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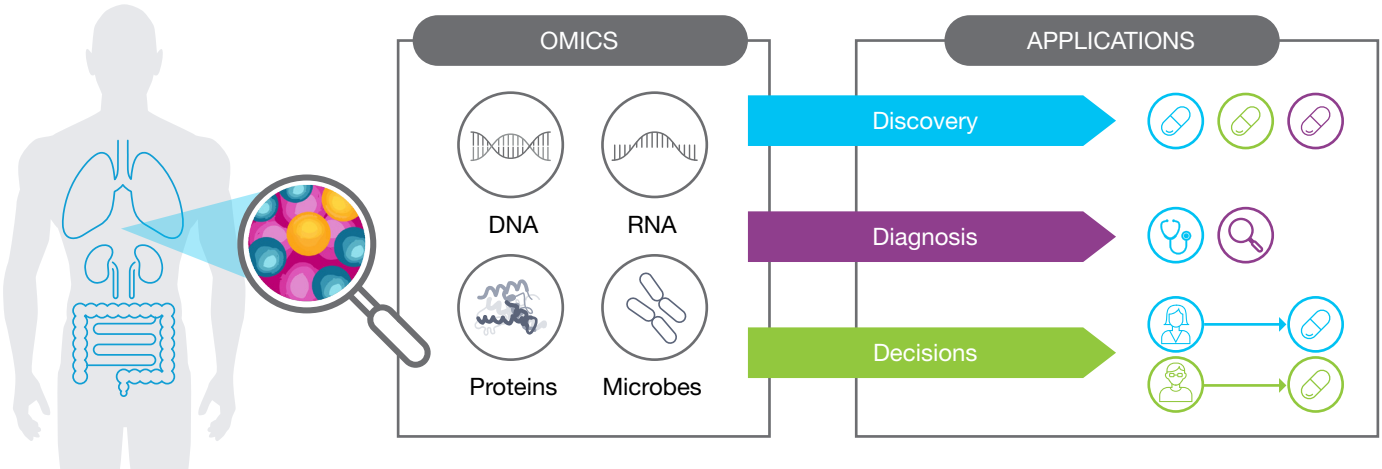
Evolving applications of omics in healthcare

What is omics?

Analysis of the molecular landscape that characterises a patient or disease is an evolving area that is increasingly driving discoveries in healthcare. The term “omics” encompasses the utilisation of several technologies to characterise biological molecules. An increasing number of healthcare applications now involve analysis of DNA (*genomics*), RNA (*transcriptomics*) and proteins (*proteomics*),[1] but it doesn’t end there. Omics can also involve the study of cellular metabolism (*metabolomics*), microbial populations living in a patient (*microbiomics*), or even the study of complex interactions between different organisms and the environment (eg, *metagenomics*, *metatranscriptomics*).[2]

The COVID-19 pandemic drove awareness of the power of nucleic acid- and protein-based technology, and accelerated the global development of affordable, portable approaches to molecular testing.[3] As omics technologies continue to evolve, more complex and sensitive analyses are feasible, and researchers are identifying ways in which they can be applied to healthcare. Significant growth in omic applications can be seen in three key areas: drug discovery, patient diagnosis and guiding healthcare decision making.



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Opportunities and challenges

While there are many opportunities for the integration of molecular analyses into healthcare, successful implementation of omic approaches requires investment in state-of-the-art technology, a broad 'bench to bedside' foundation of strategic support, and a dynamic team of specialists who can keep pace in this fast-moving environment to address its many challenges.

