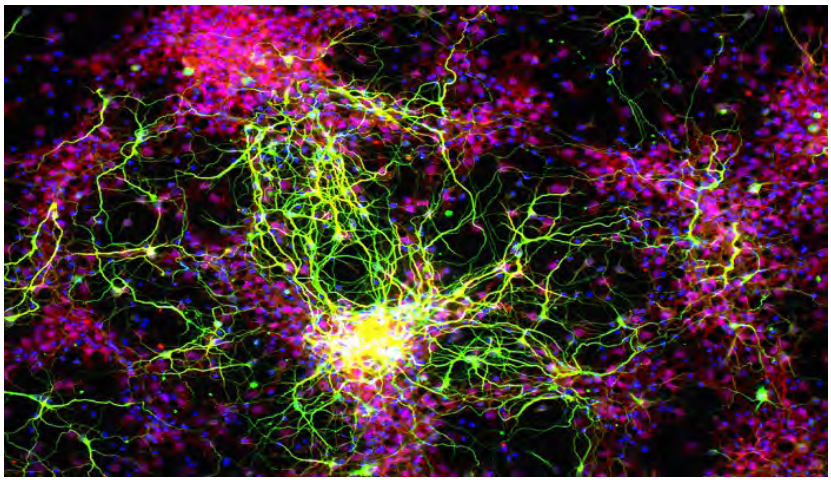
More than what meets the eye: SARS-CoV-2 infects retinal cells, replicates within them, says research



A new study conducted by German Researchers has revealed that SARS-CoV-2 also infects retinal cells, especially retinal ganglion cells, as well as light-sensitive cells.

The collaborative team of researchers led by Thomas Rauen and Hans Schöler of the Max Planck Institute for Molecular Biomedicine and virologist Stephan Ludwig of the Westfälische Wilhelms-Universität Münster have utilized organoids – an organ-like model system – of the retina from human reprogrammed stem cells to study SARS-CoV-2 infection in the retina.

There was an increased incidence of neurological impairments, as well as visual disturbances during or following Covid infections all over the world. Various studies have reported detection of SARS-CoV-2 virus in retinal biopsies taken from patients who had died from Covid-19.

Using a retina-organoid model

The retina-organoid model is now proving to be a relevant alternative to animal testing, as Sars-CoV-2 infections in humans can only be inadequately replicated in animal models, if at all. "Our retina organoid system replicates the anatomically complex structure of the human retina remarkably well," says Yotam Menuchin-Lasowski said in a news release from the institution. Human iPS cells, which are cells obtained from biopsies and reprogrammed into artificially induced stem cells, are used as the starting material for the generation of retinal organoids.

The retinal organoids were incubated with SARS-CoV-2 viruses in a safety level 3 laboratory and then analyzed after specified incubation times. Using quantitative PCR analysis, the researchers succeeded in detecting SARS-CoV-2 mRNA in the organoids, indicating that cells in the organoids were indeed infected by the virus.

Replication of SARS-COV-2 within retinal cells

The research also revealed that coronaviruses were able to replicate in these cell types. Furthermore, to measure the active virus concentrations produced by the infected organoids after different incubation times, the researchers used a "viral plaque assay," which revealed that the assay showed that new viral progeny has been formed in the retinal organoids. "This is the first demonstration that Sars-CoV-2 replicates in human retinal cells," says Thomas Rauen.

The researchers analyzed the organoids under a fluorescence microscope, to determine which cells were infected. With the help of different immune markers for the different cell types of the retina and with a fluorescent antibody against the nucleoprotein (N-protein) of SARS-CoV-2, it was shown that mainly two cell layers of the retinal organoids were infected. "For one thing, many of the N-protein-stained cells were in the outer nuclear layer of the organoids," says Yotam Menuchin-Lasowski. This is the layer that contains the cell bodies of the photoreceptors – the cones and rods that convert incoming light into nerve impulses. "Some of these cells with the N-protein actually had the typical appearance of the light-sensitive cells," he adds. "However, the cell type in which we most frequently detected the N-protein of Sars-CoV-2 is retinal ganglion cells," Menuchin-Lasowski says. These cells are located in the most inner cell layer of the retina and transmit all signals from the retina to the brain via the optic nerve.

