

Acer Personalized Neoantigen Cancer Vaccine



Sampling



Sequencing



Targeting



Manufacturing



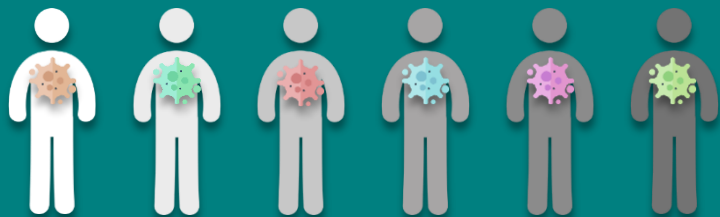
Treatment



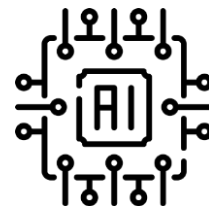
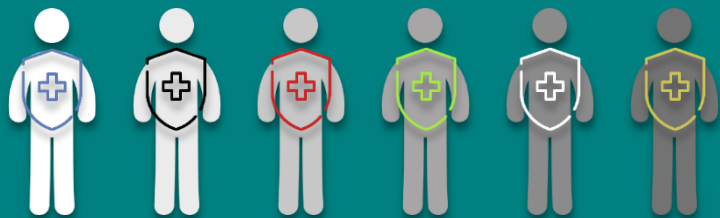
Effect

Acer Value Lab
Li-Tzu Yeh Ph.D.
2024. 11. 16

Unique tumor in every patient



Unique immune system in every patient

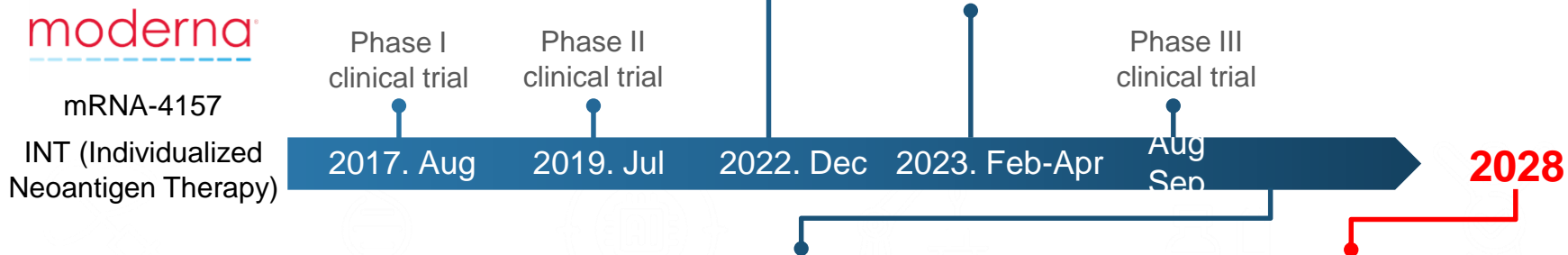


Why Use AI for Cancer Treatment

Neoantigen

New drug targets must be identified for each patient for optimal activation of the immune system.

莫德納開發 mRNA 黑色素瘤疫苗！結合默克免疫藥物降 44% 復發率 TechNews
科技新報
2022.12.14



Phase II、III personalized cancer vaccine

Company	Cancer type
Merck & Co / Moderna	Melanoma、NSCLC
Genentech / BioNTech (BNT)	Melanoma, Colorectal cancer, Pancreatic cancer
Merck & Co / Gritstone Bio	Metastatic colon cancer
Stemirna Therapeutics	Oesophageal Cancer、NSCLC

R&D day and business updates Anticipating 3 launches



Oncology therapeutics

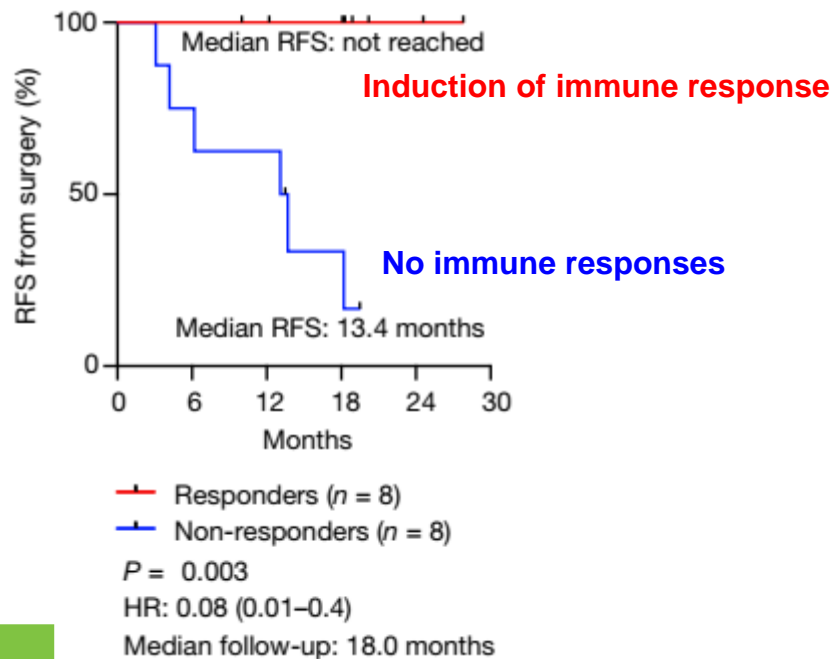
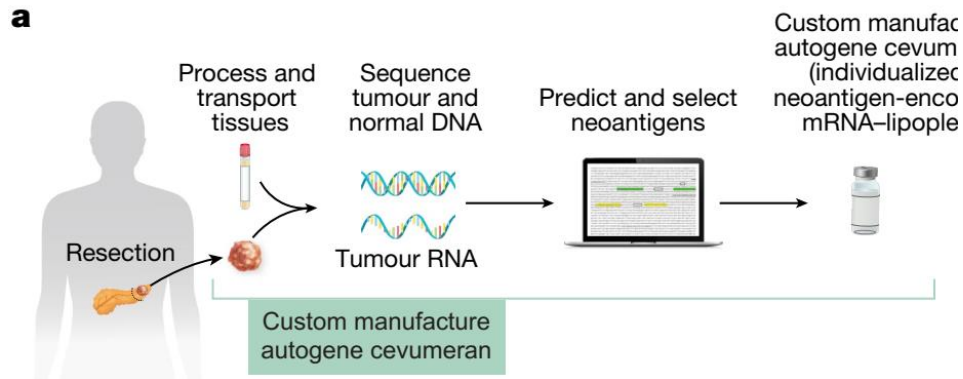
- **INT:** Positive Phase 2 data
- **INT:** Phase 3 in adjuvant melanoma enrolling
- **INT:** Phase 3 in NSCLC to begin in 2023

