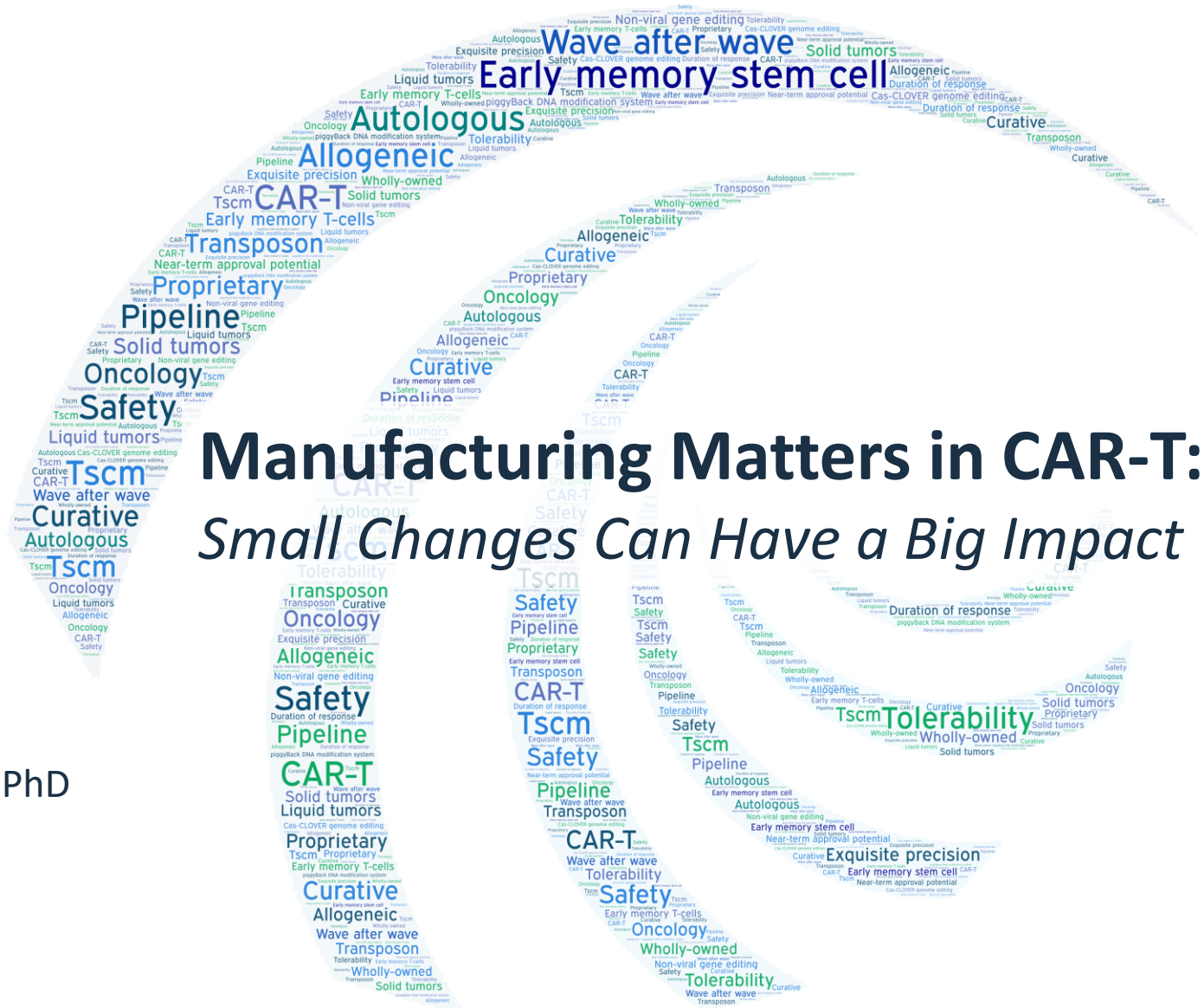
POSEIDA THERAPEUTICS

The Next Generation of Cell and Gene Therapeutics with the Capacity to Cure



Manufacturing Matters in CAR-T:

Small Changes Can Have a Big Impact

Eric Ostertag, MD, PhD
Chairman & CEO

September 2020

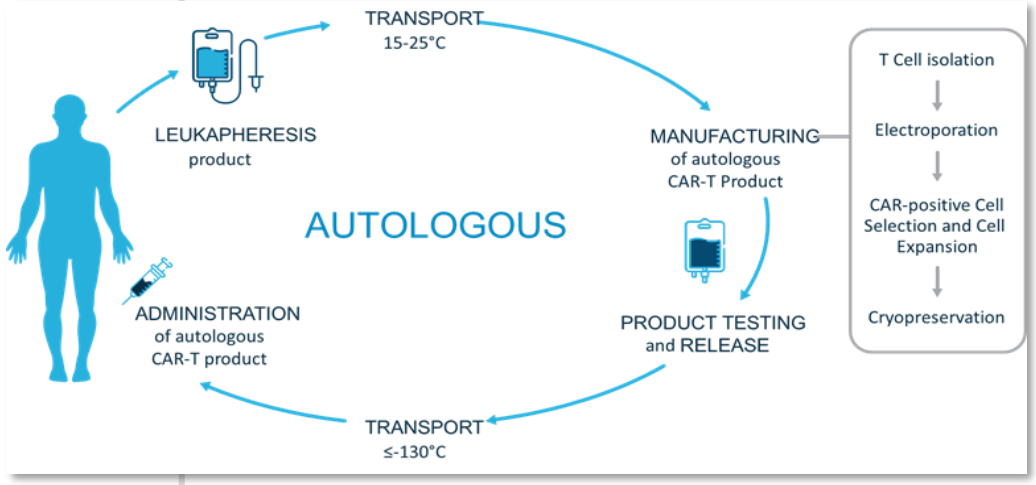
Disclaimer

This presentation and any accompanying oral commentary contain "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, as amended. Forward-looking statements are statements that are not historical facts and include, without limitation, statements related to future events; our future financial performance or condition; business strategy; expected timing and plans with respect to development milestones, clinical trials, and regulatory activities; estimated market opportunities for product candidates; and future results of anticipated development efforts. Words such as "expect(s)," "feel(s)," "believe(s)," "will," "may," "anticipate(s)", “potentially” or negative of these terms or similar expressions are intended to identify forward-looking statements. These forward-looking statements are based on management's current expectations of future events only as of the date of this presentation and are subject to a number of important risks and uncertainties that could cause actual results to differ materially and adversely from those set forth in or implied by such forward-looking statements. These risks and uncertainties include, but are not limited to: risks associated with conducting clinical trials; whether any of our product candidates will be shown to be safe and effective; our ability to finance continued operations; our reliance on third parties for various aspects of our business; competition in our target markets; our ability to protect our intellectual property; our ability to retain key scientific or management personnel; and other risks and uncertainties described in our filings with the Securities and Exchange Commission, including under the heading “Risk Factors”. Except as required by law, we assume no obligation to update these forward-looking statements, or to update the reasons why actual results could differ materially from those anticipated in the forward-looking statements, even if new information becomes available in the future.

