

Scientists see through human organs for the first time

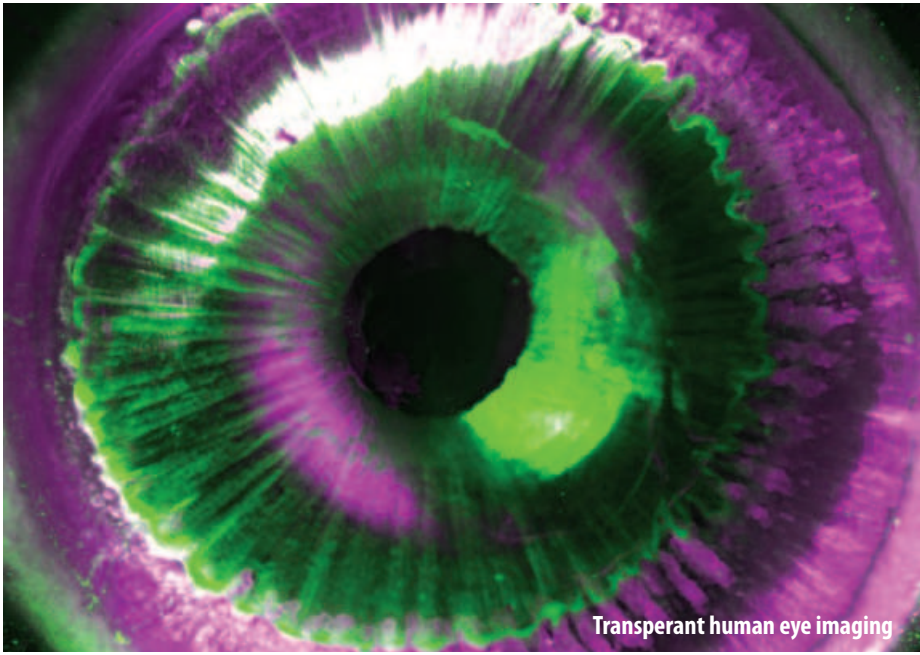
Transparent human organs allow 3D maps at the cellular level

STAR HEALTH REPORT

For the first time, researchers managed to make intact human organs transparent. Using microscopic imaging they could reveal underlying complex structures of the see-through organs at the cellular level. Resulting organ maps can serve as templates for 3D-bioprinting technologies. In the future, this could lead to the creation of on demand artificial organs for many patients in need. The findings published in Cell joined forces from Helmholtz Zentrum München, Ludwig Maximilians University Munich (LMU), and Technical University of Munich (TUM).

In biomedical research, seeing is believing. Deciphering the structural complexity of human organs has always been a major challenge due to the lack of technologies to image them at the cellular level. Recent developments in tissue clearing allowed researchers to obtain first cellular views of intact transparent mouse organs in 3D. These methods, however, were not applicable to human organs.

Human organs are particularly stiff due to accumulation of insoluble molecules including collagen in tissues that have grown for years or even decades. Thus, traditional detergents that are used for making mouse organs transparent do not work on human organs, particularly adult ones. "We had to change our approach completely and start from scratch to find



new chemicals which can make human organs transparent," says Shan Zhao, PhD student at Helmholtz Zentrum München and first author of the study. After exhausting trials, the team discovered that a detergent called CHAPS could make small holes throughout the entire stiff human organs. CHAPS allows additional solutions to travel deep into centimetres-thick human organs and convert them into a transparent structure.

After making the human organs transparent, which were obtained post mortem from Prof Ingo Bechmann's lab at the University of Leipzig, the team had to tackle additional challenges for both organ imaging and the analysis of the large amount of resulting data. First, they developed a new laser-scanning microscope with a large sample holding capacity called "Ultramicroscope Blaze" in collaboration with Miltenyi Biotec.

