Supporting Information

Engineered PROTAC-CID systems for mammalian inducible gene regulation

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Section 1. Supplementary Text

Step-by-step fluorescence protein activation assay protocol

Reagents:

1. PEI Max (Polysciences no. 24765-1)
2. DMEM, high glucose, GlutaMAX™ Supplement, pyruvate (Thermo Fisher Scientific no. 10569044)
3. Penicillin-Streptomycin (10,000 U/mL) (Thermo Fisher Scientific no. 15140122)
4. Fetal Bovine Serum 500ML(FBS) (Thermo Fisher Scientific no. 10437028)
5. TrypLE™ Express Enzyme (1X), phenol red (Thermo Fisher Scientific no. 12605068)
6. PBS pH=7.4 (Thermo Fisher Scientific no. 10010023)
7. Sony sorting chip 100 ⌠M for MA900 (SONY no. LE-C3210)
8. Automatic Setup Beads kit (SONY no. LE-B3001)
9. DMSO (Sigma, no. D8418)

Procedure:

1. Preparation of PEI Max solution

   50 mg PEI Max is dissolved in 45 mL Mill-Q Water. pH is adjusted to 7.1 by adding 10 M NaOH dropwise. Use Mill-Q water to adjust the volume to 50 mL. Filter the solution with 0.45 μM pore size Membrane filter (Millipore no. HAWP03700). Allocate the PEI Max solution to 1 mL and store at -20°C for use (avoiding multiple freeze-thaw cycles). Before using, PEI Max solution is heated at 65°C for 2 min.
2. Cell culture

   HEK293T cells are seeded into 96 well plates (Corning no. 3598), 12-24 h early before transfection when cell confluence achieves 50% (Caution: HEK293T cells should be divided every 2 days to avoid overcrowding).
3. Transfection

   4.5 μL PEI Max solution and 300 μL DMEM are mixed (Caution: Do not use DMEM medium with FBS, FBS would interfere with transfection). Shake gently to mix. 180 ng of pUAS-1-EYFP, 180 ng of pHef1a-BFP, 180 ng of plasmids encoding GAL4 fused protein, and 180 ng of plasmids encoding VPR fused protein were mixed into a 1.7 mL tube (Caution: plasmids should be prepared freshly with good quality and preservation. Bad plasmid preservation would affect the gene activation ability dramatically). Mix the PEI-DMEM solution with plasmids and incubate at room temperature for 30 min. Add 1/3 volume of the mixture to one well of 96 well plate gently. Return the 96 well plates for culture.
4. Gene induction

   12 h after transfection, the cell culture medium is replaced with DMEM with 10% FBS and 100 U Penicillin-Streptomycin. DMSO dissolved inducer or DMSO as control is added according to the experiments.
5. Flow cytometry sample collection

   2 d after transfection, remove the cultured medium, and ~ 50 μL trypLE is added into each well. After 3 min of digestion (Caution: cells should be thoroughly digested to avoid cell clusters to block the flow cytometry, but too long time of digestion will be harmful to the cells). 100 μL of DMEM with 10% FBS are added into wells to inactivate the trypLE. Cell-containing medium is moved to a 1.7 mL tube. Centrifuge the medium with 3000 g at 5 min. Remove the

supernatant and 200 μL PBS is added to make the single cell solution. Transfer the cells to 12×75 mm flow tubes.

6. Flow cytometry data collection

Before running, change the sorting chip on MA900 every 24 h and check the MA900 flow cytometry with setup beads. Collect the cells as the parameter described in Methods. Clean the MA900 flow cytometry with 10% bleach and water after using.

Section 2. Supplementary Figures

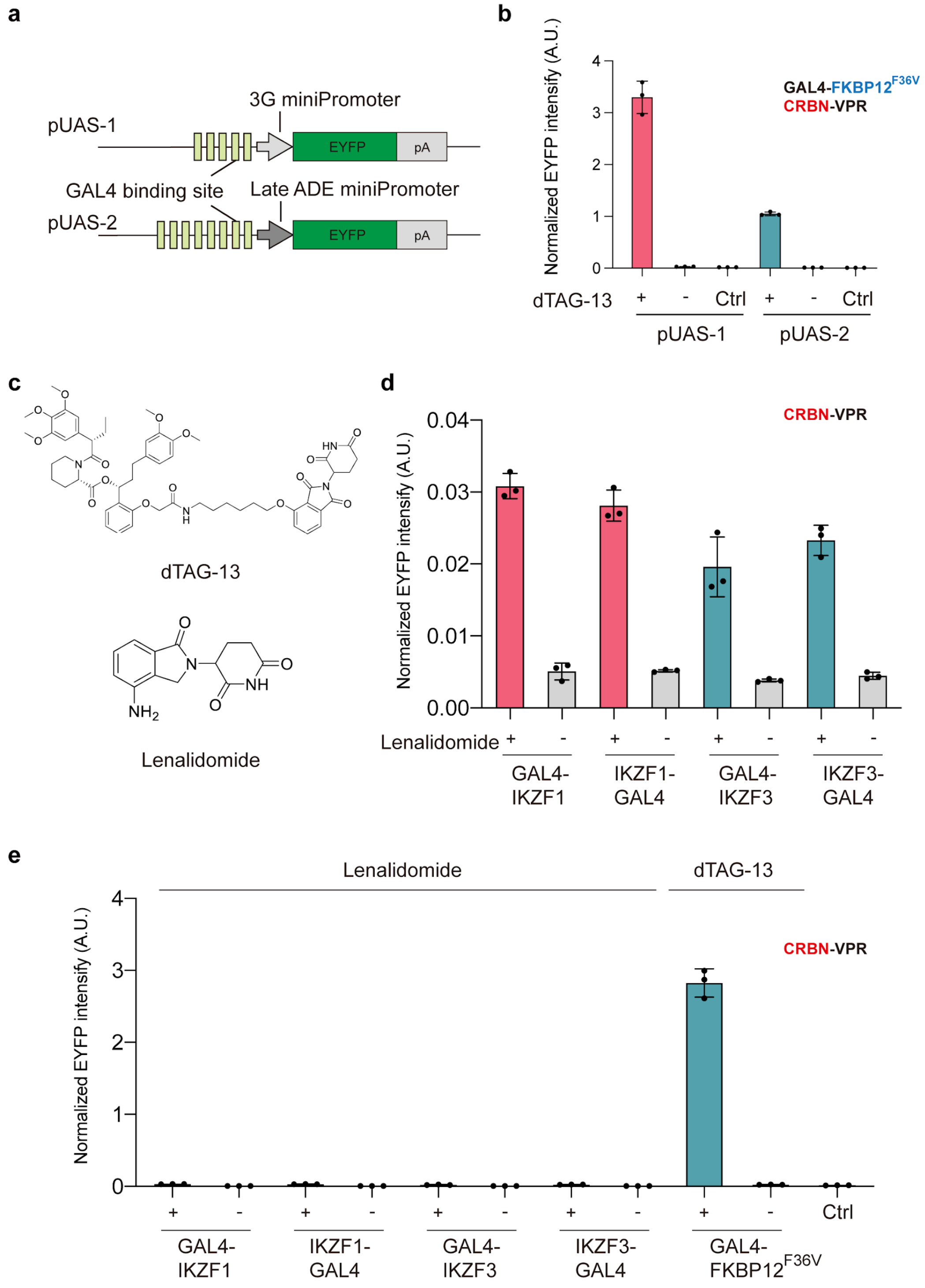

Figure S1. Activity comparisons between promoter configurations and between degrader types for inducible EYFP expression. a, Schematic of the pUAS promoters used for evaluating PROTAC-CID-based gene activation systems. pUAS-1 promoter was designed by connecting 5 copies GAL4 binding sites with miniPromoter derived from TRE3G promoter (3G miniPromoter). pUAS-2 was engineered with 8 copies

GAL4 binding sites with mini-promoter derived from Late ADE gene. b, Quantitative EYFP gene activation efficiency for the comparison of pUAS-1 and pUAS-2 promoter-based reporter systems. HEK239T cells transfected dTAG-13 PROTAC-CID systems and reporter plasmid induced by 100 nM dTAG-13 (+) or DMSO (-) for 2 days. c, Chemical structure of dTAG-13 (PROTAC) (Top) and Lenalidomide (Molecular glue) (Below). d and e, Fluorescence quantification of EYFP intensity for dTAG-13 and Lenalidomide inducible gene activation in HEK293T cells. IKZF1 or IKZF3 fused to GAL4 at N-terminal or C-terminal. HEK293T cells were induced by Lenalidomide (1 μM) and 100 nM dTAG-13 for 2 days. The same data are shown in Figure S1e and Figure 1b for the dTAG-13 group of gene activation. b-e, Error bars reflect the mean with SD from n =3 biological replicates. “+” represents treatment with inducers. “–” represents treatment with DMSO. Ctrl, control. HEK293T cells were transfected with the reporter plasmid only as in the control group.

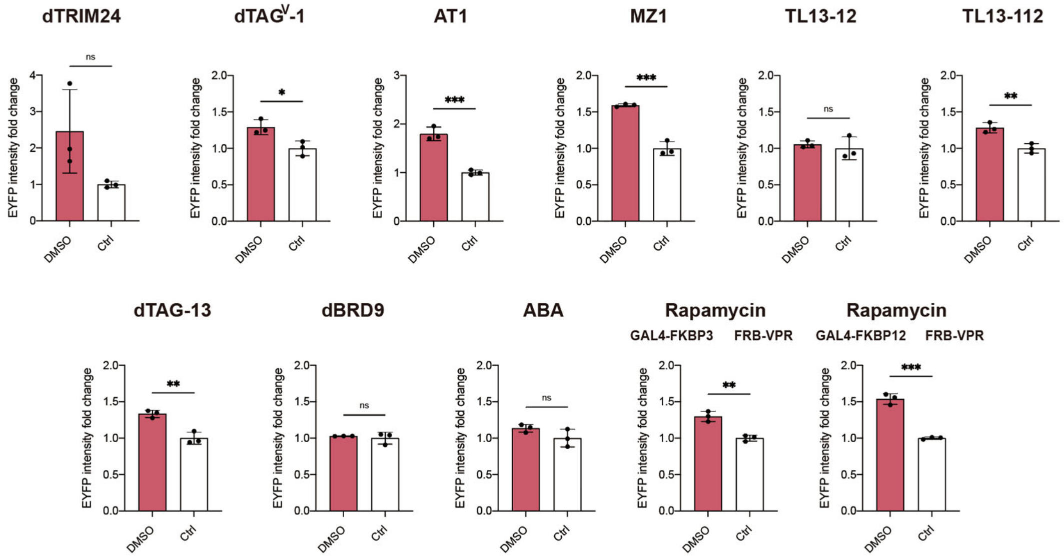

Figure S2. Basal level of the PROTAC-CID based gene activation systems. The differences between red column (w/ PROTAC-CID proteins, w/o inducer, >=1) and white column (w/o PROTAC-CID proteins, w/o inducer, normalized as 1) represent the basal leaky effect. P value was calculated by two tailed unpaired t-test. * $p<0.05$; ** $p<0.01$; ***$p<0.001$; n.s., non-significant. Data are from Fig. 1b, n = 3 biologically independent repeats with an error bar of SD.

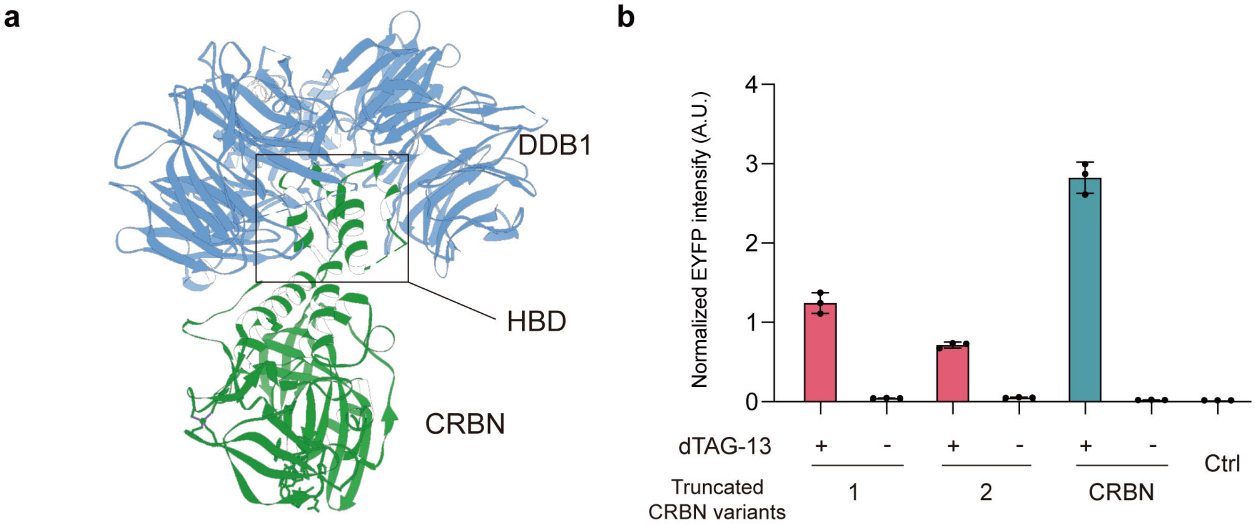

Figure S3. Truncated CRBN with disabled E3 ubiquitin ligase function for PROTAC-CID platform. a, Crystal structure of CRBN with DDB1[1]. 7-α-helical bundle domain (HBD) in CRBN interacts with DDB1 and was labeled in the rectangle. b, Two truncated CRBN variants by removing the HBD domain to disable the E3 ubiquitin ligase function were fused with VPR (tCRBN-VPR). Full-length CRBN fused with VPR (CRBN-VPR) for comparison. HEK293T cells transfected with reporter plasmid (pUAS-1-EYFP), GAL4-FKBP12^{F36V}, and CRBN-VPR or tCRBN-VPR were treated with 100 nM dTAG-13 (+) or DMSO (-). HEK293T cells transfected with reporter plasmid as the control group (Ctrl). The same data of the full-length CRBN fused with VPR from Fig. 1b were used for comparison. n = 3 biologically independent repeats with an error bar of SD.

