S9-4

High-throughput screening of serum proteins using a novel aptamer-based biochip

Sung Chun Kim

GenoProt. Inc., Seoul 152-841. Korea.

The specificity and affinity of aptamers for their cognate ligands are comparable to those of antibodies for antigens. To use aptamers effectively in high-throughput assays in a microarray format, to analyze various analytes, we developed a strategy in which the aptamer was split into two DNA phase and allowed to reassemble into the functional aptamer by the cognate ligand. We have named this method "aptamer-based biochip assay". As proof-of-principle, we used the microarray containing oligonucleotides derived from the aptamer library against proteins pool. We applied special aptamer probes, which has the capacity to recognize proteins pools with high affinity and specificity. In the DNA phase, target-aptamer complexes are amplified by PCR and are hybridized with microarray. We focused particularly on cardiovascular disease to determine whether protein profiling could subdivide this clinically heterogeneous diagnostic category into molecularly distinct disease. We constructed a microarray containing oligonucleotides derived from the aptamer library against serum. Using 3 K biochips, we analyzed and compared proteins profiles in 98 cardiovascular patients, 40 with normal healthly control. Our biochip analysis of both serums identified the molecular events associated with her clinical category. Our results suggest that the aptamer-based biochip is a protein analysis algorithm that provides detailed analysis of phenotypes related to organism health. The biochip assay is extremely sensitive, since it is based on PCR amplification. This method can detect as few as several hundred molecules of target protein. Thus, these results suggest that aptamer-based biochip assay has the potential for use in nucleic acid microarrays for detecting various ligands.