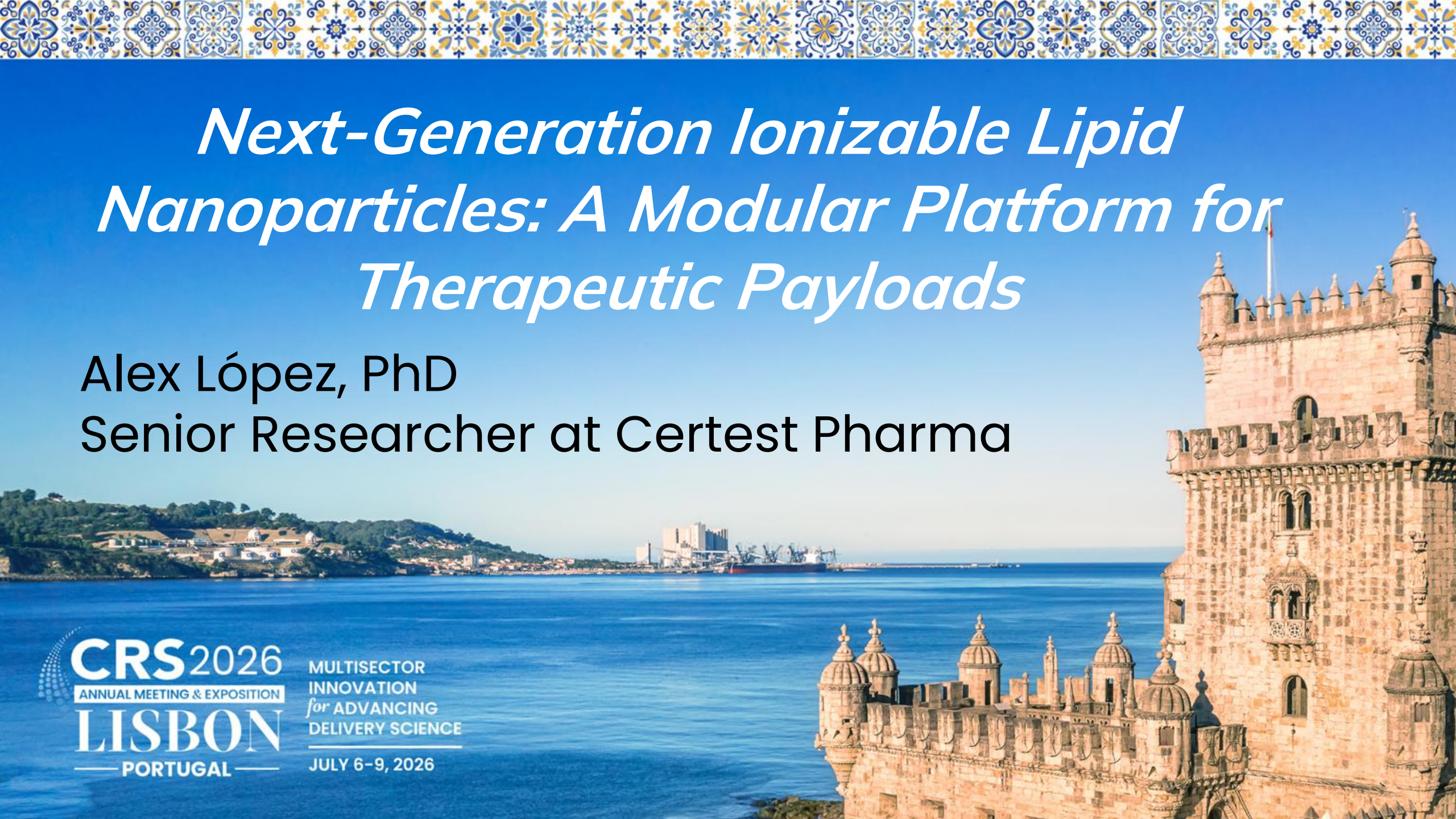
Next-Generation Ionizable Lipid Nanoparticles: A Modular Platform for Therapeutic Payloads

Alex López, PhD
Senior Researcher at Certest Pharma



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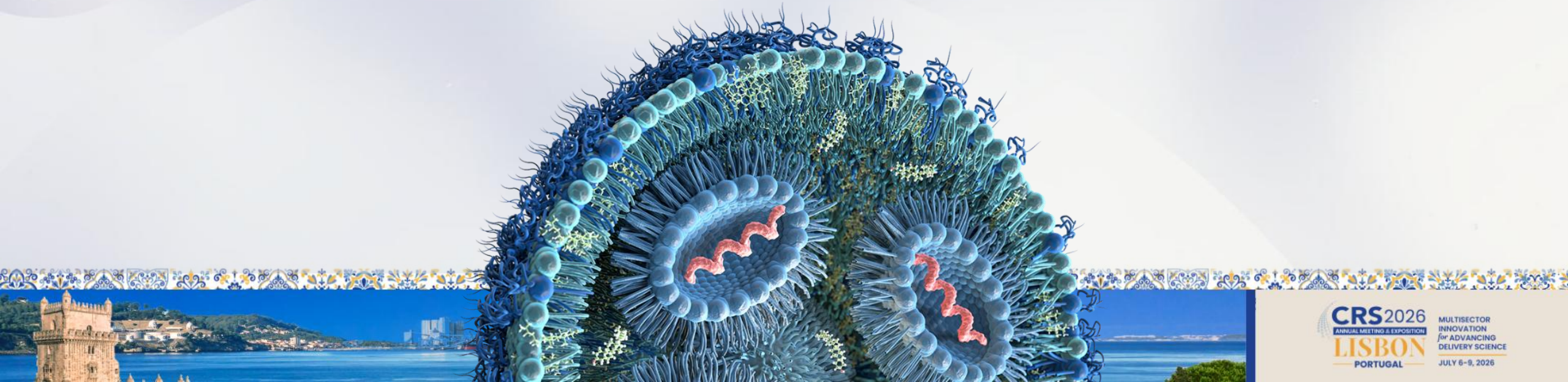
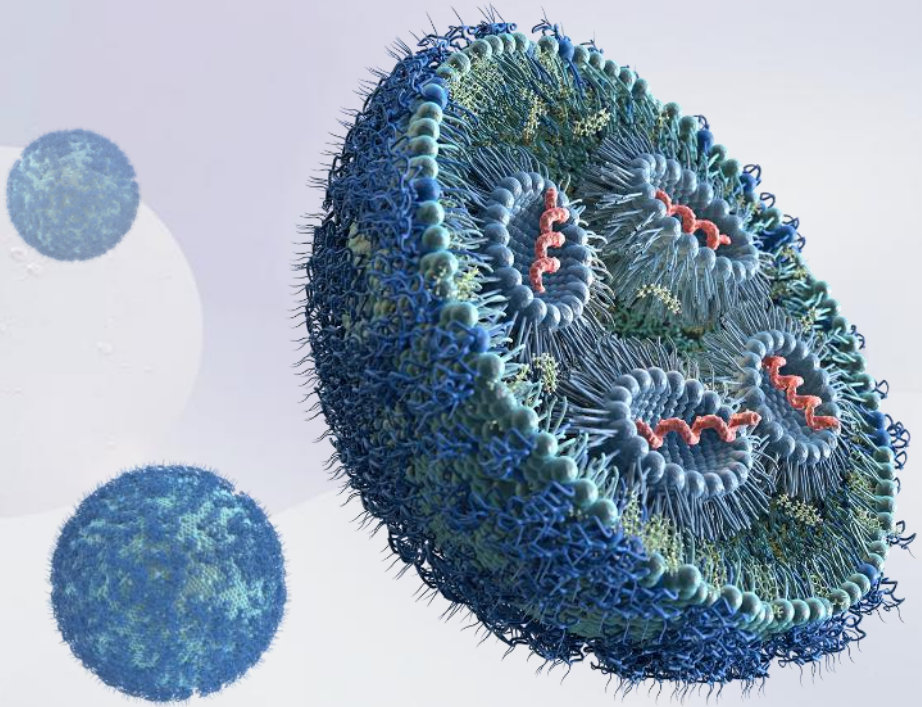
08/07/2026





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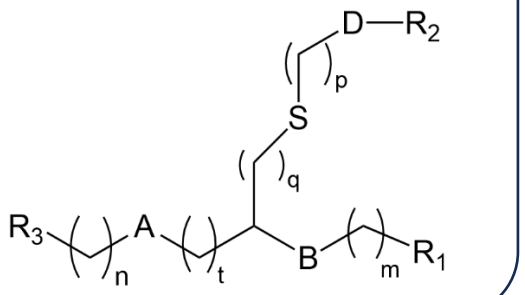
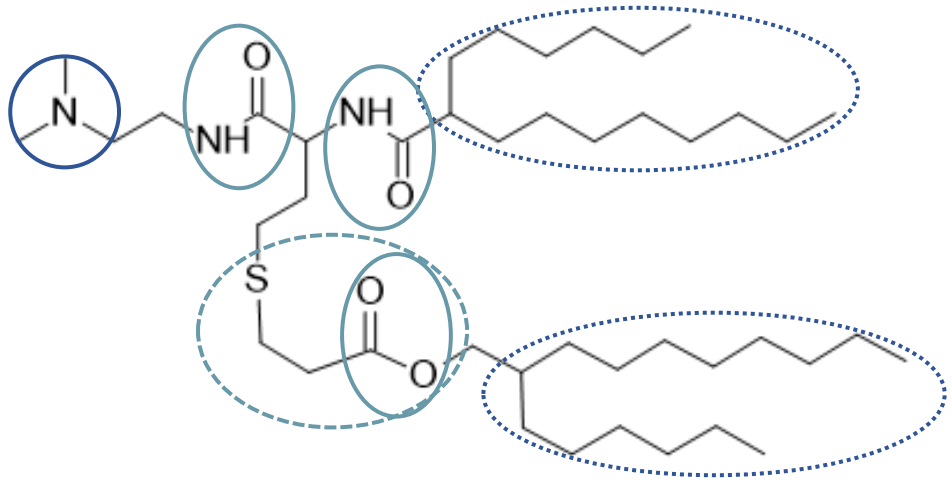
2. Thermostable LNP Formulations
3. Targeting
4. APIs
5. Services
6. Partnership

