

# Immune cell injections could prevent ischemic leg amputation

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A study has found that a subset of a special type of white blood cells called monocytes could be the key to regrowing blood vessels in the legs of patients with chronic limb-threatening limb ischemia (CLTI).

Over the course of a seven-year study, the researchers found that injecting these [monocytes](#) into ischemic limbs could rescue the [limb](#) from amputation by stimulating the growth of large blood vessels.

"Our research has revealed a potential cell therapy that could find clinical utility in promoting [blood vessel development](#) in the limbs of patients with CLTI as an adjunct to conventional surgical treatments, and could also be delivered into limbs with poor blood supply before they become critically ischemic," said Dr. Ashish Patel, Clinical Senior Lecturer in Vascular Surgery and Consultant Vascular and Endovascular Surgeon.

CLTI results from the build-up of plaque in the arteries that causes constant pain and the development of ulceration and gangrene in the affected leg. Despite the availability of modern surgical treatments, which include [bypass surgery](#) and angioplasty or stenting, up to 30% of patients require an amputation within a year of surgical treatment. The quality of life of patients can be similar to those with terminal cancer.

Despite a concerted drive to develop novel biological therapies to stimulate blood vessel regeneration over the past two decades, no effective treatments to date have been developed.

Building on previous research by this group, a new paper [published](#) in *Science Translational Medicine* has revealed monocytes are comprised of subsets. Within ischemic limbs, one of these subsets is able to regulate vascular remodeling—the process by which blood vessels undergo structural changes in response to various stimuli.

The researchers found that injecting subsets of monocytes—a type of white blood cell that is important in the [immune response](#)—into the ischemic limbs rescues the limb from amputation by stimulating growth of large [blood vessels](#).

This bench to bedside study began by analyzing the precise phenotype of the circulating monocyte subsets in response to CLTI in the laboratory, and found that the CD16 subset is mobilized in CLTI patients. These monocytes were isolated from patients with CTLI and shown to stimulate vascular remodeling in both in vitro and in vivo models, highlighting their potential use as a cell therapy.

With cell-based therapies, it is crucial that administered cells remain at the target site in a patient's body for a certain period so they can deliver their therapeutic effects. Poor cell retention is believed to be one of the reasons for the lack of success of cell-based [blood](#) vessel regeneration in previous studies. As a result, the authors carried out a first-in-man cell tracking study in conjunction with a team in the Cell and Gene Therapy Unit at Guy's and St Thomas' Trust.

This [clinical study](#) showed that the injected monocytes remained in the leg for 72 hours with over 80% of them remaining viable for therapeutic use. There was also evidence of improved vasculature at the injection site.

**More information:** Ashish S. Patel et al, A subpopulation of tissue remodeling monocytes stimulates revascularization of the ischemic limb, *Science Translational Medicine* (2024). [DOI: 10.1126/scitranslmed.adf0555](#)

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