

INDEX

A

A549 4, 117, 119
 A549 human lung adenocarcinoma cells 7
 ABC reagent 15
 ABTs 69
 ABT-737 59, 61, 69
 Accutase 14, 18
 Accutase Cell Detachment Solution 179, 180
 Aciclovir (ACV) v, 12, 150
 Acute myeloid leukemia (AML) 57–59, 68
 Adeno-associated viral (AAV) vectors vi, 101,
 104–106, 109
 Adenoviral vector 2, 4, 29,
 30, 36, 37, 41
 Adenovirus vector 3, 7
 Adoptive immunotherapy 69
 AgeI 98–100
 Alamar Blue 45, 49, 50, 52, 179–182
 Alexa Fluor® 647 66
 Alpha-fetoprotein promoter 6
 α -Glycyrrhetic acid (AGA) 46, 50, 52
 Ampicillin 28, 33, 36, 98, 112,
 114, 115, 121, 166, 168, 169
 Ampicillin sodium sulfate 112
 Anesthesia mask 14, 18
 Annexin V 154, 159, 162
 Annexin-PE assay 61
 Anomalous transcription 12
 Antibiotic-antimycotic 179
 Anti-CD19-PE antibody 154, 156, 157, 160, 161
 Anti-human CD19 57, 61
 AP1903 58
 Apoptosis 7, 58, 88, 111,
 150, 151, 158, 159, 178, 182
 Apoptotic cell death 75, 87, 90
 Automatic cell counter 136
 Auxin 4

B

Bacmid DNA 98, 100–103, 108
 Bacto-tryptone 113
 Bacto-yeast extract 113
 Baculoviral genome 108
 Baculoviral vectors 98
 BALB/c mice v, 1

BamHI 98–101
 Benzonase Endonuclease 99
 18- β -Glycyrrhetic acid 154, 159
 Bicistronic constructs 76, 140–142
 Bicistronic vector 135–145
 Bioluminescence 124, 126, 128
 Bioluminescence imaging (BLI) 124–126,
 128–130, 132, 133
 Bioluminescence imaging system 126
 BM-40 27
 Bovine serum albumin 31, 39
 Bregma 18
 Bright-Glo 61, 67
 Brivudin 12
 Bromovinyl deoxyuridine (BVdU) vi,
 152, 154, 158–161
 Bystander effect vi, 2, 6, 7,
 12, 43, 52, 77, 159, 160, 165, 178, 183
 Bystander killing effect 123

C

CAG promoter 179, 182
 Calcium phosphate (CaPO₄) transfection 21
 Cancer v, vi, 2–4, 7,
 11–24, 27–41, 43, 52, 54, 57–71, 75–84, 87–95,
 97, 107, 111, 135, 150, 152, 165, 177, 178, 182
 Cancer immunotherapy 57–71
 Carbenoxolone 154, 159
 Carboxylesterase 7
 CArG elements 111–122
 Caspase-3/7 90, 92
 Caspase-3/7 activity assay 91, 92
 Caspase-3/7 ELISA 91, 92
 CD19 beads 61, 65, 71
 CD33 57, 59, 63, 66–69
 CD44v6 57
 CD63 ExoELISA 89, 90, 92
 CD123 57, 58
 CD-UPRT-EGFP plasmid 88
 CD-UPRT/5-FC system 76, 87
 CD-UPRT mRNA 88
 Cell cycle analysis 92, 95, 119, 120
 CellTiter 96 AQueous One Solution assay
 kit 137, 138, 143
 CellTiter-Glo Reagent 99, 107

