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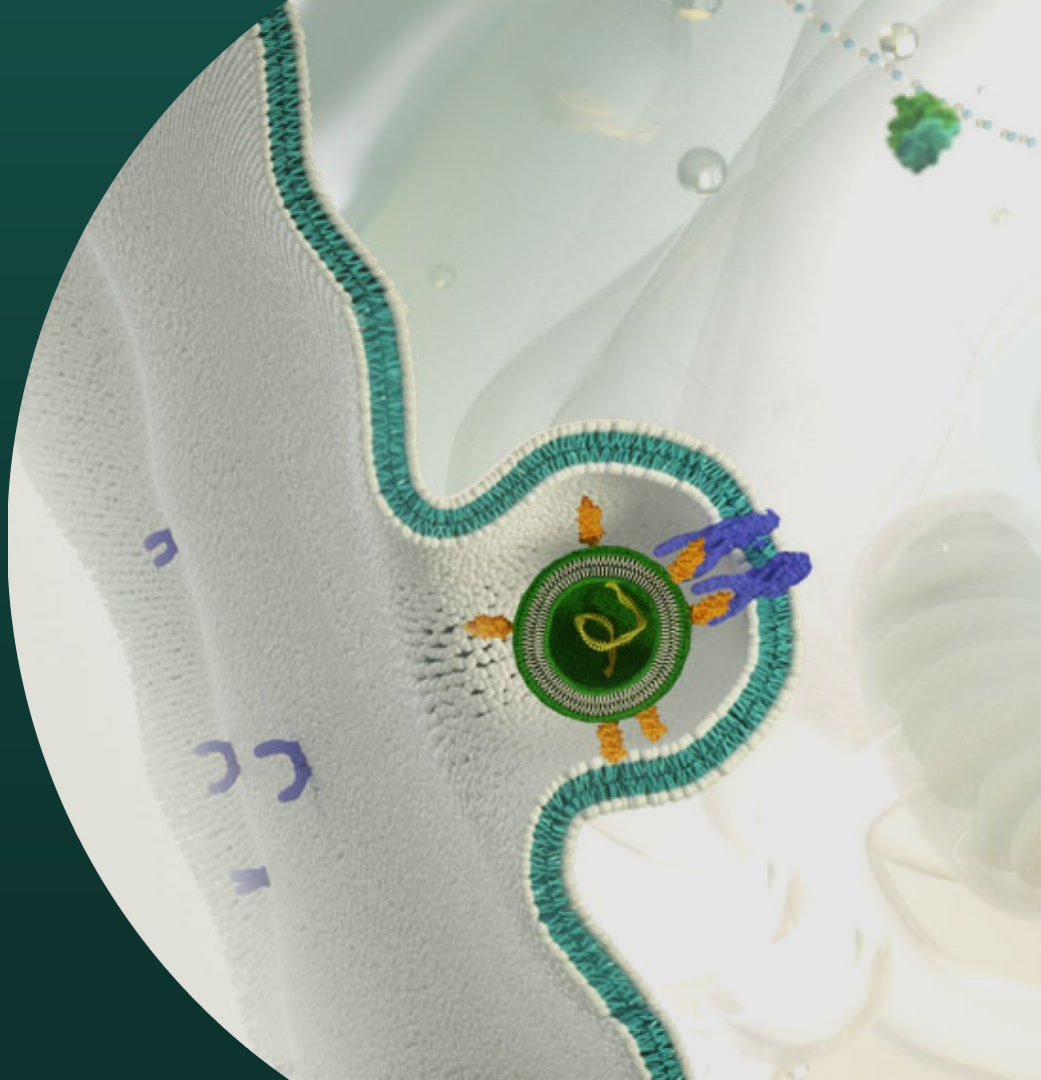
LNP Technology for Infectious Disease and Cancer mRNA Vaccines

Ghania Chikh

Vaccines2026, May 28th 2026



Presentation Outlines

- Introduction to Acuitas Therapeutics LNP technology
- Next generation LNP technology for infectious disease vaccine
- LNP technology for cancer vaccine
- Alternate vaccine format: Preformed Vesicle (PFV)

Acuitas Therapeutics LNP Technology

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Acuitas' LNP Technology Is Clinically Validated

- Acuitas LNP formulation used in ONPATTRO® (Alnylam partnership)
  - ✓ First Approved RNAi product (2018)
  - ✓ Approved in Canada, US, EU, Japan & elsewhere

- Acuitas LNP formulation used in Comirnaty® (BioNTech/Pfizer partnership)
  - ✓ Emergency authorization in Canada, US, EU, UK and elsewhere (2020)
  - ✓ First approved mRNA therapeutic (2021)

- First LNP personalized CRISPR gene editing therapy (2025)

Children's Hospital of Philadelphia

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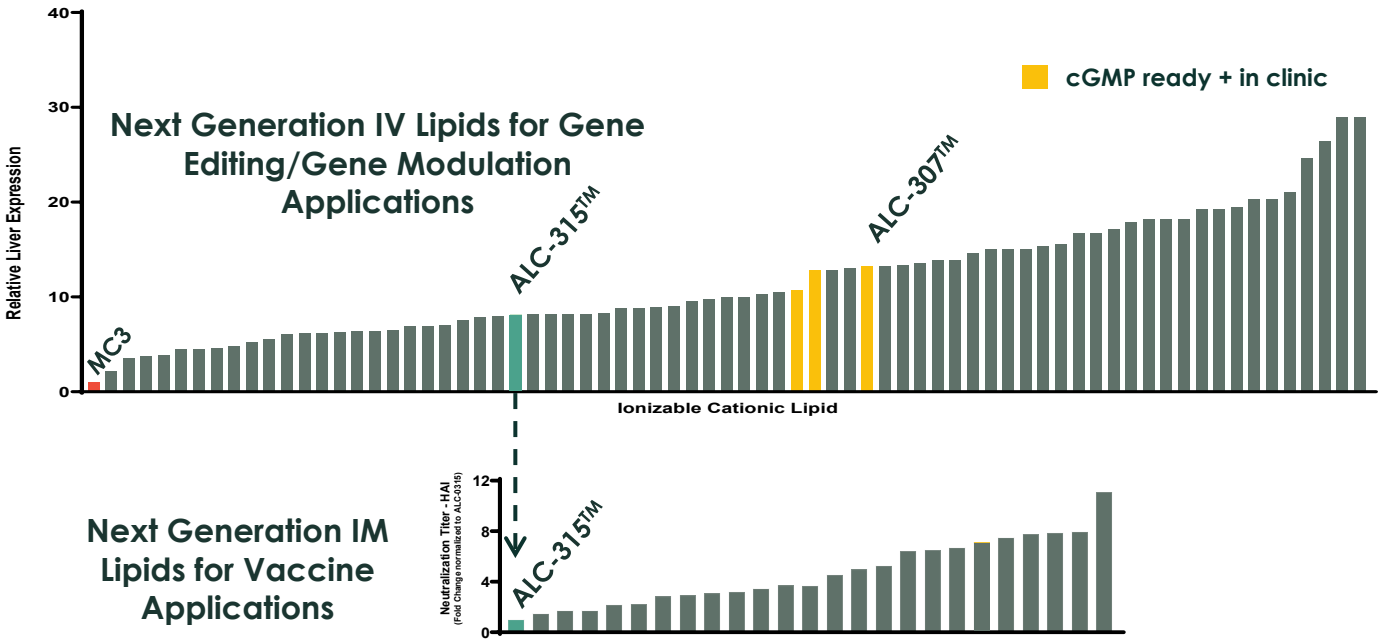
Our Approach to Innovation