INT
(adjuvant melanoma)
mRNA-4157

INT
(undisclosed indication)
mRNA-4157

INT
(adjuvant NSCLC)
mRNA-4157

Personalized RNA Neoantigen Vaccines Stimulate T cells in Pancreatic Cancer



Item	Description
Stage	Phase I (NCT04161755)
Cancer type	Pancreatic cancer
Experimental (16人)	mRNA Vaccine + Tecentriq (aPD1) + mFOLFIRINOX

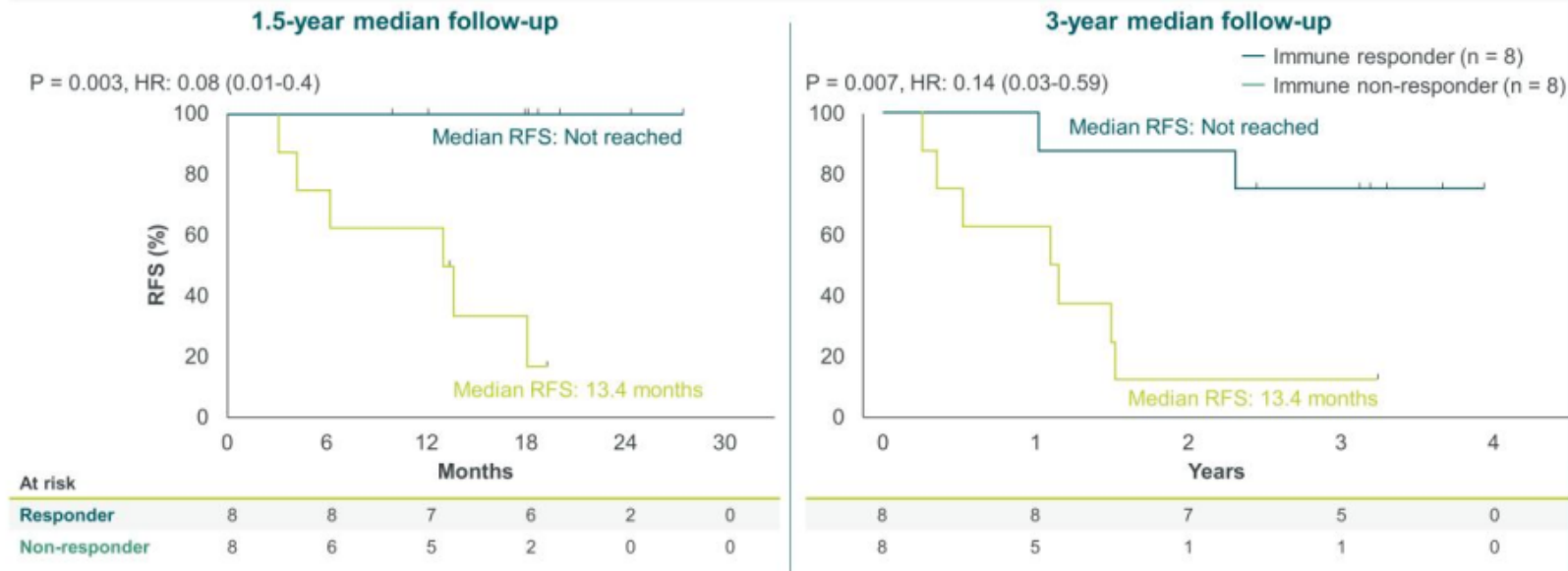
Item	Description
Stage	Phase II (NCT05968326, 2023.10.18, 260 patients)
Cancer type	Pancreatic cancer
Experimental (16人)	Arm 1 : mRNA Vaccine + Tecentriq (aPD1) + mFOLFIRINOX Arm 2 : mFOLFIRINOX

Nature. 2023 Jun;618(7963):144-150

Personalized RNA Neoantigen Vaccines Stimulate T cells in Pancreatic Cancer

Phase 1, investigator-initiated trial in resectable PDAC: 3-year follow-up data

Balachandran V et al. Presented at AACR 2024. # CT025 & Rojas et al. Nature. 2023.



1. Partnered with Genentech, member of Roche Group.

PDAC = Pancreatic ductal adenocarcinoma; OS = overall survival, RFS = relapse-free survival.

