THE GENOMICS REVOLUTION

Human genomics, the growing field of medical research using gene sequences to understand, diagnose and treat human diseases, will revolutionise clinical practice in the coming years, through medical care customised to a patient's unique genetic makeup. NCI is playing an active and increasing role in supporting this next-generation approach to medical research.

Genomic medicine relies on the sequencing of thousands of whole genomes, each of which produces around 200 gigabytes of data reliant on NCI's fast computer and filesystem for analysis and storage. Medical research of this kind, working at the population scale, requires genomic sequences to be gathered in one place, like the Garvan Institute of Medical Research's Medical Genome Reference Bank (MGRB).

The MGRB stores the genomes of thousands of disease-free Australian seniors to provide a rigorous sample with which to compare the genomes of patients with rare diseases and cancer. In a world first, the MGRB aligned 1200 human genomes overnight, making full use of the data bandwidth available at NCI.

IMPACTED GOVERNMENT PORTFOLIOS:

Health
Industry, Innovation & Science

Bringing together the national efforts in human genomics is the Australian Genomics Health Alliance (AGHA), a $25 million, NHMRC-funded collaboration of 50 organisations committed to integrating genomic medicine into clinical practice. NCI, as a national partner in the AGHA, plays a leading role in developing its National Repository as a federated, secure data storage and sharing system that leverages local, state and national infrastructure, and implements standards and protocols for the sharing of genomic data for national and international use.

The field of human genomics is becoming an increasingly active international research space. The United States, Britain and France have all set genome sequencing targets for the coming decade. The aim is to create a new genomic medicine service, offering patients a diagnosis where there wasn't one before, and to inform national health policy so as to maximise societal benefits from this rapidly-evolving technology.