Novel Ionizable lipids

Sequential Thiolactone Amine Acrylate Reaction

WO2024/110381

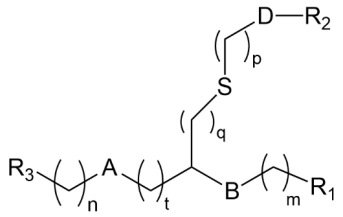




- Ionizable head
- Branched tails
- Biodegradable groups
- Superior biodegradabili

Proprietary Ionizable Lipid Families

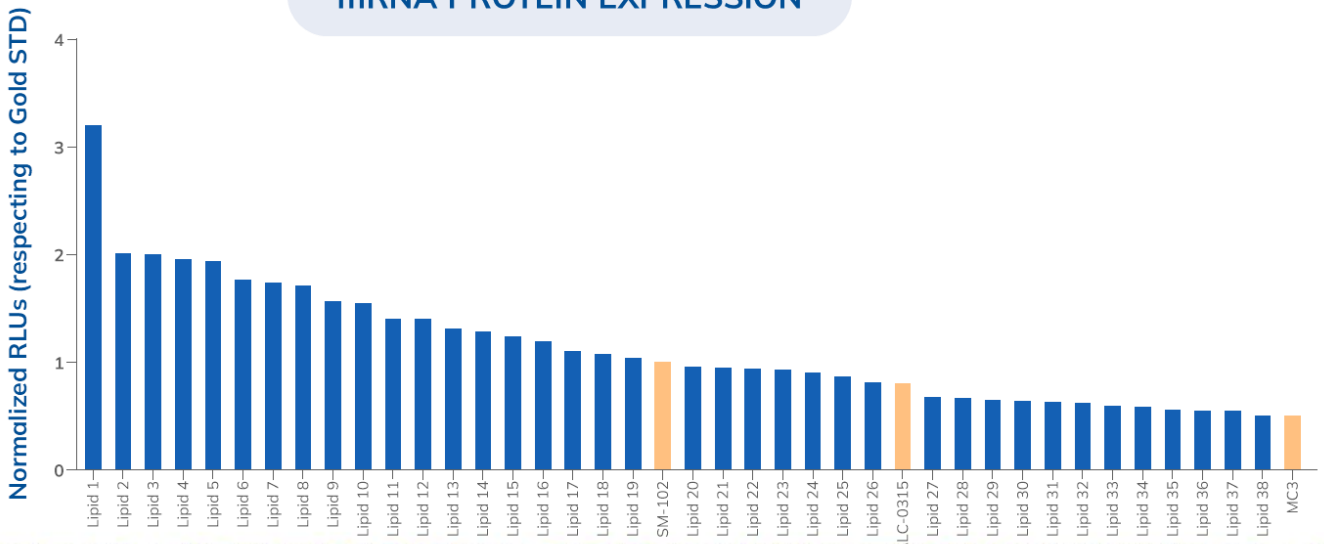
Clinical-Ready ILs

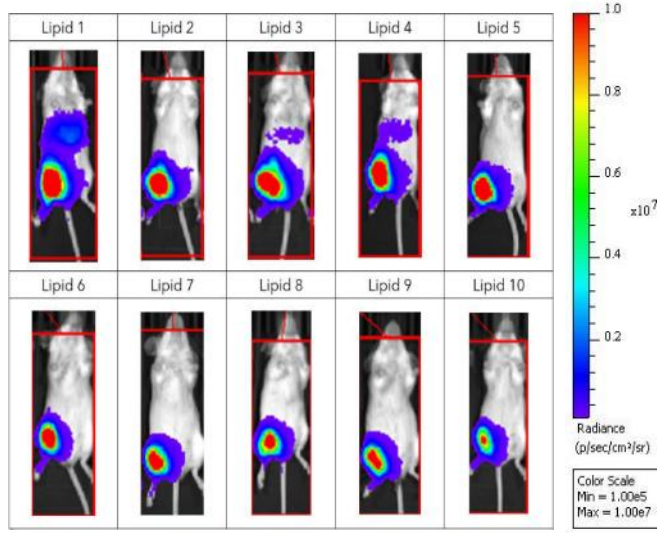


WO2024110381

- Large-scale in vivo screening
- Potency and tolerability selected
- Broad compatibility across multiple cargos
- Validated in non-human primates
- Two Phase 1 clinical programs

mRNA PROTEIN EXPRESSION





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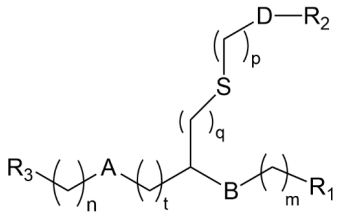
Clinical-Ready ILs



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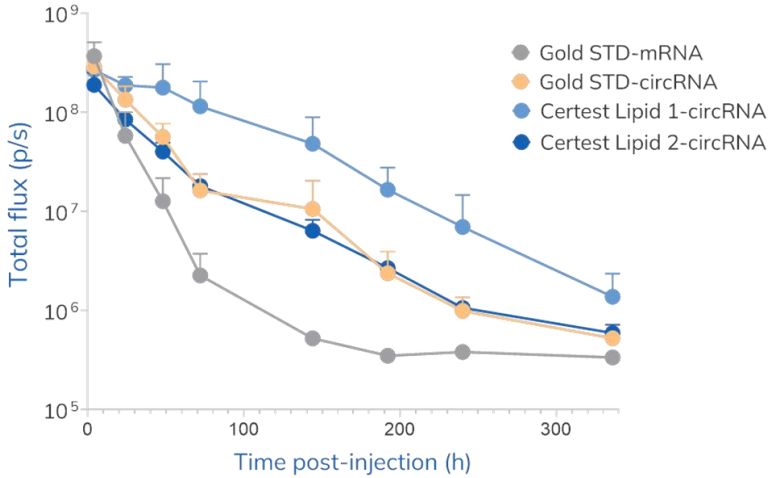
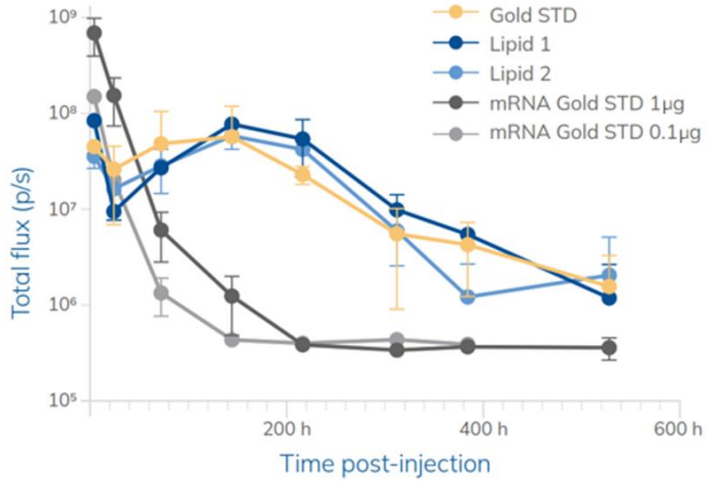
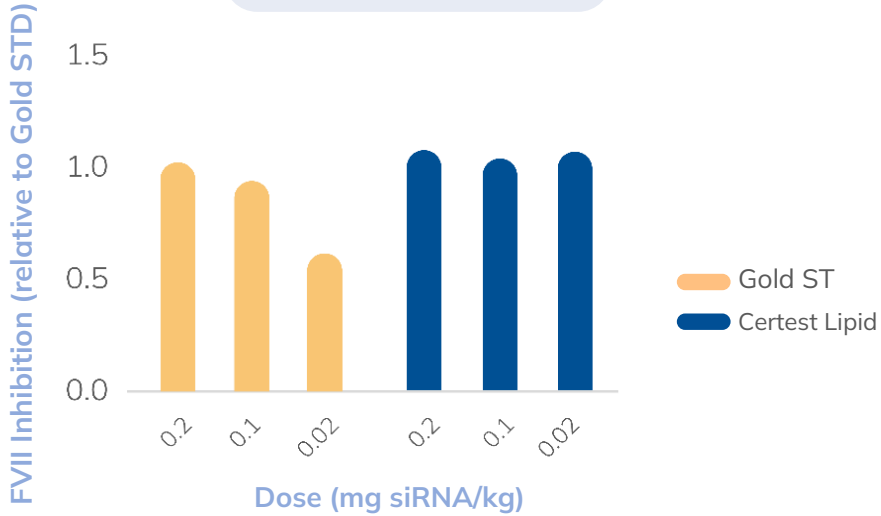
circRNA



