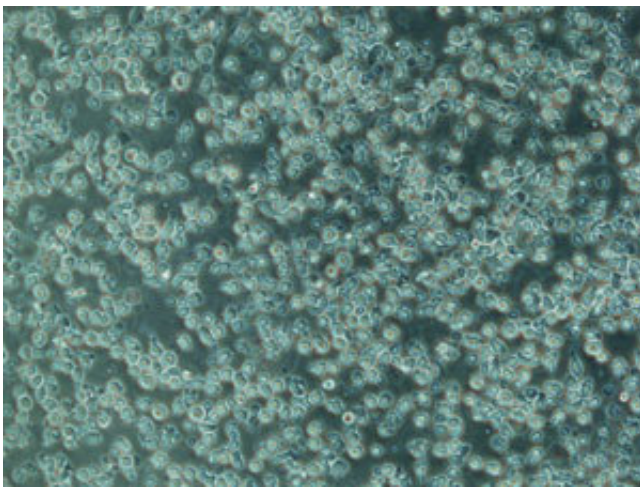


# Generating large numbers of universal immune cells could transform cancer immunotherapy

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A novel method to generate natural killer cells from peripheral blood cell-derived stem cells may transform immunotherapies for different cancers. Credit: A\*STAR Institute of Bioengineering and Nanotechnology

A scalable method of generating universal 'off-the-shelf' natural killer (NK) cells for cancer immunotherapies has been devised by A\*STAR researchers. Their technique could ensure that future NK cell-based cancer treatments can be used for most patients.

NK cells are a group of small [white blood cells](#) from the innate immune system that help kill virus-infected cells and malignant cancer cells.

Scientists can harvest NK cells and use them to directly target cancer cells. However, existing techniques generate limited numbers of NK cells from selected donors that are suitable for specific patients only.

"Current donor-dependent NK cell harvesting methods carry the risk of graft-versus-host disease, because traces of other cells and molecules from donors that are mixed in with the NK cells can react to patients' [normal cells](#). This can limit the use of therapies considerably," says Shu Wang at the A\*STAR Institute of Bioengineering and Nanotechnology, who led the study. "We wanted to devise a new method of generating large numbers of pure, universally-suitable NK cells that could widen the use of such immunotherapies."

The team needed a readily available, sustainable and non-controversial source of stem cells from which they could derive massive numbers of NK cells. So they used [peripheral blood cells](#) to generate induced human pluripotent [stem cells](#), iPSCs, which can differentiate into every type of cell in the body, including NK cells. This is the first time peripheral blood cell-derived iPSCs have been used to generate NK cells.

Wang's team designed a new protocol to derive NK cells from iPSCs, with a focus on robustness and scalability. They co-cultured iPSCs with bone marrow connective tissue cells—these activate the signaling processes needed for cell differentiation and commitment to a specific cell type, which resulted in large yields of NK cells.

"An unexpected bonus of our protocol was that most derived NK cells were free of a particular group of inhibitory receptor proteins that can limit universal application in patients," says Jieming Zeng, the first author of the study. "This means that we may now have an invaluable cell source for a wider group of patients."

Scaling up the manufacture of NK cells will require considerable further

investment, particularly with its reliance on the connective tissue cell lines that may prove expensive to provide in the form of cell banks. The team will continue to streamline their technique, and believe the breakthrough will inform the development of universal 'off-the-shelf' cancer treatments.

**More information:** Jieming Zeng et al. Generation of "Off-the-Shelf" Natural Killer Cells from Peripheral Blood Cell-Derived Induced Pluripotent Stem Cells, *Stem Cell Reports* (2017). [DOI: 10.1016/j.stemcr.2017.10.020](https://doi.org/10.1016/j.stemcr.2017.10.020)

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