Super-Absorbent Material to Check Droplet Infections from COVID-19 Patients

To tackle the challenge of controlling droplet infection in order to check the spread of coronavirus, Indian scientists have developed a highly efficient super-absorbent material that will help in safe disposal of respiratory secretions from infected COVID-19 patients in hospitals and quarantine centres handling such patients.

Scientists at state-run Sree Chitra Tirunal Institute for Medical Sciences and Technology have named this material 'AcryloSorb' and the system based on it 'Chitra Acrylosorb Secretion Solidification System'. AcryloSorb can absorb liquid 20 times more than its dry weight. Containers filled with the material will immobilise contaminated fluid by solidifying it, thus avoiding spillage and will also disinfect it. The canister containing the solidified waste can then be disposed of by incineration. The technology, developed by Manju S and Manoj Komath of the institute, will help reduce the risk for hospital staff, help in disinfecting bottles and canisters that are reused and makes such disposal safer and easier.

Scientists have designed suction canisters and disposable spit bags using "AcryloSorb" technology. AcryloSorb suction canisters will collect liquid respiratory secretions from ICU patients or those with copious secretions treated in wards. The container can be sealed after use, making it safe and fit for disposal.

Membrane tech to enrich oxygen supply in air: A spinoff company, Genrich Membranes, being funded by the department of science and technology, has developed a membrane oxygen equipment for COVID-19 patients that enriches oxygen supply in the air by up to 35% under pressure. The device does not require trained manpower for its operation, needs minimum maintenance, is portable, compact and with plug-and-play facility provides quick-start oxygen-enriched air.

New Blood Test for Detection of 50 Different Types of Cancer

A new blood test can detect more than 50 types of cancer, as well as where in the body they originated — even before symptoms develop.

Researchers in the United States and United Kingdom developed the new test, and they now report their findings in the journal *Annals of Oncology*.

There is an urgent need for better diagnostic tools for cancer. All too often, healthcare professionals can only make a diagnosis after symptoms have developed, at which point it may be too late for curative treatment.

Screening programs, such as mammograms for breast cancer and Pap smears for cervical cancer, intend to overcome this problem by detecting cancer at an earlier stage.

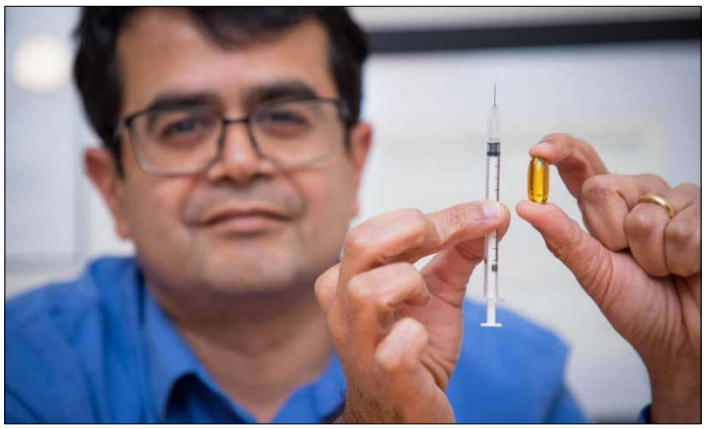
However, these tests are typically only available to a subset of the population (those at highest risk),

are limited to a small number of cancers, and have variable rates of compliance. These methods can also be invasive or uncomfortable, which may discourage attendance.

Now, researchers have developed a simple blood test that can detect over 50 different types of cancer, in many cases before any clinical signs or symptoms develop, from just a single draw of blood.

New Formulation Allows Oral Delivery of Many Injectable Drugs, Including Insulin

A new startup, i2O Therapeutics, has launched to commercialize innovations developed at Harvard University that will one day enable patients and clinicians to give up syringes in favor of pills.



Using ionic liquid technologies developed in the lab of Harvard bioengineer Samir Mitragotri, biologic therapies that would normally need to be delivered via needle may be reformulated and encapsulated as pills for oral delivery. Harvard's Office of Technology Development has granted i2O Therapeutics an exclusive license to the technology, to develop safe and effective oral formulations for a range of biologics, large molecules, and peptide-based pharmaceuticals. The company has raised $4M in seed funding from Sanofi Ventures and the JDRF T1D Fund to advance its mission, and will initially focus on developing formulations for GLP1 analogs, glucagon-like peptides that help balance glucose levels to treat diabetes.

