Supplementary Figures

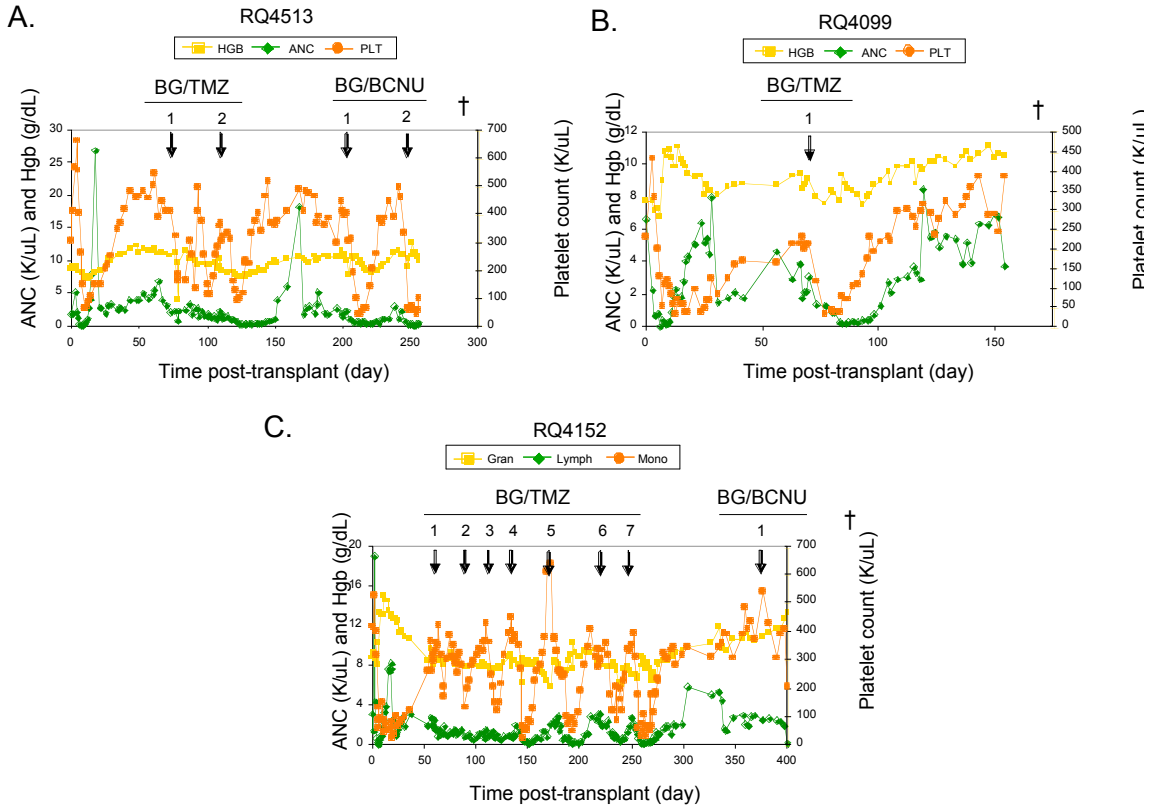

Figure S1: In vivo selection in animals RQ4513, RQ4099 and RQ4152 after multiple cycles of BG/BCNU and/or BG/TMZ. Rhesus competitive repopulation experiments were set up using equal numbers of mobilized peripheral blood CD34+ cells transduced with SIV vectors expressing MGMT*-YFP (or MGMT*-GFP) or MGMT*-HOXB4-GFP. Absolute neutrophil count (ANC), hemoglobin (Hgb) and platelet counts in peripheral blood over time for RQ4513 (A), RQ4099 (B) and RQ4152 (C). The arrows indicate the cycles of drug administration.

