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Community news
Pears
Building

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Building progresses despite pandemic

Scientists study coronavirus

Tips for children and parents

Work on the building adapts to new ways of working – and IIT scientists start researching coronavirus

The building work has continued, despite the challenges posed by the pandemic, and researchers at the Institute of Immunity and Transplantation are designing a number of studies looking at how the virus works.

On page 3 Dr Matthew Reeves explains how his research into a different virus might help with the current need to track coronavirus.

And on page 4 Dr Joe Grove has some information for children and parents about the virus.

Update on the Pears Building

Not surprisingly, the coronavirus has meant Willmott Dixon has lost some time against some aspects of the construction plan, but in others workers have been able to make good progress.

The project has adapted quickly to the new health and safety requirements, reducing the number of workers on site to ensure that social distancing rules can be adhered to.

Some delays have been caused by the temporary closure of some contracted suppliers due to the pandemic, but the installation of the windows is 90% completed and we expect the brickwork to be finished within the next month or so – allowing us to remove the scaffolding and unveil the building proper.

Work on the laboratories has proceeded as planned with all the flooring now installed and a start made on the furniture and doors.

The main feature staircase and atrium pods are due on site shortly and will begin to be installed this month, and the landscaping work will start.

Other news stories

Dr Joe Grove, IIT virologist, has been selected to join the World Economic Forum Young Scientist Class 2020. This community was created in 2009 to engage rising-star researchers in the work of the World Economic Forum.

It comprises a group of extraordinary scientists from various academic disciplines and countries who are committed to integrating scientific knowledge into society for the public good. It is helping leaders engage with science and the role it plays in finding solutions to the current Covid-19 crisis.

Meanwhile, Mala Maini, professor of viral immunology at the IIT, has been interviewed on BBC radio and television to provide expert insights into how coronavirus enters human cells and on the role of the immune system in eliminating the virus.

Focus on the IIT

Matthew Reeves

molecular virologist

A research team working on a vaccine for a virus that causes severe birth defects and which women risk passing on to their unborn child are hoping their work may help with the Covid-19 pandemic.

It's estimated that 60% of the global population – 100% in some areas – are infected with human cytomegalovirus (HCMV) which pregnant women can pass on to their unborn baby, yet most people have never heard of it.

The long-term answer, as with coronavirus, is a vaccine. And the IIT team working on a HCMV vaccine is looking at whether a vital tool it has developed could be used to help with the current pandemic.

"One reason most people haven't heard of HCMV is that at the moment we don't have an answer to prevent infection of unborn babies, but we hope we soon will," said Dr Matthew Reeves, molecular virologist at the IIT, who, along with colleague Paul Griffiths, professor of virology at the Royal Free Hospital, is leading the search for the vaccine.

Most people catch HCMV when they are healthy and it doesn't usually cause problems. However, along with infection in the womb which leads to birth defects such as deafness, visual loss and brain damage, it can cause severe and sometimes fatal disease in people with lowered immunity, including transplant patients.

And it's a lifelong infection. "Once you've got it, you're infected for life," said Dr Reeves. "Most people have no idea they have it and their immune system can control it. But it's the leading cause of viral disease in in pregnancy: around 1% of babies in the UK are born with a HCMV infection and around 20% of those display signs of disease.. That's more than the number born with Down's syndrome and is similar to German measles pre-vaccine."

It's also a big problem for another group of patients who are the focus of much research at the IIT – transplant patients. "With so many people having the virus, there's a high chance that an organ donor could have it and in immunocompromised people like transplant patients, that's a problem."

Because their own immune system has been suppressed to prevent organ rejection, they are much more at risk of severe symptoms of HCMV, which can damage their lungs, liver, kidneys, gut and eyes. "Healthy people, if they get symptoms, will have a mild, flu-like response. But in transplant patients, the virus can run unchecked."

A prime source of infection for pregnant women is their existing children, particularly those who go to nurseries. "HCMV is transmitted in saliva. A first child gets HCMV at nursery by putting a toy in their mouth which another child infected with HCMV has had in their mouth. The child goes home and the pregnant mother kisses the child and catches it. It almost certainly won't be a problem for her but her unborn baby could be severely affected."

At the moment the only answer is a familiar instruction, said Dr Reeves. "Yes, it's wash your hands and good hygiene. Soap and water is very effective against many viruses and we would recommend that nursery staff and parents of young children wash their hands often."

