on the key science. Unfortunately the reverse has happened over time, as proposals are getting longer and more complex.

Long proposals also have implications for peer review. Peer reviewers and grant review panel members are presented with a large amount of information. A Project Grant panel member is given up to 100 proposals of 80 to 100 pages. Many proposals are turgid and poorly presented. Expecting reliable judgements of research quality amid this ocean of information is optimistic.

There is no evidence of how long a grant proposal should be in order for reliable funding decisions to be made. We therefore recommend that different length proposals are compared in order to find the optimal size. The same proposal would be sent to multiple reviewers, but each reviewer would see a different length version. If the same decisions were consistently made using shorter proposals then it would provide good **scientific evidence** for shortening proposals. Our team is researching this area and in 2011 we won an NHMRC Project Grant with the aim of comparing the reliability in peer review when using shorter proposals, and to assess the costs saved in researcher and reviewer time.

The reasons why much of the current information is requested is a perceived need to answer ministerial requests, and to have an audit trail in case something goes wrong. There has also been a steady growth in the proposal length over time, as new questions are added to plug perceived holes. This risk averse behaviour comes at the expense of researchers' time.

Applications should be simple for both for researchers and reviewers. Researchers could write a scientific proposal, short track record and one-page budget, make a PDF and email it to the NHMRC. Researchers would save time, universities would employ less bureaucratic overheads, and the NHMRC and peer reviewers would enjoy massive reductions in their workload. The only downside is less information for bureaucratic purposes. Funding bodies are already struggling to cope with demands of the bureaucracy, and cracks are beginning to appear due to the steadily growing number of applications per year.

**Reliably funding the best research is an extremely difficult and an inherently uncertain task.** With so many excellent health and medical research proposals there will always be excellent proposals that miss out. There is also an element of luck in success, as up to 30% of rejected proposals in the NHMRC project grant scheme would have been funded had they been reviewed by a different panel (Graves et al 2011). **Failure and uncertainty in funding peer review will always be with us.** This hard to swallow fact needs to be accepted by researchers, funding agencies, politicians and the public.

Uncertainty cannot be made to go away by using more reviewers because the difference in scores between successful and rejected proposals is knife-edge thin. Using data from 2,983 Project Grants proposal submitted in 2009, the average difference in score between neighbouring proposals was just 0.06 on a scale of 1 to 7, with a standard deviation of 0.43. To have a 95% probability of showing a difference of 0.06 between two neighbouring proposals would require 1,528 reviewers per proposal (with a 5% significance level). For many fields this

number of expert reviews is more than the active number of researchers worldwide. A simple sample size calculation therefore shows that **it is impossible to remove the uncertainty in peer review.**

Every experienced Australian researcher knows the success of a proposal is influenced by chance, but this unpalatable truth is never mentioned or taken into account by Australian funding agencies. **There should be more openness about randomness**, and it could even be used to allocate funding. Proposals could be categorised by reviewers into: 'Always Fund', 'Never Fund' and 'Maybe Fund'. Those that make it into the 'Always Fund' category are successful, with the remainder of the budget given at random to those in the 'Maybe Fund' category. Random allocation has been used by a US funding agency (Ioannidis 2011), and to assign places to equally qualified medical and school students (Stone 2008).

Using the three categories of 'Always Fund', 'Never Fund' and 'Maybe Fund' has the added advantage that it will be easily understood by foreign reviewers, or Australian reviewers who are not yet familiar with the esoteric scoring system used to rate Project Grants.

**The feedback on rejected proposals from both the ARC and NHMRC is paltry.** Yet massive costs are incurred generating a lot of data that could be used to give comprehensive feedback. The NHMRC give the overall and criteria category scores for rejected Project Grants with no explanations. The ARC give even less for rejected Discovery projects, giving a ranking bracket such as, "ranked as not in the top 25% of unsuccessful proposals". If researchers knew why they had failed then they could put in a better proposal next time round. They may even decide against re-submitting if they realised that they had targeted the wrong scheme, or needed more time to, for example, collect more pilot data. **It is a fundamental flaw of the current funding peer review process that the reasons for rejection are not shared with the researchers.** Without any feedback researchers are left to guess what changes they should make or whether they should even re-submit.

A better system would give the researcher the reasons behind why the proposal was rejected, using the data created during the peer review process. This could include a transcript (or recording) of panel meetings, and the scores from all panel members and external reviewers. The panels are rightly made up of some of the best scientists in the country, and researchers would benefit from their opinions. Discarding these expert reviews wastes valuable information. The panels may change their behaviour if their comments are recorded. Whether this would be a change for the better or worse is unknown. Again we argue that these changes could be investigated using research into the pros and cons of open peer review of grant proposals.

The ARC and NHMRC give such thin feedback because they want to avoid giving ammunition for appeals, as appeals take up huge amounts of staff time. This is a disappointing but somewhat understandable attitude. An independent and so less risk averse funding agency would be able to tolerate appeals from disgruntled researchers.

7. Examine the institutional arrangements and governance of the health and medical research sector, including strategies to enhance community and consumer participation. This will include comparison of the NHMRC to relevant international jurisdictions.

**Governance of the health and medical research sector:** Funding bodies have two parts: a scientific part and a bureaucratic part. The scientific part is concerned with funding the best medical research, the bureaucratic part is concerned with avoiding political disasters, which leads to risk averse decisions. We propose a radical refocusing on the scientific part of funding bodies by making them independent of government. Funding bodies would be similar to the Reserve Bank of Australia, who make difficult decisions on interest rates that are independent of the current government, and are for the benefit of the country.

The NHMRC and ARC could be turned into government funded non-governmental organisations (NGOs). They could be legally constituted and remain independent from politics. There would be a governance system with power to change senior managers who fail to perform.

A funding NGO could make strong decisions, and would be able to stand up to political pressure and disgruntled researchers. The welfare gains would be large because they could do clever things like: simplify proposals and lower costs; give substantial and unambiguous feedback to researchers who need to improve; be entrepreneurial and engage with the private sector, foreign governments and philanthropists; and use technology and information exchange to revolutionise the way that knowledge is generated. There is currently no innovation in grant funding schemes, instead changes are made in reaction to complaints or to gather more information based on the flawed reasoning that more information must create a better process.

## References

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## Professor Nicholas Graves

Queensland University of Technology  
60 Musk Avenue, Kelvin Grove  
Queensland 4059  
Phone: 07 3138 6115

## Associate Professor Adrian Barnett

Queensland University of Technology

## Professor Philip Clarke

The University of Melbourne