Workflow of Acer Personalized Neoantigen Cancer Vaccine



Sampling



Sequencing



Targeting



Manufacture

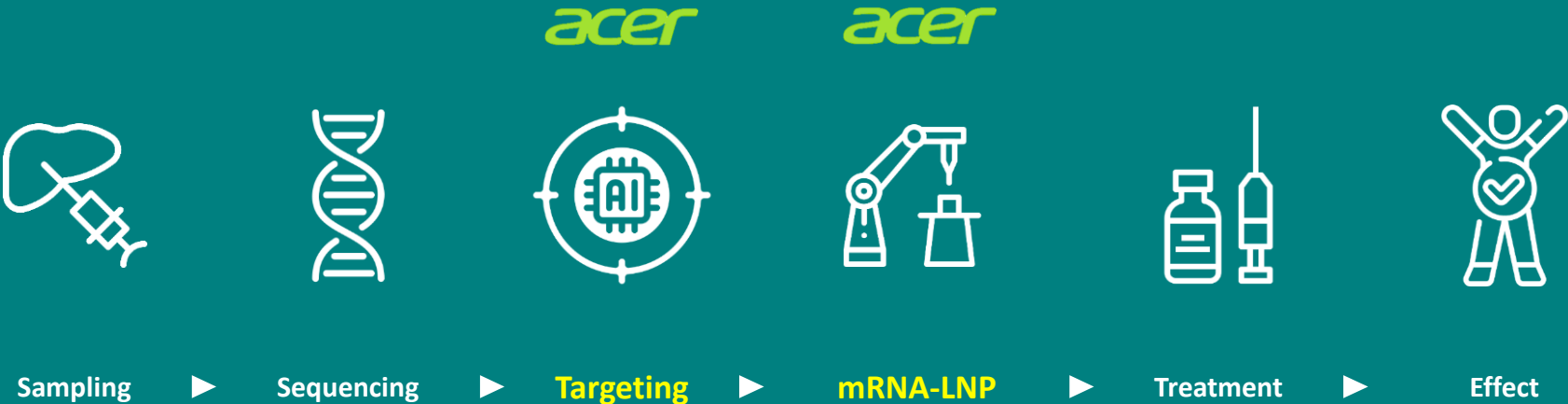


Treatment



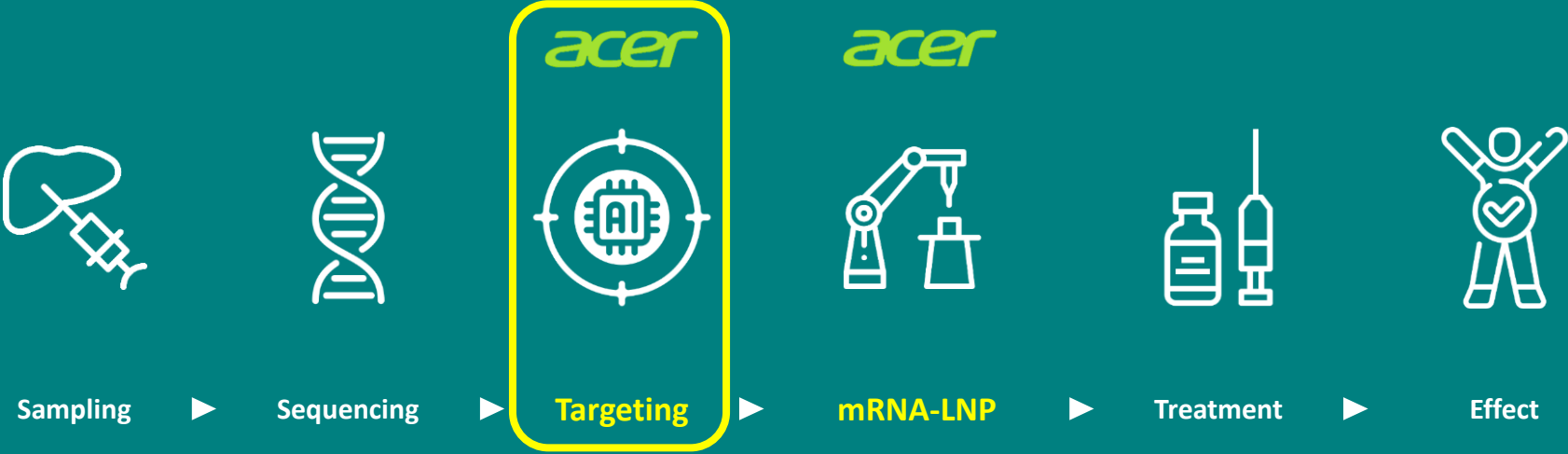
Effect

Acer Platforms for Personalized Neoantigen Cancer Vaccine



Targeting : Acer Artificial intelligence prediction of neoantigen
mRNA-LNP : Acer mRNA payload design
Acer ionizable lipid-111

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Acer Artificial Intelligence for Personalized Neoantigen Cancer Vaccine



NGS

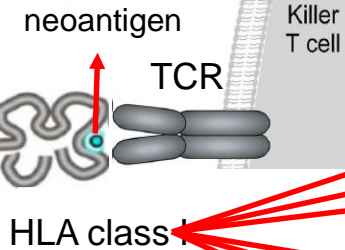
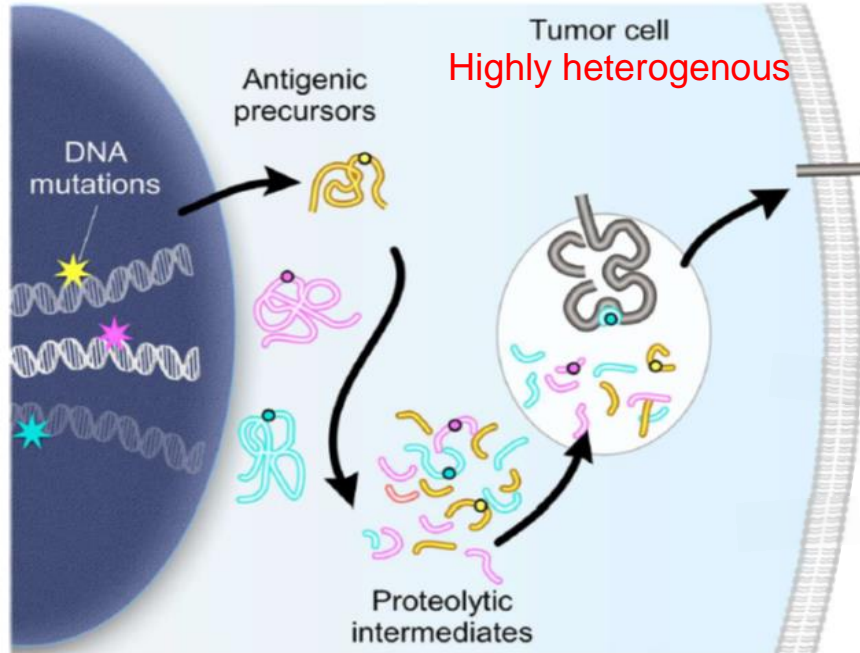


