



## VESKI Innovation Fellow

Dr Seth Masters

### Research Project

Virus and host miRNA that target the innate immune system and inflammation

### Project Summary

A growing number of people are being diagnosed with chronic inflammatory diseases, caused when their bodies continue to fight an infection that does not exist – a ghost.



Dr Seth Masters is one of the first Laboratory Heads for the newly formed Inflammation Division at the Walter and Eliza Hall Institute of Medical Research. He wants to understand what's happening at a molecular level and in turn discover a therapy that will change their lives.

Dr Masters will also investigate inflammation as a consequence of infection both bacterial and viral. When the body's immune system is under threat from disease and infection, it defends itself with inflammation. The body's white blood cells kill foreign organisms or diseased cells and kick-start the healing process. However, if the inflammatory response is too strong, surrounding tissue can be destroyed leading to chronic inflammatory diseases.

These diseases, which include rheumatoid arthritis, gout, cancer and type 2 diabetes, are common problems for Australians, and understanding them has become a key focus in the inflammation field.

Dr Master's project will investigate an important class of regulators that limit inflammation called micro-RNAs, small nucleic acid-based molecules encoded in the human genome. He has identified a micro-RNA, which limits inflammation linked to several diseases including Crohns disease.

Seth also proposes to identify micro-RNAs in viruses that are used to avoid the body's immune system and then target them with technologies such as "locked nucleic acids", a newly developed technology not yet employed in the fight against viral infections.

His team will conduct trials against the herpes simplex virus and Epstein-Barr virus, which will be a first for Victoria as well as globally. The result will be a definitive catalogue of the micro-RNAs in these viruses that regulate innate immune pathways and inflammation. This will lead to new strategies to treat, vaccinate and prevent the spread of these diseases.

*"Knowing science, technology and innovation is recognised by government and financially supported is a fantastic thing. Without that impetus, people are going to drop out of science and technology, and if we don't have that money we can't do what we want to do, we can't generate innovative ideas, technologies, and therapies for medical research."*

Dr Seth Masters

## Personal History

Seth graduated from Melbourne University in 2000 with a Bachelor of Science with first class honours majoring in chemistry and biochemistry. He also completed a Diploma in Arts (Philosophy).

Upon returning to Melbourne and The Walter and Eliza Hall Institute of Medical Research, Seth is also returning to the place he conducted his doctoral research.

After completing his studies in Melbourne, Seth spent three years in Bethesda, USA at the National Institute of Arthritis and Musculoskeletal and Skin Disease. During this time he helped discover a new, rare inflammatory disease that affects young children, and a therapy that totally resolves it.

In 2009, he moved to Trinity College, Dublin and continued to conduct further postdoctoral research. While there, Seth was part of the team that discovered the potential underlying basis for Type 2 diabetes, a debilitating disease where people stop responding to insulin.

As well as making consistently high quality contributions in top ranking journals, Seth has received numerous awards including recognition from the NIH for the discovery of a new disease as well as the Irish Society of Immunology, the International Society of Systemic Autoinflammatory Diseases, and from multiple international conferences. While working overseas, Seth also received a prestigious NHMRC Overseas Biomedical Fellowship.

His partner, Dr Lisa Mielke, works as a postdoctoral researcher in the Molecular Immunology division at the Walter and Eliza Hall Institute of Medical Research on understanding the role of immune cells in the development of cancer.

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## BACKGROUND INFORMATION

VESKI enhances Victoria's intellectual capital through a dynamic program of fellowships, awards, and international networks including the VESKI Innovation Fellowships. This established and prestigious program returns successful Australian expatriates and leading researchers with outstanding skills in the fields of science, innovative technology and design to Victoria. VESKI is supported by the State Government of Victoria.