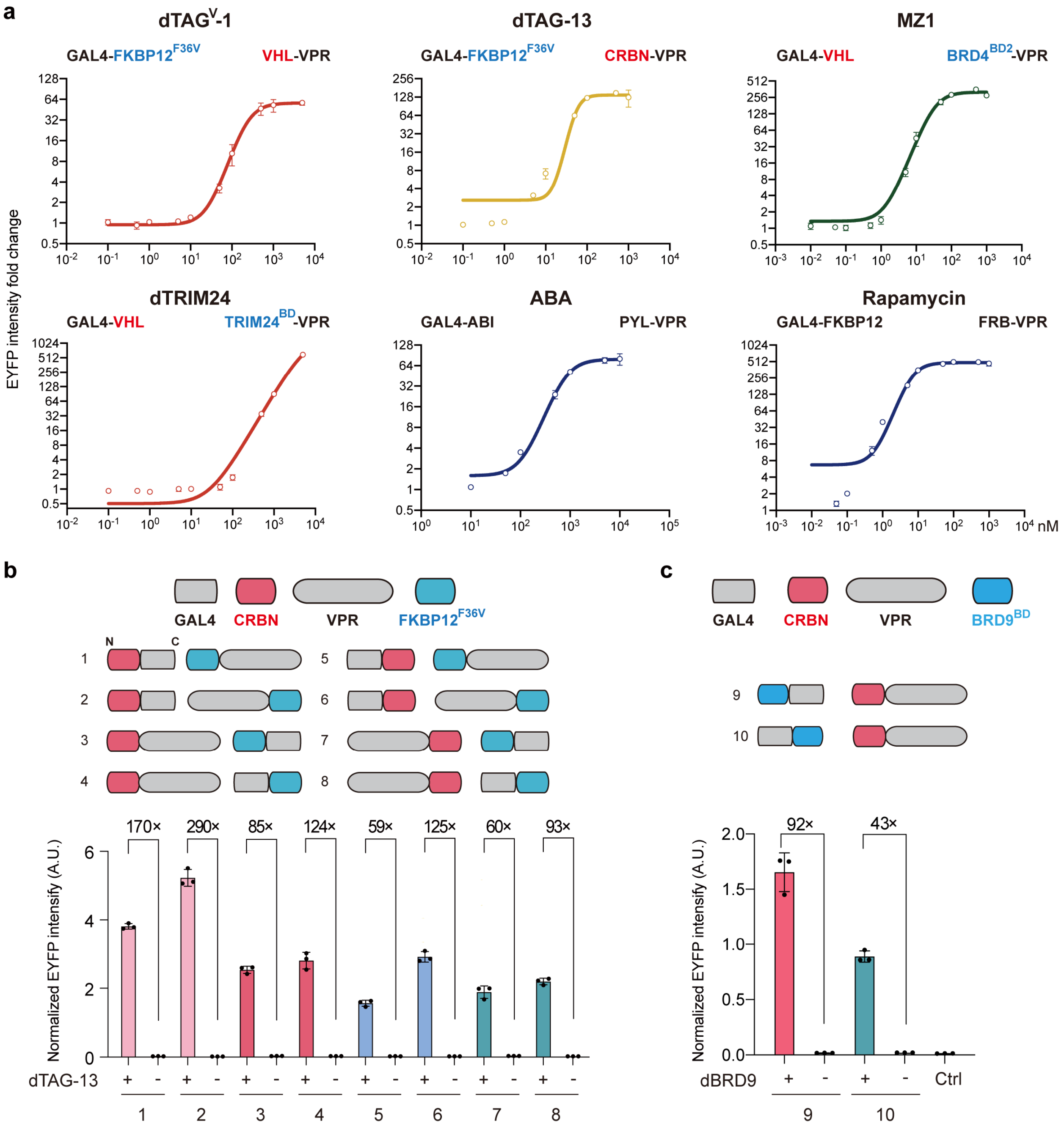

Figure S4. Sensitivity and modularity of the PROTAC-CID systems. a, The dose-response curve of PROTAC small molecules, Rapamycin and ABA. The EC$_{50}$ of PROTAC-CID tools was calculated by Prism 9 (Graphpad) using the "[Agonist] vs. response -- Variable slope (four parameters)" model. The nonlinear regression results were listed in Table 4. b, dTAG-13 interacting protein partners (CRBN or FKBP12^{F36V}) fused with GAL4 or VPR in N-terminal or C-terminal. EYFP induction efficiency was measured by all combinations of fusion proteins with either 100 nM dTAG-13 (+) or DMSO (-). For the protein fusion configuration, unless stated otherwise, fuse protein starts with N-terminal and ends with C-terminal. When CRBN was fused with VPR in N-terminally and GAL4 was placed in the N-terminal of FKBP12^{F36V}, the same data are shown in Fig. 1b and Fig. S3 for comparison. c, BRD9^{BD} fused with GAL4 in N-terminal or C-terminal treated with 1 μM dBRD9 or DMSO. Data are shown in n = 3 independent biological replications with an error bar of SD.

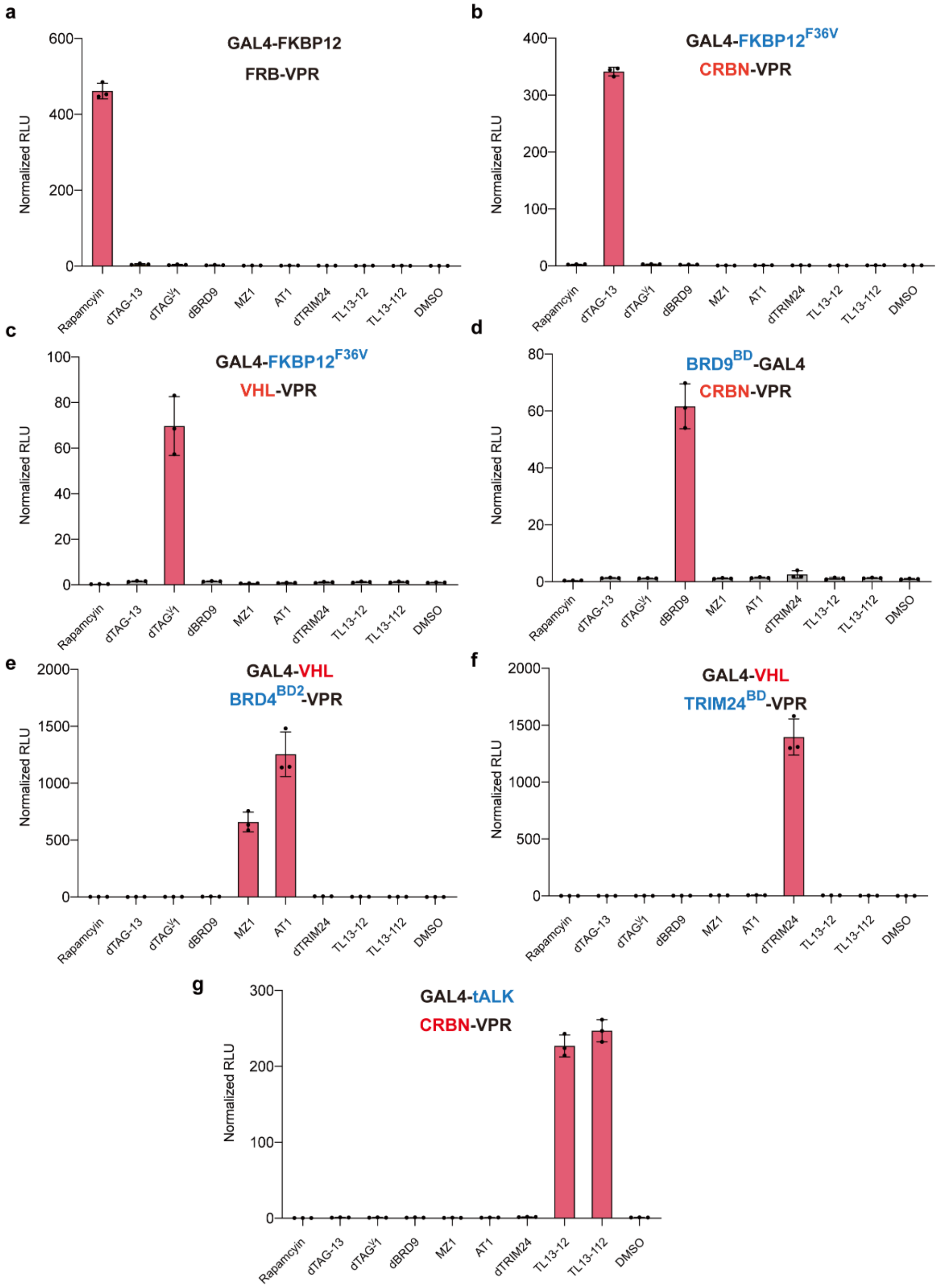

Figure S5. Orthogonal analysis of the PROTAC-CID systems. a-g, Firefly luciferase expression induced by PROTAC-CID systems (100 nM dTAG-13, 1 µM dTAG^{V}-1, 1 µM dBRD9, 100 nM MZ1, 1 µM AT1, 5 µM dTRIM24, 1 µM TL13-12, 1 µM TL13-112), 100 nM Rapamycin or DMSO. HEK293T cells pre-transfected with plasmids encoding GAL4 or VPR fused with protein partners. Cells were lysed 2 days post-induction to measure the intensity of bioluminescence. RLU, relative light units. See Materials and Methods for the RLU normalization calculation. Data are shown in n = 3 independent biological replications with an error bar of SD.

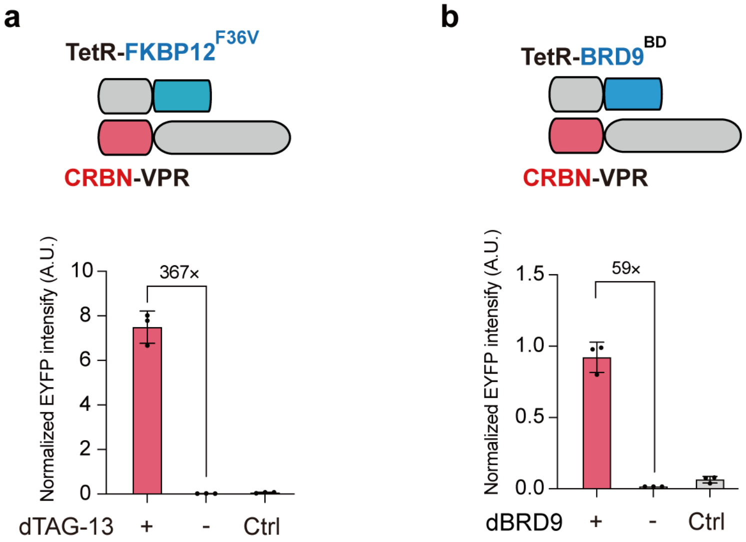

Figure S6. TetR DNA binding domain for PROTAC-CID platform. a and b, Schematic of the inducible PROTAC-CID systems with the replacement of the DNA binding domain from GAL4 to TetR. FKBP12^{F36V} or BRD9^{BD} fused with TetR C-terminally (Above). Efficacy of dTAG-13 or dBRD9 to induce TRE promoter-driven EYFP expression. HEK293T cells transfected with plasmids treated with 100 nM dTAG-13 (+), 1 µM dBRD9 (+) or DMSO (-) for 2 days. Data are shown in n = 3 independent biological replications with an error bar of SD.

