This PhD program of work seeks to translate advances in genetic technologies into healthcare for those affected by inherited kidney disease.

Firstly, this involves undertaking epidemiological analyses of cohorts of patients in Australia affected by inherited kidney diseases individually and collectively.

Secondly, a clinical and multidisciplinary service model has been proposed and commenced with short-term evaluation of effectiveness to be undertaken.

Thirdly, a collaborative diagnostic genomic service is being established, validated and assessed to identify causative variants in known genes implicated in inherited kidney disease for affected Australian families.

Lastly, a research genomic and functional genomic project has been assessed in order to identify and validate new or novel genetic causes of inherited kidney disease for those in whom current diagnostic genomics has been unable to secure a genetic diagnosis.

Together this pipeline of activities is a patient-centric attempt to understand and explain inherited kidney disease in Australia whilst investigating ways in which to optimise clinical care and to thus attempt to improve future outcomes.

The hypothesis of this study is that modern genetic sequencing and interpretation in GRD can contribute to personalised care by

- Clarifying clinical diagnosis
• Improving options for clinical management
  
  Aim 1 Systematic Reviews of
    Aim 1.1 Therapeutics in GRD
    Aim 1.2 GRD Clinical Services
  
  Aim 2 Profiling GRD populations
    Aim 2.1 Registry-based analysis of existing GRD cohorts
    Aim 2.2 Identify cohort with Phenotypically Indeterminate GRD
    Aim 2.3 Describe phenotypes/pedigrees
  
  Aim 3 Genetic Sequencing of GRD populations
    Aim 3.1 DNA extraction/banking
    Aim 3.2 Perform Whole Exome Sequencing (WES)
    Aim 3.3 Describe and interpret gene mutations of affected patients and families
  
  Aim 4 Translation into Personalised Healthcare
    Aim 4.1 Validate GRD genotype-phenotype relationships against clinical outcomes
    Aim 4.2 Implement Collaborative GRD Service
    Aim 4.3 Identify candidates for targeted therapeutics

**SIGNIFICANCE AND OUTCOMES**

This PhD program has this year resulted in several significant outcomes:
1. Commencement and growth of RBWH Renal Genetics Clinic (commenced 1/7/13)- a national first
2. First Description of the Epidemiology of Genetic Renal Disease in QLD - publication OJRD
3. Report of the Epidemiology of RRT treated Alport Syndrome related ESKD in Australia and New Zealand – publication NDT
4. Dissemination of a proposed Australian Renal Genetic Clinic Model - abstracts ANZSN, HGSA, RBWH Symposium
5. Commencement of Diagnostic Renal Gene Panels - abstracts ANZSN, ASN, RBWH Symposium (Award – Best Clinical Science Oral)

**PUBLICATIONS / PRESENTATIONS**

Conference presentations
2014 ANZSN ASM (Melbourne): Published in Nephrology 2014 Supplement
• Eculizumab is effective therapy for atypical haemolytic uraemic syndrome (aHUS): a case series of Australian patients
• The initial six months of an Australian Renal Genetics Clinic Service
• Exomic approaches to diagnosis amongst Australians with Genetic Renal Diseases
• Utilising Exome Sequencing to identify nephronophthisis mutations within an Australian clinical cohort (Co-Author)
• Heterozygous LMX1 B mutation detection in familial FSGS without extrarenal manifestations using whole exome sequencing (Co-Author)
• Whole exome sequencing identifies a novel mutation in ATP6VOA4 in familial distal renal tubular acidosis (CoAuthor)
• Coincident IgA Nephropathy in an Australian patient with Fabry’s Disease (Co-Author)
• Renal Oncocytosis in the setting of a rare unvalidated FLCN gene variant (Co-Author)

2014 ASN Kidney Week (Philadelphia): Published in JASN 204 KW Supplement
• Clinical diagnostic testing amongst Australians with Genetic Renal Diseases using a Targetted Exomic Approach

2014 RBWH Symposium
• The Queensland Renal Genetics MDT Clinical Service (2nd Author)
• Exomic Approaches to Diagnosis Amongst Australians with Genetic Renal Diseases (Award - Best Clinical Science Oral)
• Eculizumab is effective therapy for atypical haemolytic uraemic syndrome (aHUS): A case series of Australian Patients

2014 HGSA ASM
• The Queensland Renal Genetics MDT Clinical Service (2nd Author)

2014 Australian Renal Genetics Symposium
• Organising Committee and Session Chairperson

"Renal Genetics Progress in Australia 2013-2014" (presentation)

Publications
• NOS3 as a Potential Modifier of ADPKD Phenotypic Variability - Progress towards an answer
  o Nephrology journal, Invited Editorial, accepted (submitted August 2014)
• End-stage kidney disease due to Alport Syndrome – Outcomes in 296 consecutive ANZDAT A Registry cases
  o NDT, In Press, Published Online 24th July 2014
• The prevalence and epidemiology of genetic renal disease amongst adults with chronic kidney disease in Australia
  o OJRD, June 2014, Vol.9:98
• Atypical HUS associated with severe, unexpected antibody mediated rejection post kidney transplant
  o Nephrology journal, April 2014, Vol 19, Supp.1, p22-26