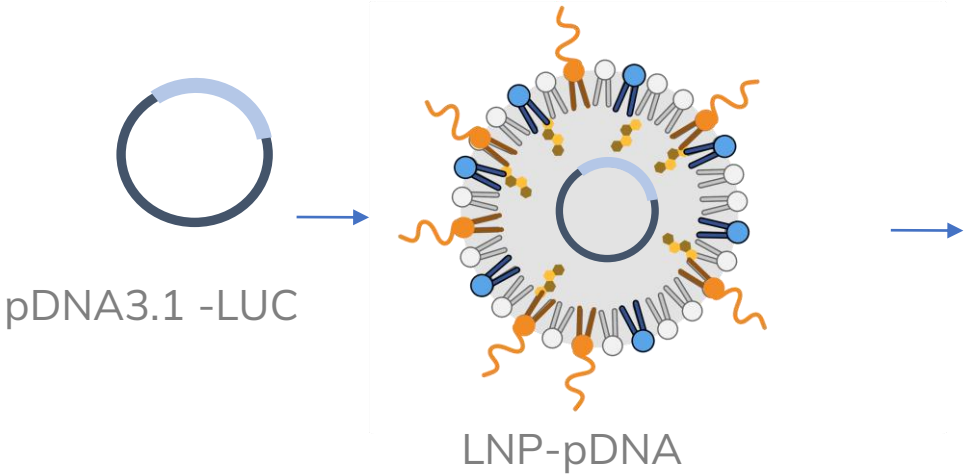
saRNA



siRNA vaccines

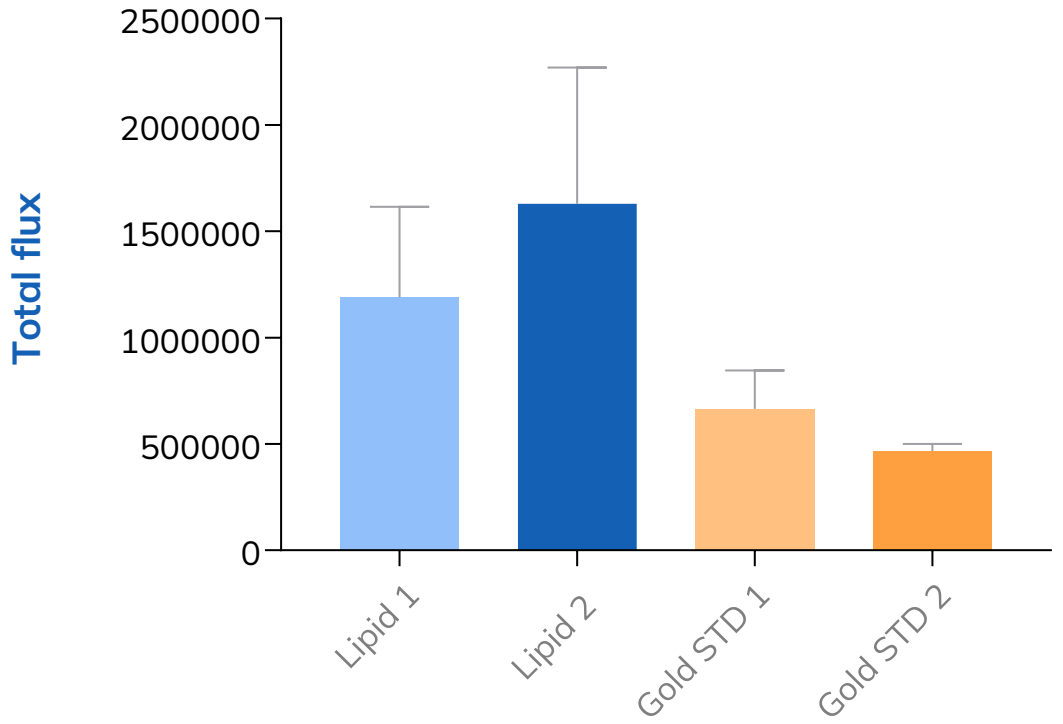


Delivery of pDNA with Certest lipids



Luciferase expression vs. gold-standard ionizable lipids

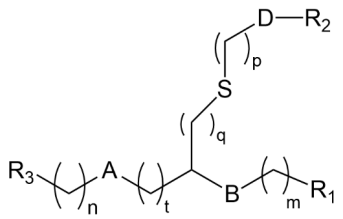
3x protein expression



4h post-IVT injection (5 µg RNA/mouse)

Proprietary Ionizable Lipid Families

Clinical-Ready ILs



WO2024110381

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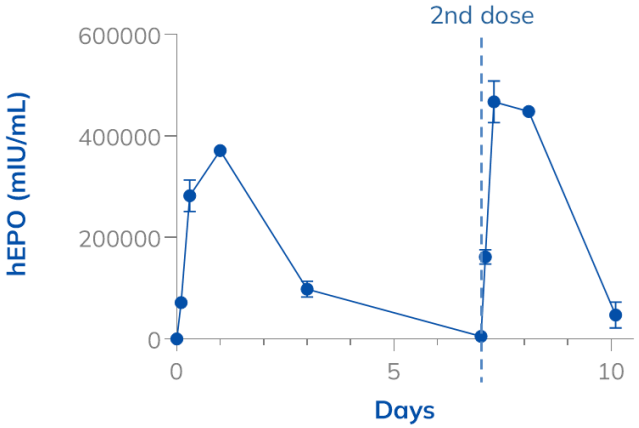
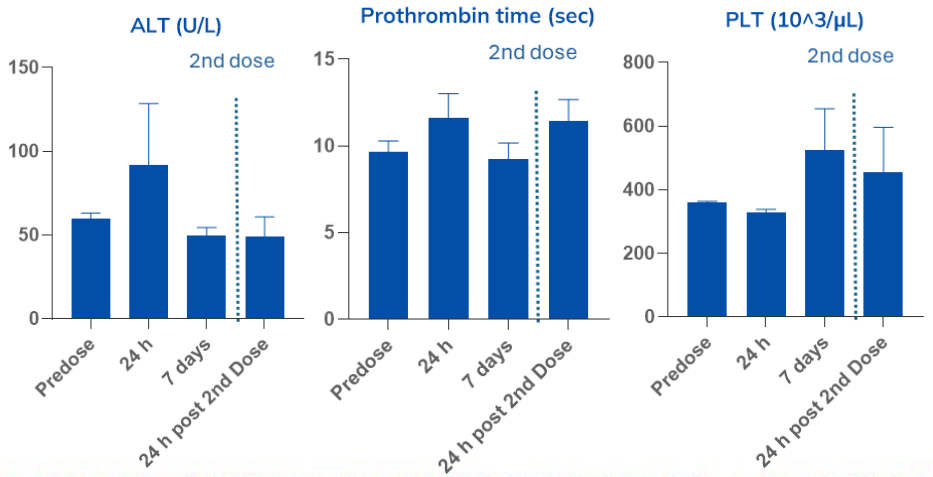
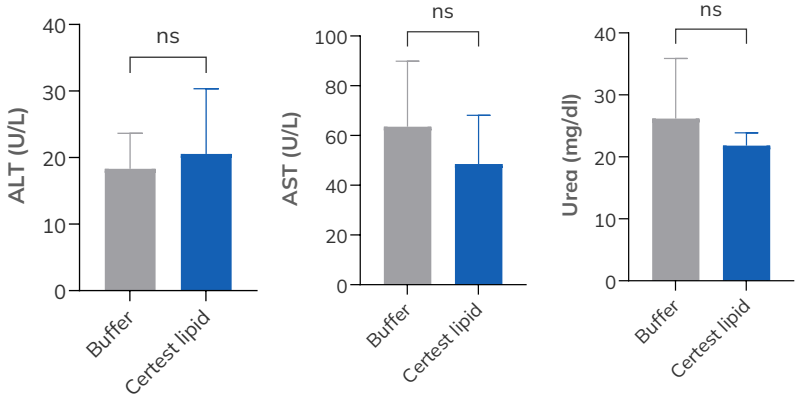
- **Two Phase 1 clinical programs**

NonHuman Primates studies





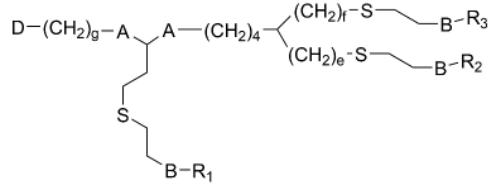
Tolerability studies (2.5 mg/kg dose) in Mice



Proprietary Ionizable Lipid Families

- Selective spleen delivery profiles
- Minimal liver expresión
- Compatible with standard 4-component LNPs
- Extrahepatic biodistribution capabilities
- Optimized for tissue-selective delivery

