Outsmarting brain cancer: Researchers develop nanoparticle and inhibitor that triggers the immune system

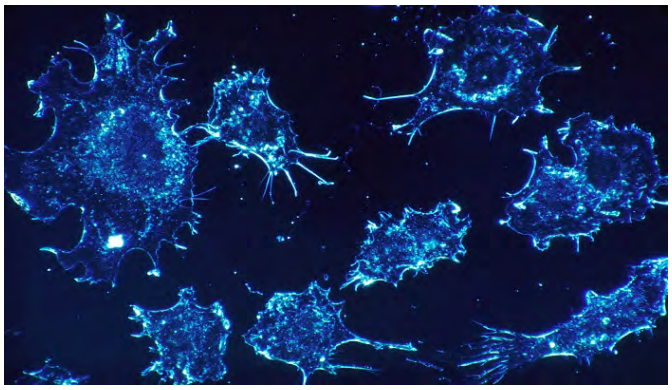
Scientists at the University of Michigan Rogel Cancer Center were optimistic when they identified a small molecule that blocked a key pathway in brain tumors. But there was a problem: How to get the inhibitor through the bloodstream and into the brain to reach the tumor.

In collaboration with multiple labs, the teams fabricated a nanoparticle to contain the inhibitor, and the results were even better than expected. Not only did the nanoparticles deliver the inhibitor to the tumor in mouse models, where the drug successfully turned on the immune system to eliminate the cancer, but the process triggered immune memory so that a reintroduced tumor was also eliminated—a sign that this potential new approach could not only treat brain tumors but prevent or delay recurrences.

"Despite survival gains in many cancer types, glioma remains stubbornly challenging, with only 5% of patients living five years after their diagnosis," said study author Pedro R. Lowenstein, M.D., Ph.D., Richard C. Schneider Collegiate Professor of Neurosurgery at Michigan Medicine.

Gliomas are often resistant to traditional therapies, and the environment inside the tumor suppresses the immune system, rendering new immune-based therapies ineffective. The small molecule inhibitor AMD3100 was developed to block the action of CXCR12, a cytokine released by the glioma cells that builds up a shield around the immune system, preventing it from firing up against the invading tumor. Researchers showed in mouse models of glioma that AMD3100 prevented CXCR12 from binding with immune-suppressive myeloid cells. By disarming these cells, the immune system remains intact and can attack the tumor cells.

However, AMD3100 was having trouble getting to the tumor as it did not travel well through the bloodstream, and it did not pass the blood brain barrier, a key issue with getting drugs into the brain. The researchers created a protein-based nanoparticles to encapsulate the inhibitor and injected AMD3100-loaded nanoparticles into mice with gliomas.



As the nanoparticles traveled through the bloodstream toward the tumor, they released AMD3100, which restored the integrity of the blood vessels. The nanoparticles could then reach their target, where they released the drug, thus blocking the entry of the immune-suppressive myeloid cells into the tumor mass. This allowed the immune cells to kill the tumor and delay its progression.

Further studies in mice and patient cell lines demonstrated that coupling the AMD3100 nanoparticle with radiation therapy enhanced the effect beyond either the nanoparticle or radiation alone.

Among the mice whose tumors were eliminated, the researchers then reintroduced the tumor, simulating a recurrence. Without any additional therapy, 60% of mice remained cancer-free. This suggests that, like a vaccine, AMD3100 created immune memory, enabling the immune system to recognize and destroy the reintroduced cells.

"Every glioma recurs. It's very important for glioma therapy to have this immunological memory," Maria G. Castro, senior author of the study, published in *ACS Nano* said in a news release. Additional safety testing is necessary before moving to a clinical trial.

New draft regulations for professional conduct of RMPs issued by NMC

The National Medical Commission (NMC)'s Ethics and Medical Registration Board (EMRB) has issued draft regulations on "National Medical Commission, Registered Medical Practitioner (Professional Conduct) Regulations 2022" and has invited comments from the public, experts, stakeholders, and organizations within a month.

The draft aims to address vari-

ous issues on professional conduct of registered medical practitioners and includes directions on prefix, suffix and modern medicine; professional development programmes; right to remuneration; prohibiting soliciting of patients; prescribing general medicine; prohibition of fee splitting or commissions; prohibition of endorsement of the product or a person; restriction on advertisement; responsibility regarding sale of drugs and medical records; informed consent, among others.

Moreover, according to the draft regulations, the responsibilities of RMPs towards each other include professional integrity; RMP as locum; reporting and inspection whereas those towards the public and allied healthcare professionals talk about public education and awareness, leadership, etc.

Listing down the regulations on misconduct, the EMRB issued a warning stating that "Any violation of these regulations, or other applicable Acts related to medical practice which are in force, shall constitute professional misconduct."