10,000,000 potential 9-mer peptides from human gene

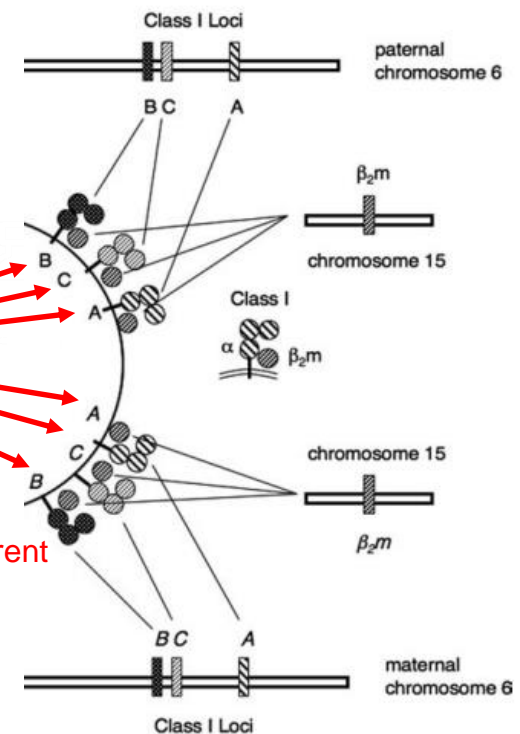
acer



1,000-10,000 unique epitopes presented by HLA class I

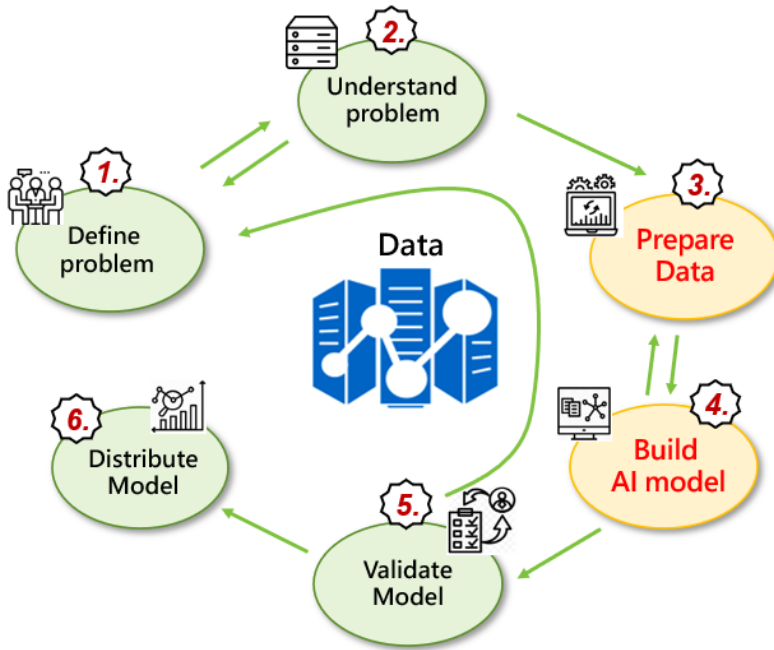


1. High polymorphism (n>20,000)
2. Inheritance from each parent
3. Codominant expression



The Strategy of Improving Acer AI Model Performance

AI model development flow chart



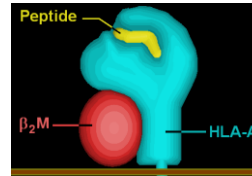
Open source

Pro: Less cost on experiments
Con: Data quality does not control

Generate data by ourself

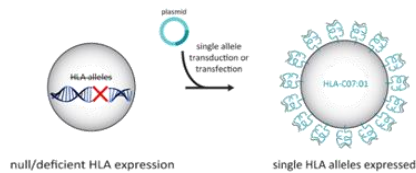
Pro:

1. Race specific allele
2. Data variety
3. More and better data, better performance
4. Intellectual property



Acer BioLab - Generate Data for AI Model

Data set for AI training



genetic engineering
HLA mono-allelic cells



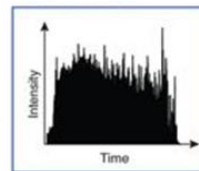
immunoprecipitation of HLA peptide complexes