Three main obstacles typically prevent the administration of protein drugs by mouth. Digestive enzymes in the gut can easily destabilize the molecules; a layer of thin mucus in the gut presents a physical barrier; and the cells lining the wall of the gut have extremely tight junctions that can prevent the transport of proteins. The Mitragotri Lab's innovations have been shown to overcome all three.

The ionic liquids developed in Mitragotri's lab are essentially liquid salts, composed of small-ion ingredients that are generally regarded as safe. "We pair these formulations up with specific drugs, and we have shown in the lab that a variety of drugs can be delivered, like insulin, including other peptides, small molecules, and antibodies." Mitragotri said.

"The primary indications are likely to include diabetes, autoimmune disease, and oncology. Those are the key areas where we see this platform making a strong impact," he added.

The technology has the potential to ease the burden of treatment for numerous conditions and improve patients' overall experience.

New Research Reveals How Oxygen Transfer is Altered in Diseased Lung Tissue

A team of researchers at the University of Illinois at Urbana-Champaign has developed tiny sensors that measure oxygen transport in bovine lung tissue.

The study establishes a new framework for observing the elusive connection between lung membranes, oxygen flow and related disease. The study is published in the journal *Nature Communications.*

"The membranes that encase lungs and add the elasticity needed for inhaling and exhaling appear to also play a critical role in supplying oxygen to the bloodstream," said materials science and engineering professor Cecilia Leal, who led the study with graduate students Mijung Kim and Marilyn Porras-Gomez.

For lung tissue to perform effectively, it must be able to transfer oxygen and other gases through its membranes, the researchers said. One way this happens is through a substance - called a surfactant - that reduces lung liquid surface tension to allow this exchange to occur. However, a surfactant called cardiolipin is known to be overly abundant in tissues infected with bacterial pneumonia, the study reports.

The new sensors are thin silicon- and graphene-based films that contain tiny transistors that mea-

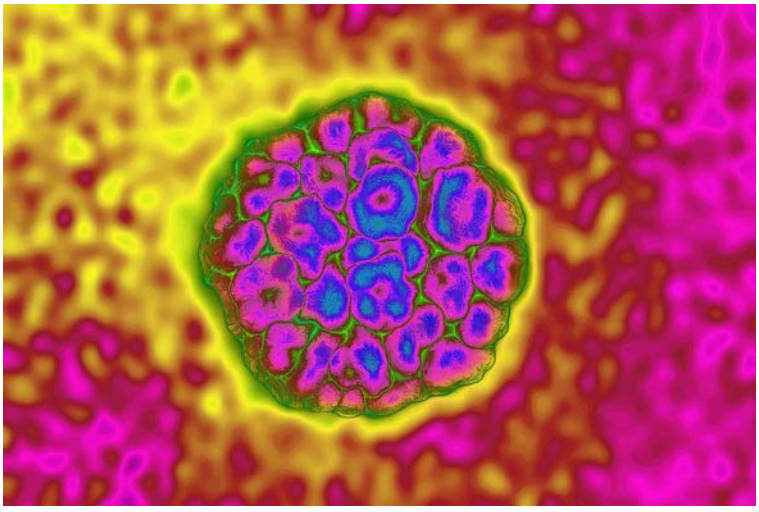
sure oxygen permeation between biological surfaces. "A thin film of lung membranes is spread out over many tiny sensors at the device surface, giving us a better picture of what is going on over a relatively large area rather than just a spot," Leal said.

The team used the sensors to compare oxygen transfer between healthy and diseased membranes. The samples consisted of a bovine lipid-protein extract commonly used to treat premature infants suffering respiratory distress, with a portion of the samples combined with cardiolipin.

"We found that more oxygen passes through the tissue diseased by cardiolipin," Leal said. "Which may help explain previous observations of there being an off-balance of oxygen in the blood of pneumonia patients. Even though an increase in oxygen flow could be perceived as positive, it is important to keep the natural exchange that occurs in the lung - transferring oxygen more rapidly into the bloodstream disrupts this healthy equilibrium."

The researchers also compared the structure of healthy and diseased tissue using microscopic and X-ray imaging. They found that the tissue combined with cardiolipin showed damaged spots, which they posit may be responsible for increased oxygen transfer and subsequent off-balance oxygen levels in pneumonia patients.