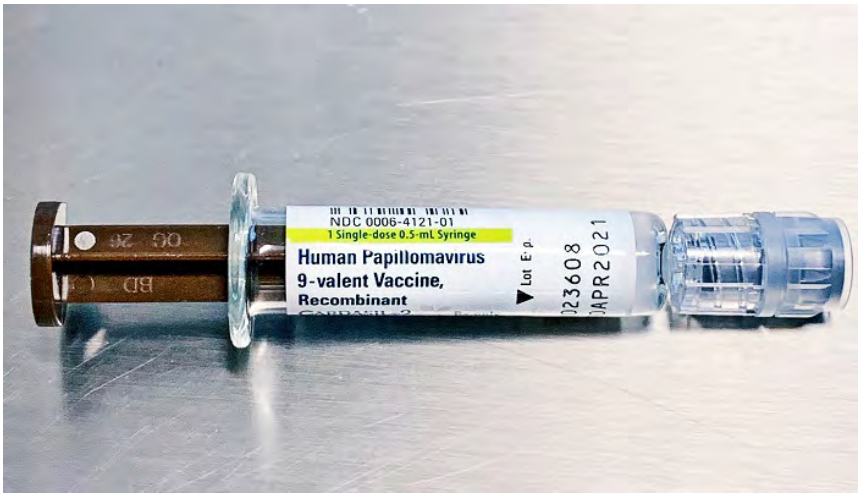
For example, according to the guidelines, marketing and increasing visibility in market-available medical consultation apps is not permitted, while doctors returning from foreign universities where MBBS is mentioned or equivalent to MD cannot mention the same in India unless FMGE is completed and an MD degree is obtained separately in the country.

Aside from that, ayurvedic medicine practitioners are not permitted to practise allopathy, and vice versa, whereas written approval is required for telemedicine practice (digital signature), reports *The Daily Pioneer*.

The proposed regulations also intend to address the standards for practising telemedicine in the country, such as the scope of technology used for telemedicine, the framework for telemedicine, the guidelines for technology allowing telemedicine, the obligations of the NMC, and so on.

SII to launch cervical cancer vaccine in India

The Serum Institute of India (SII) is introducing its Quadrivalent Human Papillomavirus (qHPV) vaccine against cervical cancer, which would be made in India and would be easily accessible. Sources say the company is stockpiling the vaccine while waiting for approval from the country's drug regulator.



Gardasil, manufactured by Merck, and Cervarix, manufactured by Glaxo Smithkline, are currently available in India. SII's entry into this space is expected to bring down the prices of the vaccines available currently, reports Business Standard.

According to official sources, the company had previously requested permission from the government to manufacture and stockpile the indigenously developed Quadrivalent Human Papillomavirus (qHPV) vaccine against cervical cancer after the completion of phase 2/3 clinical trials to ensure its early availability in the country.

A technical expert panel recommended the vaccine against Human Papilloma Virus (HPV), one of the most prevalent causes of cervical cancer, for inclusion in the Universal Immunisation Programme in 2017, however it has yet to be implemented countrywide, reports *Economic Times*.

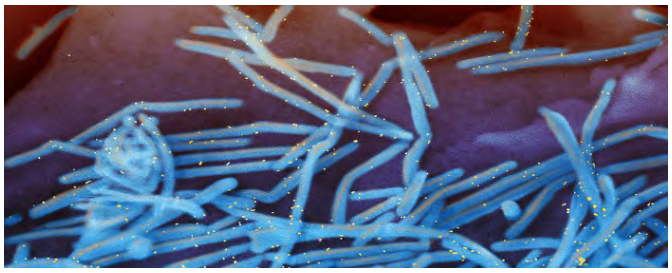
According to an official source familiar with the matter, if the government adopts SII's request, it will save substantial time in including the qHPV vaccine in the Universal Immunisation Programme. Meanwhile, sources told *The Print* that SII is looking at a November launch date for the vaccine.

Respiratory Syncytial Virus responsible for nearly 100,000 deaths among children globally in 2019

According to a recent study published in The Lancet journal, a common virus that generally causes cold-like symptoms was responsible for more than 100,000 fatalities in children under the age of five worldwide in 2019. Respiratory Syncytial Virus (RSV) is the most prevalent cause of acute lower respiratory infection in young infants, according to researchers.

The study, which is the first to look at RSV disease burden in specific age groups, found that there were over 45,000 fatalities among children under six months old in 2019, with one in every five RSV infections happening in this age group.

According to sources, the research's findings are roughly similar with prior estimates from a 2015 study, which put the number of yearly cases of RSV in children under the age of five at 3.3 crores, resulting in 1,18,200 fatalities overall. In 2019, 3.3 million RSV-associated acute lower respiratory infection episodes occurred in children under the age of five, resulting in 26,300 in-hospital fatalities and 1,01,400 RSV-attributable deaths overall. This accounts for 2% of all yearly fatalities in this age group from any cause, the researchers said.



Meanwhile, in 2019, there were 66 lakh RSV-associated acute lower respiratory infection episodes worldwide, 13,300 hospital fatalities, and 45,700 total deaths attributed to RSV – 2.1 percent of all yearly deaths.