Cell viability	49, 50, 52, 83, 84, 88, 92, 107, 119, 125, 133, 138, 139, 143–145, 161, 179, 181, 182
Cell viability assay	90, 92, 136–138, 143, 180–182
Cervical carcinoma	vi, 177–183
Cesium chloride (CsCl)	99, 104, 106
C6 glioma tumors	4
Chain termination	2, 43, 178
Chemical inducer of dimerization (CID)	58, 61, 69, 71
C3H/HeJ mice	46
Chimeric antigen receptor (CAR)	vi, 57–71
Cholesterol (Chol)	44, 47, 48, 54
Cholesterol–methyl- β -cyclodextrin	44
Chromogen solution	15
clinicaltrials.gov	58
Clonase II enzyme mix	29, 36
Colony picking needle	125
Colorectal carcinoma cell line	2
CombiMag reagent	117
Competent cells	33, 36, 98, 100, 108, 114
Cryosection	24
Cyclophosphamide	6
Cytomegalovirus promoter	3, 137, 179, 182
Cytopathic effect (CPE)	37
Cytosine deaminase (CD)	v, vi, 2, 4, 76, 87, 124, 136, 137, 165–175
Cytosine deaminase/5-fluorocytosine (CD/5-FC)	76, 87, 165
Cytosine deaminase/uracil phosphoribosyltransferase fusion protein (FCU1)	vi, 136, 137, 145
Cytosolic TK	11
Cytotoxic effects	vi, 4, 6, 58, 77, 135–145, 182
D	
DAB color development solution	20
DEAE-dextran	22
DH-5 α	28, 33, 36
DH10Bac competent cells	98, 100, 108
Dialysis tubing	30
Difucosylated carbohydrate antigen	57
Dimethyl sulphoxide (DMSO)	60, 62, 79, 81, 119, 154
1,2-Dioleoyl-3-trimethylammonium-propane (DOTAP)	44–47, 49, 50
Diphtheria toxin A fragment (DT-A)	99, 100, 102, 107, 108
DLR assay	117
D-luciferin	127, 128, 130, 132
DMEM:F12	127
DMEM-HG medium	45, 46, 48–50
DNA miniprep	98, 108, 115
Dual luciferase reporter assay	29, 35
Dulbecco's modified Eagle medium (DMEM)	13, 15–18, 30, 31, 80–83, 88, 91, 99, 112, 126, 136, 152, 155, 156, 158, 159, 168, 180, 181
Dural	24
Dynamic light scattering (DLS)	90, 171
E	
Effectene	80
Egr-1 promoter	111–122
Embryonic stem cells (ESC)	124–130
Endocytosis	166, 172
Endo-lysosome membrane rupture	166
Endometrioid epithelial ovarian cancer cells	3
Enzymatic assay	31
<i>Escherichia coli</i>	v, 2, 4–6, 28, 136, 166
ESF921 media	98, 101, 103
Ethanol	13, 18, 20, 24, 28, 31, 32, 36, 39, 93, 98, 102, 108, 115, 122, 154, 158, 159, 170
Ethylenediamine tetraacetic acid (EDTA)	14, 28, 45, 79, 80, 99, 152, 154, 155, 167
Eukaryotic elongation factor 2 (eEF-2)	97
Exosomes	vi, 75–84
Extracellular vesicles (EVs)	vi, 77, 87–95
F	
FaDu cells	6
FaDu human nasopharyngeal squamous cell carcinoma cells	6
Falling sensation test	24
FastDigest green buffer	113, 116, 119, 120
FastDigest NotI	113
FastDigest XhoI	113
FBJ murine osteosarcoma viral oncogene homolog (FOS)	2
Fetal bovine serum (FBS)	13, 45, 49, 60–62, 67, 83, 88, 91, 94, 99, 105, 107, 112, 117, 136, 143, 155, 171, 179
Fetal calf serum (FCS)	15, 20, 28–31, 79, 152, 154
[¹⁸ F] hydroxymethyl-butyl-guanine (FHBG)	125, 132, 133
Firefly luciferase (Fluc)	28, 29, 32, 34, 36, 60, 67, 125–127
Flow cytometer	15, 22, 23, 93, 156, 157
Fludarabine	4, 5
Fluorescence-associated cell sorting (FACS)	17, 22, 23, 130, 154, 156, 157, 160, 161
5-Fluorocytosine (5-FC)	v, vi, 2, 4, 76, 78, 81, 83, 87, 88, 90–92, 94, 124, 137–141, 145, 165, 166, 172–174