New Method to Block Cancer-Causing HPV Virus



The human papillomavirus (HPV) is the main cause of several cancers, including cervical cancer, which kills almost 300,000 women around the world each year. Although vaccines offer a proven first line of defense against HPV infection, researchers continue to look for additional options to guard against the virus.

In a new study published in the *Proceedings of the National Academy of Sciences*, Yale Cancer Center (YCC) researchers have demonstrated in principle a new biological approach that can stop HPV infection. This method may eventually aid in treating not only HPV, but other viruses, as well as non-viral diseases that are currently thought to be "undruggable," said the researchers.

"We show that very short peptides [fragments of a protein] can block the HPV virus from infecting cells," said senior author Daniel DiMaio, M.D., Ph.D., deputy director of YCC, the Waldemar Von Zedtwitz Professor of Genetics, and professor of molecular biophysics and biochemistry and of therapeutic radiology. "This research confirms our model for how HPV infects cells. It also shows that the intracellular trafficking of a virus could be the target for a new anti-viral approach."

HPV is carried into the cell by a membrane-bound sac called an endosome. An HPV protein known as L2 contains a segment known as a "cell-penetrating peptide" that sticks through the membrane of the endosome into the cell's interior. There, a sequence of L2 next to the cell-penetrating peptide binds to a cell protein called retromer. Retromer then delivers the virus into a cellular transport mechanism known as the retrograde pathway that drops off the virus in the nucleus, where it can begin making copies of itself.

Previous research by DiMaio's lab found that the core machinery of the cell-penetrating peptide is surprisingly short. Peptides are composed of amino acids, and a sequence of only six amino acids was needed for the peptide to penetrate cell membranes, while a sequence of only three amino acids was required to bind to the retromer protein.

When the investigators added the synthesized cell-penetrating peptides into a culture medium of human cells, they saw that the peptides did enter the cytoplasm and bind to the retromer. When the scientists then infected the cells with HPV, the virus could no longer bind to the retromer and leave the endosome

because the retromer was tied up by the peptide, and infection was blocked.

The Yale researchers demonstrated that this peptide inhibition persists even after the peptides are removed.

Although vaccines will always be the best foundation to prevent HPV infections, DiMaio said, "the vast majority of people worldwide are not vaccinated, especially in the developing world where most cases of cervical cancer occur." Additionally, current vaccines don't guard against all strains of HPV, he said.

Key Factors for Reducing Brain Damage from Cardiac Arrest

People who suffer cardiac arrest usually have low likelihood of survival, especially if it happens out of the hospital. Those who do survive can have neurological damage due to the lack of oxygen-rich blood reaching their brain. Cardiopulmonary resuscitation (CPR) can help maintain this blood flow, but it's not always successful. Extracorporeal CPR (ECPR) may be an option, but it can be costly, and it's not always clear which patients it will benefit.

Osaka University-led research may have uncovered how to more effectively use ECPR for better outcomes. The researchers reported their findings in the journal *Circulation.*

"Standard CPR uses chest compressions to manually stimulate blood flow to vital organs, which can help limit long-term neurological damage," explains Tasuku Matsuyama, the study's lead author. "With ECPR, blood is removed from a vein and oxygenated blood is pumped into an artery. This is a more effective way to maintain tissue function until normal heart rhythms can be restored."

Right now, however, there is little evidence-based guidance on which patients will show the most neurological benefit from ECPR.

The researchers sought this evidence through a multicenter clinical study of people who had suffered out-of-hospital cardiac arrest (OHCA). In what was called the CRITICAL study, the aim was to understand the factors that predict post-ECPR outcomes.

The researchers prospectively followed 256 OHCA patients at 14 hospitals in Osaka. These patients had initially been given CPR either by bystanders or EMS personnel before receiving ECPR and in-hospital treatment.

The study found that as the time to receiving ECPR decreased, the chance of maintaining brain function went considerably up. Also, when undergoing the same amount of time before receiving ECPR, those who had heart rhythms that responded to defibrillation had much better odds of maintaining brain function than those who did not.

Body's Ability to Uptake Analgesics Shunts Due by Antibiotics

Biologists at Lawrence Livermore National Laboratory (LNLL), California, have found manipulating the gut microbiome with antibiotics alters the uptake and effectiveness of acetaminophen.

