Australian Nutrition Trust Fund
Travel Fellowship to Department of Bioinformatics (BiGCaT) Maastricht University
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I am a Registered Nutritionist (Aus, UK) and early career researcher in the Department of Nutrition, Dietetics and Food, Monash University. My PhD focused on nutrigenomic responses to meal composition in chronic disease and I am currently working on establishing my independent research profile. I applied for this fellowship to visit The Department of Bioinformatics (BiGCaT), Maastricht University to develop bioinformatics techniques to analyse and interpret gene expression results obtained in nutrition intervention studies.

With advances in understanding the human genome we are now in the position of acquiring large 'omics' datasets. Transcriptomics has advanced biomedical applications, however, the application of genomics to nutrition has been slower than predicted due to the complexity of data interpretation and the lack of computational methods targeted towards nutritional biology. There are not many research groups that are leading in nutritional genomics in Australia, which is one of the reasons that I wanted to visit the Department of Bioinformatics (BiGCaT) in Maastricht University and also build collaborative links with the European Network of Excellence for Nutrigenomics (NuGO).

One of the objectives of NuGO is to 'shape the nutrition bioinformatics infrastructure, by initiating, coordinating and facilitating projects in this area, and by hosting the dissemination of all data, results and information'. I wanted to work with Professor Evelo's research group to learn new research techniques in the field of nutrition science; the basic principles that are currently being applied to the analysis and interpretation of big nutrition data. The bioinformaticians at BiGCaT, Maastricht University not only develop analytical methods but also develop software platforms so users of transcriptomic technology, who may not have the statistical or computational expertise are able to analyse results using packages in a user-friendly manner.

The Place:
Maastricht is located in the southern province of Limburg, the Netherlands, and is approximately three hours by train from Amsterdam. The city runs along the river Maas, from which it derives its name, and is located near the boarders to Belgium and Germany. Maastricht lays claim to be the oldest city in Holland, and is home to around 120,000 people.



View of Maastricht City Centre across the river Maas, Maastricht University entrance and Maastricht University Medical Centre entrance

Maastricht University is just over 70 years old, a fairly new university, ranked 5th in the Young University Rankings 2018, and 103rd in the World University Rankings 2018. Many of the undergraduate programs are offered in English, which attracts many international students (50% of total intake). The bioinformatics team are situated within the Faculty of Health, Medicine & Life Sciences, and are located adjacent to the hospital known as Maastricht University Medical Centre (MUMC).

The Skills:
Specifically, I wanted to analyse data from microarray and RNAseq experiments that I have collected in previous nutrition intervention studies. During my visit I learned how to interpret gene

expression data at a functional level. I began with an overrepresentation analysis to decipher the affected biological processes. I then became familiar with the pathway creation, visualization and analysis tool, PathVisio [1] and the online pathway repository WikiPathways [2]. Moreover, I learned how to perform a gene ontology analysis using the sophisticated analysis in GO-Elite [3]. Finally, the results obtained at a functional level were integrated, extended and explored using the open-source network analysis tool, Cytoscape [4]. I not only learned how to apply the pathway-based techniques, which are the main expertise of Evelo's group, but also gained better insight in the biological effect in my two studies.

The People:
I learned to apply the latest tools of nutritional bioinformatics to my own data, guided primarily by Dr Susan Steinbusch-Coort, and overseen by Prof Chris Evelo at Maastricht University, but with input from the whole bioinformatics team at BiGCaT. The team is comprisd of bioinformaticians with various backgrounds and skillsets from biomedical science to information technology and programming. Susan was originally trained in biomedical sciences and combined with her coding and statistical skills had great insight in methods to explore transcriptomics in a way that is biologically meaningful.

The Outcomes:
The main outcomes of the visiting fellowship will be that I utilise the analytical techniques in current and future intervention studies in the Department of Nutrition, Dietetics and Food at Monash University, and to advance my own publications and scientific reputation in the space of nutritional genomics. I have also now established a collaboration with the bioinformaticians at BiGCaT and plan to continue to work, publish, and apply for funding together.

The opportunity to travel and spend time working with global experts in the field of nutrigenomics has been an amazing experience. Not only did I get to learn techniques that I hope will enhance my research profile, but I was able to spend two weeks in a beautiful part of the world and experience how the people of Maastricht live and work.

I wish to thank the NuGO for their financial support for this visit; Dr Chiara Murgia for her support and connecting me with the researchers at Maastricht, and Professor Chris Evelo, Dr Susan Steinbusch-Coort, and their colleagues at BiGCaT, Maastricht University for hosting and welcoming me in their department.

L-R: Prof Chris Evelo, Dr Aimee Dordevic, Dr Susan Steinbusch-Coort

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