5-Fluorouracil (5-FU)	v, vi, 2, 4, 87, 124, 165, 166, 172, 174
Folate	44, 45, 58
Folic acid (FA).....	46, 48, 53
Formaldehyde.....	22, 31, 39, 40
Forward primers.....	33, 34, 36, 115, 118, 121, 122
Foundation for the Accreditation of Cellular Therapy (FACT).....	69
Freezing medium	62, 80, 81
G	
G418	76, 79–81
Gamma counter.....	126, 128
Ganciclovir (GCV).....	v, vi, 1–3, 7, 12, 14, 17–19, 23, 31, 39, 40, 43–46, 49, 50, 52, 54, 76, 87, 124, 132, 133, 150, 152, 178–183
Gap junctional intercellular communications (GJIC).....	150, 151, 178
Gap junctions	vi, 44, 46, 49, 50, 52, 123
GCV diphosphate	150
GCV monophosphate.....	150
GCV-triphosphate.....	2, 12, 43, 124, 132, 133
Gene delivery plasmid pHR ⁺ -EF- eGFP-WPRE-SIN	153
Gene directed enzyme prodrug therapy (GDEPT).....	183
Gene-mediated cytotoxic immunotherapy (GMCI).....	150
GenJet <i>In Vitro</i> DNA Transfection Reagent.....	98
Gentamycin	98
Glioblastoma cell line	vi, 18, 88
model	91, 92
multiforme.....	13
tumor spheroids	vi, 90
GlutaMAX	13, 79, 80, 83
GlutaMAX supplement.....	137
G2/M Transition.....	111–122
Goat serum	15, 20
GP+E-86 helper cells	79, 80
Green fluorescent protein (GFP)	17, 19, 23, 67, 107
Growth arrest and DNA damage-inducible 45 alpha (GADD45 α).....	vi, 111–122
GTG TM agarose gel	114, 115
GVC-monophosphate	2, 124
H	
Hamilton syringes	47, 154, 160
Hank's balanced salt solution (HBSS).....	14, 16, 22
H357 cells	vi
HE4 promoter	3
Head and neck squamous cell carcinoma	43
Heat shock.....	33, 100, 114, 121
HEK293 cell lines	99
HEK293 cells	136–141
HEK293T cells.....	vi, 13, 88, 89, 91, 94
HeLa cells	78, 136–139, 141, 180, 182
Hemocytometer	49, 62, 64, 90, 92, 136, 168, 171
Heparinized blood	62
Hepatitis A virus 3C protease (3C)	vi, 136
Hepatocellular carcinoma cells	6
Herpes simplex virus-derived thymidine kinase.....	2, 150
Herpes simplex viruses (HSVs)	v, 1, 11
Herpes simplex virus thymidine kinase (HSV-tk).....	1–3, 27, 31, 39, 40, 45, 76, 124, 178
Herpes simplex virus thymidine kinase/ ganciclovir (HSV-tk/GCV).....	2, 43, 44, 46, 47, 50, 52, 87, 178, 183
H&E staining	131
Histological examination	131
Horseradish peroxidase.....	4, 6, 153, 157
Horse serum	15, 19
Hot bead sterilizer	24
HotStar HiFidelity DNA polymerase	118, 121
HotStar HiFidelity PCR buffer	118
HSC-3 cells	45, 46, 49, 50, 54, 180, 182
Human growth hormone (hGH)	99, 100
Human guanylate kinase (GMPK).....	150
Hydrogen peroxide	20, 54
Hypointense contrast	133
I	
Immunomagnetic selection	63
Immunotherapy	57–71
IncuCyte IncuCyte [®] S3 Live-Cell Analysis System	83
IncuCyte [®] S3 Live-Cell Analysis System	83
Indole-3-acetic acid.....	4, 6
Induced pluripotent stem cells (iPSC).....	124
Inducible caspase 9 (iC9)	vi, 58, 59
Infinity TM cholesterol reagent.....	47
E460 infusion forward primer	115
E460 infusion reverse primer	115
Inter-cellular diffusion	12
Interleukin-2	60, 63
Internal ribosomal entry site (IRES)	79, 152
Intracranial injections.....	13
Intraperitoneal administrations	53
Intron-splicing.....	97–109
Isoflurane	18, 128, 130
Isoflurane sedation system	127
Isopropyl- γ -D-thiogalactopyranoside (IPTG)	98, 101, 112, 114

