Glycobiology Laboratory

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Carbohydrates from mammalian cells play several functional roles in cell adhesion and recognition, cell development, glycoprotein folding among others. The fucosylated carbohydrate structure Lewis X (Le X,
Galbeta4[Fucalpha3]GlcNAc) is abundant in the brain. Le X expression in neurons is temporally and spacially regulated and it seems to be involved in neuron adhesion and neurite outgrowth, however, the molecules that participate in the process have not been identified and the mechanisms underlying these roles have not been elucidated. In the central nervous system, Le X expression also identifies stem cells and specific progenitor cells. In brain, Le X is synthesized by fucosyltransferase
9 (FUT9). This is an alpha3 fucosyltransferase expressed at higher levels in brain tissue. The knock-out mouse FUT9-/- showed disappearance of Le X in the brain, concomitant with behavior alterations.
Previous work from the laboratory has identified the expression of Le X specifically in differentiated human NT2N neurons in vitro most likely synthesized by FUT9. A specific neuron glycoprotein or proteoglycan Le X-carrier of 460 kDa was also identified. Furthermore, incubation with antibody anti-Le X led to the inhibition of neurite outgrowth and impairment of neuron adhesion. Le X was found in the exocytotic compartment defined by the tetanus neurotoxin-insensitive vesicle-associated membrane protein (TI-VAMP), which is involved in neurite outgrowth, of NT2N neurons and also of rat hippocampus neurons in culture.
Our aim is to characterize molecules that are associated with the Le X motif and to identify the corresponding lectin receptors, and, therefore, to elucidate mechanisms that underlie the functional role of Le X in neurite outgrowth and neuron adhesion. The results might have impact in the improvement of brain plasticity and brain repair.

http://www.itqb.unl.pt/research/biology/glycobiology