

Connection discovered between the nervous system and the vascular system

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Dr. Frédéric Charron, researcher at the Institut de recherches cliniques de Montréal (IRCM), and his team have shown for the first time that a key molecule of the vascular system directs axons during the formation of neural circuits. This connection between the nervous system and the vascular system could be a good starting point for the development of therapies for neurodegenerative diseases. The discovery will be published tomorrow by *Neuron*.

"To properly form neural circuits, developing axons (long extensions of [neurons](#) that make the nerves) need molecules to guide them towards their target, in the same way that road signs guide us when we drive," explains Pierre Fabre, doctoral student in Dr. Charron's team and first co-author of the article.

The nervous system is not the only system formed during human embryo development. Blood vessels are also organized into a very complex network, which led to the idea that certain molecules could be reused by both the nervous system and the [vascular system](#). In fact, recent studies revealed that the reference points used to guide axons also help blood vessels reach their targets.

"One of the key molecules of the vascular system is the vascular endothelial growth factor, better known as VEGF," adds Mr. Fabre. "We discovered that VEGF is able to attract nervous system axons. More specifically, we identified Flk-1 as the receptor responsible for this effect, making it a prime target for the development of therapies to re-

grow axons after lesions of the central nervous system or [neurodegenerative diseases](#)."

This scientific breakthrough was possible due to an innovative technique developed by Dr. Charron's laboratory a few years ago. The system uses a microscopic device to control and observe, in real time, the axon's behaviour in response to guidance molecules. This technique allowed the researchers to follow the axon's trajectory and revealed VEGF's role in directing axons.

"This research could have an important long-term impact in the field of spinal cord repair, as the results will help us better understand the development of the spinal cord," says Dr. Charron, Director of the IRCM's Molecular Biology of Neural Development research unit. "The more we learn about the molecules needed to appropriately guide axons, the more it will become possible to develop a therapy to treat spinal cord injuries."

"These new findings are of great interest to the research community as they offer new hope for the treatment of neurodegenerative diseases," says Dr. Anthony Phillips, CIHR's Scientific Director of the Institute of Neurosciences, Mental Health and Addiction. "CIHR recognizes the important work of Dr. Charron's team and this novel discovery linking blood vessels and neurons to neural circuit formation."

More information:

[www.cell.com/neuron/abstract/S0896-6273\(11\)00343-6](http://www.cell.com/neuron/abstract/S0896-6273(11)00343-6)

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