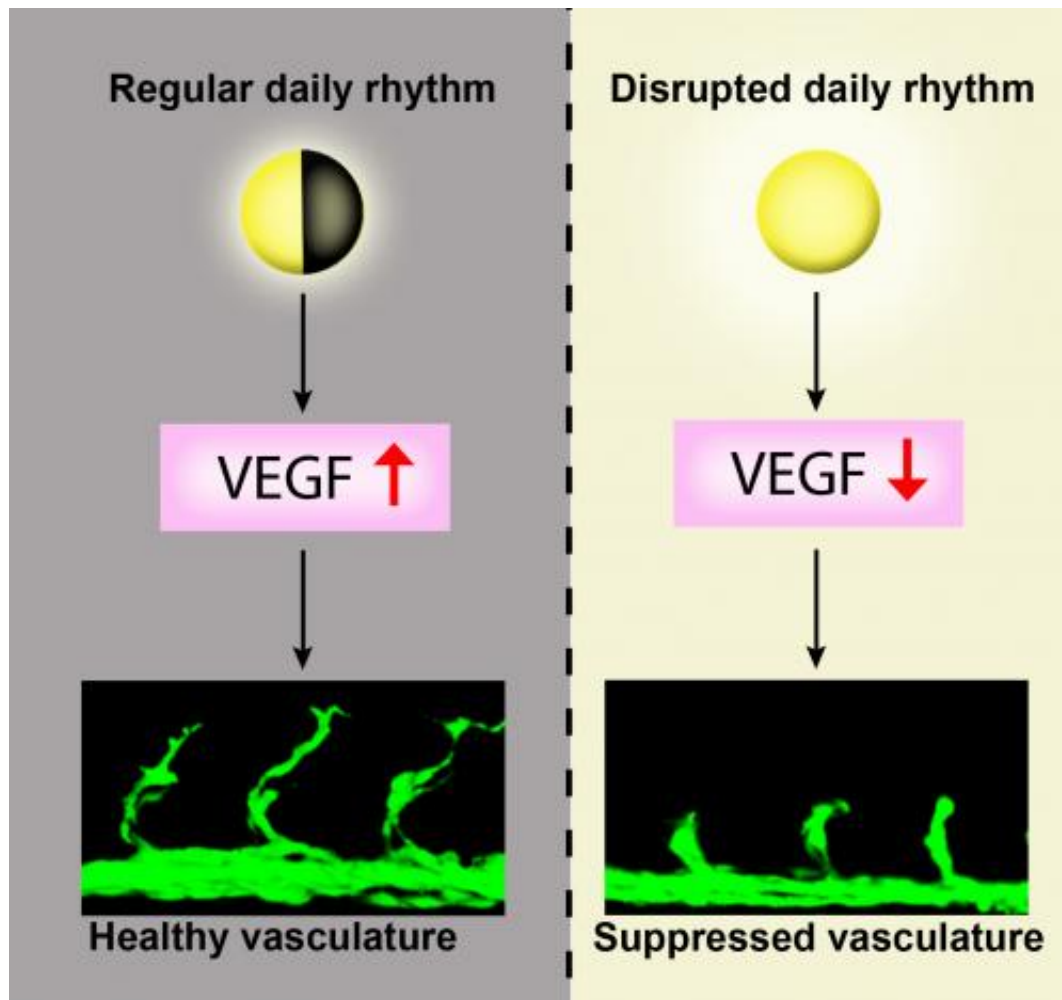


# Zebrafish study explains why the circadian rhythm affects your health

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A normal circadian rhythm regulates the genes needed to form the signalling substance VEGF, which in turn is necessary for blood vessel growth (angiogenesis). When light at night disturbs the circadian rhythm, and VEGF cannot be produced - blood vessel growth is inhibited, which can be seen in the microscope images at right. Credit: Lasse Dahl Jensen

Disruptions to the circadian rhythm can affect the growth of blood vessels in the body, thus causing illnesses such as diabetes, obesity, and cancer, according to a new study from Linköping University and Karolinska Institutet in Sweden.

The circadian rhythm is regulated by a "clock" that reacts to both incoming light and genetic factors.

In an article now being published in the scientific journal *Cell Reports*, it is demonstrated for the first time that disruption of the circadian rhythm immediately inhibit [blood vessel growth](#) in [zebra fish](#) embryos.

Professor Yihai Cao leads a research group, which has demonstrated that the breaking point is the production of a very important signalling substance: vascular endothelial growth factor (VEGF). The formation of this substance requires a normal circadian rhythm.

During experiments with hours-old zebra fish embryos, the researchers manipulated their circadian rhythm through exposing them to lighting conditions varying from constant darkness to constant light. The growth of blood vessels in the various groups was then studied. The results showed that exposure to constant light (1800 lux) markedly impaired blood vessel growth; additionally, it affected the expression of genes that regulate the circadian clock.

"The results can definitely be translated into clinical circumstances. Individuals with disrupted [circadian rhythms](#) – for example, shift workers who work under artificial lights at night, people with sleeping disorders or a [genetic predisposition](#) – should be on guard against illnesses associated with disrupted blood vessel growth," says Lasse Dahl Jensen, researcher in Cardiovascular Physiology at Linköping University

(LiU), and lead writer of the article.

Such diseases include heart attack, stroke, [chronic inflammation](#), and cancer. Disruptions in blood vessel growth can also affect foetal development, women's reproductive cycles, and the healing of wounds.

**More information:** Opposing Effects of Circadian Clock Genes *Bmal1* and *Period2* in Regulation of VEGF-Dependent Angiogenesis in Developing Zebrafish by L D Jensen, Z Cao, M Nakamura, Y Yang, L Bräutigam, P Andersson, Y Zhang, E Wahlberg, T Länne, K Hosaka and Y Cao. *Cell Reports* Online Now 9 Aug 2012.

Provided by Linköping University

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