elution of HLA peptides

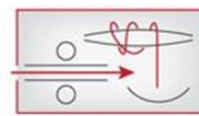
UHPLC Separation



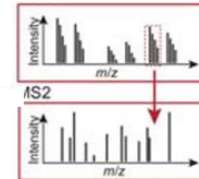
Chromatogram



Mass Spectrometer



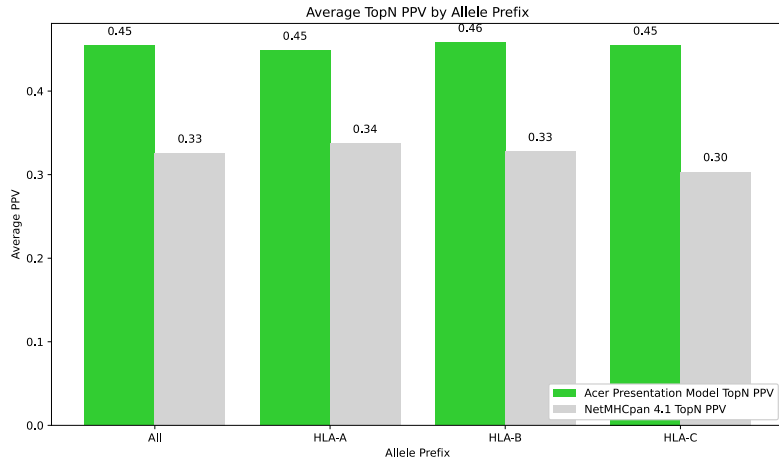
MS1



HLA peptide identification

datasets for neural network training

AI Models Performance – HLA class I

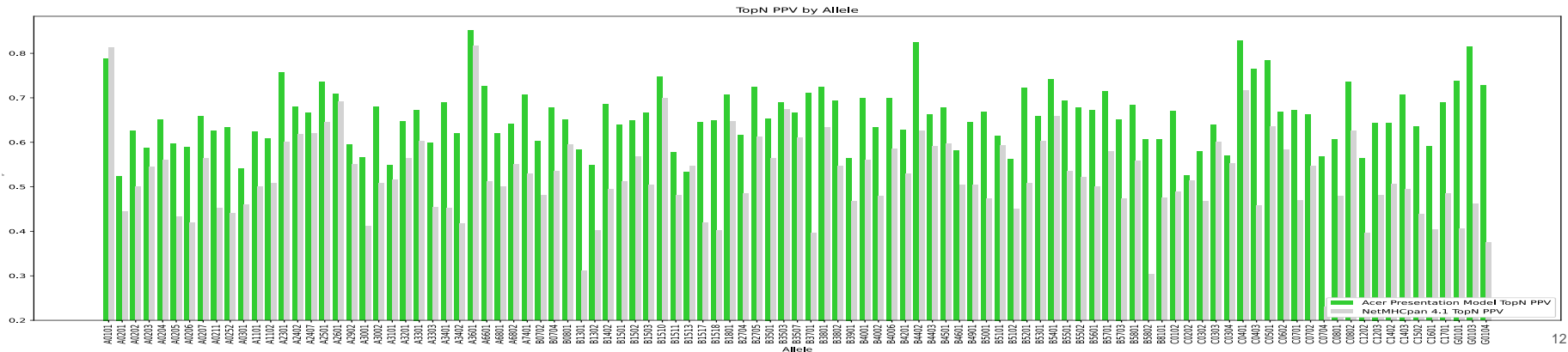


Number of Model Alleles (Class I) : 103

Taiwanese Alleles (proportion >0.5%) : 57

Category	Acer	NetMHCpan 4.1
Overall	0.45	0.33
HLA-A	0.45	0.34
HLA-B	0.46	0.33
HLA-C	0.45	0.33