- Screening program combined with structure-activity relationship (SAR) analysis results in improved potency
- Enhanced potency and enabled partner programs across a broad range of applications
  - → 33 ongoing clinical trials

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Next Generation LNP Technology for Infectious Disease mRNA Vaccines

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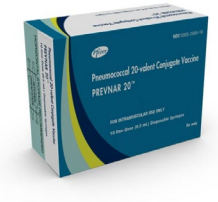
Multi-Valent mRNA Vaccines

- Acuitas LNP (ALC-315®) technology enabled Pfizer/BioNtech vaccine Comirnaty®
- New vaccines predominantly multivalent
  - Provide broad protection against multiple viral strains
- Need for next generation LNP enabling multivalent mRNA vaccines
  - Higher potency needed to ensure protective titers against *each* viral strain
- Next Generation Acuitas LNP provide 5-17-fold higher potency compared to ALC-315®



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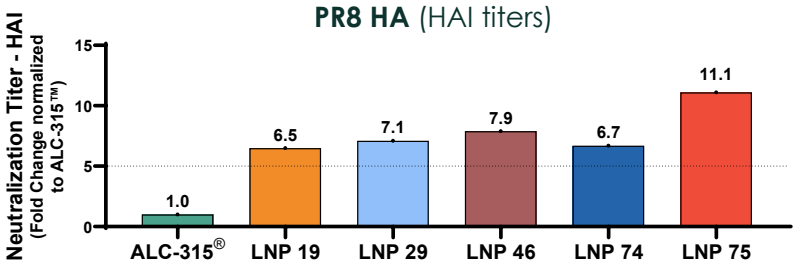
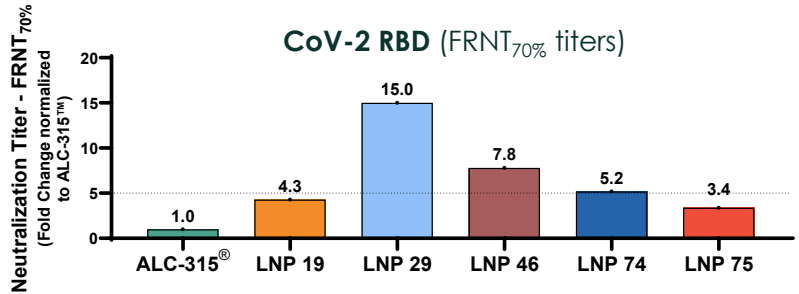
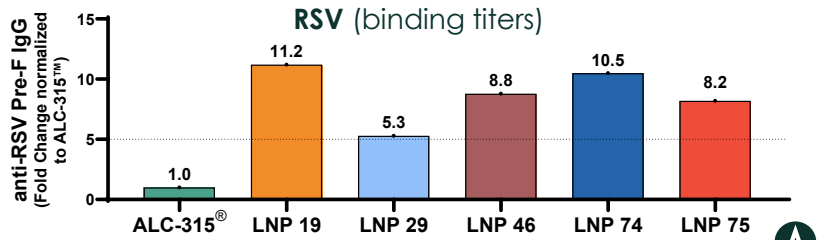
Next Gen LNP Potency Is Antigen Independent

- Next Gen LNP show consistently higher antibody titers across multiple viral antigens







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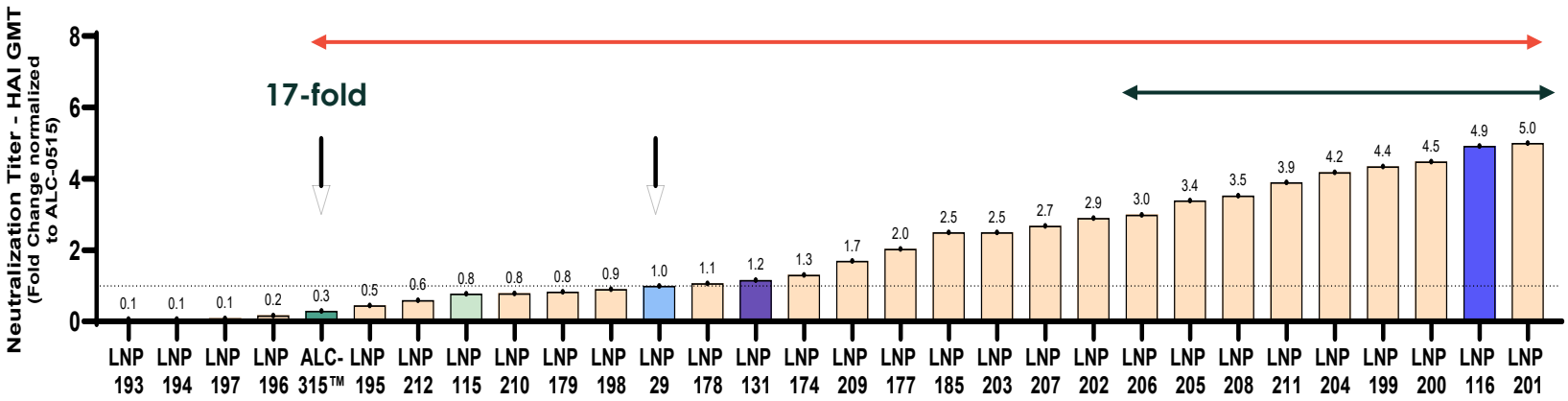
0.2ug dose for PR8 & RSV, 0.5 ug for RBD, prime/boost: D1/D14, HAI, nAb @ D28, 8-10 mice per group

