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the business of Bio & Health Sciences
ASIA EDITION

The Future of mRNA Is Being Built in APAC

January 3, 2026 | Analysis | By Ayesha Siddiqui

Beyond scientific advancement, mRNA represents a strategic opportunity shaped by policy stability, public investment and regional collaboration. Across APAC, governments are increasingly recognising that supportive regulatory frameworks and long-term funding can serve as powerful competitive advantages, attracting global capital and talent. While political dynamics in the United States have slowed momentum, experts emphasise that the science underpinning mRNA technology remains sound. To fully realise its potential, the region will need greater coordination across borders, including regulatory harmonisation and joint development pathways, to build a resilient mRNA ecosystem capable of addressing shared health challenges and driving long-term innovation.



mRNA first entered the global spotlight during COVID-19, turning companies such as Moderna and BioNTech into household names. The technology returned to headlines more recently for a very different reason. The United States Department of Health and Human Services (HHS) has announced plans to cut $500 million from mRNA vaccine research funding.

While the US winds back research and investment, momentum is building elsewhere. Across Asia-Pacific (APAC), countries such as Australia, Singapore and South Korea are accelerating investment in mRNA research and manufacturing. The region now contributes about 30 per cent of global mRNA activity. Governments and institutions increasingly view mRNA not as a pandemic-era solution, but as a strategic platform technology with long-term value.

That shift is reflected in the breadth of applications now under development. Researchers across APAC are trialling mRNA-based therapies for cancer, Tuberculosis (TB), Urinary Tract Infections (UTIs) and next-generation influenza vaccines. In the coming pages we look at the current mRNA landscape, where it is heading, and how the United States' decision to halt funding could act as a catalyst for growth across the APAC mRNA sector.

APAC mRNA Landscape

There is a flurry of activity across APAC's mRNA ecosystem, supported by strong policy, research and manufacturing efforts. The key developments are outlined below:

Government Initiatives

Governments across APAC are playing a crucial role in expanding the mRNA sector, supporting progress from early research to manufacturing scale-up. In Australia, funding streams such as the Future Health Research and Innovation (FHRI) Fund in Western Australia, the National Collaborative Research Infrastructure Strategy (NCRIS) and state-level commitments through mRNA Victoria have channelled investment into RNA facilities, translational programmes, pandemic readiness and early-stage therapeutic development.

Singapore too has taken a similar approach through the Nucleic Acid Therapeutics Initiative (NATi) and a seven-year, $130 million National Initiative for RNA Biology and Its Applications (Nirba), backed by the National Research Foundation to support work spanning RNA vaccines, disease therapy and prevention. South Korea has gone further still, embedding mRNA into national preparedness planning. Its KRW 505.2 billion mRNA Vaccine Development Support Project, overseen by the Korea Disease Control and Prevention Agency (KDCA), spans non-clinical research through phase III trials, with the aim of securing COVID-19 mRNA licences by 2028 and enabling vaccine deployment within 100–200 days in future pandemics.

“Many regional countries view mRNA as strategically important from a scientific preparedness and long-term innovation standpoint, particularly in the context of pandemic preparedness. This has driven public-sector and academic investments aimed at building foundational expertise, workforce skills, and research infrastructure. APAC contributes about 30 per cent to the mRNA research, development and manufacturing. Markets such as Korea, Japan, Australia, and China are among those strengthening these ecosystems,” said **Josephine Cheng, Senior Modality Expert, APAC Process Solutions, Life Science Business of Merck**.

These investments are now translating into tangible scientific and manufacturing capability across the region. “The APAC region now has many strong elements for a flourishing mRNA Biopharma sector: Extensive pre-clinical, clinical and commercial grade mRNA manufacturing facilities that can support R&D and ensure supply independence, many big multi-national mRNA companies with research hubs and large regional offices presence, several new companies with large teams based in countries such as China. All these are underpinned by a strong foundational base in exceptional world-class RNA science and nanotechnology; many of which are supported by their respective Government-backed initiatives,” said **Professor Archa Fox, The University of Western Australia’s School of Human Sciences, Director of Australian Centre for RNA Therapeutics in Cancer and Director of the RNA Innovation Foundry**.

