



Te Ara Paerangi Future Pathways Green Paper Submission Department of Pathology, Dunedin School of Medicine, University of Otago

Introduction

The Department of Pathology in the Dunedin School of Medicine at the University of Otago has 47 research active staff and 44 postgraduate students who would be affected by changes in the New Zealand research funding system. Our research encompasses clinical, translational biomedical, and fundamental biology of cells and molecules.

Our submission is based on an in-house discussion and collaborative contribution. We have deliberately left the submission granular and included viewpoints from individuals, so that the information provided here is as rich as possible.

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Chair, Department of Pathology Research Committee

1. Ngā Whakaarotau Rangahau - Research Priorities

Q1: What principles could be used to determine the scope and focus of research priorities?

Summary of views: the consensus view of our Department is that it is risky for NZ to set narrow, defined research priorities, because priorities can change rather rapidly according to abrupt changes in environmental, political, economic, and health landscapes. We believe it is important to maintain a research environment that is appropriately supported at multiple levels, from basic to applied research, and is flexible enough to address new priorities as they arise. Therefore, any predefined research priorities should be broad in scope and flexible, with public good being foremost for government funding rather than commercial gain.

Individual comments:

“New priorities supersede old ones all the time, COVID being a good example. And some priorities grow greater in importance all the time e.g., climate change. Humans are not great at predicting the future. Therefore, caution should be taken in setting very specific priorities at a national level. The more numerous specific priorities exist, the more expensive the governance/administration. Priority setting should not confound priorities that can best be achieved through scientific research with those that can best be achieved through investment in care of society (e.g. housing, healthcare, education). Government investment should make up ALL the 2% of GDP in RSI with business investment on top of that. Government should not be funding research intended for private enterprise. Outcome measures should be societal i.e., benefit NZ over and above companies. My personal view is that resourcing for deprioritised research should also be substantially increased because you never know what is coming next.” [senior academic]

“Government research funding at 2% GDP should be considered a minimum. But it is still a low goal I think, NZ should now aim for 3% and that's the trend of OECD in general (for e.g. Germany: <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>)” [mid-career academic]

“Research prioritisation runs the risk of having a negative effect by ensuring promoting research unique to NZ, while having a negative impact on researchers carrying out basic science, which builds the foundation for tackling issues that may arise in the future, while providing essential support for research and innovation. With limited financial resources, national research priorities may be broadly categorized into two parts: 1. Research relevant to NZ (e.g. Health Research Involving Māori, Environmental research pertaining to NZ). 2. Research questions that align with global needs (e.g. Basic research, Health research, Climate change, social media, science and technology). The scope and focus of these two categories are dynamic and will depend on the needs nationally and globally. Category 1 can focus on immediate needs of the country and increase Partnership with Māori. Category 2 addresses more global needs and provides a platform for NZ to contribute to science and innovation globally, while incorporating Mātauranga Māori.” [early career researcher]

Q2: A: What principles should guide a national research priority-setting process?

Q2: B: How can this process best give effect to Te Tiriti?

Summary of views: We think that a more flexible research environment would need to be less constrained by process, with Te Tiriti embedded all the way through. Some view CoREs as a good model, but there are also views that CoREs sequester funds into the hands of a few. A consensus view was that basic research is not currently a priority (and in fact has been actively deprioritised); an odd strategy considering the overwhelming evidence for substantial benefit arising from basic research. Many beneficial discoveries, or applications thereof, emerged from research that never sought them originally (e.g., RNA technologies, CRISPR/Cas), reinforcing the idea that humans are bad at predicting the future, and that having concrete priorities should not be the only approach for delivering benefit for NZ. We believe basic/fundamental discovery/ideas research should be a strong priority, as it is within the NIH model.

Individual comments:

“I agree with what is set out under 1.2.1. The “how” and “where” of the design is going to be important, to avoid patch protection and some negative behaviours being sustained. In scope, developing and maintaining new technologies will be crucial if we are to respond to new challenges as they arise.” [senior academic]

“The process of setting up research priorities should not be influenced by the political landscape of the country but should focus on the essential research needs of the country. To best give effect to Te Tiriti, panels prioritizing research should be diverse with cross-disciplinary expertise including research and RSI governance/policy makers. I agree with the process set out by other countries under section 1.3.1.” [early career researcher]

Q3: How should the strategy for each research priority be set and how do we operationalise and implement them?

