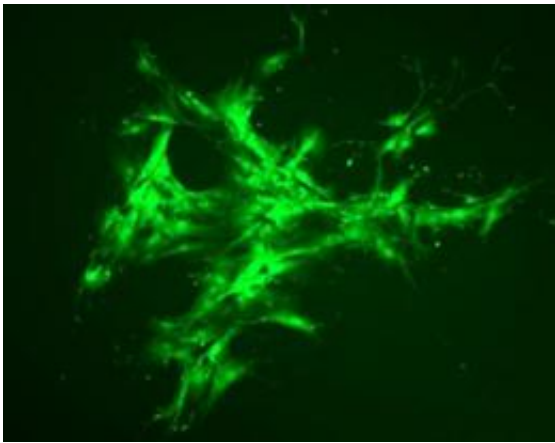


Researchers discover new blood vessel-generating cell with therapeutic potential

October 16 2012

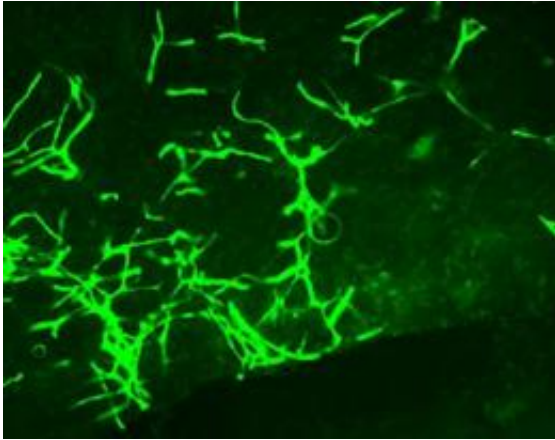


This shows an endothelial cell colony formed by one single adult vascular endothelial stem cell on a culture disk. Credit: Petri Salvén Laboratory

Researchers at the University of Helsinki believe they have discovered stem cells that play a decisive role in the growth of new blood vessels. If researchers learn to isolate and efficiently produce these stem cells found in blood vessel walls, the cells could offer new opportunities for developing therapeutics to treat diseases, such as cardiovascular disease and cancer. The study reporting the discovery of these stem cells is published in the open access journal *PLOS Biology* on October 16.

The growth of new blood vessels, known as neoangiogenesis, occurs during the repair of damaged tissue and organs in adults. However, malignant tumours also grow new blood vessels in order to receive

oxygen and nutrients. As such, neoangiogenesis is both beneficial and detrimental to health, depending on the context, requiring [therapeutic approaches](#) that can either help to stimulate or prevent it. Therapeutics that aim to prevent the growth of new blood vessels are already in use, but the results are often more modest than predicted.

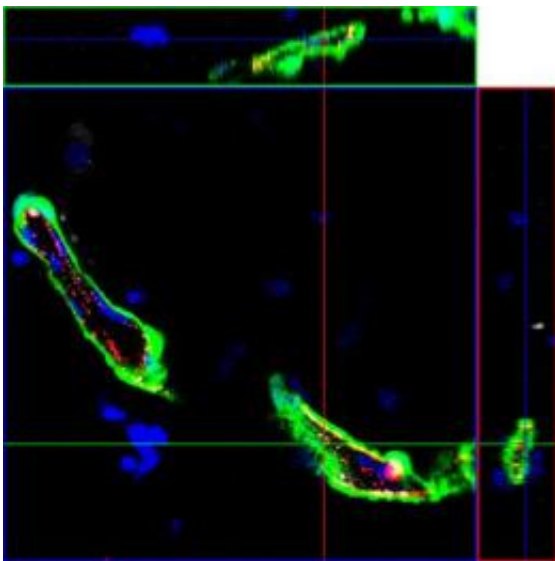


This shows functional blood vessels formed in vivo in mouse by transplanted daughter cells of one single adult vascular endothelial stem cell. The endothelial cells of the cell transplant are genetically tagged by green fluorescent protein to enable their recognition and tracking in the wild type recipient animal. Credit: Petri Salvén Laboratory

Adjunct Professor Petri Salvén and his team, from the University of Helsinki, now report that these [stem cells](#) can be found among the cells—so-called [endothelial cells](#)—that line the inside of blood vessel walls. He explains, "we succeeded in isolating endothelial cells with a high rate of division in the [blood vessel walls](#) of mice. We found these same cells in human blood vessels and blood vessels growing in malignant tumours in humans. These cells are known as vascular endothelial stem cells, abbreviated as VESC. In a cell culture, one such cell is capable of producing tens of millions of new blood vessel wall

cells".

From their studies in mice, the team are able to show that the growth of new blood vessels weakens, and the growth of malignant tumours slows, if the amount of these cells is below normal. Conversely, new blood vessels form where these stem cells are implanted.



This shows functional blood vessels grown in vivo from a single transplanted adult vascular endothelial stem cell. High resolution confocal microscope scanning is used to visualize the cross sections of individual blood vessels. The blood vessel endothelial cells are green (genetic GFP-tag) and the nuclei are blue. Credit: Petri Salvén Laboratory.

"The identification and isolation of an entirely new adult stem cell type is a significant discovery in stem cell biology." explains Salvén.

"Endothelial stem cells in blood vessels are particularly interesting, because they offer great potential for applications in practical medicine and the treatment of patients."

If an efficient method of vascular endothelial stem cell production could be developed, it could offer new treatment opportunities in situations where damaged tissue or diseases call for new blood vessel growth, or where the constriction or dysfunction of blood vessels deprives tissues of oxygen, for example in cardiac disease. These cells also offer new opportunities for developing therapeutics that seek to prevent new blood vessel growth in malignant tumours.

More information: Fang S, Wei J, Penttimikko N, Leinonen H, Salven P (2012) Generation of Functional Blood Vessels from a Single c-kit+ Adult Vascular Endothelial Stem Cell. *PLoS Biol* 10(10): e1001407. [doi:10.1371/journal.pbio.1001407](https://doi.org/10.1371/journal.pbio.1001407)

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