세미나 초록

성명	부지윤
소속	인하대학교 생명공학과
발표 주제	Exosomes as a Biomarker for Cancer Immunotherapy: From Nanoscale Fabrication to Clinical Analysis
발표 내용	Exosomal programmed death-ligand 1 (PD-L1) has emerged as a promising marker for predicting immune checkpoint inhibitor responses, yet existing detection methods lack the sensitivity required for clinical application. To overcome these limitations, we developed a dendrimer–peptide conjugate (G7-pPDL1) that exploits multivalent binding interactions to achieve markedly enhanced capture of PD-L1–expressing exosomes. Molecular modeling and binding analyses confirmed that conjugating the PD-L1–binding peptide pPDL1g onto generation 7 poly(amidoamine) dendrimers significantly increased binding avidity compared with free peptides or monoclonal antibodies. Atomic force microscopy and bio-layer interferometry demonstrated stronger and more stable interactions at the nanoscale, which translated into superior capture efficiency of PD-L1^{+}exosomes in complex biological fluids. Clinical validation using serum from cancer patients revealed that exosomes enriched on G7-pPDL1 surfaces correlated with response to ICI therapy and outperformed tissue-based PD-L1 immunohistochemistry in predicting patient outcomes. Furthermore, integration of the G7-pPDL1 interface with a solution-immersed silicon (SIS) sensor enabled highly sensitive and label-free optical detection of captured exosomes, demonstrating the potential for seamless translation into a clinically actionable liquid biopsy platform. Collectively, these results establish G7-pPDL1 as a versatile nanoscale tool for enhancing exosome capture and advancing precision immuno-oncology.