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Differences in the Glycocalyx of 5637 and SV-HUC-1 Cells and their Impact on Lectin Targeting

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Background: Bladder cancer is one of the most common malignancies. Advances have been made in diagnosis, therapy, and surveillance resulting in increasing survival rates of patients, but the search for more effective therapies is imperative to be continued. Among others, lectin-mediated targeting might be a promising concept. Thus, the potential of fluorescein-labeled plant lectins was investigated using 5637 cells as a model for human urinary carcinoma [1] and SV-HUC-1 cells as a model for non-tumorigenic human uroepithelial cells.

Results and Discussion: As illustrated in Fig. 1, for all applied lectins the binding capacities of 5637 cells were significantly higher as compared to non-tumorigenic SV-HUC-1 cells proving the feasibility of the lectin concept for bladder cancer cells. Highest interaction with 5637 cells was observed for WGA. Thus, WGA was used for cytoinvasion studies following a pulse-chase concept at 4°C and 37°C. Decreased fluorescence intensities at 37°C pointed to internalisation of the lectin via energy-consuming transport processes and accumulation within acidic compartments of the cell resulting in pH-dependent fluorescence quenching. Intracellular localization was confirmed by addition of monensin which compensates the pH-gradient between acidic compartments and the cytoplasma leading to a full restoration of the fluorescence intensity.

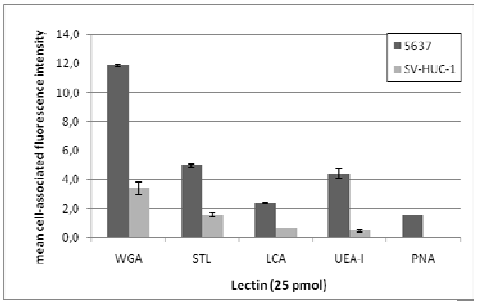

Fig. 1. Comparison of the lectin-binding capacities of 5637 (malignant) cells and SV-HUC-1 (healthy) cells

Conclusion: According to these findings, WGA which is not only cytoadhesive but also cytoinvasive might be a promising candidate for the development of targeted drug delivery systems for bladder cancer therapy leading to reduced toxicity, prolonged exposition, and improved efficacy.

[1] Plattner VE, Wagner M, Ratzinger G, Gabor F, Wirth M. Targeted drug delivery: Binding and uptake of plant lectins using human 5637 bladder cancer cells. Eur J Pharm Biopharm. 2008; 70: 572–576. doi:10.1016/j.ejpb.2008.06.004