Polyplus transfection®
THE DELIVERY EXPERTS

IN VIVO DELIVERY IN MICE

Guidelines for Nucleic Acid Delivery Experiments in Mice

With a proven track record (over 700 publications), our *in vivo* reagents have been used to target a wide range of organs using various administration routes.

For other delivery routes or animal models, please contact our Scientific Support team through the contact form on Polyplus-transfection website. They will be happy to assist you!

GENERAL CONSIDERATIONS

- *in vivo*-jetPEI®/nucleic acid complexes are prepared in 5% glucose (final concentration).
- The concentration of nucleic acid in the final injection volume should not exceed 0.5 µg/µl.
- The volume of *in vivo*-jetPEI® added is determined by the N/P ratio: a measure of the ionic balance of the complexes, which corresponds to the number of *in vivo*-jetPEI® nitrogen residues per nucleic acid phosphate.
- Animal experiments must be approved by the local ethics committee. At Polyplus-transfection®, mice were anaesthetized by inhalation using anaesthetic metoxyflurane or by intraperitoneal injection of pentobarbital or ketamine/xylazine. Standard conditions are given for a 20-25g mouse.

REAGENTS

***in vivo*-jetPEI®:** delivery of any type of nucleic acid (DNA, siRNA, miRNA, oligonucleotide, mRNA) in various tissues.

***in vivo*-jetPEI®-Man:** mannose-conjugated *in vivo*-jetPEI® designed to enhance nucleic acid delivery to cells expressing mannose-specific membrane receptors (*e.g.* macrophages, dendritic cells).

***in vivo*-jetPEI®-Gal:** galactose-conjugated *in vivo*-jetPEI® designed to enhance nucleic acid delivery to cells expressing galactose-specific membrane lectins (*e.g.* hepatocytes).

jetSI 10 mM: designed for siRNA delivery to the brain.

Product	Reagent size	Buffer size	Reference number
in vivo-jetPEI®	0.1 ml	10 ml	201-10G
	0.5 ml	2 x 10 ml	201-50G
in vivo-jetPEI®-Gal	0.1 ml	10 ml	202-10G
in vivo-jetPEI®-Man	0.1 ml	10 ml	203-10G
jetSI 10 mM	0.5 ml	-	403-05

Resources

A non-exhaustive list of references is indicated for each administration route, check our online database: **www.polyplus-transfection.com** for additional or other references.

Contact us: **support@polyplus-transfection.com**

RECOMMENDED STARTING CONDITIONS

NASAL INSTILLATION

Nucleic acid: 20 µg

***in vivo*-jetPEI®:** 2.4-3.2 µL

N/P ratio: 6-8

Injection volume: 50-100 µL, 5% glucose

Method: The mouse is held supine at an angle of 45° with pressure applied to the lower mandibule to immobilize the tongue and prevent swallowing. Complexes in solution are then introduced to the nasal planum using a micropipet.

References:
- Kim BJ *et al.*, (2017) ***Appl Microbiol Biotechnol*** (DNA, lung)
- Rodriguez M *et al.*, (2017) **Sci Rep** (siRNA, lung and brain - prefrontal cortex)
- Long L *et al.*, (2015) ***Respi Res*** (siRNA, lung)

TOPICAL APPLICATION

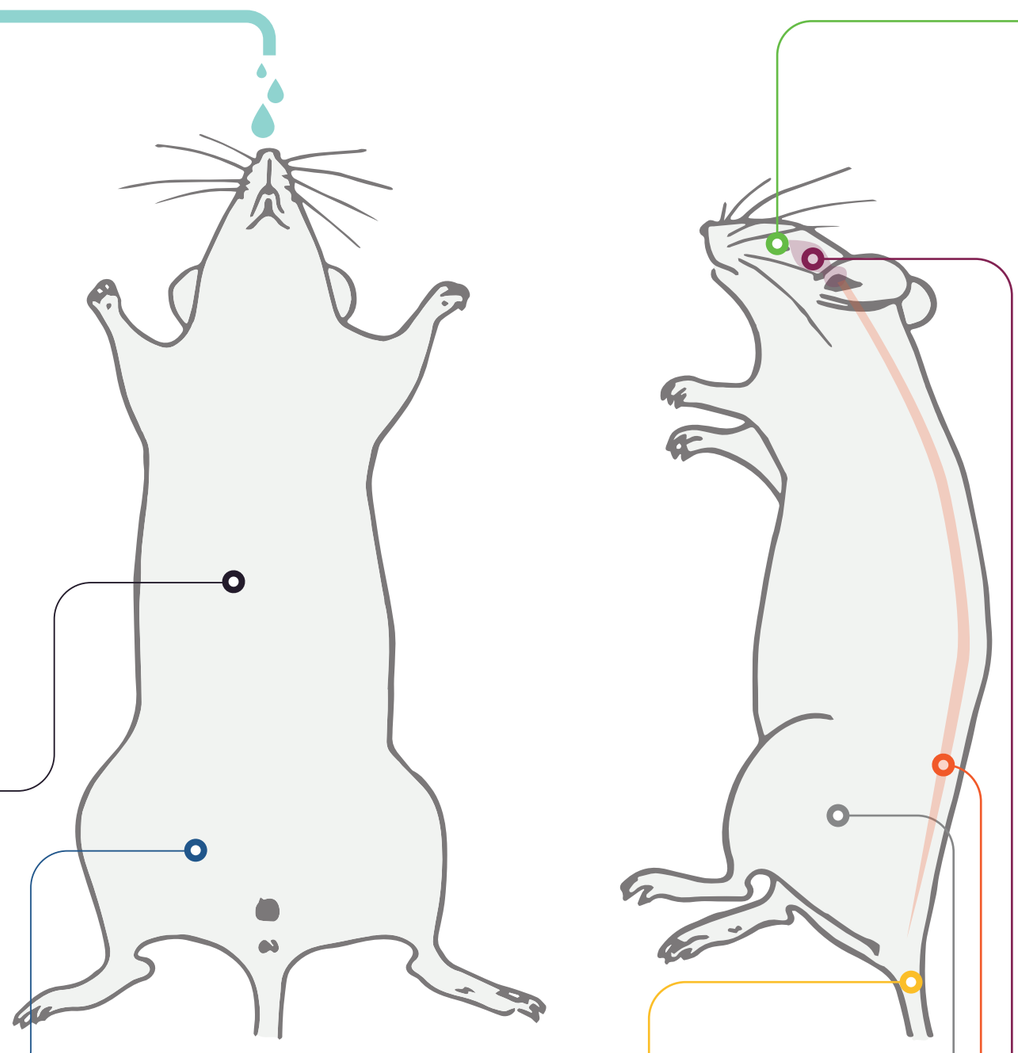
Please contact our scientific support for starting conditions adapted to your application.