+33%

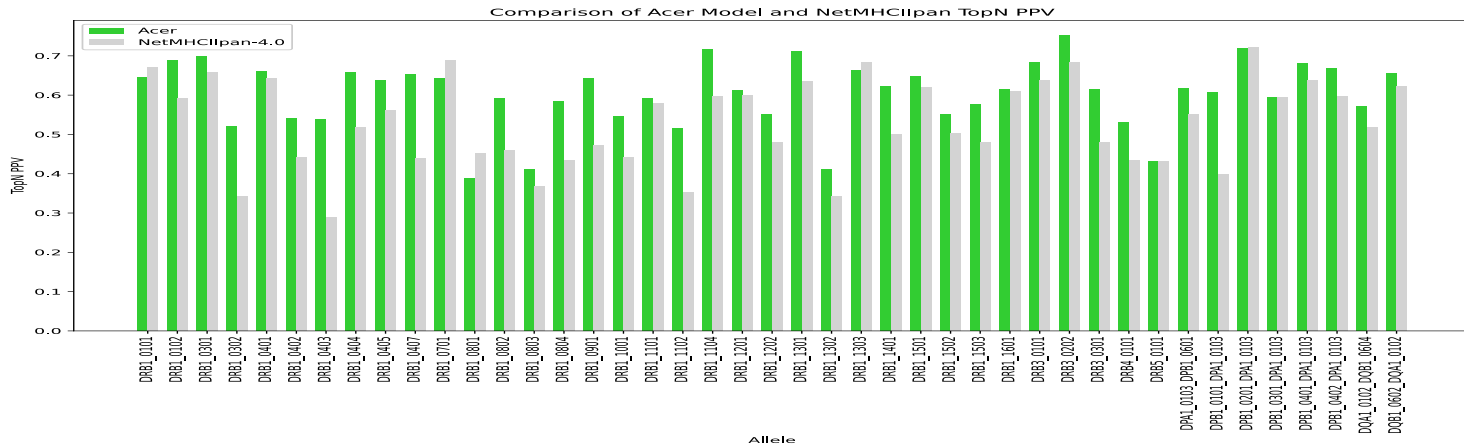


AI Models Performance – HLA class II

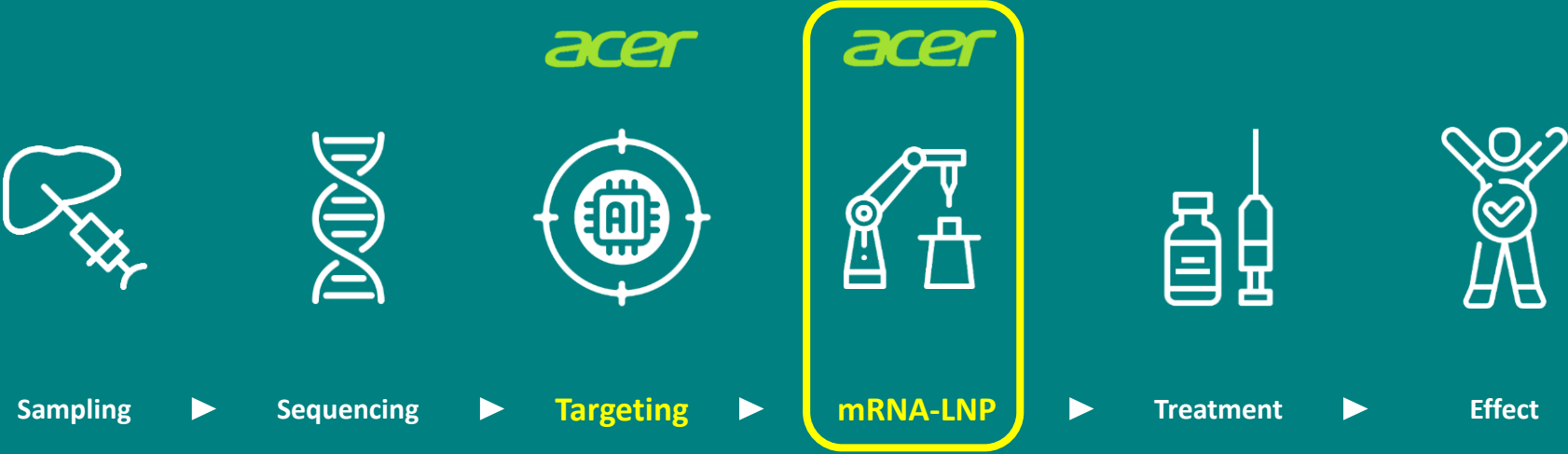
Number of Model Alleles (Class II) : 43

Acer	NetMHCIIpan 4.0
0.603	0.529

+14%

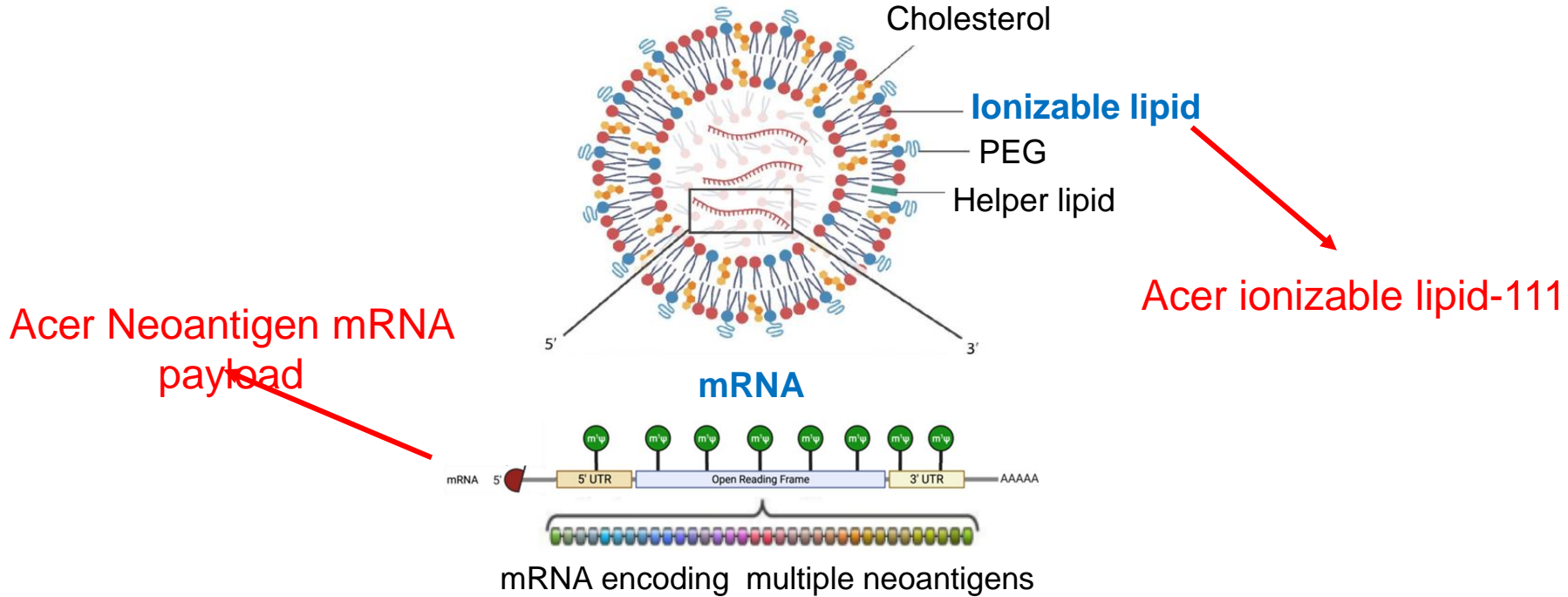


Acer Platforms for Personalized Neoantigen Cancer Vaccine



Targeting : Acer Artificial intelligence prediction of neoantigen
mRNA-LNP : Acer mRNA payload design
Acer ionizable lipid-111

