

GenVoy-ILM™

T Cell Kit for mRNA

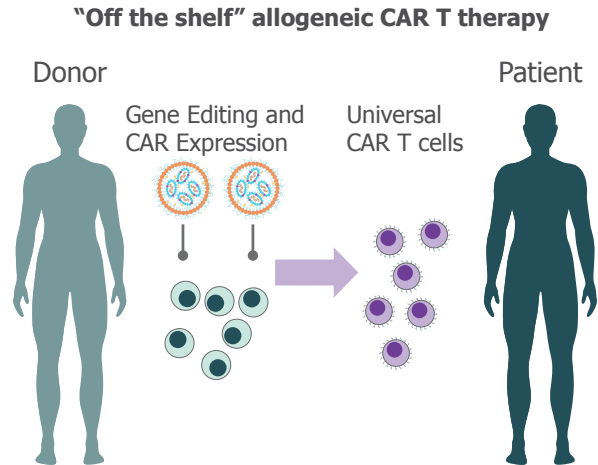
on NanoAssemblr® Ignite™

Scale Up Your Cell Therapy with
Lipid Nanoparticles



GenVoy-ILM T Cell Kit for mRNA, Ignite

Current gene delivery methods have significant challenges, hindering future innovations in cell therapies. Non-viral electroporation method can be harsh on cells, making it difficult to generate quality cells at high yields, whereas conventional viral vector delivery method is expensive and cumbersome to manufacture. Lipid nanoparticles (LNPs) enable researchers to establish a clinically-relevant and scalable method for *ex vivo* gene delivery and editing to advance the development of cell therapies.



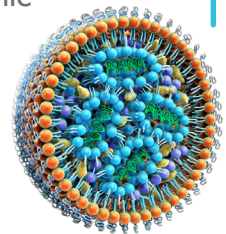
GenVoy-ILM™ T Cell Kit for mRNA, Ignite is an off-the-shelf lipid nanoparticle (LNP) reagent mix optimized for the delivery of messenger RNA (mRNA) or Cas9 mRNA/sgRNA into activated human primary T cells. This kit is available in two sizes: 3 mL and 6 mL.

LNPs are prepared on the NanoAssemblr® Ignite™ instrument with Ignite NxGen™ Cartridges. This non-viral delivery method can be seamlessly integrated into any standard human T cell culture workflows using an established protocol with either freshly isolated or cryopreserved T cells. With this kit, researchers can establish a clinically-relevant and scalable method at the preclinical scale for *ex vivo* gene delivery and editing.

This kit is also available on the NanoAssemblr Spark™ as GenVoy-ILM™ T Cell Kit for mRNA, Spark.

Why Use the GenVoy-ILM T Cell Kit for mRNA, Ignite?

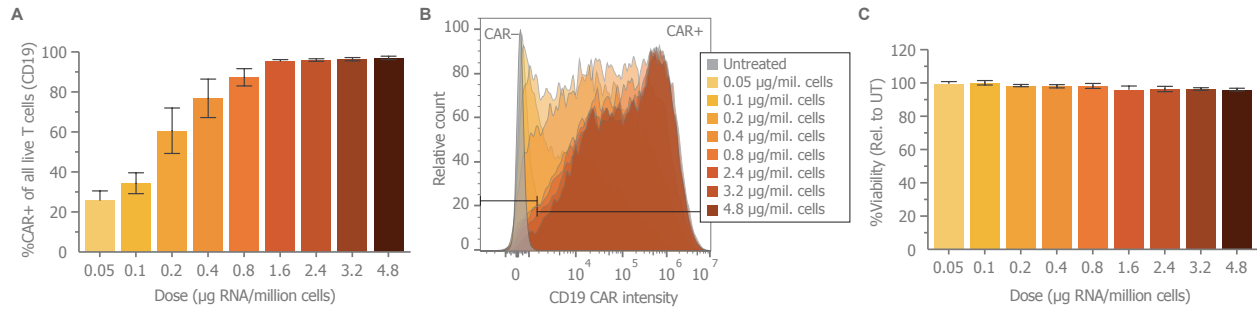
- Deliver mRNA into activated primary T cells reproducibly with high efficiency
- Maintain high T cell viability, even after multi-step genome editing
- Scale up your research from discovery to preclinical on the NanoAssemblr platform
- Optimized and validated with T cell manufacturing workflow
- Accelerate your therapy with this off-the-shelf reagent with a clear licensing path to the clinic