Extrahepatic ILs



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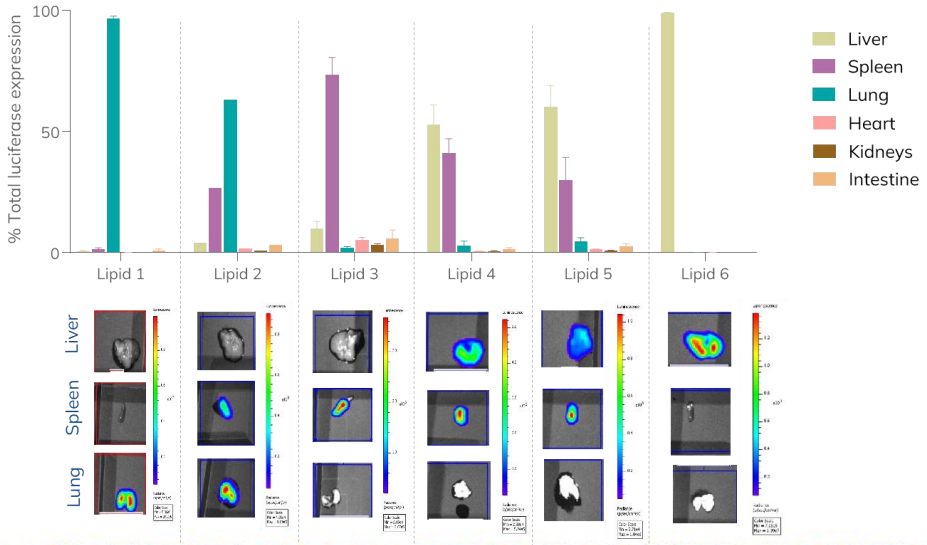
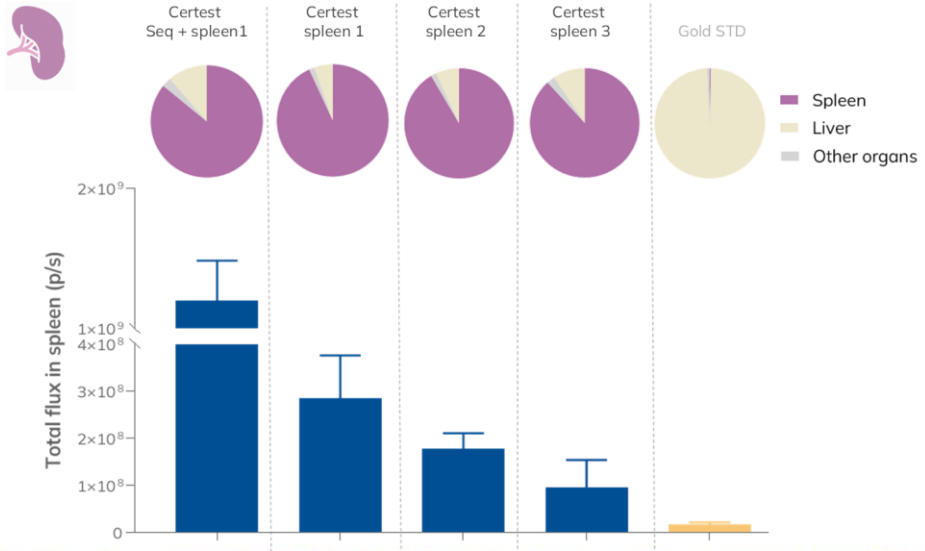
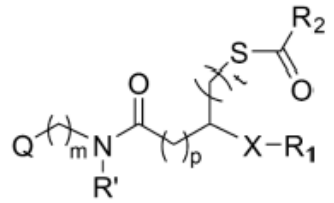
***In vivo* TISSUE SELECTIVITY**





Proprietary Ionizable Lipid Families

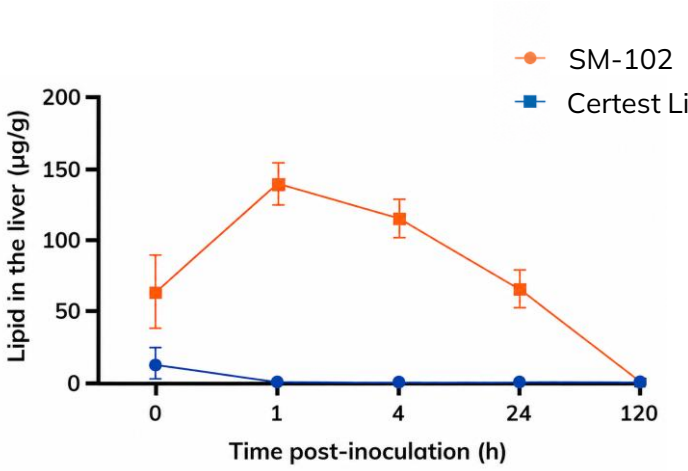
Highly-Biodegradable ILs

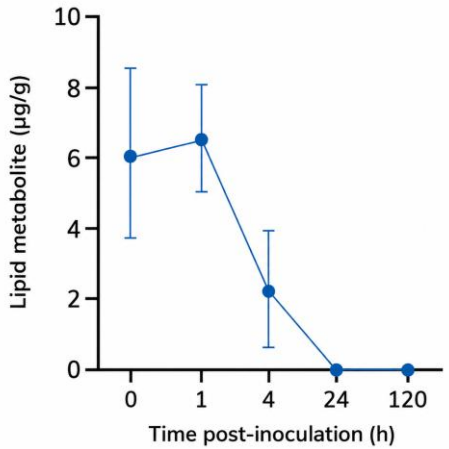


WO2025157953

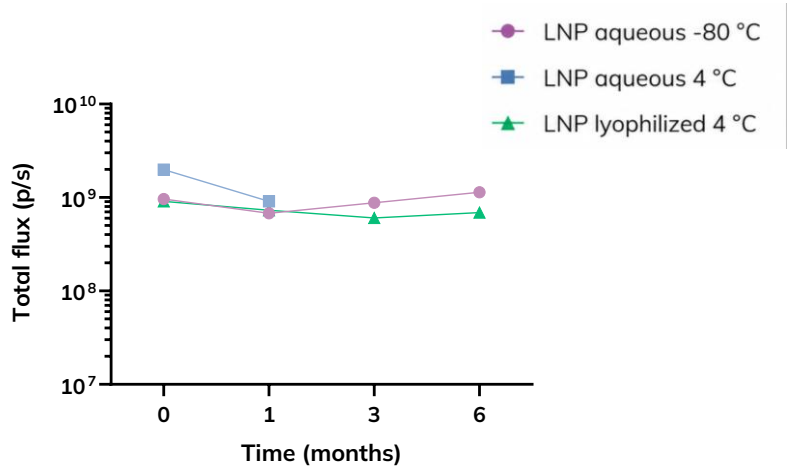
- Enhanced biodegradability and clearance
- Stable under standard storage conditions
- Improved tolerability at high doses
- Designed for repeat-dose applications
- Optimized for high-exposure RNA therapies

Biodegradability studies



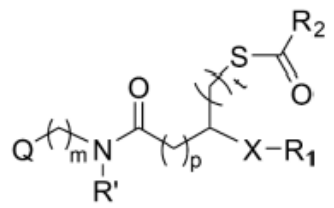


LNP stability



Proprietary Ionizable Lipid Families

Highly-Biodegradable ILs



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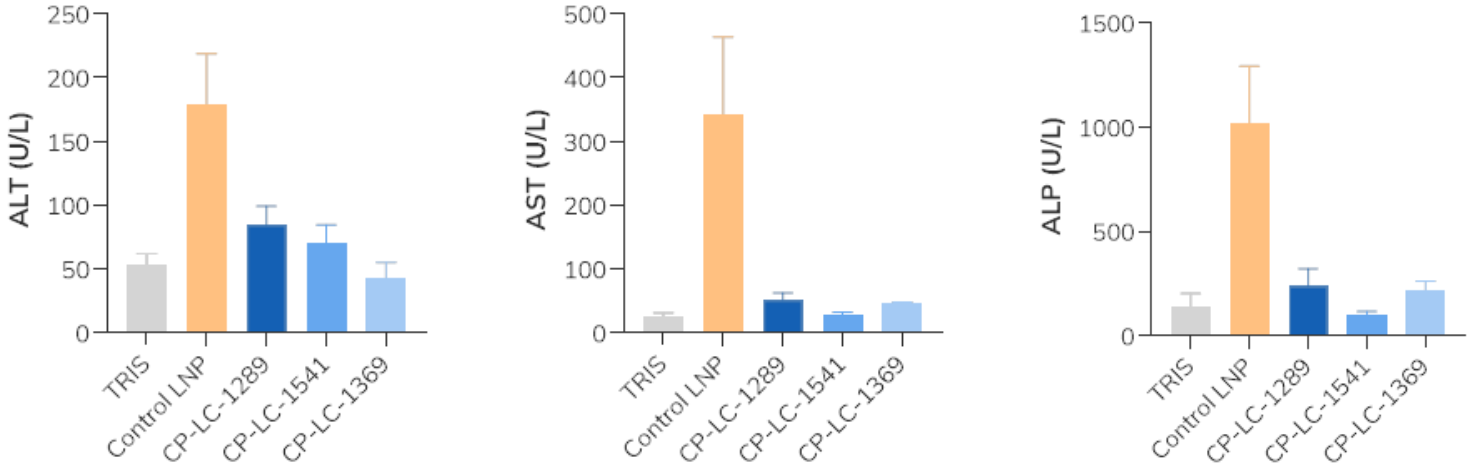
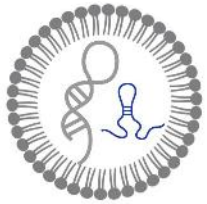
- Enhanced biodegradability and clearance
- Stable under standard storage conditions
- Improved tolerability at high doses
- Designed for repeat-dose applications
- Optimized for high-exposure RNA therapies

Tolerability high dose (5 mg/kg)



