Technical Note:

Publication on *in vivo* transfection of nucleic acid

with Polyplus-transfection reagents using the most common administration routes

Reagent used: *in vivo*-jetPEI®, unless specified

Delivery mode	DNA, oligonucleotides and plasmid-based shRNA	siRNA and RNA
Systemic injection (IV)	**DNA** Stellari *et al., (2016) J Transl Med 14(1) :226* He *et al., (2016) PLoS Pathog 12(7):e1005743* Elias *et al., (2016) Sci Rep 6 :24971* Stellari *et al., (2015) J Transl Med 13, 251* Ronald *et al., (2015) Proc Natl Acad Sci USA 112. 3068-73* Li *et al., (2015) Antiviral Res 123 :50-61* Bhatnagar *et al., (2014) Cancer Res 74(20), 5772* Dalli *et al., (2014) EMBO Mol Med 6(1), 27* Rodriguez *et al., (2013) Biochem Pharmacol 86, 1541* Osorio *et al., (2013) Cell Commun Signal 11, 19* Stefanov *et al., (2013) PLoS Genetics 8, e1003203* Aich et al., *(2012) Nat Commun 3, 877* Stellari *et al., (2012) PLoS ONE 7, e3971* Wong *et al., (2011) J Control Release 150, 298* Ansaldi *et al., (2011) PLoS ONE 6, e2509* Ochoa-Callejero *et al., (2010) Vaccine 28, 5323* Bhang *et al., (2011) Nat Med 17, 123* Lin *et al., (2011) Biomaterials 32, 1978* Wong *et al., (2011) Gene Ther 18, 82* Rodrigo-Garzon *et al., (2010) Cancer Gene Ther 17, 20* Klucar *et al., (2009) Vaccine 27, 1816* Dallabrida *et al., (2008) Faseb J 22, 3010* Nishikawa *et al., (2008) Hum Gene Ther 19, 1009* Bonnet *et al., (2008) Pharma Res 25, 2972* Robbins *et al., (2008) Hum Gene Ther 19, 991* Liu *et al., (2006) Mol Ther 13, 1006* Liu *(2006) Faseb J 20, 2384* Ge *et al., (2004) PNAS 101, 8676*	**siRNA** Xiao *et al., (2016) Nat Med 22(8):906-14* Kim *et al., (2016) Br J Pharmacol 173(6) : 1045-57* Kang *et al., (2016) Biochim Biophys Acta 1861 :1025-35* Lee *et al., (2015) Nat Commun 6 :10154* Zhang *et al.,* (2015) Int *J Clin Exp Med 8, 15146-54* Frye *et al.,* (2015) J *Exp Med 212. 2267-87* Keaney *et al., (2015) Sci Adv 1(8):e1500472* Chang *et al., (2014) Hepatology 60(4), 1251* Kim *et al., (2014) J Biol Chem 189(39), 27065* Kim *et al., (2014) FEBS J doi :10.1111* Paneni *et al., (2014) Atherosclerosis 136(2), 426* Zhou *et al., (2014) Nat Commun 5, 3619* Ellermeier *et al., (2013) Cancer Res 73(6), 1709* Liu *et al., (2013) J Cell Biol 201, 863* Shin *et al., (2013) J Hypertens 31, 1575* Kim *et al., (2013) Cell Signal 25, 2348* Jin *et al., (2013) Cell Reports 3, 1-13* Xia *et al., (2012) J Viral Hepat 19, 509* Campbell *et al., (2012) Nat Commun 3, 849* Mostafa Anower *et al., (2012) Eur J Pharmacol 688, 76-83* Kim *et al., (2012) Free Radic Biol Med 53, 629-4* Jin et al., *(2012) J Dermatol Sci 67, 88-94* Paneni *et al., (2012) Circ Res 111, 278-8* Lin *et al., (2012) J Virol 86, 10359* Ji *et al., (2012) Genomics Inform 10, 40-3* Ebert *et al., (2011) Gastroenterology 141, 696* Gerster *et al., (2010) Int J Radiat Oncol Biol Phys 77, 253* Ye *et al., (2010) Methods Find Exp Clin Pharmacol 32, 391*