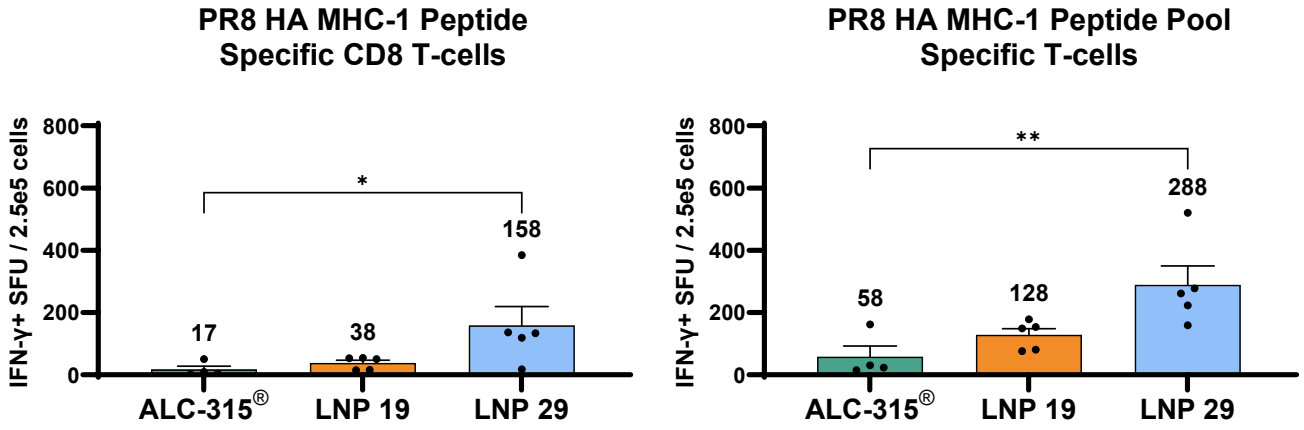
SAR Refining of LNP 29 lipid Class



- Several newly synthesized lipids based on LNP 29 structure, are 3 to 5-fold more potent than LNP 29 lipid

0.05ug dose for PR8 prime/boost: D1/D14, HAI D28, 5-10 mice per group

Superior T cell Response W/Next Gen LNP



- Next Gen LNP induce superior T cell responses compared to ALC-315®

0.2ug dose for PR8 prime/boost: D1/D14, IFNγ ELISpot D28, 5 mice per group

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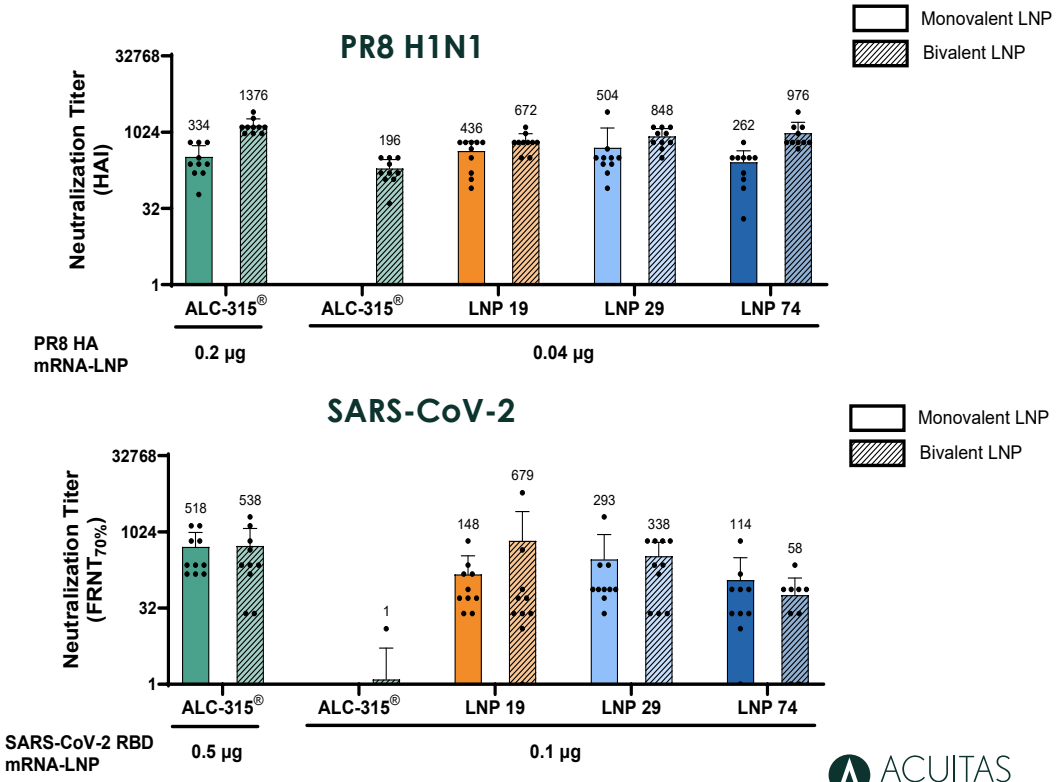
Next Gen LNP Enables Multi-Valent Vaccine

- Next Gen LNP provide similar neutralization titers @ five-fold lower dose



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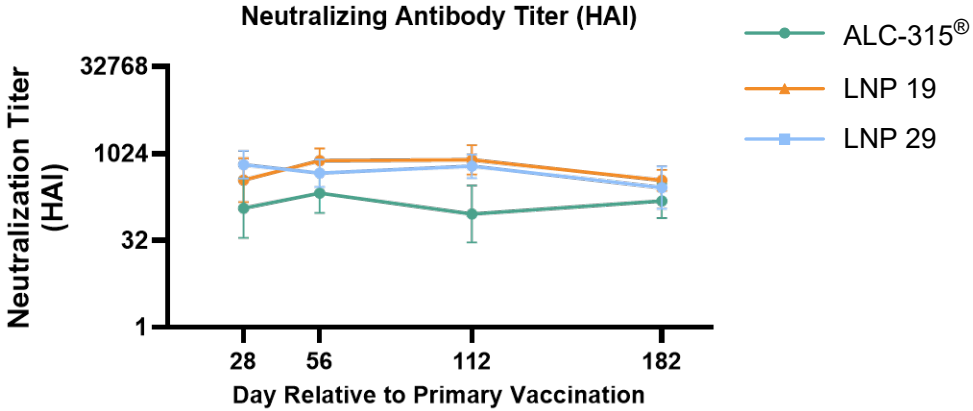
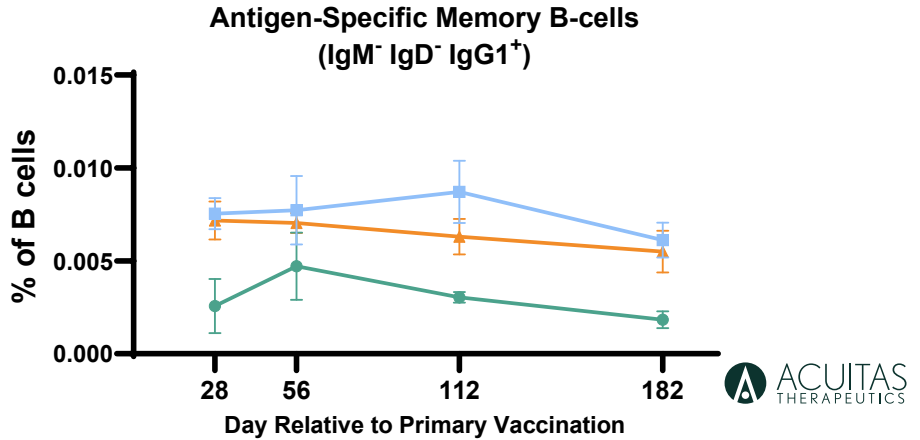
Next Gen LNP Provide Superior Vaccine Durability

