Needle-like Nanostructures to Deliver Multi-scale Biomolecules to Non-activated Immune Cells

Current methods for gene delivery may result in limited viability and efficacy

Current gene delivery struggles to target primary naïve T and B cells efficiently while maintaining their naïve state, limiting therapeutic efficacy. Existing methods fail to deliver genetic material without cell pre-activation or manipulate multiple miRNAs within the same cell, resulting in reduced viability and efficacy, leading to T cell exhaustion.

This innovation enables efficient delivery of multiple genetic materials to naïve immune cells, preserving their naïve state. It enhances cell viability and modulation post-delivery, inducing specific changes for optimized immune responses, offering superior protection against intracellular pathogens.

New nanowire platform increase efficacy to improve treatment

This technology utilizes a functionalized nanowire platform to deliver multiple genetic materials, including CRISPR and microRNAs, directly to naïve T and B cells without pre-activation, retaining their naïve state. This approach allows precise control over the immune cells' programming to increase their efficacy in adoptive cell therapy, offering a significant leap forward in treating various maladies through immune system modulation.

Summary Bullets

- This functionalized nanowire platform delivers multiple genetic materials to naïve T and B cells without pre-activation, enhancing their efficacy in adoptive cell therapy.
- The prototype improves gene delivery efficiency while preserving the naïve state of immune cells, increasing cell viability and immune response modulation.
- It offers superior protection against intracellular pathogens and serves as a research tool for immune cell manipulation across various species, ages, and subtypes.

Solution Advantages

- Efficient gene delivery to naïve immune cells.
- Induced specific changes in treated cells
- Preserve immune cells' naïve state.
- Enhance protection against intracellular pathogens
- Improve cell viability post-delivery

Potential Commercial Applications

- Adoptive T cell therapy
- Research tool for immune cell manipulation across species, ages, and subtypes.
- Enhanced immune protection strategies against intracellular pathogens

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IP Status

The patent application has filed :

Publications

Functionalized nanowires for miRNA-mediated therapeutic programming of naïve T cells, Nature Nanotechnology - 2024

Images

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