Summary of Main Points: There were no strong views on operational strategies, but most agreed that there has been an over-proliferation of governance mechanisms in current funding initiatives, with disproportionate amounts of time and funding spent on deciding who should receive funds, why those particular teams should receive them and how much funds should be spent. Simplification of governance and operation is important. Te Tiriti should be embedded. Transparency is key.

Individual comments:

“Governance – if there are a few broad research priorities, then this should hopefully also simplify governance. Agree that governance works best when led by the PIs (as seen in other countries). Each priority will need a dedicated outreach arm, and a predetermined, resourced, connection with stakeholders.” [senior academic]

“The metrics to assess strong research leadership can be biased based on a funding track record, which may have the unintended effect of overfunding specific groups and in turn a specific research priority while undervaluing other innovative research that can be carried out in NZ. One possible solution could be to include a section in the funding applications on how the proposed project is likely to benefit NZ (HRC grants).” [early career researcher]

“Consideration should be given to mechanisms to report misconduct/protect the researchers' intellectual property. If deciding on funding on track record only, the following should be considered: auto citations (being widely discussed in academia); the number of relevant publications (original papers vs reviews); the outcome of the former grants (realistic evaluation of the grants' effect). Re grants evaluation: In Europe, to protect against improper spending of public money, institutions financing science have clauses on the return of funding in case of negligence to deliver promised results (or providing a valid rationale for the above). A whole system of penalties is used to force the responsible decision (of applicant) when applying for funding and to minimise the system abuse.” [early career researcher]

2. Te Tiriti, Mātauranga Māori Me Ngā Wawatao Te Māori - Te Tiriti, Mātauranga Māori and Māori Aspirations

Q4. How would you like to be engaged?

Q5. What are your thoughts on how to enable and protect mātauranga Māori in the research system?

Summary of views: there was an overwhelming view that many more avenues for Māori engagement need to be embedded within our science funding system. The Department strongly supports the aspirations of Te Ara Paerangi future pathways green paper in this space. We think there needs to be a system-wide 'fix' to properly enable mātauranga Māori and incorporate Te Ao Māori into the research system. Without system-wide reform, mātauranga Māori will continue to be an aspiration only. This may mean changing the way our research institutions operate as well as changing research funding mechanisms.

Individual comments:

"To enable mātauranga Māori into the science and innovation sector, it is essential to encourage Māori students in high school and early university years to pursue careers in science. On the other hand, there is a need to systematically upskill all residents of NZ in understanding Te Ao Māori. Efforts on both sides will in the long run lead to incorporation of mātauranga Māori in the science and innovation sector." [early career researcher]

"Really need more Māori to be in the research system in the first place, and this comes down to workforce development and retention. Put more money towards people and targeted money for Māori researchers." [senior academic]

"Funding support and insight into research topics at the high school and university undergraduate level to incentivize Māori students to pursue a career in science. Outreach in this space." [early career researcher]

"Māori should be included at the initial stage of the project planning and as equal partners. At present, there is no space for Māori voice and discussion. Lack of support from the University to establish proper connections results in "hunting" for Māori collaborator in the grants to tick off the Vision Mātauranga section of the grant. This problem has been raised by many Māori researchers - they feel used by pākehā investigators." [early career researcher]

Q6. What are your thoughts on regionally based Māori knowledge hubs?

Summary of views: there was unanimous support for this idea. We also thought that institutions need to step up to play a serious role in retention and recruitment at all levels, and that solutions to engagement should not involve the over-burdening of individuals.

3. Te Tuku Pūtea - Funding

Q7. How should we determine what constitutes a core function and how should core functions be funded?

Summary of views: we support the concept of core functions, and there are obvious examples of research initiatives that are definite core functions and should be supported by block funding. At the same time, we think that non-obvious core functions could be difficult to determine. For example, is health delivery research a core function? Medical laboratory science innovation? We found it difficult to determine how these should be decided, except to evaluate what the consequences would be if we didn't have them.

Individual comments:

"A core function could be determined by conducting an analysis of what the consequences would be of not having that function. For at least some instances, the case for core function status should be relatively easy to determine." [senior academic]

"Core functions should be technology that can assist critical research and high-priority research areas across multiple sectors e.g., health, environmental and engineering. These core functions will provide an infrastructure to carry out critical research without different institutions, CRIs etc. investing in developing similar tools." [early career researcher]

"Core functions should be ongoing initiatives, not dependent on the present project, e.g. maintaining of tissue biobanks/biorepositories." [early career researcher]

Q8. Do you think a base grant funding model will improve stability and resilience for research organisations, and how should we go about designing and implementing such a funding model?

