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Non-genetic engineering of cells for drug delivery and cell-based therapy

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Abstract: Cell-based therapy is a promising modality to address many unmet medical needs. In addition to genetic engineering, material-based, biochemical, and physical science-based approaches have emerged as novel approaches to modify cells. Non-genetic engineering of cells has been applied in delivering therapeutics to tissues, homing of cells to the bone marrow or inflammatory tissues, cancer imaging, immunotherapy, and remotely controlling cellular functions. This new strategy has unique advantages in disease therapy and is complementary to existing gene-based cell engineering approaches. A better understanding of cellular systems and different engineering methods will allow us to better exploit engineered cells in biomedicine. Here, we review non-genetic cell engineering techniques and applications of engineered cells, discuss the pros and cons of different methods, and provide our perspectives on future research directions.

Key Words: Cell Engineering, Therapeutic Delivery, Immunotherapy, Cancer, Nanoparticle

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