Waste disposal protein is mechanism behind cancer tumor suppression

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"Taking out the trash" takes on a whole new meaning, as investigators at The Cancer Institute of New Jersey (CINJ) and Rutgers, The State University of New Jersey, have discovered that a waste disposal protein is the key to cancer tumor suppression in a process known as autophagy.

Autophagy is a process in which cancer cells eat themselves. Previous study from the lab of Eileen White, PhD, associate director for basic science at CINJ, and a number of other groups has shown that autophagy is a pathway to cancer tumor suppression, but scientists did not know the mechanism behind it, until now.

The latest research, which appears in this week's print and online editions of *Cell,* focuses on a protein known as p62. This protein is responsible for disposing of damaged proteins that accumulate in a cell when it is no longer receiving nourishment for growth and is under other environmental stress. In order for cells to prevent themselves from becoming a cancer tumor, they need to rid themselves of this waste. The p62 protein packages the damaged materials and prepares these materials, along with itself, to be degraded through the autophagy process. Disruption in the process or failure to dispose of p62 from the cell can result in toxicity, genome damage and inflammation, which in turn can promote tumor progression.

Dr. White, who is an adjunct professor of surgery at UMDNJ-Robert Wood Johnson Medical School, and a professor of molecular biology and biochemistry at Rutgers University, is the senior author of the

research publication. She notes this is the first time the disposal of p62 has been linked with tumor suppression, which can be key in cancer prevention. "This discovery is important, because we now have an opportunity to look at people at risk for cancer before it develops," she notes. "These latest findings show that p62 can act as a marker to identify certain cancers and that we can manipulate p62 levels to stimulate the process of autophagy and ultimately tumor suppression."

The team looked at both mouse models and human tissue samples from liver, lung and kidney tumors. White indicates there is evidence that controlling p62 levels also has implications in lymphoma and breast and prostate cancers. And because diseases such as Alzheimer's, Parkinson's and Huntington's share the same property of failing to dispose of protein waste properly, White says this latest discovery involving the p62 protein also has implications for further unlocking the mysteries of neurodegenerative disorders and for providing tools for new drug discovery.

Many current cancer treatments also activate the process of autophagy. White notes further understanding of the p62 mechanism in relation to this functional consequence is necessary, as induction of autophagy during treatment can be counterproductive. White notes subsequent study should include trying to identify new or existing drugs that will enhance the autophagy process so that novel mechanisms for tumor prevention can be established.

Source: Rutgers University (news : web)