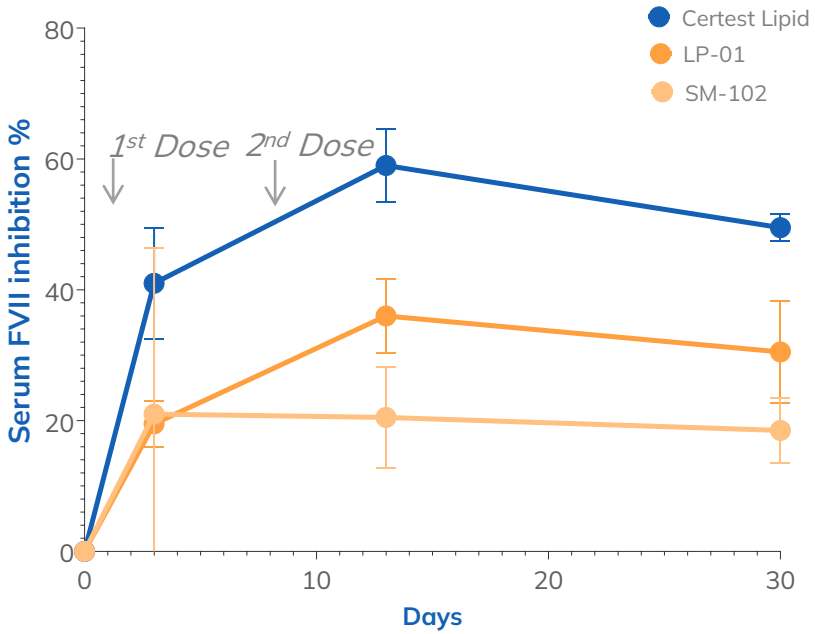
Enhanced CRISPR/Cas gen editing



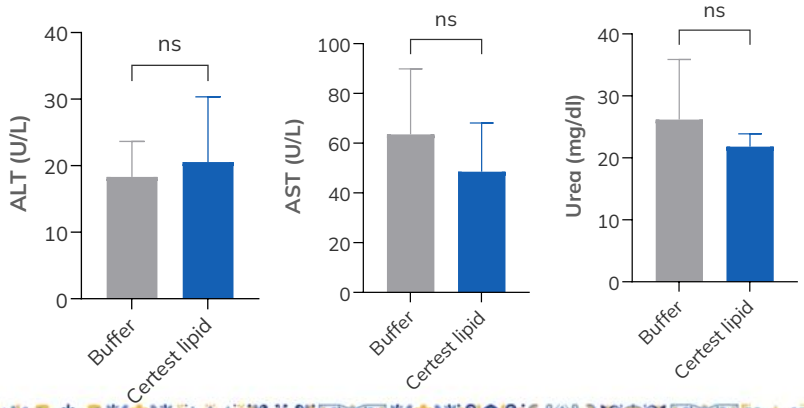
Cas9 mRNA + sgRNA (1:1 w)
20 µg/dose

Coagulation Factor VII target

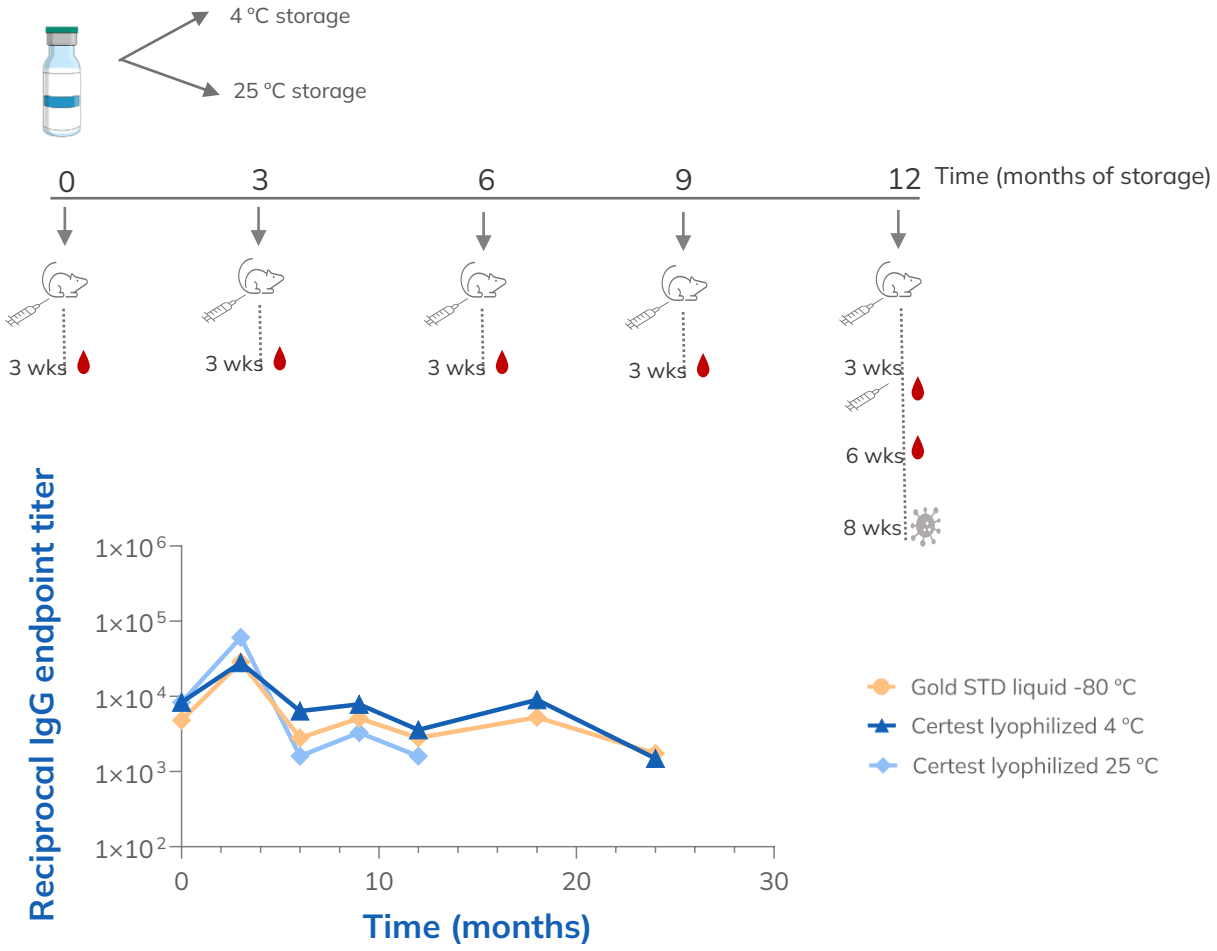
Serum Factor VII quantification

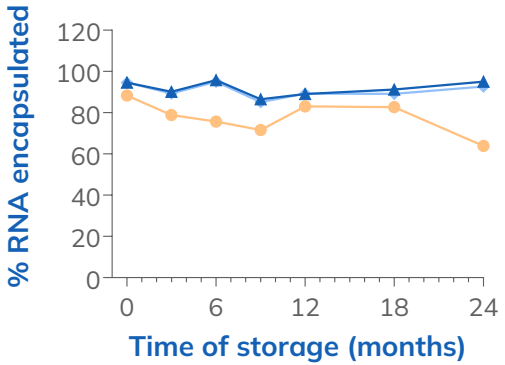


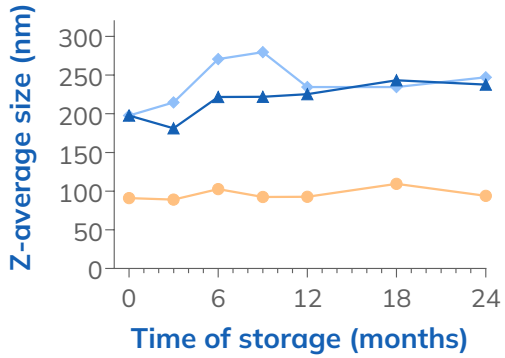
Serum biochemical analysis

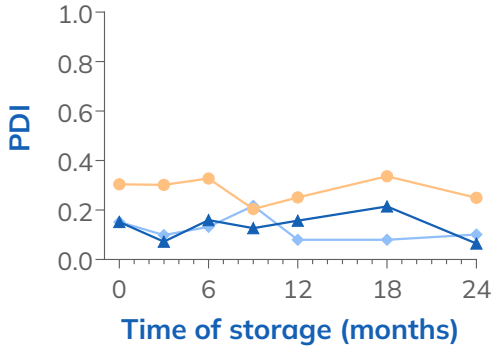


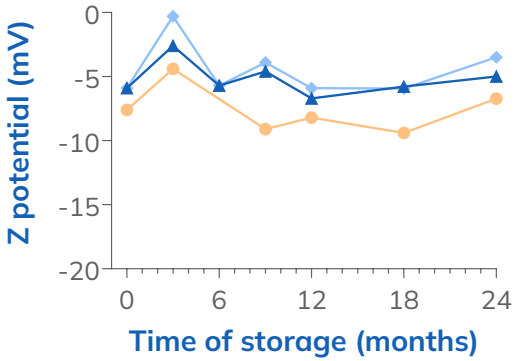
SARS-CoV-2 Vaccine | Stability of freeze-dried LNPs







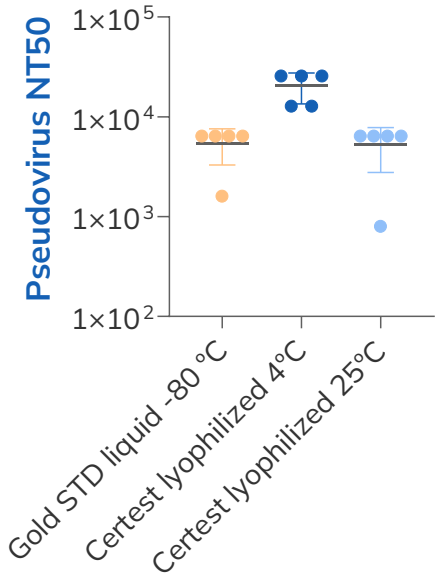




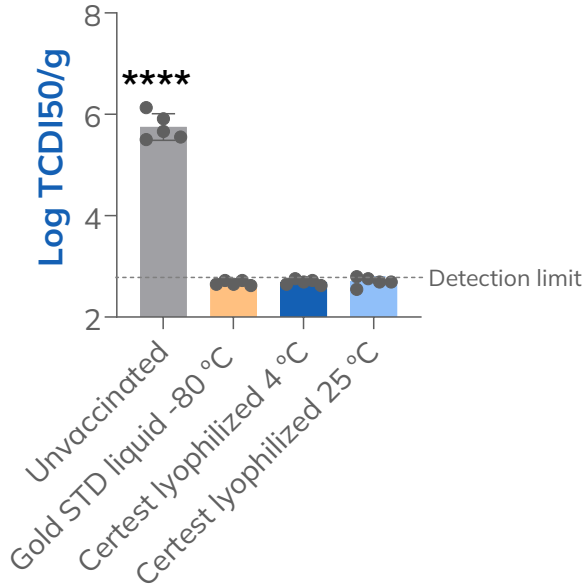
https://doi.org/10.1038/s41541-025-01201-1