K

Kanamycin28, 98, 101
 Kozak sequence 20

L

Laemmli lysis buffers..... 153, 157
 LAR II 35
 LB agar36, 112, 166, 168
 LB agar ampicillin-100 166
 LB broth 115, 121, 166, 168, 169
 LB media 98
 LB/Ampicillin/IPTG/X-Gal plates 114
 L-deoxythymidine (LdT)..... vi, 152
 LeGO vectors 13
 LentiGO-vectors 13
 Lentivectors (LVs) 151, 152, 155, 156, 161
 Lentiviral vectors v, 4, 13, 97
 Lewis Y (LeY)..... 57
 Lipid concentration..... 44, 47, 48
 Lipofectamine™ 2000 29, 30, 117, 121
 Lipoplexes..... v, 44–46,
 48–50, 53, 178, 181
 Luciferase28, 29, 32, 34–36,
 61, 67, 113–115, 125–127
¹⁷⁷Lu-DOTATATE therapy124, 126–130
 Luminescence 35, 67, 118, 132, 153, 158
 Lymphoprep60, 62
 LyseBlue 167, 169, 175

M

MACS enrichment 61
 Mafosfamide 59, 61, 69, 71
 Magnetic resonance imaging (MRI) 14,
 19, 24, 124, 125, 127, 130, 133
 Marcaine 14
 Matrigel92, 95, 125,
 127, 128, 130, 132
 Matrigel matrix91, 95
 MAX Efficiency DH10Bac competent cells 100, 108
 Melanoma cells 7
 Mesenchymal stem cells (MSCs).....vi, 4, 75–84, 133
 Mesothelioma cells 7
 6-Methylpurine deoxyriboside 4
 Microplate reader32, 99, 107,
 137, 138, 144, 154, 180, 182
 Microscope, fluorescence15, 23
 Microscope, light 15, 20, 37
 Midi Plasmid Kit 34
 Mini-extruder44, 47
 Minipreps DNA purification system 115
 Mitochondria 143
 Mitochondrial TK 11
 ModFit 120

Molecular switch 112
 Mono-phosphate kinase 11
 Monophosphorylated GCV.....2, 43, 178
 Monophosphorylation 150
 mTeSR1 medium 127
 MTT 119, 144
 Multi-Detection Microplate Reader 99, 107
 Multimodal molecular imaging 123–133
 Multiplicity of Infection (MOI) 17,
 23, 40, 92, 94, 103, 157, 161
 MV4-11-cGFP-ffLuc cells 66

N

N₂O flow 24
 NADH 144
 NADPH 144
 Nanodrop instrument 82
 Nanosight instrument 82
 NanoSight NS50089–91
 Necrosis 150, 182
 NIH2T3 cells 80
 N,N'-dimethyl formamide (DMF) 113
 Noncollagenous protein 27
 Non-Essential Amino Acids (NEAA) 30,
 31, 112, 117
 Non-obese/diabetic severe combined
 immunodeficiency (NOD/SCID)
 mice 154, 160
 Nucleoside analogs..... vi, 2, 11, 12, 152
 Nude rats18, 24

O

Open reading frames (ORFs)vi, 99, 118, 119, 122
 Optimem 14, 15, 21
 Opti-MEM29, 34, 37,
 60, 61, 112, 117
 OptiMEM medium 137
 Oral squamous cell carcinoma (OSCC).....v, vi,
 7, 43–54, 177–183
 Orthotopic tumor46, 50, 52
 Osteonectin promoter 27–41
 Ovarian carcinoma cells 7
 Oxyluciferin 130

P

Pac I (restriction enzyme)30, 36
 Packaging plasmid 13, 21, 153, 155
 1-Palmitoyl-2-oleoyl-sn-glycero-3-
 ethylphosphocholine (EPOPC).....44, 46, 47
 Pan-BCL inhibitor59, 69
 Pancreatic cancer cells7, 107
 Paraffin 17, 20, 24
 Parafilm 17, 64

