

Decoy ODN transfection (in vivo)

No	Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	decoy ODN target	ODN dose	HVJ-E dose	dosing strategy	Remarks
1	K. Sumi <i>et al.</i>	<i>Gene Ther.</i> , 11(24), 1763-1771 (2004).	15306843	Mouse	skin, ear lobe	subcutaneous injection	STAT-6	800 µg			
2	N. Matsuda <i>et al.</i>	<i>Mol. Pharmacol.</i> , 67, 1018-1025 (2005).	15576632	Mouse	lung	tail vein	NF-κB	80 µg			
3	S. F Feigl <i>et al.</i>	<i>J. Clin. Invest.</i> , 115, 3057-3071 (2005).	16239967	Mouse	colonic lamina propria	intrarectal, intraperitoneal	NF-κB	75 µg		i.r : day 0, ip: day 1, 2	
4	H. Nakamura <i>et al.</i>	<i>FEBS Lett.</i> , 580(11), 2717-2722 (2006).	16647058	Mouse	uterus	uterine cavity injection	STAT-3				
5	N. Matsuda <i>et al.</i>	<i>J. Pharmacol. Exp. Ther.</i> , 332(3), 730-737 (2010).	20008488	Mouse	spleen	tail vein	NF-κB	100µg			sepsis induction
6	T. Watanabe <i>et al.</i>	<i>J. Clin. Invest.</i> , 120(5), 1645-1662 (2010).	20389019	Mouse		intraperitoneal administration	NF-κB			day1,2 before H.pylori infection	
7	T. Kimura <i>et al.</i>	<i>Indian J. Physiol. Pharmacol.</i> , 54(5),27-32 (2010).		Mouse	uterus	uterine cavity injection	NF-k B , Stat-3, AP-1				

siRNA transfection (in vivo)

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	siRNA target	siRNA dose	HVJ-E dose	dosing strategy	Remarks
1	M. Ito <i>et al.</i>	<i>J. Gene Med.</i> , 7(8), 1044-1052 (2005).	15756713	SCID mouse	i.d transplanted tumor (HeLa)	intratumor injection	Rad51	35µg		day 0,2,4	Day2 CDDP(cisplatin)
2	S. F Feigl <i>et al.</i>	<i>Nature Med.</i> , 12, 99-106 (2006).	16327802	Mouse	lung	intratracheal	IL-13 Receptorα 2	100µg		day 0,2,4,6,8,10,12, 14,16,18,20,22	
3	K. Ishibashi <i>et al.</i>	<i>J. Dent. Res.</i> , 85(12), 1101-1105 (2006).	17122162	Rat	submandibular gland	retrograde ductal injection	rCLCA(Ca2+-dependent cl-channels), CFTR(cystic fibrosis transmembrane conductance regulator)	2 nmol	80µL(2AU)	day 0	
4	S. F Feigl <i>et al.</i>	<i>J. Immunol.</i> , 178, 5859 - 5870 (2007).	17442970	Mouse	colon	intrarectall injection	IL-13 Receptor α2				
5	Y. Nimura <i>et al.</i>	<i>Int. J. Oncol.</i> , 30(6), 1477-1484 (2007).	17487369	BALB/C nude mouse	i.d transplanted tumor (H1299)	intratumor injection	Ku80			day0(1shot) or day 2, 4(2 shots)	siRNA + 4Gy irradiation
6	T. Watanabe <i>et al.</i>	<i>J. Clin. Invest.</i> , 118(2), 545-559 (2008).	18188453	Mouse	colon	intrarectally	IRF4	100µg		day-2,-1-,0,1	colitis
7	K. Ishibashi <i>et al.</i>	<i>Am J Physiol Regulatory Integrative Comp Physiol.</i> , 294, 1729-1736 (2008).	18337312	Rat	submandibular gland	retrograde ductal injection	CFTR (cystic fibrosis transmembrane conductance regulator)	2 nmol			
8	Y. Doi <i>et al.</i>	<i>Proc. Natl. Acad. Sci. USA</i> , 105(24), 8381-8386 (2008).	18550828	SJL/J mouse (ex vivo)	inguinal and popliteal LN cells (enrich in lymphoblasts)	adoptive transfer experimental autoimmune encephalomyelitis (EAE) model in irradiated mice/ i.p. injection of NR4A2 siRNA-treated LN cells	orphan nuclear receptor NR4A2				
9	H. Kato <i>et al.</i>	<i>J. Exp. Med.</i> , 205, 1601-1610 (2008).	18591409	Mouse		intravenously injection	short poly I:C , long poly I:C(purpose :dsRNA-induced IFN-β production)				
10	K. Morita <i>et al.</i>	<i>J. Pharmacol. Exp. Ther.</i> , 326, 633-645 (2008).	18448867	Mouse	spinal cord	spinal cord injection	GlyT1, GlyT2, GlyRα3				