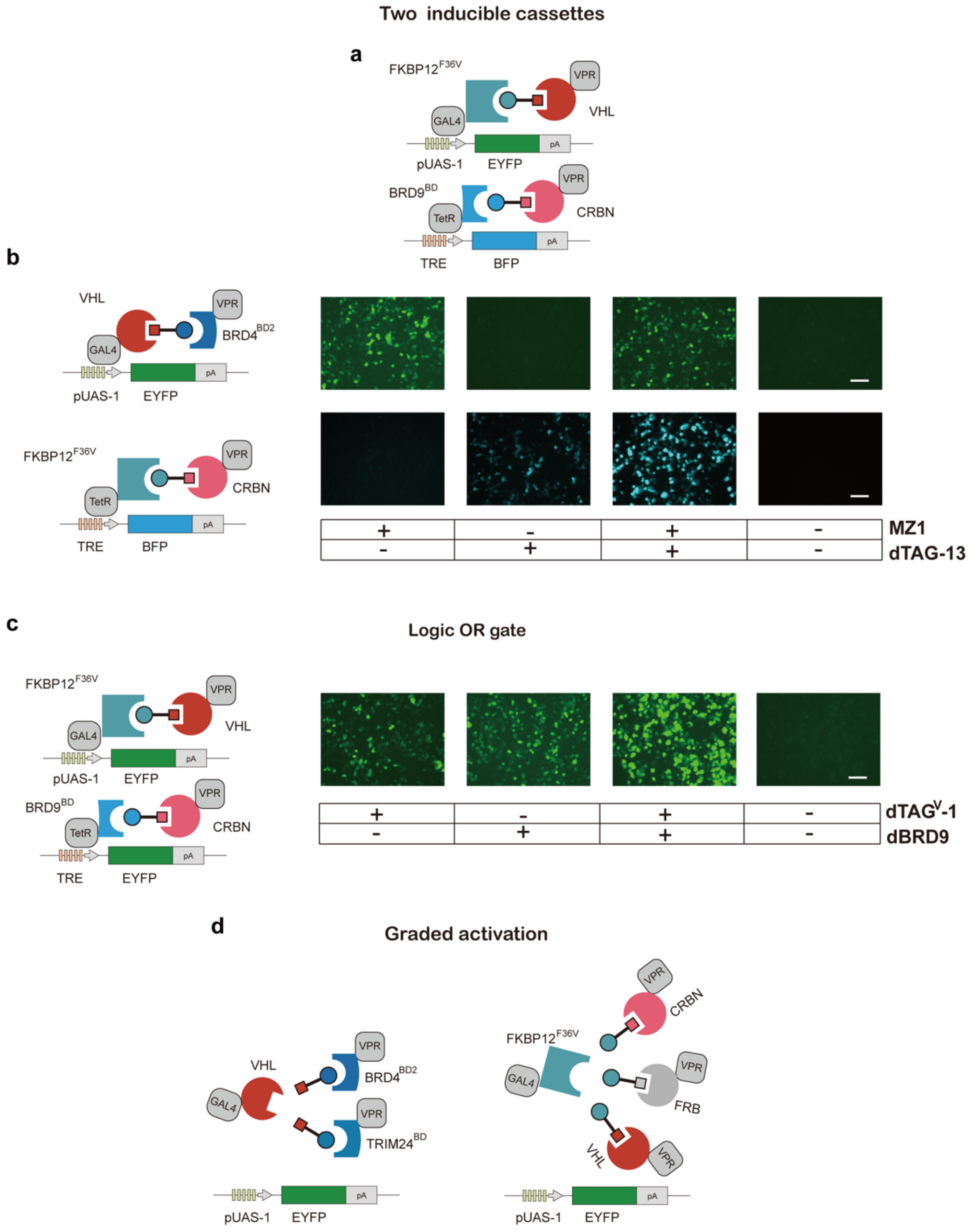

Figure S7. Multiplexing gene regulation by PROTAC-CID small molecules. a and b, Dual inducible expression cassettes to drive EYFP and BFP regulated by two PROTACs. c, Dual inducible expression cassettes to drive the same EYFP gene forming a logic OR gate. b and c, Representative images of EYFP or BFP intensity 2 days post-induction in HEK293T cells transfected with constructs in the presence of dTAG-13 (100 nM), MZ1 (100 nM), dTAG^{V}-1 (1 μM) or dBRD9 (1 μM). Data are shown in n = 3 biologically independent repeats. d, Schematic design of the graded activation systems. b and c, Scale bar, 125 μm. Images of each condition were taken independently for n = 3 times with similar results shown above.

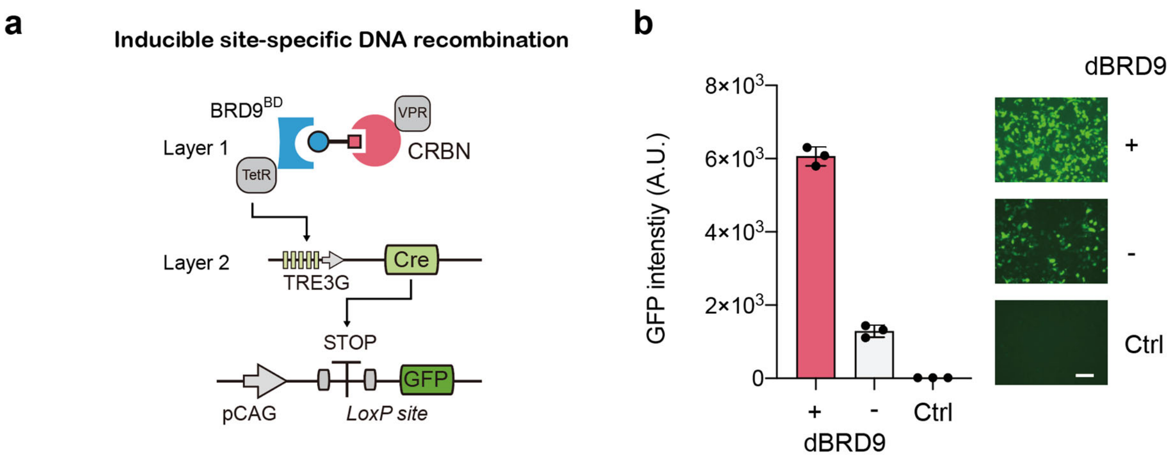

Figure S8. Inducible Cre DNA recombinase by PROTAC-CID. a, Schematic of the PROTAC-CID based inducible site-specific DNA recombination platform. Cre gene was placed downstream of TRE3G promoter. Pre-mature STOP transcriptional signal was put between constitutive pCAG promoter and *Gfp* gene. The induced Cre protein will remove the STOP signal to activate the GFP expression. b, Representative images and fluorescence quantification of the GFP intensity induced by dBRD9 (+) after 2 days of induction. The red bar represents the GFP intensity of induced cells, and the grey bar represents the uninduced cells (-) transfected with the PROTAC-CID system, TRE3G driven Cre, and the LoxP-STOP-LoxP-GFP reporter plasmids. The control (Ctrl) group refers to the HEK293T cells transfected with the LoxP-STOP-LoxP-GFP reporter plasmid. Data are shown in n = 3 biologically independent repeats with an error bar of SD. b. Scale bar, 125 μm.

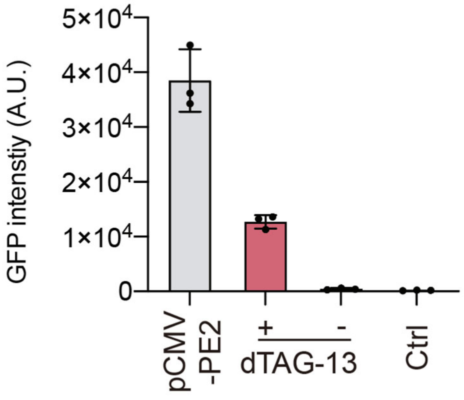

Figure S9. Inducible PE to repair micro-deleted *Cre* gene. Quantitative GFP intensity for the evaluation of inducible PE activity compared with pCMV-driven PE2 in HEK293T cells. The micro-deleted *Cre* gene was repaired by the PE system to express functional Cre protein. GFP will be expressed once the pre-mature STOP signal is removed by Cre protein. HEK293T cells transfected with LoxP-STOP-LoxP-GFP reporter plasmid as control (Ctrl). HEK293T cells were treated with 100 nM dTAG-13 (+) or DMSO (-). (n=3 biological repeats with an error bar of SD).

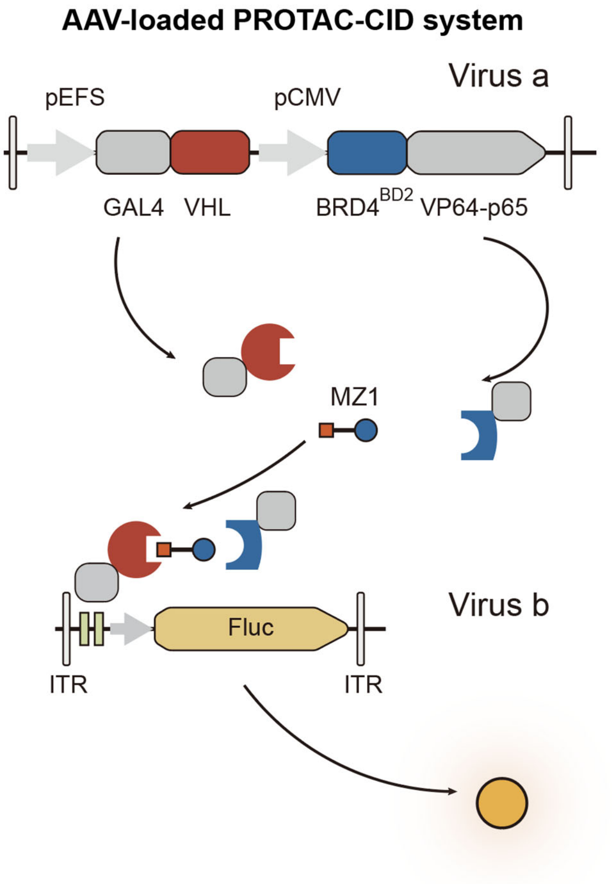

Figure S10. Schematic depicting the compact PROTAC-CID system loaded by AAV vectors to induce the Fluc expression. pEFS, elongation factor 1α short promoter. pCMV, truncated human cytomegalovirus promoter. ITR, inverted terminal repeat. In Virus a, GAL4 fused with VHL and BRD4^{BD2} fused with VP64-p65 gene activation domain was expressed constitutively. GAL4-VHL fusion protein binds with the pUAS-2 promoter upstream of the *Firefly luciferase (Fluc)* gene in Virus b. In the presence of MZ1, BRD4^{BD2}-VP64-p65 will be brought in proximity to the pUAS-2 promoter to drive the *Fluc* gene expression.

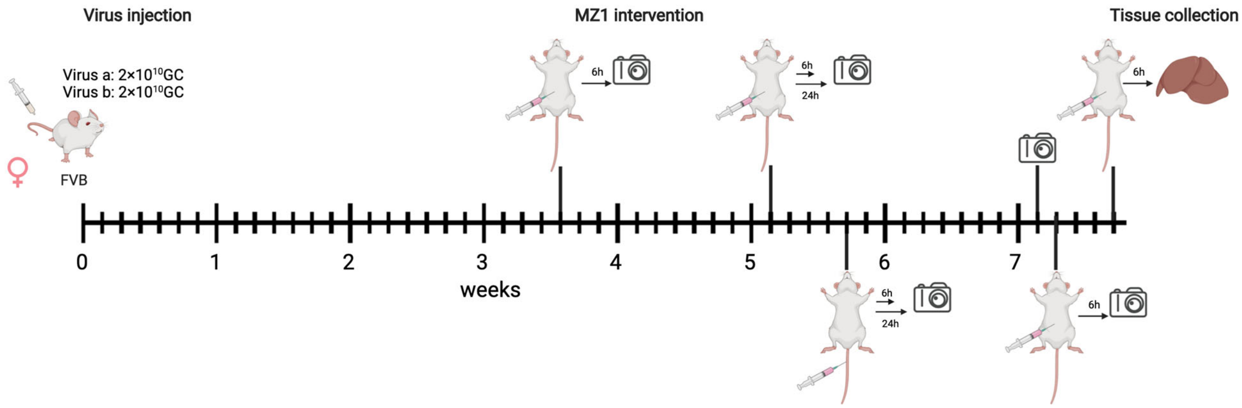

Figure S11. Schematic of in vivo studies of PROTAC-CID gene activation in FVB mice model treated with AAV virus and MZ1. 8-week-old FVB female mice were injected with either Virus a or Virus a and Virus b at a dose of 2×10^{10} genome copies (GC) per mouse by i.v. injection. 25 days post-injection, mice were administrated with MZ1 (10 mg/kg) by i.p. injection. 6 h post-MZ1 treatment, the bioluminescence was monitored. Mice were treated with 50 mg/kg MZ1 by i.p. injection or 10 mg/kg by i.v. injection to compare the route of administration. On day 52, mice were treated with 50 mg/kg MZ1by i.p. injection and observed the luciferase bioluminescence. On day 54, after being treated with 50 mg/kg MZ1 by i.p. injection, liver tissue was collected for protein detection.

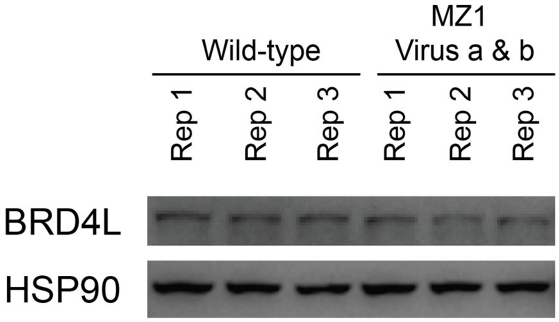

Figure S12. Immunoblot analysis of endogenous BRD4 expression in FVB mice liver tissue. Immunoblot analysis of endogenous long isoform BRD4 (BRD4L) after 50 mg/kg MZ1 treatment by i.p. injection. The short isoform BRD4 (BRD4S) was undetectable in the liver tissue. Uncropped immunoblots are displayed in Fig. S16.

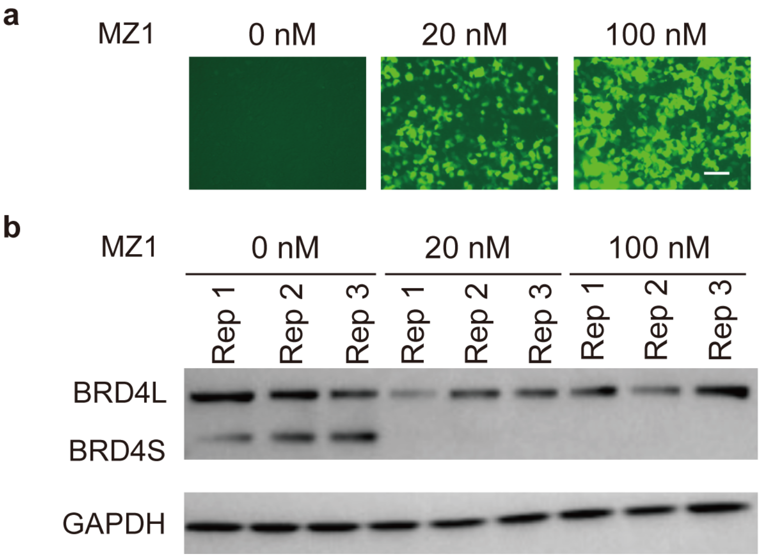

Figure S13. Immunoblot analysis of endogenous BRD4 expression in HEK293T cells. HEK293T cells were pre-transfected with MZ1 (GAL4-VHL and BRD4^{BD2}-VPR) PROTAC-CID systems to activate the pUAS-1 driven EYFP. 48 h post-induction, the EYFP intensity was observed (a) and cells were lysed for immunoblot to detect the BRD4 expression. Scale bar 125 µm. b, Long isoform BRD4 (BRD4L). Short isoform BRD4 (BRD4S). Uncropped immunoblots are displayed in Figure S17. Rep, Replication.

