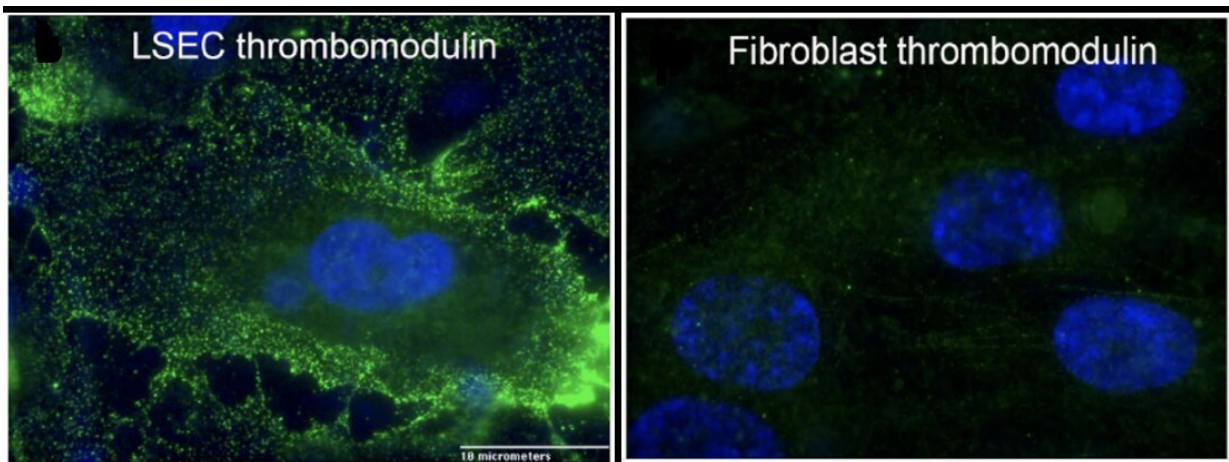


# Endothelial cells play important role in blood clotting

December 8 2021, by Molly Chiu

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Endothelial cells (left) and fibroblasts produce coagulation factors (green). Cell nuclei are in blue. Credit: Clay T. Cohen et al / *Scientific Reports*, 2021

When an injury occurs, coagulation proteins are integral to forming clots (thrombosis) and stopping bleeding (hemostasis). Dr. Clay Cohen, assistant professor of pediatric hematology and oncology at Baylor College of Medicine, is studying how the blood vessel walls play a role in these processes.

"Most experts believe the proteins that contribute to the development of a blood clot come exclusively from the liver," said Cohen, who is also director of the Hemophilia Treatment Center and co-director of the

Young Women's Bleeding Disorders Clinic at Texas Children's Hematology Center. "Our laboratory has been evaluating whether [endothelial cells](#), which form the lining of the [blood vessel walls](#), can also produce [coagulation proteins](#)."

Thrombin, an enzyme in blood, is key to the clotting process. Cohen describes the steps to make thrombin as a cascading domino system—a series of steps triggered by the activation of different proteins.

In a [previous study](#), Cohen and co-authors at Rice University detailed the first half of the process, showing the activation of a protein called coagulation factor X. In a new study published in *Scientific Reports*, these researchers confirmed that endothelial cells facilitate the rest of the thrombin-making process without help from external proteins, including those made in the liver.

"We showed that not only do endothelial cells produce all the proteins necessary for the domino effect to happen, but they allow the [domino effect](#) to happen on their surfaces," Cohen said.

Cohen and his team measured the thrombin activity in cultures of endothelial cells and fibroblasts, a type of cell found in connective tissue. Both [cell types](#) showed thrombin activity on the [cell surface](#), with the strongest activity shown in endothelial cell cultures.

"The vascular wall and endothelial cells are viewed as being important for preventing [blood clots](#). If your veins are trying to make blood clots, the blood isn't going to flow normally," Cohen said.

"Our findings that the endothelial cells have a role in blood clot formation, now shifts the way we think about how blood clots develop and how to treat and prevent them."

## Next steps

One of the next steps in Cohen's research will be to study how his findings on the role of the endothelial cells in clot formation may impact women on estrogen therapy.

"Women taking estrogen are at higher risk for developing blood clots, but it's not clear why," Cohen said. "I'm interested in learning how endothelial [cells](#) react to estrogen exposure as a potential explanation for increasing the risk of developing a blood clot."

Dr. Nancy A. Turner and Dr. Joel L. Moake with Rice University also contributed to this work.

**More information:** Clay T. Cohen et al, Human endothelial cells and fibroblasts express and produce the coagulation proteins necessary for thrombin generation, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-01360-w](#)

Provided by Baylor College of Medicine

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