Novochizol
First-in-class polysaccharide materials technology

BREAKTHROUGH VACCINE ADJUVANT-CARRIERS FOR BETTER IMMUNIZATIONS

First-in-class chitosan nanoparticles for systemic and mucosal sterilizing immunity

Chitosan, a derivative of chitin, is the second most abundant polysaccharide on earth. It has numerous applications in healthcare and other fields, but its inherent characteristics and imperfect chemical transformations limit its use.

Novochizol™ technology quantitatively transforms single linear chitosan molecules into uniformly sized nanoparticles that can be used alone, as excipients, emulsifiers or carriers of countless active ingredients.

Novochizol™ overcomes the limitations of chitosan, enhances its existing beneficial properties and displays new characteristics, offering a first-in-class delivery system for all classes of biologically active molecules.

NOVOCHIZOL™ vs CHITOSAN

Chitosan	NOVOCHIZOL™
• Solubility only at acid pH	• Solubility/dispersibility under all conditions
• High viscosity	• Low viscosity
• Rapid biodegradation	• Slow biodegradation
• Low physical stability	• High physical stability
• Low chemical stability	• High chemical stability
• Limited physical states	• Aqueous suspensions, aerosols, hydrogels, solid states
• Batch-to-bath heterogeneity	• Sustained release of small molecules, peptides, nucleic acids, and proteins, including recalcitrant , hydrophobic compounds.
• Limited carrier possibilities	

THE CASE FOR NOVOCHIZOL™ AS A VACCINE CARRIER WITH UNPARALLELED PERFORMANCE

Novochizol™ properties that make it especially attractive for effective vaccines delivery and immunization:

- Capacity to formulate all classes of vaccines: proteins, nucleic acids and viruses and virus-like particles
- Protection of antigens against degradation in extracellular environments
- Endocytosis of Novochizol::antigen complexes leading to increase in antigen presentation on APC cells
- For injectable vaccines: bioadhesion to tissues for prolonged and sustained antigen exposure to sentinel cells
- For intra-nasal vaccines: strong mucoadhesion, decreasing mucociliary clearance
- For intra-nasal vaccines: ability to open tight junctions between epithelial cells of the mucosae
- Chitosan-mediated enhancement of overall immune responses.

POC 1: NOVOCHIZOL™ PROTECTS LABILE PROTEINS FROM DEGRADATION

In the context of a collaborative research project with the EPFL on the formulation of anti-cancer immunotherapies we have demonstrated that interleukin-2, a labile cytokine with a half -life of less than 5 minutes in vivo, **retained its biological activity in vitro when formulated with Novochizol™ for at least 6 weeks**. Extended preservations and protection were also observed with Botulinum toxin *in vitro* and *in vivo* and with poly-Arginine *in vivo*.

POC 2: NOVOCHIZOL-BASED VACCINE ELICITS IMMUNITY REGARDLESS OF ROUTE OF ADMINISTRATION

Recombinant Influenza A/H5 hemagglutinin formulated with Novochizol™ was administered either via intramuscular injection (IM) or intranasally (IN) to BALB/c mice. After 2 immunizations, **specific antibodies were detected in the blood in both the IM group (blood titer: 26730) and the IN group (blood titer: 13770).**

POC 3: NOVOCHIZOL-BASED MUCOSAL VACCINE CONFERRED 100% PROTECTION AGAINST LIVE H5N8

BALB/c mice were vaccinated against H5NB either through intramuscular injection with H5 hemagglutinin with aluminum hydroxide (IM group) or via intranasal administration of a Novochizol-based H5 formulation (IN group). Upon exposure to live H5N8, mice in the IM group developed high blood titers of specific antibodies (blood titer: 13770) with 90% survival, but mice in the IN group developed low blood titers of specific antibodies (blood titer: 1778) with 100% survival. **The Novochizol-based vaccine appears to have elicited fully protective sterilizing immunity.**

POC 4: NOVOCHIZOL™ IS AN EFFECTIVE ADJUVANT FOR INTRAMUSCULAR VACCINES

BALB/c mice were vaccinated against H5NB through intramuscular injection of H5 + Seppic ISA 70 (S group) or of a Novochizol-based H5 formulation (N group). **Total blood titers of specific antibodies in the N group were equal or superior to that of the S group.**

FURTHER INFORMATION: www.novochizol.ch info@novochizol.ch Tel +41 76 370 73 25