

Biological link established between tumors and depression

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In a study that could help explain the connections between depression and cancer, researchers at the University of Chicago have used an animal model to find, for the first time, a biological link between tumors and negative mood changes.

The team determined that substances associated with <u>depression</u> are produced in increased quantities by tumors and are transmitted to the brain.

Additionally, pathways that normally moderate the impact of depressioncausing substances are disrupted when a <u>tumor</u> develops.

The research further showed that tumors induce changes in gene expression in the hippocampus, the portion of the brain that regulates emotion. Although researchers have long known that depression is a common outcome for people diagnosed with cancer, they had not known if it was brought on by a patient learning of the diagnosis or the result of treatments such as <u>chemotherapy</u>. Now a third source may have been identified.

"Our research shows that two types of tumor-induced molecules, one secreted by the immune system and another by the stress axis, may be responsible," said Leah Pyter, a postdoctoral fellow and lead author of a paper, "Peripheral Tumors Induce Depressive-like Behaviors and Cytokine Production and Alter Hypothalamic-Pituitary-Andrenal Axis Regulation," which is published in the current issue of the <u>Proceedings</u>



of the National Academy of Sciences.

"Both of these substances have been implicated in depression, but neither has been examined over time frames and magnitudes that are characteristic of chronic diseases such as cancer," she said.

For their research, the team conducted a series of tests on about 100 rats, some of whom had cancer to determine their behavioral responses in tests of emotional state.

"Rats are commonly used to test drugs that are being studied for potential human benefits, such as treating depression," said Brian Prendergast, Associate Professor of Psychology at the University of Chicago, and the senior author on the study. "In this case, examining <u>behavioral responses</u> to tumors in non-human animals is particularly useful because the rats have no awareness of the disease, and thus their behavioral changes were likely the result of purely biological factors."

The team used tests commonly used in testing anti-depressants on rats and found that the rats with tumors became less motivated to escape when submitted to a swimming test, a condition that is similar to depression in humans. The rats with tumors also were less eager to drink sugar water, a substance that usually attracts the appetites of healthy rats.

Further tests revealed that the rats with tumors had increased levels of cytokines in their blood and in the <u>hippocampus</u> when compared with healthy rats. Cytokines are produced by the immune system, and an increase in cytokines has been linked to depression.

The team also found that stress hormone production also was altered in rats with tumors. The rats with tumors also had dampened production of the stress hormone corticosterone. The hormone helps regulate the impact of cytokines and reducing its production therefore increases the



impact of cytokines.

Source: University of Chicago (<u>news</u> : <u>web</u>)

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