Supplemental Methods

Ligation-Mediated PCR and integration site analysis

DNA for detection of viral integration sites was isolated from murine splenocytes using DNeasy Blood, Tissue and Plant Kit (Qiagen, Valencia, CA) per manufacturer's instruction. Ligation-mediated PCR (LM-PCR) modified to streamline the procedure was used to determine viral integration sites. Briefly, 500 ng of DNA was digested 1 hour at 37 ^{0}C with 50 units of Mse1 (New England Biolabs, Ipswich, MA) in a 10 μl volume followed by heat inactivation at 65 ^{0}C for 20 minutes. Adapter primers were ligated on by the addition of 1.5 μl ligase buffer, 30 units T4 ligase (New England Biolabs, Ipswich, MA) and 1 μl each of 50 μM ALF3us 5'/5Phos/TAGTCCCTTAAGCGGAG/3AmM and ALF3ls 5'GTAATACGACTCACATAGGGC (IDT, Coralville, IA) and the reaction was incubated for one hour at RT. PCR was carried out using a long terminal repeat (LTR) specific primer MSCV LTR1 5'-TCTCGCTTCTGTTCGCGCGCTTC and an adaptor specific primer AFL3 5'-GTAATACGACTCACTATAGGGC. PCR conditions for a 50 μl reaction were 2 units Taq polymerase (Qiagen), 5 μl polymerase buffer and 1 μl each of ligation reaction, 10 mM dNTP, 10 μM primers. PCR Cycling conditions were 7 cycles of 94 ^{0}C for 30 sec and 72 ^{0}C for 4 minutes followed by 37 cycles of 94 ^{0}C for 30 sec, 63.7 ^{0}C for 30 sec and 72 ^{0}C for 3 minutes. Nested PCR used 1 μl of the first PCR product, the same reaction conditions were used as the first reaction, and nested primers were MSCV LTR 2 Nested 5'-CGTCGCCCGGGTACCCGTATTC and AFL3 nested 5'-AGGGCTCCGCTTAAGGGAC. Nested cycling conditions: 5 cycles of 94 ^{0}C for 30 sec and 72 ^{0}C for 4 minutes followed by 30 cycles 94 ^{0}C for 30 sec, 63.7 ^{0}C for 30 sec and 72 ^{0}C for 3 minutes. 10μl of the nested PCR product were run on a 2% agarose gel. An internal control band from the 5'LTR 617 bp was seen. The nested PCR reaction was shotgun cloned without purification into the TOPO TA cloning kit (Invitrogen, Carlsbad,

CA) and transformed into One Shot E. coli (Invitrogen). Plasmid DNA was isolated using Miniprep Kit (Qiagen) and sequenced using primers M13F and M13R provided by TOPO TA cloning kit. A valid clone contains sequences of nested primers, LTR and/or mouse genomic DNA. The mouse genomic DNA sequence was blasted using NCBI's BLAST databases.

Supplemental Table 1. MSCV-Myc integration sites in recipient mice

Gene	Location and distance	Mouse chromosome	Clones
Prkcbp1	3' 46 kb	2	10
4632428N05Rik	3' UTR	10	2
STXBP4	Intron 4	11	1
Ankrd11	3' UTR	8	1
LOC383692	5', 100 kb	2	1
Ipp	Intron 1	4	1
Tbkbp1	5' UTR	11	1
Tel	Intron 1	11	1
Olfr356/Olfr357	5 kb	2	1
Sema4b	Intron 2	7	1
Diap2	5' 8 KB	X	1
Emilin2	Intron 4	17	1
Spag9	5' 6.5 kb	11	1
Lst1	Intron 2	17	1
Hpse	5', 8.5 kb	5	1
LOC100038945	5', 500 kb	11	1
Tcf7	5', 26 kb	11	1
Trpa1	Intron 8	1	1
Actr3	5', 33 kb	1	1
Hipk1	5', 5 kb	3	1
Uvrag	Intron 13	7	1
EG434228	3', 7 kb	7	1
Alg9	5', 1 kb	9	1
Dhps	5', 2 kb	8	1

Supplemental Table 2. MSCV-Myc integration sites in recipient mice

Gene	Location and distance	Mouse chromosome	Clones
Prkcbp1	3' 46 KB	2	11
Kctd1	Exon 5	18	2
Ttc13	Intron 4	8	2
LOC100039758	5', 38 KB	9	2
LOC629750	Intron 1	11	1
Ctsd	5', 8 kb	7	1
LOC668121	5', 41 KB	5	1
St3gal2	Intron 2	8	1
Cbx1	Intron 1	11	1
Mgst2	Intron 1	3	1
Vps13d	Intron 5	4	1
9130005N14Rik	Intron 6	5	1
Ptpn3	Intron 4	4	1
Tcfec	5', 1 KB	6	1
Zfp51	Intron 1	17	1
LOC100039681	5', 31 KB	9	1
Ntn5	5', 4 KB	7	1
Rbm12b	5', 4 KB	4	1
Cux1	Intron 2	5	1
Lgmn	5' 13 KB	12	1