	Nakamura *et al., (2013) Biomed Res Int 2013, 92879.* **shRNA delivery** Jiao *et al., (2015) Nat Immunol 16(3) :246-57* Andre *et al., (2015) Mol Med Rep 12(6) :8320-6* Wang *et al., (2011) Arch Biochem Biophys 508, 93* Paranjpe *et al., (2010) Am J Pathol 176, 2669* Williams *et al., (2010) Am J Pathol 176, 2732* Zeng *et al., (2010) Microvasc Res 80, 116* **Oligonucleotides delivery** Takagi *et al., (2011) Immunity 35, 958* **DNA and siRNA codelivery** Francis *et al., (2014) Mol Ther 22(9), 1643* Taylor *et al., (2012) Mol Ther 20, 1305* Ge *et al., (2004) PNAS. 101, 8676* **STICKY SIRNA™** Bonnet *et al., (2013) J Control Release 170, 183* Kedinger *et al., (2013) BMC Cancer 13, 338* Bonnet *et al., (2008) Pharma Res 25, 2972* Bolcato-Bellemin *et al., (2007) PNAS 104, 16050* **RNA** Chen *et al., (2015) Nucleic Acids Res. 43(7):3857-69* Using in vivo-jetPEI®-Gal Ranjan *et al., (2010) Virol J 7 , 102*	Lee *et al., (2010) J Inflamm (Lond) 7, 31* Kim *et al., (2010) Cardiovasc Res 87, 119* Chalmin *et al., (2010) J Clin Invest 120, 457* Miyamoto *et al., (2010) Arthritis Res Ther 12, R87* Besch *et al., (2009) J. Clin. Invest 119, 2399* Filippi *et al., (2009) J Clin Invest 119, 1515* Poeck *(2008) Nature Med 14 1256* Bonnet *et al., (2008) Pharma Res 25, 2972* Yang *et al., (2008), Nature 455, 1210* Lively *et al., (2008) J Allergy Clin immunol 121, 88* Ito *et al., (2008), Cancer Res 68, 3214* Choi *et al., (2008) J Biol Chem 283, 20186* Wang *et al.,(2008) Hypertension 52 , 484* Song *et al., (2007) Circulation 116, 1585* **miRNA mimic, miRNA inhibitors, antagomiR** Li *et al., (2016) Nat Microbiol 1(10) :16132* Zhao *et al., (2016) Sci Rep 6 :26611* Zhao *et al., (2015) Biochem Pharmacol 98, 602-13* Wang *et al., (2015) J Pharmacol Exp Ther 354, 131-41* Shi *et al., (2015) Cancer Res 75, 5309-17* Morishita *et al., (2015) Int J Nanomedicine 10, 3475-88* Guan *et al., (2015) Int J Biol Sci. 11(11) :1257-68* Wahlquist *et al., (2014) Nature 508(7497), 531* **Poly(I:C) delivery** Asdonk *et al., (2016) J Cell Mol Med 20(9):1696-705* Besch *et al., (2009) J. Clin. Invest 119, 2399* Tormo *et al., (2009). Cancer Cell 16, 103* **5'pppRNA delivery** Liu *et al., (2016) J Virol 90, 9406* Chiang *et al., (2015) J Virol 89, 8011*

