Medical Xpress

Researchers show how the brain can protect against cancer

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Scientists have been aware for many years that if cancer patients are not able to deal with the stress associated with being sick, the cancer will progress faster than in calmer patients. To counteract this phenomenon, physicians encourage treatments that help cancer patients handle their stress. Scientists theorized that the stress relief may have come as a result of increased beta-endorphin peptide (BEP), the "feel good" hormones in the brain that are released during exercise, a good conversation, and many other aspects of life that give humans pleasure.

Researchers at Rutgers hypothesized that BEP producing neurons do not just make us feel good, but also play roles in regulating the stress response and immune functions to control tumor growth and progression. In a paper published today in the *Proceedings of the National Academy of Science*, Dr. Dipak K. Sarkar and his colleagues demonstrate the physical mechanisms that support their hypothesis.

"Our findings show promise for future therapeutic treatments for bolstering the immune function," said Sarkar, professor of animal sciences and director of the Endocrinology Program at the Rutgers School of Environmental and Biological Sciences, and principal investigator of the research project.

Previous research has shown that too few, or inactive, BEP neurons are associated with various diseases. For example, low numbers of BEP neurons have been identified in the brains of patients with depression and schizophrenia. Neurons that produce too little BEP are found in

many obese patients. In both these cases the patients also had higher levels of infection and more incidence of cancer.

To test their hypothesis about the role of BEP in controling tumor growth and progression, the Rutgers scientists took neural stem cells, transformed them into BEP neurons by treating them with particular chemicals, and then transplanted them into brains of live rats. The authors studied tumor growth in the rats that had been given carcinogens to induce prostate tumors. The authors noted that the BEP neurons boosted the immune system by increasing the activity of particular immune cell types and decreasing inflammation.

The neurons also protected the rats against prostate cancer 90 percent of the time. The researchers discovered that the "natural killer," or NK cells that typically attack cancer cells in the body, are activated by the inserted BEP neurons. The NK cells reduced inflammation around the cancer cells, which slowed down caner cell growth and killed many of these cells.

"We are optimistic that this research can be applied to human medicine," said Sarkar. "Instead of transplanting cells, we will investigate whether we can increase BEP using a chemical approach."

Source: Rutgers University