

Cancerous tumors often grow in environments with low oxygen levels, a condition called hypoxia. This lack of oxygen not only affects the tumor itself but also the blood vessels that supply it with nutrients. To survive, both cancer cells and the cells that form blood vessels (called endothelial cells) must adapt to these tough conditions.

One of the key players in this adaptation is a group of proteins called hypoxia-inducible factors (HIFs). These proteins help cells adjust to low oxygen by switching their energy source and stimulating the growth of new blood vessels, a process known as angiogenesis. There are two main types of HIFs—HIF-1 and HIF-2. At first, cells rely on HIF-1, but over time, they shift to using HIF-2 in a process called the "HIF-switch." This switch is an important survival strategy for both cancer cells and the blood vessels that feed them.

Scientists have recently discovered that tiny molecules called microRNAs also play a role in this process. These molecules help fine-tune how cells respond to hypoxia, including how they form new blood vessels. While most research has focused on microRNAs controlled by HIF-1, our new studies show that HIF-2 also influences microRNA activity during prolonged hypoxia. In fact, we have identified 11 microRNAs that are specifically regulated by HIF-2, and these may play a crucial role in tumor survival and blood vessel formation.

The goal of this research is to understand how HIF-2-controlled microRNAs help cancer cells and blood vessels survive in low-oxygen environments. I will investigate whether blocking these microRNAs affects blood vessel growth and survival under hypoxia. I will also identify which genes these microRNAs control, as they could hold the key to potential new treatments for cancer.

Since microRNAs or their inhibitors could one day be used in therapies, uncovering their role in cancer growth could be a big step toward new ways to fight the disease.