T CELLS AS TRAINED
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Natural-killer (NK) cells have an essential role within the innate immune system in tumor surveillance. During NK development the *Bcl11b* gene is expressed transiently in immature cells, but is not observed in NK precursors or mature NK cells.

Researchers lead by Pantao Liu discovered that deleting the same gene from T cells creates a form of NK-like cells that may have potential as a cell-based therapy for cancer.

"*Bcl11b* is essential for T cell development and T cell maintenance. Once *Bcl11b* is deleted, NK-like cells (we call them ITNKs) grow out in both cultured T cells and in the mouse", explained Liu. Interestingly, ITNKs could be created by deleting *Bcl11b* from all lineages, including mature T cells.

The ITNKs were able to effectively kill melanoma and lymphoma cells *in vitro*. Furthermore, in mice transplanted with ITNKs, these cells were maintained in the mice for at least 3 months, with no change in the cell number, no indiscriminate killing of healthy cells and no evidence of malignant transformation.

Further examination of the ITNK cells was carried out in mice that were injected with *Bcl11b*-null thymocytes that were then allowed to develop into ITNKs *in vivo*. Subsequent injection with murine melanoma B16 cells enabled the researchers to examine the frequency of metastasis. In the mice pretreated with the *Bcl11b*-null thymocytes, only approximately 20 lung metastases were observed, which contrasted with about 200 in the untreated mice.

Liu commented that the essence of this study was "ITNKs kill tumor cells effectively *in vitro* and *in vivo* and prevent metastasis in the mouse. Importantly, unlike NK cells, ITNKs do not rely on the major histocompatibility complex status for their killing."

This finding needs to be established in humans, and may then provide a new cell source for cell-based therapies.

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Original article Li, P. *et al.* Reprogramming of T cells to natural-killer like cells upon *Bcl11b* deletion. *Science* 329, 85–89 (2010)