Manufacturing Matters in CAR-T

Small Changes Can Have a Big Impact

- **Cell-based products**, such as CAR-T, are emerging as a disruptive and transformational therapeutic class for many indications
- Cell-based products are **living drugs** and are affected by donor and manufacturing variability
- The **type and quality of cells** affect product performance
- What may appear to be **small changes** in manufacturing can have a **big impact** on final product performance

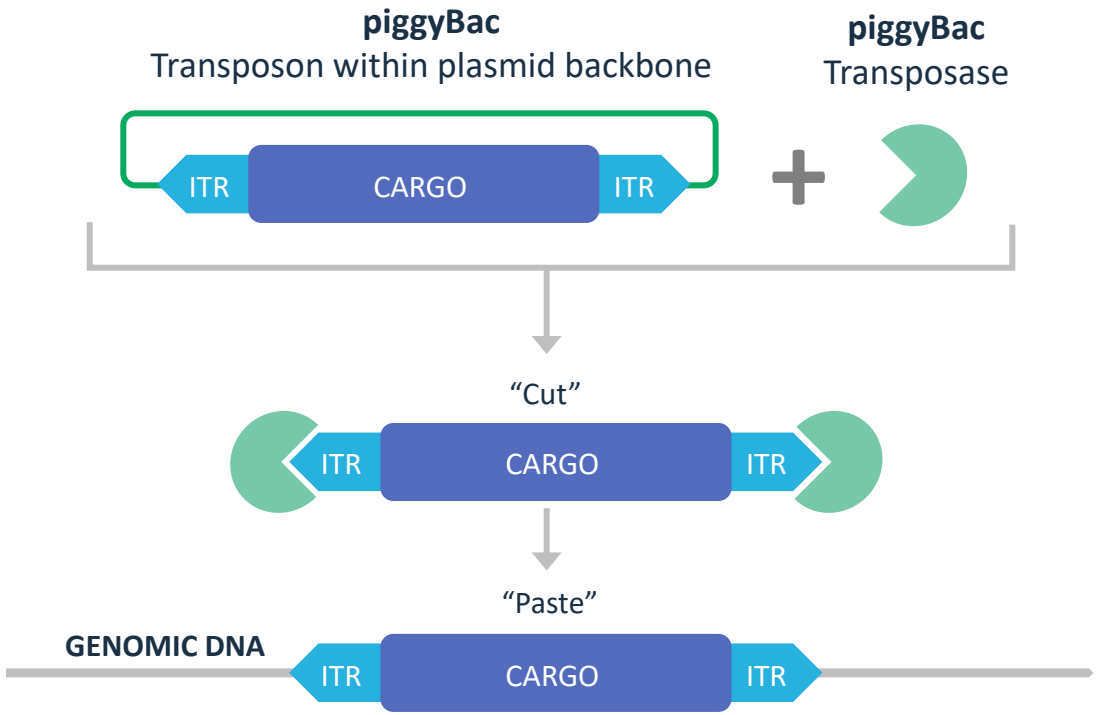


POSEIDA THERAPEUTICS

piggyBac®: A Versatile DNA Delivery System Ideal for CAR-T

Differentiating Features

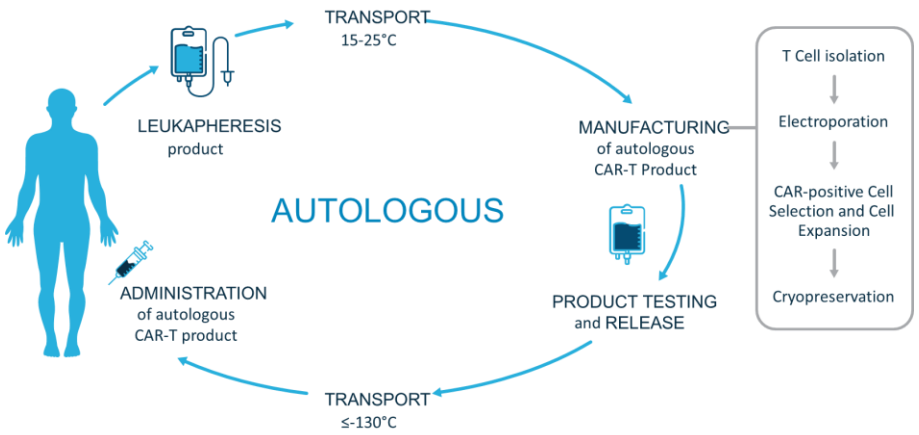
- Non-viral gene insertion
- Very large cargo capacity (~200 kB)
- Works in a wide variety of cell types
- Favorable insertion profile
- Preferentially favors stem cell memory T-cells (Tscm)
- Multiple safety benefits



POSEIDA THERAPEUTICS

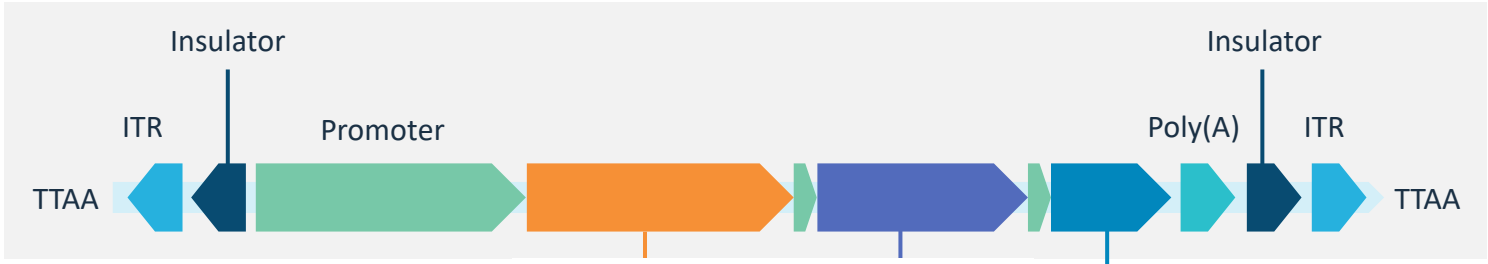
Poseida's Autologous CAR-T Manufacturing and Product Structure

Autologous Manufacturing Process



- Individualized manufacturing
- Patient donor material is variable
- Importance of T_{scm}
- **Manufacturing optimization can improve final product**

Therapeutic Transgene



INCORPORATES PROPRIETARY SAFETY SWITCH

- Rapid, dose-dependent **elimination** of engineered T- cells as needed
- Potential **management of** Cytokine Release Syndrome (**CRS**) or other AEs