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	siRNA target	siRNA dose	HVJ-E dose	dosing strategy	Remarks
11	M. Boirivant <i>et al.</i>	<i>Gastroenterology</i> , 135(5), 1612-1623 (2008).	18765239	Mouse	colon	intrarectal injection	Toll like receptor(TLR)-2	1mg			
12	K. Morita <i>et al.</i>	<i>Pain</i> , 138(3), 525-536 (2008).	18353555	Mouse	spinal cord	spinal cord injection	GlyR α 3				
13	M. Matsuda <i>et al.</i>	<i>Gene Ther.</i> , 16(12), 1465-1476 (2009).	19675593	Mouse	i.d transplanted tumor (human glioblastoma cell), intracranial transplanted tumor (human glioblastoma cell)	intratumor injection	Eg5				
14	N. Matsuda <i>et al.</i>	<i>J. Pharmacol. Exp. Ther.</i> , 332(3), 730-737 (2010).	20008488	Mouse	spleen	tail vein	Histamine H4 Receptors	50 μ g			sepsis induction
15	T. Watanabe <i>et al.</i>	<i>J. Clin. Invest.</i> , 120(5), 1645-1662 (2010).	20389019	Mouse		ip	Stat1	100 μ g			
16	T.Takahashi <i>et al.</i>	<i>Pain</i> , 150(1), 183-191 (2010).	20546998	Rat		intrathecal(i.t) injection	Ca $_v$ 3.2	9 μ g/1shot			Total siRNA dose:27 μ g
17	E.Tskitishvili <i>et al.</i>	<i>Am. J. Obstet. Gynecol.</i> , 203(4), 364.e6-e12 (2010).	20579953	Mouse	uterus	uterine cavity	RCAS1				
18	T. Fujioka <i>et al.</i>	<i>J. Pharmacol. Sci.</i> , 113(4), 353-361(2010).	20647689	Mouse	transplanted tumor (colon26)	intratumor injection	bcl-2	40 μ g/1shot	40 μ L/1shot	day 0,2,4,6,8	HRE-CMV sh bcl-2(Plasmid)
19	L. Chen <i>et al.</i>	<i>Circulation</i> , 122, 910-919 (2010).	20713899	Mouse	dorsal skin	subcutaneous injection	Int6	40 μ g			siRNA-Int6 plasmid

Protein(antibody) transfection (in vivo)

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	Protein/Antibody	protein dose	HVJ-E dose	dosing strategy	Remarks
1	K. Owada-Makabe <i>et al.</i>	<i>Neurosci. Lett.</i> , 378(1), 18-21 (2005).	15763165	Rat	brain (nucleus tractus solitarius)	local injection (with microinjection)	β -galactosidase	16.7ng	0.003 AU	day 0	
2	E. Yasuoka <i>et al.</i>	<i>J. Mol. Med.</i> , 85(3), 279-288 (2007).	17072578	Mouse	nasal cavity	intranasal	OVA (ovalbumin)	9.1 μ g		day 35, 42, 49	protein vaccine
3	K.Shintani-Ishida <i>et al.</i>	<i>Biochim.Biophys.Acta.</i> , 1812(7), 743-751 (2011).	21447388	Rat	heart		anti-PLB antibody				

Plasmid DNA transfection (in vivo)

