Glycoprotein Mucin Molecular Brush on Cancer Cells and its Correlation with Resistance Against Drug Delivery

XIN WANG, AALOK SHAH, ROBERT CAMPBELL, KAI-TAK WAN, Northeastern University — Uptake of cytotoxic drugs by typical tumor cells is limited by the dense dendritic network of oligosaccharide mucin chains that forms a mechanical barrier. Atomic force microscopy is used to directly measure the force needed to pierce the mucin layer to reach the cell surface. Measurements are analyzed by deGennes’ steric reputation theory. Multi-drug resistant ovarian tumor cells shows significantly larger penetration load compared to the wide type. A pool of pancreatic, lung, colorectal, and breast cells are also characterized. The chemotherapeutic agent, benzyl-α-GalNac, for inhibiting glycosylation is shown to be effective in reducing the mechanical barrier.