According to the paper, the incidence rate in India is 53 per 1,000 children per year (5.3 percent), with an estimated 61,86,500 episodes of RSV-associated acute lower respiratory infection in children under the age of five. 97% of RSV related deaths in children under the age of five that occurred in low- and middle-income nations, reported NDTV.

The study's shortcomings were noted by the authors. Variations in criteria such as study setting, exact case definition for acute lower respiratory infection (ALRI), health-care access and seeking behaviour, and eligibility for RSV testing, they added, might impact the modeling's predictions of fatality statistics.

Amrita Vishwa Vidyapeetham develops Synthetic Jaw-Bone Graft, gets nod for clinical trials

Amrita Vishwa Vidyapeetham, has received approval from the Central Drugs Standard Control Organization (CDSCO) for conducting pilot clinical trial for a novel bone graft developed jointly by Amrita School of Nanosciences, Amrita School of Medicine and Amrita School of Dentistry, Kochi.

The project was funded by the Dept. of Sciences and Technology, Govt. of India, in the initial lab phase and then by Biotechnology Industry Research Assistance Council (BIRAC) for the translational large animal testing and regulatory testing phases.

The synthetic bone graft, named Nanotex Bone, provides a solution in the world for patients who lose part of their lower jaw (mandibular bone) due to cancer, injury or

trauma. The product, patented by Amrita Vishwa Vidyapeetham, also accepts tooth implants, enabling patients to lead a close-to-normal life even after losing a portion of their oral cavity bone. The clinic trial, which entails testing on ten patients, will be conducted at Amrita School of Medicine and Amrita School of Dentistry, Kochi.

It is expected to be completed in 2 years. This is the first time that a university in India has innovated a medical product and taken it all the way from lab research to a potentially successful medical application on its own.

"This GMP has cleanroom processing lines for implant and oncology products where the test products can be manufactured. No other educational institution in India has established a GMP facility for manufacture of medical implants and nanomedicines and none is directly associated with a hospital, like we are with the 1,300-bed Amrita Hospital in Kochi. This is what makes Amrita Vishwa Vidyapeetham unique," said Dr Shantikumar Nair, Dean of Nanosciences, Center for Nanosciences & Molecular Medicine, Amrita Vishwa Vidyapeetham, who is spearheading the Nanotex Bone project in a news release.

Chennai Hospital doctors perform hip replacement surgery with the help of mobile software

Doctors at SIMS hospitals in Chennai employed a specialised mobile software to perfect the surgical results of complete hip replacement surgery for a 62-year-old British national suffering from osteoarthritis.

Michael Mckenna, a builder by profession was told by doctors in UK that he would need a total hip replacement, but the procedure would impair his mobility and make it impossible for him to continue working. When he contacted SIMS Hospitals' specialists, he was recommended to have "high-performance" hip replacement surgery, reported TOI.

According to senior orthopeadic surgeon Dr. Vijay C Bose, Robotic surgeries, although highly precise are expensive. "Our hospital developed a software called DiCAST (Digital inclinometer-Co Axial Stitch Techniq), which could be customized to meet the requirements of the patient and the surgeon. This software helps the doctor place the implant in the right position reducing all margins of error. Outcomes of these surgeries are on par with that of robotic hip replacement surgery," said Nevertheless, the software does not increase the cost of the surgery, he added.

ISRO to back Indian hospitals for quality upgradation with space tech

Several Indian hospitals will be able to improve the quality of their services by incorporating space technology into their emergency and critical care units, with the help of Indian Space Research Organization (ISRO). In 2016, a number of healthcare organisations approached ISRO to learn about the best practises in the quality domain and adopt them in their emergency and critical care departments "for reducing mortality rates."

These organizations include Association of Healthcare Providers (India) (AHPI), Indian Society of Critical Care Medicine (ISCCM), Society for Emergency Medicine India (SEMI), and the Consortium of Accredited Healthcare Organisations (CAHO), according to ISRO (Indian Space Research Organisation).

"It is heartening to note that the pilot studies conducted in Dr. Mehta's hospital, Chennai and Narayana Health City, Bangaluru, based on the learnings from ISRO, have yielded positive results," ISRO said in a statement.

It is intended to undertake the Health-QUEST (Quality Upgradation Enabled by Space Technology) studies at 11 selected hospitals throughout the country to gain a larger advantage from ISRO's knowledge transfer and improve the way services are offered at these departments, according to the statement.

"Keen interest has also been shown by health care professionals in learning about how ISRO is planning to handle the interplay among Man, Machine and Environment in the Human Space flight programmes and about the medical equipment developed by ISRO," the statement further added.

The Directorate of Safety Reliability and Quality (DSRQ), ISRO, is gearing up to organise a HEALTH-QUEST event at ISRO's headquarters shortly which would involve brain-storming sessions between quality experts from ISRO and eminent doctors from various domains across the country, ISRO said.

During the occasion, DSRQ Director Dr. Brinda V, Narayana Health Chairman Dr. Devi Prasad Shetty, AHPI President Dr. Alexander Thomas, and SEMI President Dr. Venkatesh A N will share their experiences, reports Economic Times.