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	Plasmid DNA	DNA dose	HVJ-E dose	dosing strategy	Remarks
1	H. Nakamura <i>et al.</i>	<i>Mol. Hum. Reprod.</i> , 9(10), 603-609 (2003).	12970398	IVCS mouse(day 1.5 post coitum)	uterus	uterine cavity	LacZ Luciferase	80 μ g		25 μ L	After transfection, the cervix was clamped for 10min. HVJ-E-plasmid complex was finally suspended in human tubal fluid(HTF) medium
2	K. Oshima <i>et al.</i>	<i>FASEB J.</i> , 18(1), 212-214 (2003).	14630698	Rat	inner ear	intrathecal injection (cerebrospinal fluid:CSF)	human HGF(Hepatocyte growth factor)			day 0, 14	
3	H. Kanzaki <i>et al.</i>	<i>J. Dent. Res.</i> , 83(12), 920-925 (2004).	15557398	Wistar Rat	sub-perosteal area	periodontal tissue	OPG(Osteoprotegerin)			day 0, 3, 7, 10, 14 and 17. 5 μ L(1shot)	

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	Plasmid DNA	DNA dose	HVJ-E dose	dosing strategy	Remarks
4	M. Ono <i>et al.</i>	<i>Circulation</i> , 110, 2896-2902 (2004).	15505094	Wistar Rat	lung	left lung (with catheter)	Lac Z, human HGF(Hepatocyte growth factor)	60µg		300µL	pulmonary Hypertension(PH)model mouse(with MCT)
5	H. Nakamura <i>et al.</i>	<i>Biochem. Biophys. Res. Commun.</i> , 321(4), 886-892 (2004).	15358109	Mouse	uterus	uterine cavity	IkBa Mutant	80µg		25µL	After transfection, the cervix was clamped for 10min. HVJ-E-plasmid complex was finally suspended in human tubal fluid(HTF) medium
6	M. Takeno <i>et al.</i>	<i>Clin. Exp. Allergy</i> , 34(6), 965-970 (2004).	15196287	BALB/C mouse	spleen	intravenous injection(tail vein)	mouse txk (a member of Tec family tyrosine kinases)	50µg		day - 1,+1,+3,+20,+22,+24	Day 0 = First immunization mouse txk is a member of Tec family tyrosine kinases, acts Th-1-specific transcription factor in the T lymphocytes.)
7	T. Yamazaki <i>et al.</i>	<i>Blood</i> , 104(8), 2345-2352 (2004).	15187024	C57BL/6 mouse	abdominal subcutaneous tissue	abdominal subcutaneous tissue	PILSAP(puromycin-insensitive leucyl-specific aminopeptidase)	20µg	40µL(1AU)		intra-matrigel injection
8	M. Shimamura <i>et al.</i>	<i>Circulation</i> , 109, 424-431 (2004).	14707023	Wistar Rat	brain	cisterna magna injection(with cannula)	human HGF(Hepatocyte growth factor)	400µg		100µL	After removal 100µL of cerebrospinal fluid(CSF),HVJ-E+plasmid complex infused.Rats were placed head down for 30min.
9	T. Itani <i>et al.</i>	<i>Int.J. Mol. Med.</i> , 16, 821-825(2005).	16211250	SD rat (MRP2 mutant)	liver	peripheral portal vein	human MRP2(Multidrug resistance protein 2)	700µg	1mL(25AU)		SD rat (MRP2 mutant; Eisai hyperbilirubinuria rat)
10	T. Matsuoka <i>et al.</i>	<i>Diabetes</i> , 54, 2882-2890 (2005).	16186389	Wistar Rat(STZ induced diabetic Rat)	carotid artery	carotid artery	Tim44(Mammalian translocase of inner mitochondrial membrane 44)	20µg	2AU	100µL	Neo,After balloon injury,HVJ-E+plasmid complex incubated in the carotid artery for 20min.
11	M. Ono <i>et al.</i>	<i>J. Thorac. Cardiovasc. Surg.</i> , 129, 740-745 (2005).	15821638	neonatal pig (piglet)	lung	left pulmonary artery with balloon	human HGF(Hepatocyte growth factor)	2mg		20mL (1shot)	HVJ-E-plasmid complex was infused via the catheter, after the occlusion of the left pulmonary artery flow by balloon inflation for 3 minutes.
12	N. Shigemura <i>et al.</i>	<i>Circulation</i> , 111, 1407-1414 (2005).	15781752	SD rat	lung	dorsalis Penis Superficialis vein(via the catheter)	human HGF(Hepatocyte growth factor)	100µg		0.5mL(1shot)	