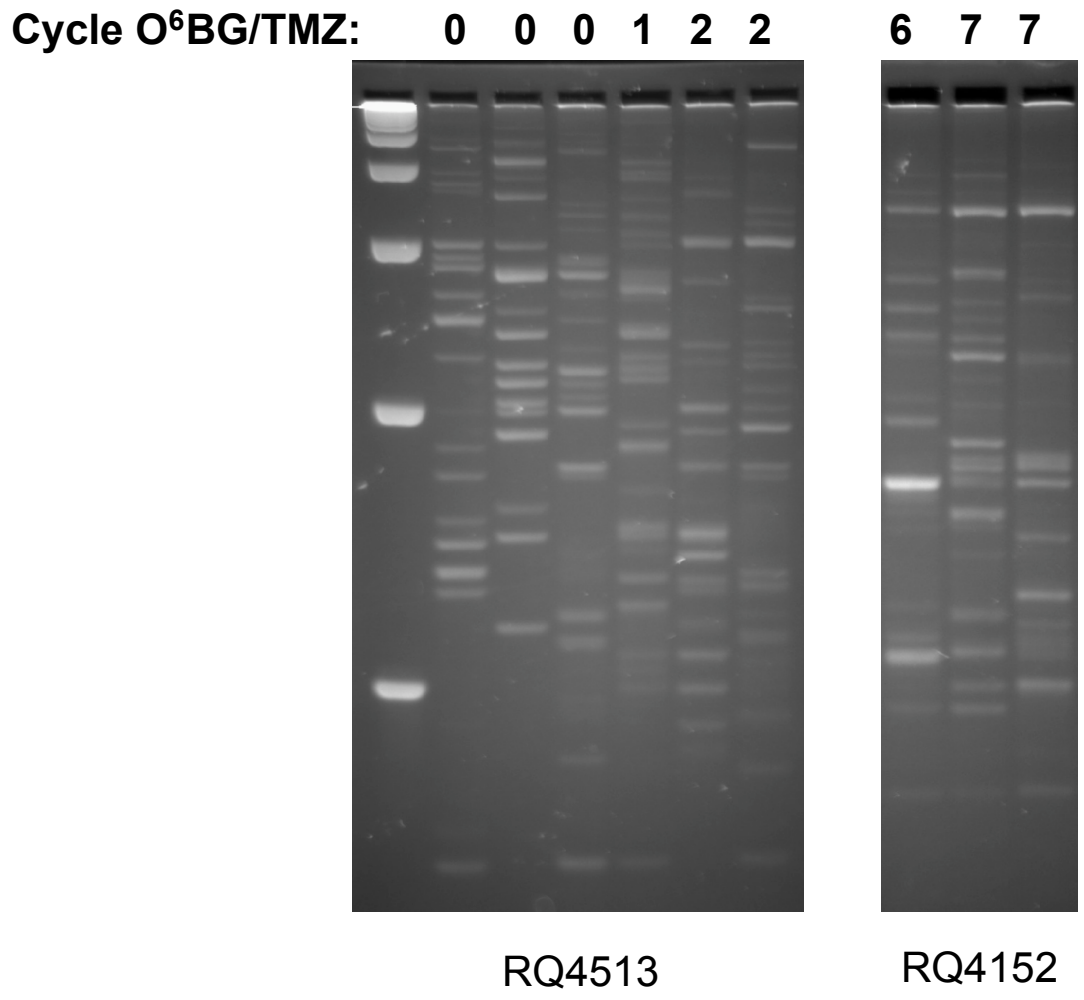

Figure S2: LAM-PCR analysis of chemoprotected multiple clones in rhesus macaque RQ4513 (left) and RQ4152 (right). The cycle of BG/TMZ is indicated above the gel.

