

PlasmidFactory®

Solutions for Gene Modified Cell Therapy

Powering your cell therapies with DNA made by experts

PlasmidFactory 25 YEARS

Your trusted CDMO Partner

Why choose PlasmidFactory



- 25+ years of DNA manufacturing expertise
- Independent, flexible & trusted European CDMO
- Scalable production: Research → High Quality → GMP Grades
- Proprietary technologies: Minicircle, ITRPROTECT®, ITRRESCUE®, POLYARESCUE®
- 3,500+ plasmid & Minicircle projects delivered, incl.136 GMP-like projects & 5 production runs in the GMP facility
- 99.9% success rate

Company info

Minicircle info

GMP Manufacturing You Can Trust

Designed for highest plasmid & Minicircle DNA quality requirements



Status: Commissioning completed
First GMP batches successfully produced

State-of-the-art GMP facility

- Dedicated building for GMP Grade plasmid & Minicircle DNA
- 450 m^2 cleanrooms suites (grades C & D)
- Facility designed to prevent cross-contamination

Flexible manufacturing with highest safety standards

- End-to-end single-use USP- and DSP- process
- Ph. Eur. / USP grade WFI supply
- EU GMP-Part 2 and 4, Annex 1 & 2, AMWHV
- Various fill & finish options
- QP batch release

Full GMP compliance

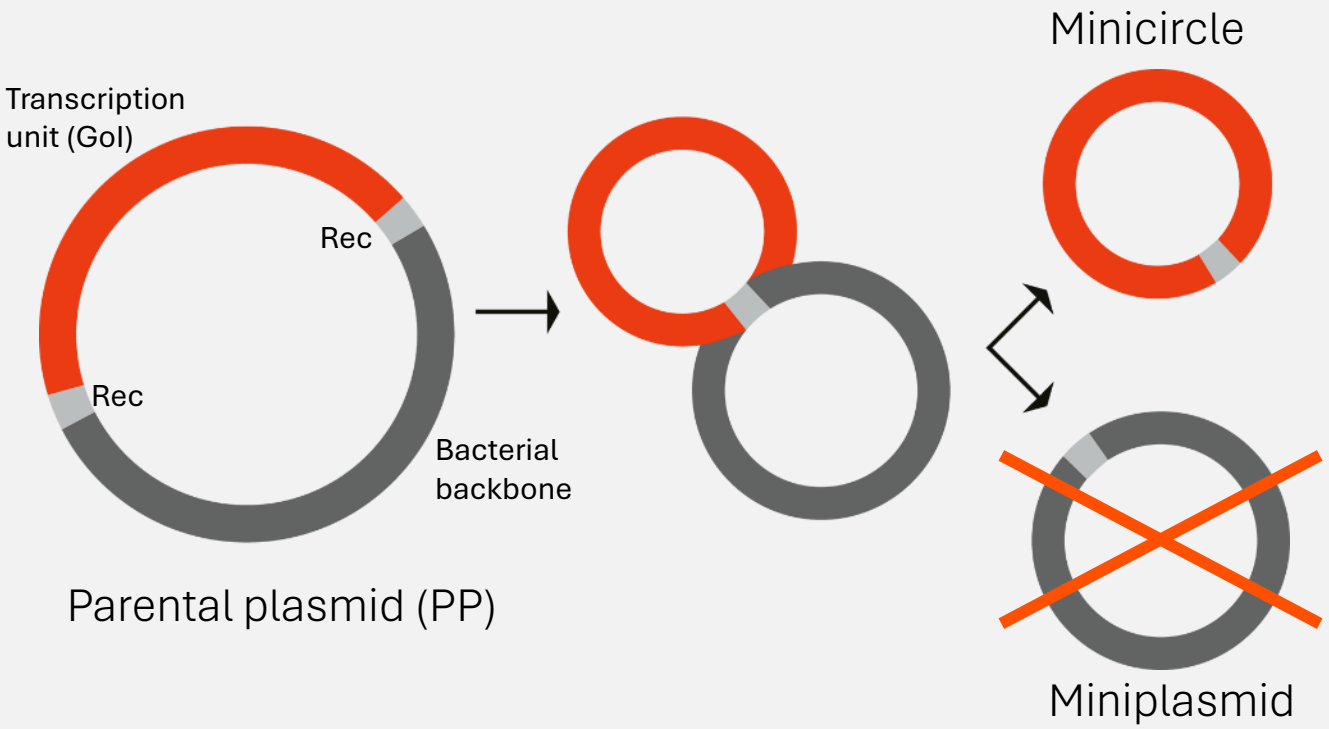
- Data integrity measures and systems in place
- Appendix 11/21 CFR Part 11

