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How Space Medicine Is Rewriting Healthcare

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Long considered the stuff of science fiction, space medicine is rapidly becoming a reality. The field has been back in the spotlight this year with growing activity around the world. In April 2026, NASAâ??s Artemis II mission carried AVATAR (A Virtual Astronaut Tissue Analog Response), an investigation that used organ-on-a-chip devices to study the effects of deep space radiation and microgravity on human health. Closer to home, China launched new in-orbit experimental projects in the same month as part of its broader ambitions for a space hospital. Across Asia Pacific, there are also growing collaborations and research efforts aimed at understanding how the human body behaves beyond Earth. What are the latest developments in space medicine across the region, and why does exploring space matter at all? Letâ??s find out.

As space missions become longer and human spaceflight programmes expand, countries across Asia Pacific are increasing efforts in space medicine research. India, China, Japan, Australia and South Korea are studying how space conditions affect human biology. The goal is not only to support future missions beyond Earth, but also to apply these findings to healthcare on Earth.

India, with its growing space exploration ambitions, is also expanding its focus on space medicine. In March 2026, the Indian Space Research Organisation (ISRO) and All India Institute of Medical Sciences (AIIMS) signed a memorandum of understanding to promote research aligned with ISRO's priorities, with a focus on advancing human health, performance and safety during space missions.

Earlier, in December 2025, ISRO and Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) entered into a partnership supporting the Gaganyaan programme through studies on physiological and behavioural changes in space, radiation exposure, biomedical systems, telemedicine and astronaut medical technologies. SCTIMST also launched a Space Medicine Centre and a Bioastronautics Fellowship in November 2025, expanding research and training efforts in the field.

China is another country increasing its focus on the field. In April 2026, it sent five healthcare devices into orbit aboard an experimental spacecraft in what marked an initial step toward its plans for a future space hospital. The devices are expected to undergo testing over the next three years to support astronaut healthcare and space medicine research.

The project, led by Shenzhen University of Advanced Technology in collaboration with the Chinese Academy of Sciences' Innovation Academy for Microsatellites, is examining health challenges associated with microgravity, radiation and confined environments. Such conditions can lead to bone density loss, muscle atrophy, slower wound healing, cardiovascular changes and psychological stress.

Japan is also making waves in this space. Japan Aerospace Exploration Agency (JAXA) is quite active in the field, continuing research into the physiological and psychological changes experienced during spaceflight and the measures needed to manage them. The research aims to support human health during missions beyond low Earth orbit, while also identifying findings that could have applications for healthcare on Earth.

JAXA's protein crystal growth programme has processed over 600 samples through Kibo, contributing to shortened drug development processes; a novel H-PGDS inhibitor designed from a space-grown crystal entered Phase III trials for Duchenne muscular dystrophy; space-grown crystals of the kinase MAP2K7 diffracted at 1.3Å versus 2.1Å on the ground — the step-change separating structures that guide rational drug design from those that cannot.

Speaking about APAC’s role in the emerging space medicine ecosystem, **Raviteja Duggineni, Founder & CEO of ResearchSat,** said, “The Asia-Pacific region sits at the centre of this transition for structural reasons. Japan has operated the world's most commercially mature microgravity drug discovery programme for over two decades, with Kibo functioning as a fee-for-service structural biology CRO. China has pursued volume and vertical integration: Tiangong executed 31 new science projects in 2025, generating over 150 terabytes of data and 50-plus authorised patents, with recent missions delivering stem-cell-based brain organoid experiments. India has moved decisively at the policy layer — ISRO's IMEx-2026 explicitly calls for pharmacology and drug research proposals for Gaganyaan and the Bharatiya Antariksh Station, and the ISRO-DBT MoU couples space biotechnology to the BioE3 biomanufacturing policy. Yet the most commercially significant fact is what sits outside these three orbital programmes: a multi-billion-dollar pool of sophisticated pharma demand in Korea, Singapore, and Australia — markets with no domestic orbital infrastructure but extraordinary therapeutic ambition. South Korea has committed $1.6 billion to over 1,200 drug development projects through its Drug Development Fund, and Korean pharma exported $14.5 billion in licensed technologies in 2025. Layered onto this is a subtler convergence: long-duration spaceflight compresses the phenotypes of biological ageing — bone loss, muscle atrophy, immune dysregulation — from years into weeks, making microgravity the natural validation environment for the geroscience and longevity therapeutics now drawing record venture capital. Korea, Japan, and Singapore — the markets with the most acute ageing-population pressure — are precisely where this demand will land first.”

Beyond national agencies and research institutions, companies are also entering this space. In Australia, ResearchSat is building Australia's space-based biomanufacturing infrastructure to exploit that condition commercially operating as a space-based CRO and CDMO for pharmaceutical and biotech clients who need microgravity as a research and production environment, without managing space operations themselves.