DIFFERENTIATED BINDING CAR-T MOLECULE

- Centyrin™ or VH molecule with **high-specificity binding**
- Fully human with no **tonic signaling observed to date**

DRUG RESISTANCE GENE PERMITS POSITIVE SELECTION

- **~100% of T-cells** in final product express the CAR molecule
- Predicted to result in **greater therapeutic index**

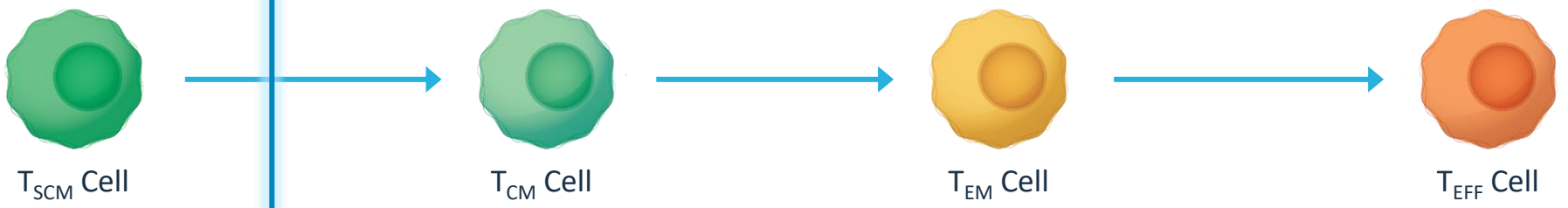
POSEIDA THERAPEUTICS

Not All T-Cells are Created Equally

The Importance of Stem Cell Memory T Cells (Tscm)

LESS DIFFERENTIATED

MORE DIFFERENTIATED



- Self renewing
- Long lived
- Multipotent

piggyBac
Designed to Preferentially Transpose T_{SCM} Cells

STEMNESS MATTERS

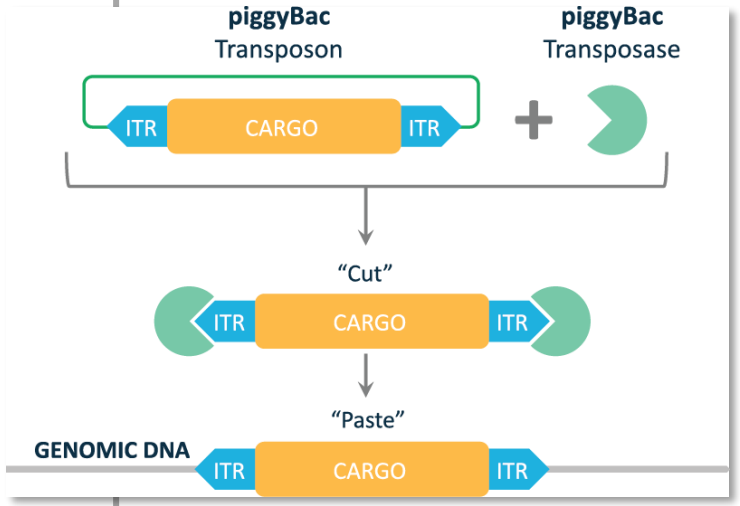
Products with High % of T_{SCM} Cells:

- Strong correlation with **best responses** in the clinic
- More gradual tumor killing with **less toxicity**
- Better **duration of response** and potential for re-response
- Key to CAR-T success in **solid tumors**

POSEIDA THERAPEUTICS

Improving Transposition Frequency During Manufacturing May Improve Final Product

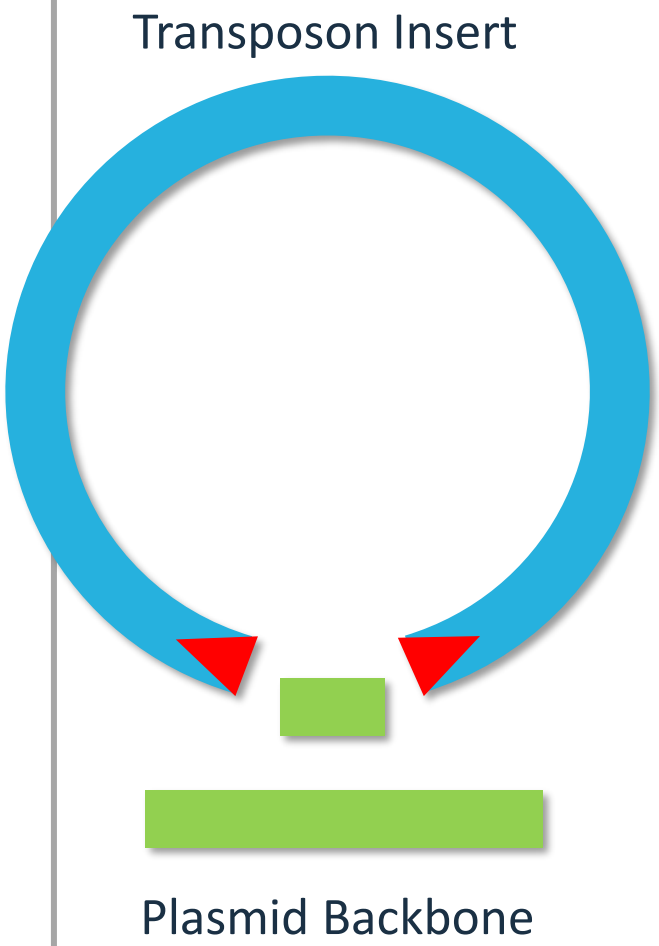
- Transposition occurs in first 24 hours of manufacturing process
- Higher transposition means:
  - More CAR-positive cells at start of process
  - Less cells are killed during positive selection step
- More cells at start of process means:
  - Reduced manufacturing timelines to get same number of cells
  - Less proliferation of cells in culture = more proliferative capacity in patient = **more efficacious CAR-T product**



POSEIDA THERAPEUTICS

piggyBac Transposition Efficiency and Plasmid Size

- Hypothesis: We may increase transposition frequency by reducing the size of the “backbone” and bringing the inverted terminal repeats “ITRs” closer
- piggyBac has massive cargo capacity (>200 kb in literature; >20X lentivirus) but transposition frequency drops with increasing plasmid size
  - Retrovirus, including lentivirus, cargo capacity ≅ 10-20 kb
- Recent published results from other labs suggested that a smaller backbone gives better transposition efficiency [1, 2, 3]



1. Jin Y, et al. Proc Natl Acad Sci U S A. 2017, 114(28):7408-7413.
2. Monjezi R, et al. Leukemia. 2017, 31(1):186-194.
3. Holstein M, et al. Mol Ther. 2018, 26(4):1137-1153

