Nanomedicine

Synthetic nanomedicines include popular drug delivery vehicles like liposomes, micelles and polymers. We use these systems to target conventional drug molecules, but more and more these vehicles prove useful for the delivery of biologics especially nucleic acids. Lipid nanoparticles (LNPs) are currently the most clinically advanced nonviral carriers for the delivery of therapeutic nucleic acids. Free nucleic acids suffer from unfavorable physicochemical characteristics and rapid clearance mechanisms, hampering the ability to reach the cytoplasm of target cells when administered intravenously. As a result, the therapeutic use of nucleic acids is crucially dependent on delivery strategies. LNPs can encapsulate nucleic acids to protect them from degradative endonucleases in the circulation, prevent kidney/liver clearance, and provide a vehicle to deliver them in the cell and induce its subsequent release into the cytoplasm. Currently, the development of rapid-mixing platforms for the reproducible and scalable manufacturing has facilitated entry of LNPs into the clinic. In addition we explore novel carrier materials for these therapeutic modalities.

Projects

- *mRNA delivery for cardiac regeneration*
- *mRNA delivery for immune therapy of cancer*
- *siRNA/lncRNA delivery to inhibit cancer signaling*
- *DNA delivery for T-cell modification (with Nanocell Therapeutics bv)*
- *Local hydrogel depots for controlled drug release (with SentryX bv)*

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