How cancer spreads: Metastatic tumor a hybrid of cancer cell and white blood cell

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Yale Cancer Center scientists, together with colleagues at the Denver Police Crime Lab and the University of Colorado, have found evidence that a human metastatic tumor can arise when a leukocyte (white blood cell) and a cancer cell fuse to form a genetic hybrid. Their study, published in the journal *PLOS ONE*, may answer the question of how

cancer cells travel from the primary tumor's site of origin to distant organs and tissues of the body—the deadly process of metastasis.

Such a theory was first proposed as an explanation for metastasis more than a century ago. But until now, the theory was unproven in human cancer because genomic differences between cells from the same patient cannot be distinguished. To get around this problem, the researchers analyzed genomic DNA in the secondary malignancies of a patient who had a melanoma brain metastasis and had received a bone marrow transplant from his brother.

They found signature genes from both the patient and donor together in the tumor cells, providing the first evidence that leukocytes (in this case from the donor) can fuse with cancer cells and initiate a tumor.

"Our results provide the first proof in humans of a theory, proposed in 1911 by a German pathologist, that metastasis can occur when a leukocyte and cancer cell fuse and form a genetic hybrid," said corresponding author John Pawelek, research faculty in the dermatology department of Yale Cancer Center and Yale School of Medicine. "This could open the way to new therapy targets, but much work needs to be done to determine how fusion occurs, the frequency of such hybrids in human cancers, and the potential role of hybrids in metastasis," he added.

More information: dx.plos.org/10.1371/journal.pone.0066731

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