Summary of views: we strongly support the idea of base grant funding, and that such funding is tracked to ensure base funding is actually used for supporting research. As the green paper points out, NZ is unique in having a system where infrastructure support comes directly out of (capped) government grants awarded to researchers. Because overheads to institutions are calculated on FTE, this mechanism for infrastructure support has stunted recruitment, retention, and research paths for the early career workforce. The current system creates tensions between researchers and the institutions they work for, and incentivised attracting money as being the object of the proposed research, and not the research (or research outcomes) itself. We only felt qualified to include the University perspective in this response, and for universities we think that overheads to offset the cost of research should be negotiated separately with institutions rather than forming part of the award to research teams (as for the NIH, etc). We don't have a view on how this should be progressed or negotiated, because the current financial mechanisms behind overhead distribution are opaque to us.

A note regarding PBRF, which is considered out of scope for this green paper but was mentioned in the paper as follows: *“We recognize, however, that submitters may have thoughts on the relationship between the PBRF and the funding model changes proposed, and we are interested in any feedback you have on this.”*

We think PBRF is extremely important to consider together with Te Ara Paerangi, because PBRF is viewed by MBIE as the primary funding source for basic/fundamental (‘new ideas’) research in the education sector (Figure). However, PBRF is used by many institutions to fund infrastructure (including research infrastructure) and operations, with less funds than appreciated (and sometimes no funds) available for fundamental discovery research.

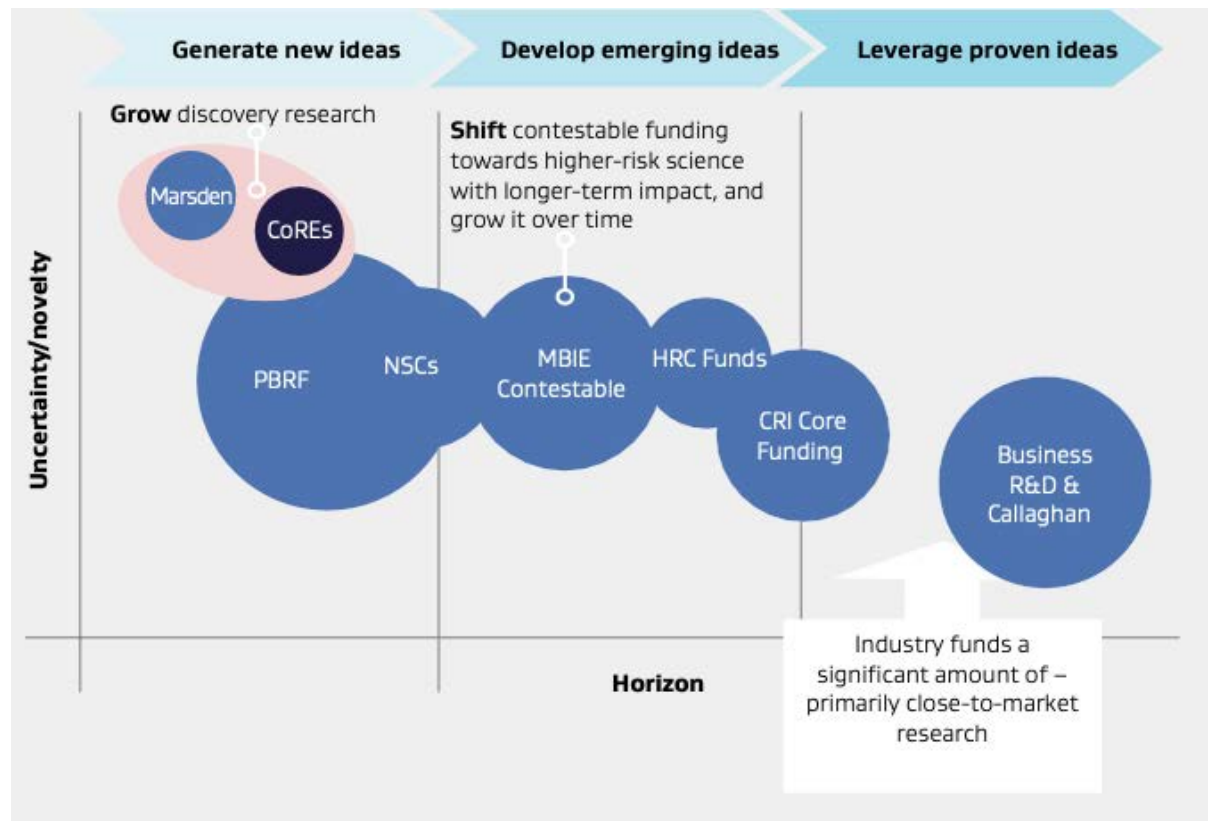


Figure: from MBIE’s National statement of Science Investment 2015-2025.