The effectiveness of drug treatments can vary widely between individuals, which can lead to decreased efficacy or increased adverse reactions. Much of the variation can be contributed to genetics, but environmental factors such as nutritional status, disease state and gut bacterial composition also can influence the metabolic characteristics.

In recent years, the contribution of the gut microbiome on drug processing has been at the forefront of many studies in-

vestigating variations in drug response by the host. The gut microbiota is a vast and diverse microbial community residing in the human body that has co-evolved with its host to perform a variety of essential functions through a network of metabolism and signaling processes involved in the use of nutrients and the processing of foreign substances.

Disruption of the microbiota, whether induced by dietary changes, antibiotic administration or invasive pathogens, can disturb the balance of the microbiota and alter metabolic networks. These disturbances can affect the biodisposition of certain drugs, which can ultimately lead to adverse drug reactions. There are many diverse mechanisms the gut microbiome can use to alter the disposition, efficacy and toxicity of drugs and foreign substances. These can include the expression of enzymes that can activate or inactivate drugs, the direct binding of drugs to a bacterial organism, the reactivation of drugs by microbial expressed enzymes, and the direct competition between the host and microbes for host metabolizing enzymes. For example, an association between pre-dose, gut-derived urinary metabolites and response to the commonly used analgesic acetaminophen has been reported.

In the new research, the LLNL team determined how changes in the gut microbiome can alter the pharmacokinetics and biodistribution of acetaminophen by looking at mice after treatment with the antibiotics ciprofloxacin, amoxicillin or a cocktail of ampicillin/neomycin.

The LLNL-developed Lawrence Livermore Microbial Detection Array was used to determine the gut composition after the antibiotics were administered. The analysis revealed that changes in microbe content in antibiotic-treated animals was associated with changes in acetaminophen biodisposition and metabolism. The study is published in *Nature Scientific Reports.*

Epilepsy Triggered by Antibodies in the Brain

Certain forms of epilepsy are accompanied by inflammation of important brain regions. Researchers at the University of Bonn have now identified a mechanism that explains this link. Their results may also pave the way to new therapeutic options in the medium term. They have now been published in the renowned scientific journal *Annals of Neurology.*

Epilepsy can be hereditary. In other cases, patients only develop the disease later in life: as a result of a brain injury, after a stroke or triggered by a tumor. Inflammation of the meninges or the brain itself can also result in epilepsy.

Researchers have now identified an autoantibody that is believed to be responsible for encephalitis in some patients. Unlike normal antibodies, it is not directed against molecules that have entered the organism from outside, but against the body's own structures—hence the prefix "auto," which can be translated as "self." The researchers discovered it in the spinal fluid of epilepsy patients suffering from acute inflammation of the hippocampus. The autoantibody is directed against the protein Drebrin. Drebrin ensures that the contact points between nerve cells function correctly. At these so-called synapses, the neurons are interconnected and pass on their information.

When the autoantibody encounters a Drebrin molecule, it knocks it out of action and thereby disrupts the transmission of information between nerve cells. At the same time it alerts the immune system, which is then activated and switches to an inflammatory mode, while simultaneously producing even more autoantibodies. "However, Drebrin is located inside the synapses, whereas the autoantibody is located in the tissue fluid," says Dr. Julika Pitsch, who heads a junior research group in Prof. Becker's department. "These two should therefore normally never come into contact with each other." The autoantibody seems to use a back door to enter the cell. This is actually intended for completely different molecules: the so-called neurotransmitters.

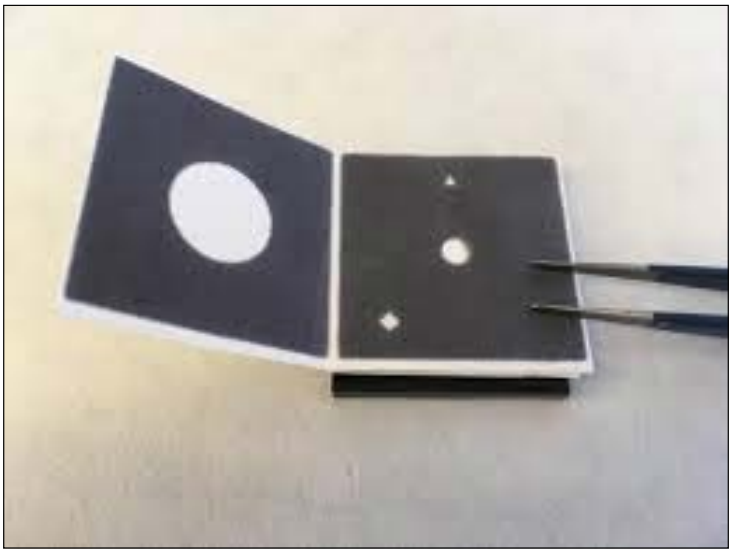
Information processing in the brain is electrical. The synapses themselves however communicate