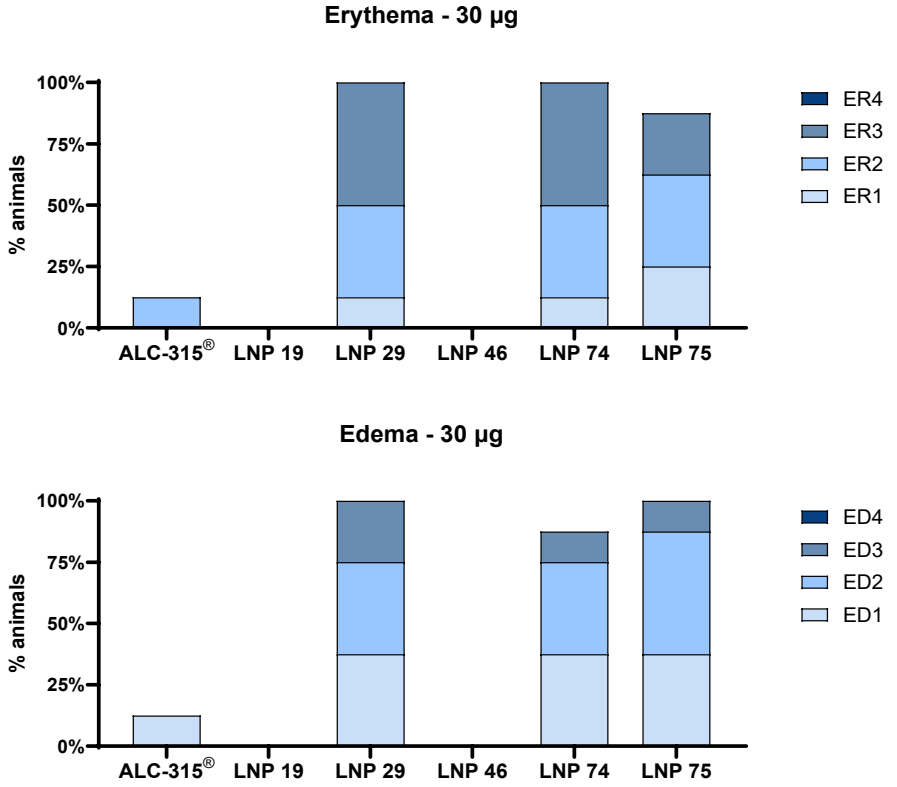
- Next Gen LNP maintain higher neutralization titers & memory B cell pool compared to ALC-315® >6 months





Next Gen LNP: Reactogenicity

- Acceptable reactogenicity across all Next Gen LNP



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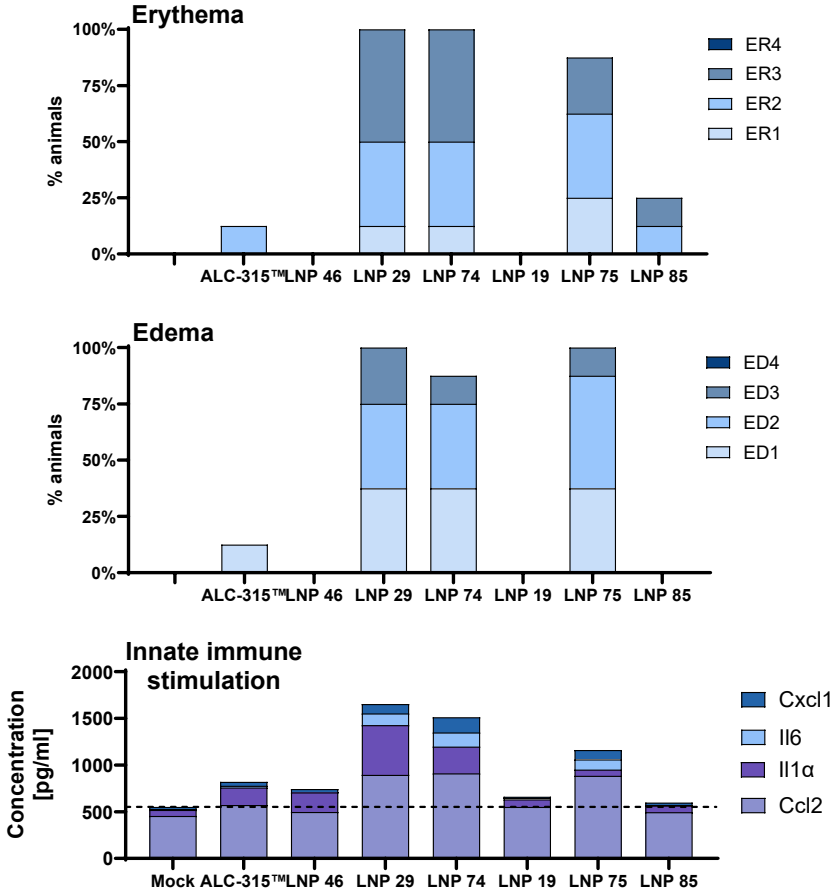
Correlation Between Reactogenicity & Innate Immune Stimulation



- Innate immune induced by LNP (rodents) correlates with erythema and edema findings (GP)

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Summary: Next Generation Vaccine LNP

- Next Generation LNP provide greater than 5-fold increase in potency for multi-valent vaccines
  - Higher T cell responses
  - Higher memory B cell pool
- Elevated neutralizing antibody titers are maintained over 6 months (studies ongoing)
- Enhanced potency of Next Gen LNP independent of innate immune response.
- Transient reactogenicity finding are acceptable & consistent with immune stimulation and inflammatory responses

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LNP Development for mRNA-Based Cancer Vaccine

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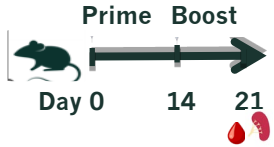
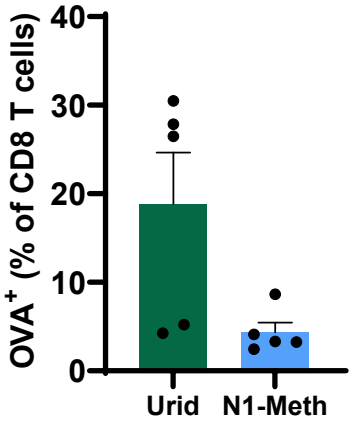
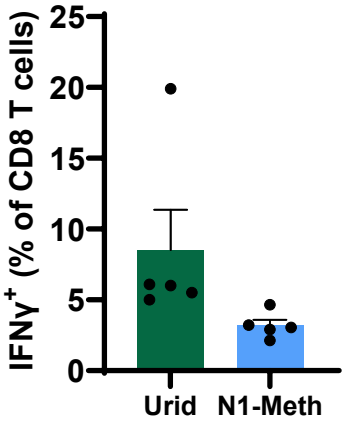
Overview

