# From research to clinical application, a successful and reproducible continuum process for lentiviral vector manufacturing

Lucille Lamouroux, Antoinette Crooke, Stéphane Carrasco, Bruno Matéo, Arnaud Penel, Nicolas Martin, Christine Duthoit, Régis Gayon, Raphaël Sevrain and Clement Ducros.
Flash Therapeutics – 3 avenue Hubert Curien, 31100 Toulouse, France

## A GMP PLATFORM FROM RESEARCH TO CLINIC

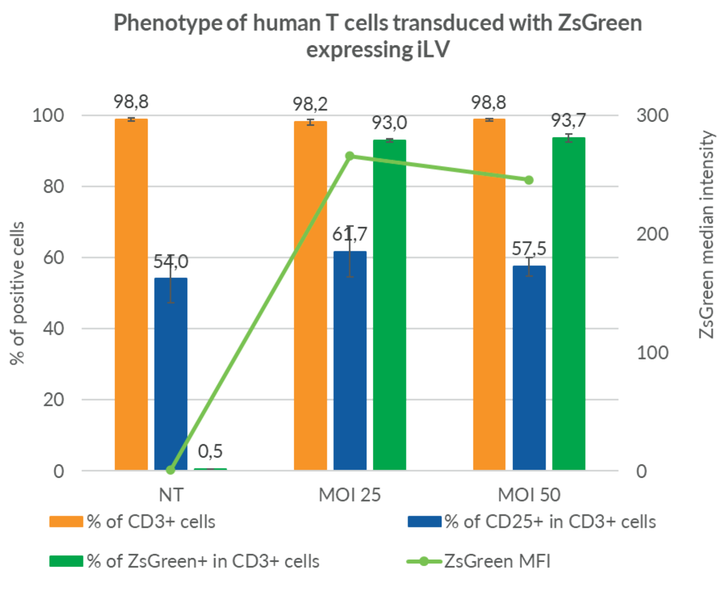
### A fully integrated & flexible manufacturing solution to each project

1. **Broad experience**
   17-year track record in vector design & manufacturing
2. **Project management**
   Dedicated project manager
3. **Vector manufacturing and QC**
   - Proprietary process
   - Reproductibility
4. **QA and CMC**
   Support on regulatory files
5. **High quality product**
   - High concentration
   - High purity
   - Excellent transduction efficiency and transgene expression

## CONCENTRATED AND PURIFIED INTEGRATIVE LENTIVIRAL VECTORS FOR HIGH TRANSDUCTION EFFICIENCIES AND PRESERVATION OF CELL PHENOTYPE

### Human T cells ILV transduction

ILV can transduce more than 90% of activated human T lymphocytes without affecting viability nor proliferation, and preserving the original cell phenotype.



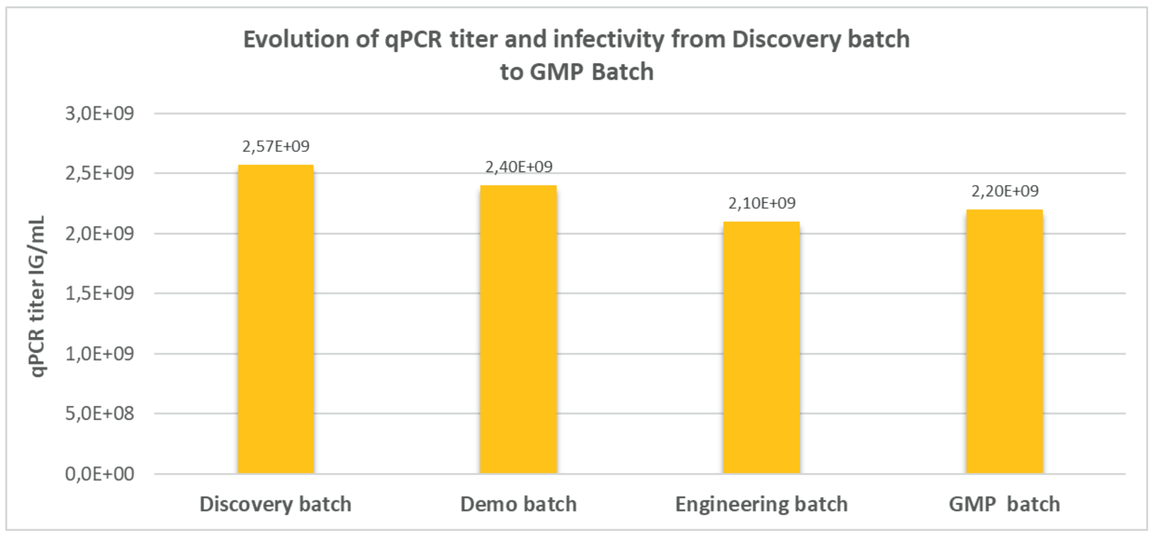

### High CAR expression on human T cells

ILV transduction leads cells to a high CAR expression on activated human T lymphocytes.