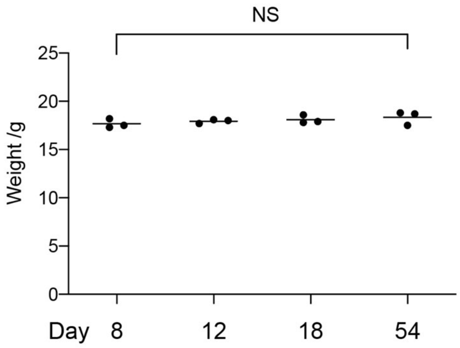

Figure S14. Weight loss analysis of AAV and MZ1-treated mice. FVB mice receiving Virus a and Virus b were treated by MZ1 as in Figure S10 and S11. The dotted line represents the mean weight of tested mice. Statistical analysis was performed using an unpaired two-tailed Student’s t-test. NS, not significant.

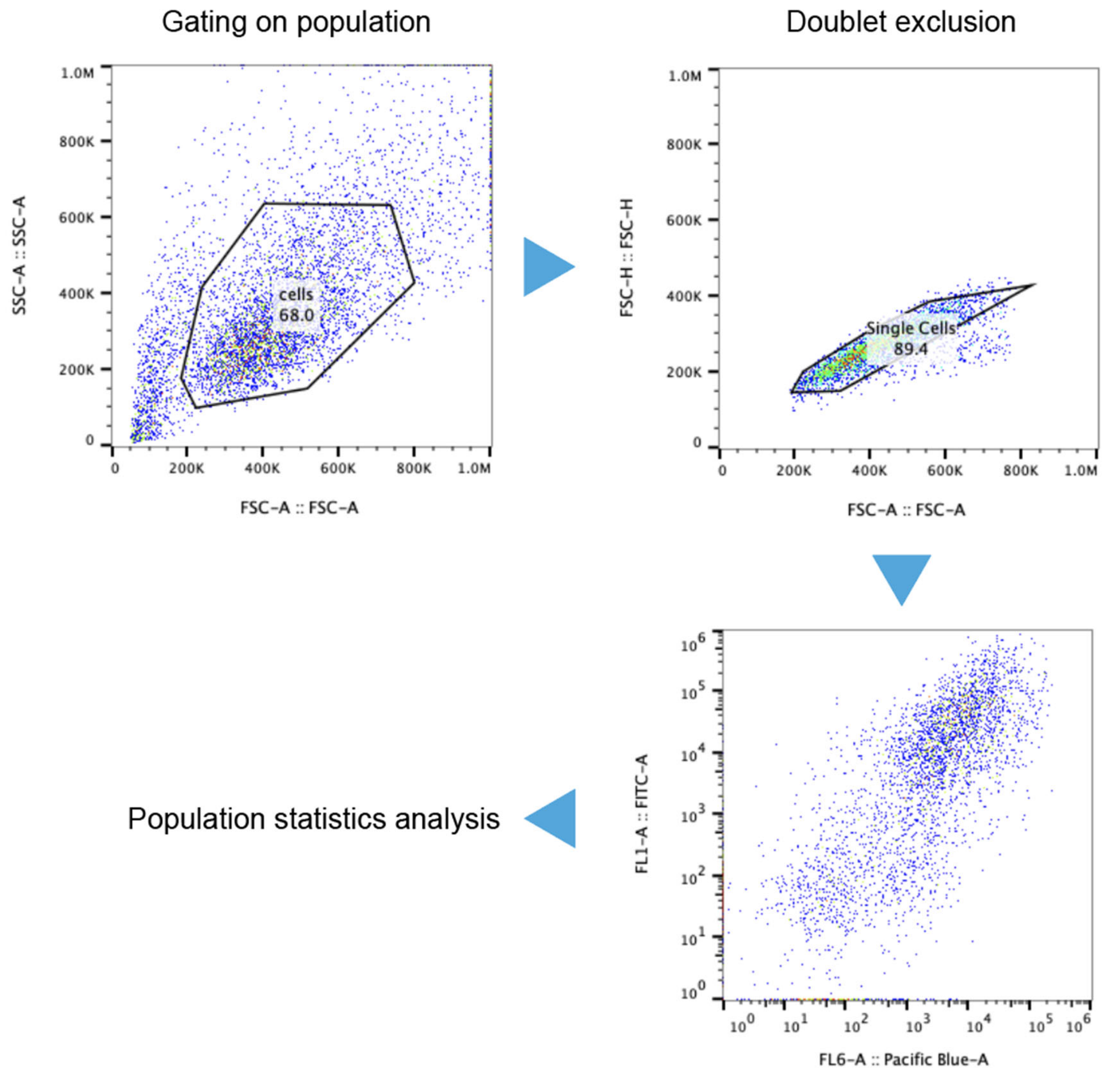

Figure S15. FACS gating examples for flow cytometry data analysis in this study. FL1-FITC-A channel is used for measuring the intensity of EYFP and GFP. FL6-Pacific blue-A channel is used for measuring the intensity of BFP.

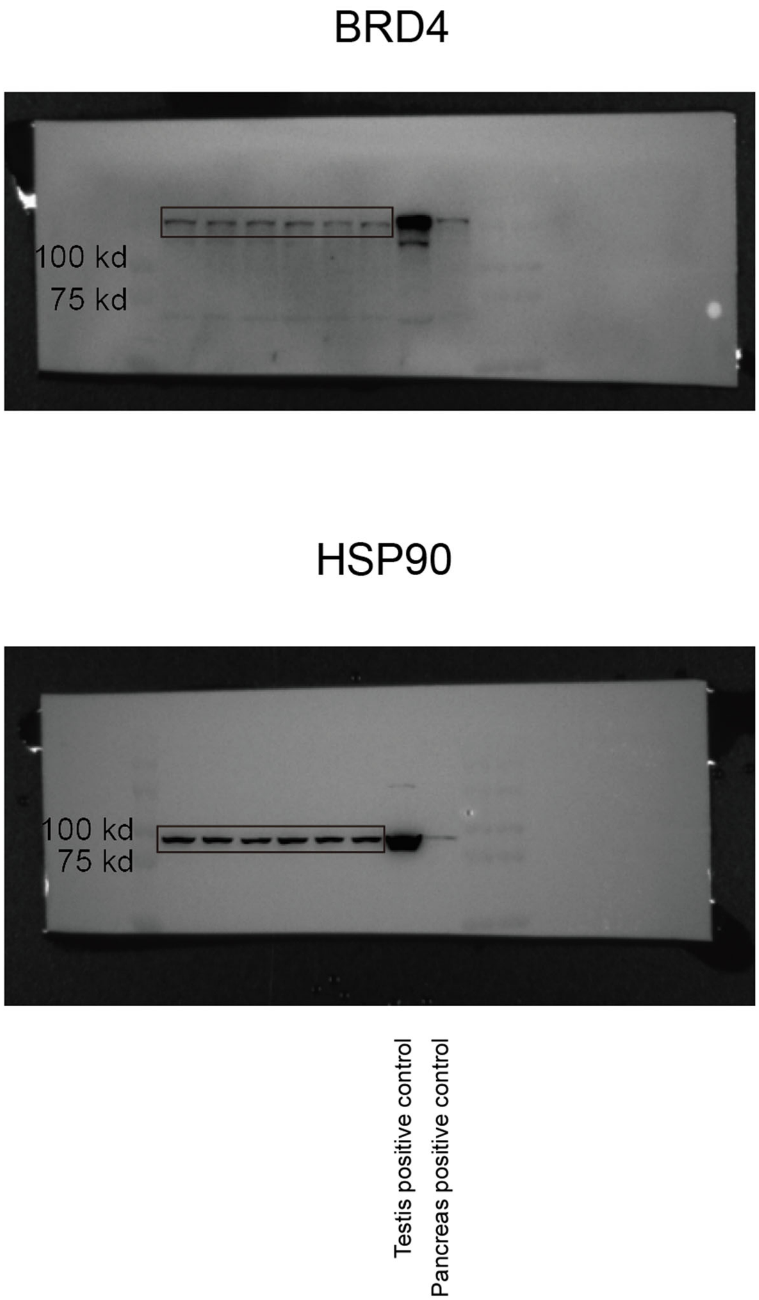

Figure S16. Uncropped original immunoblots data in Figure S12. Mice testis and pancreas tissue as the positive control for BRD4 detection.

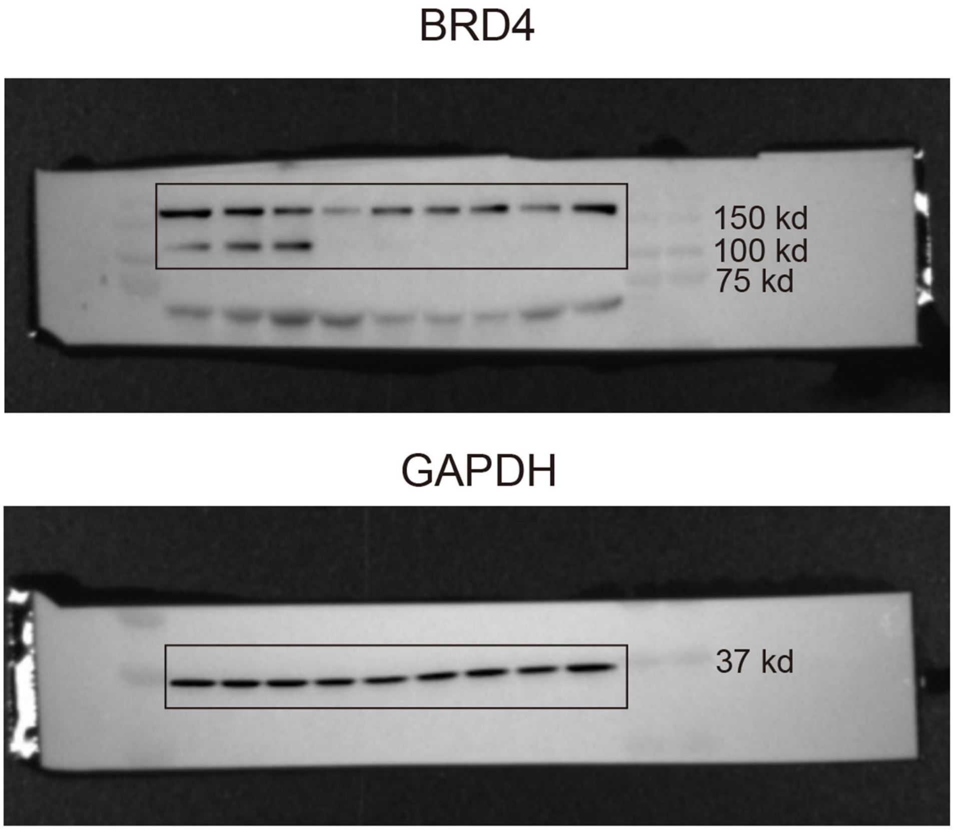

Figure S17. Uncropped original immunoblots data in Figure S13.

Section 3. Supplementary Tables

Table S1. Protein partners and fusion strategies in Figure 1b.

	Fusion protein 1 (E3 ubiquitin ligases are shown in red)	**Fusion protein 2 (**Target proteins are shown in blue**)**	**Concentration of the small molecules**
PROTACs			
dTRIM24	GAL4-VHL	TRIM24-VPR	5 μM
dTAG^{V}-1	VHL-VPR	GAL4- FKBP12^{F36V}	5 μM
AT1	GAL4-VHL	BRD4-VPR	1 μM
MZ1	GAL4-VHL	BRD4-VPR	100 nM
TL13-12	CRBN-VPR	GAL4-tALK	1 μM
TL13-112	CRBN-VPR	GAL4-tALK	1 μM
dTAG-13	CRBN-VPR	GAL4- FKBP12^{F36V}	100 nM
dBRD9	CRBN-VPR	GAL4-BRD9	1 μM
ZXH3-26	CRBN-VPR	GAL4-BRD4	1 μM
CID inducers			
ABA	GAL4-ABI	PYL-VPR	250 μM
Rapamycin	GAL4-FKBP3	FRB-VPR	1 μM
Rapamycin	GAL4-FKBP12	FRB-VPR	10 nM

Table S2. gRNA sequences and primers for amplifying the genome sites in Figure 3c and 3e.

