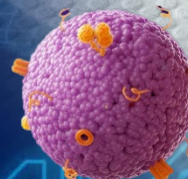


제 135회 ORGAN ON A CHIP 기술교류회

2026. 10. 8 **목** 오후 4시 30분
한림대학교 자연과학관 7103호



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엑소좀을 이용한 면역항암치료제 반응 예측 기술 개발

Exosomes as Predictive Biomarkers for ICI Therapy: From Nanoscale Engineering to Clinical Application

Immune checkpoint inhibitors (ICIs) have transformed lung cancer treatment, but reliable biomarkers for predicting therapeutic response remain limited. Tissue PD-L1 immunohistochemistry is affected by spatial heterogeneity, requires invasive biopsy, and provides limited information on temporal changes in the tumor-immune microenvironment. Circulating PD-L1-positive exosomes may provide a minimally invasive alternative; however, their low abundance and the limited sensitivity of conventional assays impede clinical application. Here, we developed an integrated detection platform that combines avidity-enhanced molecular recognition with ultrasensitive optical biosensing. Generation-7 poly(amidoamine) dendrimers presenting multiple PD-L1-binding peptides were used to construct a multivalent capture interface, thereby enhancing the avidity and capture efficiency of PD-L1-positive exosomes compared with conventional antibody-based surfaces. In serum samples from patients with lung cancer, PD-L1-positive exosome levels were associated with ICI response and showed a stronger relationship with clinical outcomes than tissue PD-L1 scores. For label-free quantification, the multivalent capture interface was integrated with a reflection-mode solution-immersed silicon ellipsometric biosensor. Optical interrogation under an optimized p-polarized condition enabled sensitive measurement of nanoscale interfacial changes induced by intact vesicle binding and distinguished ICI responders from non-responders. These findings establish a complementary strategy for improving the analytical performance of exosome-based liquid biopsy and support circulating PD-L1-positive exosomes as biomarkers for guiding precision immunotherapy.

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