

Apples and oranges: Tumor blood vessel cells are remarkably atypical

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Contrary to a long-standing assumption that blood vessel cells in healthy tissues and those associated with tumors are similar, a new study unequivocally demonstrates that tumor blood vessel cells are far from normal. The research, published by Cell Press in the September issue of the journal *Cancer Cell*, identifies tumor-specific blood vessel cells that are atypically stem cell-like and have the potential to differentiate into cartilage- or bone-like tissues.

Although it has been known for some time that tumors can be eradicated in mice by targeting their blood supply, very little is known about the biology of the endothelial cells that line tumor blood vessels (TECs). "A primary assumption of antiangiogenesis therapy is that TECs are normal and derived from nearby, preexisting vessels," explains senior author Dr. Michael Klagsbrun from Children's Hospital Boston and Harvard Medical School. "However, we and other groups have shown that there are several key differences between normal and tumor endothelium."

Dr. Klagsbrun and lead author Dr. Andrew Dudley isolated TECs from mice that spontaneously develop prostate tumors very similar to human prostate cancers. The researchers found that the TECs were multipotent, meaning that they were not fully mature and had the potential to differentiate into multiple different types of cells. The isolated TECs differentiated to form cartilage- and bone-like tissues. "These results suggest that TECs possess a stem/progenitor cell property that distinguishes them from ECs throughout the normal vasculature and undergo atypical differentiation," explains Dr. Klagsbrun.

The researchers went on to demonstrate blood vessel calcification in human and mouse prostate tumor specimens. This bone-like calcification has also been described in diseased blood vessels and is likely to have clinical significance in prostate cancer. "It is possible that calcification of tumor blood vessels could impair blood flow or enable tumor cell entry into the bloodstream, facilitating metastasis," offers Dr. Klagsbrun. "Further, the expression of bone-specific proteins in prostate tumor cells may enable their survival once they reach the bone microenvironment."

Additional research is required to determine how the atypical properties of TECs are associated with the tortuous, leaky vessels characteristic of tumors and whether vascular calcification does indeed encourage tumor cell metastasis. It is also possible that vascular calcification, which is easily discernible histologically, may be a useful diagnostic criterion.

Source: Cell Press

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