Description	gRNA sequence (5’ to 3’)	Forward primer (5’ to 3’)	Reverse primer (5’ to 3’)
A3G site 1	GTTACGAAAACCTAGGGGTG	TGAAAGTGGCATCTTGAAAGGG	ACCCTTGCATTCCAATACCAC
A3G site 2	AGATCCAGGGACACGGTGCT	GTGGGAAACAGCCGTCAG	CACTGAGCACTGAAGGCC
A3G site 3	AAAACCGAGGGGTAAGAATC	ACACTCTTTCCCTACACGACGCTCTTCCGATCTATAGGATAGGAGTGATGGACAGG	GACTGGAGTTCAGACGTGTGCTCTTCCGATCTCTGCTGCTCCTCAATACACC
ABE site 1	GACAAACCAGAAGCCGCTCC	TCTCTTGTGGTTTCCTAGCTTCTGA	ACTTTCCCCTGAGTTTAAGTGATG
ABE site 2	GAACACAAAGCATAGACTGC	ACATTTGGGCTTCTTTCTAGTTGA	CCTGATGTAATGACTAGACTGAGGC

Table S3. pegRNA sequences, nicking sgRNA and primers for measuring prime editing efficiency in Figure 3h.

pegRNA	space sequence (5' to 3')	3' extension (5' to 3')	PBS length (nt)	RT template length (nt)
HEK3_His$_6$ins	GGCCCAGACTGAGCACGTGA	TGGAGGAAGCAGGGCTTCCTTTCCTCTGCCATCAATGATGGTGATGATGGTGCGTGCTCAGTCTG	13	52
Cre_2ATins	AAATGCCAGATTACGTATCC	TCGCTGCCAGGATATACGTAATCTGGC	11	14

Nicking sgRNA	spacer sequence (5' to 3')
HEK3_His$_6$ins	GTCAACCAGTATCCCGGTGC
Cre_2ATins	CGAACGCACTGATTTCGACC

Description	sequence
HEK3 fwd	CTTTTCCTCTGTTGAGCTCG
HEK3 rev	GAATCAGTGCTGGAGAATGG

Table S4. Nonlinear regression analysis for calculating EC_{50} of PROTAC-CID tools.

ABA

Description	Number
Best-fit values	
Bottom	1.587
Hillslope	2.083
Top	79.43
EC_{50}	762.6
$\log EC_{50}$	2.882
Span	77.84
Goodness of Fit	
Degrees of Freedom	17
R squared	0.9724
Sum of Squares	631.1
Sy.x	6.093
Constraints	
EC_{50}	$EC_{50} > 0$

dTAG^{V}-1

Description	Number
Best-fit values	
Bottom	0.9420
Hillslope	1.937
Top	56.67
EC_{50}	227.8
$\log EC_{50}$	2.358
Span	55.73
Goodness of Fit	
Degrees of Freedom	26
R squared	0.9697
Sum of Squares	496.3
Sy.x	4.369
Constraints	
EC_{50}	$EC_{50} > 0$

dTAG-13

Description	Number
Best-fit values	
Bottom	2.581
Hillslope	3.384
Top	138.3
EC_{50}	52.98
$\log EC_{50}$	1.724
Span	135.7
Goodness of Fit	
Degrees of Freedom	23
R squared	0.9579
Sum of Squares	4269
Sy.x	13.62
Constraints	
EC_{50}	$EC_{50} > 0$

dTRIM24

Description	Number
Best-fit values	
Bottom	0.5037
Hillslope	1.463
Top	1431
EC_{50}	6347
$\log EC_{50}$	3.803
Span	1430
Goodness of Fit	
Degrees of Freedom	26
R squared	0.9968
Sum of Squares	2974
Sy.x	10.69
Constraints	
EC_{50}	$EC_{50} > 0$

Rapamycin

Description	Number
Best-fit values	
Bottom	6.692
Hillslope	1.871
Top	490.6
EC_{50}	6.322
$\log EC_{50}$	0.8008
Span	483.9
Goodness of Fit	
Degrees of Freedom	29
R squared	0.9914
Sum of Squares	13564
Sy.x	21.63
Constraints	
EC_{50}	$EC_{50} > 0$

MZ1

Description	Number
Best-fit values	
Bottom	1.416
Hillslope	1.728
Top	321
EC_{50}	32.39
$\log EC_{50}$	1.51
Span	319.6
Goodness of Fit	
Degrees of Freedom	29
R squared	0.9781
Sum of Squares	13560
Sy.x	21.62
Constraints	
EC_{50}	$EC_{50} > 0$

Section 4. Supplementary Sequences

Sequences S1. Amino acid sequences of PROTAC-CID protein partners used in this study.

GAL4-FKBP12$^{\text{F36V}}$:

SV40 NLS
GAL4 DBD
FKBP12$^{\text{F36V}}$
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRY
SPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDN
VNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMGVQVETIS
PGDGRTFPKRGQTCVVHYTGMLEDGKKVDSSRDRNKPFKFMLGKQEVIRGWEEGVAQ
MSVGQRAKLTISPDYAYGATGHPGIIPPHATLVFDVELLKLETSGGGSKRPAATKKAGQ
AKKKKSR

CRBN-VPR:

SV40 NLS
CRBN
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMAGEGDQQDAAHNMGNHLPLLPESEEEDEMEVEDQDSK
EAKKPNIINFDTSLPTSHTYLGADMEEFHGRTLHDDDSCQVIPVLPQVMMILIPGQTLPL
QLFHPQEVSMVRNLIQKDRTFAVLAYSNVQEREAQFGTTAEIYAYREEQDFGIEIVKVK
AIGRQRFKVLELRTQSDGIQQAKVQILPECVLPSTMSAVQLESLNKCQIFPSKPVSREDQC
SYKWWQKYQKRKFHCANLTSWPRWLYSLYDAETLMDRIKKQLREWDENLKDDSLPS
NPIDFSYRVAACLPIDDVLRIQLLKIGSAIQRLRCELDIMNKCTSLCCKQCQETEITTKNEI
FSLSLCGPMAAYVNPHGYVHETLTVYKACNLNLIGRPSTEHSWFPGYAWTVAQCKICA
SHIGWKFTATKKDMSPQKFWGLTRSALLPTIPDTEDEISPDKVILCLGGGSRADPKKKRK
VEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLD
MLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASV
PKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSA
LAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPA
VFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAP
GLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQ
PKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLL
EDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDL
NLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKK
KKSR

GAL4-VHL:

SV40 NLS
GAL4 DBD
VHL

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMPRRAENWDEAEVGAEEAGVEEYGPEEDGGEESGAEESGPEESGPEELGAEEEMEAGRPRPVLRSVNSREPSQVIFCNRSPRVVLPVWLNFDGEPQPYPTLPPGTGRRIHSYRGHLWLFRDAGTHDGLLVNQTELFVPSLNVDGQPIFANITLPVYTLKERCLQVVRSLVKPENYRRLDIVRSLYEDLEDHPNVQKDLERLTQERIAHQRMGD

TRIM24^{BD}-VPR:

SV40 NLS
TRIM24^{BD}
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSPNEDWCAVCQNGGELLCCEKCPKVFHLSCHVPTLTNFPSGEWICTFCRDLSKPEVEYDCDAPSHNSEKKKTEGLVKLTPIDKRKCERLLLFLYCHEMSLAFQDPVPLTVPDYYKIIKNPMDLSTIKKRLQEDYSMYSKPEDFVADFRLIFQNCAEFNEPDSEVANAGIKLENYFEELLKNLYPGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

TRIM24-VPR:

SV40 NLS
TRIM24
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSGTSRRSRTMEVAVEKAVAAAAAASAAASGGPSAAPSGENEAESRQGPDSERGGEAARLNLLDTCAVCHQNIQSRAPKLLPCLHSFCQRCLPAPQRYLMLPAPMLGSAETPPPVPAPGSPVSGSSPFATQVGVIRCPVCSQECAERHIIDNFFVKDTTEVPSSTVEKSNQVCTSCEDNAEANGFCVECVEWLCKTCIRAHQRVKFTKDHTVRQKEEVS

PEAVGVTSQRPVFCPFHKKEQLKLYCETCDKLTCRDCQLLEHKEHRYQFIEEAFQNQKV
IIDTLITKLMEKTKYIKFTGNQIQNRIIEVNQNQKQVEQDIKVAIFTLMVEINKKGKALLH
QLESLAKDHRMKLMQQQQEVAGLSKQLEHVMHFSKWAVSSGSSTALLYSKRLITYRLR
HLLRARCDASPVTNNTIQFHCDPSFWAQNIINLGSLVIEDKESQPQMPKQNPVVEQNSQP
PSGLSSNQLSKFPTQISLAQLRLQHMQQQVMAQRQQVQRRPAPVGLPNPRMQGPIQQPS
ISHQQPPPRLINFQNHSPKPNGPVLPPHPQQLRYPPNQNIPRQAIKPNPLQMAFLAQQAIK
QWQISSGQGTPSTTNSTSSTPSSPTITSAAGYDGKAFGSPMIDLSSPVGGSYNLPSLPDIDC
SSTIMLDNIVRKDTNIDHGQPRPPSNRTVQSPNSSVPSPGLAGPVTMTSVHPPIRSPSASSV
GSRGSSGSSSKPAGADSTHKVPVVMLEPIRIKQENSGPPENYDFPVVIVKQESDEESRPQ
NANYPRSILTSLLLNSSQSSTSEETVLRSDAPDSTGDQPGLHQDNSSNGKSEWLDPSQKS
PLHVGETRKEDDPNEDWCAVCQNGGELLCCEKCPKVFHLSCHVPTLTNFPSGEWICTFC
RDLSKPEVEYDCDAPSHNSEKKKTEGLVKLTPIDKRKCERLLLFLYCHEMSLAFQDPVP
LTVPDYYKIIKNPMDLSTIKKRLQEDYSMYSKPEDFVADFRLIFQNCAEFNEPDSEVANA
GIKLENYFEELLKNLYPEKRFPKPEFRNESEDNKFSDDSDDDFVQPRKKRLKSIEERQLL
KLERPPDITLQGSWPASGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDF
DLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYET
FKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSG
QISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQ
AGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTT
EPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSG
SGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTG
PVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEA
AICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHIS
TGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

BRD4-VPR:

SV40 NLS
BRD4
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMSAESGPGTRLRNLPVMGDGLETSQMSTTQAQAQPQPAN
AASTNPPPPETSNPNKPKRQTNQLQYLLRVVLKTLWKHQFAWPFQQPVDAVKLNLPDY
YKIIKTPMDMGTIKKRLENNYYWNAQECIQDFNTMFTNCYIYNKPGDDIVLMAEALEKL
FLQKINELPTEETEIMIVQAKGRGRGRKETGTAKPGVSTVPNTTQASTPPQTQTPQPNPPP
VQATPHPFPAVTPDLIVQTPVMTVVPPQPLQTPPPVPPQPQPPPAPAPQPVQSHPPIIAATP
QPVKTKKGVKRKADTTTPTTIDPIHEPPSLPPEPKTTKLGQRRESSRPVKPPKKDVPDSQQ
HPAPEKSSKVSEQLKCCSGILKEMFAKKHAAYAWPFYKPVDVEALGLHDYCDIIKHPM
DMSTIKSKLEAREYRDAQEFGADVRLMFSNCYKYNPPDHEVVAMARKLQDVFEMRFA
KMPDEPEEPVVAVSSPAVPPPTKVVAPPSSSDSSSDSSSDSDSSTDDSEEERAQRLAELQE
QLKAVHEQLAALSQPQQNKPKKKEKDKKEKKKEKHKRKEEVEENKKSKAKEPPPKKT
KKNNSSNSNVSKKEPAPMKSKPPPTYESEEEDKCKPMSYEEKRQLSLDINKLPGEKLGR
VVHIIQSREPSLKNSNPDEIEIDFETLKPSTLRELERYVTSCLRKKRKPQAEKVDVIAGSSK
MKGFSSSESESSSESSSSDSEDSETGPAGGGSRADPKKKRKVEASGSGRADALDDFDLD
MLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRI

EEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINY
DEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQA
VAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLN
QGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIAD
MDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRP
LPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREM
ADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLN
DECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

BRD4^{BD2}-VPR:

SV40 NLS
BRD4^{BD2}
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSSKVSEQLKCCSGILKEMFAKKHAAYAWPFYKPVDVEALG
LHDYCDIIKHPMDMSTIKSKLEAREYRDAQEFGADVRLMFSNCYKYNPPDHEVVAMAR
KLQDVFEMRFAKMPDGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDF
DLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYET
FKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSG
QISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQ
AGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTT
EPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSG
SGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTG
PVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEA
AICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHIS
TGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

BRD4^{BD1}-VPR:

SV40 NLS
BRD4^{BD1}
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSNPPPPETSNPNKPKRQTNQLQYLLRVVLKTLWKHQFAWP
FQQPVDAVKLNLPDYYKIIKTPMDMGTIKKRLENNYYWNAQECIQDFNTMFTNCYIYN
KPGDDIVLMAEALEKLFLQKINELPTGGGSRADPKKKRKVEASGSGRADALDDFDLDM
LGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIE
EKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYD
EFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAV
APPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQ
GIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADM
DFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLP
ASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMAD

TVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDE
CLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

GAL4-FKBP12:

SV40 NLS
GAL4 DBD
FKBP12
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRY
SPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDN
VNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMGVQVETIS
PGDGRTFPKRGQTCVVHYTGMLEDGKKFDSSRDRNKPFKFMLGKQEVIRGWEEGVAQ
MSVGQRAKLTISPDYAYGATGHPGIIPPHATLVFDVELLKLETSGGGSKRPAATKKAGQ
AKKKKSR

GAL4-tALK:

SV40 NLS
GAL4 DBD
tALK
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRY
SPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDN
VNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSRTSTIMTDY
NPNYCFAGKTSSISDLKEVPRKNITLIRGLGHGAFGEVYEGQVSGMPNDPSPLQVAVKTL
PEVCSEQDELDFLMEALIISKFNHQNIVRCIGVSLQSLPRFILLELMAGGDLKSFLRETRPR
PSQPSSLAMLDLLHVARDIACGCQYLEENHFIHRDIAARNCLLTCPGPGRVAKIGDFGM
ARDIYRASYYRKGGCAMLPVKWMPPEAFMEGIFTSKTDTWSFGVLLWEIFSLGYMPYP
SKSNQEVLEFVTSGGRMDPPKNCPGPVYRIMTQCWQHQPEDRPNFAIILERIEYCTQDPD
VINTALPIEYGPLVEEEEKTSGGGSKRPAATKKAGQAKKKKSR

VHL-VPR:

SV40 NLS
VHL
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMPRRAENWDEAEVGAEEAGVEEYGPEEDGGEESGAEESG
PEESGPEELGAEEEMEAGRPRPVLRSVNSREPSQVIFCNRSPRVVLPVWLNFDGEPQPYP
TLPPGTGRRIHSYRGHLWLFRDAGTHDGLLVNQTELFVPSLNVDGQPIFANITLPVYTLK
ERCLQVVRSLVKPENYRRLDIVRSLYEDLEDHPNVQKDLERLTQERIAHQRMGDGGGS

RADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

GAL4-BRD9:

SV40 NLS
GAL4 DBD
BRD9
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMGKKHKKHKAEWRSSYEDYADKPLEKPLKLVLKVGGSEVTELSGSGHDSSYYDDRSDHERERHKEKKKKKKKKSEKEKHLDDEERRKRKEEKKRKREREHCDTEGEADDFDPGKKVEVEPPPDRPVRACRTQPAENESTPIQQLLEHFLRQLQRKDPHGFFAFPVTDAIAPGYSMIIKHPMDFGTMKDKIVANEYKSVTEFKADFKLMCDNAMTYNRPDTVYYKLAKKILHAGFKMMSKQAALLGNEDTAVEEPVPEVVPVQVETAKKSKKPSREVISCMFEPEGNACSLTDSTAEEHVLALVEHAADEARDRINRFLPGGKMGYLKRNGDGSLLYSVVNTAEPDADEEETHPVDLSSLSSKLLPGFTTLGFKDERRNKVTFLSSATTALSMQNNSVFGDLKSDEMELLYSAYGDETGVQCALSLQEFVKDAGSYSKKVVDDLLDQITGGDHSRTLFQLKQRRNVPMKPPDEAKVGDTLGDSSSSVLEFMSMKSYPDVSVDISMLSSLGKVKKELDPDDSHLNLDETTKLLQDLHEAQAERGGSRPSSNLSSLSNASERDQHHLGSPSRLSVGEQPDVTHDPYEFLQSPEPAASAKTTSGGGSKRPAATKKAGQAKKKKSR

GAL4-BRD9^{BD}:

SV40 NLS
GAL4 DBD
BRD9^{BD}
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSESTPIQQLLEHFLRQLQRKDPHGFFAFPVTDAIAPGYSMIIKHPMDFGTMKDKIVANEYKSVTEFKADFKLMCDNAMTYNRPDTVYYKLAKKILHAGFKMMSTSGGGSKRPAATKKAGQAKKKKSR

GAL4-FKBP3:

SV40 NLS
GAL4 DBD
FKBP3
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSSPKYTKSVLKKGDKTNFPKKGDVVHCWYTGTLQDGTVFDTNIQTSAKKKKNAKPLSFKVGVGKVIRGWDEALLTMSKGEKARLEIEPEWAYGKKGQPDAKIPPNAKLTFEVELVDIDTSGGGSKRPAATKKAGQAKKKKSR

GAL4-ABI:

SV40 NLS
GAL4 DBD
ABI
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMVPLYGFTSICGRRPEMEAAVSTIPRFLQSSSGSMLDGRFDPQSAAHFFGVYDGHGGSQVANYCRERMHLALAEEIAKEKPMLCDGDTWLEKWKKALFNSFLRVDSEIESVAPETVGSTSVVAVVFPSHIFVANCGDSRAVLCRGKTALPLSVDHKPDREDEAARIEAAGGKVIQWNGARVFGVLAMSRSIGDRYLKPSIIPDPEVTAVKRVKEDDCLILASDGVWDVMTDEEACEMARKRILLWHKKNAVAGDASLLADERRKEGKDPAAMSAAEYLSKLAIQRGSKDNISVVVVDLKKLTSGGGSKRPAATKKAGQAKKKKSR

PYL-VPR:

SV40 NLS
FRB
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSAPTQDEFTQLSQSIAEFHTYQLGNGRCSSLLAQRIHAPPETVWSVVRRFDRPQIYKHFIKSCNVSEDFEMRVGCTRDVNVISGLPANTSRERLDLLDDDRRVTGFSITGGEHRLRNYKSVTTVHRFEKEEEEERIWTVVLESYVVDVPEGNSEEDTRLFADTVIRLNLQKLASITEAMNGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPT

QAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

FRB-VPR:

SV40 NLS
FRB
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSSSILWHEMWHEGLEEASRLYFGERNVKGMFEVLEPLHAMMERGPQTLKETSFNQAYGRDLMEAQEWCRKYMKSGNVKDLTQAWDLYYHVFRRISGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

GAL4-IKZF1:

SV40 NLS
GAL4 DBD
IKZF1
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGSGSMDADEGQDMSQVSGKESPPVSDTPDEGDEPMPIPEDLSTTSGGQQSSKSDRVVASNVKVETQSDEENGRACEMNGEECAEDLRMLDASGEKMNGSHRDQGSSALSGVGGIRLPNGKLKCDICGIICIGPNVLMVHKRSHTGERPFQCNQCGASFTQKGNLLRHIKLHSGEKPFKCHLCNYACRRRDALTGHLRTHSVIKEETNHSEMAEDLCKIGSERSLVLDRLASNVAKRKSSMPQKFLGDKGLSDTPYDSSASYEKENEMMKSHVMDQAINNAINYLGAESLRPLVQTPPGGSEVVPVISPMYQLHKPLAEGTPRSNHSAQDSAVENLLLLSKAKLVPSEREASPSNSCQDSTDTESNNEEQRSGLIYLTNHIAPHARNGLSLKEEHRAYDLLRAASENSQDALRVVSTSGEQMKVYKCEHCRVLFLDHVMYTIHMGCHGFRDPFECNMCGYHSQDRYEFSSHITRGEHRFHMSTSGGGSKRPAATKKAGQAKKKKSR

GAL4-IKZF3:

SV40 NLS
GAL4 DBD
IKZF3
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRY
SPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDN
VNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGSGSMEDIQTNAE
LKSTQEQSVPAESAAVLNDYSLTKSHEMENVDSGEGPANEDEDIGDDSMKVKDEYSER
DENVLKSEPMGNAEEPEIPYSYSREYNEYENIKLERHVVSFDSSRPTSGKMNCDVCGLSC
ISFNVLMVHKRSHTGERPFQCNQCGASFTQKGNLLRHIKLHTGEKPFKCHLCNYACQRR
DALTGHLRTHSVEKPYKCEFCGRSYKQRSSLEEHKERCRTFLQSTDPGDTASAEARHIK
AEMGSERALVLDRLASNVAKRKSSMPQKFIGEKRHCFDVNYNSSYMYEKESELIQTRM
MDQAINNAISYLGAEALRPLVQTPPAPTSEMVPVISSMYPIALTRAEMSNGAPQELEKKS
IHLPEKSVPSERGLSPNNSGHDSTDTDSNHEERQNHIYQQNHMVLSRARNGMPLLKEVP
RSYELLKPPPICPRDSVKVINKEGEVMDVYRCDHCRVLFLDYVMFTIHMGCHGFRDPFE
CNMCGYRSHDRYEFSSHIARGEHRALLKTSGGGSKRPAATKKAGQAKKKKSR

IKZF1-GAL4:

SV40 NLS
IKZF1
GAL4 DBD
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMDADEGQDMSQVSGKESPPVSDTPDEGDEPMPIPEDLSTT
SGGQQSSKSDRVVASNVKVETQSDEENGRACEMNGEECAEDLRMLDASGEKMNGSHR
DQGSSALSGVGGIRLPNGKLKCDICGIICIGPNVLMVHKRSHTGERPFQCNQCGASFTQK
GNLLRHIKLHSGEKPFKCHLCNYACRRRDALTGHLRTHSVIKEETNHSEMAEDLCKIGS
ERSLVLDRLASNVAKRKSSMPQKFLGDKGLSDTPYDSSASYEKENEMMKSHVMDQAIN
NAINYLGAESLRPLVQTPPGGSEVVPVISPMYQLHKPLAEGTPRSNHSAQDSAVENLLLL
SKAKLVPSEREASPSNSCQDSTDTESNNEEQRSGLIYLTNHIAPHARNGLSLKEEHRAYD
LLRAASENSQDALRVVSTSGEQMKVYKCEHCRVLFLDHVMYTIHMGCHGFRDPFECN
MCGYHSQDRYEFSSHITRGEHRFHMSGSGSMKLLSSIEQACDICRLKKLKCSKEKPKCA
KCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDI
KALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVST
SGGGSKRPAATKKAGQAKKKKSR

IKZF3-GAL4:

SV40 NLS
IKZF3
GAL4 DBD

Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMEDIQTNAELKSTQEQSVPAESAAVLNDYSLTKSHEMENV
DSGEGPANEDEDIGDDSMKVKDEYSERDENVLKSEPMGNAEEPEIPYSYSREYNEYENI
KLERHVVSFDSSRPTSGKMNCDVCGLSCISFNVLMVHKRSHTGERPFQCNQCGASFTQK
GNLLRHIKLHTGEKPFKCHLCNYACQRRDALTGHLRTHSVEKPYKCEFCGRSYKQRSSL
EEHKERCRTFLQSTDPGDTASAEARHIKAEMGSERALVLDRLASNVAKRKSSMPQKFIG
EKRHCFDVNYNSSYMYEKESELIQTRMMDQAINNAISYLGAEALRPLVQTPPAPTSEMV
PVISSMYPIALTRAEMSNGAPQELEKKSIHLPEKSVPSERGLSPNNSGHDSTDTDSNHEER
QNHIYQQNHMVLSRARNGMPLLKEVPRSYELLKPPPICPRDSVKVINKEGEVMDVYRC
DHCRVLFLDYVMFTIHMGCHGFRDPFECNMCGYRSHDRYEFSSHIARGEHRALLKGSG
SMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVE
SRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETD
MPLTLRQHRISATSSSEESSNKGQRQLTVSTSGGGSKRPAATKKAGQAKKKKSR

CRBN-GAL4:

SV40 NLS
CRBN
GAL4 DBD
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMAGEGDQQDAAHNMGNHLPLLPESEEEDEMEVEDQDSK
EAKKPNIINFDTSLPTSHTYLGADMEEFHGRTLHDDDSCQVIPVLPQVMMILIPGQTLPL
QLFHPQEVSMVRNLIQKDRTFAVLAYSNVQEREAQFGTTAEIYAYREEQDFGIEIVKVK
AIGRQRFKVLELRTQSDGIQQAKVQILPECVLPSTMSAVQLESLNKCQIFPSKPVSREDQC
SYKWWQKYQKRKFHCANLTSWPRWLYSLYDAETLMDRIKKQLREWDENLKDDSLPS
NPIDFSYRVAACLPIDDVLRIQLLKIGSAIQRLRCELDIMNKCTSLCCKQCQETEITTKNEI
FSLSLCGPMAAYVNPHGYVHETLTVYKACNLNLIGRPSTEHSWFPGYAWTVAQCKICA
SHIGWKFTATKKDMSPQKFWGLTRSALLPTIPDTEDEISPDKVILCLGGGSMKLLSSIEQA
CDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFL
LIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRIS
ATSSSEESSNKGQRQLTVSTSGGGSKRPAATKKAGQAKKKKSR

GAL4-CRBN:

SV40 NLS
GAL4 DBD
CRBN
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRY
SPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDN
VNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSGGGSMAGEGDQQ
DAAHNMGNHLPLLPESEEEDEMEVEDQDSKEAKKPNIINFDTSLPTSHTYLGADMEEFH
GRTLHDDDSCQVIPVLPQVMMILIPGQTLPLQLFHPQEVSMVRNLIQKDRTFAVLAYSN

VQEREAQFGTTAEIYAYREEQDFGIEIVKVKAIGRQRFKVLELRTQSDGIQQAKVQILPEC
VLPSTMSAVQLESLNKCQIFPSKPVSREDQCSYKWWQKYQKRKFHCANLTSWPRWLYS
LYDAETLMDRIKKQLREWDENLKDDSLPSNPIDFSYRVAACLPIDDVLRIQLLKIGSAIQR
LRCELDIMNKCTSLCCKQCQETEITTKNEIFSLSLCGPMAAYVNPHGYVHETLTVYKAC
NLNLIGRPSTEHSWFPGYAWTVAQCKICASHIGWKFTATKKDMSPQKFWGLTRSALLPT
IPDTEDEISPDKVILCLTSGGGSKRPAATKKAGQAKKKKSR

VPR-CRBN:

SV40 NLS
VPR
CRBN
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDL
DMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFK
SIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQI
SQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAG
EGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEP
MLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSG
SRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPV
HEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAI
CGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHIST
GLSIFDTSLFGGGSMAGEGDQQDAAHNMGNHLPLLPESEEEDEMEVEDQDSKEAKKPN
IINFDTSLPTSHTYLGADMEEFHGRTLHDDDSCQVIPVLPQVMMILIPGQTLPLQLFHPQE
VSMVRNLIQKDRTFAVLAYSNVQEREAQFGTTAEIYAYREEQDFGIEIVKVKAIGRQRFK
VLELRTQSDGIQQAKVQILPECVLPSTMSAVQLESLNKCQIFPSKPVSREDQCSYKWWQ
KYQKRKFHCANLTSWPRWLYSLYDAETLMDRIKKQLREWDENLKDDSLPSNPIDFSYR
VAACLPIDDVLRIQLLKIGSAIQRLRCELDIMNKCTSLCCKQCQETEITTKNEIFSLSLCGP
MAAYVNPHGYVHETLTVYKACNLNLIGRPSTEHSWFPGYAWTVAQCKICASHIGWKFT
ATKKDMSPQKFWGLTRSALLPTIPDTEDEISPDKVILCLTSGGGSKRPAATKKAGQAKK
KKSR

FKBP12$^{\mathrm{F36V}}$-GAL4:

SV40 NLS
FKBP12$^{\mathrm{F36V}}$
GAL4 DBD
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMGVQVETISPGDGRTFPKRGQTCVVHYTGMLEDGKKVDS
SRDRNKPFKFMLGKQEVIRGWEEGVAQMSVGQRAKLTISPDYAYGATGHPGIIPPHATL
VFDVELLKLEGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTK
RSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKD
AVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSTSGGGSKRPAATKKAGQ
AKKKKSR

FKBP12^{F36V}-VPR:

SV40 NLS
FKBP12^{F36V}
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMGVQVETISPGDGRTFPKRGQTCVVHYTGMLEDGKKVDSSRDRNKPFKFMLGKQEVIRGWEEGVAQMSVGQRAKLTISPDYAYGATGHPGIIPPHATLVFDVELLKLEGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

VPR-FKBP12^{F36V}:

SV40 NLS
VPR
FKBP12^{F36V}
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFGGGSMGVQVETISPGDGRTFPKRGQTCVVHYTGMLEDGKKVDSSRDRNKPFKFMLGKQEVIRGWEEGVAQMSVGQRAKLTISPDYAYGATGHPGIIPPHATLVFDVELLKLETSGGGSKRPAATKKAGQAKKKKSR

BRD9^{BD}-GAL4:

SV40 NLS
BRD9^{BD}

GAL4 DBD
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSESTPIQQLLEHFLRQLQRKDPHGFFAFPVTDAIAPGYSMIIKHPMDFGTMKDKIVANEYKSVTEFKADFKLMCDNAMTYNRPDTVYYKLAKKILHAGFKMMSGGGSMKLLSSIEQACDICRLKKLKCSKEKPKCAKCLKNNWECRYSPKTKRSPLTRAHLTEVESRLERLEQLFLLIFPREDLDMILKMDSLQDIKALLTGLFVQDNVNKDAVTDRLASVETDMPLTLRQHRISATSSSEESSNKGQRQLTVSTSGGGSKRPAATKKAGQAKKKKSR

TetR-FKBP12^{F36V}:

SV40 NLS
TetR
FKBP12^{F36V}
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMSRLDKSKVINSALELLNEVGIEGLTTRKLAQKLGVEQPTLYWHVKNKRALLDALAIEMLDRHHTHFCPLEGESWQDFLRNNAKSFRCALLSHRDGAKVHLGTRPTEKQYETLENQLAFLCQQGFSLENALYALSAVGHFTLGCVLEDQEHQVAKEERETPTTDSMPPLLRQAIELFDHQGAEPAFLFGLELIICGLEKQLKCESGGPAGGGSMGVQVETISPGDGRTFPKRGQTCVVHYTGMLEDGKKVDSSRDRNKPFKFMLGKQEVIRGWEEGVAQMSVGQRAKLTISPDYAYGATGHPGIIPPHATLVFDVELLKLETSGGGSKRPAATKKAGQAKKKKSR

TetR-BRD9^{BD}:

SV40 NLS
TetR
FKBP12^{F36V}
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMSRLDKSKVINSALELLNEVGIEGLTTRKLAQKLGVEQPTLYWHVKNKRALLDALAIEMLDRHHTHFCPLEGESWQDFLRNNAKSFRCALLSHRDGAKVHLGTRPTEKQYETLENQLAFLCQQGFSLENALYALSAVGHFTLGCVLEDQEHQVAKEERETPTTDSMPPLLRQAIELFDHQGAEPAFLFGLELIICGLEKQLKCESGGPAGGGSESTPIQQLLEHFLRQLQRKDPHGFFAFPVTDAIAPGYSMIIKHPMDFGTMKDKIVANEYKSVTEFKADFKLMCDNAMTYNRPDTVYYKLAKKILHAGFKMMSTSGGGSKRPAATKKAGQAKKKKSR

ABE8e-SpG:

SV40 NLS
ABE8e
SpG Cas9 nickase

MKRTADGSEFESPKKKRKVSEVEFSHEYWMRHALTLAKRARDEREVPVGAVLVLNNR
VIGEGWNRAIGLHDPTAHAEIMALRQGGLVMQNYRLIDATLYVTFEPCVMCAGAMIHS
RIGRVVFGVRNSKRGAAGSLMNVLNYPGMNHRVEITEGILADECAALLCDFYRMPRQV
FNAQKKAQSSINSGGSSGGSSGSETPGTSESATPESSGGSSGGSDKKYSIGLAIGTNSVGW
AVITDEYKVPSKKFKVLGNTDRHSIKKNLIGALLFDSGETAEATRLKRTARRRYTRRKN
RICYLQEIFSNEMAKVDDSFFHRLEESFLVEEDKKHERHPIFGNIVDEVAYHEKYPTIYHL
RKKLVDSTDKADLRLIYLALAHMIKFRGHFLIEGDLNPDNSDVDKLFIQLVQTYNQLFEE
NPINASGVDAKAILSARLSKSRRLENLIAQLPGEKKNGLFGNLIALSLGLTPNFKSNFDLA
EDAKLQLSKDTYDDDLDNLLAQIGDQYADLFLAAKNLSDAILLSDILRVNTEITKAPLSA
SMIKRYDEHHQDLTLLKALVRQQLPEKYKEIFFDQSKNGYAGYIDGGASQEEFYKFIKPI
LEKMDGTEELLVKLNREDLLRKQRTFDNGSIPHQIHLGELHAILRRQEDFYPFLKDNREK
IEKILTFRIPYYVGPLARGNSRFAWMTRKSEETITPWNFEEVVDKGASAQSFIERMTNFD
KNLPNEKVLPKHSLLYEYFTVYNELTKVKYVTEGMRKPAFLSGEQKKAIVDLLFKTNR
KVTVKQLKEDYFKKIECFDSVEISGVEDRFNASLGTYHDLLKIIKDKDFLDNEENEDILE
DIVLTLTLFEDREMIEERLKTYAHLFDDKVMKQLKRRRYTGWGRLSRKLINGIRDKQSG
KTILDFLKSDGFANRNFMQLIHDDSLTFKEDIQKAQVSGQGDSLHEHIANLAGSPAIKKG
ILQTVKVVDELVKVMGRHKPENIVIEMARENQTTQKGQKNSRERMKRIEEGIKELGSQI
LKEHPVENTQLQNEKLYLYYLQNGRDMYVDQELDINRLSDYDVDHIVPQSFLKDDSID
NKVLTRSDKNRGKSDNVPSEEVVKKMKNYWRQLLNAKLITQRKFDNLTKAERGGLSE
LDKAGFIKRQLVETRQITKHVAQILDSRMNTKYDENDKLIREVKVITLKSKLVSDFRKDF
QFYKVREINNYHHAHDAYLNAVVGTALIKKYPKLESEFVYGDYKVYDVRKMIAKSEQE
IGKATAKYFFYSNIMNFFKTEITLANGEIRKRPLIETNGETGEIVWDKGRDFATVRKVLS
MPQVNIVKKTEVQTGGFSKESILPKRNSDKLIARKKDWDPKKYGGFLWPTVAYSVLVV
AKVEKGKSKKLKSVKELLGITIMERSSFEKNPIDFLEAKGYKEVKKDLIIKLPKYSLFELE
NGRKRMLASAKQLQKGNELALPSKYVNFLYLASHYEKLKGSPEDNEQKQLFVEQHKH
YLDEIIEQISEFSKRVILADANLDKVLSAYNKHRDKPIREQAENIIHLFTLTNLGAPAAFKY
FDTTIDRKQYRSTKEVLDATLIHQSITGLYETRIDLSQLGGDSGPKKKRKV

tCRBN-VPR-1:

SV40 NLS
tCRBN
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSLKDDSLPSNPIDFSYRVAACLPIDDVLRIQLLKIGSAIQRLR
CELDIMNKCTSLCCKQCQETEITTKNEIFSLSLCGPMAAYVNPHGYVHETLTVYKACNL
NLIGRPSTEHSWFPGYAWTVAQCKICASHIGWKFTATKKDMSPQKFWGLTRSALLPTIP
DTEDEISPDKVILCLGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDFDL
DMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYETFK
SIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSGQI
SQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQAG
EGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTTEP
MLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLGSGSG
SRDSREGMFLPKPEAGSAISDVFEGREVCQPKRIRPFHPPGSPWANRPLPASLAPTPTGPV
HEPVGSLTPAPVPQPLDPAPAVTPEASHLLEDPDEETSQAVKALREMADTVIPQKEEAAI

CGQMDLSHPPPRGHLDELTTTLESMTEDLNLDSPLTPELNEILDTFLNDECLLHAMHIST
GLSIFDTSLFTSGGGSKRPAATKKAGQAKKKKSR

tCRBN-VPR-2:

SV40 NLS
tCRBN
VPR
Nucleoplasmin NLS

MPKKKRKVGGGSPGGGGSMAGEGDQQDAAHNMGNHLPLLPESEEEDEMEVEDQDSK
EAKKPNIINFDTSLPTSHTYLGADMEEFHGRTLHDDDSCQVIPVLPQVMMILIPGQTLPL
QLFHPQEVSMVRNLIQKDRTFAVLAYSNVQEREAQFGTTAEIYAYREEQDFGIEIVKVK
AIGRQRFKVLELRTQSDGIQQAKVQILPECVLPAETLMDRIKKQLREWDENLKDDSLPSN
PIDFSYRVAACLPIDDVLRIQLLKIGSAIQRLRCELDIMNKCTSLCCKQCQETEITTKNEIF
SLSLCGPMAAYVNPHGYVHETLTVYKACNLNLIGRPSTEHSWFPGYAWTVAQCKICAS
HIGWKFTATKKDMSPQKFWGLTRSALLPTIPDTEDEISPDKVILCLGGGSRADPKKKRK
VEASGSGRADALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLDMLGSDALDDFDLD
MLINSRSQYLPDTDDRHRIEEKRKRTYETFKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASV
PKPAPQPYPFTSSLSTINYDEFPTMVFPSGQISQASALAPAPPQVLPQAPAPAPAPAMVSA
LAQAPAPVPVLAPGPPQAVAPPAPKPTQAGEGTLSEALLQLQFDDEDLGALLGNSTDPA
VFTDLASVDNSEFQQLLNQGIPVAPHTTEPMLMEYPEAITRLVTGAQRPPDPAPAPLGAP
GLPNGLLSGDEDFSSIADMDFSALLGSGSGSRDSREGMFLPKPEAGSAISDVFEGREVCQ
PKRIRPFHPPGSPWANRPLPASLAPTPTGPVHEPVGSLTPAPVPQPLDPAPAVTPEASHLL
EDPDEETSQAVKALREMADTVIPQKEEAAICGQMDLSHPPPRGHLDELTTTLESMTEDL
NLDSPLTPELNEILDTFLNDECLLHAMHISTGLSIFDTSLFTSGGGSKRPAATKKAGQAKK
KKSR

BRD4^{BD2}-VP64-p65

SV40 NLS
BRD4^{BD2}
VP64-p65

MPKKKRKVGGGSPGGGGSSKVSEQLKCCSGILKEMFAKKHAAYAWPFYKPVDVEALG
LHDYCDIIKHPMDMSTIKSKLEAREYRDAQEFGADVRLMFSNCYKYNPPDHEVVAMAR
KLQDVFEMRFAKMPDGGGSRADPKKKRKVEASGSGRADALDDFDLDMLGSDALDDF
DLDMLGSDALDDFDLDMLGSDALDDFDLDMLINSRSQYLPDTDDRHRIEEKRKRTYET
FKSIMKKSPFSGPTDPRPPPRRIAVPSRSSASVPKPAPQPYPFTSSLSTINYDEFPTMVFPSG
QISQASALAPAPPQVLPQAPAPAPAPAMVSALAQAPAPVPVLAPGPPQAVAPPAPKPTQ
AGEGTLSEALLQLQFDDEDLGALLGNSTDPAVFTDLASVDNSEFQQLLNQGIPVAPHTT
EPMLMEYPEAITRLVTGAQRPPDPAPAPLGAPGLPNGLLSGDEDFSSIADMDFSALLTTN
PG

Fluc:

Fluc
PEST Tag

MEDAKNIKKGPAPFYPLEDGTAGEQLHKAMKRYALVPGTIAFTDAHIEVDITYAEYFEM
SVRLAEAMKRYGLNTNHRIVVCSENSLQFFMPVLGALFIGVAVAPANDIYNERELLNSM
GISQPTVVFVSKKGLQKILNVQKKLPIIQKIIIMDSKTDYQGFQSMYTFVTSHLPPGFNEY
DFVPESFDRDKTIALIMNSSGSTGLPKGVALPHRTACVRFSHARDPIFGNQIIPDTAILSVV
PFHHGFGMFTTLGYLICGFRVVLMYRFEEELFLRSLQDYKIQSALLVPTLFSFFAKSTLID
KYDLSNLHEIASGGAPLSKEVGEAVAKRFHLPGIRQGYGLTETTSAILITPEGDDKPGAV
GKVVPFFEAKVVDLDTGKTLGVNQRGELCVRGPMIMSGYVNNPEATNALIDKDGWLH
SGDIAYWDEDEHFFIVDRLKSLIKYKGYQVAPAELESILLQHPNIFDAGVAGLPDDDAGE
LPAAVVVLEHGKTMTEKEIVDYVASQVTTAKKLRGGVVFVDEVPKGLTGKLDARKIRE
ILIKAKKGGKIAVGSTGSSHGFPPEVEEQDDGTLPMSCAQESGMDRHPAACASARINV