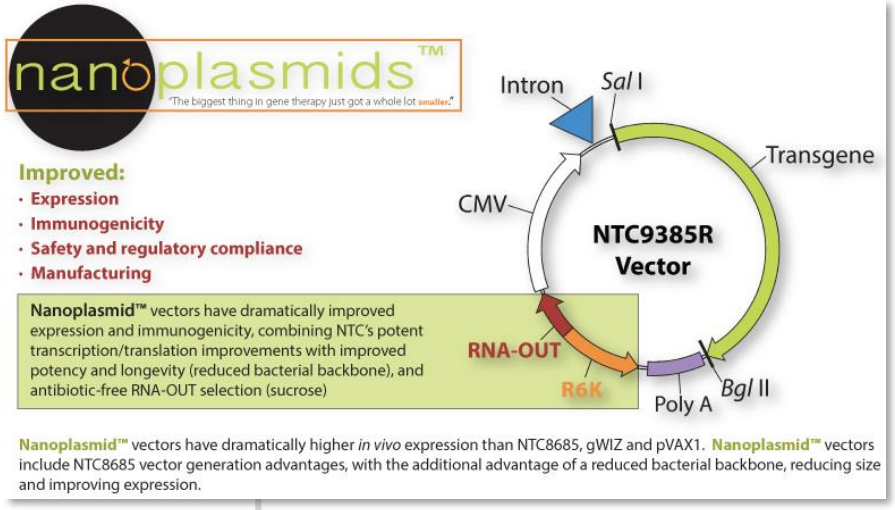
Achieving Improved piggyBac Transposition with Nanoplasmid by Reducing the Plasmid (Backbone) Size

Standard Plasmid

- Antibiotic resistance marker and replication origin (> 2,000 bp)

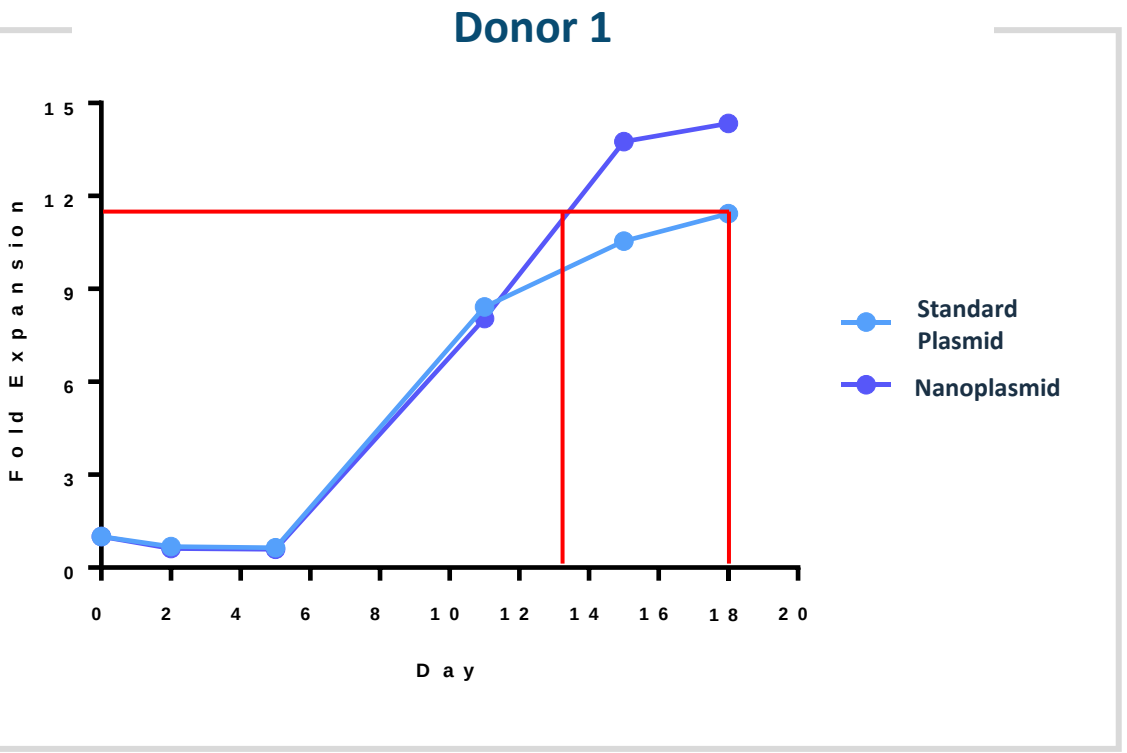
Nanoplasmid

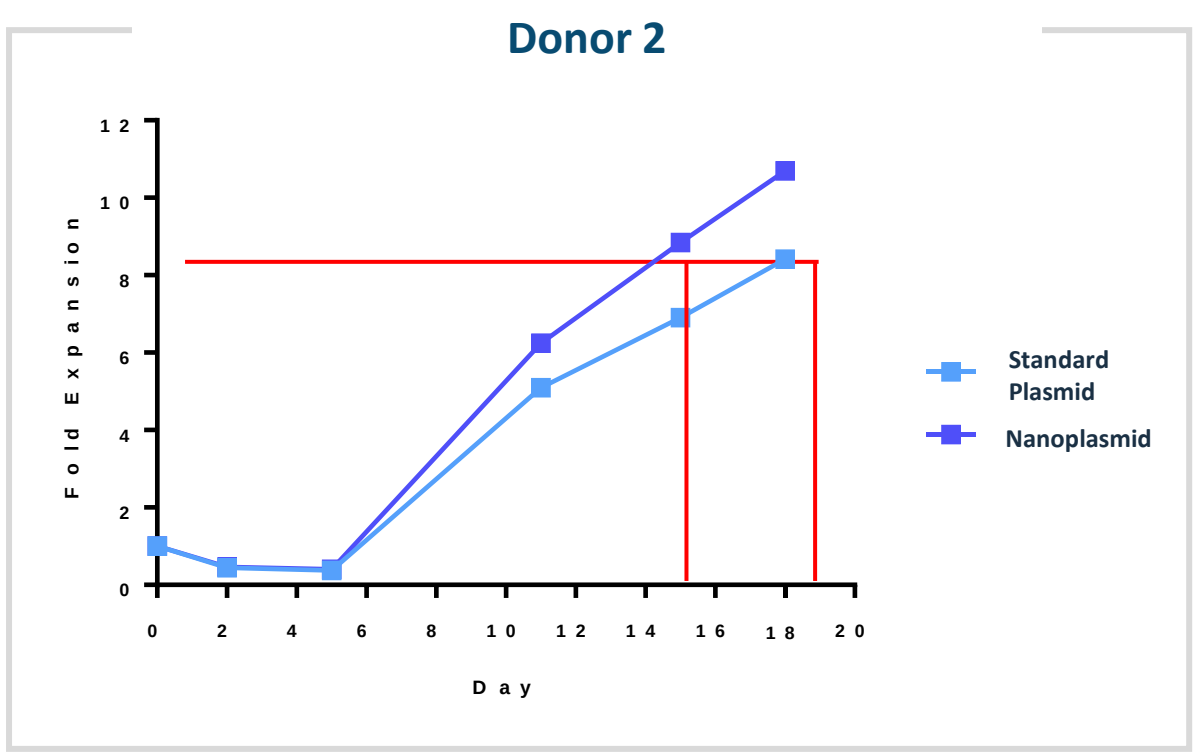
- Reduces the backbone size to < 500 bp (less DNA = less toxicity)
- Brings piggyBac® ITRs closer together (enhanced transposition efficiency)
- Antibiotic-free selection (superior for manufacturing and regulatory)
- Higher manufacturing yield
- Tested in multiple clinical trials with no serious adverse events reported