Interestingly, many of the retinal symptoms associated with Covid-19 are related to retinal ganglion cells, but these have previously been associated predominantly with secondary effects of other Sars-CoV-2-induced disease symptoms, such as damage to blood vessels or an increase in eye pressure.

WHO urges quality care for women and newborns in critical first weeks after child-birth

The World Health Organization (WHO) has launched its first ever global guidelines to support women and newborns in the postnatal period – the first six weeks after birth. This is a critical time for ensuring newborn and maternal survival and for supporting healthy development of the baby as well as the mother's overall mental and physical recovery and wellbeing.

Worldwide, more than 3 in 10 women and babies do not currently receive postnatal care in the first days after birth – the period when most maternal and infant deaths occur. Meanwhile the physical and emotional consequences of childbirth – from injuries to recurring pain and trauma – can be debilitating if unmanaged, but are often highly treatable when the right care is given at the right time.

"The need for quality maternity and newborn care does not stop once a baby is born," said Dr Anshu Banerjee, Director of Maternal, Newborn, Child and Adolescent Health and Ageing at WHO. "Indeed, the birth of a baby is a life-changing moment, one that is bound by love, hope and excitement, but it can also cause unprecedented stress and anxiety. Parents need strong health care and support systems, especially women, whose needs are too often neglected when the baby comes."

In addition to addressing immediate health concerns, these first weeks after birth are crucial for building relationships and establishing behaviours that affect long-term infant development and health. The guidelines include recommendations for breastfeeding counselling – to aid attachment and positioning as breastfeeding is established – and to support parents in providing responsive care for their newborns.

Some of these recommendations include high-quality care in health facilities for all women and babies for at least 24 hours after birth; taking steps to identify and respond to danger signs needing urgent medical attention; treatment, support and advice to aid recovery and manage common problems; exclusive breastfeeding counselling; access to postnatal contraception and health promotion, including for physical activity, screening for postnatal maternal depression and anxiety; along with referral and management services where needed, among many others.

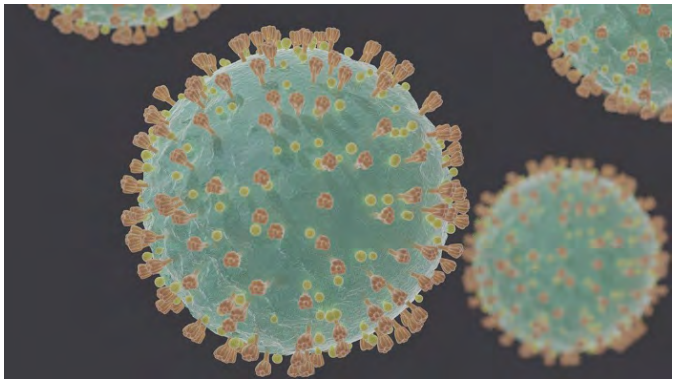
The recommendations detail the minimum length of hospital stay after birth and provide guidance on discharge criteria. They complete a trilogy of guidelines from WHO for quality maternity care through pregnancy and during and after childbirth, centred on meeting the needs of all those who give birth and their babies.

HIV drugs may protect against SARS-CoV-2

According to early findings, certain HIV medicines may have a role in protecting against SARS-CoV-2 infections, which may explain why individuals living with the disease have not appeared to be at increased risk for serious COVID-19 infections while being more prone to infections in general.

The new study included 500 persons with HIV in France, with a third of them getting long-term treatment with protease inhibitor medicines as part of their antiviral treatment. SARS-CoV-2 infections were detected in 12 percent of those on protease inhibitors and 22 percent of those not taking these drugs over the course of a year. Four individuals in the non-protease-inhibitor group were found to have contracted COVID-19 and were admitted to the hospital, reported Nancy Lapid for Reuters.

The findings suggest that patients who used protease inhibitors were 70% less likely than those who did not become infected with SARS-CoV-2 after accounting for other risk factors.



Protease inhibitors, which prevent the virus from replicating, are being used in several novel COVID-19 therapies. "Protease inhibitor drugs have long history of use, a good safety profile, and are generally well

tolerated," Dr. Steve Nguala from the Intercommunal Hospital Center of Villeneuve-Saint-Georges, said in a statement. He further added such treatments may help "to prevent the spread of infections and mutation of future variants."

The researchers are gearing up to present their findings at the European Congress of Clinical Microbiology & Infectious Diseases.