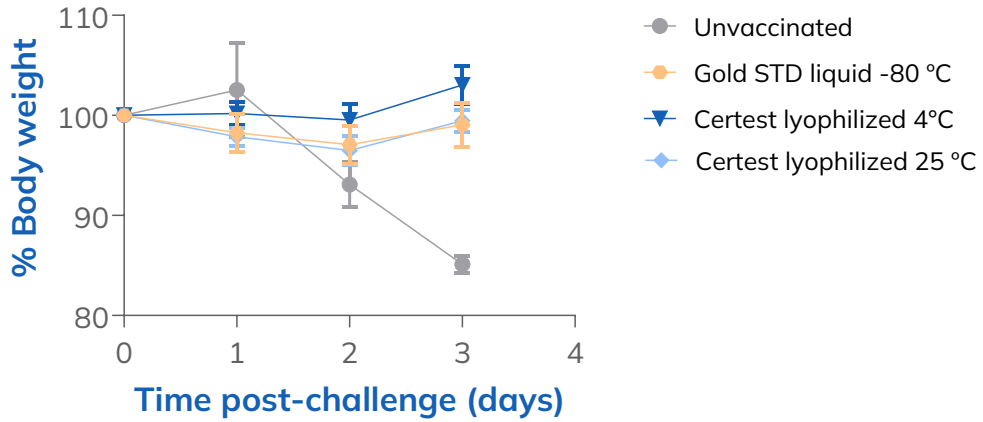
VACCINE EFFICACY AFTER 12 MONTHS OF STORAGE

Serum neutralization titers post-boost



Lung viral load
(day 3 post-SARS-CoV-2 challenge)



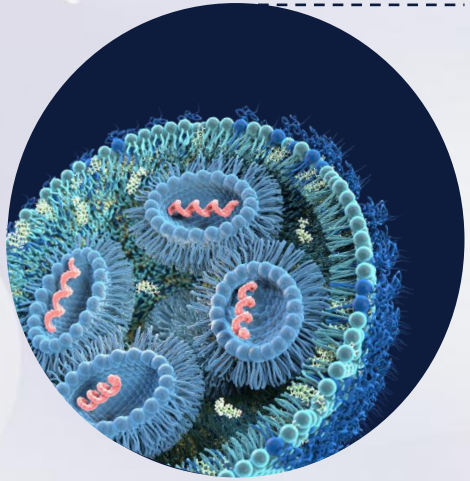


https://doi.org/10.1038/s41541-025-01201-1

Certest Lyophilized vaccines retain their immunogenicity and efficacy after **12 months of storage** at temperatures up to **25°C**

From Passive to Active Targeting – CerTarget Lipid Technology

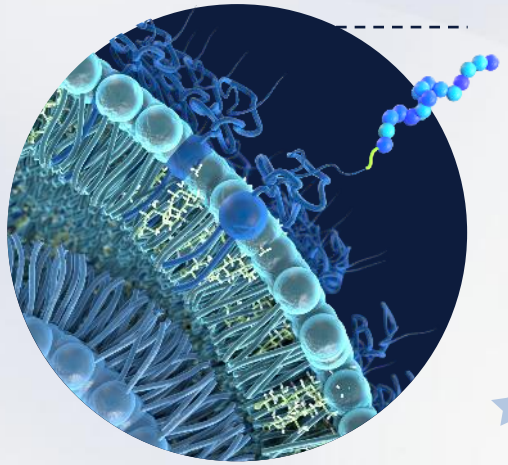
Pasive Targeting



Four component LNP

- *Organ-selective delivery through lipid composition*
- *FTO (Freedom to Operate)*
- *Protein corona-driven biodistribution modulation*

Active Targeting

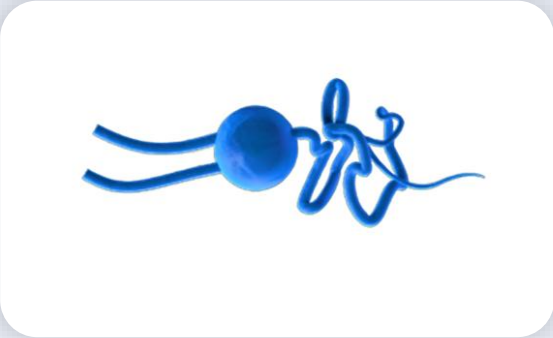


Ligand-conjugated LNPs with CerTarget Lipid Technology

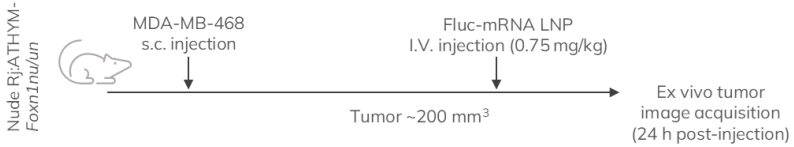
- *Improved conjugation and ligand presentation*
- *Preserved LNP functionality and stability*
- *20-fold in vivo increase in tumor delivery*
- *Compatible with multiple ligands (peptides, AB, Fab)*

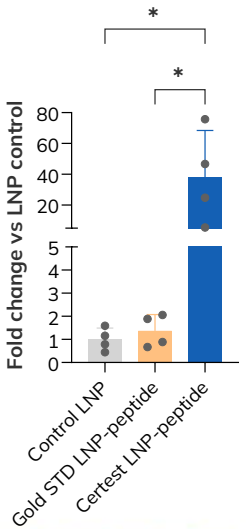
Proprietary CerTarget Technology for Enhanced Targeted Delivery

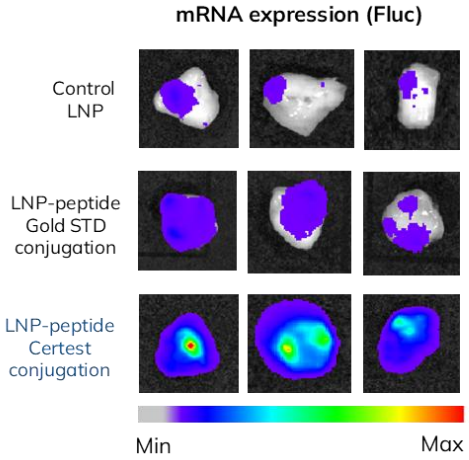
CerTarget Lipid



- PEG-alternative surface lipid platform
- Compatible with peptides and antibody conjugation
- Preserved LNP stability and functionality
- Improved receptor-mediated delivery performance
- **20-fold increase in tumor delivery in vivo**
- 3-fold increase in brain delivery in vivo.

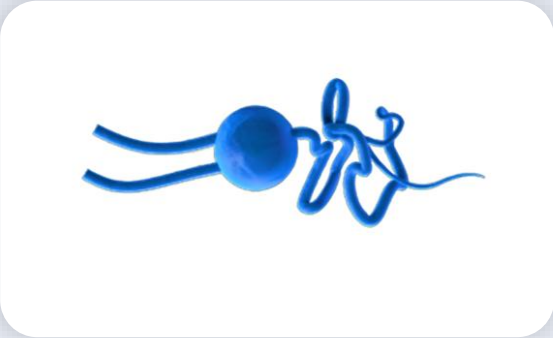






Proprietary CerTarget Technology for Enhanced Targeted Delivery

CerTarget Lipid



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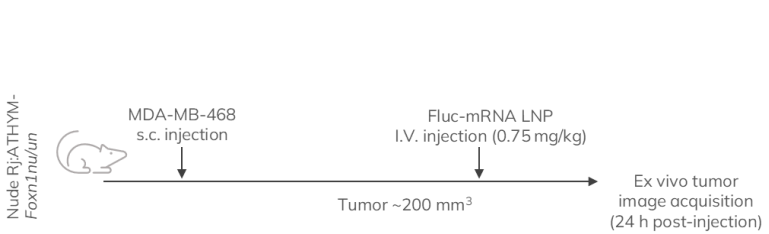
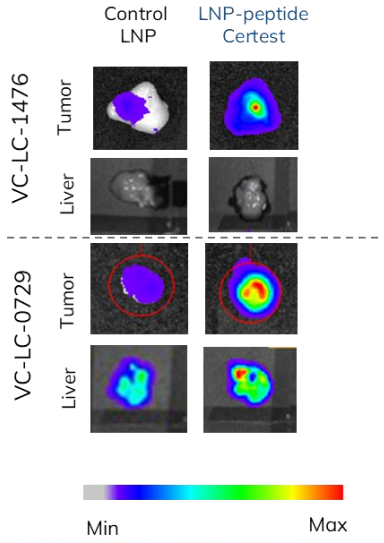
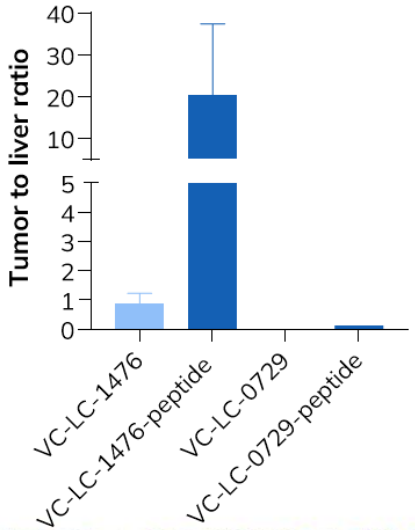