P3 cells	18, 19
pCMV-DR8.91 plasmid	153
p3C plasmid	142
PCR.....	20, 28, 29, 33, 34, 41, 102, 103, 106, 115–118, 121
pCtrl plasmid	142
PD-10 desalting columns	99, 104, 106
Pedal withdrawal reflex	24
pEEV plasmid.....	179, 182
pEGFP-N1	88, 89, 91
<i>Peg-pam-3c</i> plasmid.....	60
Penicillin	13, 28, 29, 45, 49, 88, 98, 101, 103, 105, 112, 152, 155
Penicillin/streptomycin solution	88
Peripheral blood mononuclear cells (PBMC)	60, 62–64, 70
pFB-CMV-inBar (SV40)-GFP	98
pFB-CMV-inDTA(hGH)	98
pFB-hTERT-inDTA(hGH)	98
pFB-inCap2-inRep	98
pFB-inCap6-inRep	98
pFB-SURV-inDTA.....	100, 101, 108
pFCUI-3Cmut plasmid.....	142
pFCUI plasmid	137, 142, 145
pGL3-basic vector	29
PHK26 Red Fluorescent Cell Linker Kit	61, 67
Photochemical internalization (PCI).....	165–176
Photodynamic therapy (PDT).....	vi, 165, 174, 175
Photosensitizer AlPcS2a	168, 171
Plasmid DNA Isolation Kit	30
Plasmid Miniprep kit.....	136
Plasmids	vi, 13, 15, 20, 21, 29, 30, 34, 36, 43, 45, 46, 49, 50, 53, 60, 61, 79, 80, 88, 94, 97–101, 112–117, 119, 121, 126, 136, 137, 140–142, 153, 155, 161, 166–170, 175, 178, 179, 181–183
Plasmocin.....	13
Platelet extract (PE).....	80, 81
Plate reader	14, 18, 158
pMD.G plasmid	153, 155
pNGVL1-tk plasmid	179, 181
Polyacrylamide	153
Polybrene	22
Polyethyleneimine (PEI)	153, 155, 161
Polyplexes	166, 167, 170–173, 178
Polyvinylidene difluoride (PVDF) membrane	153, 157
Positron emission tomography (PET)	124–127, 130–133
pPH36 plasmid	166
pPK-CMV-F3 fusion vector	113–114
Prodrug.....	vi, 2, 4, 6, 7, 12, 54, 75–84, 135, 138, 139, 142–145, 149–152, 154, 158–161, 165, 183
Prodrug gene therapy	75–84
Prostate cancer	v, 27–41, 77, 150
Protamine sulfate	22, 80, 153, 156, 157, 167, 170, 175
Proteinase K	28, 36
pTarget.....	114–119, 121
pT.luc/pTarget.....	115–117
Purine nucleoside phosphorylase	4, 5
Puromycin	126, 130
Q	
Q-solution	118
R	
Rat C6 glioblastoma	77
Recombinant baculovirus (rBV)	98, 99, 101–103, 108, 109
Reduced-serum medium	29, 88, 91
Regenerative medicine	vi, 70, 123
Regenerative process	75
RelesR	127, 130
Resazurin	45, 46
Restriction enzyme.....	30, 98, 99, 113, 115, 120
Resveratrol	vi, 112, 115–120
Resveratrol induction.....	117, 119
Resveratrol-responsive promoter	118
Retronectin.....	61, 64, 65, 70, 71
Retroviral transduction	64, 65
Retrovirus vector.....	59, 63, 76
Reverse primer.....	33, 34, 36, 115, 118, 121, 122
RevitaCell	126, 128, 130
RIPA lysis buffer	153, 157
RNAse A.....	93, 167, 175
ROCK inhibitor	130
Rotatory evaporator.....	44, 47
S	
SCC-VII cells	46, 48, 50, 52, 53
SCID mice	6, 91, 92, 154, 160
SeaPlague Agarose	31
Second genetic hit.....	111
Sephacryl S-500 gel	82, 83
Serum response elements (SREs).....	112
Sevoflurane	14, 18
Sf9 lysis buffer	99, 104
SimplyBlue SafeStain.....	99, 106
SIN vector	20
Small interfering RNAs.....	88
Small unilamellar cationic liposomes (SUV)	47
Snappgene.....	98, 99
SOC medium	100, 114