via chemical messengers, the aforementioned neurotransmitters: In response to an electrical pulse, the transmitter synapse emits transmitters that then dock to certain receptors of the receiver synapse, where they in turn also generate electrical pulses.

The synaptic vesicles—the packaging of the neurotransmitters—are absorbed again and recycled. "The autoantibody seems to use this route to sneak into the cell, as with a Trojan horse," explains Becker's colleague Prof. Dr. Susanne Schoch McGovern.

In cell culture experiments, the researchers were able to show what happens next: Shortly after the addition of the autoantibody, the neurons in the Petri dish begin to fire machine gun-like rapid bursts of electrical impulses. "We know that this form of electrical excitation is contagious, so to speak," emphasizes Prof. Becker. "With nerve cells, which are interconnected to form a network, all the nerve cells involved suddenly start firing wildly." This may then result in an epileptic seizure.

Wastewater Test to Potentially Provide Early Warning of COVID-19



Researchers at Cranfield University are working on a new test to detect SARS-CoV-2 in the wastewater of communities infected with the virus.

The wastewater-based epidemiology (WBE) approach could provide an effective and rapid way to predict the potential spread of novel coronavirus pneumonia (COVID-19) by picking up on biomarkers in faeces and urine from disease carriers that enter the sewer system.

Rapid testing kits using paper-based devices could be used on-site at wastewater treatment plants to trace sources and determine whether there are potential COVID-19 carriers in local areas.

Dr. Zhugen Yang, Lecturer in Sensor Technology at Cranfield Water Science Institute, said: "In the case of asymptomatic infections in the community or when people are not sure whether they are infected or not, real-time community sewage detection through paper analytical devices could determine whether there are COVID-19 carriers in an area to enable rapid screening, quarantine and prevention.

"If COVID-19 can be monitored in a community at an early stage through WBE, effective intervention can be taken as early as possible to restrict the movements of that local population, working to minimise the pathogen spread and threat to public health."

Recent studies have shown that live SARS-CoV-2 can be isolated from the faeces and urine of infected people and the virus can typically survive for up to several days in an appropriate environment after exiting the human body.

The paper device is folded and unfolded in steps to filter the nucleic acids of pathogens from wastewater samples, then a biochemical reaction with preloaded reagents detects whether the nucleic acid of SARS-CoV-2 infection is present. Results are visible to the naked eye: a green circle indicating positive and a blue circle negative.

WBE is already recognised as an effective way to trace illicit drugs and obtain information on health, disease, and pathogens. Dr. Yang has developed a similar paper-based device to successfully conduct tests for rapid veterinary diagnosis in India and for malaria in blood among rural populations in Uganda.

Paper analytical devices are easy to stack, store and transport because they are thin and lightweight, and can also be incinerated after use, reducing the risk of further contamination.

PracticeSuite Offers Healthcare App to Docs for Remote Patient Care

PracticeSuite, Inc., a US-based healthcare cloud technology company with offices in various cities in India, including two in Kochi, has offered its PS Telemed App to all doctors in India at no cost to remote patient care.

This is in addition to its recent similar global rollout to help doctors worldwide to cope up with COVID-19 situation. A doctor or a healthcare professional can utilize this tool to consult patients under quarantine by simply using a computer or a smartphone. This will ensure safety of medical professionals.

Further, this technology will help doctors to continue to provide their ongoing non-urgent chronic and routine care to ensure continuity-of-care during the COVID-19 crisis.

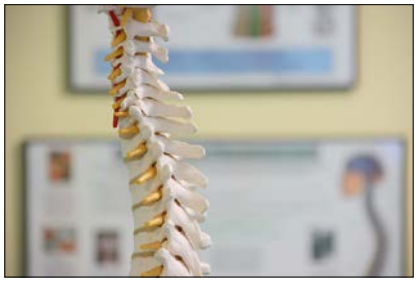
The platform allows providers to render care remotely to patients from the safety of their homes. Available as a free downloadable app, PS Telemed App is currently available in Android Playstore and Apple App Store; it can be instantly activated through a simple registration.