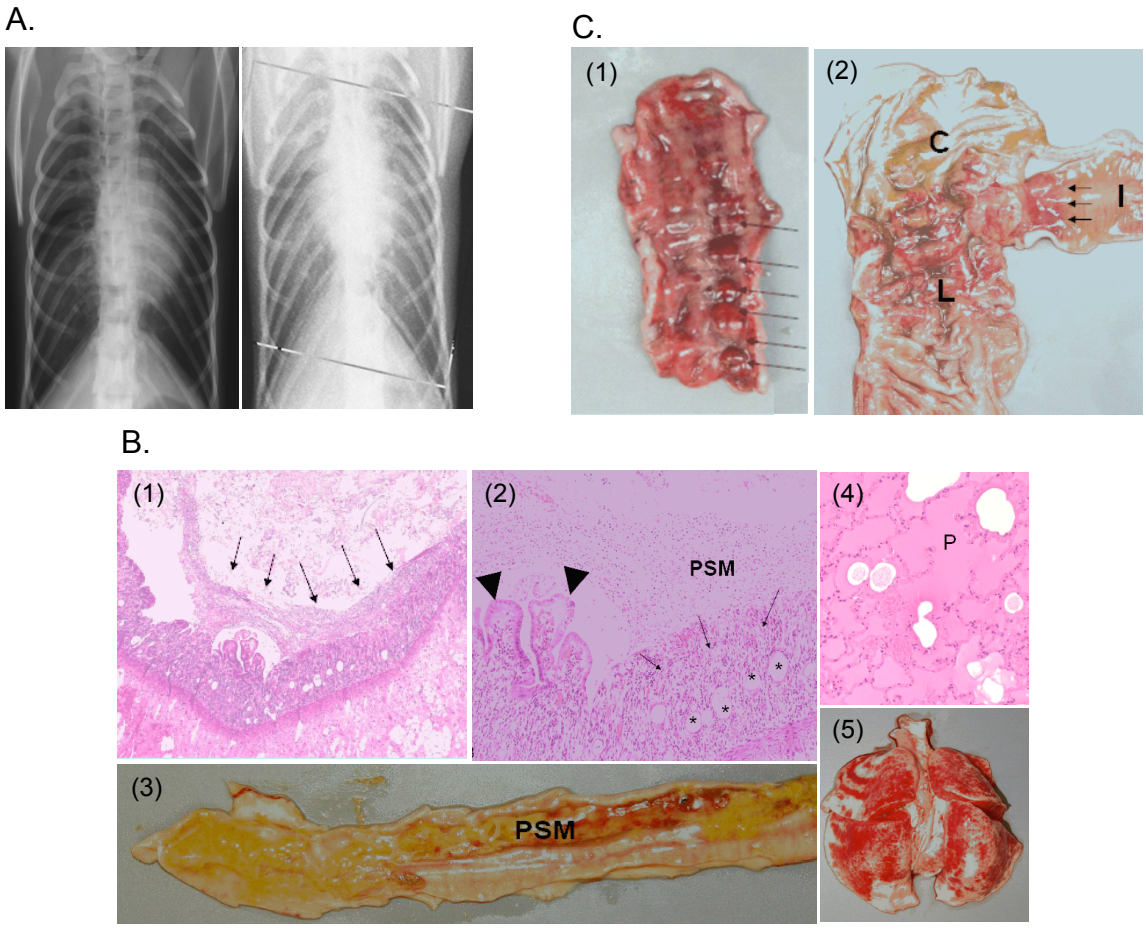

Figure S3: MGMT*-mediated in vivo selection with BG/BCNU causes high levels of non-hematopoietic toxicity. (A) Xray (RQ4876) revealing diffuse pulmonary infiltrates consistent with pneumonitis. (B) Colon and lung specimens obtained at necropsy (RQ4513) showing pseudomembranous colitis and pulmonary congestion, respectively. (1) 40x magnification of colon showing extensive mucosal necrosis with pseudomembrane formation (arrows). (2) 100x magnification of colon showing a small remnant of surface mucosa (arrowhead). Crypts are dilated and remaining epithelium is severely attenuated (*). The mucosa is collapsed and fused (arrows). A thick pseudomembrane (PSM) composed of fibrin, hemorrhage, leukocytes and cellular debris is attached to the mucosal surface. (3) Gross specimen of colon corresponding to panels (1) and (2). (4) 100x magnification of lung with pink material (P) filling the alveoli corresponding to edema fluid. (5) Gross specimen of the lungs corresponding to panel (4) with the dark red discoloration in the lungs correlating with congestion and extensive pulmonary edema. (C) Gross specimen of large bowel obtained at necropsy (RQ4152) showing severe necrohemorrhagic colitis. (1) There was extensive mucosal hemorrhage and necrosis with severe linear ulcerations (arrows) in the large bowel. (2) The mucosal necrosis was confined to the large intestine. There was a sharp line of demarcation (arrows) at the ileocecocolic junction with no evidence of involvement of the small intestine and cecum on the gross exam (C=Cecum, I=Ileum, L=Large bowel).

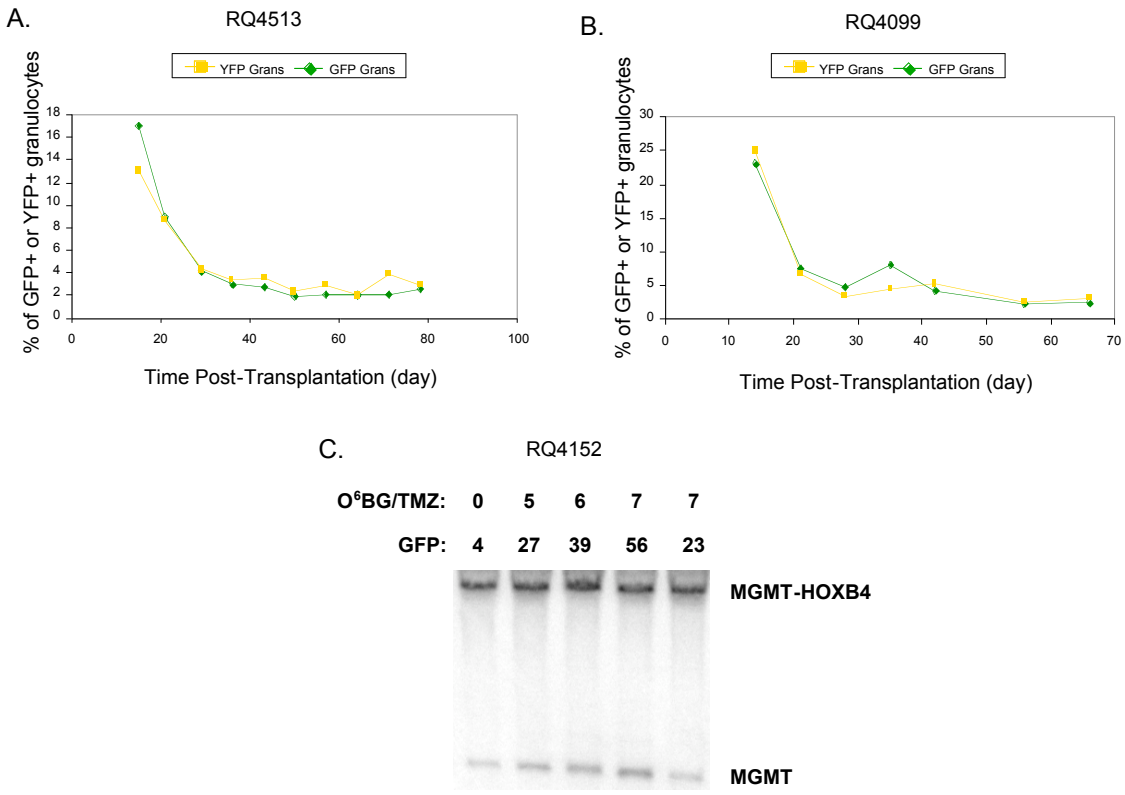

Figure S4: Early engraftment of vector transduced granulocytes. Rhesus competitive repopulation experiments were set up using equal numbers of mobilized peripheral blood CD34+ cells transduced with SIV vectors expressing MGMT*-YFP (or MGMT*-GFP) or MGMT*-HOXB4-GFP. (A) Percent GFP or YFP-positive granulocytes from peripheral blood for RQ4513. (B) Percent GFP or YFP-positive granulocytes from peripheral blood for RQ4099. (C) For RQ4152, because both MGMT* and MGMT*-HOXB4-transduced cells used GFP as expression marker, Southern blot was used to distinguish the two compartments. Number of BG/TMZ cycles and percentage of GFP-positive granulocytes are indicated above the blot.

