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NUHS
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New cancer therapy uses white blood cells from healthy donors

Trial to determine if allogeneic T cells can deliver more effective treatment

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CytoMed Therapeutics chief operating officer Tan Wee Kiat (second from left) with Dr Esther Chan (left), Dr Raghav Sundar and Dr Tan Lip Kun from the National University Cancer Institute team that will trial the firm's new cancer therapy from April. The treatment potentially advances existing chimeric antigen receptor T-cell therapies by using white blood cells from healthy, cancer-free donors instead of from cancer patients themselves, as is the current practice. ST PHOTO: GAVIN FOO

A new treatment using white blood cells from healthy donors that are modified to more effectively recognise and kill cancer cells will be trialled in Singapore from April.

The two-year trial at the National University Cancer Institute, Singapore (NCIS) will test the therapy on nine to 18 patients who have lymphoma, multiple myeloma, colorectal cancer, lung cancer, liver cancer or ovarian cancer – six of the most common types of cancers in Singapore.

The new treatment, developed by local biotech firm CytoMed Therapeutics, treats cancer patients with modified T cells – a type of white blood cell that helps the body fight infections and diseases, including cancer.

CytoMed's new treatment potentially advances existing chimeric antigen receptor (CAR) T-cell therapies by using white blood cells from healthy, cancer-free donors instead of from cancer patients themselves, as is the current practice.

Cancerous cells are occasionally able to evade detection by the body's immune system, and this is where cell-based immunotherapies like the CAR T-cell therapy come in.

"T cells in our body may not always be able to recognise or kill cancer cells, because the cancer cells can disguise themselves as healthy cells and produce signals that can suppress the patient's immune cells at the cancer site," said CytoMed chief operating officer Tan Wee Kiat.

"CytoMed's new product grafts an artificial protein, known as a chimeric antigen receptor, on the surface of these T cells to allow them to target and destroy cancer cells more effectively."

The CAR T-cell therapy is much more targeted than conventional cancer treatments such as chemotherapy, which kills both cancerous and healthy cells.

The two CAR T-cell therapies currently available in Singapore are both autologous – meaning that the T cells are harnessed from the patient themselves.

They are approved to treat only certain relapsed or refractory types of leukaemia or lymphoma.

Dr Tan said: "Our treatment is allogeneic, which means that the T cells are obtained from healthy donors, who do not have to be genetically matched with the intended patients."

These allogeneic T cells may be of higher quality, since they are obtained from healthy donors as opposed to sick patients.

The trial will assess if this leads to more effective treatment.

Dr Tan Lip Kun, a senior consultant at NCIS and one of the trial's investigators, told The Straits Times: "In autologous CAR T-cell therapies, the T cells are obtained from cancer patients.

"These patients tend to have high-risk, relapsed or resistant cancers, and would have undergone several courses of chemotherapy or other types of immunotherapy, so their own T cells are fewer and weaker. This makes it harder to genetically engineer and manufacture enough CAR T cells to recognise and fight the cancer cells."

Another potential advantage of CytoMed's allogeneic T cells is that they may be able to tackle a wider range of cancers.

The trial will also evaluate if there are any specific types of cancer that respond better to the treatment.

While existing CAR T-cell treatments have mostly targeted a few types of blood cancers such as leukaemia and lymphoma, CytoMed said its technology may be able to treat more than 20 different types of solid and blood cancers. Solid cancers include cancers of the breast, lung, liver and ovaries.

Other doctors not involved in the trial also said the use of allogeneic T cells could improve the efficiency of CAR T-cell treatments and, when the treatment becomes fully commercialised, minimise the waiting time for patients.

Dr Francesca Lim, a senior consultant at Singapore General Hospital, said: "Often, patients may be too weak to have their own white blood cells collected as starting materials to manufacture CAR T cells. If proven to work, this off-the-shelf product could treat more patients at a time than autologous products, which are patient-specific."

Dr Dawn Mya, a haematologist at Mount Elizabeth Novena Hospital, said: "Compared with autologous CAR T cells, allogeneic CAR T cells can provide patients with a faster treatment process. This is because, in theory, allogeneic CAR T cells can be ready-made products that are available off-the-shelf any time."

Still, it remains to be seen if the allogeneic CAR T-cell products will yield superior outcomes to autologous ones, especially in terms of how long they can remain effective, she added.

"Because cancers can relapse even after CAR T-cell treatment, we will have to wait for the trial's data to see how long CytoMed's new product can control the cancer for."

The trial will involve patients whose cancers have proven to be resistant to standard cancer treatments.

Its principal investigator, Dr Raghav Sundar, an NCIS consultant, said: "Because this technology's benefits are still very theoretical, we are taking a lot of precautions to see if it is safe, and whether its purported benefits play out in reality. That is why we are not recruiting many volunteers.

"Because this is a first-in-human trial too, we don't want to try something completely new on cancer patients who still have multiple options, such as chemotherapy, remaining."

The trial will be expanded to more patients if successful. Dr Sundar estimated that it would be around five to eight years before the new therapy could become commercially available.

Dr Esther Chan, an NCIS senior consultant involved in the trial, said: "CAR T-cell therapy can be a life-saving treatment for many patients who are given a slim to no chance of survival. We are concurrently doing several trials for autologous CAR T-cell therapies, but this is the first locally designed trial that uses an allogeneic method to modify cells to fight cancer."

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