

Restoring flawed tumor vessels could lead to better cancer treatments

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Researchers led by Peter Carmeliet (VIB-KU Leuven) have found a novel way to normalize the dysfunctional blood vessels that are typical for tumors. Those vessels play a pivotal role in cancer metastasis, as their fragility and permeability allows cancer cells to escape through the blood stream and invade other organs. By manipulating the blood vessel cells' sugar metabolism, the scientists were able to 'cool down' their overheated engines and create a healthy and structured blood vessel network. On top of preventing the spread of cancer cells, the restored vessels delivered chemotherapy drugs in a more efficient way to the tumor. These groundbreaking results are published in the scientific journal *Cancer Cell*.

Blood vessel cells, so called endothelial cells, in tumors need to divide rapidly and therefore consume large quantities of sugar. As a result, the metabolism of those cells gets overheated, which makes them fragile, dysfunctional and irregular in shape and size. Because of the weaknesses of flawed vessels, cancer cells can use them as 'highways' to spread to distant organs. Furthermore, they are unable to deliver enough oxygen to the [tumor](#), which allows the tumor to proliferate even further. Finally, poorly-functioning vessels hinder the smooth delivery of chemo- and immunotherapy drugs to the tumor.

Blocking sugar consumption

In contrast to the traditional cancer therapy aiming at blocking new

tumor [blood vessel formation](#) and destroying existing tumor vessels, the research team led by professor Peter Carmeliet (VIB-KU Leuven) focused on normalizing the detrimental process instead.

Prof. Peter Carmeliet (VIB-KU Leuven): "Therapies that destroy tumor vessels are not always effective. In some cases, patients even show resistance to these drugs. So when we investigated the root of the problem, we were pleased to see that dysfunctional vessels are very susceptible to drugs blocking their sugar metabolisms, precisely because their sugar engines are so overheated. Our study proves that we could neutralize this out-of-control [sugar consumption](#) with a small molecule compound, thereby healing the impaired tumor [vessels](#)."

Great clinical importance

Apart from reducing the chances of [cancer cells](#) spreading throughout the body, a future vessel normalization therapy would have other perks as well. Indeed, it promises not only to improve standard chemotherapy, but also to provide extra benefits to recently developed immunotherapy.

Prof. Peter Carmeliet (VIB-KU Leuven): "Our study also shows that healthy [tumor vessels](#) ensure a better delivery of chemotherapeutic agents to the tumor. In addition, they could improve the supply of immune cells as well. This is very important, because many emerging cancer therapies directly address the body's immune system. That is why we are already planning to investigate the effects of tumor vessel normalization therapy with immunotherapy. In this way, we are getting closer to identifying more targeted and specific treatments in the fight against cancer."

More information: On November 17th, Peter Carmeliet will be made a baron by King Philip, to honor the societal value of his research.

Provided by VIB (the Flanders Institute for Biotechnology)

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