Biotech and Pharmaceutical Companies Pursue Targeted and Specialised Therapies

Advances in genomics and big data bring the possibility of new treatment for cancer and inherited diseases in the Middle East.

BY INGA STEVENS

In a region where monogenic diseases such as Thalassemia and Sickle Cell Anaemia have high prevalence, and with the World Health Organisation predicting that cancer cases in the Middle East will double by 2030, global biopharmaceutical organisations such as AstraZeneca are dedicating more man power and resources to preventing genetic diseases. By translating research achievements, data platforms and new technical developments into well-integrated patient treatment programs, they can help tackle the region's unique healthcare requirements.

With companies investing millions in new personalized therapeutic treatments that rely on advances in genomics and big data aggregation to target very specific types of cancer or other diseases affecting small groups of patients. Personalised medicine could provide better prevention and treatment options for patients in the Middle East.

"At AstraZeneca, personalised healthcare is about matching medicines to the patients most likely to benefit from them," says Samer Al Hallaq, Area Vice President for the Middle East at AstraZeneca. "The approach involves a detailed understanding of the biology of a disease, identifying biomarkers and developing tests, known as companion diagnostics, which doctors can use to identify who is most likely to respond to treatment with a targeted therapy."

Cancer treatment is one of the most advanced areas in terms of a personalised medicine approach. The pharmaceutical giant has a robust pipeline that includes investigational therapies in varied stages of clinical development, from recently approved products to earlier-stage molecules in clinical trials.

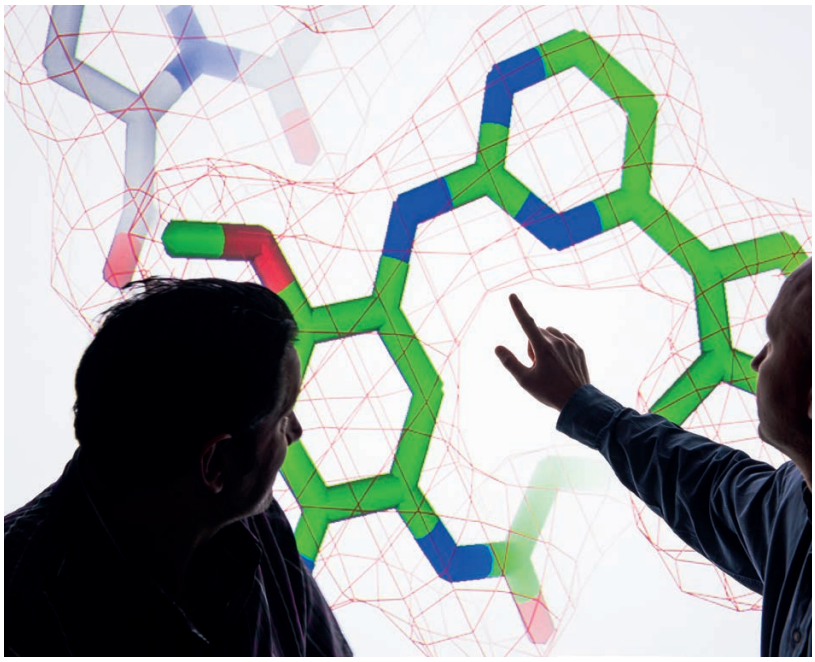
"Oncology is a strategic priority for AstraZeneca because of the potential of our broad pipeline to offer transformational therapies in cancer care," he says. "Our next-generation portfolio focuses on immuno-oncology and DNA damage response (DDR) as a breakthrough paradigm in cancer treatment. Our increased commitment to DDR therapies complements developments in our exciting immuno-oncology pipeline, from which we are expecting clinical results over the coming year."