Platform and Delivery Innovation

Much of APAC’s scientific activity focuses on improving mRNA delivery and stability. These remain two of the most persistent challenges for the modality. In Singapore, researchers are developing targeted delivery platforms to improve mRNA stability, supported by up to $2.87 million from CEPI for ACM Biolabs to validate its thermostable ACM Tunable Platform, which allows storage at 2–8°C rather than ultra-cold temperatures. A collaboration between the Yong Loo Lin School of Medicine at the National University of Singapore and Tsinghua University has also produced a new vaccine-delivery approach designed to improve safety, enhance effectiveness and reduce patient burden.

Manufacturing Capability and Infrastructure Build-out

APAC is building an advanced RNA manufacturing environment especially in Singapore and Australia. Australia (Victoria) has become the only location globally where both Moderna and BioNTech have committed R&D and manufacturing operations.

One of the major bottlenecks in making mRNA-LNP therapeutics commonplace in clinical practice is manufacturing, and Australia has multiple companies advancing domestic production capacity. In Sydney, this includes the NSW Government-run pilot RNA manufacturing facility and Aurora Biosynthetics, a pioneering advanced RNA therapeutics manufacturing company. CDMO Southern RNA is also establishing manufacturing operations in Queensland.

“Australia is supporting ecosystem development through initiatives such as RNA Australia, the RNA Institute at UNSW, BASE in Queensland and the Perth RNA Innovation Foundry at the University of Western Australia. From laboratory work through to clinical application, the country is building an integrated pipeline and laying the foundations for mRNA-based therapeutics to become a central component of clinical practice within the next five to 10 years as new products gain approval,” said **Professor Greg Neely, Head, Dr. John and Anne Chong Lab for Functional Genomics, Charles Perkins Centre, School of Life and Environmental Sciences, The University of Sydney**.

Singapore is also expanding its manufacturing footprint and has opened an mRNA BioFoundry at A*STAR's Bioprocessing Technology Institute, using automation and machine learning to develop more efficient manufacturing workflows. "I see a robust and exciting mRNA landscape in APAC, with excellent foundational science on RNA in normal and diseased systems, as well as diverse mRNA research applications, including using RNA as medicine and targeting RNA. Increasingly, as more data is generated, RNA research also feeds into AI, enabling machine learning to learn RNA features and engineer better RNA drugs. To enable the use of mRNA in medicine, manufacturing and quality control are also very important. Singapore is building the technologies and infrastructure needed to enable high-quality RNA manufacturing," said **Dr Wan Yue, Executive Director, A*STAR Genome Institute of Singapore (A*STAR GIS)**.

Therapeutic Expansion Beyond COVID-19

Beyond vaccines, firms across APAC are expanding mRNA programmes into chronic disease, oncology and infectious diseases. In South Korea, GC Biopharma submitted an Investigational New Drug application for a phase I clinical trial of GC4006A, its mRNA COVID-19 vaccine candidate. Dx&Vx signed a $220 million agreement with a US biotech partner to develop mRNA cancer vaccines, and EuBiologics has been selected to lead Korea's $356 million mRNA vaccine programme for future pandemics.

In Australia, researchers have reported pre-clinical success with an mRNA tuberculosis vaccine developed through collaboration between the University of Sydney, the Centenary Institute and the Monash Institute of Pharmaceutical Sciences, addressing limitations of the century-old BCG vaccine. The Victorian Government continues to support therapeutic expansion through the mRNA Victoria Research Acceleration Fund, with six research teams sharing AU$1.7 million to advance mRNA treatments for heart disease, Alzheimer's, neurological and autoinflammatory conditions. Separately, researchers led by the University of Technology Sydney, in collaboration with Commonwealth Scientific and Industrial Research Organisation (CSIRO) and University of New South Wales (UNSW), secured AU$1.8 million to develop an mRNA vaccine targeting urinary tract infections.