Paediatric cardiologists perform breatkthrough cardiac surgery on 17-year-old

A pioneering paediatric cardiac procedure, Percutaneous Transcatheter Pulmonary Valve Implantation (TPVI) was performed on a 17-year-old Engineering student Shaik Imran at Apollo Hospitals, Hyderabad, by a team of paediatric cardiologists led by Chief Paediatric Cardiologist Dr. Kavitha Chintala with Dr. Muthukumaran CS, Dr. Manoj Agarwala and Dr. Rufus Demel. The Transcatheter Pulmonary Valve Implantation procedure was performed for the first time in the pediatric age group in the twin States of Telangana and Andhra Pradesh.

The adolescent was born with a cyanotic heart disease, called 'Tetralogy of Fallot' wherein the oxygenated and deoxygenated blood mix in the heart, and there is decreased blood flow to the lungs. The patient's pulmonary valve and the pulmonary artery connecting right pumping chamber of the heart, the right ventricle to lungs, was severely narrowed in addition to a large hole in the bottom chambers of the heart. He underwent intracardiac surgical repair when he was one year old. During this operation the narrowed pulmonary valve was incised and a patch with a valve fashioned from pericardium sewn into it was placed to allow smooth blood flow into the lung. Over the years this valve became completely dysfunctional resulting in leak back into the right pumping chamber, which became severely enlarged and dysfunctional. As a result of this, the teen was getting tired easily which was limiting his day-to-day physical activities.

After a thorough evaluation, the specialists decided to implant a new pulmonary valve between the right ventricle and pulmonary artery to prevent reflux of the blood. They chose the minimally invasive percutaneous transcatheter route to implant the valve. This enabled avoidance of a major open heart re-do surgery which is associated with prolonged hospital stay and recovery time and the need to go on cardio-

pulmonary bypass with its antecedent problems.

TPVI is a minimally invasive procedure performed in the Cath lab through the veins of the groin region via a large bore sheath called the python sheath. The Team used an indigenously manufactured valve called "MyVal" made by Meril that was originally applied as the aortic valve but is being successfully used in pulmonary position as well. The valve is made of bovine pericardium mounted on a cobalt alloy frame. The valve is crimped / compressed over a balloon and this assembly is passed through the sheath into the pulmonary artery where it is implanted in place by blowing the balloon. The valve implantation was successfully done in approximately one and half hours without any complications. He was observed in the ICU overnight and discharged the next day of the procedure. He is now ready to attend in person classes in college.

Very few cases of this nature have been performed in India and this is the first time that Transcatheter Pulmonary Valve Implantation procedure is being done in the paediatric age group in this region. Apollo hospitals, Jubilee Hills, now offers this minimally invasive non-surgical procedure to replace pulmonary valve in suitable patients, says Dr Kavitha Chintala.

Multi-organ transplant surgery performed simultaneously on 4 patients

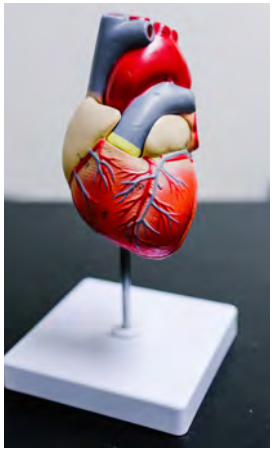
The Facility of Post Graduate Medical Education and Research (IPGMER) has performed multi-organ transplant surgery on four patients at the same time, a first for any medical institute in Bengal and with just a few precedents across the country. IPGMER had activated four different transplant teams for the multi-organ transplant surgeries of the heart, liver and two kidneys of the donor to four different patients.

The organ retrieval and harvesting began late in the night, reported TOI.

The donor, Chandra Dutta, is a 42-year-old resident

of East Burdwan. In a road accident that occurred a few days ago, Dutta had sustained a severe head injury and was brought to the SSKM hospital's trauma care centre where she was declared brain dead. The hospital's transplant coordinators and counsellors managed to convince her husband to donate her organs.

Because the hospital had ready recipients, ROTTO permitted IPGMER to keep all four organs. In addition, the skin and cornea would be stored in the hospital. The hospital had to engage retrieval teams for



the various organs in addition to the transplant teams.

