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Nobel winner Ciechanover makes breakthrough in cancer research

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New research from the Haifa laboratory of Nobel Prize winner Prof. Aaron Ciechanover has uncovered two proteins that suppress cancerous growths.

In the study, published last week in the journal Cell, Ciechanover and his colleagues at the Technion – Israel Institute of Technology show that cancerous tissues were considerably repressed after being treated with a high concentration of the proteins, which are normally linked to an inflammatory process in the body.

Ciechanover, a faculty member at the Technion medical school, won the Nobel Prize in Chemistry in 2004 together with Avram Hershko, also of the Technion, and American biologist Irwin Rose, for their discovery of the ubiquitin process – a cellular system responsible for breaking down damaged proteins liable to harm cells or tissues.

This new study was led by research fellow Dr. Yelena Kravtsova-Ivantsiv, with the participation of research fellows and physicians from Rambam, Carmel and Hadassah medical centers.

The study focused on two proteins. The first is p50, which is produced in many body cells and is recognized as a factor that encourages inflammation – and which has been proven to be a factor in numerous cancer studies. p50 is produced by another protein called NFB, which was discovered nearly 30 years ago and has been linked in numerous studies to the development of malignancies in the prostate, breast, lungs, head and neck, colon, brain, and more. The second protein is called KPC1, and it, too, is involved in the production of p50.

What this new study has revealed for the first time is that, in high concentrations, p50 is capable of having the opposite effect – of suppressing cancerous cells.

"The p50 protein is quite reminiscent of Dr. Jekyll and Mr. Hyde," Ciechanover told Haaretz. "In certain situations, it can disguise itself and change its assignment. Until now, we knew it as a protein that hooks up with another protein called p65, which balances it. Together, these two proteins encourage cancer. But in this study, we found that when there is an over-expression of the protein p50, it has nothing to hook up to, and it thus hooks up to itself. As a result, it essentially 'changes its spots' and suppresses cancerous growths. It does this by producing other proteins that are known cancer suppressors. This is a very interesting phenomenon that requires more follow-up studies."

Three groups of mice were injected, with each injected with different samples of human brain cancer cells: one group got cancer cells to which KPC1 had been added; one cells to which a high concentration of p50 had been added; and the third got cells that were untreated.

Within weeks, the mice that got the untreated cells had large tumors; the group with the KPC1 treated cells had substantially smaller tumors; while the third group, which had gotten the cells treated with a high concentration of p50, developed tiny tumors. From this, the researchers conclude that increasing the presence of p50 in tissues is liable to protect them from tumors.

"We've also found that this is true for malignancies in the digestive system and bone tumors," added Ciechanover. He warned that the research is still at its preliminary stage and must continue for several more years before drugs could potentially be produced based on the discovery.

Ciechanover receiving his 2004 Nobel Prize for Chemistry from Swedish King Carl Gustaf. *Reuters*