GenVoy-ILM T Cell Kit for mRNA, Ignite

Dose-dependent Transfection Efficiency of CD19 CAR with High Cell Viabilities

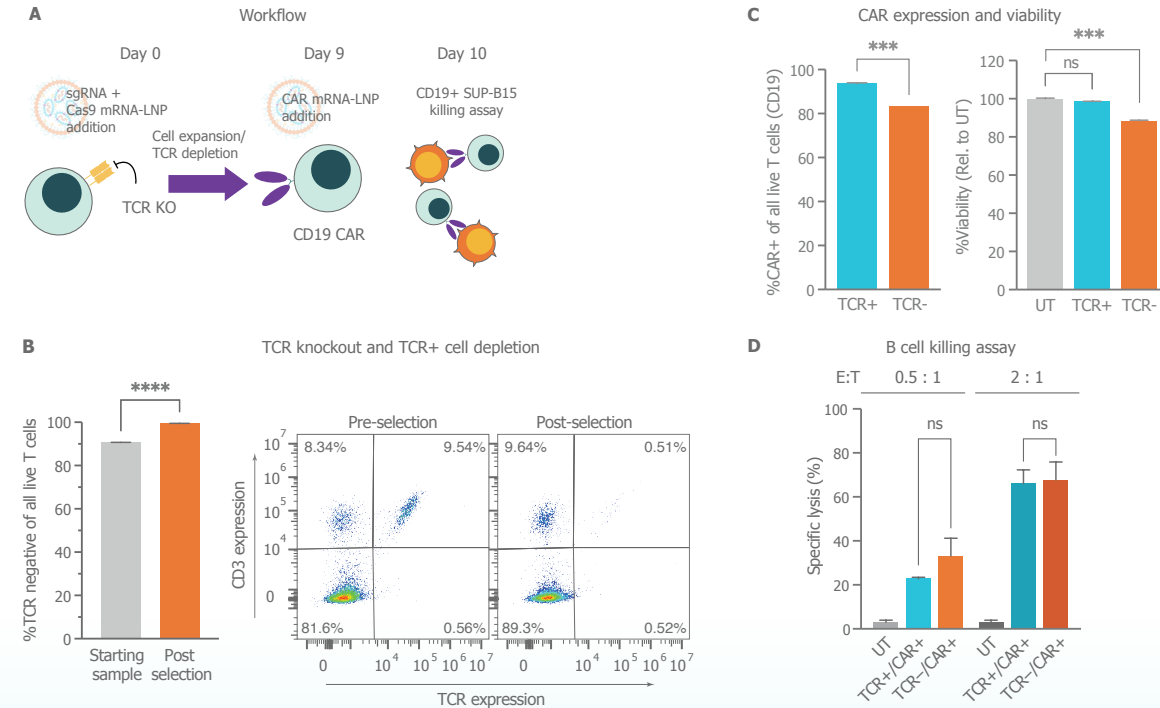
Achieve high transfection efficiency with a uniform cell population while maintaining high cell viabilities when delivering CD19 CAR mRNA-LNPs into activated human primary T cells.



Dose-dependent CD19 CAR expression and cell viabilities in primary T cells. A) Percent CD19 CAR expression and **B)** Corresponding flow histograms as detected by flow cytometry at the indicated 0.05–4.8 µg RNA/million cell dose. **C)** Corresponding percent cell viability normalized to untreated controls.

