

Scientists provide explanation for how cancer spreads

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Metastasis, the spread of cancer throughout the body, can be explained by the fusion of a cancer cell with a white blood cell in the original tumor, according to Yale School of Medicine researchers, who say that this single event can set the stage for cancer's migration to other parts of the body.

Their work was Published in the May issue of *Nature Reviews Cancer*. The studies, spanning 15 years, have revealed that the newly formed hybrid of the cancer cell and white blood cell adapts the white blood cell's natural ability to migrate around the body, while going through the uncontrolled cell division of the original cancer cell. This causes a metastatic cell to emerge, which like a white blood cell, can migrate through tissue, enter the circulatory system and travel to other organs.

“This is a unifying explanation for metastasis,” said John Pawelek, a researcher in the Department of Dermatology at Yale School of Medicine and at Yale Cancer Center, who conducted the studies with colleague Ashok K. Chakraborty and several other Yale scientists. “Although we know a vast amount about cancer, how a cancer cell becomes metastatic still remains a mystery.”

The fusion theory was first proposed in the early 1900s and has attracted a lot of scientific interest over the years. Pawelek and his colleagues began their research several years ago by fusing white blood cells with tumor cells. These experimental hybrids the researchers observed, were remarkably metastatic and lethal when implanted into mice. In addition,

the scientists noted, some of the molecules the hybrids used to metastasize originated from white blood cells, and these molecules were the same as those used by metastatic cells in human cancers. Pawelek and his team then validated previous findings that hybridization occurs naturally in mice, and results in metastatic cancer.

“Viewing the fusion of a cancer cell and a white blood cell as the initiating event for metastasis suggests that metastasis is virtually another disease imposed on the pre-existing cancer cell,” said Pawelek. “We expect this to open new areas for therapy based on the fusion process itself.”

The research team recently began studying cancers from individuals who had received a bone marrow transplant—a new source of white blood cells for the patient. Genes from the transplanted white blood cells were found in the patient tumor cells, indicating that fusion with white blood cells had occurred. But Pawelek said these studies must be greatly expanded before his team can say with certainty that white blood cell fusion accounts for cancer metastasis in humans.

“To date, the fusion theory and the considerable evidence supporting it have largely been overlooked by the cancer research community,” said Pawelek. “The motivation for our article is to encourage other laboratories to join in.”

Source: Yale University

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