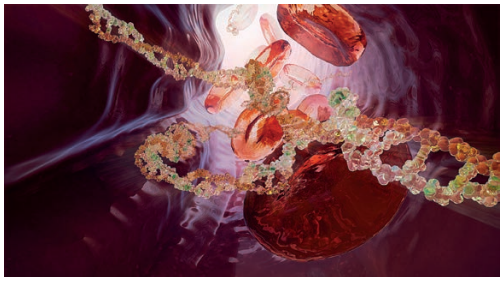
DDR is one of AstraZeneca's four key platforms in oncology, in addition to immuno-oncology, antibody drug conjugates and tumour drivers and resistance. DDR is a network of cellular pathways that minimise the daily impact of DNA damage. Currently, many cancers are known to have defects in DDR pathways, which make them dependent on and therefore highly sensitive to inhibition of the alternative DNA repair mechanism. Targeting DDR deficiencies to preferentially kill cancer cells, while minimising the impact on normal cells, has potential for more selective, better tolerated therapies to improve survival in multiple cancers.

According to Dr. Falah Al Khatib, Consultant Clinical Oncologist at Mediclinic City Hospital, the complex nature of cancer forces scientists and doctors to look deeper into human genetics to figure out its cause. "The very nature of cancer means that personalised medicine strategies—from screening, diagnosis and prognosis—to targeted therapies that identify the unique factors driving the cancer in that particular patient, can be implemented on a larger scale."

"By identifying the specific drug combination the first time round, patients should benefit from better outcomes with fewer adverse effects. This is one of the major goals for personalised medicine," Dr. Al Khatib adds.

Next-generation sequencing (NGS) is a new technology that is accelerating the way genetic data is used in disease management. With the first human genome sequencing carrying a price tag of $2.7 million, the past 25 years has led to substantial reductions in the cost of genome sequencing. As innovation in genome-sequencing technologies and strategies





As human genome sequencing becomes more widespread, the technology is innovating as the price goes down.

continues to increase, particularly with the emergence of commercial enterprises offering genome-sequencing services at competitive pricing, we can expect continued reductions in the cost for human genome sequencing.

However, as Al Hallaq, AstraZeneca explains, such advances bring new complexities. "The biggest challenge is no longer a lack of genetic data; the challenge now is how to handle this big data—the sheer volume of it, and how to interpret it and turn it into knowledge. This presents an urgent need to develop new, scalable and expandable big data infrastructure and analytical methods that can enable healthcare providers' access knowledge for the individual patient, yielding better decisions and outcomes."

AstraZeneca's ambitions for personalised healthcare go far beyond treating cancer. It aims to apply the team's expertise to a range of diseases across all its focus areas including cardiovascular and metabolic disease, respiratory, inflammation and autoimmunity. In a region where conditions like cardiovascular and metabolic disease cause 45% of early deaths; personalised medicine may be used to treat a mix of environmental and genetic factors that are known to result in cardiovascular disease and metabolic syndrome.

"In these conditions, the genetic influence is much more subtle; genes interact with the environment making it more challenging for AstraZeneca's personalised healthcare team to find biomarkers that can be used to select patients or monitor disease. What NGS can do in common conditions is help you understand the pathophysiology of the disease, which will bring new targets and lead you to biomarkers," says Al Hallaq.

No matter what the disease area, personalised therapies are changing the way patients are cared for and treated. A multidisciplinary healthcare approach is required in order to evaluate the treatment options and to ensure that the treatment planning is a collaborative process with health and community care professionals together with the patient and the patient's family.

"Because the multidisciplinary approach facilitates collaboration among multiple specialties, this allows for individualised, comprehensive care to be delivered to families who experience complex inherited medical conditions. As the genetic basis of many complex conditions is discovered, the advantages of an interdisciplinary approach for delivering personalised medicine will become more evident," Al Hallaq notes.

As more is learned about the role of various genes and genetic modifiers on the development of disease, personalised medicine will play a larger role in routine medical care, representing the next evolutionary step in medicine and pharmacy. From improving prognosis, diagnosis and therapy outcomes by focusing on an individualised approach in research and every day clinical practice, close collaboration between health IT companies, biopharmaceuticals, and healthcare service providers will continue to be a necessary element to advancing personalised medicine in the future. F

FACTS

3 billion

base pairs in a human genome spell out the instructions for making and maintaining a human being.

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