* Nanoplasmid is a trademark of Nature Technology Corporation (NTC) and nanoplasmids are licensed from NTC

Nanoplasmid Shortens Manufacturing Time



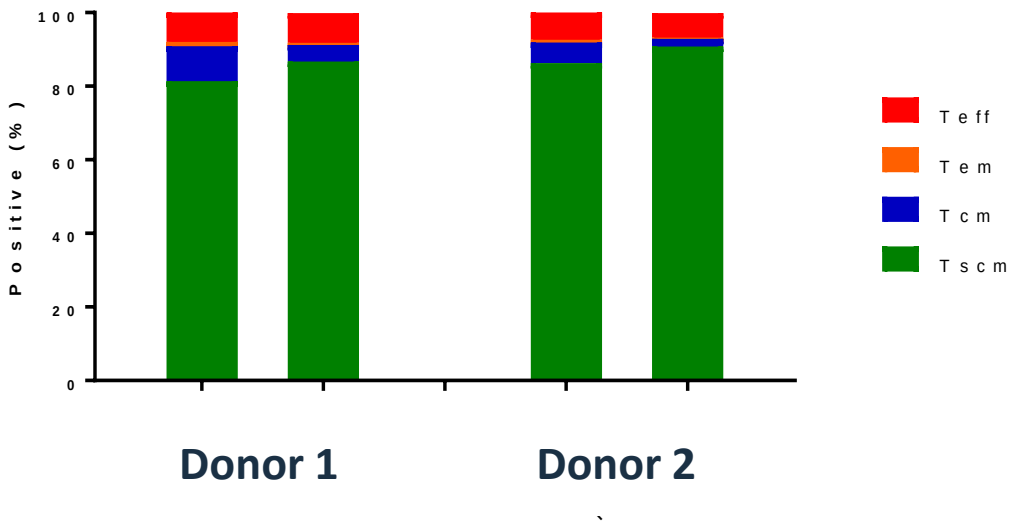


CAR-T product made from nanoplasmid reaches the same number of cells as CAR-T made from standard plasmid in ~4 fewer days

