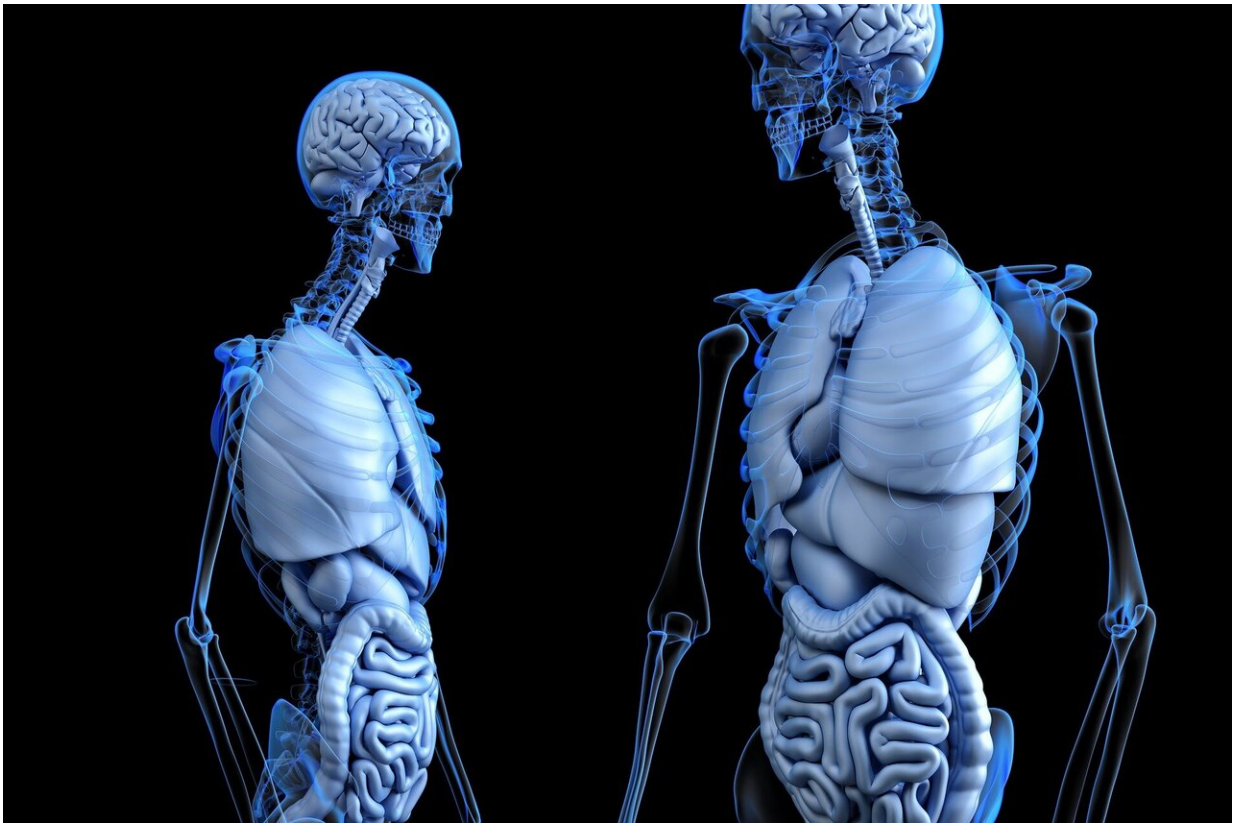


Liver research reveals structure of blood flow architecture, holding promise for transplants

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The liver is not only the largest organ in the body but also plays one of the most important roles in human metabolism as it transforms toxic substances in the body. Understanding the way its blood vasculature

works is crucial, particularly during organ transplant. As the new organ may be larger or smaller than the original, whether the blood circulation will adapt to the change in size is one of the most critical factors in the transplant's success. College of Engineering Chair Professor Dr. Sylvie Lorente, Mechanical Engineering, is part of an international team whose research shows that the challenge of predicting the liver vessel network can be met thanks to the constructal law of design evolution.

The team's work unveils the structure of the [liver](#) blood flow architecture as a combination of superimposed tree-shaped networks and a porous system. A main blood vessel (trunk) is connected to smaller vessels (branches), which are connected to smaller and smaller branches. Dr. Lorente notes: "The liver is fascinating because blood enters through two of those trees and goes out through one single tree. The connection between them occurs through micrometric elements, the lobules, which behave like a porous material."

Published in *Scientific Reports*, "The liver, a functionalized vascular structure," explains how the organ's entire [blood circulation](#) can be predicted as a design that evolved toward configurations with increasingly less resistance to the flows that go through them.

"Building on our results, we plan now to model how the liver changes in size and what the limits to failure are," says Dr. Lorente. "We hope that our work can help surgeons in the decisions they have to make before and during transplant."

More information: Sylvie Lorente et al. The liver, a functionalized vascular structure, *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-73208-8](#)

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