β1,3-N-Acetylglucosaminyltransferase-3 expression suppresses neuroblastoma cell migration and invasion and correlates with favorable outcomes of patients with neuroblastoma

Wan-Ling Ho¹,²,³,⁶, Mei-Ieng Che⁷, Chih-Hsing Chou⁷, Hsiu-Hao Chang³, Yung-Ming Jeng⁴, Wen-Ming Hsu⁵,⁸,* (許文明), Kai-Hsin Lin³,* (黃敏銓), Min-Chuan Huang⁷,⁸,*

¹Department of Pediatrics, Shin Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan; ²School of Medicine, Fu Jen Catholic University, New Taipei City, Taiwan; Departments of ³Pediatrics, ⁴Pathology, and ⁵Surgery, National Taiwan University Hospital and College of Medicine, National Taiwan University, Taipei, Taiwan; ⁶Graduate Institute of Clinical Medicine and ⁷Graduate Institute of Anatomy and Cell Biology, College of Medicine, National Taiwan University, Taipei, Taiwan; ⁸Research Center for Developmental Biology and Regenerative Medicine, National Taiwan University, Taipei, Taiwan

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Abstract

Aberrant expression of the simple mucin-type carbohydrate antigens such as T, Tn, and sialyl-Tn antigens is associated with poor prognosis in several cancers. β1,3-N-acetylglucosaminyltransferase-3 (B3GNT3), a member of the β3GlcNAcT family, is responsible for forming extended core 1 (T antigen) oligosaccharides. B3GNT3 was initially identified from SK-N-MC neuroblastoma (NB) cells, however, the role of B3GNT3 in cell behaviors and clinical significance of NB remains unclear. Here we showed that increased B3GNT3 expression evaluated by immunohistochemistry in NB tumor tissues correlated well with the histological grade of differentiation as well as a favorable Shimada’s subset of pathology. Univariate and multivariate analyses revealed that positive B3GNT3 expression in tumor tissues predicted a favorable prognosis in NB patients independent of other prognostic markers. Re-expression of B3GNT3 suppressed colony formation, migration, invasion, and T antigen expression in SK-N-SH cells. Moreover, B3GNT3 expression decreased phosphorylation of focal adhesion kinase, Src, paxillin, Akt, and ERK1/2. We conclude that B3GNT3 predicts a favorable cancer behavior of NB and suppresses malignant phenotypes by modulating mucin-type O-glycosylation and signaling in NB cells.