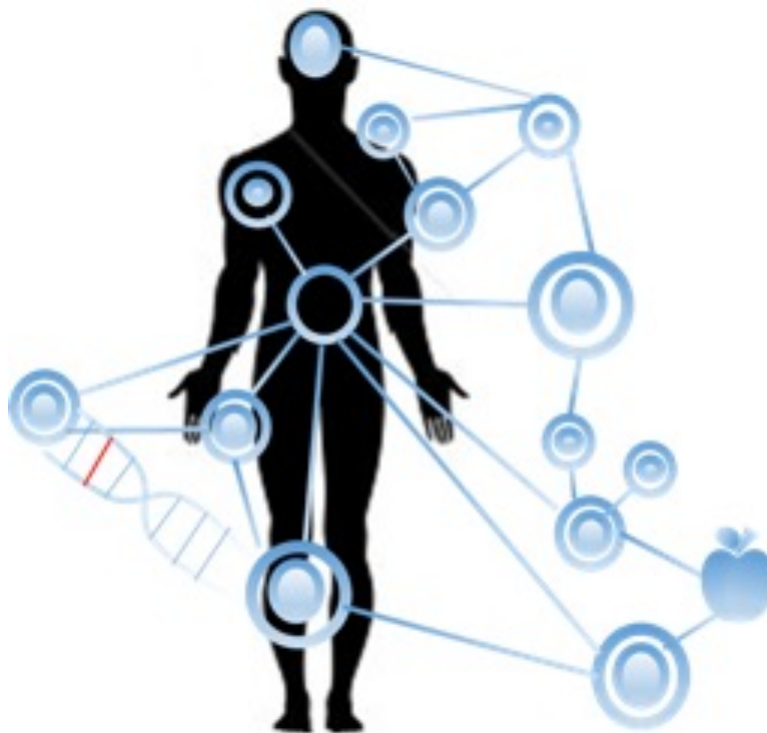


Our vision is to develop fundamentally new approaches for diagnosing, treating, and preventing diseases by understanding the human as an integrated biological system.



Advances in enabling high throughput “omics” technologies (genomics, transcriptomics, proteomics, metabolomics and others) in the last decade have resulted in unprecedented volumes of complex data now being available. These data can enable physicians to provide their patients with care that is more personalized, predictive, preventive and participatory. The expertise required to manage and understand these data is to be found in fields outside of medical science. Thus, interdisciplinary collaborations coupled to a systems approach are key to unlocking the information in these data, and turning the data into knowledge.

Precision Medicine is widely seen as the future of medicine which can improve patient care and relieve overstretched healthcare systems by cutting the substantial costs arising from ineffective treatments. In addition, it can decrease adverse reactions and enhance treatment outcomes for patients. Precision Medicine is now coming into reach because of advances in

“omics” technologies and emerging disciplines such as computational modelling, molecular bioinformatics, biostatistics, statistical genetics and clinical informatics – all of which are key to the analysis and integration of complex omics data sets into clinically relevant information. Identified bottlenecks in the implementation of Precision Medicine include a:

- limited understanding of the underlying mechanisms of diseases at a genetic, molecular and cellular level
- lack of communication and sharing of information between disciplines and sectors at the early stage of biomedical discovery and development
- critical shortage of skilled researchers and clinicians who are trained to work across these different disciplines and sectors.

For the successful integration of omics-based Precision Medicine into clinical applications it is necessary for scientists to transcend the boundaries of their traditional disciplines, learn one another’s languages, and apply their skills and expertise to solve problems in new domains. For instance, designing new therapies for a disease as complex as cancer requires the collaboration between computational modelers, biologists, clinicians, and often also industry. Increasingly, we need to consider environmental influences, such as nanoparticles, and life style, e.g. food and nutrition. Only this type of collaborative research can effectively translate omics technologies and associated computational analysis into tangible benefits, such as (a) the identification of new drug targets; (ii) new diagnostic applications for the improved selection of patients who will respond to therapies; (iii) new therapeutic interventions; (iv) new strategies for prevention of diseases, e.g. through targeted nutrition; and (v) the design of clinical trials in Precision Medicine.

UCD is responding to the above challenges and promoting research excellence towards the advancement of Precision Medicine. At the heart of this endeavor are 3 highly active and successful biomedical research and training institutes/centres:

- Systems Biology Ireland
- UCD Conway Institute of Biomolecular and Biomedical Research
- UCD Charles Institute of Dermatology

Underpinned by the activities of UCD Clinical Research Centre, they form a key element of UCD’s strategic planning in establishing a strong translational research strand that leverages UCD’s strengths in systems biology, computing, bioinformatics, biomedical and clinical research. This unique constellation of co-located clinical, research and training expertise together with partner organisations from the international academic and industry sectors present a robust and innovative platform through which we can deliver a comprehensive interdisciplinary programme in Precision Medicine that includes -omics technologies as technological enablers, basic research into molecular disease mechanisms, translational research that applies computational data interpretation to diseases, network biology informed diagnostics development and clinical trials, and clinical research including early phase clinical trials.

The UCD Health Programme directly aligns with and supports Healthy Ireland: A. Framework for Improved Health and Wellbeing 2013-2025.