But a stronger solution is needed. "Of course vaccination is the answer. And a number of vaccinations have been trialled, notably by Paul Griffiths, but so far a protection rate of about 50% has been achieved. It is thought that to approach licensing it needs to at least be above the 60% considered necessary for herd immunity to develop."

His team has found evidence of a novel immune response triggered by the vaccine. "If we look at people who have been infected in the community, we don't see evidence of this, only if people are vaccinated. If we can understand the importance of this response, we can use it to make a more effective vaccine."

He is confident that in the next couple of years they will have a vaccine candidate that can be taken through the approval processes for testing – but that can take many years. In the meantime, his team is looking at other ways they can help.

"One of the most severe effects of the virus in babies is deafness and if this is picked up straight after the birth, we can test for HCMV and diagnose it as congenital infection. This means that we will know how it was acquired and can help the child sooner. But to know that the virus was passed on by the mother to the baby in the womb, it's crucial that we identify the HCMV infection within 21 days of birth, not weeks or months down the line, when the hearing loss may be more obvious."

Dr Reeves and his team are working with colleagues in Swansea and Cardiff to develop a simple handheld biosensor test, similar to the one used by people with diabetes, to check babies' saliva for HCMV infection. Importantly, it can give a result in 15 minutes. "It's non-invasive and uses an antibody to detect the virus and would enable us to know the infection status at birth."

He is now looking at whether the biosensor can be adapted to look for coronavirus. "It can potentially be modified to detect either current infection or evidence of past infections. And of course testing is going to be key to managing this pandemic until we have a vaccine."

Facts for children on coronavirus by Dr Joe Grove, IIT virologist

- Viruses are ridiculously small. If you made coronavirus a million times bigger than it actually is, it would be about the size of an apple. If you made a person a million times bigger they would be about as long as Britain. In other words, the size difference between a human and a virus is the same as that between our country and a piece of fruit. This means we can't see viruses; they are invisible.

- Viruses use our bodies to make copies of themselves and it's this that causes damage and makes us ill. Coronavirus copies itself in our throats and lungs; for some people this causes problems with breathing.

- Viruses don't have eyes, ears, noses, legs, wings or tentacles. They can't smell us out, or crawl across the room to get us. They need to be delivered into a human body. With coronavirus this can happen if you are close to someone when they cough or sneeze, or if you touch something with the virus on it and then transfer it to your eyes, nose or mouth.

- Our immune system is an automatic defence system that fights viruses and when they land on us our bodies know how to get rid of them.

- Because this coronavirus is completely new, we don't know everything about it yet and it has made some people very sick. But most people don't get very ill and get better soon. And children's immune systems seem particularly good at protecting them from it.

- Also, there are heroes, like the nurses, doctors and scientists at the Royal Free London's hospitals, fighting the disease the virus causes, called Covid-19.

- We should all try to help stop coronavirus from spreading: washing with soap destroys any virus on our hands; we can catch our coughs in tissues, or in the crook of our elbows; and we should keep our distance from people when we're outside.

Note to parents

Children are hearing a lot of scary words, big numbers and confusing information during adult conversations and constant news coverage. It is unrealistic, and unhelpful, to try to completely shield them from this. Instead, they deserve simple explanations of the facts and reassurance not to worry too much.

As a scientist I'm very happy to provide this. I have a YouTube channel, Dr Joe Talks Viruses, where I share child-friendly explanations of viruses and the scientific concepts that we're all becoming increasingly aware of. If you have any questions you want me to answer, please e-mail **joe@virus-vs-antibody.com**

Illustration by **David S. Goodsell,** RCSB Protein Data Bank; doi: 10.2210/rcsb_pdb/goodsell-gallery-019

Coronavirus research currently underway at the IIT

Patients are helping scientists at the IIT to study how the immune system responds to coronavirus.

There are two major components of the human immune system involved in fighting it. First, a fast-acting component helps reduce the initial virus load, but is unable to eliminate the virus. About seven days later, a slower-acting component produces antibodies that can attach to the virus and stop it from infecting cells in the patient's airways. It also produces killer cells that can recognise and eliminate airway cells already infected with the virus. Together, the antibodies and killer cells clear the virus from the patient's system.

Researchers do not yet know all the details of the antibodies and killer cells that can eliminate coronavirus, or for how long the antibodies and killer cells will persist in the patients after recovery. Determining whether the antibodies and killer cells will protect patients from future infection will give us critical information about the testing of future vaccines.

We are grateful to all patients who choose to participate in these research studies.