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Researcher finds an SOS response to cancer-causing agents

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University of Saskatchewan microbiologist Wei Xiao has found a way to trigger a protein combination called 9-1-1 that sends an SOS signal for cells to fight cancer-causing agents such as industrial toxins, ultraviolet radiation, and X-rays.

The finding—published this week in the prestigious journal Cell—is seen as a breakthrough in cancer research that could lead to better cancer diagnosis through targeting defective genes. It may also pave the way for a drug that activates the SOS response in cells.

“With no exaggeration, this is a result that many in the field have awaited with anticipation for some 20 years,” said Michael Ellison, director of the Institute for Biomolecular Design and Project CyberCell at the University of Alberta.

The study demonstrated that a process known as ubiquitination, sometimes called the “kiss of death” for proteins, can serve a completely different function. Xiao and a team of graduate students found that ubiquitination can actually be used to activate the 9-1-1 protein complex, warning cells to stop dividing with damaged DNA that leads to cancer.

“It has been known for many years that 9-1-1 was important, but scientists did not know how it was turned on,” said Xiao, department head and professor of microbiology and immunology at the U of S. “We figured out how 9-1-1 is actually activated when cells face carcinogens.”

The next step toward developing diagnostic tools and drug treatments is to test whether this model, which used genes from baker's yeast that have counterparts in people, can apply to human cells as well.

Xiao will present his team's findings and future research directions at the prominent Gordon Research Conference on Mutagenesis at Oxford University this summer.

His study was funded by both the Canadian Institutes of Health Research and the Natural Sciences and Engineering Research Council.

Being published in Cell caps a rewarding week for Professor Xiao, who was also named the 2008 U of S Distinguished Researcher. The award, to be presented May 28th at convocation, recognizes a faculty member's contribution to scholarship through creation, expansion, and critique of knowledge.

"Professor Xiao has clearly established himself as an internationally recognized leader in DNA repair and cancer research," said U of S Vice-President Research Steven Franklin. "Remarkably, he has simultaneously nurtured a new generation of scientists who are already building on the significant contributions he has made to his field."

Xiao's research already garnered the National Cancer Institute of Canada's Research Scientist Award and a spot on the Canadian Who's Who list since 1996. He was also one of 12 Chinese immigrants highlighted in the book Canada at the Millennium: A Trans-Cultural Society.

The microbiologist has worked hard to help young scholars find similar success by supervising more than two dozen summer students and 19 graduate students and postdoctoral fellows, including Yu Fu and Yu Zhu who worked on the study published in Cell. Zhu has since become a

medical resident in pathology at the U of S while Fu has taken a postdoctoral fellow position at Harvard Medical School.

Xiao's expert guidance was recognized by students when the U of S College of Medicine Graduate Student Society gave him the Supervisor of the Year Award in 2007.

Source: Canadian Institutes of Health Research