COMPUTATIONAL MEDICINE COMES OF AGE IN NEPHROLOGY

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for the Genome Canada Transplant Consortium

Introduction:

- Nephology 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.

- Computation medicine including machine learning, federated learning and the use of artificial intelligence has substantially changed the way digital data is analyzed and is poised to transform the field of kidney disease and transplantation in Canada.

- Genome Canada has funded these tremendous advances to allow the integration of complex datasets, and large international collaborative research projects and to leverage machine learning in analyzing these heterogenous patient populations

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Methods: use of big data and artificial intelligence in nephrology and transplantation

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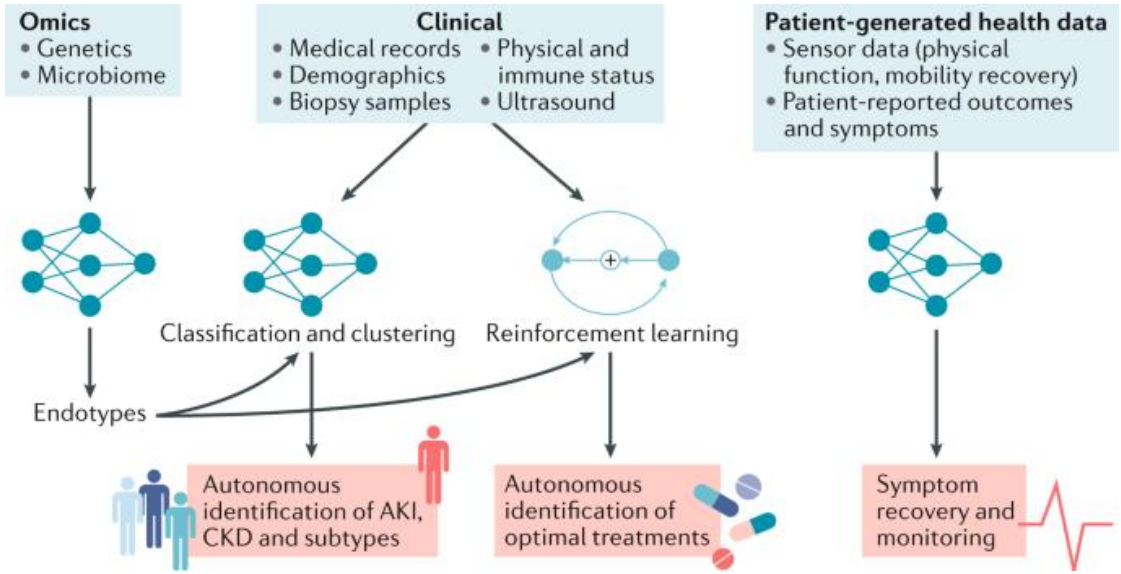
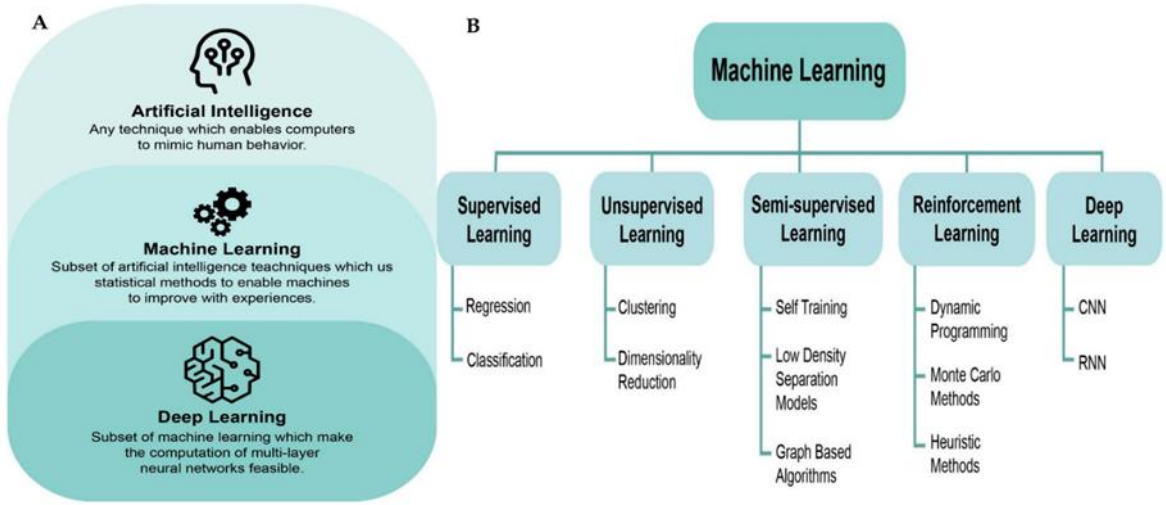
Computational approaches are being used to:

- Develop real-time clinical decision support tools so that transplant physicians across Canada can accurately identify successful (DCD) donors.
- Personalize kidney transplantation by predicting the success of potential donor-recipient matches.
- Process large genome datasets to provide biologically-driven models of the immune response
- Apply machine learning for automated analysis of kidney biopsy images.
- Integrate clinical and genomic data with machine learning to develop precise and predictive models for clinical care





Conclusions: knowledge integration, translation and exchange

- The Knowledge Integration, Translation and Exchange (KITE) Core for the Genome Canada Consortium integrates resources and skills from the Faculties of Medicine, Science, Business and Pharmaceutical Sciences along with many of their key departments.
- It integrates large data sets of clinical, therapeutic and laboratory data from participating centres in BC, across Canada and around the world to map the genomic, proteomic, clinical and therapeutic relationships and to identify risk factors and interventions.
- It enables us to visualize and analyze data streams from these genomic, proteomic and clinical sources, to understand these relationships, and to provide this output to teams of clinicians, researchers, and other members for high-level scientific presentation and publication.
- The output from these studies will be disseminated among the members of the Genome Canada Transplant Consortium to enable the benefits of this research to be implemented across Canada and in other regions throughout the world.

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