

For the first time, scientists capture very moment blood flow begins

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By capturing movies of both the blood and vasculature of zebrafish embryos, each less than two millimeters long, researchers have been able for the first time to see the very moment that blood begins to flow.

The observations, reported online on June 3rd in [Current Biology](#) show that the earliest blood flow, involving what appear to be hundreds of cells, begins all at once.

Remarkably, that onset of life-giving circulation takes more than a beating heart. In fact, [red blood cells](#) remain stuck to the blood vessel wall initially, even after the heart starts to beat, says Atsuko Sehara-Fujisawa of Kyoto University.

"When most of the red blood cells finish their invasion into the vasculature, they are released into the circulation almost simultaneously," she says. "We could show that those blood cells release themselves into the flow, using 'molecular scissors' to disrupt their adhesion to [blood vessels](#) and enter the circulation dependent on plasma flow. Without those scissors, blood cells stagnate on the blood vessel wall."

Those molecular scissors come in the form of a protease enzyme known as ADAM8, the researchers report.

These findings raise an obvious question: Why would the onset of primitive [blood circulation](#) require such an active protease instead of just going with the flow, with blood cells entering the circulation one by one?

First, the researchers say, proteolysis would allow for control over which blood cells enter the circulation and which get held back. It might also help to stop blood cells from entering the circulation too early, preventing leaks that might occur if blood vessels aren't fully formed, or avoiding stagnation before an adequate flow of plasma is established with the heartbeat, the researchers add. It may be that blood cells need plasma to flow before they can reach maturity.

The findings likely have application to other types of blood cells in [zebrafish](#) and to blood flow in other animals, even humans, the researchers say, noting that ADAM8 is found at high levels in the blood of humans and mice into adulthood.

More information: Iida et al.: “Report: Metalloprotease-Dependent Onset of Blood Circulation in Zebrafish.” Publishing in Current Biology 20, 1-7, June 22, 2010. [DOI 10.1016/j.cub.2010.04.052](https://doi.org/10.1016/j.cub.2010.04.052)

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