GMP info

Minicircle: Proprietary Production Method

Minimalistic DNA vector reduced to the gene of interest (GoI) and available in GMP

Minicircle production

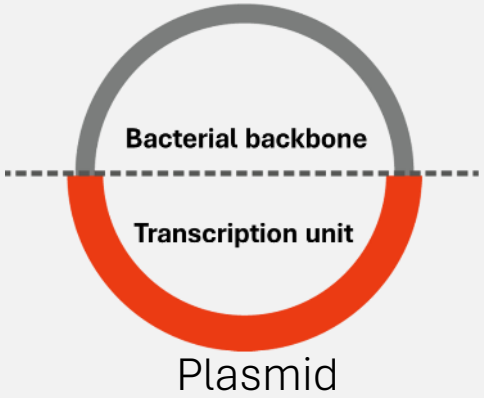


Minicircle vs. plasmid features



- No bacterial backbone
- Small, supercoiled

- Bacterial sequences
- Larger size



Minicircle: Small, monomeric, supercoiled

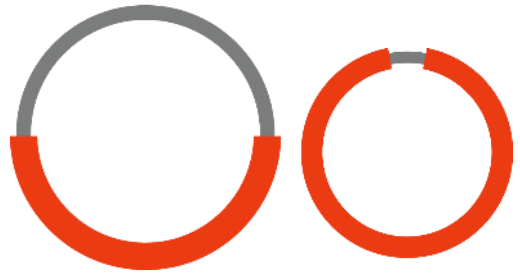
Minicircle info

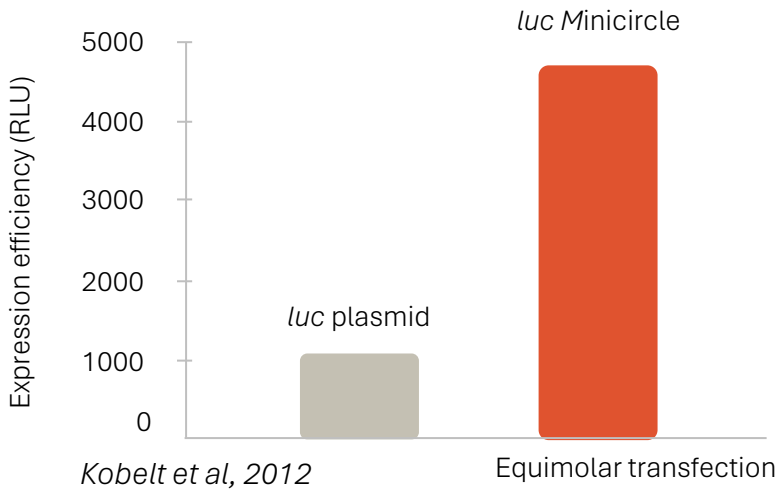
Minicircle: Advantages at a Glance

Bacterial backbone-free Minicircles

- No antibiotic resistance or other bacterial markers
- Less immunogenicity
- Lower DNA toxicity
- Higher transfection efficiency
- Reduced transgene silencing
- Stronger, more stable gene expression
- Almost no cargo size restriction,
- **Improved yield – minimized costs**
- **Ideal for virus-free gene transfers**

Part of several clinical trials





Kobelt et al, 2012

Minicircle: Small, monomeric, supercoiled

Minicircle DNA: Clinical Footprint

Snapshot of registered and planned clinical trials using Minicircle for cell engineering

Registered clinical trials

2020 — **CARAMBA-1 - SLAMF7 CAR-T (Multiple Myeloma)** — Recruitment ended

- Phase I/IIa (FiH) • EUCT 2024-512643-23-00 • NCT04499339
- Virus-free Sleeping Beauty gene transfer using Minicircle DNA + transposase mRNA
- Opened Jun 2020 • 33 participants • DE site (multi-country approvals reported in EU project updates)

2024 — **TranspoCART19 - CD19 CAR-T (r/r B-cell Lymphoma)** — Recruiting

- Phase I/IIa • EUCT 2024-514544-90-00 • NCT06378190
- Non-viral Sleeping Beauty transposon delivered as a Minicircle + SB100X mRNA
- Start Mar 2024 • 27 participants • 9 sites (Spain)