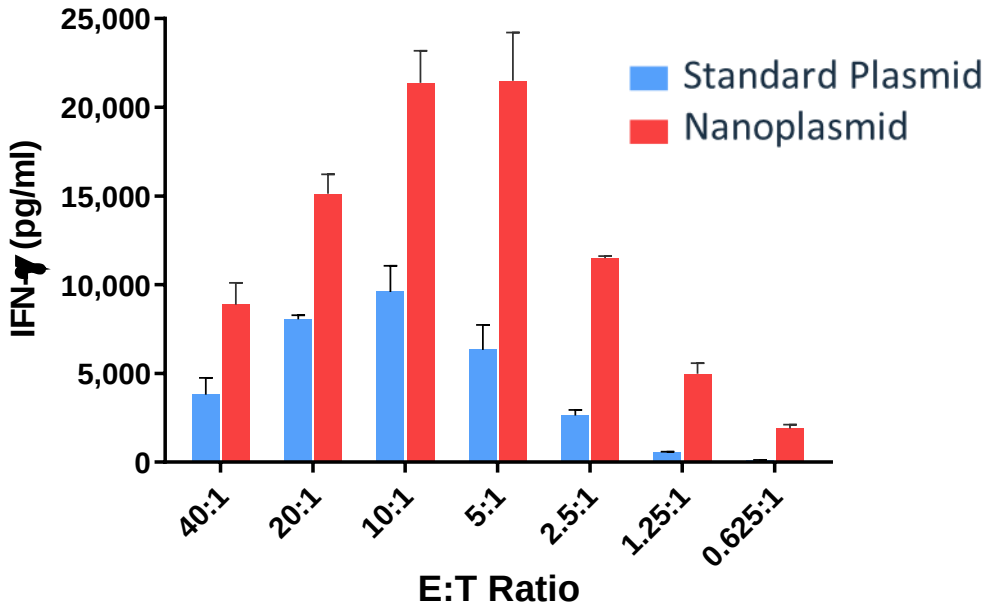
POSEIDA THERAPEUTICS

Nanoplasmid-produced CAR-T Shows Comparable or Better Phenotype and Function

Post-Thaw CD8+ Memory



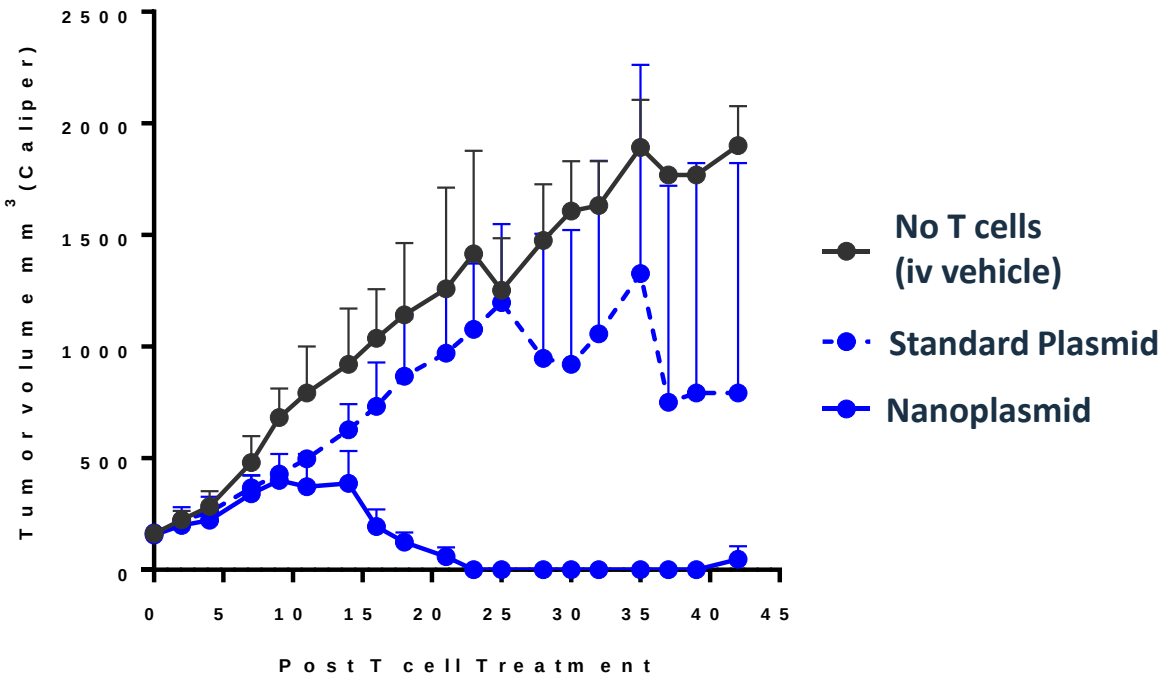
BCMA on K562



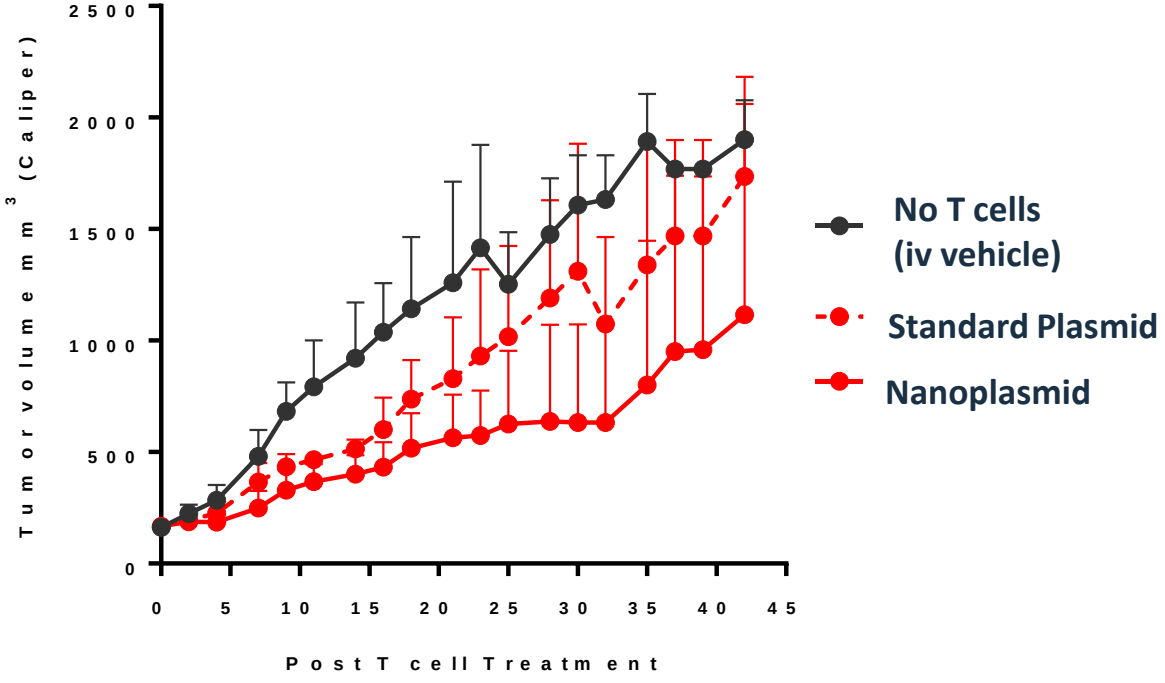
POSEIDA THERAPEUTICS

Nanoplasmid CAR-T Improves Efficacy in a Prostate Cancer Model (LNCaP)