New Percutaneous Screw System for Versatile & Flexible Procedural Approaches

Precision Spine has launched the SureLOK MIS 3L Percutaneous Screw System to provide versatility and flexibility to surgeons in terms of procedural approaches and application of its different components.

The system was designed for immobilisation and stabilisation of spinal segments in adults as an adjunct to fusion to treat acute and chronic instabilities or deformities of the thoracic, lumbar and sacral spine.

Additionally, it may be used for non-cervical pedicle screw fixation for pseudarthrosis, severe spondylolisthesis, trauma, curvatures, spinal stenosis, spinal tumour and failed previous fusion.



The system components are available in various sizes and include cannulated pedicle screws, straight and pre-curved rods and locking caps.

The component versatility enables clinicians to match each patient's anatomy more accurately.

The screws come with a 150mm extended tab that allows low profile, MIS Percutaneous placement with 50mm of controlled rod reduction.

Furthermore, an open tulip design makes rod introduction easy, while the proximal tapered triple lead thread helps improve efficiency in placing screws and optimise pull-out strength.

The percutaneous rod inserter of the SureLOK MIS 3L system features a bulleted tip, keyed hex end and 15° rod angle to ease rod insertion and release.

For quick and efficient rod delivery, the inserter shaft is designed to glide easily through the tulips. The SureLOK MIS 3L also features a reliable compression / distraction system.

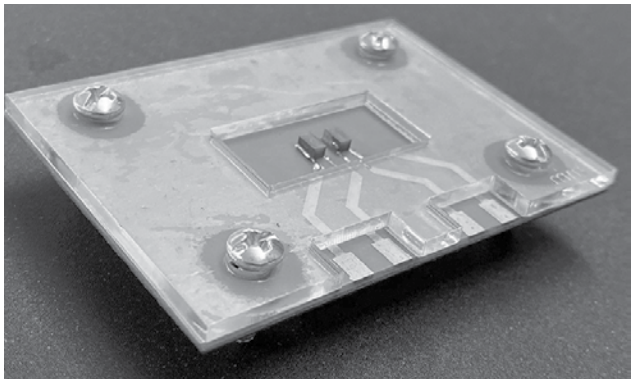
Spotting Disease with a Chip that Measures Stiffness of Extracellular Matrix

Researchers from Purdue University are reporting in journal *Lab on a Chip* on a new device that can take samples of extracellular matrices and quickly perform stiffness tests on them. Because the technology is non-destructive and only uses transient sound waves, the samples are not significantly affected by the testing. There's no squishing or stretching involved, so the samples can be tested repeatedly to see how their status progresses over time.

"There's a sound wave propagating through the material and a receiver on the other side. The way that the wave propagates can indicate if there's any

damage or defect without affecting the material itself." said Rahim Rahimi, one of the lead researchers, in a Purdue press release.

The lab-on-a-chip device has a tiny ultrasound generator and a detector separated by empty space. A sample of cells surrounded by their matrix is placed in the opening and the device is then activated to transmit ultrasonic waves through the sample. The receiving sensor outputs its readings to a computer that displays them for interpretation.



Because of its simplicity, the detectors of the device can be multiplied to be able to test hundreds or thousands of samples at the same time. Such capabilities would let researchers perform large scale stiffness testing of how diseases impact cells, potentially providing new information for scientists to apply in fighting those diseases.

Identification of COVID-19 Patients with Lung Ultrasound

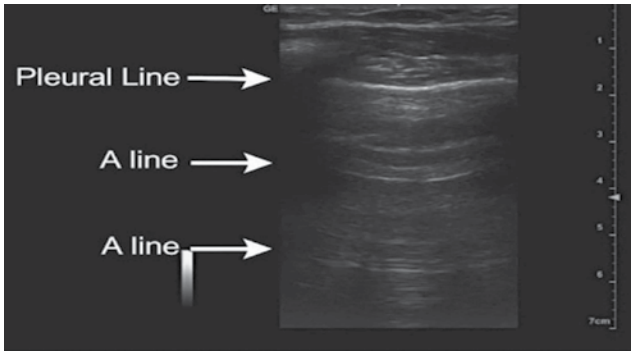
Researchers from Italy have created protocols for performing lung ultrasonography on patients with COVID-19. Their list of four brief acquisition protocols is published in a clinical letter in the *Journal of Ultrasound in Medicine.*

The protocols outline the best probe to use, where clinicians should look for artifacts, where to set the focus, and how to visualize the widest surface possible with one scan. The authors reported that hospital staff in Germany have asked to implement the protocols and that they are training doctors in Rome on their techniques.