Chandra's organs are expected to give a new lease of life to four patients suffering from end-stage organ failure from different corners of the state. The heart was being transplanted into a 37-year-old woman from Rajarhat, the liver recipient is a man from Purulia while two youths recieved the kidneys of the donor. All four recipients are enlisted in the organ recipient registry at SSKM Hospital.

Woman with brain tumor misdiagnosed with epilepsy

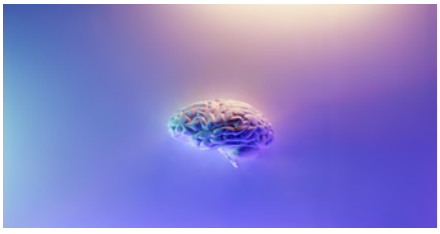
For 7 years, 44-year-old Nicola Clark was unaware that she was suffering from brain tumour. She was made to undergo several scans over the years, all of which failed to reveal the slow-growing cancerous tumour burrowed inside her brain. In her own words, it was her tumour that was playing "hide and seek" on the scans.

Clark, a resident of Essex, soon experienced seizures, which was later misdiagnosed as that occurring due to epilepsy in 2010. For seven years, she took medication for the condition to no avail while her seizures worsened, reported *Express.co.uk*. She even claimed that her husband saved her life once when she had passed out on the middle of the road in Essex.

Clark even experienced black outs during conversations, during the absence of her seizures, which became more intense and regular. Clark had seizures once every three months in the beginning of her illness, but by 2017, she was suffering an acute seizure every three weeks.

She told *Express.co.uk*, "They tried all these different tests, but the only thing that was changing was it was getting worse. So, they did the best they could. But it was my tumour that was playing hide and seek on scans." Her condition was presumed to be epilepsy after several failed attempts at a definite diagnosis.

Clark's condition became apparent only when she travelled farther north to the Royal Hallam hospital in 2017 for a second evaluation. She was diagnosed with a Grade 1 ganglioglioma, which required brain surgery and entailed drilling a huge hole in the skull to have access to the brain and remove the tumour.



Headaches, fits, and chronic nausea are all indicators of a brain tumour, according to the NHS, but the symptoms might take time to appear, as it did with Clark.

Doctors use robotic surgery to remove 9 kidney tumours from man in 30 minutes

Doctors from All India Institute of Medical Sciences (AIIMS), Jodhpur, have removed 9 tumours from a single kidney of a man with the help of robotic surgery. The patient was suffering from a rare inheritable disease called VHL, which is caused by development of cysts in the kidneys, pancreas and genital tract.

The 45-year-old man was brought into the hospital with a pain which resembled that experienced during acidity. However, an ultrasound revealed that he had bilateral multiple renal tumours, i.e. multiple tumours in both the kidneys.

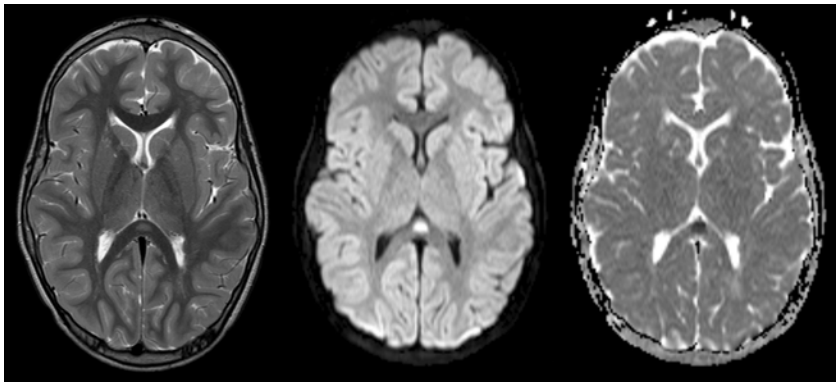
"So we first decided to remove the 9 tumours from

one kidney, comprising 8 cystic tumours and one solid tumour," said Associate Professor at the Urology department, Gautam Choudhary in a news report in TOI. "We had earlier done nephrectomy through open surgery but considering the complexity due to multiple tumours in multiple organs here, we used Robotic surgery as it gives advantage of better vision, better control and freedom of movement inside the body during surgery," he added.