The research supposedly conducted in the “discovery research” space directly with PBRF funds is extremely limited because individual research teams cannot access the majority (or, as is the case of our department, any) of these funds. Therefore, there are strong views in the department in support of pursuing base funding mechanisms that liberate PBRF funds to go towards the purpose outlined in the figure above.

Individual comments:

“Very little of the PBRF investment, at least at this institution, is directly available to researchers to support their research. Therefore, the pool of funding that addresses basic research is severely limited because PBRF funds are instead redirected to institutional infrastructure or core facilities. Researchers then must attract other funding (health related or applied) to even afford to use these facilities. I would like to see more government investment into “new ideas” basic research, or better support of tertiary institution

infrastructure through other funding avenues so that PBRF can go towards funding the activities that it is supposed to." [senior academic]

"As the green paper sets out, we have a unique opportunity to change the full costing model to eliminate many of the vulnerabilities of the system. Yes, I think we need a base grant funding model. From a university perspective, it would be ideal to have overhead components funded separately and not built into research contracts as they are currently. Because research contracts have \$ ceilings and overheads are calculated on FTEs, this model has had dire consequences for the research workforce. Overheads to be negotiated separately between universities and funding agencies. 3c, a negotiated system probably best for universities." [senior academic]

"One basic issue with PBRF is that we all know and hear its good for University and everyone (including ECR and Mid-Career) put a huge amount of time into it. However, for an individual researcher it's not clear how it can also benefit them? In many departments they don't even get \$ of it. There need to be transparency of benefit and flow on effect for the Institution and also for an individual researcher level. Many researcher terms this as money making exercise for university with no benefit being extended to us." [mid-career academic]

"The current funding system is insufficient to support stable science careers in NZ. As a consequence, there is a constant brain-drain of the brightest minds, which is a major loss for NZ. The major goal of the base grant should be to improve the salary funding for researchers and providing better job security. This can be achieved by providing overheads as a block fund to the institute separately to the funds secured by the researchers within the institute. This will enable maintenance and extension of the research infrastructure by the institute while enabling researchers to support jobs of their team. This can be achieved by defining the costs that can be covered by a base grant. It is also important that the base grant provided matches the inflation rate to enable long term job sustainability." [early career researcher]

4. Ngā Hinonga - Institutions

This section seems to be more targeted to CRIs, so we have limited feedback to give here. In general, we felt that overall increasing the funding in the system would alleviate a lot of pressure within and between institutions, and allow collaboration and coordination to develop organically.

Q9. *How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?*

Summary of views: The model to have fewer, but better funded research institutions that was proposed in the paper seems reasonable. Overall, more funding in the system would reduce non-productive competition and siloed research.

Q10. *How can institutions be designed to better support capability, skills and workforce development?*

Summary of views: Increasing the funding in the system and redesigning the way science is funded (e.g. separating out overheads) would go a long way towards addressing this problem. Standardizing employment contracts and working conditions for each level of scientists and then resourcing career development properly would also help. Institutions want to support and retain their talented people and give them flexibility but currently cannot afford to do so.

Q11. *How should we make decisions on large property and capital investments under a more coordinated approach?*

Summary of views: Some capital investment initiatives should be coordinated, for e.g., genome sequencing. NZ now has at least 2 Novoseq sequencers, just one of which is enough to serve Australasia. A barrier to institutional ownership is depreciation, running costs etc. How would this be coordinated between institutions? A shift in thinking would be required for this to work well across NZ's institutions.

Q12. *How do we design Tiriti-enabled institutions?*

Summary of views: Recruitment/representation of Māori within institutions is key.

Q13. *How do we better support knowledge exchange and impact generation?*

Summary of views: our feedback is not so much a comment on commercialization, but relevant to the "ideas pipeline". We think less money and effort should be spent on measurement/prediction of impact, and more money/effort on strategically growing a specific workforce/skillset that can communicate and disseminate information resulting from research, though to the end users as per Fig 3 of the green paper. Individuals involved in research dissemination and implementation need not be the same people who do the

research. These people could be scientifically trained and have a strong cross-disciplinary angle (current examples might be key Comms people in CoREs, etc). NB, this role is NOT marketing. There should be recognition that it is beyond the scope of each individual in the system to bridge to all parts of the system.