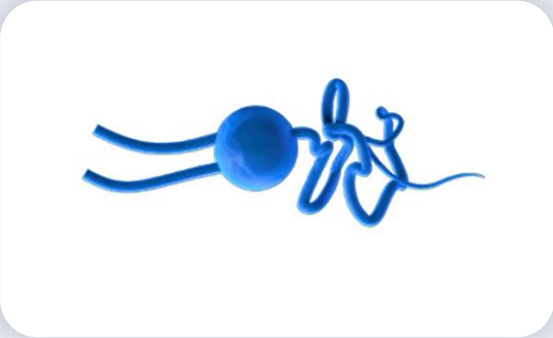




Compatible with extrahepatic lipids

Proprietary CerTarget Technology for Enhanced Targeted Delivery

CerTarget Lipid



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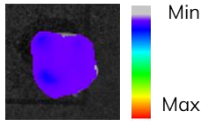
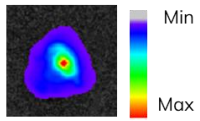
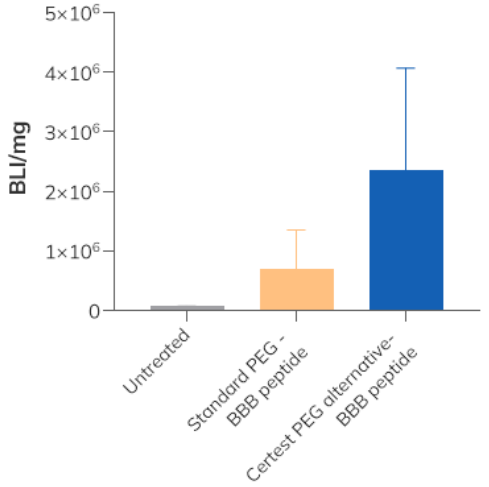
DSPE-PEG-Peptide



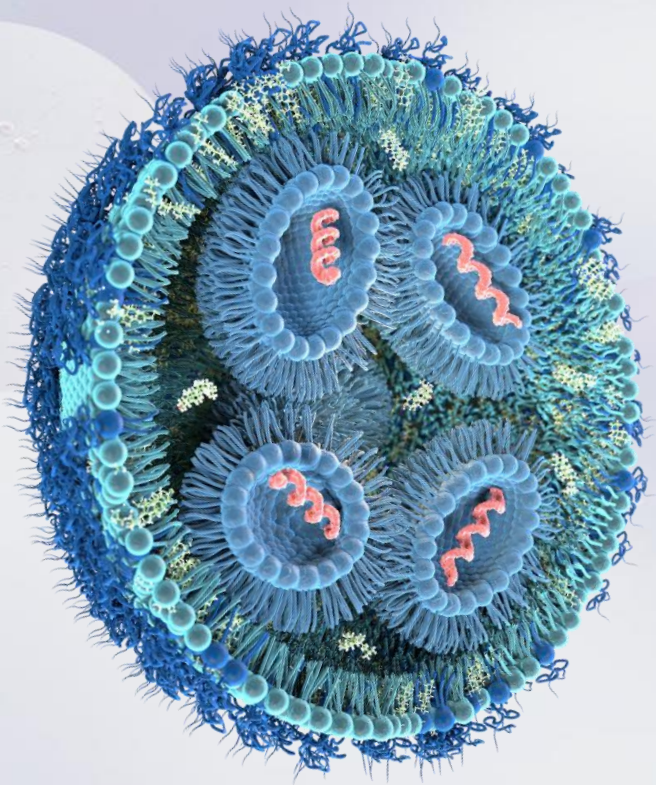
CerTarget lipid-Peptide





Platform Enhancement Technologies

Developing technologies the enhance LNP delivery performance



Optimized Thermostable LNP Formulations

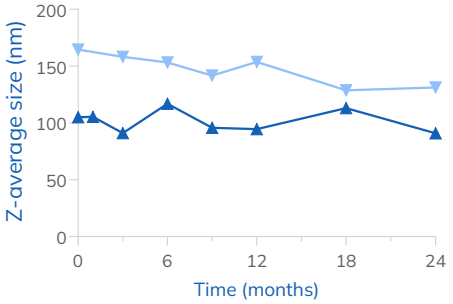
Stability and efficacy of lyophilized LNPs and naked oligonucleotides, as well as liquid formulations

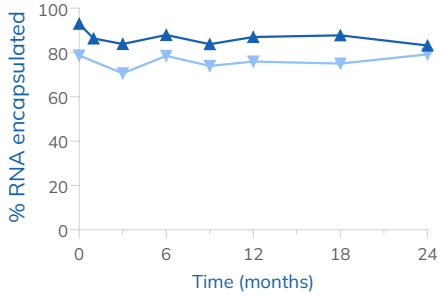
RNA and Oligonucleotide modifications

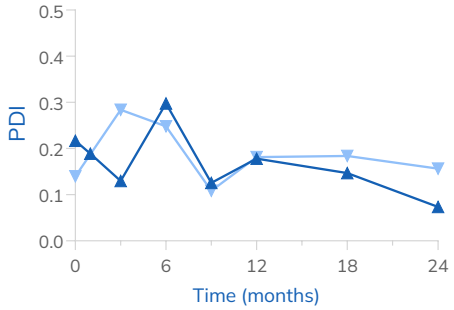
Tailored modifications to improve stability, specificity, and functionality

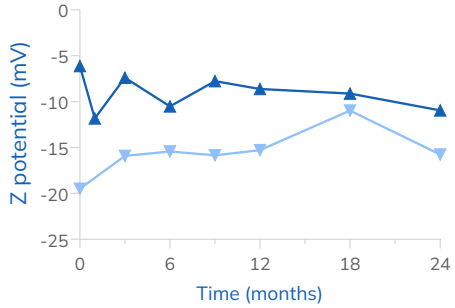
Enhancement of thermal stability. Freeze-drying