Multi-step T Cell Engineering for Off-the-shelf Cell Therapy

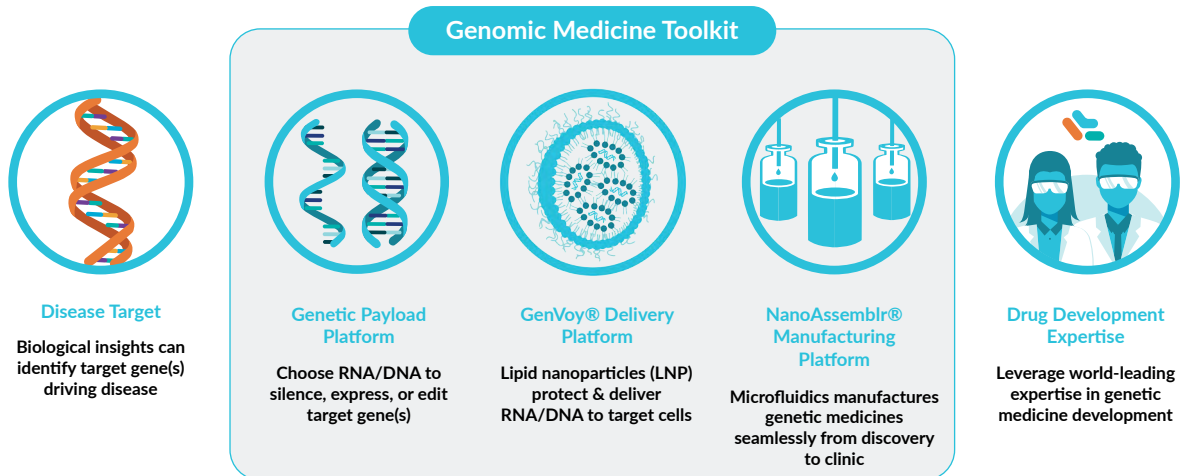
Achieve highly efficient genome editing knockouts in combination with high levels of CD19 CAR expression. This allows for the engineering of functional and viable “universal” CAR T cells that effectively kill CD19+ tumor cells.



Multi-step T cell engineering for off-the-shelf cell therapy. A) Schematic illustration of experiment. mRNA-LNPs containing sgRNA + Cas9 mRNA were added to primary T cells. Cells expanded prior to treatment with CD19 CAR mRNA-LNPs. At 24 hours post CAR mRNA-LNP treatment, CD19+ T cell killing assay was conducted for 16 hours. **B)** TCR knockout efficiency was assessed. Starting sample was TCR negative selected to further purify the TCR- population. **C)** Left: Percent CD19 CAR expression 24 hours after treatment with CAR mRNA-LNPs at 3.2 µg RNA/million cells, when population is TCR+, or TCR-. Right: Corresponding cell viabilities, normalized to the untreated population. **D)** Functional killing of CD19+ B cells (SUP-B15) by either UT, TCR+/CAR+, or gene-edited TCR-/CAR+ T cells at the indicated effector to target ratios (E:T). For all, a dose of 3.2 µg RNA/million cells was applied. Error bars represent standard deviation. Statistical significance was evaluated using t-tests or one-way ANOVA among the shown groups.