5. Te Hunga Mahi Rangahau - Workforce

Q14 - How should we include workforce considerations in the design of research Priorities?

Summary of views: We believe workforce consideration should underpin all other priorities. Consider expanding the roles of the science workforce into dissemination, liaison and implementation roles, supporting running of core infrastructure, 'career scientist' positions with due consideration for equity. Giving people opportunity to move through to leadership is important, but there is a scarcity of opportunities at mid-career levels because of the lack of opportunities outside or alongside a traditional academic path.

Q15 - What impact would a base grant have on the research workforce?

Summary of views: We think this impact would be hugely positive (but note the comment above regarding the tracking of base funding). We agree that base grant funding should come with workforce development and retention expectations/obligations that are placed on institutions.

Q16 - How do we design new funding mechanisms that strongly focus on workforce outcomes?

Summary of views: We think that the current funding system prioritises missions at the expense of people and capability; and where investment is investigator-led, disproportionately favours established teams or individuals with strong traditional track record metrics. As a result, our research workforce is extraordinarily precarious. We cannot hope to meet research priorities if we do not have a strong, stable research workforce with inbuilt succession planning. We believe rebalancing the system to better sustain workforce and capability should be a priority in redesigning NZ's research funding strategy. This could take place via introducing new (or broadening existing) career development schemes, and incentivising recruitment and retention at institutions, especially addressing diversity and reversing bias against women, Māori and Pacific people, and other minorities.

Individual comments:

"Yes, reforms are necessary! NZ needs more and better funded career development schemes, stretching through to mid-career. These need to come along with a diverse array of metrics/benchmarks for ECRs to measure outcomes, not just publications, citations, etc. However, any career development schemes must be viewed as long term commitments because their disruption can have devastating workforce consequences as has been seen in Australia. In addition, investment in research infrastructure such as equipment, or in core facilities, should come along with dedicated staff to run and extract the maximum benefit from those facilities – in a scientific capacity, not just a maintenance one" [senior academic]

"Employment precarity and uncertainty are detrimental to a research career. In addition to this, there is a limitation on pathways available after a PhD. Currently in the university

system, training is only provided to become a PI and work towards a tenure track. However, this career pathway has very limited opportunities, as there is greater demand for the limited lecturing and tenure track positions than their availability. This is compounded by the fact, alternative career tracks are not available, especially for those post-doctoral researchers, who do NOT want to be a PI, but are extremely valuable and with highly skilled technical expertise. If an individual continues as research only staff, they are entirely dependent on very limited number of fellowships with little or no support available from the institution. This model is continuously resulting in brain-drain for NZ. Suggestions for improvements include:

1. Foster better relations between RSI and Universities very early on, from the undergraduate level, and increase Bio-tech funding within NZ this in turn will enable younger scientists (early-mid career) to think of Industry as an alternative route.
2. The idea of a base fund with well set out expectations need to be made available. These expectations can include: Receipt of grant funding, publications and service contribution. Such funding will enable individuals to develop a research career as a PI (early-mid career).
3. For those that do not want to become PIs provide an alternative route as a scientific officer, whereby, these positions can be funded by a base grant for technical expertise. In turn this system will also enable setting up core facilities as knowledge and experience will be retained.
4. Educate students early on about the expectations in an academic career.
5. Provide opportunities to carry out short-term overseas placements.” [early career researcher]

6. Te Hanganga Rangahau - Infrastructure

Q17. When should government, rather than research institutions, assume a role in funding infrastructure?

Q18. How should we decide what infrastructure is important?

Q19. How should we support sustainable, efficient and enabling investment in research infrastructure?

Summary of views: With the entire research capacity of NZ being about the size of Melbourne, we believe that it is a good idea that government should take leadership on important research infrastructure resourcing that is beyond institutional scale. This is particularly crucial because expensive equipment comes with depreciation costs that can be crippling for institutions (who try to recover from users, but this is practically impossible). Infrastructure funded on this scale should be accessible enough to be for the good of all NZ research and should include important systems-scale infrastructure with national importance (such as curating and analyzing Big Data).

Individual comments:

“One example of research infrastructure suitable for funding beyond institutions would be a genomic medicine platform for NZ (equipment and pipeline). This is too large and important for a single institution to take on, but vital for futureproofing of medicine in NZ and ensuring genomic data sovereignty. The example of genomic medicine would need a pipeline that is developed in partnership with Māori to ensure that tikanga and tino rangatiratanga is preserved. Importantly, high tech infrastructure can't operate without skilled human capital and so the investment would involve also funding people.” [senior academic]