LipoVax NTA(Ni) Vaccine Adjuvant

His-Tagged-based Protein or Peptide Carrier Vaccine Adjuvant

Product information

LipoVax NTA(Ni) is Ni^{2+}-based liposome adjuvant that can anchor diverse histidine-tagged proteins or peptides to an antigen-presenting carrier to trigger immune response (immunization, vaccination, antibody generation).

LipoVax NTA(Ni) is available in one quantity – 2mL; #LV02000 2x1mL.

Storage and stability

Shipping and storage: LipoVax is shipped at RT and stored at +4°C. LipoVax is stable for 6 months for unopened vials stored at 4°C. DO NOT FREEZE.

Description

LipoVax NTA(Ni) is a liposome-based adjuvant containing phospholipid, cholesterol and nickel-chelating lipid (60:39:1), showing high affinity to bond with electron-rich ligand such as histidine. Therefore, complexes can be generated using Ni-nitrilotriacetic acid (NTA) and his-tagged proteins or peptides. The resulting liposomes are **non-viral biologics delivery systems**, self-assembled from metal-chelating lipid and his-tagged immunogens such as envelope glycoproteins. Nickel-based liposome adjuvant is compatible with most immunization procedures: such as intramuscular, intraepidermal, intravenous, intraperitoneal or subcutaneous.

Method/protocol

Recommendations before starting:

The ligand or protein antigen should be free of extraneous microbial contamination.

1. Allow **LipoVax NTA(Ni)** adjuvant solution to reach room temperature before beginning.
2. We recommend to dilute antigen mixture in saline buffer or phosphate buffer for a final immunogen concentration of 10-100 µg/100 µL* and incubate 1h-2h at RT.
3. Mix LipoVax adjuvant with an equal volume of antigen solution for a 1:1 volume ratio.
4. For the removal of the non-conjugated ligand, we recommend to proceed by gel filtration or by dialysis. For the dialysis use 1L PBS; operate with MWCO below 1,000 kDa. Quantify the protein association with Protein Assay.
5. Inject into the animal according to the table below.

* For record, the total lipid concentration is 11.25 mM comprising 1 %mol of NTA(Ni) lipid. Only half is exposed to the liposome surface, which equals to 55 nM of conjugable lipid.

Note: Ratio can be optimized from 1:1 to 1:9 (100µL adjuvant per 900µL antigen). Do not store the complexes.

Volume (mL) for injection depends on the site of injection and the animal model. Typical routes of administration include intramuscular (IM), subcutaneous (SC), intradermal (ID) or intraperitoneal (IP).

Species	I.M.	S.C.	I.D.	I.P
Mice, hamsters	0.05-0.1	0.1-0.2	0.025	0.5
Guinea pigs, rats	0.1-0.2	0.2-0.4	0.025	1.0
Rabbits	0.25	0.25	0.025	10
Pigs	0.25-0.5	0.5	0.5	50

Table 1: Recommended volumes for injection of immunogen-adjuvant mixtures per site of injection for different animal species (Adapted from Leenars MPPA, Hendriksen CFM et al., 1999).

- **Envelope protein antigen nanocarrier**

A major step toward in vaccination field is an immunogen capable of eliciting neutralizing antibodies. Liposomal nanoparticles platform that presents well-ordered viral trimeric proteins (e.g. gp140 HIV-1) were superior to vehicle proteins for induction of antigen-specific antibody responses. It has been shown that such liposomes promote dendritic cells maturation and elicit long-lasting neutralizing antibodies responses. The antigen-conjugated liposomes are a promising initial lead for the development of new vaccines.

Results

Results presented below demonstrate the effect of LipoVax adjuvant on immune system response:

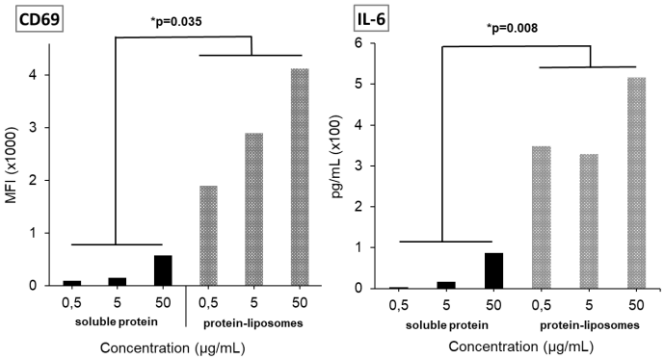

Figure 1. Activation of primary B cells by soluble protein and protein-conjugated liposomes. CD69 cell surface activator was analyzed by flow cytometry and IL-6 level secreted in B cells supernatant was measured by ELISA. Adapted from Wyatt R. T., *et al., Cell Reports*, 2016; 15(9): 1986-1999.

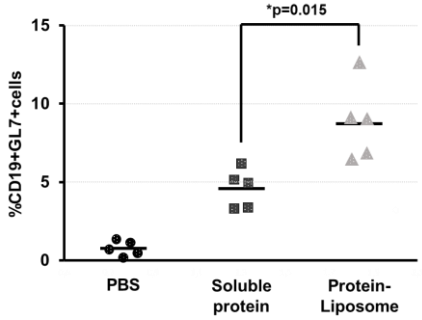

Figure 2. S.c. immunization of C57Bl/6 mice with protein-anchored liposomes induced enhanced germinal center formation. After 14 days, lympho node B cells were analyzed for the activation marker, GL7. The percentages of CD19+ GL7+ cells are enumerated. Adapted from Wyatt R. T., *et al., Cell Reports*, 2016; 15(9): 1986-1999.

References and background reading

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- Thalhauser, S., Peterhoff, D., Wagner, R., & Breunig, M. (**2020**). Critical design criteria for engineering a nanoparticulate HIV-1 vaccine. *Journal of Controlled Release*, *317*, 322-335.

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