2025 — **LION-1 - ROR1 CAR-T (ROR1$^+$ tumors)** — Recruiting

- Phase I (FiH) • EUCT 2024-512019-36-00 • NCT pending (CTIS)
- Start Apr 2025 • 46 participants • 1 site (Germany)
- Includes hematologic + solid tumors (e.g., MCL, CLL, TNBC, OC, ACC)

2026 — **TCX-001 - Siglec-6 CAR-T (r/r AML & CLL)** — Recruiting

- Phase I (FiH) • SNCTP000006901 • BASEC2026-00192
- Non-viral Sleeping Beauty CAR-T program using Minicircle DNA
- Recruiting • 1 site (Zurich)

Studies in preparation

Oncology (engineered cells)

- ROR2 CAR-T (Uniklinikum Würzburg; Phase I (FiH) start planned in 2026)
- FLT3 CAR-T (Uniklinikum Würzburg)

Autoimmune / gene therapy

- Nimvec™ AM510 (Amarna; Type 1 Diabetes)

Undisclosed / confidential

- At least 4 additional clinical studies in preparation

Minicircle in GMCT: Relevant Publications

Minicircle DNA represents the new standard for virus-free GMCT



Minicircle DNA allows virus-free transposon-based approaches for gene modification of CAR-T, CAR-NK and HSCs (Bexte et. al., Holstein et al., Diez et al.)

- Virus-free, Sleeping Beauty–based Minicircle approach enables stable genomic integration and efficient gene engineering of immune and stem cells
- Comparable anti-tumor efficacy to lentiviral CAR-T approaches with efficient tumor eradication and prolonged survival in preclinical models
- Improved genomic safety profile with near-random integration and absence of residual vector DNA in the final engineered cell product

Minicircle DNA technology is compatible with state-of-the-art genome editing and modern delivery technologies (Tennant et al., Lennerz et al., Czapla K)

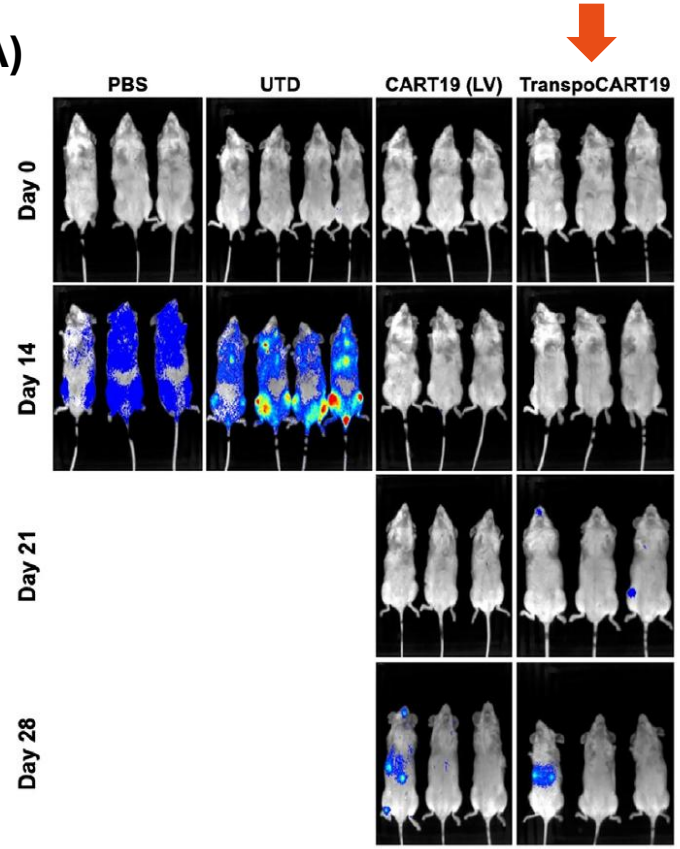
- Successful CRISPR-based knock-in using minicircle DNA as HDR and HITI donor template
- Compatible with multiple delivery approaches including nucleofection, LNP delivery, hydrodynamic injection and microinjection
- Enables efficient genome editing workflows across in vitro, *ex vivo* and *in vivo* applications, incl. TCR-T cells

