

## Efficient CRISPR gene editing in primary cells and organoids using virus-like particles

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### Organisation

**Name of the organisation** Katholieke Universiteit Leuven (KUL)

**Department** Chronic Diseases and Metabolism

**Specific Research Group or Service**

Laboratory of Respiratory Diseases and Thoracic Surgery (BREATHE)

**Country** Belgium

**Geographical Area** Flemish Region

**Name of the organisation** Katholieke Universiteit Leuven (KUL)

**Department** Pharmaceutical and Pharmacological Sciences

**Country** Belgium

**Geographical Area** Flemish Region

### Partners and collaborations

Katholieke Universiteit Leuven (KUL)

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Human health
<b>The Method is situated in</b>	Basic Research, Translational - Applied Research
<b>Type of method</b>	In vitro - Ex vivo
<b>Specify the type of cells/tissues/organs</b>	several primary cell models (rectal organoids, endothelial cells, epithelial cells, iPSCs, ...)

## DESCRIPTION

### Method keywords

organoids  
genome engineering  
gene editing  
CRISPR-Cas9  
CRISPR/Cas  
virus-like particles  
transduction  
base editing

prime editing  
knock out

### Scientific area keywords

gene therapy  
genetics  
3D organoid models  
human diseases  
human health  
human adult stem cells

### Method description

Using the combination of advanced CRISPR tools including several Cas orthologs, based editors (ABE, CBE, CGBE) and prime editing technologie with efficient delivery vehicles such as LV, AAV and virus-like particles (VLPs), our lab has become experienced with introducing or replacing precise edits in several primary cell models. For gene editing, VLPs are especially well suited because they link the efficacy of viral transduction with the delivery of RNP cargo, delivering a very transient dose of gene editing cargo. We have built VLPs harbouring several gene editing enzymes (Cre, several Cas variants, several base editors, several PE strategies), as well as reporter cargos (mNeonGreen, B-galactosidase, fLuc,...).

### Lab equipment

BSL2 is required to work with cells from human origin and with particles capable of entering these cells.

### Method status

Still in development  
Internally validated

## PROS, CONS & FUTURE POTENTIAL

### Advantages

Efficient gene editing in hard-to-edit cell types using ultra transient exposure and therefore limiting risks on off-target editing. VLP preps can be ordered from the Leuven Viral Vector Core (<https://gbiomed.kuleuven.be/english/corefacilities/LVVC/technology>)

### Challenges

VLP production is expensive and needs to be performed by experienced staff under highly standardised SOP's. We have large libraries of VLPs available and have shared many before under academic collaboration.

## REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

### Links

[Leuven Viral Vector Core](#)

### Other remarks

This work was performed in collaboration with the Leuven Viral Vector Core (Contact: [lvvc@kuleuven.be](mailto:lvvc@kuleuven.be)).



Vlaanderen  
verbeelding werkt

