

Precision and Computational Medicine Comes of Age in Nephrology

Despite many academic and industry efforts to treat acute and chronic kidney disease, therapies remain limited. The future of nephrology will need to bring together basic, clinical, computational and translational scientists, health care professionals and patients to build a truly holistic approach to diagnose, manage and treat kidney disease in the future. The field of cancer has been led the revolution in personalized medicine, and borrowing from the experiences in oncology, we will implement precision medicine approaches in an effort to recognize the heterogeneity of acute and chronic kidney disease and the importance in differentiating such heterogeneity so that precise treatments can be developed and provided to individual patients, to increase the chances of success.

Efforts to translate these and other precision medicine approaches are being led by the Genome Canada Transplant Consortium, with the B.C. Immunology Laboratory at Vancouver General Hospital to evaluate cutting edge technologies and advanced computational bioinformatics for kidney disease patients, not just in BC but across Canada.

Our approach has been to assess;

1. Immunogenomic and Immunopeptidome analysis for disease risk pre-transplant
2. Monitoring assays for mechanisms of immune injury and inflammation post-transplant
3. Pharmacokinetic and pharmacodynamic modeling for improved immunosuppressive protocols
4. Artificial intelligence and machine learning strategies for drug repurposing to increase therapeutic options
5. Computational medicine strategies to model complex clinical models and simulations based on multi-omics data and health records
6. The scientific and clinical quality control/assurance metrics and training needed for setting up a network to deliver personalized medicine to kidney patients.
7. The phasing and priority needed to move the field forward.