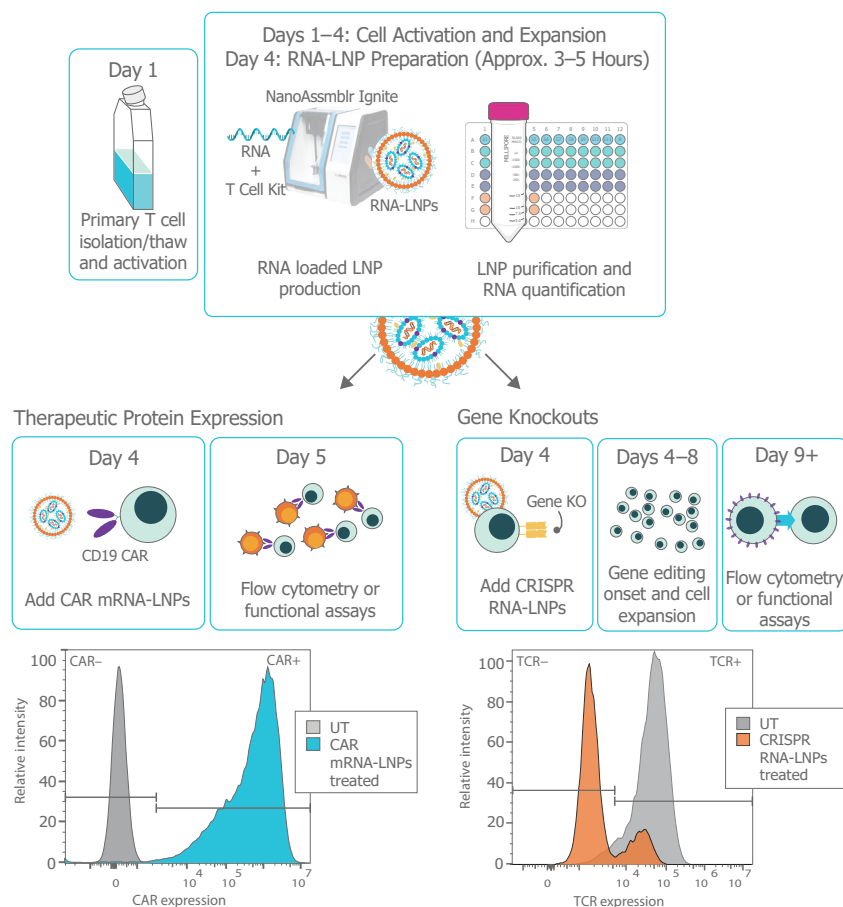
Lipid Nanoparticles Empower Genomic Medicine Development

Precision NanoSystems' Genomic Medicine Toolkit comprising the GenVoy LNP delivery platform, NanoAssemblr manufacturing platform and technical expertise enable researchers to develop genetic vaccines, gene therapies and cell therapies.



Easily Integrated into Standard T Cell Culture Protocols

The GenVoy-ILM T Cell Kit for mRNA, Ignite can be easily integrated into any standard T cell manufacturing workflow for both mRNA-based gene expression and CRISPR/Cas gene editing applications. See examples of the workflows as outlines below after preparing mRNA-LNPs on the NanoAssemblr Ignite instrument.

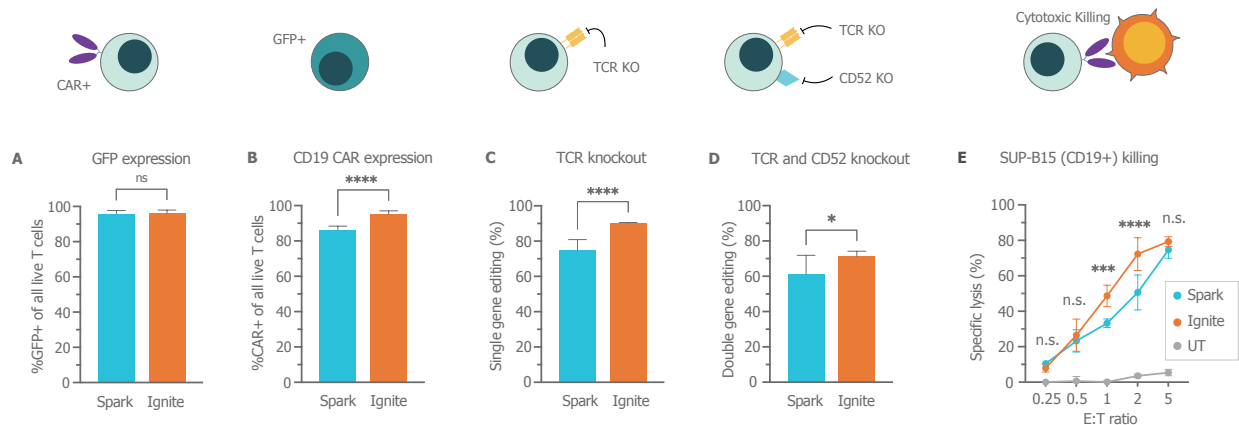


Seamlessly Scale Up From Discovery to Preclinical

The GenVoy-ILM T Cell Kit for mRNA is available on NanoAssemblr Spark and Ignite instruments.