Intraperitoneal injection (IP)	**DNA delivery** Hine *et al., (2011) Mol Ther* Wirtz *et al., (2011) Gastroenterology 141, 1875* Lee *et al., (2010) J Inflamm (Lond) 7, 31* Kitamura *et al., (2011) BBRC 404, 599* Smitha *et al., (2010) J Helminthol 84, 149* Serba *(2008) Gut 57, 344* Buckley *et al., (2008) Hum Gene Ther 19, 1050* Louis *et al., (2006) Cancer Gene Ther 13, 367* Caldas *(2006) Mol Cancer Ther 5, 693* **shRNA delivery** George and Tsutsumi *(2007), Gene Ther 14, 890* **Oligonucleotides delivery** Dabertrand *et al., (2010) Eur J Pharmacol 628, 36* Nickerson and Colledge *(2004) Gene Ther 11, 1351* **STICKY SIRNA delivery** Capulli *et al., (2015) Mol Ther Nucleic Acids 4:e248*	**siRNA delivery** Albino *et al., (2016) Cancer Res 76, (12), 3629* Park *et al., (2015) Gene Ther 22, 325-32* Gerster *et al., (2010) Int J Radiat Oncol Biol Phys 77, 253* Feng *et al., (2011) PLoS ONE 6, e2365* Busser *et al., (2010) Mol Ther 18, 528* Cubillos-Ruiz *et al., (2009) J. Clin. Invest 119, 2231* Storci *et al., (2008) J Pathol 214, 25* Lefort *et al. (2007) Genes Dev 21, 562-7* **Poly(I:C) delivery** Bhoopathi *et al., (2014) Cancer Res 74, 6224* Wu *et al., (2011) Cancer Immunol Immunother 60, 1085* Tormo *et al., (2009) Cancer Cell 16, 103* **miRNA and pre-miRNA delivery** Veliceasa *et al., (2015) Vasc Cell 7. 6* Stickel *et al., (2014) Blood 124, 2586-95* Hsu *et al., (2014) J Pathol 232, 330* Nezami *et al., (2014) Gastroenterology 146(2), 473* Cubillos-Ruiz *et al., (2012) Cancer Res 72, 1683*
Intratumoral Injection	**DNA delivery** Kitano *et al., (2016) Onco Targets Ther 9 :503-16* Gupta *et al., (2016) Tumor Biol 37(9) :12089* Gupta *et al., (2016) Virus Res 213:289-98* Zhong *et al., (2015) J Biol Chem 290:8876-87* Ronald *et al., (2015) Proc Natl Acad Sci USA 112. 3068-73* Rama *et al., (2015) Int J Mol Sci 16. 12601-15* Li *et al., (2015) J Cancer Res Clin Oncol 141. 1909-20* Hsieh *et al., (2015) Mol Imaging Biol 17(6):802-10* Ma *et al.,* (2013) *Mol Cancer Ther 12, 286-9*	**siRNA** delivery Hirahata *et al., (2016) Cancer Med 5(5):892* Chen *et al.,* (2014) *Br J Cancer 110, 1014* Zhang *et al.,* (2014) *BMC Cancer 14, 310* Kurioka *et al.,* (2014) *Sci Rep 4, 6111* Wang *et al.,* (2014) *Apoptosis 19, 643-5* Wang and Gartel *(2011) Oncotarget 2, 1218* Zhang *et al., (2010) Ann Surg Oncol 16, 2617* Goodwin *et al., (2010) Cancer Res 70, 2932*