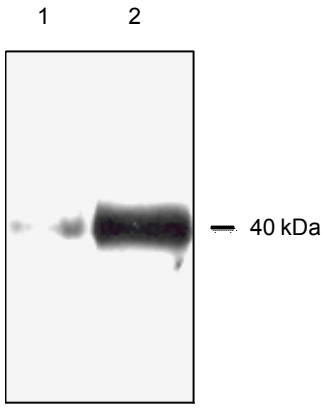

Figure S5: HOXB4 expression in animal RQ4152. Western blot obtained from RQ4152 marked peripheral blood cells sorted by flow cytometry 8 months after transplantation. Lane 1: RQ4152; Lane 2: Positive control cell line (293T cells transiently transfected with HOXB4-expressing plasmids). KDa: Kilodaltons

Supplementary Tables

#hits	Chr	Gene symbol	Gene name	Position from TSS	CAG
3	1	CCT3	Chaperonin containing TCP1, subunit 3	Intron (6 kB)	
3	1	CD55	Decay accelerating factor for complement	Intron (19 kB)	
2	1	C1orf71	Chromosome 1 open reading frame 71	Intron (5 kB)	
1	1	FOXJ3	forkhead J3	Intron (12 kB)	
1	1	GALNT2	UDP-N-acetyl-alpha-D-glactosamine: polypeptide N-acetylgalactosaminyltransferase 2 (GalNAc-T2)	Intron (165 kB)	
1	1	LOC343153	Similar to ribosomal protein L26	Downstream (57 kB)	
1	1	LOC388648		Downstream (14 kB)	
1	1	NFIA	Nuclear factor I/A	Intron (193 kB)	
2	1	PDIK1L	PDLIM1 interacting kinase 1 like	Downstream (14 kb)	
1	1	PRDX6	Peroxiredoxin 6	Upstream (69 kB)	
1	1	PTPRV	Protein tyrosine phosphatase, receptor type V	Intron (5 kB)	
1	1	RAP1A	Member of RAS oncogene family	Intron (102 kB)	
1	1	RPS6KC1	Ribosomal protein S6 kinase	Intron (154 kB)	
1	1	SPSB1	splA/ryanodine receptor domain and SOCS box containing 1	Intron (88 kB)	
1	2	AFTIPHILIN	Aftiphilin protein	Intron (7 kB)	
1	2	FLJ10081	Hypothetical protein FLJ10081	Intron (5 kB)	
1	2	LOC442621	Similar to heat shock 70 kD protein binding protein	Downstream (43 kB)	
1	2	LOC647029	Hypothetical protein LOC647029	Intron (485 kB)	
1	2	MGC39518	Hypothetical protein MGC39518	Intron (39 kB)	
1	2	PPM1B	Protein phosphatase 1B	Exon (32 kB)	
1	2	YWHAQ	Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein	Intron (15 kB)	
1	3	ACAD11	Acyl-coenzyme A dehydrogenase family, member 11	Intron (63 kB)	
1	3	DOCK3	Dedicator of cytokinesis 3	Intron (348 kB)	
1	3	PB1	Polybromo 1	Exon (17 kB)	
1	3	STXBP5L	Syntaxin binding protein 5-like	Intron (514 kB)	
1	4	ANKRD17	Ankyrin repeat domain 17	Intron (103 kB)	
1	4	CHIC2	Cysteine-rich hydrophobic domain 2	Intron (7 kB)	X
1	4	EIF4E	Eukaryotic translation initiation factor 4E	Upstream (28 kB)	X
1	4	ESSPL,	Epidermis-specific serine protease-like protein	Downstream (106 kB)	
1	4	FLJ38482	Hypothetical protein FLJ38482	Intron (89 kB)	
3	4	GBA3	Glucosidase, beta, acid 3 (cytosolic)	Upstream (54 kB)	
1	4	LOC401131		Intron (88 kB)	
1	4	LOC644740	Similar to CCR4-NOT transcription complex subunit 7	Upstream (87 kB)	
1	5	CTNNA1	Catenin (cadherin-associated protein)	Upstream (139 kB)	
1	5	IQGAP2	IQ motif containing GTPase activating protein 2	Intron (41 kB)	
1	5	LMAN2,	Lectin, mannose-binding 2	Intron (8 kB)	