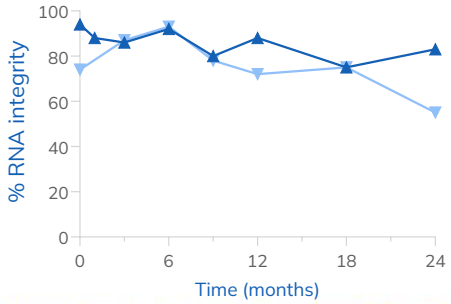
STABILITY AFTER 2 YEARS

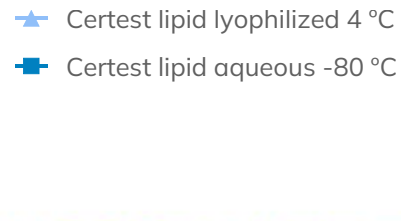


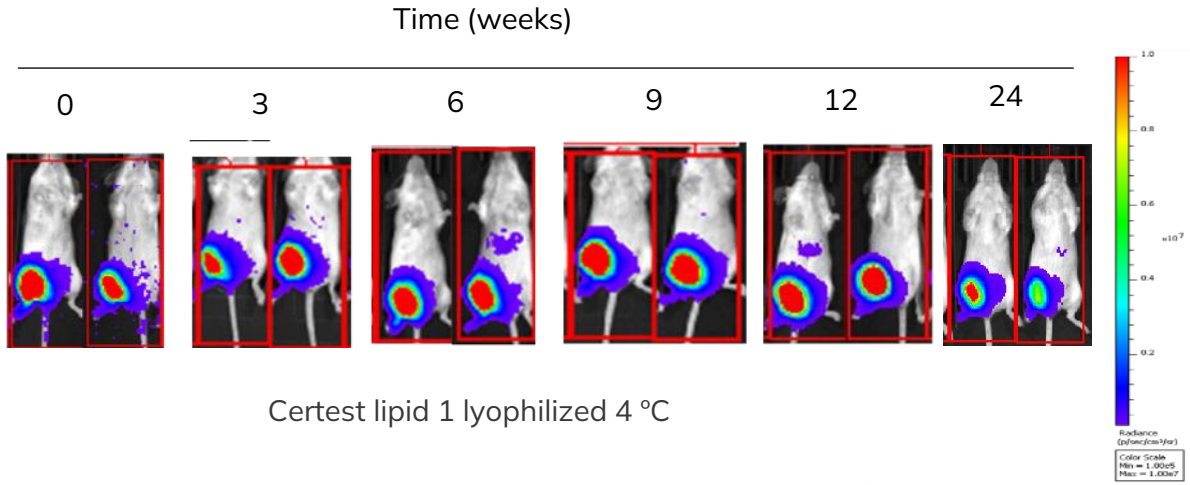






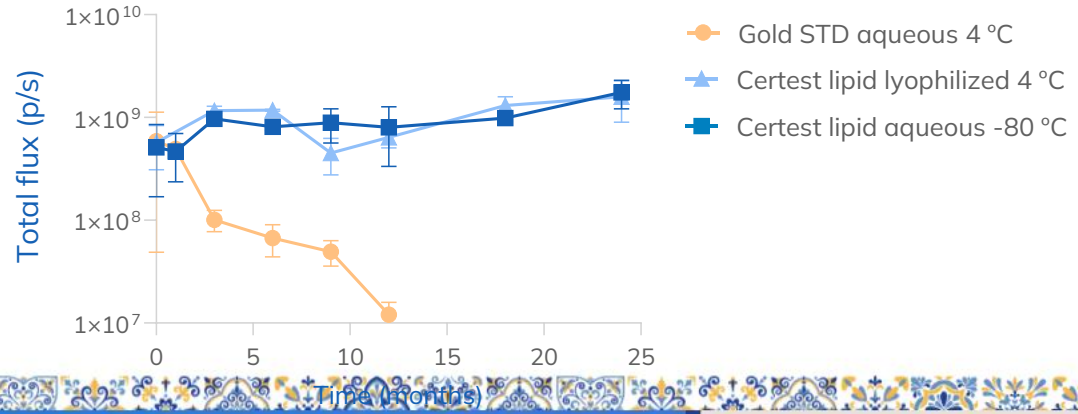






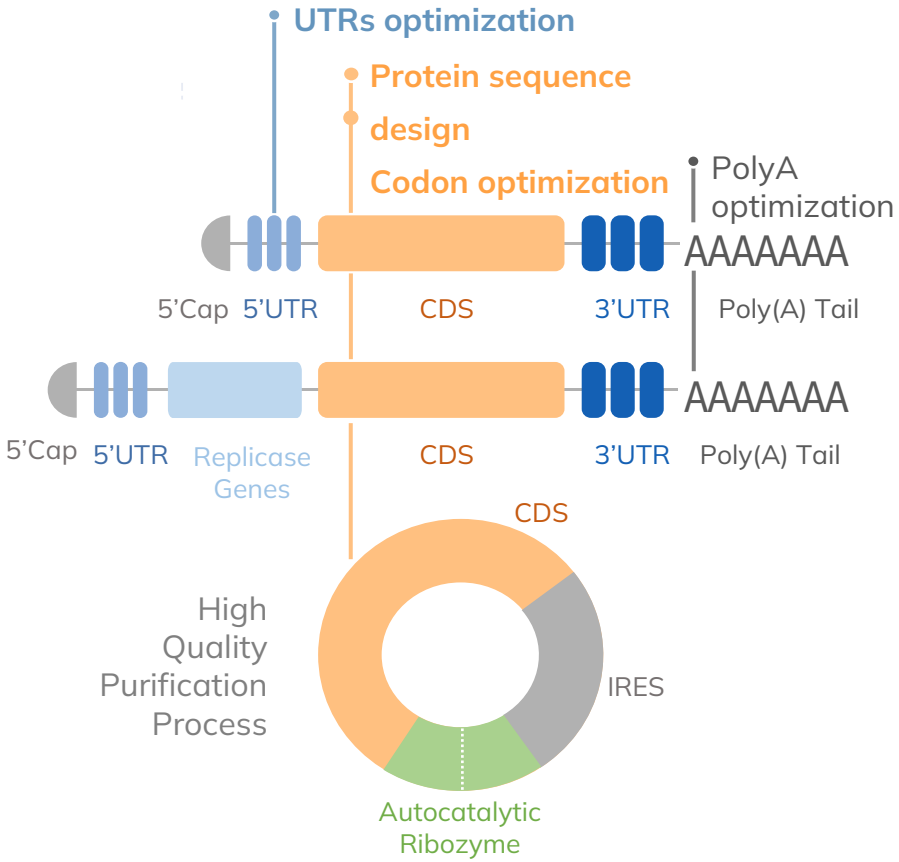
Certest lipid 1 lyophilized 4 °C

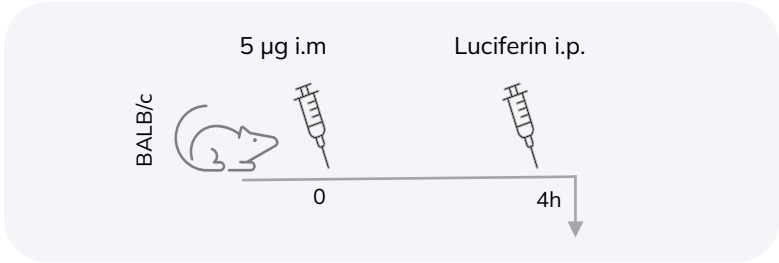
4 h post-I.M. injection (1 µg RNA/mouse)



Proprietary RNA technology

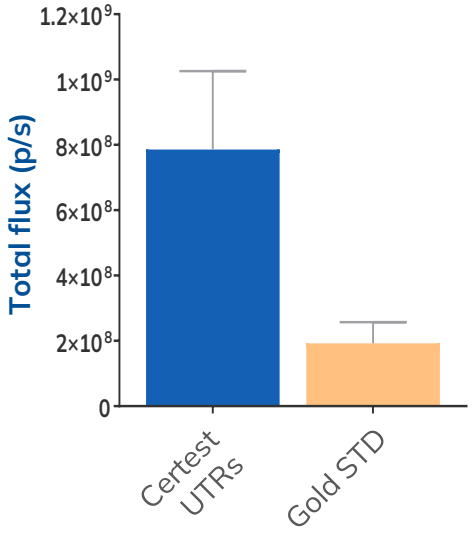
mRNA, saRNA and circRNA available





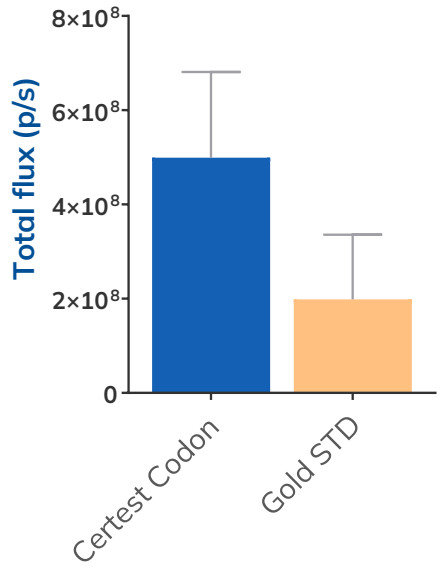
UTRs OPTIMIZATION

4x protein production

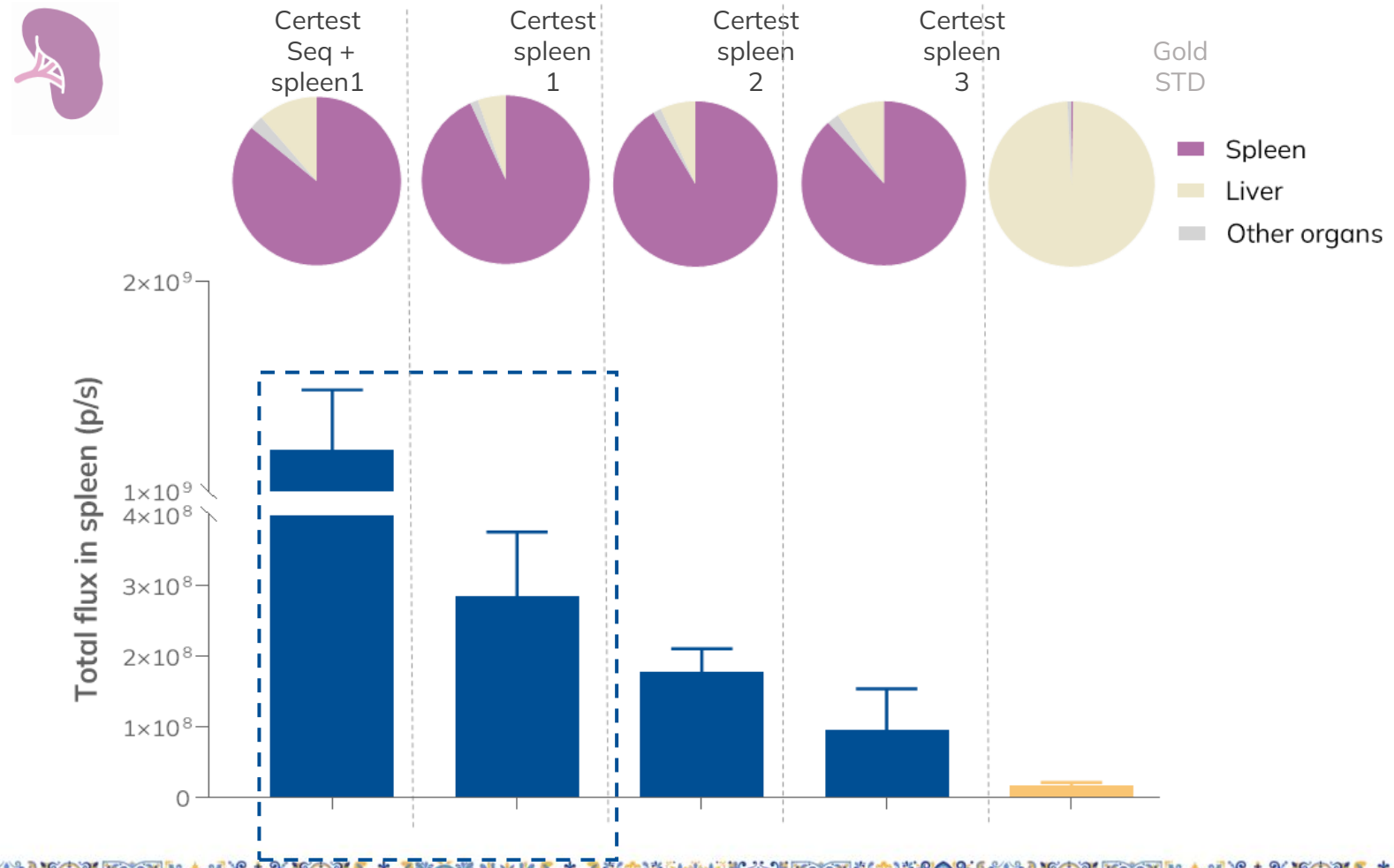


CODON OPTIMIZATION

3x protein production



Proprietary RNA technology



Spleen specific UTRs increase protein expression for targeted

3,000
sqm of dedicated labs

75+
people

Thank you – Questions?

certest PHARMA

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