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	Plasmid DNA	DNA dose	HVJ-E dose	dosing strategy	Remarks
13	N. Shigemura <i>et al.</i>	<i>Am. J. Respir. Crit. Care Med.</i> , 171, 1237-1245 (2005).	15764723	Rat	lung	dorsalis Penis Superficialis vein	human HGF(Hepatocyte growth factor)	100µg		0.5mL(1shot)	
14	H. Futamatsu <i>et al.</i>	<i>Circ. Res.</i> , 96, 823-830 (2005).	15774858	Lewis rat	heart	heart	human HGF(Hepatocyte growth factor)	20µg	200µL(5AU)	day 0,14. (50µL×4sites)	
16	Y. D. Kim <i>et al.</i>	<i>Gene Ther.</i> , 13(3), 216-224 (2006).	16177820	SD rat		liver	pEBAct-ins(human insulin+EBV origin of replication+ the EBV nuclear antigen EBNA-1 +amp-resistance gene)	100µg		1 shot(four sites)	right lobe margin of the liver
17	H. Kanzaki <i>et al.</i>	<i>Gene Ther.</i> , 13(8), 678-685 (2006).	16397507	Wistar rat	palatal periodonal tissue of upper first molar	palatal periodonal tissue of upper first molar	mouse RANKL(receptor activator of nuclear factor kappa B ligand)			day 0, 3, 7, 10, 14 and 17. 5µL(1shot)	
18	H. Suzuki <i>et al.</i>	<i>Cancer Biol. Ther.</i> , 5(11), 1487-1491 (2006).	17102594	Nude KSN/Slc mouse	i.d transplanted tumor (LoVo:human colon cancer cell line)	intratumor injection	N116-cdel2(dominant negative RAS Mutant)	75µg		day 3,10(after transplantation)	1×10 ⁷ LoVo cells were subcutaneously injected into the back of nude mouse.
19	Y. Zhang <i>et al.</i>	<i>J. Am. Soc. Nephrol.</i> , 17, 1090-1101 (2006).	16510762	CD-1 mouse (STZinduced diabetic mouse)	kidney	tail vein injection	LacZ,Tim44(Mammalian translocase of inner mitochondrial membrane 44)	80µg	8 AU	120µL (1shot)	STZ(150mg/kg)induced diabetic mouse
20	M. Ieda <i>et al.</i>	<i>Circulation</i> , 114, 2351-2363(2006).	17101855	diabetic mellitus induced rat	heart	local injection	NGF(Nerve growth factor)	50 µg			
21	T. Hamada <i>et al.</i>	<i>Am. J. Pathol.</i> , 171,872-881 (2007).	17640959	SD rat	spleen	local injection	Oncostatin M (OSM)			day 4, 11,18	Liver Damage Induced by Dimethylnitrosamine(DMN) in Rats
22	T. Watanabe <i>et al.</i>	<i>J. Clin. Invest.</i> , 118(2), 545-559 (2008).	18188453	Mouse	colon	i.p.	NOD-2(Nucleotide-binding oligomerization domain 2)	100µg		day-2,1-,0,1	MDP(muramyl dipeptide)
23	Y. Mitani <i>et al.</i>	<i>J. Thorac. Cardiovasc. Surg.</i> , 136(1), 142-149 (2008).	18603067	Rat	lung	intratracheal injection	Atrial natriuretic peptide gene and β-galactosidase gene				
24	H. Matsubara <i>et al.</i>	<i>Clin Orthop Relat Res.</i> 466(12), 2962-2672 (2008).	18813894	Japanese white Rabbit(2.5-3kg)	osteotomy gap of rabbit tibias	Subcutaneous injection(S.c)	human HGF(Hepatocyte growth factor)	50µg	5AU	postoperative 2 weeks	final volume of 100µL balance salt solution for S.C
25	M. Okada <i>et al.</i>	<i>Vaccine</i> , 27, 3267-3270 (2009).	19200841	Mouse		Intramuscular (i.m) injection	HSP65(mycobacterial heat shock protein 65) and IL-12(interleukin-12)	50µg			DNA tuberculosis vaccine
26	T. Fujita <i>et al.</i>	<i>Cancer Res.</i> , 69(12), 5142-5150 (2009).	19491278	Mouse		Intramuscular (i.m) injection	TGFR plasmid(TGF-beta type II receptor fused to the human IgG heavy chain)				DNA vaccine C57BL/6 mice subcutaneously bearing E.G7 tumors were administered TGFR plasmid DNA i.m. near the established tumor.

