



# WEIZMANN *views*

## THE ORIGINS OF BLOOD AND LYMPHATIC VESSELS AND THE HOPE FOR NEW THERAPIES

"I believe there is real magic in the way that embryos develop. I've been studying them for almost 15 years and I haven't stopped being amazed," says Dr. Karina Yaniv of the Weizmann Institute of Science's Department of Biological Regulation.

Dr. Yaniv focuses on examining how blood

and lymphatic vessels form during embryonic development. Her research may, in the future, lead to new therapies for heart disease, stroke, cancer, and other illnesses. "I think it's imperative for us to learn how to manipulate vessel growth," she says. "Sometimes we want to encourage vessel growth and sometimes we want to stop it."

a large amount of blood vessels," Dr. Yaniv explains. "If we knew how to stop blood vessels from growing, we could potentially kill the tumor." In her lab, she uses the zebrafish embryo as a model to study vessel formation. Zebrafish embryos offer unique opportunities for study, as they develop outside the mother's body and are nearly transparent, so it's possible to observe their entire vascular system at every stage of embryonic development. "We can see the blood cells flowing within the vessels under the microscope, which is invaluable for our research," says Dr. Yaniv.

The formation and anatomical layout of the zebrafish vascular system is similar to that of humans and other vertebrates. "From human to chicken to salamander, we all use the same mechanisms to make blood vessels," she notes. "I believe that nature has provided us with a great book of instructions [on how vessels develop] in the form of the embryo, and all we need to do is learn how to read it."

By manipulating genes, Dr. Yaniv and her colleagues are able to produce zebrafish embryos that have more blood and lymphatic vessels than normal and others that are lacking vessels. "We're especially interested in looking at these embryos—which we call mutants—because they will teach us how to make blood vessels and how to stop blood vessels from growing," she says.

During her postdoctoral studies, Dr. Yaniv showed that, contrary to common belief, zebrafish do have a lymphatic system. This system, found in humans and many other animals, is a network of vessels

**"Understanding how blood and lymphatic vessels form during embryonic development could lead to new therapies for heart disease, stroke, cancer, and other illnesses."**

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In cardiac ischemia, for example, a partially or completely blocked artery causes a decrease in the flow of blood and oxygen to the heart. As a result, the heart muscle tissue can be damaged. "But if we knew how to grow new blood vessels, we could save that tissue," says Dr. Yaniv.

On the other hand, selectively blocking the formation of new blood vessels could help in treating cancer. "Tumors are very, very smart and the first thing they do when they grow is to surround themselves with



Dr. Karina Yaniv



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that helps keep body fluid levels in balance, absorbs and transports fats, and protects the body from infection. Thanks to Dr. Yaniv's findings, several labs in the U.S. and Europe have started using zebrafish in their studies of the lymphatic system.

Dr. Yaniv also traced the formation of lymphatic vessels in the living embryo, determining for the first time the developmental history of this system—a question that had remained unresolved for the last century. Her studies showed that, in the vertebrate embryo, the lymph vessels originate in the veins. Since metastatic cancer cells use the lymphatic network to migrate to distant organs, a better understanding of how lymph vessels form during embryonic development might make it possible to block their growth around a malignant tumor and prevent the spread of metastasis.

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Born and raised in Córdoba, Argentina, Dr. Yaniv received both her BSc in chemistry and biology and MSc in biological

chemistry from the Hebrew University of Jerusalem, and her PhD in developmental biology from the Hebrew University–Hadassah Medical School. After conducting postdoctoral research in the Laboratory of Molecular Genetics at the National Institutes of Health's National Institute of Child Health and Human Development (NICHD) in Bethesda, Maryland, she joined the Weizmann Institute as a senior scientist in 2009.

The Institute's emphasis on bringing bright young scientists to Israel has benefited Dr. Yaniv and her family. As a mother of three young boys, she appreciates the opportunity to live on the Weizmann campus and take advantage of the Institute's amenities, such as day-care facilities. “To be a mother and a scientist is definitely not easy, but the Weizmann Institute helps women like me combine the two and do it well,” she says.

Dr. Yaniv is also grateful for the ongoing support of her colleagues in her department. “They're always offering to help me with my grant applications, scientific papers, or other projects,” she says. “They say: whatever you need, we're here for you. And that is more than I ever could have asked.”

*Dr. Karina Yaniv's research is supported by the Willner Family Center for Vascular Biology; the Estate of Paul Ourieff; the Carolito Stiftung; the Abraham and Sonia Rochlin Foundation; Lois Rosen, Los Angeles, CA; the Estate of David Arthur Barton; and the Estate of George Talis.*

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