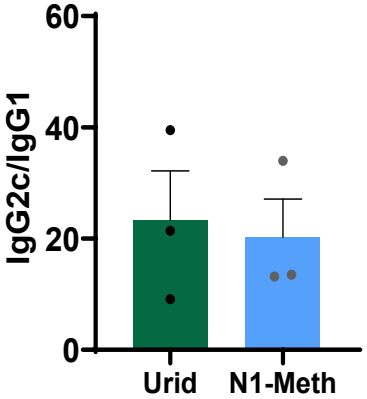
- Acuitas LNP's potency
- Acuitas LNP's comparison to non-viral lipid-based delivery platforms currently in the clinic

Uridine - based mRNA More Potent Than N1-methylpseudouridine Backbone









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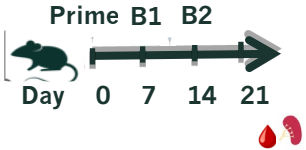
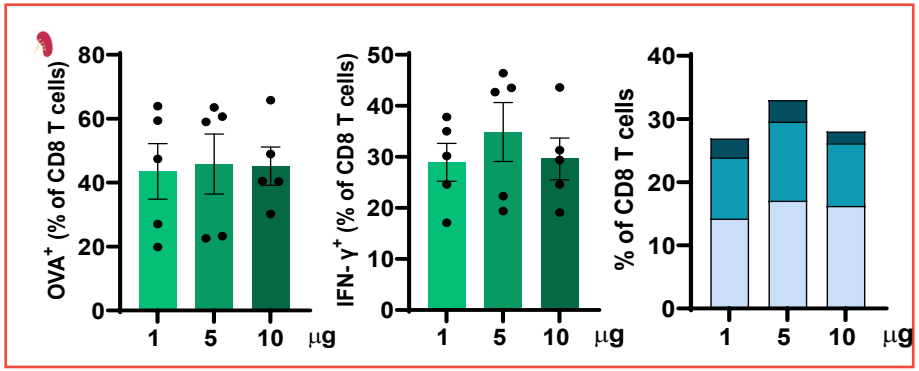
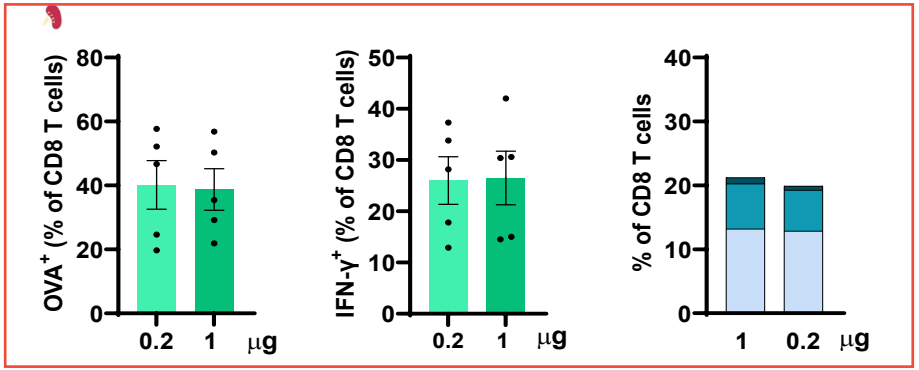
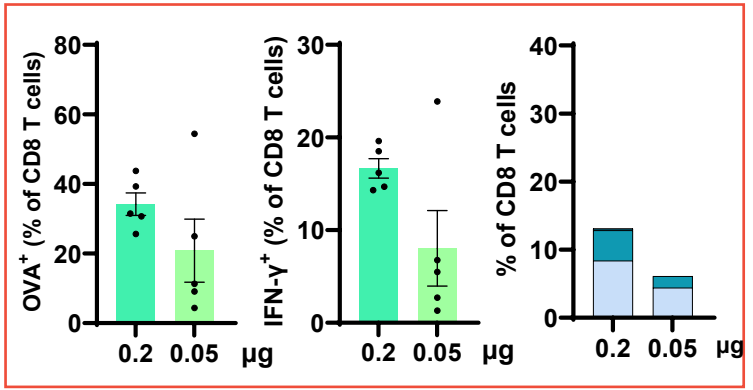
Comparable Potent CD8+ T Cell Response Achieved Across 0.2 to 10µg Dose Range W/ ALC-315™









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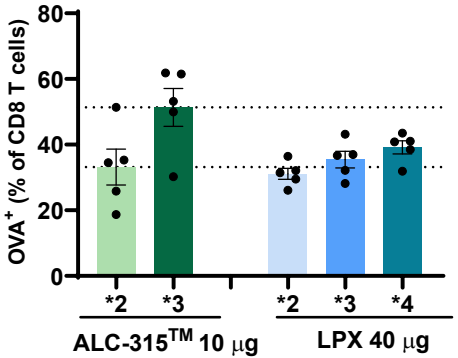
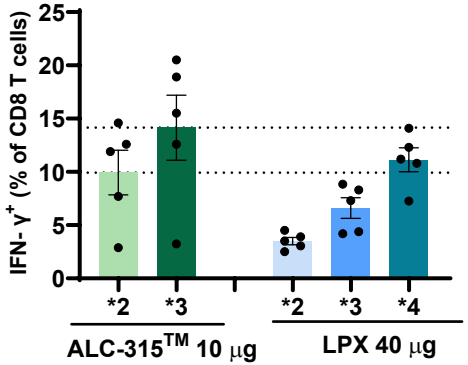
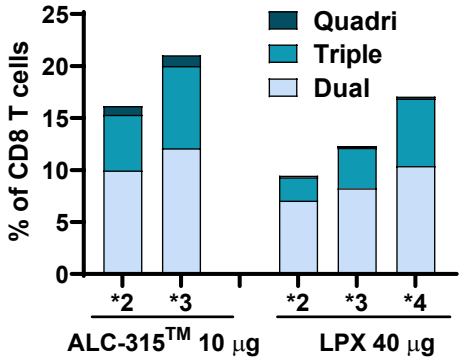
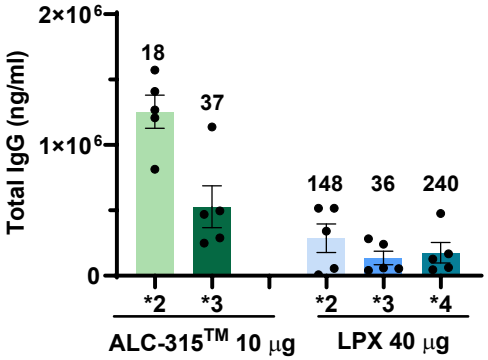
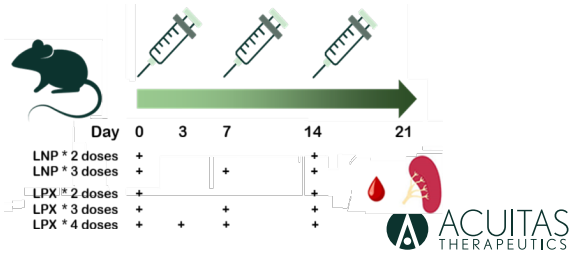
ALC-315™ Induces Equivalent or Better Immune Response @ Lower Dose & Fewer Injections Compared To LPX