	Rodriguez *et al., (2013) Biochem Pharmacol 86, 1541* Hine *et al., (2011) Mol Ther* Amit *et al., (2011) Int J Clin Exp Med 4, 91* Amit and Hochberg *(2010) J Transl* Med *8, 134* Scaiewicz *et al., (2010) J Oncol 2010, 17817* Kang *et al., (2009) BMC Cancer 9, 126* Stone *et al., (2009) PLoS One 4, e7334* Garg *et al., (2009) Cancer Gene Therapy 17, 155* Prados *et al., (2009) Exp Dermatol 19, 363* Kang *et al., (2009) BMC Cancer 9, 126* Ortiz *et al., (2009) J Mol Med 87, 899* Jeudy *et al., (2008) Cancer Gene Ther 15, 742* Chumakova *et al., (2008) Cancer Lett 261, 215* Hua *(2007) Cancer Gene Ther 14, 815* Lavergne *et al., (2004) J Immunol 173, 3755* Ohlfest *et al., (2004) Mol Ther 10, 260* Lavergne *et al., (2003) Cancer Res 63, 7468* Kitano *et al., (2012) J Gene Med 14, 642-5.* **Dbait delivery** Berthault *et al., (2011) Cancer Gene Ther 18, 695* Quanz *et al., (2009) Clin Cancer Res 15, 308* **LNA delivery** Cogoi *et al., (2013) Nucliec Acids res 41(7):4049*	**miRNA and pre-miRNA delivery** An *et al., (2016) Biochim Biophys Acta 1862(10), 1926* Wang *et al., (2015) J Pharmacol Exp Ther 354, 131-41* Kong *et al.,* (2014) *Cancer Res 74, 3764.* Hsu *et al.,* (2014) *J Pathol 232, 330* Song *et al.,* (2014) *Clin Cancer Res 20, 878-8* Gabriely *et al., (2011) Cancer Res 71(10), 3563-72* **DNA and siRNA codelivery** Taylor *et al., (2012) Mol Ther 20, 1305* **shRNA** delivery Hu *et al.,* (2014) *Int J Clin Exp Pathol 7, 2143* Zhang *et al., (2009) Ann Surg Onc 16, 2617* Niola *et al., (2006) Cancer Biol Ther 5, 174* Hua *et al., (2007) Cancer Gene Ther 14, 815* **Oligonucleotides** delivery Liu *et al., (2010) J Exp Clin Cancer Res 29, 63* Canello *et al., (2014) PLoS One 9(12):e113854* **Poly(I:C) delivery** Duewell *et al.,* (2014) *Cell Death Differ 21, 1825.* Bhoopathi *et al.,* (2014) *Cancer Res 74, 6224.*
Intratracheal delivery	**DNA delivery** Bivas-Benita *et al., (2013) Mucosal Immunol 6(1), 156* **Aerosol** Bivas-Benita *et al., (2010) J Virol 84, 5764* **Aerosol** Hu *et al., (2010) J Gene Med 12, 276* Gregory *et al., (2009) Vaccine 27, 5299*	**miRNA delivery** Chen *et al., (2016) J Cell Physiol 231(10) :2236*

	Tian *et al., (2008) J Asthma 45, 715* Liu *et al., (2006) Faseb J 20, 2384* Liu *(2006) Am J Respir Crit Care Med 173, 566*	
Intranasal delivery	**DNA delivery** Buckley *et al., (2008) Hum Gene Ther 19, 1050*	**siRNA delivery** Long *et al., (2015) Respir Res 16. 11* Aguilera-Aguirre *et al., (2014) J Immunol 193, 4643* Liu *et al., (2014) J Virol 88, 4229*
Intrabiliary injection	**DNA delivery** Li *et al., (2014) J Clin Invest 124, 3241*	
Intramuscular injection	**DNA delivery** Yu *et al., (2016) Vaccine 34(37):4399* Tseng *et al., (2015) J Vasc Surg* Bivas-Benita *et al., (2010) J Virol 84, 5764*	**5'PPP-RNA** Beljanski *et al., (2015) J Virol 89, 10612* miRNA delivery Hsu *et al., (2016) J Cell Mol Med 21(3):519* Veliceasa *et al., (2015) Vasc Cell 7. 6*
Sub-cutaneous (SC) and subepidermal (SE)	**DNA delivery** Zhang *et al.,* (2014) *Free Radic Biol Med 69, 96-10.* (SC) Oh *et al., (2013) Eur J Nucl Med Mol Imaging 40, 1607* (SC) Cid-Arregui *et al., (2003) J Virol 77, 4928* (SC)	**siRNA delivery** Acosta *et al.,* (2014) J *Neurosci 34, 1494.* **Intradermal** Murase *et al., (2009) J Biol Chem 284, 4343* **SE** **Oligonucleotide delivery** Matsumoto *et al., (2015) Nature Commun 6, 6280* **Peritumoral** **miRNA delivery** Giroud *et al., (2016) Sci Rep 6 :28613*
Intra-articular injection	**siRNA** Kramer *et al., (2010). Arthritis Rheum 62, 3109.*	**Poly(I:C) delivery** Magnusson *et al., (2006) Arthritis Rheum 54, 148* Zare *et al., (2006) J Leukoc Biol 79, 482*
Topical application	**Topical DNA delivery to the skin** Cabrera *et al., (2015), PLoS Pathog 11(1):e1004571* Lorincz *et al., (2011) Nanomedicine** using *in vivo*-jetPEI®-Man	**Topical siRNA delivery to blood vessels** Kudo *et al., (2007) Arterioscler Thromb Vasc Biol 27, 1562*

