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# Christine & T. Jack Martin Research Travel Grant

# 2018 Final Report

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# Study centre visits:

1. Professor Susan Clark, The Epigenetics Laboratory, Genomics and Epigenetics Division, Garvan Institute of Medical Research.
2. Dr Lan Ho-Pham, The Bone and Muscle Research Group (BMRg) in Ton Duc Thang University Vietnam.

# Conference: Attendance & Presentation

1. The American Society for Bone Mineral Research 40th Annual Meeting, Canada 2018.
2. St Vincent's Campus Research Symposium, Australia, 2018
3. IOF Regional 7th Asia-Pacific Osteoporosis Conference, Australia, Dec 2018
4. The 4th Pan Asian Biomedical Science Conference, Vietnam, 2018

I would like to acknowledge AMGEN and ANZBMS for offering me the Christine and TJ Martin Research Travel Grant 2018. The major research I had done in my PhD project at the University of Technology, Sydney is to construct an osteogenomic profiling from genetic variant associated with low BMD, and then to use the osteogenomic profiling to develop prognostic models for personalized prediction of fracture risk. I had also been working on the application of Machine Learning approach for predicting fracture. These work were based on the on-going longitudinal Dubbo Osteoporosis Epidemiology Study in Australia. This travel award provided me with an opportunity to validate my work in other data, broaden my experience and skills in other labs and foster new international collaborations.

I first attended the American Society for Bone Mineral Research 40th Annual Meeting in Canada to present my research projects: “*Assessing Clinical Utility of Genetic Profiling in Fracture Risk Assessment: A Decision Curve Analysis*” and “*Contribution of Multimorbility to Post-Fracture Mortality: Result of a Long Term Population Based Study*”. During the meeting, I learnt great ideas from other presentations and had the opportunity to interact with many experts in the bone and genetics fields. I also met Prof. Qing Wu from Nevada Institute of Personalized Medicine, University of Naveda, Lasvegas. We discussed our common interests in understanding the predictive value of osteogenomic profiling in BMD, bone loss, and fracture and how we can collaborate to construct osteogenomic profiling for American population and use it for fracture and bone loss prediction. At the end of the meeting, Prof. Wu offered me the postdoctoral fellowship to work in his lab after my PhD graduation.

On return to Sydney, I visited the Epigenetics Laboratory, Genomics and Epigenetics Division of Professor Susan Clark in Garvan Institute of Medical Research. The Clark Lab has the capability and developed high throughput sequencing tools required “to unravel the epigenome” and are now developing more sophisticated bioinformatics and capability to build and interpret reference epigenome maps of normal and diseased cells to both understand epigenome biology and address how this impacts on disease states. I was lucky to have Dr Loi Luu as my direct supervisor, who taught me in details techniques and workflows used in whole genome sequencing, whole genome bisulphite sequencing, and relevant bioinformatics skills for data pre-processing before variant discovery. During this time, I presented my research work at the St Vincent's Campus Research Symposium and the IOF Regional 7th Asia-Pacific Osteoporosis Conference in Australia and had a lot constructive discussions to improve my research results.

In December 2018, I had a talk about osteogenomic profile and fracture and BMD prediction at the 4th Pan Asian Biomedical Science Conference and obtained the best oral presentation award. I later spent time at the Vietnam Osteoporosis Study lab (run by the Bone and Muscle Research Group - Ton Duc Thang University Vietnam) in April 2019 under the supervision of Dr Ho-Pham. At VOS, I had opportunity to validate the osteogenomic profile in Asian data (Vietnam Osteoporosis Study) with more than 2000 participants having both phenotype and genotype information. Using this data, I constructed osteogenomic profiling of Asian from 16SNPs associated with BMD for predicting bone loss and fracture. The SNPs were genotyped and reported as a part of the study “*GWAS of bone size yields twelve loci that also affect height, BMD, osteoarthritis or fractures*”, published in Nature Communications [1]. Apart from my validation project, I also collaborated with Dr Lich Pham to work on the Diseasome project and had some interesting results. We are preparing the manuscript “*Network analysis of human diseases and the consequences of multimorbidity and comorbidity: the Vietnam Osteoporosis Study*” to submit in the peer-reviewed journal this year. In addition, I supported Dr Minh Doan to redesign and manage VOS’s database, following relational database standards.

In sum, I am grateful to AMGEN and ANZBMS for their support of this great travel award. It gave me a valuable opportunity to strengthen my international profile, broaden my collaborations, and acquire significantly new skills and knowledge in the analysis of high-throughput data, which ultimately help improve my research capacity of the osteoporosis research community in Australia.

**References**

1. Styrkarsdottir, U., et al., *GWAS of bone size yields twelve loci that also affect height, BMD, osteoarthritis or fractures.* Nat Commun, 2019. **10**(1): p. 2054.