

## Stress may help cancer cells resist treatment, research shows

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Scientists from Wake Forest University School of Medicine are the first to report that the stress hormone epinephrine causes changes in prostate and breast cancer cells that may make them resistant to cell death.

"These data imply that emotional stress may contribute to the development of cancer and may also reduce the effectiveness of cancer treatments," said George Kulik, D.V.M., Ph.D., an assistant professor of cancer biology and senior researcher on the project.

The study results are reported on-line in the *Journal of Biological Chemistry* and will appear in a future print issue.

Levels of epinephrine, which is produced by the adrenal glands, are sharply increased in response to stressful situations and can remain continuously elevated during persistent stress and depression, according to previous research. The goal of the current study was to determine whether there is a direct link between stress hormones and changes in cancer cells.

While a link between stress and cancer has been suggested, studies in large groups of people have been mixed.

"Population studies have had contradictory results," said Kulik. "We asked the question, 'If stress is linked to cancer, what is the cellular mechanism?' There had been no evidence that stress directly changes cancer cells."

Studying prostate and breast cancer cells in the laboratory, Kulik and colleagues found that a protein called BAD – which causes cell death – becomes inactive when cancer cells are exposed to epinephrine.

Kulik said that connection between stress and prostate cancer has been largely unexplored. However, recent studies suggest that these laboratory findings may apply to cancer patients.

"A study from Canada showed that men who took beta blockers for hypertension for at least four years had an 18 percent lower risk of prostate cancer," said Kulik. "These drugs block the effects of epinephrine, which could explain the finding. Another study of men after radical prostatectomy reported increased mood disturbances, which are often associated with elevated stress hormones. Although these studies do not directly address the role of stress hormones, they suggest that stress hormones may play an important role in prostate cancer."

Kulik said the findings have several implications for patients and for researchers.

"It may be important for patients who have increased responses to stress to learn to manage the effects," said Kulik. "And, the results point to the possibility of developing an intervention to block the effects of epinephrine."

Kulik is now studying blood samples of prostate cancer patients to determine if there is a link between levels of stress hormones and severity of disease and has begun studying the effects of epinephrine in mice with prostate cancer.

Source: Wake Forest University Baptist Medical Center

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