3	5	LOC391836	Similar to ribosomal protein L10a	Downstream (28 kB)	
1	5	POLK	Polymerase (DNA directed) kappa	Intron (78 kB)	
1	5	RUFY1	RUN and FYVE domain containing 1	Intron (15 kB)	
1	6	C6orf10	Chromosome 6 open reading frame 10	Upstream (80 kB)	
1	6	DCDC2	Doublecortin domain containing 2	Intron (13 kB)	
1	6	ETF1P1	Eukaryotic translation termination factor 1 pseudogene	Downstream (4 kB)	
2	6	GMDS	GDP-mannose 4,6-dehydratase	Intron (420 kB)	
1	6	HCG2P6	HLA complex group 2 pseudogene 6	Upstream (0.2 kB)	
1	6	HIST1H4D	Histone 1, H4d	Upstream (2 kB)	
1	6	HLA-DQA2	Major histocompatibility complex, class II, DQ alpha 2	Upstream (45 kB)	
1	6	IER3	Immediate early response 3	Downstream (3 kB)	
2	6	PPP1R2P1	Protein phosphatase 1, regulatory subunit 2	Downstream (34 kB)	
5	6	PTK7	Protein tyrosine kinase 7	Intron (61 kB)	
1	6	TAPBP	TAP binding protein	Intron (10 kB)	
1	7	JAZF1	Juxtaposed with another zinc finger gene 1	Intron (320 kB)	X
1	7	LOC402251		Upstream (77 kB)	
1	7	NFE2L3	Nuclear factor (erythroid-derived 2) like 3	Upstream (248 kB)	
1	7	PILRA	Paired immunoglobin-like type 2 receptor alpha	Exon (0.8 kB)	
1	7	VKORC1L1	Vitamin K epoxide reductase complex	Intron (33 kB)	
1	7	ZNRF2	Zinc and ring finger 2	Intron (67 kB)	
1	8	ATP6V1H	ATPase, H+ transporting	Intron (22 kB)	
1	8	ELP3	Elongation protein 3 homolog	Intron (32 kB)	
1	8	LOC441344	Similar to Snx5 protein	Downstream (17 kB)	
1	8	SDCBP	Syndecan binding protein (syntenin)	Downstream (145 kB)	
1	8	SPATC1	Spermatogenesis and centriole associated 1	Upstream (9.5 kB)	
1	9	GARNL3	GTPase activating Rap/RanGAP domain-like 3	Upstream (10.1 kB)	
2	9	STRBP	spermatid perinuclear RNA binding protein	Intron (123 kB)	
1	9	UNC13B	Unc-13 homolog B	Intron (168 kB)	
1	10	ARHGAP19	Rho GTPase activating protein 19	Intron (37 kB)	
2	10	CNNM2	Cyclin M2	Intron (6 kB)	
1	10	EIF3S10	Eukaryotic translation initiation factor 3	Intron (41 kB)	
1	10	LOC 387647		Downstream (33 kB)	
1	10	LOC 389950		Downstream (33 kB)	
1	10	MGMT	O-6-methylguanine-DNA methyltransferase	Intron (292 kB)	
1	10	PTPN20A,	protein tyrosine phosphatase, non-receptor type 20A	Intron (87 kB)	
1	10	SLK	STE20-like kinase	Intron (42 kB)	
1	10	SUFU	Suppressor of fused homolog	Intron 66 kB, intron	X

1	11	CDC42EP2	CDC42 effector protein	3 kB, upstream	
1	11	CHKA,	Choline kinase alpha	Intron 38 kB, intron	
2	11	DPF2, D4	Zinc and double PHD fingers family 2	Intron 15 kB, intron	
1	11	EXT2	Exostoses (multiple) 2	Intron 55 kB, intron	X
2	11	FBXL11	F-box and leucine-rich repeat protein 11	Intron 78 kB, intron	
1	11	FLJ20487	Hypothetical protein FLJ20487	Downstream (33 kB)	
2	11	INCENP,	Inner centromere protein antigens 135/155 kDA	Upstream (35 kB)	
1	11	KIAA0999	KIAA0999 protein	Intron (150 kB)	
1	11	MRVI1	Murine retrovirus integration site 1 homolog	Downstream (9 kB)	
1	11	UVRAG	UV radiation resistance associated gene	Intron (137 kB)	
1	12	BCL7A	B-cell CLL/lymphoma 7A	Upstream (0.8 kB)	X
1	12	C12orf41	Chromosome 12 open reading frame 41	Intron (25 kB)	
1	12	CCDC91	Coiled-coil domain containing 91	Intron (121 kB)	
1	12	EPL1N	Epithelial protein lost in neoplasm beta	Intron (86 kB)	
1	12	KNTC1	Kinetochore associated 1	Exon (15 kB)	
1	12	TXNRD1	Thioredoxin reductase 1	Intron (46 kB)	
1	13	ATP7B	ATPase, Cu transporting, beta polypeptide	Intron (11 kb)	
4	13	LNX2	Ligand of numb-protein X2	Intron (18 kB)	
1	13	LOC390426		Upstream (90 kB)	
1	13	LOC644216	Hypothetical protein LOC644216	Downstream (142 kB)	
1	14	C14orf104	Chromosome 14 open reading frame 104	Intron (7 kB)	
1	14	FUT8	Fucosyltransferase 8	Intron (188 kB)	
1	14	NUMB	Numb homolog	Intron (103 kB)	
1	14	MIPOL1	Mirror-image polydactyly 1	Intron (86 kB)	
1	14	YWHAQP	Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, theta pseudogene	Upstream (861 kB)	
1	15	BLM	Bloom syndrome	Intron (19 kB)	X
1	15	CASC4	Cancer susceptibility candidate 4	Exon (92 kB)	
1	15	FMN1	Forming 1	Intron (215 kB)	
1	15	TMEM87A	Transmembrane protein 87A	Intron (55 kB)	
1	15	ZNF291	Zinc finger protein 291	Intron (31 kB)	
1	16	C16orf34	Chromosome 16 open reading frame 34	Exon (22 kB)	
1	16	FOXL1	Forkhead box L1	Downstream (230 kB)	
1	16	IL21R	Interleukin 21 receptor	Intron (7 kB)	X
1	16	KIAA1972	KIAA 1972 protein	Intron (22 kB)	
1	16	NFAT5	Nuclear factor of activated T-cells	Intron (53 kB)	
1	16	RSPRY1	Ring finger and SPRY domain containing 1	Intron (34 kB)	
2	16	TNRC6A	Trinucleotide repeat containing 6A	Intron (40 kB)	
2	17	ACACA,	Acetyl-coenzyme A carboxylase alpha	Intron (198 kB)	
4	17	BRCA1	Breast cancer 1, early onset	Intron (28 kB)	X
1	17	CPD	Carboxypeptidase D	Upstream (5 kB)	