Acer mRNA Payload and Ionizable Lipid



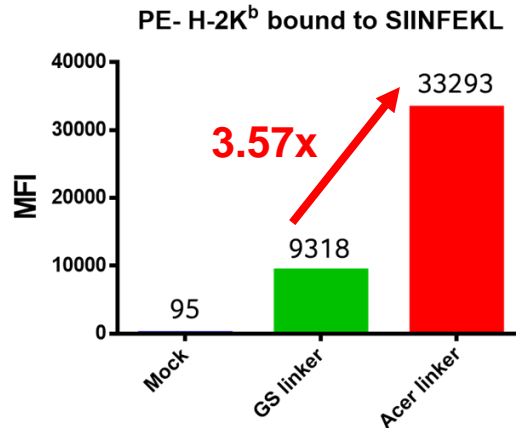
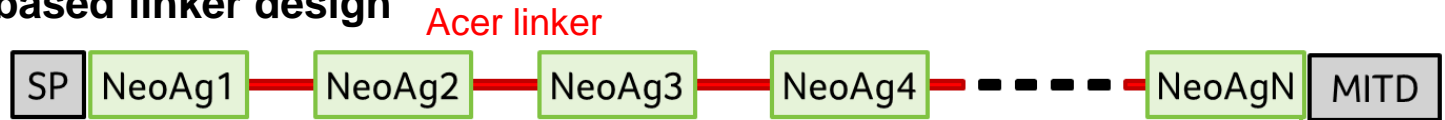
Acer AI Platform Significantly Enhances Epitope Presentation

BNT: GS

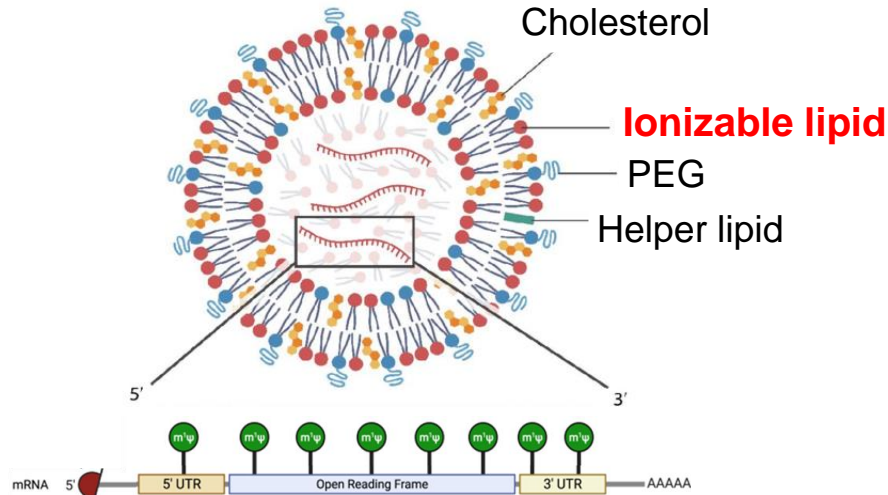
Linker Clinical Trials: NCT04161755



Acer: AI-based linker design



Ionizable Lipid for Acer Neoantigen-based Personalized Cancer Vaccine



Acer ionizable lipid-111 (AIL-111)

Moderna

SM102

FDA-approved
COVID-19 vaccine

BNT

ALC-0315

FDA-approved
COVID-19 vaccine

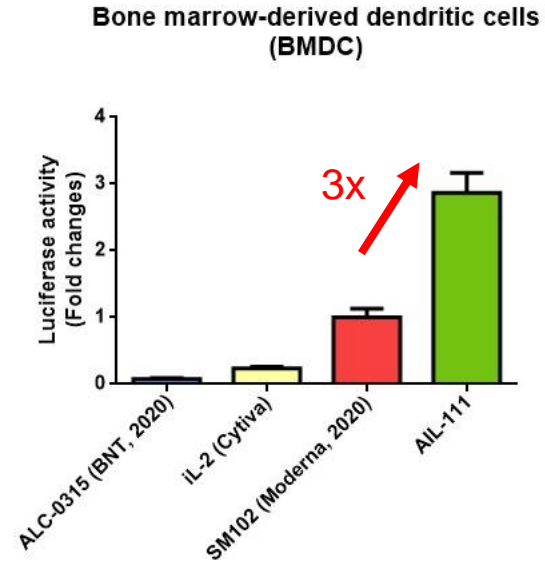
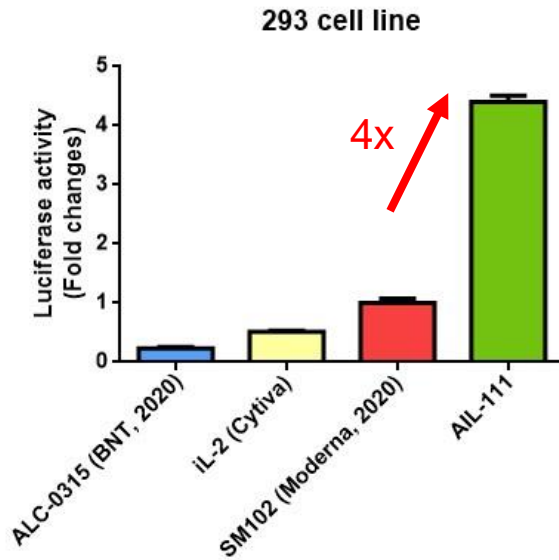
Cytiva