China is a major contributor to the global mRNA oncology pipeline. Of the 58 mRNA therapeutic cancer vaccines currently in development worldwide, 45 per cent originate from Chinese companies, even though none have yet entered phase III. WestGene Biopharma, Everest Medicines and Abogen Biosciences have received IND clearances in both the US and China and are viewed as potential candidates for global out-licensing. In Japan, Meiji Seika Pharma initiated collaborative research with the National Cancer Center to advance the clinical application of mRNA in oncology, including personalised cancer vaccines.

Where it is heading

APAC's momentum in mRNA is being driven by what scientists see as a widening runway beyond COVID-19. "I think the success of the COVID-19 mRNA-LNP vaccine really put the spotlight on mRNA as a powerful new technology. The fact that the COVID-19 mRNA vaccine has now been given to billions of people and shows an extremely good safety profile opens this technology to many other uses. The most obvious next application is to develop vaccines against other infectious diseases, then more generally as a platform to maintain readiness for future pandemics. The efforts are well underway in Australia and globally. We don't know yet what infectious agents will be most effectively prevented through mRNA vaccines vs our more traditional protein based approaches, but this knowledge will come over time," said Professor Neely.

Post-pandemic, APAC is building on the infrastructure established during COVID-19 and beginning to diversify into seasonal influenza, RSV, CMV, oncology and other areas.

"Beyond infectious diseases, the next major frontier for mRNA is in cancer vaccines, which function as therapeutic interventions. In this approach, mutations or genes that are uniquely expressed in a patient's cancer, but not in healthy tissue, are encoded into mRNA and delivered using lipid nanoparticles. These strategies are designed to activate the patient's immune system, enabling a targeted immune response that can eliminate tumour cells in responsive patients. Recent mRNA-based therapeutics, including those reported by BioNTech, have demonstrated promising efficacy in difficult-to-treat cancers such as pancreatic cancer. Significant research and development efforts in this area are ongoing in Australia and globally," said Professor Neely.

Alongside oncology, researchers are exploring how mRNA can be used to re-engineer immune responses more directly. "In parallel, there are emerging efforts to use mRNA–lipid nanoparticle platforms to deliver chimeric antigen receptors to immune cells, including CAR-T, CAR-NK, and CAR-M cells, enabling the generation of tumour-killing cells directly within the patient's

body. Programmes such as those being advanced by CREATE Medicines are conducting cutting-edge clinical trials in Australia. This approach may represent the future direction of the CAR field. While early safety profiles appear encouraging, efficacy will need to be confirmed through ongoing and forthcoming clinical trial data," said Professor Neely.

Beyond immuno-oncology, mRNA is also being applied to gene editing and gene replacement. "Another important area of progress is gene editing and gene replacement. At present, the most advanced applications involve mRNA–lipid nanoparticle–based base editors used to correct pathogenic mutations, with many successes concentrated in liver-targeted therapies due to the relative efficiency of mRNA–LNP delivery to this organ. Significant progress is expected in rare disease applications as new delivery strategies are developed," said Professor Neely.

He added, "For gene replacement, mRNA–lipid nanoparticle platforms are being used to deliver functional or enhanced versions of human genes, either to correct loss-of-function mutations in rare diseases or to modify disease trajectories in more common conditions by supplying therapeutic gene copies. Early efforts have included cystic fibrosis, where delivery of functional CFTR has been demonstrated, although achieving sustained disease modification remains challenging."

Professor Neely also leads a Sydney-based company, Enhanced Analgesics, which is developing mRNA–lipid nanoparticle therapeutics to deliver an enhanced version of a naturally occurring human pain-modulating protein. The therapy is administered intranasally, enabling delivery to the brain. In preclinical studies, this approach has demonstrated strong efficiency and therapeutic potential.

mRNA landscape in Japan

-Sayoko Taga, Manager, Public Relations Team, PublicÃ¯Â¼â? External Affairs Dept, Meji Pharma

Japan's mRNA landscape is steadily evolving, shaped by domestic investment, active regulatory engagement, and growing alignment across industry, academia, and government to support both near-term scale-up and longer-term innovation.

Industrial base: Continued domestic investment in GMP manufacturing for mRNA/LNP, fill–finish, quality control and cold-chain, with large-scale capacity still being built out. Collaboration with domestic CDMOs is advancing and improving supply flexibility for clinical trials and scale-up.