1	17	CRYBA1	Crystalline beta A1	14 kB, downstream	
1	17	DHRS7B	Dehydrogenase/reductase (SDR family) member 7B	Intron (32 kB)	
1	17	HOXB3	Homeobox B3	Downstream (2 kB)	
1	17	KIAA1618	KIAA1618 protein	Intron (45 kB)	
1	17	PRPSAP1	Phosphoribosyl pyrophosphate synthetase-associated protein 1	Intron (18 kB)	
1	17	SARM1	Sterile alpha and TIR motif containing 1	Intron (18 kB)	
1	17	SEPT9	Septin 9	Intron (145 kB)	
1	17	SMG6	Smg-6 homolog, nonsense mediated mRNA decay factor (C. elegans)	Intron (210 kB)	
1	17	STAT3	Signal transducer and activator of transcription 3	Intron (35 kB)	
1	17	WIRE	WIRE protein	Intron (34 kB)	
1	17	ZBTB4	Zinc finger and BTB domain containing 4	Exon (24 kB)	
1	18	C18orf1,	Chromosome 18 open reading frame 1	Intron (120 kB)	
1	18	KIAA1328		Intron (260 kB)	
1	18	TCF4	Transcription factor 4	Intron (330 kB)	
1	18	ZNF521	Zinc finger protein 521	Intron (93 kB)	X
1	19	CASP14	Caspase 14, apoptosis-related cysteine peptidase	Intron (3 kB)	
1	19	COX6B1	Cytochrome c oxidase subunit Vib polypeptide 1	Intron (1 kB)	
1	19	DHX34	DEAH (Asp-Glu-Ala-His) box polypeptide 34	Downstream (37 kB)	
30	19	EPS8L1	EPS8-like 1	Intron (12 kB)	
1	19	IFI30,	Interferon, gamma-inducible protein 30	Exon (4 kB)	
3	19	LOC440512		Upstream (53 kB)	
1	19	MGC62100	Hypothetical protein LOC388536	Downstream (19 kB)	
1	19	MKNK2	MAP kinase interacting serine/threonine kinase 2	Intron (4 kB)	
1	19	POLD1,	Polymerase (DNA directed), delta 1, catalytic subunit	Intron (13 kB)	
1	19	RAB3D,	Member RAS oncogene family	Intron (8 kB)	
2	19	ZNF430	Zinc finger protein 430	Intron (13 kB)	
1	20	RPL21P2	Ribosomal protein L21 pseudogene 2	Upstream (4 kB)	
1	20	TPD52L2	Tumor protein D52-like 2	Intron (3 kB)	
1	21	SON	SON DNA binding protein	Intron (21 kB)	
1	21	TIAM1	T-cell lymphoma invasion and metastasis 1	Intron (351 kB)	
4	22	CABIN1,	Calcineurin binding protein 1	Intron (23 kB)	
1	22	CLTCL1,	Clathrin, heavy polypeptide-like	Downstream (36 kB)	X
3	22	XRCC6	X-ray repair complementing defective repair	Intron (6 kB)	
2	X	ARHGEF6	Rac/Cdc42 guanine nucleotide exchange factor 6	Intron (53 kB)	
1	X	CD40LG	CD40 ligand (TNF superfamily, member 5)	Downstream (80 kB)	
1	X	SLC9A7	Solute carrier family 9, member 7	Intron (124 kB)	
1	X	TFE3	Transcription factor binding to IGHM enhancer 3	Upstream (26 kB)	X
1	X	USP9X	Ubiquitin specific peptidase 9	Exon (109 kB)	
1	Y	P2RY8	Purinergic receptor P2Y, G-protein coupled, 8	Intron (53 kB)	

Table S1. Integration sites identified in animal RQ4152 before and after BG/TMZ treatment. Chr: Chromosome number; TSS: Transcription start site; CAG: Cancer-associated genes.

