Highly Sensitive Quantitative Profiling of Cancer Cells via Protein-QD Hybrid Nanoprobes for Signal Amplification

이종욱, 황민태, 김유찬, 석현광, 이관희*
KIST
(kwanhyi@kist.re.kr*)

Pancreatic cancer is the 4th leading cause of cancer death in the United States, primarily due to the fact that most tumors are metastatic at the time of diagnosis. Therefore, early detection of pancreatic cancer is important to improve the patient survival rate. The appearance of molecular abnormalities during the transition from Pancreatic Intraepithelial Neoplasia to metastatic pancreatic cancer is a promising avenue for early detection. The amount of such biomarkers, however, is often too low to detect.

In this study, we used a bacterial expression system to synthesize multifunctional nanostructures, which consist of 24 self-assembled human ferritin heavy chain subunits and a linker peptide (protein G). The nanostructures are spherical in nature and are surface-labeled with protein G. Additionally, lipid-coated quantum dots and an anti-pancreatic cancer cell antibody were chemically conjugated to protein G on the nanoparticles at a ratio of three to one. Consequently, we were able to obtain an amplified signal, which could be used in the early detection of pancreatic cancer biomarkers.