Reference:
- Cabrera JR *et al.*, (2015) ***PLoS Pathog*** (DNA, skin)

SUBCUTANEAOUS INJECTION

Please contact our scientific support for starting conditions adapted to your application.

References:
- Luo M *et al.*, (2017) ***Nat Nanotech*** (DNA, spleen)
- Giroud M *et al.*, (2016) ***Sci Rep*** (mimic miRNA, adipose tissue)
- Oh HJ *et al.*, (2013) ***Eur J Nucl Med Mol Imaging*** (DNA, thigh & stereotaxic injection into the brain)



INTRAPERITONEAL INJECTION

Nucleic acid: 100 µg

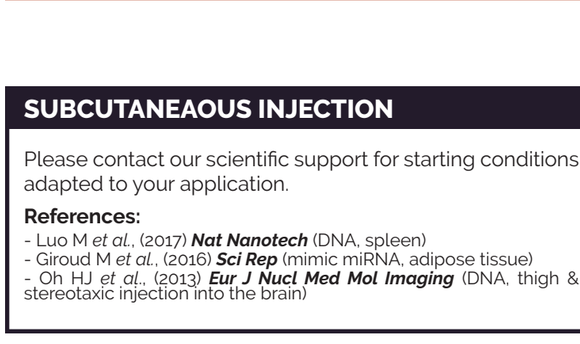
***in vivo*-jetPEI®:** 12-16 µL

N/P ratio: 6-8

Injection volume: 0.4-1 mL, 5% glucose

Method: Complexes in solution are injected into the peritoneal cavity over 10 sec, using a ½ inch 26G needle and a 1 mL syringe.

References:
- Sadio M *et al.*, (2017) ***J Innate Immun*** (mimic miRNA/antimiR, kidney & bladder)
- Furuya H *et al.*, (2017) ***Carcinogenesis*** (shRNA, peritoneal macrophages, using in vivo-jetPEI®-Man)
- Albino D *et al.*, (2016) ***Cancer Res*** (siRNA, tumor xenograft)



pCMVLuc (100 µg) was complexed with in vivo-jetPEI® at an N/P ratio of 8, in 1 mL of 5% glucose solution and injected intraperitoneally. 24 h after injection, organs were extracted and luciferase expression was measured and expressed relative to the amount of total proteins. Bioluminescence live imaging was performed using IVIS system (Perkin Elmer).

TAIL VEIN INJECTION (INTRAVENOUS ADMINISTRATION)

Nucleic acid: 40 µg

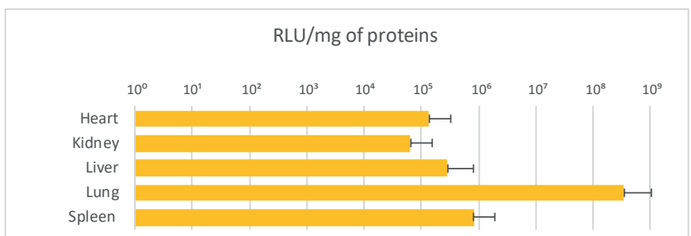
***in vivo*-jetPEI®:** 4.8-6.4 µL

N/P ratio: 6-8

Injection volume: 200-400 µL, 5% glucose

Method: The mouse is placed in a restrainer and 70% ethanol is applied on the tail to slightly swell the vein. Complexes in solution are injected into the tail vein over 10 sec, using a ½ inch 26G needle and a 1 mL syringe.

