Media Statement

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Major breakthrough in controlling virus which causes infection in bone marrow and organ transplant patients

A team of researchers from Western Australia and Queensland has found a way to manage one of the most common life-threatening viral infections in bone marrow and organ transplant recipients.

Ground-breaking research published today in one of the world's top academic journals, Science, reveals how preventing reactivation of a common virus - Human Cytomegalovirus - using a patient's own antibodies could be extremely effective in reducing the impact of this infection in transplant patients.

Bone marrow and organ transplant recipients are highly immune-compromised and are at high risk of developing life-threatening infection following transplantation.

Around 80 per cent of people worldwide are infected with Human Cytomegalovirus (HCMV), a virus that is seldom a problem as it usually remains dormant in healthy people. Problems arise when the immune system is compromised and the virus "reactivates" or comes out of its dormancy. Cytomegalovirus (CMV) will reactivate in up to two thirds of patients post-transplantation, and up to 10 per cent of those will develop life-threatening end-organ virally-mediated disease.

The team of WA researchers led by Lions Eye Institute Head of Experimental Immunology, Professor Mariapia Degli-Esposti and including Dr Chris Andoniou and

Peter Fleming, along with investigators from QIMR Berghofer in Brisbane and the Fred Hutchinson Cancer Research Center in Seattle led by Professor Geoff Hill, created a new mouse model to examine the reactivation of CMV during transplantation.

The team discovered that antibodies are key to limiting reactivation and injecting mice with their own anti-viral antibodies – a form of serotherapy - protected them from CMV reactivation. They believe the results will translate to humans in future clinical trials.

“HCMV reactivation is particularly problematic in the setting of transplantation, and affects the successes of both solid organ and stem cell transplants,” Professor Degli-Esposti said.

“Despite much effort being put into improving the control of CMV reactivation in transplantation, we still fall very short of effective treatments and CMV reactivation remains associated with significant sickness and even death.”

Professor Degli-Esposti said traditional immunotherapy approaches to managing CMV relied on controlling the virus once it had reactivated rather than preventing reactivation.

The big breakthrough came when Professor Degli-Esposti and Professor Hill’s teams joined their efforts in targeting this important clinical problem.

“The discoveries we made were only possible by having world-leading viral and transplant immunologists working together,” she said.

“Together we created a novel model of CMV reactivation in the mouse which we used to dissect the components of the immune system required to keep CMV from reactivating and causing disease.

“We have found that protection from reactivation is achievable using passively acquired antibodies.

“But viruses are clever and keep adapting and changing. These slightly different viral strains trick the immune system and bypass the critical defence check-points.

“Indeed, although we are just beginning to recognise the enormous strain variability that exits for HCMV, we know that people are often infected with more than one HCMV variant. But matching antibodies to the infecting CMV strains bypasses the problem and in these pioneering mouse studies conferred great protection from CMV reactivation.

“It is hoped that this will provide a therapeutic strategy for transplant patients not only because of the extreme effectiveness in preventing reactivation, but also because this approach has a very low risk profile.

“Our research has provided a new strategy to control CMV reactivation and the exciting possibility that we will be able to reduce rates of sickness and death among organ and bone marrow transplant recipients, as well as lower the high costs currently involved in managing this common infection.”

Studies in the United States and Europe have estimated that HCMV infection increases the cost of post-transplant care by $US58,000-$74,000 and €25,000-€30,000 (AUS $81,000-$103,000). Thus, in addition to the benefits to patients, the potential savings to health systems worldwide from a CMV antibody therapy could reach into the hundreds of millions.

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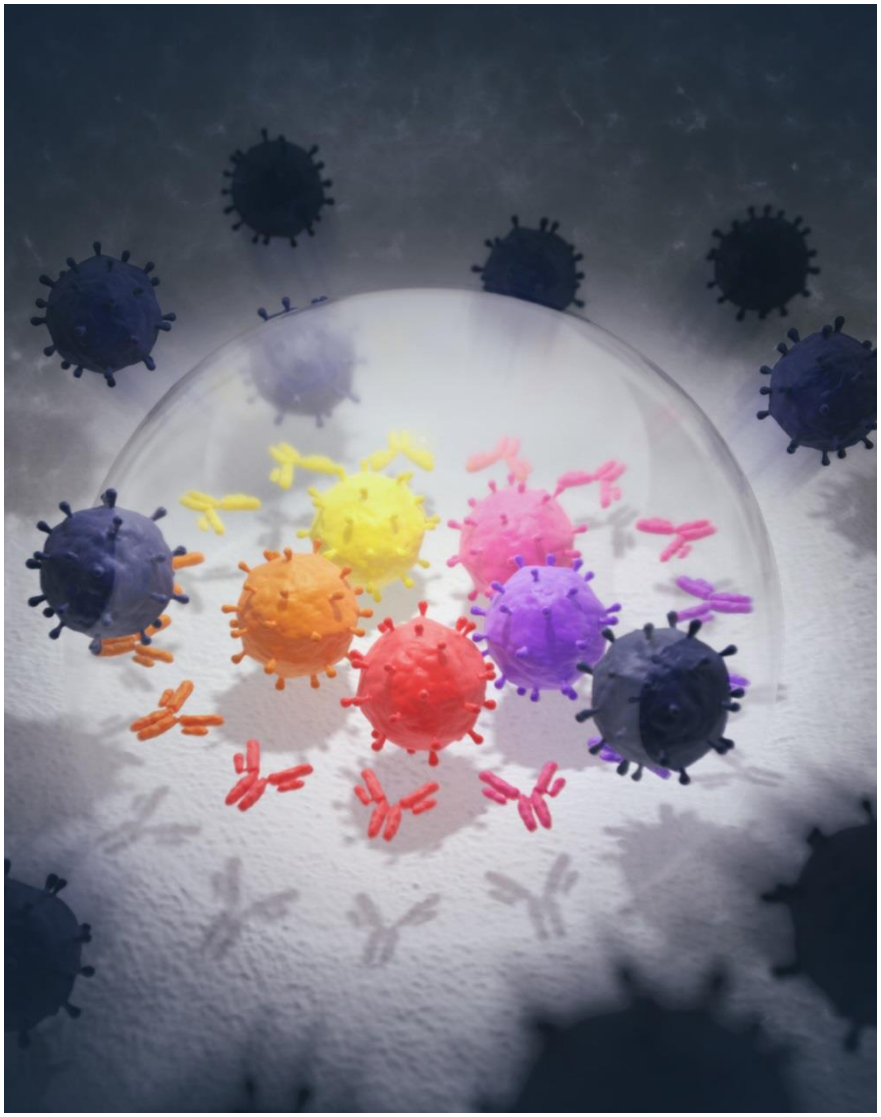

Picture caption: The image demonstrates how antibodies (Y shaped) that are specific for particular CMV viral strains (antibodies are the same colour as the viruses) are able to stop them from reactivating. If the virus and the antibodies don't match up, the virus escapes immune control and reactivates. There are no specific antibodies that can fight the "black" CMV viral strain, so this virus can reactivate and cause infection and disease.

Picture credit: Image provided by Professor Mariapia Degli-Esposti, created by Leonie Herson, Square Cell