After several complex robotic procedures for many other illnesses, the operation, which lasted 31 minutes, was the first of its sort performed at AIIMS for kidneys. The challenge was that doctors had to conclude the surgery in 30 minutes as the blood supply to the kidney had to be arrested during surgery. This could not be extended beyond 30 minutes. "We are happy that we could successfully finish the procedure in 31 minutes," he said. He further informed that the patient was discharged after 3 days observation. The same procedure would be employed for removing tumors from the second kidney after the patient fully recovers.

According to A S Sandhu, HoD (Urology), 60-70% patients with small kidney tumours have no symptoms. In most cases, the presence of tumor can only be confirmed through patient imaging for unrelated symptoms.

Woman diagnosed with rare autoimmune encephalitis treated at Mumbai Hospital



In a major success for medical science, a 45-year-old woman diagnosed with a rare case of seronegative autoimmune encephalitis was treated of the horrifying condition at the BMC-run KEM Hospital in Mumbai.

Dimple Choksi, a resident of Kalbadevi, in what was referred to as an "overnight transformation" by her husband had started speaking gibberish and would laugh inappropriately, reported TOI. "She kept rotating in an anti-clockwise manner instead of walking straight and had pulled out most of the hair from her crown," recalled her husband. She also suffered from impaired memory.

After consulting several doctors, including psychiatrists, neurologists and homeopaths, in Mumbai and Ahmedabad between August and January, they received several diagnoses, one among which was schizophrenia. She was subsequently put on 15 tablets, including six psychiatric drugs, a day.

However, after being diagnosed with seronegative autoimmune encephalitis at KEM Hospital in February through a PET Scan, her symptoms had vanished, but she told TOI that she had no recollection of what transpired in the 6 months.

Her case was discussed at KEM's monthly staff society meetings. Neurologist Dr Parthvi Ravat said, "After observing her and listening to the family, we suspected autoimmune encephalitis." But the diagnosis was difficult.

Viruses, bacteria, and fungus were ruled out initially by the KEM team. Then, to validate their suspicions, an MRI scan was performed and her cerebrospinal fluid was forwarded to NIMHANS in Bengaluru for antibody testing. "But the scan was normal and her samples were negative for antibodies," the doctor said. A PET scan revealed strong activity in the frontal lobes of the brain, the biggest lobes that regulate voluntary movement, memory, attention, speech, impulse control, and social behaviour. "Based on the clinical judgement, the PET scan and diagnostic criteria laid down, we then decided she had sero-negative autoimmune encephalitis," said Dr Parthvi Ravat.

When she reacted to the therapy, which included a dosage of steroids and a five-day course of intravenous immunoglobulin (IVIg) to decrease inflammatory conditions in the body, the diagnosis was confirmed. A recent PET scan revealed significantly reduced activity in the frontal lobe.

Seronegative autoimmune encephalitis falls in a grey zone between psychiatry and neurology. "Neurologists would overdiagnose it while psychiatrists believe it is psychosis or schizophrenia that could be treated with medication and shock therapy," says psychiatrist Dr Harish Shetty.

Government allows price hike of essential medicines by 10%

The government of India has now allowed drug firms to increase the prices of essential medicines including painkillers, antibiotics, anti-infective by over 10% from April in line with the change in annual wholesale price index (WPI), raising concerns for consumers who may have to factor in the higher prices into their household budgets.

In a news article by TOI, medicine pricing regulator National Pharmaceutical Pricing Authority (NPPA) indicated that the yearly adjustment in WPI, as declared by the government, comes out to 10.8 percent in 2021.

As a result, prices for over 850 formulations used in important medicines are likely to increase by at least 10%. This is the first time the rise exceeds the amount authorised for non-scheduled medications (which are outside price control). Non-scheduled medications are permitted a ten percent increase each year.

The NPPA permitted medication firms to raise prices by roughly 2% in 2019, while prices were raised by 0.5 percent in 2020, in accordance with the adjustment in the yearly WPI. Over the coming days, the NPPA will announce the ceiling pricing for the planned formulations.

This is good news for the sector, which has been dealing with a rise in production prices due to a variety of issues. Price increases in raw materials (active pharmaceutical ingredients, or APIs), freight, and plastics and packaging material, among other things, hampered the business during the epidemic.

Here's why HIV remains in human tissues even after antiretroviral therapy

Thanks to antiretroviral therapy, HIV infection is no longer the life sentence it once was. But despite the effectiveness of drugs to manage and treat the virus, it can never be fully eliminated from the human body, lingering in some cells deep in different human tissues where it goes unnoticed by the immune system.