Donor 1



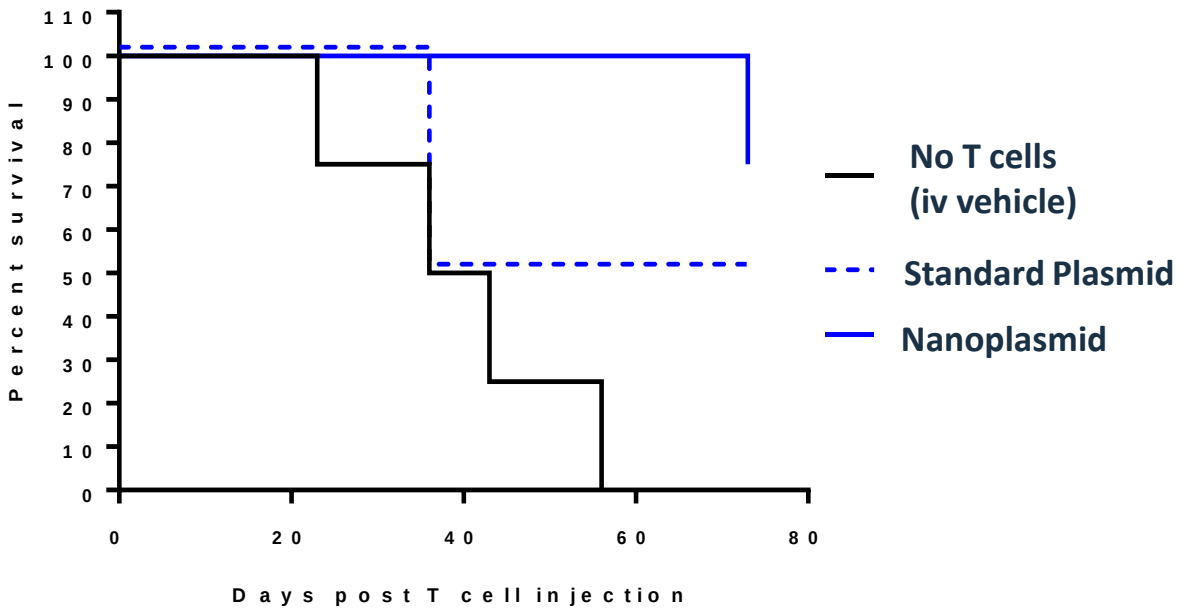
Donor 2



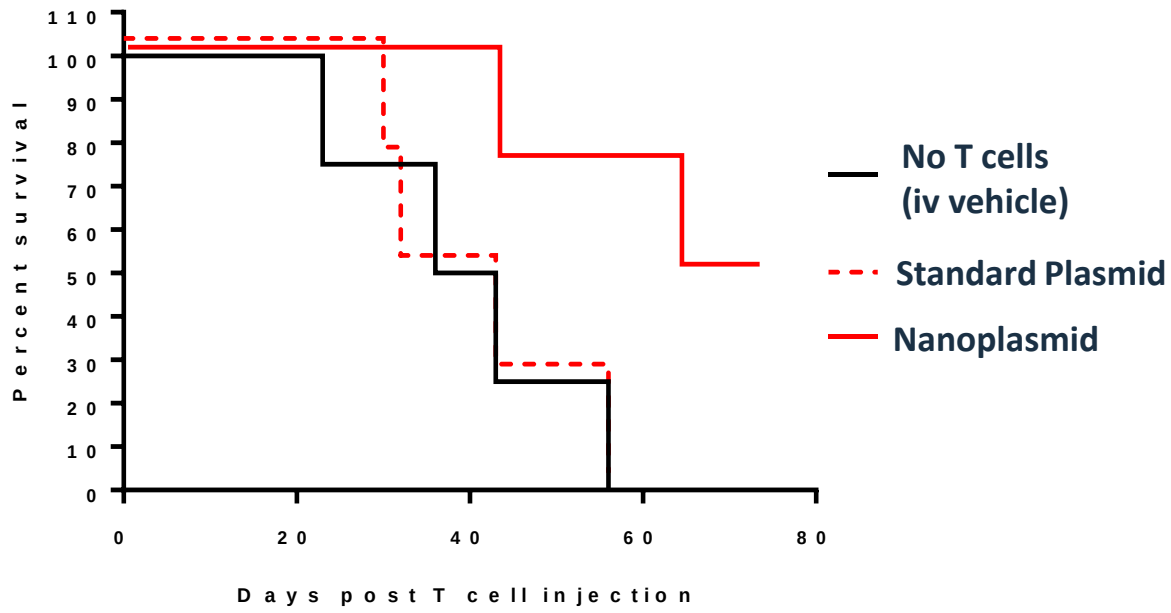
POSEIDA THERAPEUTICS

Nanoplasmid CAR-T Provided a Survival Advantage in Prostate Cancer Model (LNCaP)

Donor 1

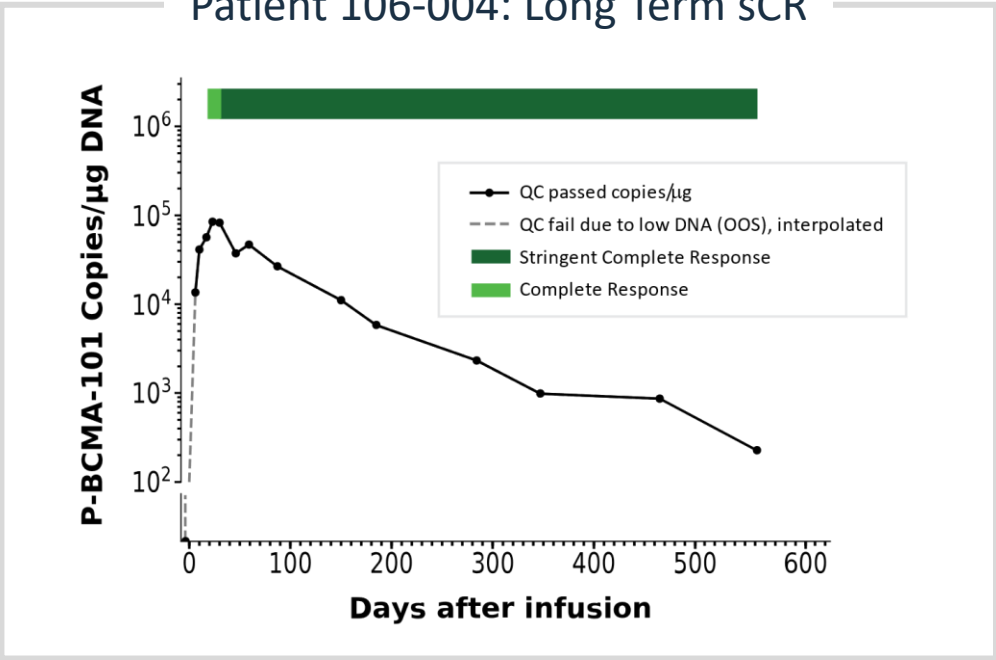


Donor 2



POSEIDA THERAPEUTICS

CAR-T Expansion is Associated with Best Responses:
Nanoplasmid CAR-T Showed Robust Expansion in the Clinic



- 3rd Cohort Patient: 59 y/o male with 4 prior lines
- Treated with P-BCMA-101 in August 2018
- Rapidly reached VGPR then sCR, continues on study at > 2 years
- Clinical evidence of engraftment and persistence of CAR+ cells at ~18 months as of March 9, 2020

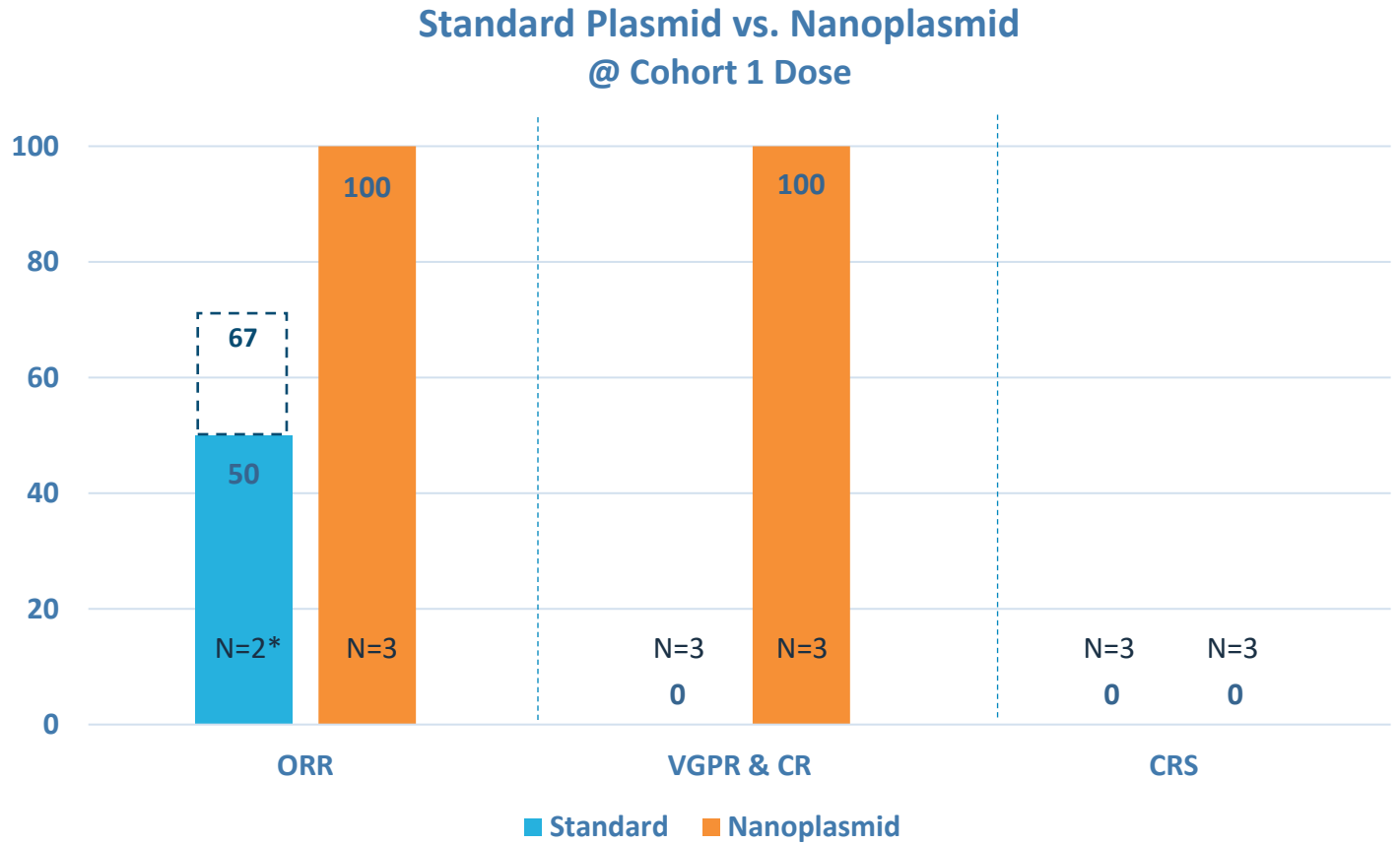
Nanoplasmid-produced products have shown robust CAR-T expansion in the clinic

