Detection of Cancer Specific EML4-ALK Fusion Gene Based on Fluorescence Resonance Energy Transfer

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One critical area of activity is the development of robust and accurate diagnostics for the routine identification of ALK translocations in lung adenocarcinoma. However, the diagnosis of oncogenic EML4-ALK fusion gene is challenging due to a large number of different EML4-ALK variant. In this study, we have developed a detection method for two different variants of EML4-ALK fusion gene based on fluorescence resonance energy transfer (FRET) between quantum dots and gold nanoparticles. To fabricate this sensor, CdSe/ZnS quantum dots and gold nanoparticles were functionalized using four different types of probe oligonucleotides were designed to be a perfect match to EML4-ALK fusion gene. Addition of complementary target DNAs into the suspensions of quantum dots-DNA conjugates and AuNPs-DNA conjugates, fluorescence quenching of quantum dots occurred due to energy transfer from quantum dots to gold nanoparticles. This method could be successfully used to detect two different variants of EML4-ALK fusion gene. This provides a new detection principle for fusion genes using the nanoparticles.