Now, new research by University of Alberta immunologist Shokrollah Elahi reveals a possible answer to the mystery of why infected people can't get rid of HIV altogether. Elahi and his team found that in HIV patients, killer T cells — a type of white blood cells responsible for identifying and destroying cells infected with viruses — have very little to none of a protein called CD73.

Because CD73 is responsible for migration and cell movement into the tissue, the lack of the protein compromises the ability of killer T cells to find and eliminate HIV-infected cells, explained Elahi. "This mechanism explains one potential reason for why HIV stays in human tissues forever," he said, adding that the research also shows the complexity of HIV infection. "This provides us the opportunity to come up with potential new treatments that would help killer T cells migrate better to gain access to the infected cells in different tissues."

After identifying the role of CD73 — a three-year project — Elahi turned his focus to understanding potential causes for the drastic reduction. He found it is partly due to the chronic inflammation that is common among people living with HIV.

"Following extensive studies, we discovered that chronic inflammation results in increased levels of a type of RNA found in cells and in blood, called microRNAs," he explained. "These are very small types of RNA that can bind to messenger RNAs to block them from making CD73 protein. We found this was causing the CD73 gene to be suppressed."

The team's discovery also helps explain why people with HIV have a lower risk of developing multiple sclerosis, Elahi noted. "Our findings suggest

that reduced or eliminated CD73 can be beneficial in HIV-infected individuals to protect them against MS. Therefore, targeting CD73 could be a novel potential therapeutic marker for MS patients." Elahi said the next steps in his research include identifying ways the CD73 gene can be manipulated to turn on in patients living with HIV and off in those with MS. The study is published in PLOS Pathogens.

Ayush Ministry to initiate studies to evaluate how Ayurveda could help treat rheumatoid arthritis

According to an official announcement, the Ayush Ministry will be initiating the world's first multicenter phase-3 clinical research to investigate the efficacy of Ayurveda in the treatment of rheumatoid arthritis.

The clinical study will follow the Good Clinical Practice principles of the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use, according to the statement and will be extensively evaluated by Dr. Daniel Erick Furst, a prominent rheumatologist at the University of California.

According to the researchers, this is one of the first multicenter phase 3 double-blind double-dummy clinical trials on the efficacy of Ayurveda in the treatment of rheumatoid arthritis. AVP Research Foundation, which is linked with Arya Vaidya Pharmacy (Coimbatore) Ltd and the Central Council for Research in Ayurveda, an entity under the Ayush Ministry, will conduct the trial.

Dr Somit Kumar, Director of AVP Research Foundation and co-investigator of this study, said in a news report by The Week, "AMRA, a double-blind double-dummy randomised clinical trial, is taking Ayurveda research in rheumatology to a global stage."

According to Dr M N Shubhashree, Research Officer, Central Ayurveda Research Institute for Metabolic Disorders, Bengaluru, the study would begin sometime around May and will be concluded in the next two years. The sample size has increased almost 5 times, from 48 patients to 240, Dr Shubhashree added.

Soon a new non-hormonal male birth control pill may help expand options

Women have many choices for birth control, ranging from pills to patches to intrauterine devices, and partly as a result, they bear most of the burden of preventing pregnancy. But men's birth control options — and, therefore, responsibilities — could soon be expanding. Scientists now report a non-hormonal male contraceptive that effectively prevents pregnancy in mice, without obvious side effects.

The researchers have presented their results at the spring meeting of the American Chemical Society (ACS). Currently, men have only two effective options for birth control: male condoms and vasectomy. However, condoms are single-use only and prone to failure. In contrast, vasectomy — a surgical procedure — is considered a permanent form of male sterilization. Although vasectomies can sometimes be reversed, the reversal surgery is expensive and not always successful. Therefore, men need an effective, long-lasting but reversible contraceptive, similar to the birth control pill for women.

"Scientists have been trying for decades to develop an effective male oral contraceptive, but there are still no approved pills on the market," says Md Abdullah Al Noman, a graduate student in the lab of Gunda

Georg, Ph.D., at the University of Minnesota. "We wanted to develop a non-hormonal male contraceptive to avoid these side effects."

