

Lymphatic System-Specific Lipid Nanoparticles

Need for lymphatic system targeted delivery

There is increasing evidence demonstrating the role of the lymphatic system in human conditions ranging from obesity and cardiovascular diseases to cancer and neurological disorders. In addition to its roles in diseases, the lymphatic system has the potential to be exploited for its properties of cargo transport, providing a promising avenue for new, more efficient therapies. Advances in targeted therapy have shown promise for using the lymphatic system in treating diseases that conventional therapies have been unable to resolve.

Lymphatic system-specific lipid nanoparticles

Innovators at Georgia Tech have developed a lipid nanoparticle that targets lymphatic endothelial cells within vessels and nodes and dendritic cells within lymph nodes with high specificity. This nanoparticle has breakthrough applications in molecule delivery in lymphatic endothelial cells and dendritic cells within the lymphatic system, including both vessel networks and the lymph nodes they drain into. Data shows these nanoparticles can efficiently deliver functional mRNA cargo into the target cells of the lymphatic system which can have applications for therapeutic and vaccine delivery. Additionally, by targeting specific cells within the draining lymph nodes, this nanoparticle has breakthrough applications in treating immune-related diseases locoregionally with mRNA (or siRNA) therapy.

Summary Bullets

- This platform technology improves current targeting to lymphatic tissues and specifically lymphatic endothelial cells.
- Provides superior tissue targeting and functional delivery of mRNA to lymphatics via loco-regional dermal or subcutaneous avenues.
- mRNA-based platforms offer a transient and less immunogenic method of delivery compared to protein therapeutics or adeno-associated virus-based platforms.

Solution Advantages

- **More stable:** Provides longer half-lives in vivo and has decreased toxicity.

- **Better targeting:** Provides superior tissue targeting and functional delivery of mRNA to lymphatics through loco-regional dermal or subcutaneous avenues.
- **Less immunogenic:** mRNA-based platforms offer a transient and less immunogenic method of delivery compared to protein therapeutics or adeno-associated virus-based platforms.
- **Multi-application:** The nanoparticle targets dendritic cells within the draining lymph node as well as it targets lymphatic endothelial cells, enabling it to be used in multiple therapeutic applications.

Potential Commercial Applications

- Lymph-specific targeted mRNA vaccine platforms to promote adaptive immunity.
- Treating the lymphatic vasculature to promote lymphangiogenesis post-injury.
- Targeted delivery of functional molecules in the lymphatic system for therapeutic purposes.
- Targeting dendritic cells within draining lymph nodes for loco-regional immune therapy.

Inventors

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IP Status

<p>Patent application has been filed</p>: US63/380429

Publications

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Images

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