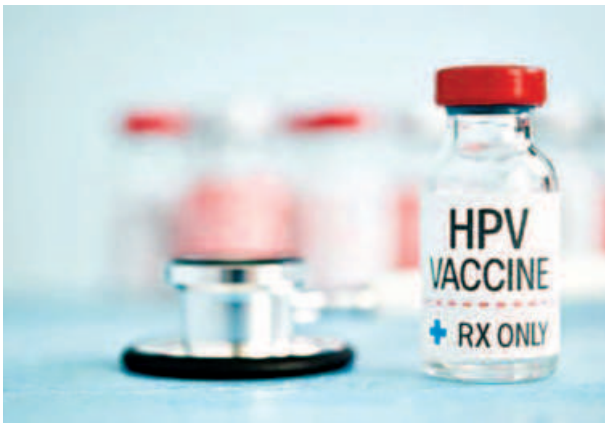
This microscope enabled imaging of human organs as large as the kidney. Next, together with Prof. Bjoern Menze from TUM, the team developed deep learning algorithms to be able to analyse hundreds of millions of cells in 3D.

The researchers named this new technology SHANEL (Small-micelle-mediated Human organ Efficient clearing and Labelling). "SHANEL can develop into a key technology for mapping intact human organs in the near future. This would dramatically accelerate our understanding of organs such as the brain, their development and function in health and disease," explains Dr. Ali Ertürk, Director of the Institute for Tissue Engineering and Regenerative Medicine at Helmholtz Zentrum München.

Now, the final goal is 3D-bioprinting of artificial organs. Cellular maps of human organs could be used to engineer large scale human tissues and organs with emerging 3D-bioprinting technologies. Towards this goal, Ertürk and his team are currently working on mapping major human organs, starting with the pancreas, heart and kidney.

"There is a huge shortage of organ donors for hundreds of thousands of people," says Ertürk. "The waiting time for patients and the transplantation costs are a real burden. Detailed knowledge about the cellular structure of human organs brings us an important step closer to creating functional organs artificially on demand."

HEALTH bulletin



Just one dose of HPV vaccine may help prevent cervical disease

A single dose of human papillomavirus (HPV) vaccine is associated with a significant reduction in cervical disease, according to a retrospective study in *Cancer*. The CDC generally recommends two doses for those vaccinated between ages 9 and 14, and three doses for those vaccinated later.

Using a U.S. insurance claims database, researchers matched nearly 67,000 females aged 9 to 26 who received at least one dose of the quadrivalent HPV vaccine with 67,000 unvaccinated controls.

The estimated rate of preinvasive cervical disease at 5 years was 2.65% in the unvaccinated group, versus 1.62%, 1.99%, and 1.86% among those who received one, two, and three vaccine doses, respectively, between ages 15 and 19. After multivariable adjustment, one vaccine dose was associated with a 36% risk reduction; two doses, a 28% reduction; and three doses, a 34% reduction.

Editorialists say the findings "add to the growing evidence suggesting that there may truly be no major difference in protection against cervical preinvasive lesions ... conferred by 1, 2, or 3 doses of HPV vaccination."

Coronavirus: Should you be scared?

DR GOLAM NABI

Coronavirus is the latest topic globally and people are becoming scared day by day. It indeed is a matter of concern, but you do not have to be scared about it so much. Since the origin of the virus in Wuhan, China, more than 65,000 people are affected so far and almost 1400 had grave consequences, but the rest of the world is not affected as much because of alertness and early warning.

This coronavirus is mainly carried by the animals and it can be transmitted from animals to animals, animals to humans and humans to humans. Similar kind of viruses have also infected people in the past, in the form of SARS-CoV (the beta coronavirus that causes Severe Acute Respiratory Syndrome, or SARS) and MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS), and the world has contained its infection successfully.

Coronavirus is mainly transmitted by inhalation and infects the respiratory tract, but not all infected people get the symptoms. Our body's immune system fights against this virus and we do not suffer, some people get mild sickness but mostly it is cleared by the immune system. A person who has a weak immune system or for some reason has compromised immune system e.g. has diabetes, respiratory diseases like asthma and chronic obstructive pulmonary disease, heart and kidney transplant, receiving chemotherapy or suffering from any sort of cancer are most vulnerable. Children and elderly people are also vulnerable due to relatively weaker immune system. The healthy adults are at low risk of infection.