iL-2

Phase I clinical trial
Rabies vaccine

AIL-111 exhibits superior luciferase activity

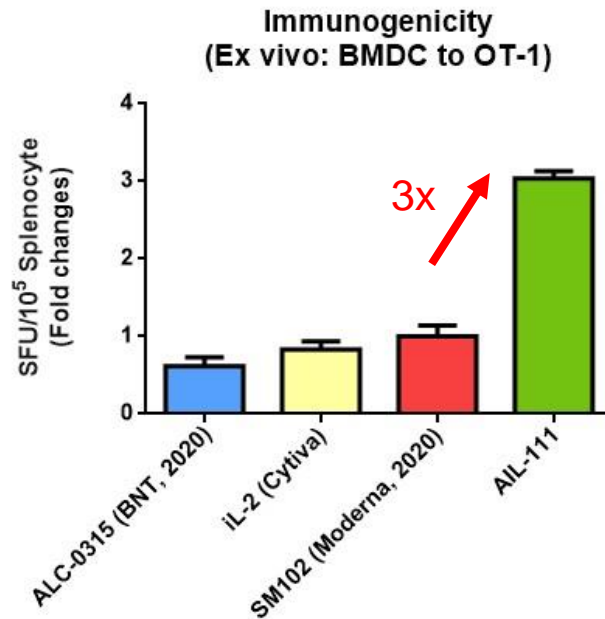
In vitro protein expression level



AIL-111 significantly enhances CD8 epitope-mediated T cell activation

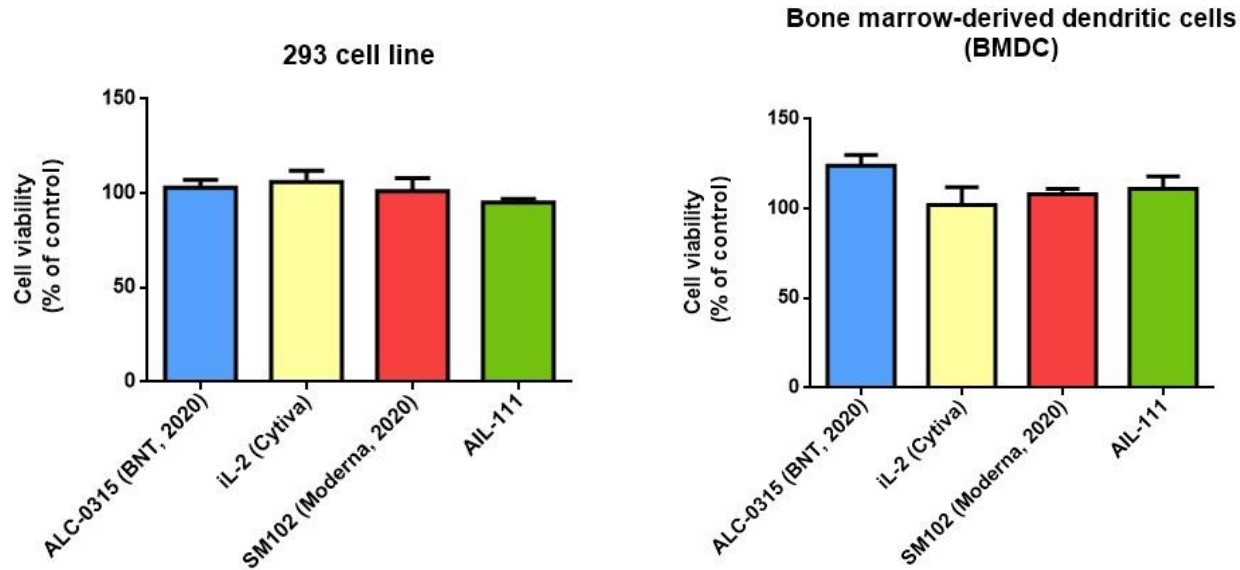
Ex vivo activation of antigen-specific T cells

BMDC-T-cell
coculture



mRNA-LNPs Formulated with AIL-111 Exhibit Comparable Safety when Compared to Varied Lipid Nanoparticles.

Cell toxicity

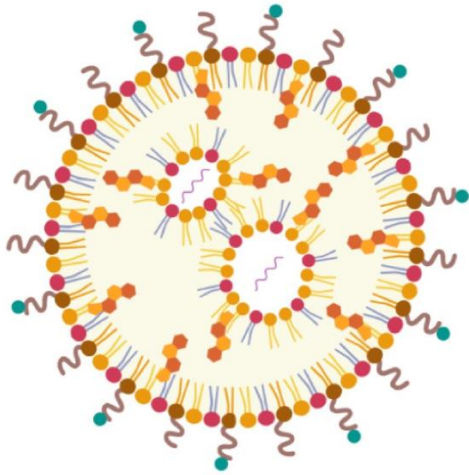


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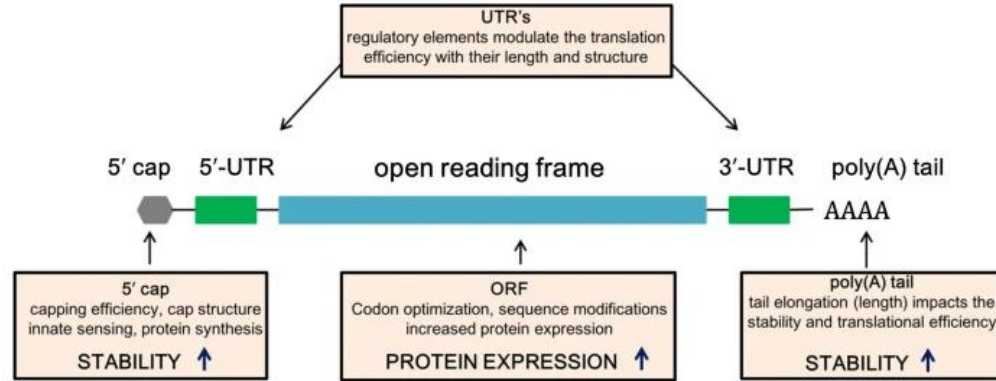
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mRNA Structural Elements



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Acer 中研院策略合作 – Personalized Neoantigen Cancer Vaccine Development

acer



Acer BioMed

中研院

GMP-compliant 場域		
GMP-compliant 生產設備		
生產人員		
研發人員		
品保人員		
離子化脂質等專利授權		
個人化 mRNA 癌症疫苗設計		
個人化腫瘤新抗原分析與預測		
個人化 mRNA 癌症疫苗製程開發		
個人化 mRNA 癌症疫苗品管建立		
mRNA 癌症疫苗生產		
法規單位諮詢	產品	產線
臨床前藥毒理試驗		
臨床試驗設計與執行		

THE BEST IS YET TO COME