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This study reports a kinetic study of the tumor-associated galactopyranosyl-(1→3)-2-acetamido-2-deoxy-α-D-galactopyranoside (T-antigen) with lectin peanut agglutinin is described. The disaccharide antigen was synthesized by chemical methods and was functionalized suitably for immobilization onto a carboxymethylated sensor chip. The ligand immobilized surface was allowed interaction with the lectin peanut agglutinin, which acted as the analyte and the interaction was studied by the surface plasmon resonance method. The ligand-lectin interaction was characterized by the kinetic on-off rates and a bivalent analyte binding model was found to describe the observed kinetic constants. It was identified that the antigen–lectin interaction had a faster association rate constant and a slower dissociation rate constant in the initial binding step. The subsequent binding step showed much reduced kinetic rates. The antigen–lectin interaction was compared with the kinetic rates of the interaction of a galactopyranosyl-(1→4)-β-D-galactopyranoside derivative and a mannopyranoside derivative with the lectin.