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A form of immune therapy might be effective for multiple myeloma

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A new study by researchers at The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC – James) provides evidence that genetically modifying immune cells might effectively treat multiple myeloma, a disease that remains incurable and will account for an estimated 24,000 new cases and 11,100 deaths in 2014.

The researchers modified a type of human immune cell – called T lymphocytes, or T cells – to target a molecule called CS1, which is found on more than 95 percent of myeloma cells, and to kill the cells. The researchers grew the modified cells in the lab to increase their numbers and then injected them into an animal model where they again killed human myeloma cells.

The findings were published in the journal *Clinical Cancer Research*.

"Despite current drugs and use of bone marrow transplantation, multiple myeloma is still incurable, and almost all patients eventually relapse," says co-principal investigator and multiple myeloma specialist Craig Hofmeister, MD, MPH, assistant professor of medicine and a member of the OSUCCC – James Translational Therapeutics Program.

"This study presents a novel strategy for treating multiple myeloma, and we hope to bring it to patients as part of a phase I clinical trial as soon as possible," Hofmeister says.

"In particular, our study shows that we can modify T lymphocytes to target CS1, and that these cells efficiently destroy human multiple myeloma cells," says principal investigator Jianhua Yu, PhD, assistant professor of medicine and a member of the OSUCCC – James Leukemia Research Program.

"An important possible advantage to this approach is that these therapeutic T cells have the potential to replicate in the body, and therefore they might suppress tumor growth and prevent relapse for a prolonged period," Yu says.

For this study, Yu, Hofmeister and their colleagues used cell lines and fresh myeloma cells from patients to produce genetically engineered T cells with a receptor that targets CS1. The researchers then tested the capacity of the modified cells to kill human multiple myeloma cells in laboratory studies and an animal model.

The study's key technical findings include:

- Compared to control T cells, the modified T cells better recognized multiple myeloma cells that overexpressed CS1, and they became more activated following the recognition;
- The researchers successfully modified fresh T cells from patients and showed that the cells can be grown (expanded) in the lab, and that they efficiently recognized and eradicated myeloma cells;
- In animal models, the modified T cells greatly reduced the tumor burden and prolonged overall survival: All mice that received the modified T cells were alive 44 days after treatment versus 29 percent and 17 percent of the study's two control groups.

More information: In early 2014, Ohio State cancer researchers Yu, Hofmeister and colleagues published a related study in the journal *Leukemia* (vol 28, pages 917) on CS1-targeted natural killer cells.

Provided by Ohio State University Medical Center