To develop their non-hormonal male contraceptive, the researchers targeted a protein called the retinoic acid receptor alpha (RAR-α). This protein is one of a family of three nuclear receptors that bind retinoic acid, a form of vitamin A that plays important roles in cell growth, differentiation (including sperm formation) and embryonic development. Knocking out the RAR-α gene in male mice makes them sterile, without any obvious side effects. Other scientists have devel-

oped an oral compound that inhibits all three members of the RAR family (RAR-α, -β and -γ) and causes reversible sterility in male mice, but Georg's team and their reproductive biology collaborators wanted to find a drug that was specific for RAR-α and therefore less likely to cause side effects.

So, the researchers closely examined crystal structures of RAR-α, -β and -γ bound to retinoic acid, identifying structural differences in the ways the three receptors bind to their common ligand. With this information, they designed and synthesized approximately 100 compounds and evaluated their ability to selectively inhibit RAR-α in cells. They identified a compound, which was named YCT529, that inhibited RAR-α almost 500 times more potently than it did RAR-β and -γ. When given orally to male mice for 4 weeks, YCT529 dramatically reduced sperm counts and was 99% effective in preventing pregnancy, without any observable side effects. The mice could father pups again 4-6 weeks after they stopped receiving the compound.

According to Georg, YCT529 will begin testing in human clinical trials in the third or fourth quarter of 2022. "Because it can be difficult to predict if a compound that looks good in animal studies will also pan out in human trials, we're currently exploring other compounds, as well," she says.

To identify these next-generation compounds, the researchers are both modifying the existing compound and testing new structural scaffolds. They hope that their efforts will finally bring the elusive oral male contraceptive to fruition.

Indian doctors perform world's first 'Autoguide' implantation on man with Parkinson-like symptoms

Doctors at the Krishna Institute of Medical Sciences (KIMS) Hospitals have performed a complex procedure called 'autoguide implantation' for Deep Brain Stimulation (DBS) using Artificial Intelligence on a 32-year-old man, diagnosed with a rare disorder having symptoms similar to Parkinson's disease. He was successfully treated using advanced treatment protocols at a hospital in Hyderabad.

Abhinay Kumar was experiencing symptoms such as tightness of hands and legs and had difficulty in walking, like in Parkinson's disease. A team of neurosurgeons, led by Dr Manas Panigrahi, HOD – Neuro Surgery at KIMS Hospitals, developed a program to provide the latest versions of the treatment. It is claimed to be the world's first such complex procedure and doctors say this is likely to revolutionise the treatment of brain ailments linked to Parkinson's disease and movement disorders, reported United News of India.

"More than six years back, Abhinay Kumar felt tremors in right hand, which increased with age and had great difficulty even in holding even a teacup, and with its progression, he was not even able to walk forcing him to give up his job. This condition required a surgical intervention to rectify the anomaly in the brain and had to be done with absolute precision," said Dr Manas Panigrahi.

"Accuracy is key while performing deep brain stimulation, and the highly skilled team of neurosurgeons and neurologists who specialise in Parkinson's disease and movement disorders, aided by an extremely accurate robotic tool, were able to reach the exact location inside the brain and treat the problem," he added.

The Stealth Autoguide robot, according to experts, assists in calculating the exact location and trajectory required to reach the targeted area of the brain. The neurosurgeon inserts a very thin wire with tiny electrodes on its tip to administer electrical stimulation to a limited area of tissue. The accuracy of deep brain stimulation registration is generally between 0.8 and 1.2 millimetres.

Using the Stealth Auto guide robot, the Parkinson's group at KIMS Hospitals achieved an accuracy of 0.2 on a recent surgery, which is the best in the country according to Auto guide data. That's roughly the thickness of a single hair.

If the surgery is done manually, the neurosurgeon himself needs to calculate the coordinates, he has to fix the leads with his own hands into the brain. With Artificial intelligence Autoguide robots fix the coordinates based on the feed from the surgeons. It performs the procedure according to the given instructions, with utmost precision and accuracy.

The KIMS Hospitals' Artificial Intelligence-integrated robotic system aids in a variety of brain procedures, such as epilepsy surgery, brain tumour biopsy, deep brain stimulation for Parkinson's disease, movement problems, and some mental diseases. The KIMS Hospitals' Parkinson's Centre is one of the only venues in Asia where such difficult treatments may have been performed.