How to know if you are infected: You have to inhale the virus from an affected person and after the incubation period of 10 – 14 days you may suffer from running nose, sneezing, sore throat, cough, mild fever, headache, and body ache. Most people recover from these symptoms within a week. But children and those who have other diseases may suffer severe symptoms

the earliest possible time seek medical help.

Awareness is very important to prevent unnecessary fear about coronavirus. Social media has a great role to make people alert. Frequent advisories should be broadcasted on television, radio, and newspapers. All entry ports of the country should be well equipped to screen the travellers arriving from abroad.



like severe cough, high temperature, severe respiratory distress, coughing of blood, difficulty in breathing similar severe pneumonia.

What to do if you are infected: Immediately report to the nearest hospital, if it is not possible to stay at home, take paracetamol tablets to control fever, keep your body well hydrated, and within

There should be an isolation ward in every hospital to isolate the affected patient. A team of doctors, nurses and other health care professionals in every hospital should be ready round the clock to deal with the emergency if it occurs.

The writer is an Associate Professor of Medicine at Z H Sikder Women's Medical College and Hospital, Dhaka.

CORONAVIRUS



Clinical characteristics of COVID-19

The clinical spectrum of 2019 novel coronavirus (2019-nCoV) infection is still being defined. Now, investigators describe the characteristics of 99 people with confirmed 2019-nCoV pneumonia who were admitted to one infectious diseases specialty hospital between January 1 and 20, 2020, in Wuhan, China.

The patients' average age was 55; two thirds were men; 47 had long-term exposure (e.g., salesmen, market managers) and 2 had short-term exposure (shoppers) to the Huanan seafood market. About 50% had chronic conditions, most commonly cardiovascular and cerebrovascular diseases (40%). At hospital admission, symptoms and signs included fever (83%), cough (82%), and shortness of breath (31%); few patients had sore throat, rhinorrhoea, or gastrointestinal symptoms (≤5% each). Laboratory findings included liver function abnormalities (43%) and lymphopenia (35%).

On chest x-ray or computed tomography, 75% had evidence of bilateral pneumonia; 1 person had a pneumothorax. Complications at time of presentation included acute respiratory distress syndrome (17%), acute kidney injury (3%), and septic shock (4%). By January 25, 11 patients (11%) had died. Seven of the deaths were in people over 60 years old.

This case series suggests that severe disease due to 2019-nCoV infection is most likely to occur in older people with comorbid conditions, as is the case with influenza and many other infectious diseases.



BP drugs, statins might be replacing healthy lifestyle changes

Adults who start blood pressure- or lipid-lowering therapy may use these medications as substitutes for healthy lifestyle changes, according to a study in the *Journal of the American Heart Association*.


Researchers studied over 41,000 Finnish adults aged 40 and older (84% women) who were free of cardiovascular disease at baseline. Participants completed multiple lifestyle questionnaires from 2000 through 2013, and pharmacy records were examined to identify the start of antihypertensive or statin therapy.

After multivariable adjustment, participants who began either treatment during the study were significantly more likely than those who did not to become obese. They were also more likely to become inactive. One unhealthy behaviour did decline among those who started these medications — cigarette smoking.


The researchers call for more effective strategies to encourage lifestyle changes in patients beginning preventive medications. They cite U.S. guidelines, which recommend cognitive-behavioural methods, multidisciplinary approaches, and consideration of the individual's social determinants of health.

  /StarHealthBD


How the order you eat your food affects your health!



1 Vegetables



2 Protein




3 Carbohydrate

Recent Research Reveals

- Starting a meal by eating vegetables and protein and finishing it with carbohydrates, keeps us fuller than if we ate same foods in reverse order
- Protein slows down release of sugar from carbohydrates into the blood stream
- When diabetics ate vegetables and proteins first, their blood sugar levels were 29% lower 30 minutes later compared to when they ate the carbohydrates first

"Starting your meal with vegetables and protein and finishing with carbohydrates could help maintain body weight"

American Diabetes Association



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