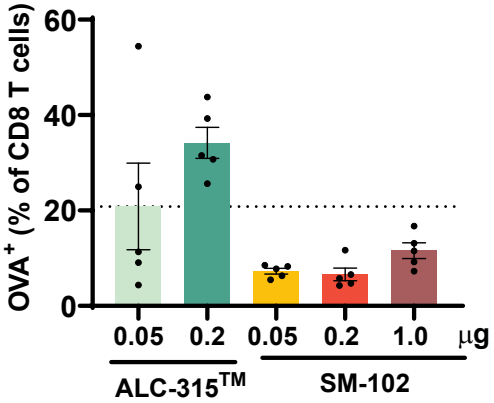


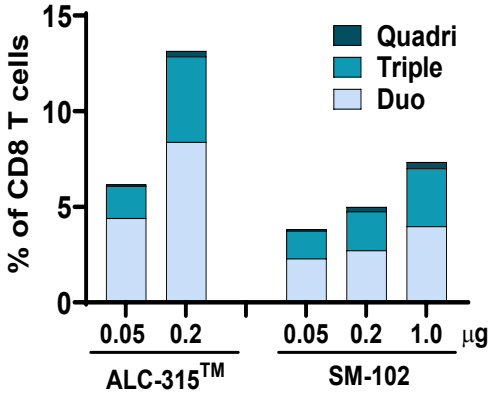


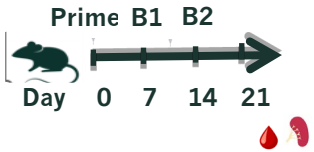


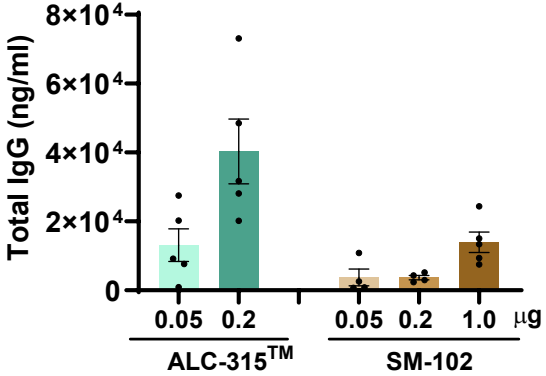


ALC-315™ Induces Superior Immune Response Compared to SM-102









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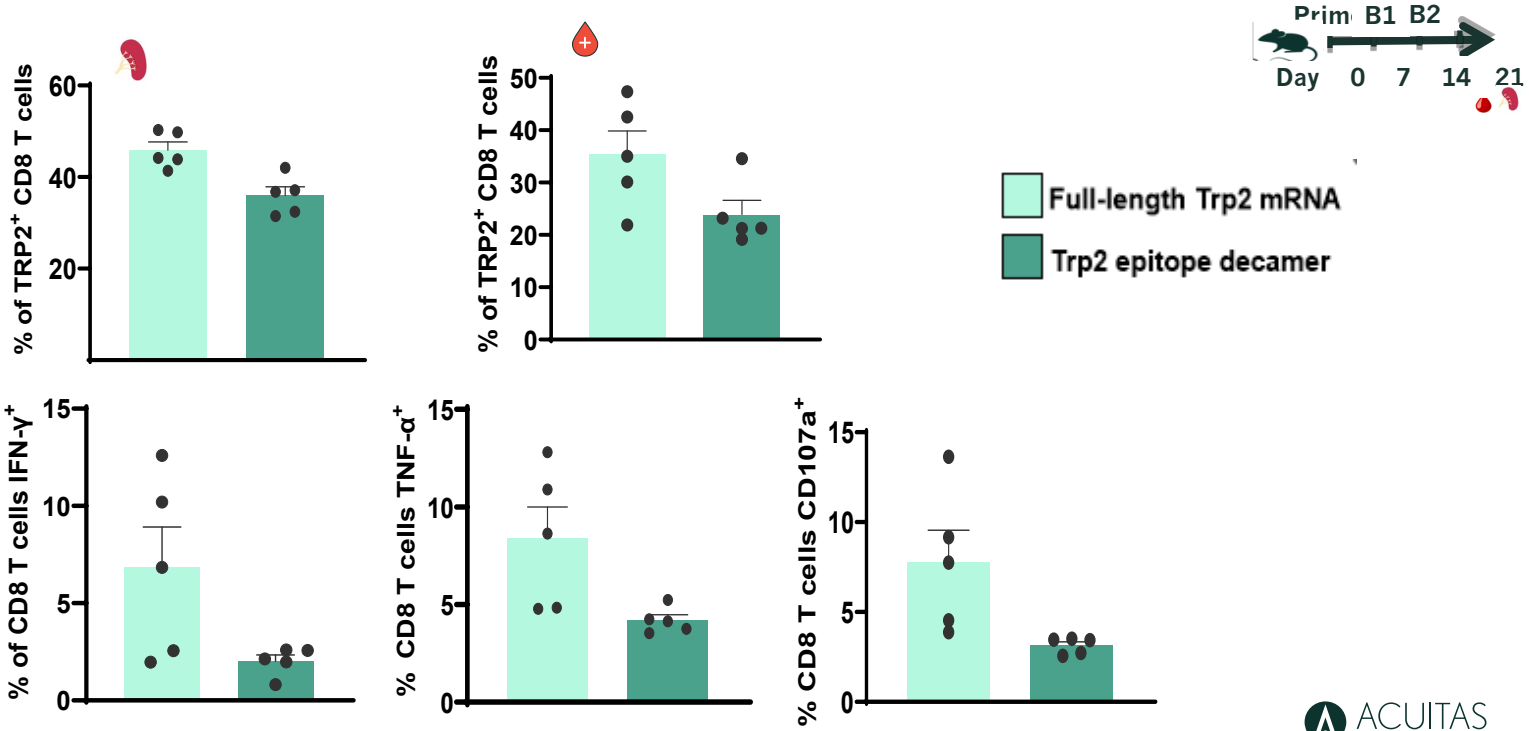
ALC-315™ Induces Strong Cellular Response Against Syngeneic Tumour Associated Antigen Model



