Social isolation worsens cancer

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Using mice as a model to study human breast cancer, researchers have demonstrated that a negative social environment (in this case, isolation) causes increased tumor growth. The work shows -- for the first time -- that social isolation is associated with altered gene expression in mouse mammary glands, and that these changes are accompanied by larger tumors.

"This interdisciplinary research illustrates that the social environment, and a social animal's response to that environment, can indeed alter the level of gene expression in a wide variety of tissues, not only the brain," said Suzanne D. Conzen, MD, associate professor of medicine at the University of Chicago and senior author of the study, to be published on September 30, 2009, in Cancer *Prevention Research*. "This is a novel finding and may begin to explain how the environment affects human susceptibility to other chronic diseases such as central obesity, type 2 diabetes, hypertension, etc."

The research began six years ago when cancer specialist Conzen joined forces with biobehavioral psychologist Martha McClintock, PhD, professor of psychology and founder of the Institute for Mind and Biology at the University of Chicago, who has long been interested in the result of social isolation in aging, to study behavior and cancer in a mouse model.

The University of Chicago scientists took mice that were genetically predisposed to develop mammary gland (breast) cancer and raised them in two environments: in groups of mice and isolated. After the same

amount of time, the isolated mice grew larger mammary gland tumors. They were also found to have developed a disrupted stress hormone response.

"I doubted there would be a difference in the growth of the tumors in such a strong model of genetically inherited cancer simply based on chronic stress in their environments, so I was surprised to see a clear, measurable difference both in mammary gland tumor growth and interestingly in accompanying behavior and stress hormone levels," Conzen said.

The researchers then turned their attention to how the chronic social environment affected the biology of cancer growth. In other words, they sought to discover the precise molecular consequences of the stressful environment.

To do this, they studied gene expression in the mouse mammary tissue over time. Conzen and her colleagues found altered expression levels of metabolic pathway genes (which are expected to favor increased tumor growth) in the isolated mice. This was the case even before tumor size differences were measurable.

These altered gene expression patterns suggest potential molecular biomarkers and/or targets for preventive intervention in human breast cancer.

"Given the increased knowledge of the human genome, we can begin to identify and analyze the specific alterations that take place in caner-prone tissues of individuals living in at-risk environments," Conzen said. "That will help us to better understand and implement cancer prevention strategies."

These findings do suggest novel targets for chemoprevention, according

to Caryn Lerman, PhD, Scientific Director of the Abramson Cancer Center at the University of Pennsylvania, Philadelphia and Deputy Editor of *Cancer Prevention Research*. "Future studies should evaluate whether these molecular processes can be reversed by chemopreventive agents."

The findings also support previous epidemiologic studies suggesting that social isolation increases the mortality of chronic diseases, as well as clinical studies revealing that social support improves the outcomes of cancer patients.

Source: University of Chicago Medical Center