Technology focus: Improving delivery (LNP design/targeting), enhancing thermostability, and exploring next-generation modalities such as self-amplifying RNA (saRNA) and circular RNA (circRNA), as well as combinations with immunotherapies. On the manufacturing side, capping efficiency and control of residual impurities are being strengthened.

Regulatory and development environment: The PMDA is clarifying requirements and approaches for CMC and platform-based development, maintaining ongoing dialogue, and putting in place practical processes for vaccine strain updates. Clinical-trial activity is progressing toward a balance between domestic patient enrolment and integration into global development.

Talent and public–private collaboration: With public support from programmes such as AMED and SCARDA, academia–industry collaboration is active. Licensing and co-development with overseas partners continue, alongside the training and mobility of mRNA specialists.

Strengths and challenges: Japan's strengths include quality-focused manufacturing capabilities and established clinical-trial infrastructure. Ongoing challenges include stable supply and domestic sourcing of raw materials, cost competitiveness and IP/international regulatory compliance, making continued capacity building through public–private efforts important.

Cooling Western Enthusiasm and APAC's Advantage

While the United States pioneered mRNA technology, cooling enthusiasm for COVID-19 vaccines and shifts in funding priorities have raised questions about whether this pullback could ripple across the Asia-Pacific. Experts, however, believe the uncertainty in some Western markets gives APAC an opportunity to accelerate.

As **Dr Gisela Mautner, CEO, Noxopharm** said, "The ongoing uncertainty around RNA-based technologies in some parts of the world represents a significant opportunity for our region to build a global leadership position via a sustainable industry backed by world-leading research and collaboration."
Dr Wan Yue agrees, "I think this presents an amazing opportunity for Asia to double down on RNA research, attract the best

RNA scientists and mRNA companies to the region, and translate our understanding of RNA into better engineered RNA products, not only for Asian populations but also for the rest of the world. Our current understanding of how mRNAs can be used in medicine is just the tip of the iceberg, and Asia has an opportunity to become a world leader in RNA medicines."

That opportunity is not limited to science alone. Stable policy frameworks and public investment are increasingly seen as competitive advantages. "We also have the opportunity to attract investment from all around the world by offering a stable and supportive framework in which to invest in these technologies. We have seen this here in Australia already, with the federal government developing a national RNA Blueprint and also investing in new mRNA facilities alongside state governments. Such strategic policies are an example of how the sector can be grown in the years ahead, supporting the development of an ecosystem that develops new drugs, vaccines and manufacturing capabilities to benefit all citizens," said Dr Mautner.

Political dynamics elsewhere, experts argue, do not undermine the underlying science. "The science, safety and efficacy of mRNA technology is generally well established. Although mRNA seems to be caught in political culture wars in the United States, that does not change the science and we need to forge ahead. The APAC region has a great opportunity to be world-leading in mRNA innovation and application beyond infectious diseases," said Professor Archa Fox.

Experts also emphasise that collaboration and coordination will be critical to sustaining momentum across the region. "Any measures that promote regional collaboration in this field should also be encouraged, whether from an investment or drug development perspective, as such approaches will spur further growth and help ensure the most promising technologies have the greatest chance of success. We also believe governments in general should be active in promoting RNA technologies to local populations, helping educate people about the numerous benefits these platforms will deliver." said Dr Mautner.

There is also a need for governments across APAC to work together more closely, particularly on regulation and development pathways. "The missing element is a coordinated effort by governments across APAC borders. We should come together to use the power of mRNA to tackle the clear regional health challenges that we face such as higher prevalence of certain cancers, chronic diseases and tropical and emerging pathogens. Coupled to this is a greater need for innovation and harmonisation in regulatory approaches, to really take advantage of what mRNA can offer in terms of rapid design and manufacture for mRNA." said Professor Archa Fox.

The APAC mRNA market is already worth $2.32 billion. It is expected to reach $7.40 billion by 2030, according to Grand View Research. Countries across the region are racing to secure a larger share through advances in science, manufacturing, and policy.

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