



**Mark Tanaka**

The University of New South Wales

### **Evolution and epidemiology of *Mycobacterium tuberculosis*: an interdisciplinary problem**

Molecular techniques are used to characterise the population genetics of *Mycobacterium tuberculosis*, a pathogen that kills 1.6 million people per year. Mathematical models and statistical methods can be used to interpret the large amount of available molecular data. One particularly important example is the estimation of epidemiological parameters involved in the spread of antibiotic resistance. The acquisition of resistance to antibiotics results in a longer duration of infection in a host, but this resistance may come at a cost through a decreased transmission rate. This raises the question of whether the overall reproductive fitness of drug-resistant strains is higher than that of sensitive strains. Collaborating with Scott Sisson from the Statistics Department and others, we estimate a number of critical parameters using approximate Bayesian computation applied to published molecular epidemiological data from Cuba, Estonia and Venezuela. We find that the relative fitness of resistant strains of *M. tuberculosis* is surprisingly high, suggesting that the prevalence of resistance will continue to rise in the future. Understanding the epidemiology of tuberculosis using data from molecular studies is an example of a problem that requires input from different disciplines.

**About the speaker:** Dr Mark Tanaka is Senior Lecturer at the School of Biotechnology and Biomolecular Sciences, The University of New South Wales. Focus of his recent research has been to make inferences about the transmission patterns of infectious diseases from molecular epidemiological data. He has developed new methods to detect emerging strains of *Mycobacterium tuberculosis*, to estimate transmission rates and to estimate mutation rates of genetic markers. These goals have been achieved by combining explicit mathematical models with novel statistical techniques.

**Time:** 4pm, Friday, 14th August

**Location:** Room RC4082

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