Enhanced cancer vaccine via direct delivery of nanovaccines to host dendritic cells recruited in injectable scaffolds

Nguyen Thanh Loc[1], 김재윤[1,2,†]
[1]성균관대학교 화학공학과; [2]성균관대학교 삼성융합의과학원
(kimjaeyun@skku.edu[†])

Despite the potential of nanovaccines, their therapeutic efficacy is limited due to ineffective delivery of the vaccines to the antigen-presenting cells (e.g., dendritic cells) to elicit adaptive immune responses. In order to overcome the current limitations, we introduce the injectable three-dimensional scaffolds constructing from mesoporous silica microrods (MSRs). The sustained release of dendritic cells (DCs)-attracting chemokine loaded in MSRs results in the recruitment of numerous host DCs into the scaffolds. The combination the nanovaccines or DNA complexes along with immune adjuvants in the MSR scaffolds leads to the internalization of the nanovaccines or DNA complexes to the recruited DCs. Consequently, the injection of the MSRs-based vaccines trigger a large number of antigen-specific activated DCs in the draining lymph nodes, which significantly prime antigen-specific T cells against tumor. Therefore, the MSRs-based vaccines suppress melanoma growth to a greater extent compared to the nanovaccine only or the soluble DNA vaccine only in animal studies. Our findings demonstrate that MSR is a versatile platform for delivering nanovaccines for enhanced cancer immunotherapy.