

Scientists find important piece in the brain tumour puzzle

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Scientists at the Montreal Neurological Institute and Hospital, McGill University and McGill University Health Centre have shown that a member of the protein family known as SUMO (small ubiquitin-like modifier) is a key to why tumour cells multiply uncontrollably, especially in the case of glioblastoma. The SUMO family proteins

modify other proteins and the SUMOylation of proteins are critical for many cellular processes. Identifying SUMO's role in the cancer cell growth will lead to a new strategy for glioblastoma treatment.

Glioblastoma is the most common and lethal brain cancer. Current standard treatments include surgical resection, adjuvant chemotherapy and radiotherapy. Despite the treatments, patients' survive about a year and half. The cancer continues growing in part due to the presence of the cancer stem cells. It is critical to understand cancer growing pathways in the stem cells for development of stem cells targeted therapies.

The molecular mechanisms that control cancer growth through cell cycle progression, involve a whole host of proteins and many aspects of this complex process are still unknown. One group of proteins termed cyclin-dependent kinases (CDKs) drive the cell cycle; yet, it is unclear why the cancer cells maintain a large amount of CDK proteins.

"In investigation of the cell cycle of human glioblastoma, we uncovered that CDK6 is modified by SUMO1. CDK6 sumoylation inhibits its degradation and thus stabilizes CDK6 [protein](#) in the cancer," says Dr. Anita Bellail, a researcher at the Montreal Neurological Institute and Hospital, McGill University and McGill University Health Centre, and lead author on the paper published in *Nature Communications*. Co-authors on the paper include Jeffrey J. Olson of the Department of Neurosurgery at Emory University and Chunhai "Charlie" Hao, Department of Pathology, Montreal Neurological Institute and Hospital at McGill University and McGill University Health Centre.

"We found that CDK6 sumoylation is required for the renewal and growth of the [cancer stem cells](#) in glioblastoma. Inhibition of SUMO1 eliminates the stem cells and suppresses the cancer progression."

Their finding adds concrete evidence to recent studies examining

sumoylation pathways in human cancer development and progression. With the new understanding of how SUMO affects the [cell cycle](#) in [cancer stem cells](#), this group of scientists are currently screening for SUMO1 targeted new drugs for the treatments of human glioblastoma.

More information: "SUMO1 modification stabilizes CDK6 protein and drives the cell cycle and glioblastoma progression." Anita C. Bellail, et al. *Nature Communications* 5, Article number: 4234 [DOI: 10.1038/ncomms5234](#). Received 01 February 2014 Accepted 27 May 2014 Published 23 June 2014

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