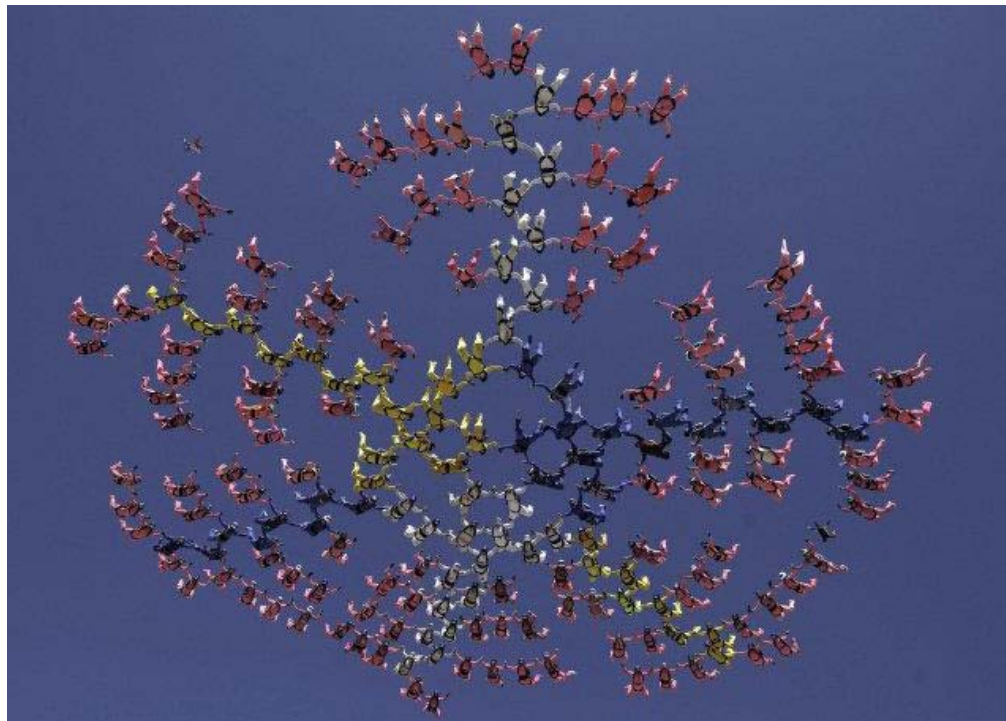


## Health » Medicine & Research

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### Protein made by breast cancer gene 'purified'

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AP In this file photo released by "Jump For The Cause," 181 female skydivers from 31 countries joined together to set a new women's formation skydiving world record in Perris, California and raised more than \$900,000 for the fight against breast cancer.

Scientists have purified, for the first time, the protein produced by the breast cancer susceptibility gene BRCA2 and used it to study the oncogene's role in DNA repair.

A team at the University of California, which has published its findings in the 'Nature' journal, claims that the work may pave the way for treating breast cancer someday.

"BRCA2 is known to be involved in repairing damaged DNA, but exactly how it works with other molecules to repair DNA has been unclear. Having purified protein makes possible far more detailed studies of how it works," lead scientist Prof. Stephen Kowalczykowski said.

While Kowalczykowski's group has purified the protein from human cells, another group led by Professor Wolf-Dietrich Heyer used genetic engineering techniques to produce the human protein in yeast.

The two approaches are complementary, Heyer said, and the two teams have been talking and cooperating throughout. "It's nice to be able to compare the two and see no disagreements between the results," he said.

Experiments with the BRCA2 protein confirm that it plays a role in repairing damaged DNA. It acts as a mediator, helping another protein, RAD51, to associate with a single strand of DNA and stimulating its activity. One BRCA2 molecule can bind up to six molecules of RAD51, say the scientists.

The RAD51/DNA complex then looks for the matching strand of DNA from the other chromosome to make an exact repair. If the BRCA2/RAD51 DNA repair system is not working, the cell resorts to other, more error-prone methods.

"It's at the apex of the regulatory scheme of DNA repair. Your DNA is constantly suffering damage, even if you avoid exposure to carcinogens. If that damage is not repaired, errors start to accumulate. Those errors can eventually lead to cancer," Kowalczykowski said.

The BRCA2 gene was discovered in 1994. But purifying the protein made by the gene has proved difficult. "It's very large, it does not express well, and it degrades easily," said Kowalczykowski.

The team succeeded in introducing a BRCA2 gene into a human cell line and producing it as a whole protein. They also tested the purified protein for its function in repairing damaged DNA.

One application of the purified protein would be to make antibodies to BRCA2 that could be used in test kits as a supplement to existing genetic tests, Kowalczykowski said. The BRCA2 protein can also be used to study how different mutations affect the gene's function.

"We're just starting to scratch the surface and understand more of the mechanisms and interaction with other factors," Kowalczykowski said.

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