- **P-BCMA-101 (multiple myeloma)**
- **P-PSMA-101 (prostate cancer)**

POSEIDA THERAPEUTICS

P-BCMA-101 Manufactured with Nanoplasmid Product Shows Better Efficacy and Equal Safety in Patients Compared to Standard Plasmid

- P-BCMA-101 **Nano demonstrated higher ORR** than P-BCMA-101
  - 100% vs. 50% by IMWG
  - 100% vs. 67% overall
- P-BCMA-101 **Nano delivered deeper responses** than P-BCMA-101
  - All 3 P-BCMA-101 Nano patients at VGPR or CR compared to zero for P-BCMA-101
- **Safety profile** was preserved with **no CRS** observed with either product in these patients



*3 patients dosed but only 2 evaluable by IMWG criteria; 3rd patient had plasmacytomas and had significant response by PET scan

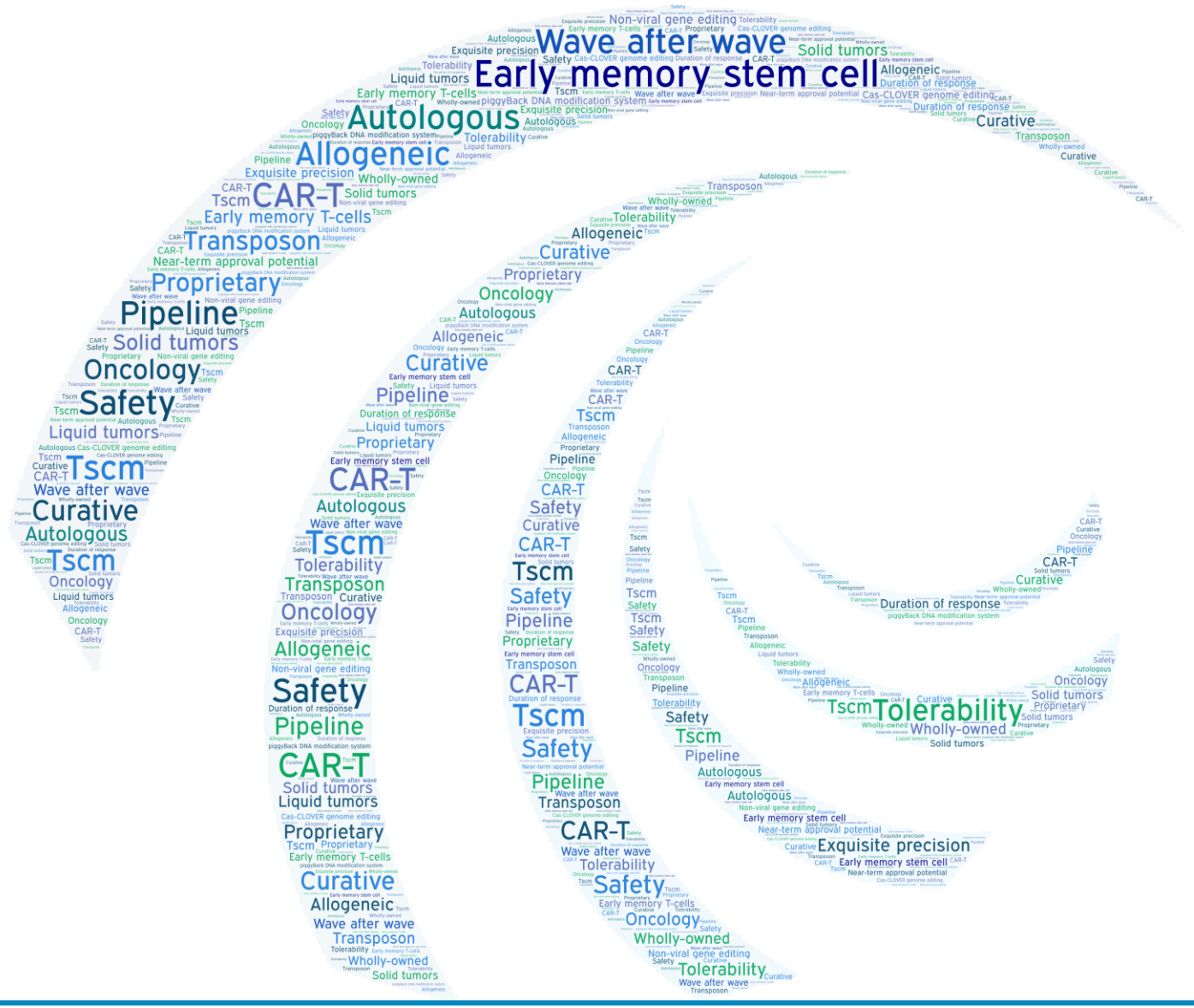
POSEIDA THERAPEUTICS

Conclusions and Summary

- CAR-T is a **living drug** and **small changes in manufacturing can have a big impact** on final product
- PiggyBac with **nanoplasmid exemplifies continuous innovation** in manufacturing:
  - Improved transposition efficiency delivers benefits including shorter manufacturing timelines
  - Produces CAR-T product with increased percentage of desirable Tscm cells
  - Produces CAR-T product with better efficacy and survival benefit in animal models
- **Product manufactured with nanoplasmid** in Poseida's P-BCMA-101 clinical trial **improved outcomes**:
  - Showed robust expansion curves, which are associated with best responses
  - Increased ORR
  - Increased depth of response
- We have incorporated **nanoplasmid into all existing and future CAR-T products**
  - P-PSMA-101 showing robust expansion curves in the clinic
- We have discovered **other methods to enhance final product** that are in process including
  - Improved transposase
  - Media supplements
  - Booster molecule

POSEIDA THERAPEUTICS

The Next Generation of Cell and Gene Therapeutics with the Capacity to Cure



Thank You