	DISCOVERY	DIAGNOSIS	DECISIONS
OPPORTUNITIES	• Novel therapeutics are being developed through genetic manipulation (gene editing, gene silencing and gene delivery), as opposed to modification of protein function via agonists/antagonists[4] • Gene editing approaches such as saturated mutagenesis and synthetic lethality screening are driving the identification of novel drug targets[5,6] • Complex multiparameter biomarker associations such as genome-wide association studies (GWAS) are contributing to our understanding of disease biology and reveal novel therapeutic targets[7]	• Complex molecular analytics can detect and stage disease with increasing sensitivity, as well as predict prognosis[8,9] • NGS-based diagnostics can detect the presence of infectious diseases from limited biological samples, as well as accurately determine variant types in a single assay[3,10] • Longitudinal monitoring of disease progression or recovery using patient blood samples negates the need for repeating invasive procedures[11] • Portable technology enables the transition from centralised testing to point-of-care diagnosis[3]	• New analytic methods for biomarker profiling enable the precise identification of specific patients who are likely to respond to targeted treatments[8] • Characterisation of novel biomarkers across many diseases enables the next wave in precision medicine[12,13] • Co-development of companion tests alongside novel treatment strategies helps validate targeted therapies in specific populations[14] • Molecular therapeutics offer the opportunity to pivot quickly and repurpose existing technologies to address new challenges[15]
CHALLENGES	• Co-evolution of technology drives an ever-changing landscape of pharmacogenetics behind disease[16] • Evolving technology requires both broad and deep knowledge for accurate data interpretation[12] • Lack of consensus on the clinical relevance of molecular biomarkers[1] • Limitations in computational and storage capacity for data with increasing complexity[16]	• Increasing complexity in data analytics requires integrated expertise across several disciplines[12] • Ethical considerations over the generation, storage and distribution of patient-specific data[1,17] • Harmonisation of molecular testing platforms across different testing centres, and standardisation of reporting[1] • Patient access to molecular diagnostics[16]	• Concerns over the cost of diagnosis and treatment[1] • Patient access to treatment and reimbursement[17] • Changing regulatory and publishing guidelines for treatments with novel mechanisms of action[18] • Demonstrating real-world relevance in small populations that are eligible for precision treatment[17] • Collaborative evaluation of efficacy and economics[17]

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Integration of omic analyses into healthcare communications benefits from an understanding of the specialist technical language and regulatory processes required to transition a product from laboratory to clinic.

***Prime Omics** is a specialist consultancy delivering technical and strategic support for the communication of omic-based data analyses.*

***Prime Omics** can help you to bridge communication gaps between assay developers, biopharma, and a range of audiences from specialist HCPs to patients.*

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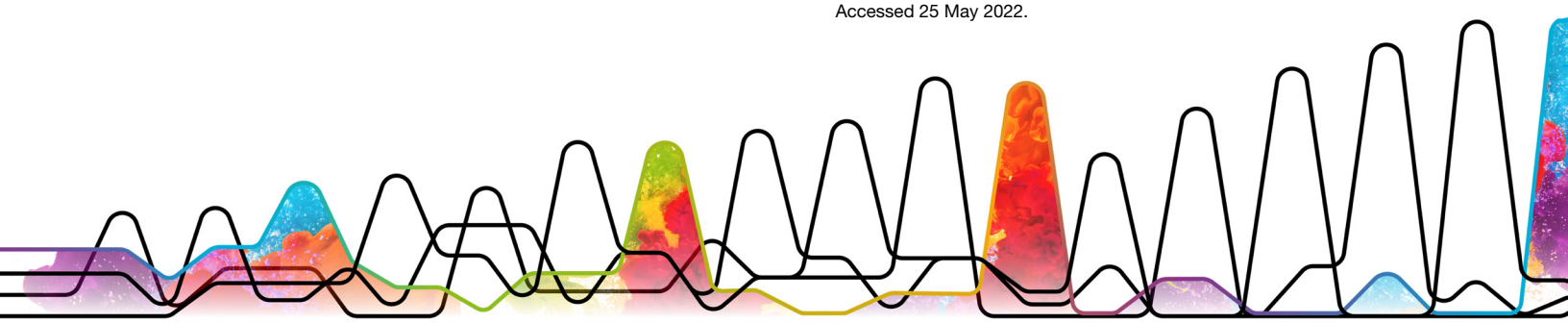

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