세미나 초록

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발표 주제	Lymphatic delivery of a natural pleiotropic immune modulator for enhanced cancer immunotherapy
발표 내용	Cancer immunotherapy has demonstrated significant potential as a cancer treatment by enhancing the immune system's ability to recognize and eliminate cancer cells. However, its efficacy can be limited by factors such as tumor heterogeneity, immunosuppressive tumor microenvironments, and systemic toxicities. Recent advances in drug delivery systems have facilitated the development of more targeted and personalized cancer therapies. Microneedles have emerged as a promising platform for non-invasive and highly localized drug delivery, directly administering drugs, vaccines, and other therapeutic agents to the skin. In this study, we designed dissolving microneedles (dMN) based on a biocompatible amphiphilic tri-block copolymer, which enables the self-assembly of nano-micelles containing hydrophobic drugs when applied to the skin. We used the dMN technology to formulate SKKU-06, a hydrophobic natural immune modulator toxin derived from fungi, which exhibits anti-cancer and immunomodulatory properties in melanoma (SSKU-06@dMN). After intratumoral application of SSKU-06@dMN to skin tumors, the drug-loaded nano-micelles can migrate to tumor-draining lymph nodes (TDLN). The dMN-guided delivery of SKKU-06 to skin tumors and TDLN induced immunogenic cell death and stimulated the activation and maturation of antigen-presenting cells (APCs), promoting the development of humoral and cellular anti-tumor immunity. Furthermore, the immunomodulatory effects of SSKU-06@dMN were enhanced when combined with anti-PD-1 treatment, impacting the tumor microenvironment through increased intratumoral CD8+ T cell infiltration and reduced Treg populations. This resulted in efficient growth inhibition of established skin cancer and metastatic cancer, as well as prolonged survival. The dMN-guided lymphatic delivery of SKKU-06 demonstrates potential for treating metastatic solid tumors and improving cancer immunotherapy efficacy by modulating the tumor microenvironment.