Glycan Detection with Electrolyte-Gated Transistors for Cancer Diagnostics

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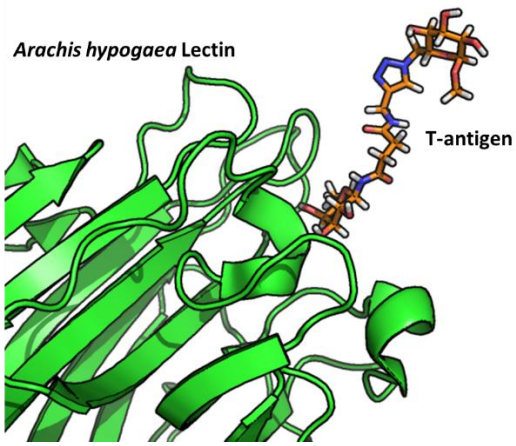
Aberrant protein glycosylation is a hallmark of cancer and represents a promising source of biomarkers for early diagnosis and disease monitoring.[1] However, conventional glycan-analysis methods often require complex instrumentation, labelling procedures, and lengthy sample preparation. Electrolyte-gated organic transistors (EGOTs) offer an attractive alternative because of their low operating voltage, high sensitivity, label-free readout, and compatibility with miniaturized point-of-care devices.[2]

Here, we present an EGOT-based platform for detecting glycoproteins carrying the T-antigen, a cancer-associated glycan motif.[3] The EGOT gate electrode was functionalized with a lectin using a controlled surface-immobilization strategy. Lectins are carbohydrate-binding proteins that provide a cost-effective recognition strategy for glycan sensing.[4] Surface plasmon resonance (SPR) was used to characterize the functionalization process, assess lectin immobilization, and investigate interactions between the functionalized surface and target glycoproteins.

SPR measurements showed that the functionalized electrode rapidly captured the target glycoprotein in solution and formed a stable complex with a slow dissociation rate, consistent with multivalent binding. The functionalized gate electrodes were subsequently integrated into EGOT devices and evaluated for sensing glycoproteins carrying the T-antigen, in aqueous media. These results demonstrate the feasibility of combining lectin-based molecular recognition with EGOT signal transduction for label-free glycan sensing. This approach may support the development of biosensing platforms for detecting disease-associated glycosylation patterns in clinically relevant samples.



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