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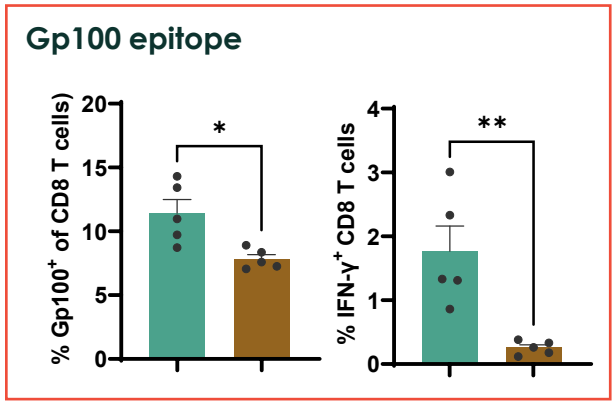
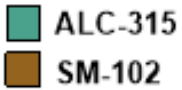
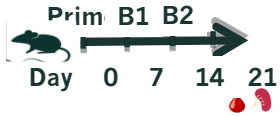
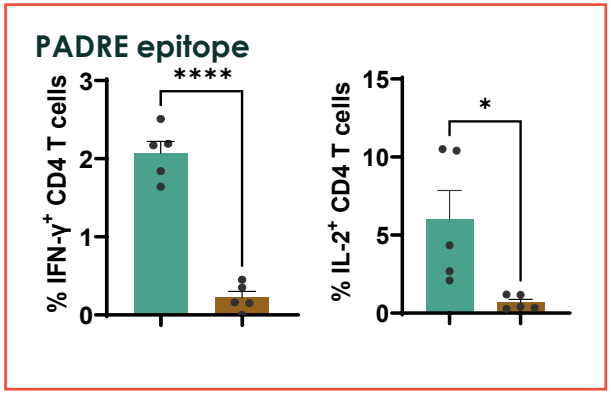
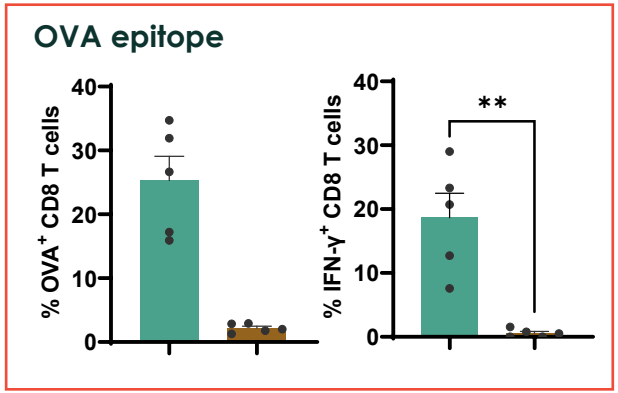
Superior Immune Response Compared to SM-102 Against Syngeneic Antigen Model











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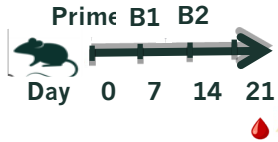
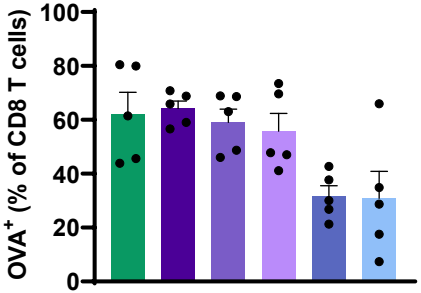
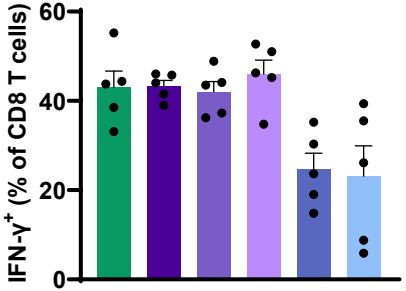
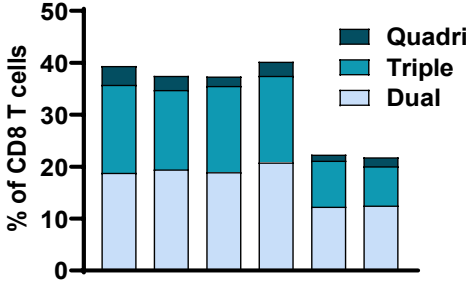
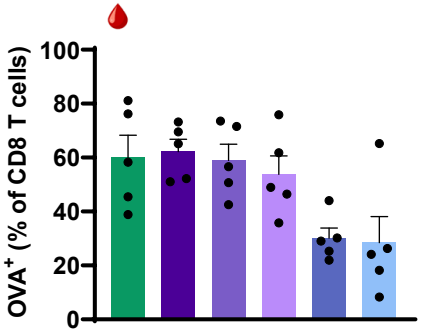
New Lipid With Equivalent Activity Than ALC-315™

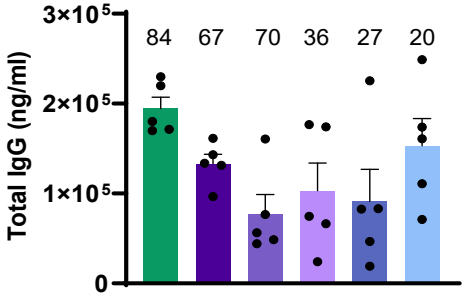












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Summary

- Stronger CD8 T cell response w/ uridine-based mRNA compared to modified mRNA.
- ALC315™ is a potent LNP: strong & comparable CD8+ T cell response across 0.2 to 10μg dose range.
- Acuitas LNP is more potent that non-viral delivery platforms currently in the clinic.

Preformed Vesicles: PFV

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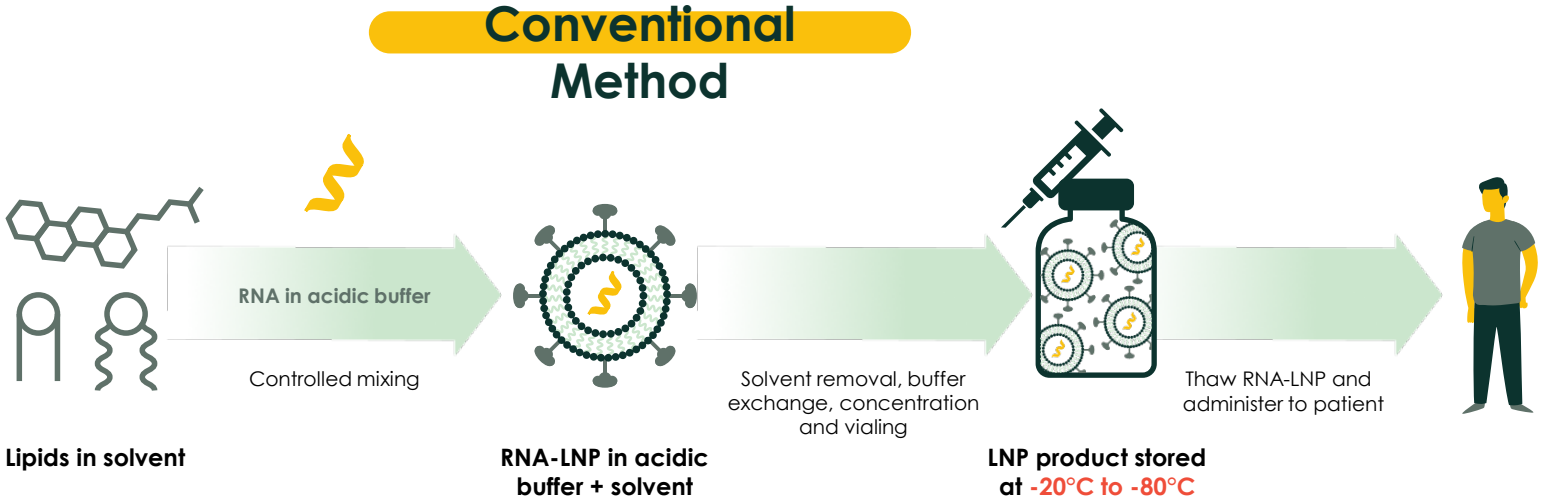
Current Manufacturing & Product Format