GMCT Webinar

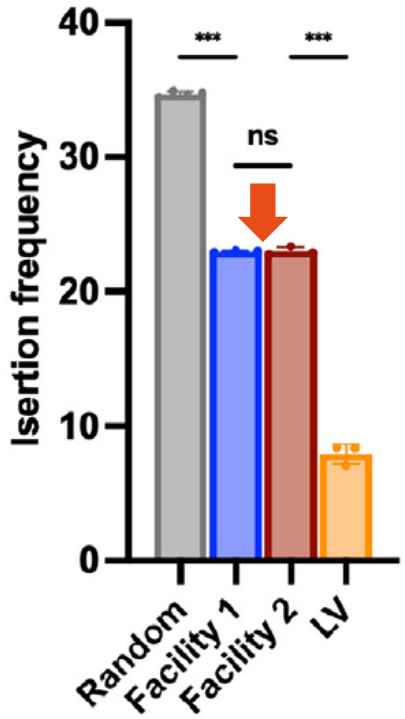
Clinical Scale Generation of functional CAR-T Cells using a Minicircle-based Sleeping Beauty Transposon System

PlasmidFactory®

A)



B)



Díez *et al.*, 2025, Mol Ther Methods Clin Dev

- MC approach results in equal tumor eradication to LVV (A)
- MC shows improved genomic safety vs. LVV (B)
- MC approach results in prolonged survival equal to LVV (data not shown)
- MC un-detectable in final CAR T product (data not shown)

Article title: Generation and GMP scale-up of human CAR-T cells using non-viral Sleeping Beauty transposons for B cell malignancies

GMCT Webinar

Testimonials

> The gene transfer rate we accomplish [with Minicircles] in primary human T cells is quite impressive and is always in excess of 50 - 60%, which is **5 to 6-fold higher** than with plasmid DNA.“



Prof. Dr. Michael Hudecek

Universitätsklinikum Würzburg & Fraunhofer IZI

References

Watch our **webinar** "Virus-Free Gene Modification with Minicircle DNA for Advanced Cell Therapies”
with application data from:

- Therycell
- HS Diagnomics
- T-CURX
- Fraunhofer IZI / University of Würzburg
- University of Bielefeld

Selected Publications

1. Monjezi et al., Leukemia, 2016 *(Enhanced CAR T-cell engineering using non-viral Sleeping Beauty transposition from minicircle vectors)*
2. Holstein et al., 2018, Mol Ther Nucleic Acids *(Efficient Non-viral Gene Delivery into Human Hematopoietic Stem Cells by Minicircle Sleeping Beauty Transposon Vectors)*
3. Tenant et al., Mol Ther, 2020 *(Fluorescent in vivo editing reporter (FIVER): A novel multispectral reporter of in vivo genome editing)*
4. Bexte et al., Mol Ther, 2024 *(Engineering of potent CAR NK cells using non-viral Sleeping Beauty transposition from minimalistic DNA vectors)*
5. Lennerz et al., 2025, ESGCT 32nd Annual Meeting *(Non-viral manufacturing of tumor-specific TCR-T cells)*
6. Díez et al., 2025, Mol Ther Methods Clin Dev *(Generation and GMP scale-up of human CAR-T cells using non-viral Sleeping Beauty transposons for B cell malignances)*

Minicircle in GMCT: The Time is Now!

Key considerations when evaluating Minicircle DNA for cellular therapy approaches

- **Is backbone-free DNA really needed?**
  Yes — bacterial backbone sequences can increase DNA toxicity, immune activation, and gene silencing. Minicircles enable more efficient transfection and gene expression in primary immune cells than conventional plasmids.
- **Does it cost more?**
  No — Minicircle approaches are typically more cost-efficient than viral vector systems and easier to handle, as no viral production or biosafety infrastructure is required.
- **Is it future-proof?**
  Yes — aligned with the industry's shift toward virus-free engineering strategies. Compatible with modern delivery technologies (LNP/PNP, electroporation, CRISPR, transposons) and enabling faster development and more scalable manufacturing than LVV approaches.
- **Is it truly unique?**
  Yes — unlike "mini/nano-plasmids," PlasmidFactory's Minicircles completely lack bacterial backbone sequences.
- **Is the company established?**
  Yes — strong European presence for 25 years with scalable GMP production and expanding capabilities toward the U.S. market.





Get in touch:

contact@PlasmidFactory.com

www.plasmidfactory.com/contact/

PlasmidFactory 25 YEARS

PlasmidFactory GmbH

Meisenstraße 96 | 33607 Bielefeld | Germany

PlasmidFactory.com