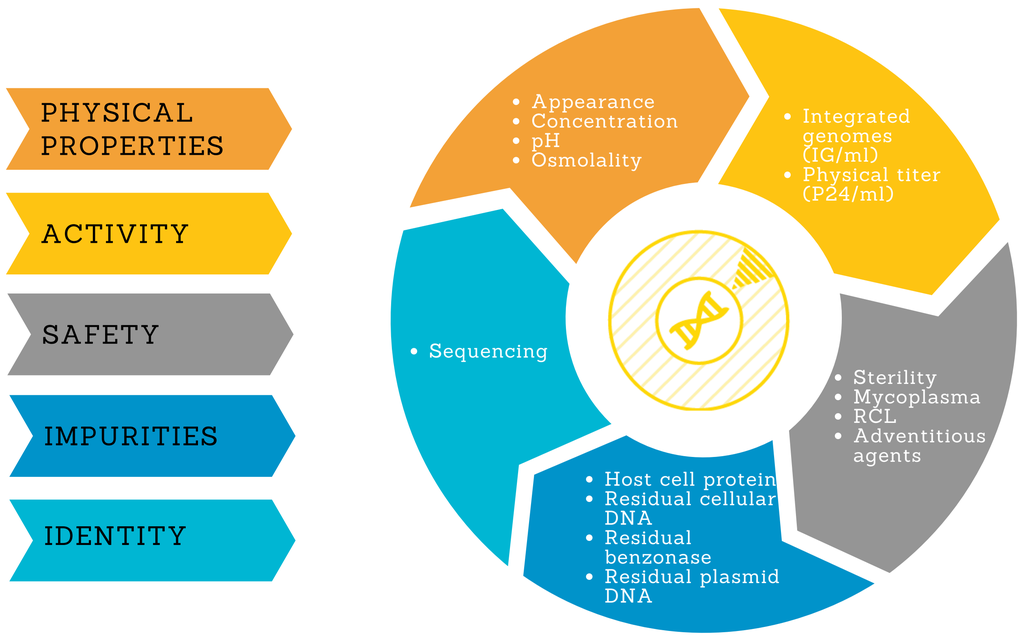

### Reproducibility throughout scale-up

Combining know-how and high-tech processes, Flash Therapeutics provides small, medium and large-scale production of high-quality lentiviral vectors with the same attribute specifications throughout the process from small scale R&D grade to large scale GMP grade.




### QC Plan

QC plan is tailored and discussed for each project according to client needs.




## A TAILOR-MADE CONTINUUM WITH OVER 9000 BATCHES PRODUCED

**Discovery Phase** (2G/3G vectors)

**Preclinical and Clinical Manufacturing** (3G vectors)

### Discovery Batch

- GoI cloning into LV backbone(s)
- Titer performance
- Cell transduction efficiency

**Deliverables**
Vector batches
Titer (IG)

### Demo-Batch

- Plasmid ratio optimisation
- LV Manufacturing process development in CS-10 & HS-36 units
- Transgene expression assay (TEA) development

**Deliverables**
Vector batches
TEA protocol
Titer (IG, p24)

### Engineering manufacturing

- LV Manufacturing process scale-up
- Engineering batch production
- QCs method qualification
- Use of validated GMP raw materials

**Deliverables**
Tailored control plan
Full QC in R&D grade
Engineering batch
Certificate of analysis (CoAs)
Short production summary

### GMP manufacturing

- GMP batch production
- Full GMP QCs
- Stability study

**Deliverables**
GMP batch
CoAs
Product release
Production batch summary
Regulatory support

**Flash Therapeutics has successfully produced over 50 large scale ILV batches expressing CAR candidates for pre-clinical research**

**Thanks to a reproducible manufacturing process, we provide high quality and high purity lentiviral vectors to ensure the success of your clinical trials with the aim of being cost effective. Personalised and tailor-made support for the success of your projects are also provided at each step of the continuum..**