Capability building through the Kia Niwha Fellowships

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Pre-clinical development of vaccines to rejuvenate the ageing immune system

Leadership development

- **Alignment with Te Niwha**: The Kia Niwha Fellowship is supporting myself, and 5 other early career researchers to build leadership skills so that we can effectively contribute to Aotearoa New Zealand's future capacity to respond to future infectious disease challenges. Through meeting at intensive wānanga we have been learning and practising Te Niwha principles tiakitanga, hononga, tūhonotanga and rangatiratanga.
- **Results & Impact**: Through the fellowship and intensive wānanga I have had the pleasure to meet with and learn from a range of experts across a diverse range of disciplines, learning about different forms of leadership and the impact they have on local communities. These experts have included leaders in public health, biomedical science, mātauranga Māori, iwi and community-led initiatives and kura kaupapa Rangatira. We have had unique experiences learning about the history of multiple iwi and hapu, gaining valuable insights on the aspirations of local communities and how we as researchers can align and work together. I have built on my ability to confidently korero about our research, answer pātai and have meaningful discussions on marae. I have had the opportunity to form relationships where I can be a link between biomedical research and Māori communities, being of service as a science communicator and building links for a future that includes collaborative science. In particular I was able to engage and learn a great deal about the history of my own iwi, this was a huge highlight for me personally and the ability to have these relationships as a result to bring through my career will be of huge value. Forging relationships with the other 5 fellows and the Te Niwha team during this shared unique experience has also been very rewarding and I anticipate will result in life-long working relationships.
- **Future Directions**: The lessons learned, experiences shared and relationships formed as a result of this fellowship and the leadership wānanga will have a significant impact on the future directions of my career and the research I conduct in the infectious disease space. It will have impact on how I communicate science and engage with the public/ local communities, this in turn will have impact on how the research I conduct is prioritised with these relationships and open communications in practise.

Research

- **Research purpose**: It has been long observed that older people are less protected by vaccines than younger people due to impaired production of protective antibodies following vaccination. This research project aims to develop and test new vaccines specifically for older individuals that can rejuvenate the ageing immune system and equitably protect older people from future infectious disease challenges.
- **Research approach**: A pre-clinical vaccine testing pipeline will be developed using the aged mouse colony at the Babraham Institute (Cambridge, UK). The pipeline will entail vaccine efficacy experiments where young and aged mice are immunised with influenza mRNA vaccines developed by the Malaghan Institute (Wellington, NZ). Following vaccination, mice will be infected with influenza A virus to determine the protective capacity of the mRNA vaccine. Immunogenicity experiments will be conducted concurrently to assess immune responses contributing to protection and how this changes with age.
- **Key results:** We have successfully established a pre-clinical vaccine testing pipeline using young and aged mice that recapitulates the age-dependent deficit in antibody production and response to infection observed in people. We have used a "standard" influenza mRNA vaccine to establish this pipeline and are

now currently testing novel vaccine candidates through this pipeline in order to identify candidates that improve antibody production and protection in aged mice.

- **Conclusion:** We have developed a pre-clinical testing pipeline comprised of a set of successful experiments using aged mice that will allow us to identify rejuvenating vaccines designed specifically for older people.
- **Future directions**: Test a range of vaccine candidates through our pre-clinical testing pipeline and identify those that are efficacious and immunogenic.
- **Alignment with Te Niwha**: This work will help us better understand on a fundamental level how we can support our kaumātua therapeutically in the face of future infectious disease threats. Simultaneously we are improving domestic research excellence through strengthening international partnerships with the UK.
- **Impact**: History has shown that effective and timely distribution of new vaccines cannot take place without a solid backbone of supporting pre-clinical data. Identifying a pre-clinically efficacious mRNA vaccine that rejuvenates the ageing immune system will contribute fundamental research to the field and necessary data to enter a phase I clinical trial.