The flagship platform is ADI-Lab — a modular, remotely operated satellite bioreactor enabling aseptic in-orbit bioprocessing of Active Pharmaceutical Ingredients (APIs) and novel biomaterials. Unlike companies offering experiment slots on the ISS, ResearchSat designs, builds, and operates its own orbital hardware, maintaining full mission control and data sovereignty for clients. Complementing this, MagRise provides ground-based microgravity simulation via magnetic levitation, enabling terrestrial validation of space-derived biology before committing to an orbital mission.

“The company's positioning is not to compete for the capital-intensive in-space manufacturing endgame already crowded with incumbents, but to operate as the orbital CRO/CDMO data layer for Asia-Pacific — the tier of the pharma supply chain that does not yet exist regionally. The staged platform mirrors how sponsors progress molecules: MagRise terrestrial simulation screens which candidates are worth flying; ADI-Lab orbital experimentation generates CMC-relevant flight data mapped to regulatory expectations; and a future biomanufacturing tier remains optional for products that cannot be reproduced on Earth. Each tier de-risks the next — the language pharma procurement actually speaks. Microgravity is not the next big thing in pharma; it is the missing variable that was always there. The companies that turn it into routine, regulated, decision-grade data will define the category, and ResearchSat is building that layer in the moment Asia-Pacific is finally being recognised as a centre of biotech gravity in its own right,” said Duggineni.

Another example is South Korea based space medicine company Space LiinTech, which is developing Low Earth Orbit research platforms to support pharmaceutical and biotechnology research in space. Its BEE platform roadmap includes modules for the International Space Station, satellite systems and future recoverable free flyer platforms designed to create research workflows between laboratories on Earth and orbit. The company says its long term aim is to build infrastructure connecting biotechnology and the space economy. Space LiinTech also announced that its self developed BEE-PC1, described as South Korea’s first space medicine research module, has begun conducting experiments in a microgravity environment after reaching the International Space Station.

Another South Korea based company working in this area is Boryung, which is building research infrastructure focused on supporting human survival in extreme environments. Through collaborations with global partners and efforts to secure independent research platforms, the company is expanding opportunities for research and development in space while exploring ways to address health challenges both on Earth and beyond.

“For most of pharmaceutical history, gravity has been an unexamined constant — the one boundary condition every drug ever approved was discovered, formulated, and tested under, without exception. The industry has quietly exhausted the easy levers of innovation: combinatorial chemistry, high-throughput screening, AI-driven target identification, organoids, CRISPR libraries — all industrialised, all asymptoting into diminishing returns as the cost of bringing a new molecule to market continues to climb. Microgravity is the first genuinely new experimental surface introduced to drug discovery in a generation, and the evidence is no longer speculative,” said Duggineni.

Why Explore Space Medicine?

The question then arises: why does it make sense to explore space medicine at all? There are two broad reasons. First, as human space missions become more frequent, understanding how the body responds to space environments becomes important for astronaut health and safety. Research on the effects of radiation, microgravity and long periods of isolation can help develop systems, treatments and medical support for people travelling and living in space.

The second is that it also has implications for people on Earth. Space medicine research aims to understand how conditions in space affect the human body and how those findings can be applied to healthcare. Scientists are studying how factors such as microgravity, radiation and isolation influence biological processes, with the goal of improving diagnostics, treatment methods and disease prevention.

“Space medicine research conducted by JAXA uses the microgravity environment as a unique platform to understand human physiology and disease, enabling high-quality protein crystal growth for drug discovery and generating knowledge that can contribute to medical technologies on Earth,” said a spokesperson from JAXA.

For example, the research that JAXA is currently undertaking on loss of bone mass and deterioration of muscle function among astronauts can be used to clarify how particular conditions such as osteoporosis and muscular dystrophy develop in people on earth, as well as to develop the necessary treatment techniques.

There have already been examples of technologies developed for astronauts finding applications on Earth. Telemedicine, robotics and miniaturised medical devices have all advanced through innovations initially designed for space missions.

One of the best examples is ultrasound technology. In the early 2000s, NASA researchers explored new ways to use ultrasound for diagnostics and remote health monitoring in space. Their work expanded its use for medical evaluations that previously relied on X rays or less portable equipment. Researchers also developed training systems that allowed non experts, including astronauts, to use ultrasound devices for diagnosis in remote settings. Those methods were later adapted for use on Earth, including for diagnosing injuries in athletes and supporting medical care in remote locations such as Mount Everest and the Arctic. Furthermore, scientific research performed in space has helped advance understanding of Alzheimer’s disease, asthma, cancer, and osteoporosis, as well as the search for treatments, according to a report from Association of American Medical Colleges (AAMC).

The next breakthrough in healthcare may not come only from a laboratory on Earth, but from research carried out hundreds of kilometres above it.

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