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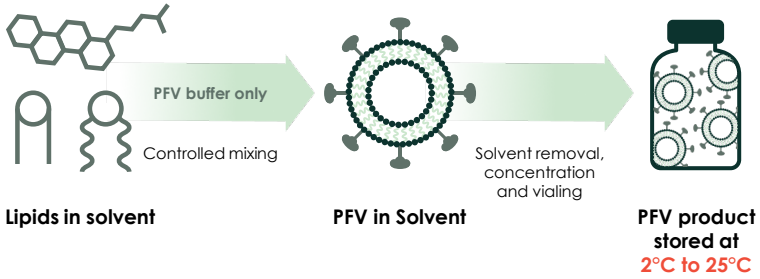
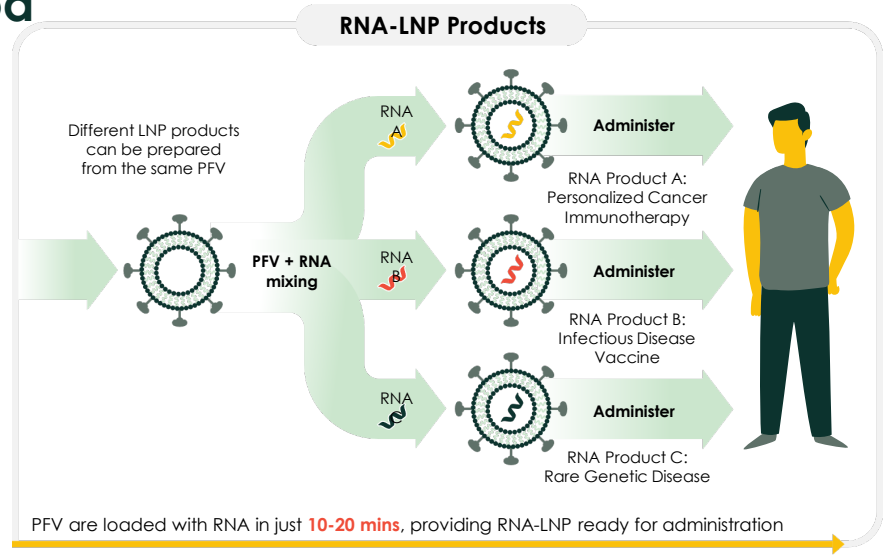
Overview of PFV

PFV Method





- Pre-Formed Vesicles (PFV) an alternative LNP enabling rapid vaccine manufacture

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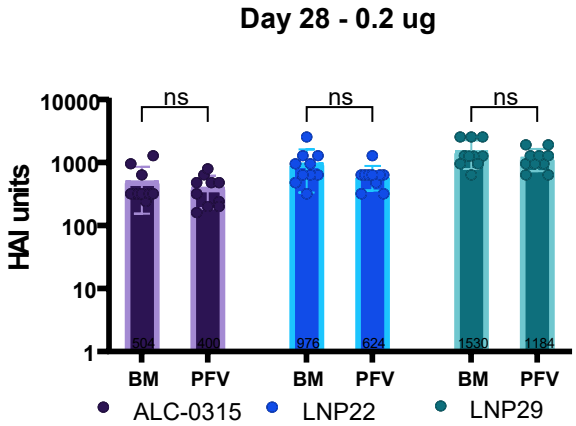
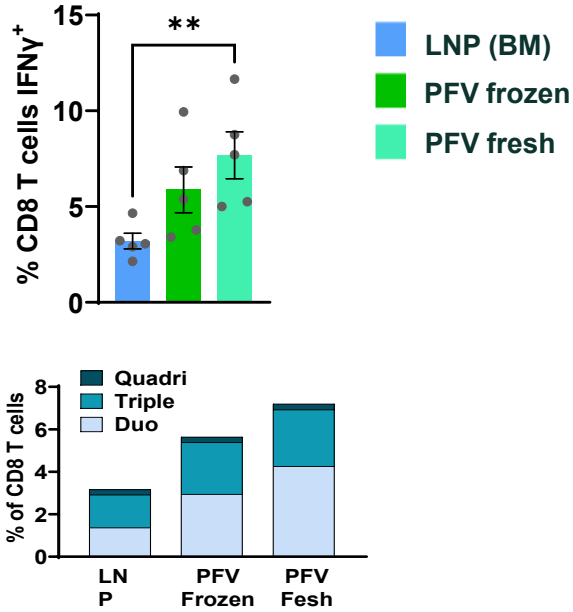
Vaccine Potency Is Maintained With PFV

Infectious Disease Vaccine



Cancer Vaccine



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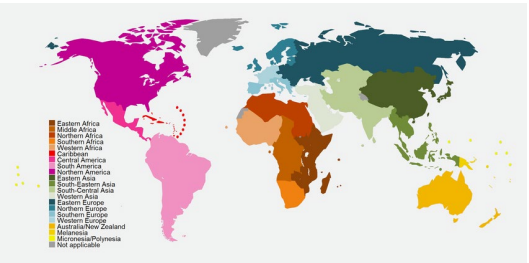
Alternative LNP Manufacturing

Opportunities For Point-of-Care Payload Encapsulation

- **Infectious Disease Vaccines**
  - Ambient RT or Refrigerated (2-8°C) storage & distribution – particularly advantageous for LMICs
  - Regional-specific vaccines (tailored to regional viral strains)
  - Delayed selection of prevalent viral strains (e.g. Flu vaccines)

- **Personalized Cancer Vaccine & Rare Genetic Diseases Therapeutics**
  - Small scall individualized kit format
  - Patient specific gene editing protein and/or guide RNA
  - Cost effective product manufacture



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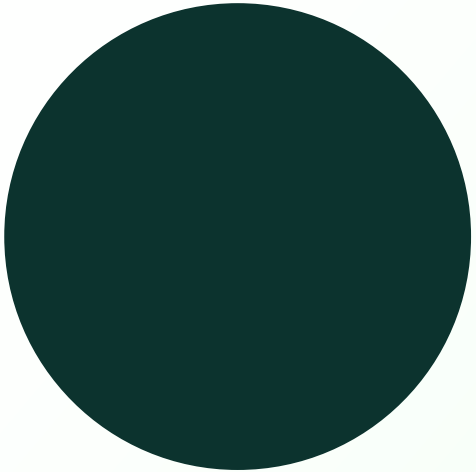

Questions?

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