	Angelos *et al., (2011). Arch Facial Plast Surg 13, 185* McKnight *et al., (2008), Ortolaryn Head Neck Surg 139, 2459* Lisziewicz *et al., (2005) J Invest Dermatol. 124, 160 using in vivo*-jetPEI®-Man Lisziewicz *et al., (2005) Aids 19, 35* using *in vivo*-jetPEI®-Man Lisziewicz *et al., (2006) Curr Drug Delivery 3, 83* using *in vivo*-jetPEI®-Man	
Intramedullar injection	**DNA delivery** Zhu *et al., (2012).Biochim Biophys Acta 1822, 936-4* **Intramedullar** Wang *et al., (2010) Hypertension 55, 1129-1136* **Intramedullar** **shRNA delivery** West *et al., (2014) Exp Physiol 99, 816-2* **Injection into renal artery** Wang *et al., (2014) Am J Physiol Renal Physiol 306, F1236* **Injection into kidney** Zhu *et al., (2014) Am J Hypertens 27, 107-1* **Infusion into the renal medulla**	**siRNA delivery** Li *et al., (2012) Ren Fail 34(10), 1288* **Injection into renal capsule**
Intracardiac injection	**mRNA delivery** Huang *et al., (2015) Mol Pharm 12(3):991-6*	**siRNA delivery** Pei et al., (2016) *Free Radic Biol Med 97:408-17* Pei *et al., (2015) Free Radic Biol Med 82, 114-21* Cilenti *et al., (2011) J Mol Cell Cardiol 50, 652* **miRNA delivery** Du *et al., (2016) Free Radic Biol Med 96 :406-17* Veliceasa *et al., (2015) Vasc Cell 7. 6*

Intrathecal injection	**shRNA delivery** Cheng *et al., (2015) Pain 156(11):2295-309*	**siRNA delivery** Xie *et al., (2015) Neuroscience 291. 317-30* Barbosa *et al., (2015) Mol Pain 11 :60* Jin *et al.,* (2014) J *Neurosci Res 92, 1690* Kiguchi *et al., (2010). Pain 149, 305* **Perineural injection** Patte-Mensah *et al., (2010) Pain 150, 522* **Paravertebral injection** Liu *et al., (2010) Brain Res 1346, 213* Lan *et al., (2010) Mol Pain 6, 2* Tulleuda *et al., (2011) Mol Pain 7, 30* Xie et al., *(2012) Neurosci Lett 515, 61-5* Kramer *et al., (2013). Neuroscience 245, 1-11* **Into Trigeminal Ganglia** Xie *et al., (2013). Pain 154, 1170.* **Injection into Dorsal Root Ganglion**
Intracerebral injection	**DNA delivery** Ran *et al., (2015) Neural Regen Res 10. 1258-64* Soroceanu *et al.,* (2015) *Cancer Res 75, 3065-76* Zuckermann *et al.,* (2015) *Nature Commun 6, 7391* Kosaka *et al.,* (2014) *Cancer Immunol Immunother 63, 847-5* Oh et al., *(2013) Eur J Nucl Med Mol Imaging 40, 1607* Lopez-Juarez et al., *(2012) Cell Stem Cell 10, 531-4* Schaffer *et al., (2010) Brain Res 1362, 32* Uchida *et al., (2010) J Neurosci 30, 15007* Wiesner *et al., (2009) Cancer Res 69, 431* Jouvert *et al., (2004) J Neurosci. 24, 10716* Wu *et al., (2004) Brain Res. 1008, 284* **shRNA delivery** Cruz *et al., (2015) J Neurosci 35(36) :12394-403* Sedbazar *et al., (2013) Biochem Biophys Res Commun 434, 434* Karatas *et al., (2013) Science 339, 1092*	**siRNA delivery** Karatas *et al., (2013) Science 339, 1092* Using jetSI 10 mM Smith *et al., (2012) J Neurosci Methods 203, 398* Using jetSI 10 mM Chauvier *et al., (2011) Cell Death Dis 2, e203* Using jetSI 10 mM Carlsson *et al., (2011) Ann Neurol 70,* 781 Using jetSI 10 mM Tai *et al., (2011) Embo J 30, 205* Using jetSI 10 mM Badaut et al., (2011) J Cereb Blood Flow Metab 31, 819 Using INTERFERin® Batassa *et al., (2010) Neurosci Lett 471, 188* Using *in vivo*-jetPEI® Cakir *et al., (2009) PLoS One 4, e8322* Using jetSI 10 mM Dominska *et al., (20101) J Cell Sci 123, 1183* Using jetSI 10 mM Cheret *et al., (2008) J Neurosci 28, 12039* Using jetSI 10 mM Froidevaux *et al., (2006) EMBO Rep. 7, 1035* Using jetSI 10 mM Guissouma *et al., (2006) Neurosci Lett, 406, 240* Using jetSI 10 mM Kumar *et al., (2006) PLoS Med 3, e96 0505* Using jetSI 10 mM Hassani *et al., (2005). J Gene Med 7, 198* Using jetSI 10 mM Bender *et al., (2013). Neurobiol Dis 54, 297* Using jetSI 10 mM Li *et al., (2012). Addict Biol 17, 392-4* Using jetSI 10 mM Zhang *et al., (2011). Am J Phys Heart Circ Phys 302* Using jetSI 10mM