Scale up from discovery to preclinical with a peace of mind. The NanoAssemblr microfluidic platform enables robust and equivalent performance of the GenVoy-ILM T Cell Kit for mRNA, Ignite to the GenVoy-ILM T Cell Kit for mRNA, Spark. These data demonstrate the seamless scalability from discovery to preclinical studies from NanoAssemblr Spark to Ignite.



GenVoy-ILM T Cell Kit for mRNA scale up from NanoAssemblr Spark to Ignite. **A)** GFP and **B)** CD19 CAR transfection efficiency 24 hours post mRNA-LNP addition. **C)** Levels of single target (T cell receptor, TCR) knockout, and **D)** Double target (TCR and CD52) knockout through sgRNA and Cas9 mRNA delivery. **E)** Functional killing of CD19+ B cells (SUP-B15) in a 16 hour co-culture experiment. For all: a dose of 3.2 μ g RNA/million cells was applied to human primary T cells. RNA-LNPs were prepared according to the GenVoy-ILM T Cell Kit for mRNA on Spark or Ignite User Guides. Average gene expression and gene knockout was detected by flow cytometry showing at minimum n=8 independent RNA-LNP preparations and n=2 donors. Functional killing performance was detected by flow cytometry showing n=2 independent RNA-LNP preparations and n=2 donors. Error bars represent standard deviation with statistical significance evaluated using t-tests among selected groups.

Ordering Information

GENVOY-ILM™ T CELL KIT FOR mRNA, IGNITE		PRODUCT CODE	INCLUDES
	GenVoy-ILM™ T Cell Kit for mRNA, Ignite, 3 mL	1001144	Lipid Mix, 3 mL Formulation Buffer (10X), 2 mL Dilution Buffer (10X), 40 mL Cryopreservation Buffer (2X), 3 mL Apolipoprotein-E3 (ApoE), 500 µg
	GenVoy-ILM™ T Cell Kit for mRNA, Ignite, 6 mL	1001161	Lipid Mix, 6 mL Formulation Buffer (10X), 4 mL Dilution Buffer (10X), 80 mL Cryopreservation Buffer (2X), 6 mL Apolipoprotein-E3 (ApoE), 500 µg x 2
INSTRUMENTS, CARTRIDGES AND ACCESSORIES		PRODUCT CODE	INCLUDES
	NanoAssemblr® Ignite™	NIN0001	1 Instrument 2 Sample Switch Arms 2 Cartridge Adapters
	NxGen™ Cartridges	NIN0061 NIN0062	100 pack 200 pack
RELATED INSTRUMENTS AND REAGENTS		PRODUCT CODE	INCLUDES
	NanoAssemblr® Spark™	NIS0001	1 Instrument 1 Power Supply (Worldwide) 1 One-year Warranty
	Spark™ Cartridge	NIS0013	80 Pack
	GenVoy-ILM™ T Cell Kit for mRNA, Spark	1000701	1 Kit
	GenVoy-ILM™ T Cell Kit for mRNA, Spark with Cartridges	1000683	1 Kit 5 Cartridges

About Precision NanoSystems

Precision NanoSystems is a global leader of innovative solutions for the discovery, development, and manufacture of genomic medicine-based gene and cell therapies, small molecule and protein-based drugs, rapidly taking ideas to patients. Precision NanoSystems ULC is a wholly owned subsidiary of Pall Corporation.

Precision NanoSystems:
50 - 655 West Kent Ave. N.,
Vancouver, BC, V6P 6T7
Canada

Precision NanoSystems USA:
395 Oyster Point Boulevard, Suite 145
South San Francisco, CA, 94080
USA

phone: 1-888-618-0031
info@precision-nano.com
precisionnanosystems.com

Precision Nanosystems Europe:
Two Snowhill Road
Birmingham, UK. B4 6WR

Precision Nanosystems APAC:
10 Anson Road #12-14
International Plaza
Singapore 079903

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