References:
- Coch C *et al.*, (2017) ***Mol Ther*** (5'pppRNA, immune cells)
- Sarett S *et al.*, (2017) ***PNAS*** (plasmid DNA, siRNA, tumors, lungs, liver, kidneys)
- Sabirov RZ *et al.*, (2017) ***EMBO*** (siRNA, heart).



pCMVLuc (50 µg) was complexed with in vivo-jetPEI® at an N/P ratio of 8, in 400 µl of 5% glucose solution and injected into the tail vein. 24 h after injection, organs were extracted and luciferase expression was measured and expressed relative to the amount of total proteins.

INTRATUMORAL INJECTION

Nucleic acid: 10 µg

***in vivo*-jetPEI®:** 1.2-1.6 µL

N/P ratio: 6-8

Injection volume: 20-100 µL, 5% glucose

References:
- Krzywinska E *et al.*, (2018) ***Nat Comm*** (DNA)
- Hsu YL *et al.*, (2017) ***Oncogene*** (antimiR)
- Hirahata M *et al.*, (2016) ***Cancer Med*** (siRNA)

RETRO-ORBITAL INJECTION (INTRAVENOUS ADMINISTRATION)

Nucleic acid: 40 µg

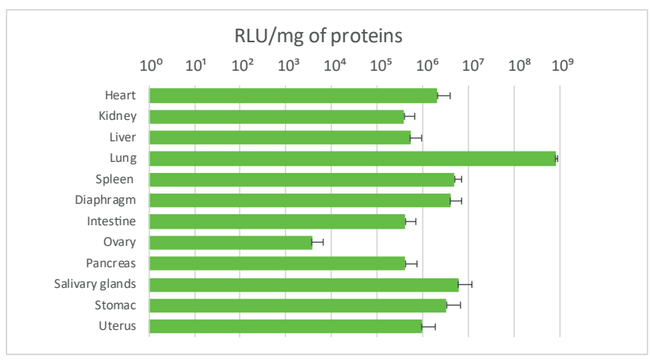
***in vivo*-jetPEI®:** 4.8-6.4 µL

N/P ratio: 6-8

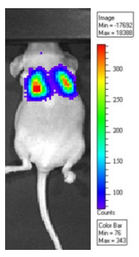
Injection volume: 100-200 µL, 5% glucose

Method: A 27G hypodermic needle is introduced carefully in front of the eye. The edge of the orbit is followed down until the needle tip reaches the base beneath the eye. Inject complexes in solution over 2 sec. If performed carefully, there will be little or no bleeding. The capillary nexus will take up the injected solution rapidly.

References:
- Li M *et al.*, (2015) **Antiviral Res** (DNA, heart)
- Liu S *et al.*, (2013) **JCB** (siRNA, aorta arches)



pCMVLuc (40 µg) was complexed with in vivo-jetPEI® at an N/P ratio of 8, in 200 µL of 5% glucose solution and injected through retro-orbital sinus. 24 h after injection, organs were extracted and luciferase expression was measured and expressed relative to the amount of total proteins. Bioluminescence live imaging was performed using IVIS system (Perkin Elmer).



INTRACEREBRAL INJECTION (STEREOTAXIC INJECTION)

siRNA: 0.1 µg/µL using jetSI 10 mM

Injection volume: 1-4 µL

Method: Single injection into either lateral ventricle or stereotaxical injection.

References:
- Yamazaki R *et al.*, (2017) ***Neurochem. Res.*** (siRNA using jetSI 10 mM)
- Karatas H *et al.*, (2013) ***Science*** (siRNA using jetSI 10 mM)

DNA: 1 µg

***in vivo*-jetPEI®:** 0.12-0.16 µL

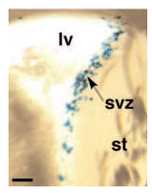
N/P ratio: 6-8

Injection volume: 4-5 µL, 5% glucose

Method: Perform single injection into either lateral ventricle (0.2 mm posterior to the bregma line, 1.1 mm lateral, and 2.2 mm deep from the pial surface) or stereotaxical injection.

References:
- Remaud S *et al.*, (2017) ***eLife*** (shRNA plasmid)
- Teplyuk NM *et al.*, (2016) ***EMBO*** (oligo)
- Soroceanu L *et al.*, (2015) ***Cancer Res*** (DNA)

Example of transfected cells expressing the ß-galactosidase found in the anterior subventricular zone (1 week after intraventricular injection of pCMV-LacZ). lv: lateral ventricle, svz: subventricular zone, str: stratium. Courtesy B. Demeneix.



OTHER ADMINISTRATION ROUTE OR OTHER ANIMAL MODEL

Please contact our scientific support for starting conditions adapted to your application.

Polyplus-transfection® is a biotechnology company that develops innovative solutions for the delivery of nucleic acids in research, bioproduction and therapeutics.

Quality is our top priority and Polyplus-transfection® is ISO 9001-certified since 2002.

CONTACT OUR SCIENTIFIC SUPPORT

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