	Hassani *et al., (2007) Nucl Acid Res 35, e65* **Oligonucleotides delivery** Teplyuk *et al., (2016) EMBO Mol Med 8(3):268* De Rivero Vaccari *et al., (2015), J Neurochem* Zhang *et al., (2009), J Neurosci 29, 13823*	*Griggs et al., (2013). J Neurosci 33, 1734* Using jetSI 10mM **miRNA delivery** Smith *et al., (2015), Hum Mol Genet 24, 6721-35* **Intraventricular**
Local injection	**DNA delivery** Yamada *et al., (2015) Hepatology 61.1627-42* **Injection into gallbladder** Buscail *et al., (2015) Mol Ther 23. 779-89* **Injection into pancreas** Xia *et al., (2013) J Pediatr Surg 48, 2140* **Microinjection into seminiferous tubules** Yuan *et al., (2013) PLoS ONE 8, e6071* **Intracorneal injection** Dall'Era *et al. (2008) Int J Impot Res 20(3), 307* **Injection into corpus cavernosum** **shRNA delivery** Li *et al., (2015) Cell Physiol Biochem 37(3) :911-20* **Intraovarian injection** Rotgers *et al.,* (2014) *Cell Death Dis 5, e1274.* **Injection into rete testis** Zhang *et al., (2012) Cell Rep 2(5), 1272* **Intravitreal injection** Liao and Yau *(2007) Biotechniques 42, 285* **Intravitreal injection**	**siRNA delivery** Li *et al., (2016) Endocrinology 157(7):2894* **Injection into testis** Gao *et al., (2016) Sci Rep 6 :28589* **Injection into testis** Chen *et al., (2016) Endocrinology 157(5):2140-59* **Injection into testis** Zheng *et al., (2015) Bone 83. 190-196* **Medullar injection into bone** Ma *et al.,* (2015) *Sci Rep 5. 8894* **Injection into testis** Arnandis *et al.,* (2014) *Biochem J 459, 355-6* **Injection into inguinal mammary gland** Kramer *et al.,* (2014) *Neuroscience 278, 144-5* **Infusion into trigeminal ganglion** **antimiR delivery** Khan *et al.,* (2013) *Eur J Oral Sci 121. 303-12* **Injection into lingual side of the first right mandibular molar area**