#hits	Chr	Gene symbol	Gene name	Position from TSS	CAG
1	1	ARHGEF11	Rho guanine nucleotide exchange factor 11	Intron (26kB)	
1	1	ASH1L	Ash1 (absent, small, or homeotic)-like	Intron (31 kB)	
1	1	CAP	Adenylate cyclase-associated protein 1	Intron (3.5 kB)	
1	1	CTNNBIP1	Catenin, beta interacting protein 1	Downstream (17 kB)	X
1	1	EIF4G3	Eukaryotic translation initiation factor 4 gamma 3	Intron (17 kB)	
1	1	EYA3	Eyes absent homolog 3	Intron (23 kB)	
1	1	FOXJ3	Forkhead box J3	Intron (70 kB)	
1	1	KIF1B	Kinesin family member 1B	Intron (46 kB)	
3	1	MACF1	Microtubule-actin crosslinking factor 1	Intron (360 kB)	
1	1	NRD1,	Nardilysin (N-arginine dibasic convertase)	Intron (46 kB)	
1	1	PRDX6	Peroxiredoxin 6	Upstream (69 kB)	
1	1		PRKACB, protein kinase, cAMP-dependent, catalytic, beta	Intron (131 kB)	
1	1	RIPK5	Receptor interacting protein kinase 5	Downstream (8 kB)	
1	1	ZMYM4	Zinc finger, MYM-type 4	Intron (4 kB)	
1	2	ALS2CR7,	Amyotrophic lateral sclerosis 2 (juvenile) chromosome	Intron (36 kB)	
1	2	ASB3	Ankyrin repeat and SOCS box-containing 3	Intron (49 kB)	
1	2	KCNH7	Potassium voltage-gated channel, subfamily H	Intron (69 kB)	
1	2	MGC11266	Hypothetical protein MGC11266	Upstream (15 kB)	
1	2	WDR43	WD repeat domain 43	Intron (21 kB)	
1	3	ANKRD28	Ankyrin repeat domain 28	Intron (28 kB)	
1	3	CLASP2	Cytoplasmic linker associated protein	Intron (58 kB)	
1	3	DOCK3	Dedicator of cytokinesis 3	Intron (272kB)	
1	3	KIAA0804		Intron (0.8 kB)	
1	3	RABL3	RAB, member of RAS oncogene family-like 3	Intron (35 kB)	
1	3	RBM6	RNA binding motif protein 6	Intron (114 kB)	
1	3	TMCC1	Transmembrane and coiled-coil domain family 1	Downstream (98 kB)	
1	4	LOC642372	Hypothetical protein LOC642372	Upstream (307 kB)	
1	4	LRBA	LPS-responsive vesicle trafficking, beach and anchor containing	Intron (420 kB)	
1	4	MAML3	Mastermind-like 3	Intron (48 kB)	
1	5	ANKRD31,	Ankyrin repeat domain 31	Intron (55 kB)	
1	5	DIAPH1	Diaphanous homolog 1	Intron (10 kB)	
1	5	GNB2L1	Guanine nucleotide binding protein (G protein), beta	Upstream (8 kB)	
1	5	IQGAP2	IQ motif containing GTPase activating protein 2	Exon (30 kB)	
1	6	CD83	CD83 antigen	Downstream (106 kB)	
1	6	CDC40	Cell division cycle 40 homolog	Intron (39 kB)	
1	6	EDN1	Endothelin 1	Downstream (28 kB)	
1	6	GMNN	Geminin, DNA replication inhibitor	Exon (6.7 kB)	
1	6	HEBP2	Heme binding protein 2	Intron (8 kB)	
1	6	LOC401252	Hypothetical gene supported by AK123889	Downstream (105 kB)	
1	6	PPP1R2P1	Protein phosphatase 1, regulatory subunit 2	Downstream (25 kB)	