While CT has excellent ability to detect COVID-19, the modality can't be used at patients' bedsides and it puts additional medical staff at risk for virus exposure. As a result, some doctors in China, Spain, and Italy have turned to lung ultrasound as an alternative imaging modality.

Patients with COVID-19 develop thickened pleura, B-lines, subpleural consolidations, and other hallmark lung ultrasound artifacts that can help doctors identify and track the progression of the disease. However, given limited time and resources, there haven't been many publications that clarify how to best use lung ultrasound to make a diagnosis of COVID-19 and guide patient treatment.

In the absence of other research on the topic, lead author Dr. Gino Soldati from the ultrasound unit at Valle del Serchio General Hospital in Lucca, Italy, and colleagues developed their own guidelines. Their set of four acquisition protocols for lung ultrasonography on patients with COVID-19 is as follows:



- Ideally, use linear probes, as these can best capture the detail of pleural and subpleural artifacts. Convex probes are also appropriate.
- Use a single focal point modality at the pleural line instead of focusing at multiple locations.
- Scans should preferably be performed in intercostal spaces, as opposed to an orthogonal view of the ribs. This enables clinicians to see the widest surface possible with one scan.
- Look for artifacts in multiple areas and bilaterally to see the extent of the affected lung surface.

Specifically, the authors recommended looking for artifacts in the following areas on both the right and left sides of patients:

- Anterior midclavicular: apical, medial, and basal
- Posterior paraspinal: apical, medial, and basal
- Lateral axillary: apical and basal

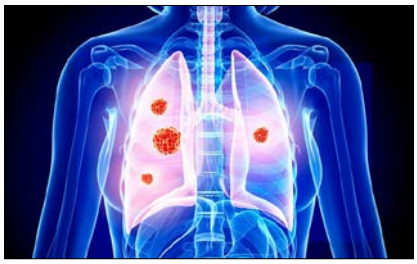
The researchers also mentioned that lung ultrasound can be used for triaging patients before

hospital admission, monitoring emergency department patients with pneumonia, managing ventilation and weaning for intensive care unit patients, and evaluating the effects of antiviral medications. This is because ultrasound can identify changes in the ratio between air, tissue, and fluid in the lungs of patients with COVID-19.

"Comparison with chest x-ray and/or lung CT scan might help in designing a proper diagnostic workup according to the general and local technological and human resources," they concluded.

Intratumoral Heterogeneity: A Potential Reason for Chemotherapy Resistance in Small Cell Lung Cancer Patients

Small cell lung cancer (SCLC) accounts for 14% of all lung cancers and is often rapidly resistant to chemotherapy, resulting in poor clinical outcomes. Treatment has changed little for decades, but a study at The University of Texas MD Anderson Cancer Center found that chemotherapy results in increased heterogeneity within the tumor, leading to the evolution of multiple resistance mechanisms.



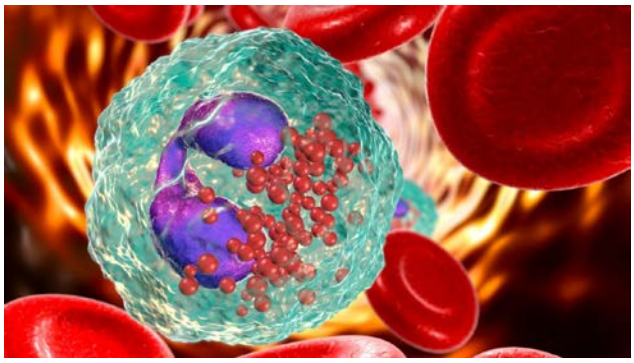
The research team, led by Lauren Averett Byers, M.D., associate professor of Thoracic/Head & Neck Medical Oncology, published their findings in *Nature Cancer*. Early results were presented at the American Association for Cancer Research Annual Meeting 2018 in Chicago.

