

Use of Sterically Stabilized Cationic Liposomes to Efficiently Deliver CpG Oligonucleotides *in vivo*

Immunostimulatory 5'—C—phosphate—G—3' (CpG) oligonucleotides (ODN) show promise as immune adjuvants, anti-allergens, and immunoprotective agents. Increasing the bioavailability and duration of action of CpG ODN can improve their therapeutic utility. With this goal in mind, FDA researchers encapsulated ODN in Sterically Stabilized Cationic Liposomes (SSCL) to provide protection from serum nucleases while facilitating uptake by B cells, dendritic cells, and macrophages. The SSCL comprise three distinct phospholipid elements, DC-CHOL (which increases liposome membrane stability while improving the uptake and encapsulation of DNA), DOPE (a pH-sensitive neutral lipid that improves the cytosolic delivery of CpG ODNs following internalization), and PEG-PE (which stabilizes the liposome and facilitates cellular uptake).

In a pathogen challenge model, sterically stabilized cationic liposome (SSCL) encapsulation doubled the duration of CpG ODN-induced immune protection. The inventors tested several SSCL-CpG compositions both *in vivo* and *in vitro*. The *in vitro* studies showed liposome-encapsulated CpG ODNs stimulated significantly more interferon-gamma (IFN-gamma) production than free CpG ODNs. The *in vivo* studies showed that SSCL encapsulation of CpG ODNs increased the magnitude and duration of the activity of the CpG ODNs. When mice administered CpG-SSCLs were infected with *L. monocytogenes* (listeria), the infected mice (~100%) survived four weeks post-treatment.

Potential Commercial Applications

- Immunotherapy and chemotherapy
- Vaccine adjuvant
- Anti-allergen

Competitive Advantage

- Liposome carrier (SSCL) can encapsulate CpG ODNs to improve therapeutic efficacy

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Publications:

Gursel I et al., "Sterically stabilized cationic liposomes improve the uptake and immunostimulatory activity of cpg oligonucleotides," *J. Immunol.* 2001 Sep 15;167(6):3324-8. PMID [11544321](https://pubmed.ncbi.nlm.nih.gov/11544321/)

Intellectual Property:

United States Patent No. [7,666,674](https://www.uspto.gov/patents/publications/7666674) issued 02.23.2010

Product Area: Immunotherapy, chemotherapy, vaccine, vaccine adjuvant, anti-allergen, kits containing SSCL-CpG ODN complex

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