Somatostatin receptor type 2 (hSSTr2).....	124, 126, 130	Truncated, non-signaling human CD19 molecules (CD19Δ).....	152
Sonicator.....	44, 47	Trypan blue.....	88, 90, 92, 179, 180
Sonifer.....	104	Trypsin.....	17, 18, 28, 32, 45, 50, 52, 54, 60, 112, 120, 160
Sorenson's buffer.....	32, 40	Trypsin-EDTA.....	14, 28, 79, 80, 152, 155
SPARC.....	27	Trypsin solution.....	49, 54, 88, 92
Spinoculation.....	17, 22, 23	Tumor chemosensitivity.....	1
Splice-corrected HSV-TK.....	12	Tumor spheroid assay.....	92
<i>Spodoptera frugiperda</i> Sf9 cell line.....	98	Tumor spheroids.....	vi, 88, 92, 168, 173, 174
Stereotactic infusion.....	19	Tumor volume.....	19, 52, 53, 94, 160
Stop & Glo reagent.....	35	Tumor xenografts.....	160, 161
Streptomycin.....	13, 28, 29, 45, 49, 88, 98, 101, 103, 105, 112, 152, 155		
Su86.86 cells.....	105, 107		
Substrate specificity.....	12, 152	U	
Suicide gene.....	v, 1, 12, 27, 43, 58, 75, 87, 97, 111, 123, 135, 149, 165, 178	U87 cells.....	17, 18, 23
SV40 large T antigen (SV40-T).....	99	U87mg cells.....	88, 92, 153, 155, 157–160
		Ultracentrifuge.....	14, 16, 22, 30, 38, 90, 91, 104, 154, 156
T		Uracil phosphoribosyl transferase (UPRT).....	vi, 76, 87, 136, 137
T4 DNA ligase.....	98, 114, 117, 120		
293T cells.....	15, 16, 61, 62, 88, 91, 94, 153, 155, 156	V	
Temgesic.....	14, 18, 19	Valaciclovir (VCV).....	150
Teratoma.....	vi, 124, 130, 131	Vero African green monkey kidney epithelial cells.....	6
Terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL).....	128, 131	Virkon.....	13
Tetrazolium compound MTS.....	143		
Thymidine-active deoxycytidine kinase.....	149	W	
Thymidine kinase (TK).....	v, 1–3, 11, 27, 31, 39, 40, 43, 45, 76, 150, 178, 179, 182	Western blotting.....	19, 153, 157
Thymidylate monophosphate kinase (tmpk).....	150	Western Chemiluminescent HRP Substrate.....	153, 158
Titration.....	17, 23, 173, 175	WI38 cell line.....	99
TK.007.....	v, 11–24	WiDr, Colorectal carcinoma cell line.....	2
tkHSV-MSC/ganciclovir system.....	76	Wst-1 reagent.....	18
TOPO TA cloning kit.....	28, 29		
TOPO vector.....	28, 33, 34	X	
293T producer cells.....	60	Xenograft model.....	90, 152, 160, 161
Transducing unit.....	17	Xenograft tumors.....	2, 3, 54, 160, 161
Transfection.....	vi, 14–16, 21, 29, 30, 34, 36, 41, 45, 46, 49, 50, 88, 91, 94, 98, 101, 108, 112, 119, 121, 136–139, 142, 143, 153, 155, 161, 165, 166, 171, 172, 174, 179–183	X-Gal.....	98, 101, 114
Transferrin.....	7, 44, 45, 50	X-Peg-pam-3e plasmid.....	60
TransfeX.....	vi, 179, 181–183	X-tremeGENE.....	14–16, 21
Transient transfection.....	6, 88, 136	X-VIVO medium.....	61, 66
Trigeminal ganglia.....	2		
		Y	
		yCD::UPRT-MSC cells.....	76, 77, 79, 81, 82, 84