The team found that after treatment, SCLC tumors rapidly evolve. Before treatment, SCLC is largely homogenous, with the same type of cells found throughout the tumor. Within weeks to months of treatment, many new and different types of cells appear; this diversity within the tumor is called intratumoral heterogeneity.

"Because you end up with a cancer that has multiple resistance mechanisms turned on at the same time in different cells, the cancer becomes much harder to treat," Byers said. "Some cells might be resistant through one mechanism or pathway, and other cells might be resistant through a different one. Treatment targeting one type of resistance will only kill a subset of cancer cells."

New Stem Cell Transplant Method to Aid Blood Cancer Patients

Researchers at UCL have developed a new way to make blood stem cells present in the umbilical cord 'more transplantable', a finding in mice which could improve the treatment of a wide range of blood diseases in children and adults.



Blood stem cells, also known as haematopoietic stem cells (HSCs), generate every type of cell in the blood (red cells, white cells and platelets), and are responsible for maintaining blood production throughout life.

When treating certain cancers and inherited blood disorders, it is sometimes necessary to replace the bone marrow by allogeneic stem cell transplantation—which involves using stem cells from a healthy donor.

The study, published in the journal *Cell Stem Cell*, highlights how a protein called NOV/CCN3, which is normally found at low levels in the blood, can be used to rapidly increase the number HSCs in single umbilical cord blood units that are capable of transplantation. This finding potentially opens the door to units that would otherwise be discarded being made available for patients of all ages.

Dr. Rajeev Gupta, Clinical Associate Professor at UCL Cancer Institute and first author of the study, explained, "We explored an alternative approach to harness this potential by increasing the functionality—rather than the number—of HSCs, and so enhance the ability of umbilical cord blood

units to transplant."

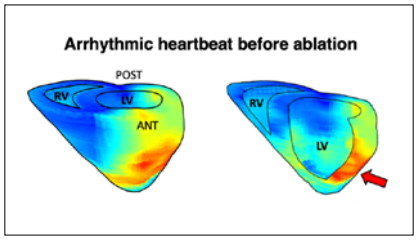
"We'd previously discovered that a regulatory protein known as NOV is essential for the normal function of human HSCs, and so we asked whether highly purified NOV might be used to manipulate cord blood HSCs to make them more transplantable."

"Using NOV, we've shown that we can rapidly manipulate blood stem cells to alter their state—changing non-functioning HSCs to functioning HSCs—which enhances cord blood engraftment potential. This finding offers a new strategy for improving blood transplants. The next stage will be to take our research into a clinical setting to explore how this can benefit patients with blood cancers and other blood disorders," said Dr. Gupta.

Accurately Localizing Cardiac Arrhythmias with Ultrasound Technique

Cardiac arrhythmias are a major cause of morbidity and mortality worldwide. Currently, the 12-lead electrocardiogram (ECG) is the noninvasive clinical gold standard used to diagnose and localize these conditions, but it has limited accuracy, cannot provide an anatomical tool to visually localize the source of the arrhythmia, and depending on which clinician is looking at the signals, there might be some interpretation variability.

Researchers at Columbia Engineering announced that they have used an ultrasound technique they pioneered a decade ago--Electromechanical Wave Imaging (EWI)--to accurately localize atrial and ventricular cardiac arrhythmias in adult patients in a double-blinded clinical study.



EWI is a high-frame-rate ultrasound technique that can noninvasively map the electromechanical activation of the heart; it is readily available, portable, and can pinpoint the arrhythmic source by providing 3D cardiac maps. The new study, published online in Science *Translational Medicine,* evaluated the accuracy of EWI for localization of various arrhythmias in all four chambers of the heart prior to catheter ablation: the results showed that EWI correctly predicted 96% of arrhythmia locations as compared with 71% for 12-lead electrocardiogram (ECG).

The researchers ran a double-blinded clinical study to evaluate the diagnostic accuracy of EWI for localizing and identifying the sites of atrial and ventricular arrhythmias. Fifty-five patients, who had pre-existing cardiac disease including previous catheter ablations and/or other cardiovascular co-morbidities, underwent EWI scans prior to their catheter ablation procedures to generate activation maps of their hearts. The team retrospectively compared EWI maps and 12-lead ECG assessments made by six expert electrophysiologists in a team led by Wan to the site of successful ablation found on the intracardiac electroanatomical maps obtained during invasive catheter mapping.