No	First Author	Reference	PubMed ID	Host	Target organ / tissue	Delivery route	Plasmid DNA	DNA dose	HVJ-E dose	dosing strategy	Remarks
27	H. Kidoya <i>et al.</i>	<i>Blood</i> . 115(15), 3166-3174 (2010).	20185589	Mouse		quadriceps muscle of the ischemic limb	P-CAG-Lacz P-CAG-VEGF P-CG-Apelin				
28	T. Okabayashi <i>et al.</i>	<i>PLoS One</i> , 5(9), e13034 (2010).	20927397	Wistar Rat	bone	intramuscular administration (one-third of the tibialis anterior muscle of the right hindlimb)	Luciferase	100µg	100µL	day 0,7	
29	M.Tomomura <i>et al.</i>	<i>In Vivo</i> , 25, 157-163 (2011).	21471529	Mouse		Intramuscular (i.m) injection	plasmid(Flag-tagged caldecrin gene)				
30	M. Okada <i>et al.</i>	<i>Clin. Dev. Immunol.</i> , 549281 (2011)	21437226	Mouse		anterior muscles in the tibia	HSP65(mycobacterial heat shock protein 65) and IL-12(interleukin-12)	50µg	100µL	3 times every 3 weeks	DNA tuberculosis vaccine

Bioimaging (in vivo)

No	First Author	Reference	PMID	Host	Target organ / tissue	Delivery route	Magnetic labeling etc	dose	HVJ-E dose	dosing strategy	Remarks
1	J A Flexman <i>et al.</i>	<i>IEEE Trans Nanobioscience</i> , 7(3), 223-232(2008).	18779103	SD Rat	liver, kidney, spleen	intravenously injection	Feridex (superparamagnetic iron oxide particles) + ¹⁸ F-fluoride + poly-L-lysine				PET(Positron Emission Tomography)

Review

No	Author	Reference	PubMed ID	Remarks
1	Y. Kaneda <i>et al.</i>	<i>Mol. Ther.</i> , 6(2), 219-226 (2002).	12161188	
2	Y. Kaneda	<i>Curr. Drug Targets</i> , 4(8), 599-602 (2003).	14577648	
3	H. Kotani <i>et al.</i>	<i>Curr. Gene Ther.</i> , 4(2), 183-194 (2004).	15180584	
4	Y. Kaneda <i>et al.</i>	<i>Adv. Genet.</i> , 53, 307-332 (2005).	16240999	
5	Y. Kaneda <i>et al.</i>	<i>Cancer Sci.</i> , 97(5), 348-354 (2006).	16630130	
6	Y. Kaneda	<i>Expert Opinion Drug Deliv.</i> , 5(2), 221-233 (2008).	18248320	
7	Q. Zhang <i>et al.</i>	<i>Biochem Biophys Res Commun</i> , 373, 345-349 (2008).	18588856	
8	P E.Lund <i>et al.</i>	<i>Pharm. Res.</i> , 27(3), 400-420 (2010).	19998056	
9	Y. Kondo <i>et al.</i>	<i>Curr. Protoc. Immunol.</i> , 2, Unit 2.16.1-12 (2010).	20376843	
10	Y. Kondo <i>et al.</i>	<i>Curr. Protoc. Immunol.</i> , 10, Unit 10.17D.1-9 (2010).	20376840	
11	T.Amatsubo <i>et al.</i>	<i>Magn. Reson. Med. Sci.</i> , 9(3) 95-99 (2010)	20885081	
12	Y Kaneda	<i>Expert. Opin. Drug Deliv.</i> , (9), 1079-1093 (2010)	20716020	
13	A.Kitani <i>et al.</i>	<i>Curr. Protoc. Immunol.</i> , 10, Unit 10.17E.1-9 (2010).	21053301	
14	Y. Kaneda	<i>BMB Rep.</i> , 43(12) 773-780 (2010).	21189152	
15	Y. Kaneda	<i>Advanced Drug Delivery Reviews</i> <in press>	21443915	

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