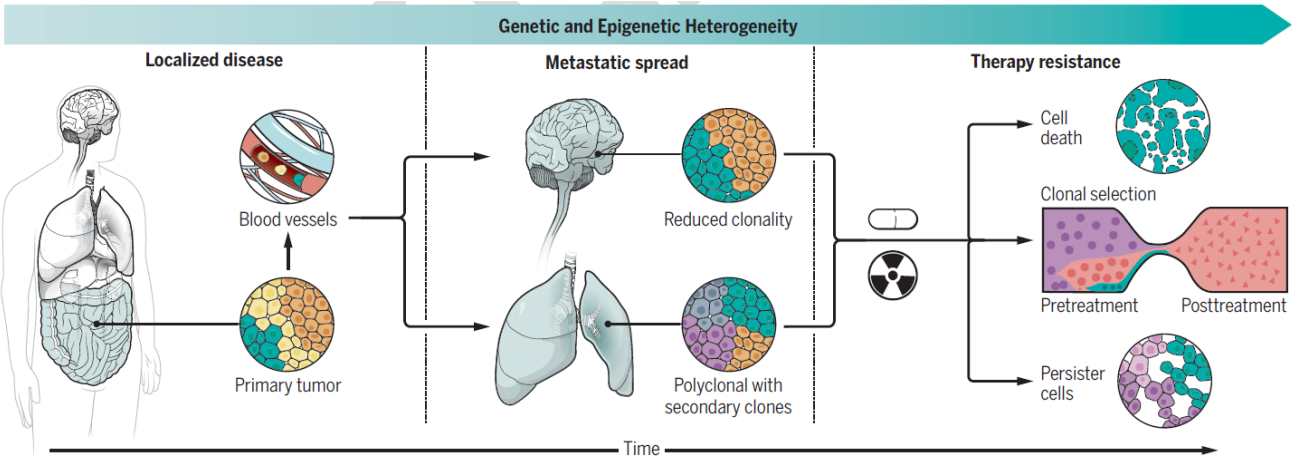
# MAPPING GENOMIC AND EPIGENOMIC EVOLUTION IN CANCER ECOSYSTEMS




*Cancer progression to metastasis and therapy resistance. (L-R) Cells from primary tumours can spread to distal organs (eg brain/lung). Treating tumours with therapy can cause cell death, but also select/induce resistant populations.*

Cancer is a major cause of disease burden for many countries. Due to population growth and aging, it is estimated that over the next 10 years, the world will see a 53% increase in cancer cases, reaching an estimated 21.6 million new cancer cases by 2030. Notably, these increases will not occur uniformly throughout the world, but will be disproportionately prevalent in Asia involving Asian-prevalent cancers such as liver, gastric, and lung cancers.

In this review published by *Science* as part of a Special Issue on Genomics, Dr Toshikazu Ushijima (National Cancer Centre, Japan), Dr Susan Clark (Garvan Institute of Medical Research, Australia), and Prof Patrick Tan (Genome Institute of Singapore, Duke-NUS Medical School Singapore) bring an Asian-Pacific perspective on the future of cancer research.

The team argues that the field should move from studying early-stage cancers to understanding the complete cancer life-cycle. These include mapping the earliest events associated with cancer initiation, by profiling normal tissues and pre-malignant lesions; and also end-stages of cancer such as distant metastases and drug-resistant tumours. These cancer maps also need to be multi-dimensional, quantifying genomic, epigenomic and proteomic changes, and integrated in a 3D context using newly emerging single cell and spatial technologies. Integrated analysis of the multi-level tumour atlas will allow us to understand how cancers evolve, highlighting pathways for therapeutic and medical interception.

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"In this Review, the team aims to convey the importance of studying cancers not just at the level of DNA, but also involving other molecular levels such as the epigenome and epitranscriptome. Integrated analysis of these different levels, particularly over time, will refine our understanding of individual cancer patient trajectories."

*Prof Patrick Tan, Executive Director, GIS*