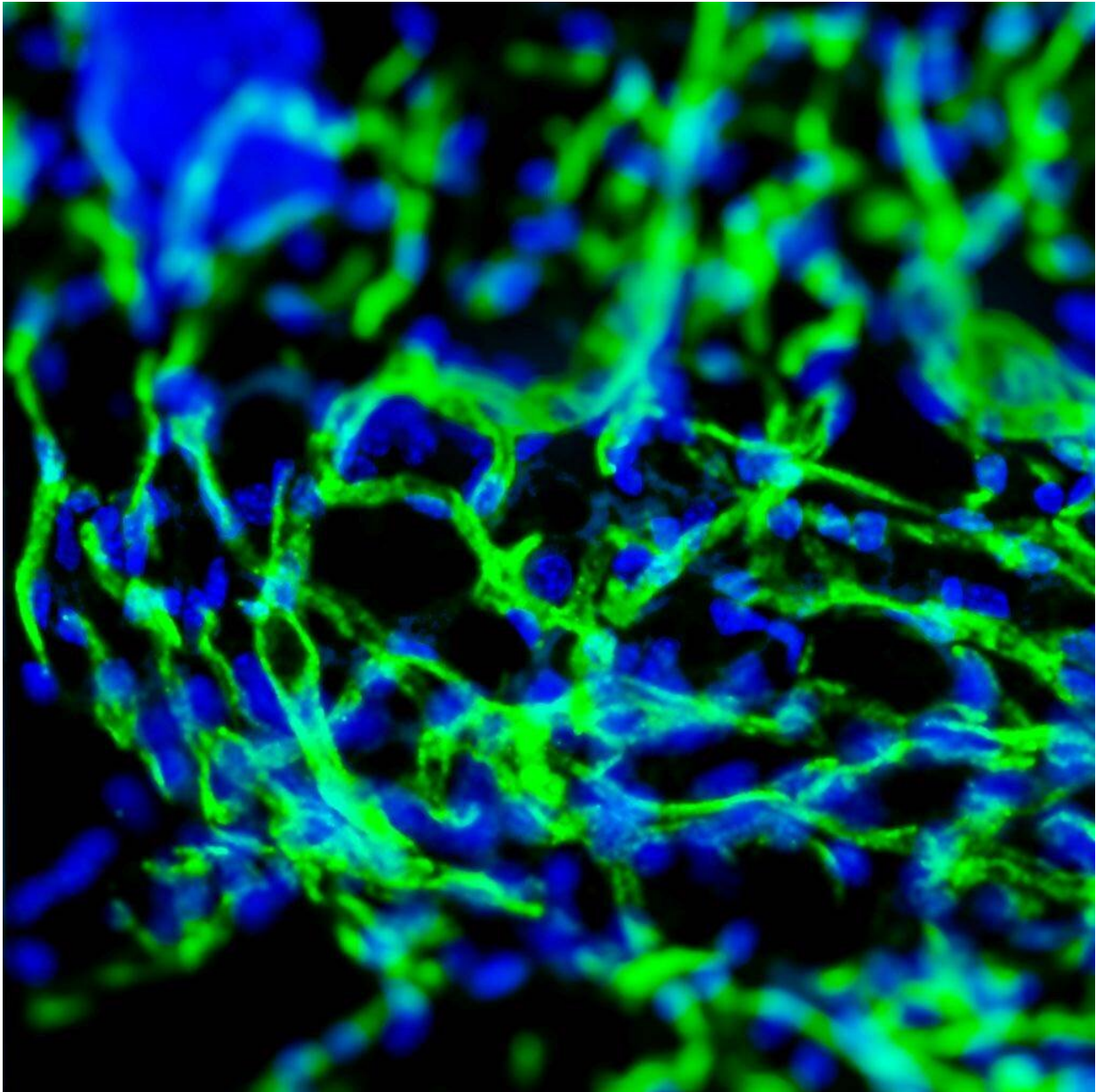


Creating blood vessels on demand

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A hydrogel injection affects the growth of new blood vessels. Credit: AG Shastri

When organs or tissues are damaged, new blood vessels must form as they play a vital role in bringing nutrients and eliminating waste and it is necessary for organs and tissues to regain their normal function. At present, the injection of growth factors or genetic material into the tissue site of interest can trigger angiogenesis, i.e. the growth of new blood vessels from pre-existing vessels. In a study published in the journal *Advanced Materials*, scientists from the Universities of Freiburg and Basel led by Prof. Dr. Prasad Shastri show that stable angiogenesis can be achieved by simply injecting a hydrogel with mechanical properties resembling that of a blood clot.

The cells that organize into [blood](#) vessels need support from other cells for stability and blood flow regulation. The Freiburg researchers and the biomedical scientists Dr. Roberto Gianni-Barrera and Dr. Andrea Banfi from the University of Basel discovered a new population of cells of the immune system that circulate in the blood, the CD11b+ monocytes that express the protein Piezo-1. This is one of the so-called mechanoreceptors that are important for the interaction of cells in the central nervous system, as reported by Shastri in an earlier [study](#). The scientists were also able to clarify the role of the cell population of CD11b+ monocytes in the stabilization of newly formed blood vessels. They found that this population of circulating cells is preferentially recruited in the hydrogel environment and organize in the vicinity of [new blood vessels](#).

"Our study represents a [paradigm shift](#), as it shows for the first time that a mechanically defined microenvironment is capable of recruiting a specific population of mechanosensing [cells](#) that can aid in a regenerative process," says Shastri. The results had an effect on the

treatment of peripheral vascular diseases, explains co-author Dr. Melika Sarem. "The hydrogel is a simple means to induce new and healthy vascular systems in a target tissue," adds Dr. Aurelien Forget, the co-first author of the study at the University of Freiburg.

More information: Aurelien Forget et al. Mechanically Defined Microenvironment Promotes Stabilization of Microvasculature, Which Correlates with the Enrichment of a Novel Piezo-1 + Population of Circulating CD11b + /CD115 + Monocytes, *Advanced Materials* (2019). DOI: [10.1002/adma.201808050](https://doi.org/10.1002/adma.201808050)

Provided by Albert Ludwigs University of Freiburg

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