1	6	RUNX2	Runt-related transcription factor 2	Downstream (227 kB)
5	6	VPS52	Vacuolar protein sorting 52	Intron (15.8 kB)
1	6	ZNF322A	Zinc finger protein 322A	Intron (16 kB)
1	7	CYP3A5	Cytochrome P450, family 3, subfamily A, polypeptide 5	Intron (6 kB)
1	7	FBXL18	F-box and leucine-rich repeat protein 18	Intron (48 kB)
1	8	FZD6	Frizzled homolog 6	Exon (20 kB)
1	8	HMBOX1	Homeobox containing 1	Intron (90 kB)
1	8	LRP12	Low density lipoprotein-related protein 12	Intron (81 kB)
1	8	PABPC1	Poly(A) binding protein, cytoplasmic 1	Intron (3.5 kB)
1	8	STK3	Serine/threonine kinase 3	Intron (36 kB)
1	9	MGC41945	Hypothetical protein MGC41945	Upstream (26 kB)
1	9	TRAF2	TNF receptor-associated factor 2	Intron (17 kB)
3	9	UNC13B	Unc-13 homolog B	Intron (94kB)
1	10	CCNJ	Cyclin J	Downstream (20 kB)
1	10	MARCH8	Membrane-associated ring finger 8	Intron (63 kB)
1	10	UROS	Uroporphyrinogen III synthase	Intron (12 kB)
9	11	FBXL11	F-box and leucine-rich repeat protein 11	Intron (22 kB)
1	11	FLJ20487	Hypothetical protein FLJ20487	Intron (3 kB)
1	11	FXYD6	FXYD domain containing ion transport regulator 6	Downstream (7 kB)
1	11	LRP5	Low density lipoprotein receptor-related protein 5	Intron (2 kB)
1	11	PDHX	Pyruvate dehydrogenase complex, component X	Intron (30 kB)
1	12	ATF7	Activating transcription factor 7	Intron (35 kB)
1	12	ATP6V0A2	ATPase, H+transporting, lysosomal V0	Exon (14 kB)
1	12	BAZ2A	Bromodomain adjacent to zinc finger domain 2A	Exon (36 kB)
1	12	FLJ14466	Hypothetical protein FLJ14466	Downstream (19 kB)
1	12	NCKAP1L	NCK-associated protein 1-like	Intron (20 kB)
1	12	R3HDM2	R3H domain containing 2	Downstream (62 kB)
1	12	SBEM	small breast epithelial mucin	Upstream (0.02 kB)
1	12	SLC38A1	Solute carrier family 38, member 1	Intron (79.5 kB)
1	13	LOC646910	Similar to heat shock protein 1	Downstream (49kB)
1	13	PSPC1,	Paraspeckle component 1	Intron 77 kB, intron
1	14	CCNB1IP1	Cyclin B1 interacting protein 1	Intron 3 kB, intron
1	14	FUT8	Fucosyltransferase 8	Intron 260 kB, intron
1	14	IGHVIII-5-2	Immunoglobulin heavy variable III-5-2	Downstream (0.8 kb)
1	14	PCNX	Pecanex homolog	Intron (88 kB)
1	14	RPS6KA5	Ribosomal protein S6 kinase, 90 kD, polypeptide 5	Intron (171 kB)
1	15	COX5A	Cytochrome c oxidase subunit Va	Intron (3 kB)
1	15	STARD9	START domain containing 9	Intron (62 kB)
1	16	CMTM4	CKLF-like MARVEL transmembrane domain containing 4	Intron (3 kB)
1	16	PDIA2	Protein disulfide isomerase family A, member 2	Intron (2 kB)
1	17	C17orf31	Chromosome 17 open reading frame 31	Intron (175 kB)

1	17	GRB2	Growth factor receptor-bound protein 2	Intron (13 kB)	
1	17	HSF5	Heat shock transcription factor family member 5	Intron (26 kB)	
1	17	PIP5K2B	Phosphatidylinositol-4-phosphate-5-kinase, type II	Intron (20 kB)	
2	17	RNF157	Ring finger protein 157	Intron (24 kB)	
2	17	SCAP1	Src family associated phosphoprotein 1	Intron (112 kB)	
2	17	SSH2	Slingshot homolog 2	Intron (18 kB)	
2	17	TNRC6C	Trinucleotide repeat containing 6C	Upstream (18 kB)	
1	17	UBE2G1	Ubiquitin-conjugating enzyme E2G1	Upstream (9.7 kB)	
2	19	COX7A1	Cytochrome c oxidase subunit VIIa polypeptide	Downstream (24 kB)	
1	19	LOC440514	Citrate synthase, mitochondrial like	Upstream (2 kB)	
1	19	LOC440518	Similar to Golgi autoantigen, golgin subfamily a	Upstream (127 kB)	
1	19	LYL1	Lymphoblastic leukemia derived sequence 1	Downstream (23 kB)	X
2	19	SIPA1L3	Signal-induced proliferation-associated 1 like 3	Intron (47 kB)	
1	19	SULT2A1	Sulfotransferase family, cytosolic 2A, DHEA preferring member 1	Downstream (13 kB)	
1	19	ZNF181	Zinc finger protein 181	Exon (5 kB)	
1	19	ZNF324	Zinc finger protein 324	Upstream (4 kB)	
1	19	ZNF473	Zinc finger protein 473	Intron (9 kB)	
1	20	C20orf112	Chromosome 20 open reading frame 112	Downstream (16 kB)	
1	20	C20orf50	Chromosome 20 open reading frame 50	Intron (85 kB)	
1	21	PCBP3	Poly (rC) binding protein 3	Upstream (89 kB)	
1	22	ATXN10	Ataxin 10	Intron (14 kB)	
1	22	BCR,	Breakpoint cluster region	Intron (22 kB)	X
1	22	CHEK2	CHK2 checkpoint homolog	Intron (19 kB)	X
1	22	HIRA	HIR histone cell cycle regulation defective homolog A	Intron (10 kB)	
1	22	LOC645280	Hypothetical protein LOC645280	N/A (30 kB)	
1	22	SLC25A17	Solute carrier family 25	Intron (10 kB)	
1	X	EFHC2	EF-hand domain (C-terminal) containing 2	Intron (30 kB)	
1	X	F8	Coagulation factor 8	Intron (83 kB)	
1	X	USP9X	Ubiquitin specific peptidase 9, X-linked	Exon (109 kB)	
1	X	ZNF41	Zinc finger protein 41	Downstream (4 kB)	

Table S2. Integration sites identified in animal RQ4513 before and after BG/TMZ treatment. Chr: Chromosome number; TSS: Transcription start site; CAG: Cancer-associated genes