Lymph Node Targeted Nanoparticles
Technology #18243

Applications
This invention delivers small molecules to lymph nodes for improved immunotherapeutic treatments. It can also be used for better vaccine outcomes, lymphatic imaging, or to target cell types within the lymphatic system via antibody conjugation.

Problem Addressed
Amplification of a patient's immune system is a well-established treatment strategy to combat disease. A bolstered immune system is most effectively achieved by targeting lymph nodes as they are heavily populated with leukocytes. Furthermore, slight imperfections in immunotherapeutics can induce fatal conditions including: extreme local inflammation, systemic inflammation, or septic-shock. Targeted delivery to lymph nodes allows molecules to be used more efficiently and to be administered in lower doses, which can reduce the potential for adverse reactions. This invention is amphiphilic nanoparticles (amph-NPs) which can deliver drugs directly to lymph nodes to significantly enhance vaccine and immunotherapy outcomes.

Technology
Hydrophobic drugs in organic solvent are mixed with an aqueous suspension of amph-NPs and dialyzed to remove the organic solvent leading to partitioning of the drug into the hydrophobic pockets of the amph-NP ligand shell. This approach allows loading of a wide variety of drugs nearly insoluble in aqueous solutions - a highly desirable feature as many molecules currently being investigated as new pharmaceuticals, though potent, well-defined, and cost effective, are hydrophobic, and, therefore, rapidly cleared in vivo, thus requiring high and often toxic doses to achieve a desired effect. This technology dramatically reduces off-target delivery and toxicity and allows cargo to be utilized more effectively and at a lower dose, thereby potentially increasing the maximum allowable clinical dose for improved therapeutic efficiency. Furthermore, these NPs are less than 5nm, which allows for efficient clearance renally preventing long-term tissue accumulation.

The Inventors performed a single subcutaneous injection near the base of the tail in mice and found 10% of the total injection dose in the draining lymph node - a 12-fold increase in NP lymph node accumulation compared to control PEG-NPs.

Advantages
- Lymph node delivery allows lower doses decreasing potential off-target toxicity
- Hydrophobic cargo capability
- Excellent stability in post-synthesis storage
- Safe, potent, and versatile vector

Categories For This Invention:
Life Sciences
Biomaterials
Micro/nanoparticles (Biomaterials)
Biotechnology
Health
Clinical Applications
Immunology
Oncology
Imaging

**Intellectual Property:**

Lymph node targeted nanoparticles
PCT
2017-070676
Nanoparticles comprising a metal core surrounded by a monolayer for lymph node targeting
US Patent Pending
2018-0311174

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