

Homogeneous Immunosensor for Glycated Hemoglobin (HbA1c) Detection Based on Luminescence Resonance Energy Transfer Using the Upconversion Nanoparticles

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(mkim@gist.ac.kr*)

In this study, we report a immunosensor for homogeneous glycated hemoglobin (HbA1c) detection based on luminescence resonance energy transfer (LRET) using the upconverting nanoparticles (UCNPs). The LRET platform has been designed for the detection of HbA1c by using UCNPs as the donor and HbA1c as the acceptor. The HbA1c used in target molecules of the platform showed absorption at 540 nm, which overlaps well with the emission of UCNPs. When HbA1c was added, the LRET occurred between a donor and acceptor under the laser irradiation with a wavelength of 980 nm. In the presence of HbA1c, the distance between UCNPs (donor) and HbA1c (acceptor) get closer to transfer energy. Consequently, the luminescence quenching of UCNPs is induced. In our optimized system, results showed the LRET-based immunosensor enabled specific HbA1c detection, and HbA1c can be detected sensitively in a homogeneous manner. This proposed method was also successfully applied to HbA1c detection in blood samples.