Rabbit virus offers promising new options

A virus that devastated New Zealand rabbit numbers in the 1990s is proving a useful tool in the development of potential new vaccines and therapies against a range of cancers.

HRC funded research by 2008 Sir Charles Hercus Health Research Fellowship recipient Dr Sarah Young and University of Otago, Dunedin, colleagues Associate Professors Margaret Baird and Vernon Ward is focusing on Virus Like Particles (VLPs), created using the empty shells of rabbit calicivirus.

Dr Young says the VLPs can be coated with proteins from cancers and then injected. As far as the host's immune system is concerned these dead shells appear just like a virus even though they are unable to cause disease. This tricks the immune system into thinking it is being infected, thus generating a far stronger immune response than would be possible by simply injecting the tumour protein on its own.

Dr Young's team has been investigating both the VLPs and potential adjuvants, which are other immune stimulating molecules, as well as specific protein(s) from the cancer. "VLPs are a really versatile platform for the delivery of tumour peptides. It is a way of bringing molecules to your immune system and activating your immune system in a way that it sees these proteins as something that it needs to make a good immune response to."

It can be used in two ways, says Dr Young. "It can be used as a prophylactic type vaccine or as a therapy and that is the way they are looking to use it in the HRC funded cancer study. For example, if a patient has a tumour you can use this as a treatment for this tumour, creating a therapy specific to that person."

Dr Young says the next step is to use it in a situation with patients who have a tumour. "We've done animal models and this shows that it is efficacious. We've done in vitro work using immune cells from healthy donors and it works well, so now we want to look at how we can generate an anti-tumour response in people that already have cancer."

They will do that work ex vivo using immune cells from a cancer patient and seeing how they can activate those with VLPs and investigate whether they can drive those into an immune response they know will kill a tumour. "If that works well then we can look at doing some in vivo trials."

Dr Sarah Young (centre) with Associate Professors Vernon Ward and Margaret Baird

Key words:

- Virus, calicivirus, immune system, cancer, tumour

Aims of this research:

- Utilising virus like particles, created from the empty shells of rabbit calicivirus, to develop potential new vaccines and therapies against a range of cancers

They are working with Dunedin oncologist Dr Chris Jackson to help get a better idea of how such a therapy could be used in a clinical setting and what other therapies it could be used in conjunction with.

"His skills in thinking about his patients have made us redesign some of our experiments in animal models. It is a really good mixture of the science and clinical skills, and he has now been brought on as a named investigator."

Dr Young is now working out of the University of Otago's Department of Pathology but is working closely with Associate Professors Ward and Baird in the Department of Microbiology and Immunology where the research has been part of Professor Andrew Mercer's HRC funded programme, *Human pathogenic viruses: drug targets and therapeutic potential*.

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