

# Carbohydrate acts as tumor suppressor

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Scientists at Burnham Institute for Medical Research (Burnham) have discovered that specialized complex sugar molecules (glycans) that anchor cells into place act as tumor suppressors in breast and prostate cancers. These glycans play a critical role in cell adhesion in normal cells, and their decrease or loss leads to increased cell migration by invasive cancer cells and metastasis. An increase in expression of the enzyme that produces these glycans,  $\beta$ 3GnT1, resulted in a significant reduction in tumor activity.

The research was published in the journal *Proceedings of the National Academy of Sciences*.

The specialized glycans are capable of binding to laminin and are attached to the  $\alpha$ -DG cell surface protein. This binding facilitates adhesion between epithelial and basement membrane cells and prevents cells from migrating. The team of scientists, led by Professor Minoru Fukuda, Ph.D., demonstrated that  $\beta$ 3GnT1 controls the synthesis of laminin-binding glycans in concert with the genes LARGE/LARGE2. Down-regulation of  $\beta$ 3GnT1 reduces the number of glycans, leading to greater movement by [invasive cancer](#) cells. However, when the researchers forced aggressive cancer cells to express  $\beta$ 3GnT1, the laminin-binding glycans were restored and tumor formation decreased.

"These results indicate that certain carbohydrates on normal cells and enzymes that synthesize those glycans, such as  $\beta$ 3GnT1, function as tumor suppressors," said Dr. Fukuda." Upregulation of  $\beta$ 3GnT1 may become a novel way to treat cancer."

Using antibodies, the team investigated the expression of both  $\alpha$ -DG and its associated glycans in both normal and cancerous cells. They found that the quantity of  $\alpha$ -DG was similar in both cell types, but the level of attached glycans was reduced in the cancer cells. Further study showed that prostate [cancer cells](#) that highly expressed the  $\alpha$ -DG glycans produced smaller tumors. The team also found that when they knocked down  $\beta$ 3GnT1 expression by RNA interference, which reduces protein expression, the amount of glycans decreased even when LARGE was overexpressed.

The scientists demonstrated that  $\beta$ 3GnT1 plays a key role in forming laminin-binding glycans attached to  $\alpha$ -DG, which in turn reduces cancer cell movement. The study provides a new understanding of the role that complex carbohydrates play in cancer and could lead to new directions in the development of therapeutics.

Source: Burnham Institute ([news](#) : [web](#))

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