Helf1a-BFP:

EBFP2

MVSKGEELFTGVVPILVELDGDVNGHKFSVRGEGEGDATNGKLTLKFICTTGKLPVPWP
TLVTTLSHGVQCFARYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGTYKTRAEVKFEG
DTLVNRIELKGVDFKEDGNILGHKLEYNFNSHNIYIMAVKQKNGIKVNFKIRHNVEDGS
VQLADHYQQNTPIGDGPVLLPDSHYLSTQSVLSKDPNEKRDHMVLLEFRTAAGITLGM
DELYK

EYFP:

MVSKGEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWP
TLVTTFGYGLQCFARYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEG
DTLVNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKVNFKIRHNIEDGSV
QLADHYQQNTPIGDGPVLLPDNHYLSYQSKLSKDPNEKRDHMVLLEFVTAAGITLGMD
ELYK

TRE-BFP:

TagBFP

MSELIKENMHMKLYMEGTVDNHHFKCTSEGEGKPYEGTQTMRIKVVEGGPLPFAFDIL
ATSFLYGSKTFINHTQGIPDFFKQSFPEGFTWERVTTYEDGGVLTATQDTSLQDGCLIYN
VKIRGVNFTSNGPVMQKKTLGWEAFTETLYPADGGLEGRNDMALKLVGGSHLIANIKT
TYRSKKPAKNLKMPGVYYVDYRLERIKEANNETYVEQHEVAVARYCDLPSKLGH

TRE3G-Dre:

SV40 NLS
HA Tag
Dre

MPKKKRKVYPYDVPDYAGSSELIISGSSGGFLRNIGKEYQEAAENFMRFMNDQGAYAP
NTLRDLRLVFHSWARWCHARQLAWFPISPEMAREYFLQLHDADLASTTIDKHYAMLN
MLLSHCGLPPLSDDKSVSLAMRRIRREAATEKGERTGQAIPLRWDDLKLLDVLLSRSER
LVDLRNRAFLFVAYNTLMRMSEISRIRVGDLDQTGDTVTLHISHTKTITTAAGLDKVLSR
RTTAVLNDWLDVSGLREHPDAVLFPPIHRSNKARITTTPLTAPAMEKIFSDAWVLLNKR
DATPNKGRYRTWTGHSARVGAAIDMAEKQVSMVEIMQEGTWKKPETLMRYLRRGGV
SVGANSRLMDS

TRE3G-Cre:

SV40 NLS
Cre

MPKKKRKVNLLTVHQNLPALPVDATSDEVRKNLMDMFRDRQAFSEHTWKMLLSVCRS
WAAWCKLNNRKWFPAEPEDVRDYLLYLQARGLAVKTIQQHLGQLNMLHRRSGLPRPS
DSNAVSLVMRRIRKENVDAGERAKQALAFERTDFDQVRSLMENSDRCQDIRNLAFLGI
AYNTLLRIAEIARIRVKDISRTDGGRMLIHIGRTKTLVSTAGVEKALSLGVTKLVERWISV
SGVADDPNNYLFCRVRKNGVAAPSATSQLSTRALEGIFEATHRLIYGAKDDSGQRYLA
WSGHSARVGAARDMARAGVSIPEIMQAGGWTNVNIVMNYIRNLDSETGAMVRLLEDG
DPKKKRKV

Sequences S2. Sequences of primers used for plasmid cloning in this study.

Aim	Name	Sequence (5’ to 3’)
GAL4-VHL	GAL4-F-d270	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-VHL	GAL4-R-d270	ATAGGTCTCTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-VHL	VHL-F-d270	TAGTAGGTCTCAATCGGGTGGCGGCTCAATGCCCCGGAGGGCGGAGAACTGGG
GAL4-VHL	VHL-R-d270	TAGTAGGTCTCATAGTGGCAATCAATCTCCCATCCGT
TRIM24-VPR	TRIM24-1-F	TAGTGGTCTCACTCAGGTACCTCTAGAAGATCTAGGACAATGGAGGTGGCGGTGGAG
TRIM24-VPR	TRIM24-1-R	TAGTAGGTCTCACGGAGTCTCGGCCGAGCCCAGCATGGGCGCGGGCAG
TRIM24-VPR	TRIM24-2-F	TAGTAGGTCTCATCCGCCACCCGTCCCTG
TRIM24-VPR	TRIM24-m-R	AGTAGGTCTCACATTCTAGGGTTTGGTAAACCCACAGGTGCTGGCC
TRIM24-VPR	TRIM24-m-F	TAGTAGGTCTCAAATGCAGGGGCCCATCCAGCA
TRIM24-VPR	TRIM24-2-R-c	TAGGTCTCACACCGCTAGCTGGCCAGGATCCCTGCAGGGTGATATCGGGCGGCCGCT
TRIM24-VPR	VPR-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG
TRIM24-VPR	VPR(L)-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
BRD4-VPR	BRD4-Front-F	AGGTCTCACTCAATGTCTGCGGAGAGCGGCCCTGGGACGAGATTGAGAAATCTGCCAGT
BRD4-VPR	BRD4-front-R	TAGTGGTCTCACACCAGCGGGACCTGTTTCGGAGTCTTCGCTGTCAGAGGAGCTGGACT
BRD4-VPR	VPR-behind-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG

BRD4-VPR	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
GAL4-tALK	GAL4-F-d270	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-tALK	GAL4-R-d270	ATAGGTCTCTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-tALK	ALK-1-F-d351-c	TATAGTGGTCTCAATCGGGTGGCGGCTCACGCACCTCGACCATCATGACCG
GAL4-tALK	ALK-1-R-d351	TATAGGTCTCAGAGGAAGGACTTGAGATCTCCCCCCGCCATGAGCTCCA
GAL4-tALK	ALK-2-F-d351	TAGTACGGTCTCACCTCCGAGAAACCCGCCCTCGCCCGAGCCAGCCCTCCTCC
GAL4-tALK	ALK-2-R-d351	TAGTAGGTCTCATAGTTTTCTCTTCCTCTTCCACAAGTGGACCATATTCTATCGGC
VHL-VPR	VHL-front-F	TAGTAGGTCTCACTCAATGCCCCGGAGGGCGGAGAACTGGG
VHL-VPR	VHL-front-F	TAGTAGGTCTCACACCATCTCCCATCCGTTGATGTGCAATGCGCTCCT
VHL-VPR	VPR-behind-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG
VHL-VPR	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
GAL4-BRD9	GAL4-F	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-BRD9	GAL4-R	ATAGGTCTCTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-BRD9	BRD9-1-F	TAGTAGGTCTCAATCGGGTGGCGGCTCAATGGGCAAGAAGCACAAGAAGCACA
GAL4-BRD9	BRD9-R	TAGTAGGTCTCATAGTGGTCTTGGCAGAGGCCGCAGGCTCTGGAGACTGAAGAAAC
GAL4-BRD4	BRD4-behind-F-c	TAGTAGGTCTCAGGTGGCGGCTCAATGTCTGCGGAGAGCGGCCCTGGGACGAGATTGAG

GAL4-BRD4	BRD4-behind-R-c	AGATGGTCTCATAGTAGCGGGACCTGTTTCGGAGTCTTCGCTGTCAGAGGAGCTGGACT
GAL4-BRD4	GAL4-front-F	AGTAGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-BRD4	GAL4-front-R	TAGTAGGTCTCACACCCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-ABI	ABI-F	TAGTAGGTCTCAGGTGGCGGCTCAATGGTGCCTTTGTATGGTTTTACT
GAL4-ABI	ABI-R	TAGTAGGTCTCATAGTTAGCTTCTTCAAATCAACCACCACC
GAL4-ABI	GAL4-front-F	AGTAGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-ABI	GAL4-front-R	TAGTAGGTCTCACACCCGATACAGTCAACTGTCTTTGACCTTTGTTACT
PYL-VPR	PYL-F	TAGTAGGTCTCACTCAGCGCCAACTCAAGACGA
PYL-VPR	VPR(L)-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
GAL4-FKBP3	FKBP3-F	TATAGTAGGTCTCAATCGGGTGGCGGCTCAAGCCCCAAGTACACCAAGAGC
GAL4-FKBP3	FKBP3-R	TAGTAGGTCTCATAGTGTCGATGTCCACCAGCTCCACCTCA
GAL4-FKBP3	GAL4-F	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-FKBP3	GAL4-R	ATAGGTCTCTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-FKBP12	GAL4-front-F	AGTAGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-FKBP12	GAL4-front-R	TAGTAGGTCTCACACCCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-FKBP12	FKBP12F36V-behind-F	TAGTAGGTCTCAGGTGGCGGCTCAATGGGAGTGCAGGTGGAAACC

GAL4-FKBP12	FKBP12F36V-behind-R	TAGTAGGTCTCATAGTTTCCAGTTTTAGAAGCTCCACATCGAAGACG
FRB-VPR	FRB-F	TAATGTGGTCTCACTCATCGAGCATCCTGTGGCA
FRB-VPR	FRB-R	TAGTAGGTCTCACACCGCTGATCCTCCTGAACACGTGGT
FRB-VPR	VPR-behind-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG
FRB-VPR	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
TRIM24^{BD}-VPR	TRIM-F	TAGTAGGTCTCACTCACCCAATGAGGACTGGTGTGC
TRIM24^{BD}-VPR	TRIM-R	TAGTAGGTCTCACACCTGGATAGAGGTTCTTTAGAAGTTCTTCA
TRIM24^{BD}-VPR	VPR(L)-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
TRIM24^{BD}-VPR	VPR-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG
BRD4^{BD1}-VPR	BRD4-BD1-F	TAGTAGGTCTCACTCAAACCCCCCGCCCCCAGAGACTT
BRD4^{BD1}-VPR	VPR-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
BRD4^{BD2}-VPR	BRD4-BD2-F	TATAGGTCTCACTCAAGCAAGGTGTCGGAGCAGC
BRD4^{BD2}-VPR	VPR-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
GAL4-BRD9^{BD}	GAL4-F	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
GAL4-BRD9^{BD}	GAL4-R	ATAGGTCTCTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
GAL4-BRD9^{BD}	tBRD9-F	TAGTAGGTCTCAATCGGGTGGCGGCTCAGAGAGCACACCTATTCAGCAACTCCT

GAL4-BRD9^{BD}	tBRD9-R	TAGTGGTCTCATAGTGCTCATCATCTTAAAGCCTGCGTGAAGGATCTTCT
pUAS-2-Fluc	UAS-F	AGCGAGGTCTCACTATTGCAGGCGATAGGTACCGAG
pUAS-2-Fluc	UAS-R	AGCGAGGTCTCAAAGCGCGCCCAGTACCGGAATG
pUAS-2-Fluc	Fluc-F	TAGTAGGTCTCAGCTTGGCAATCCGGTACTGT
pUAS-2-Fluc	Luci-R	TATAGGTCTCAATCCCACGGCGATCTTGCCGCCCTTCTTGG
pUAS-2-Fluc	PEST-R	ATAGGGTCTCATAGTTACACATTGATCCTAGCAGAAGCACAGGCTGCAGGGTGACG
pUAS-2-Fluc	PEST-F	TAGGGTCTCAGGATCCACCGGATCTAGCCATGGCTTCCCGCCGGAGGTGGAGGAGCAGG
TRE-EYFP	EYFP-F	TAGTAGGTCTCAGCTTATGGTGAGCAAGGGCGAGGAGCTGTTCACCGGGGT
TRE-EYFP	EYFP-R	ATACGTAGGTCTCATAGTTTACTTGTACAGCTCGTCCATGCC
TRE-EYFP	TRE-F	AGCGAGGTCTCACTCATTGTATAGAAAAGTTGGCTCCGAA
TRE-EYFP	TRE-R	AGCGAGGTCTCAAAGCCGACCGGTAATCAGCCTGC
pUAS-1-Dre	UAS-F	TAGTAGGTCTCACTCAGCAGTTTATGGCGGGCGT
pUAS-1-Dre	569-6-1-R	TAGTAGGTCTCAGGTCCCGACATGGTGGCTCAGC
pUAS-1-Dre	dre-R	TAGTAGGTCTCATAGTGCCACAATCAGCTATCCATCAGTCGAGAATTGGCTCCCACGG
pUAS-1-Dre	dre-F	TAGTGGTCTCAGACCATGCCTAAGAAGAAGAGGAAGGTTTACCCATACGATGTTCCAGA
TRE3G-Cre	TRE-3G-R	TAGTAGGTCTCAGGTCACTTTACGAGGGTAGGAAGTGGTACG
TRE3G-Cre	TRE3G-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG

TRE3G-Cre	TRE-cre-F	AGGTCTCAGACCATGCCAAAGAAGAAGCGGAAGGTCAATTTACTGACCGTACACCAAAA
TRE3G-Cre	CreNLS-R-ACTA	TAGGTCTCATAGTTTAGACCTTCCGCTTCTTCTTATCGCCATCTTCCAGCAGGCGCACC
TRE3G-Dre	TRE-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG
TRE3G-Dre	Dre-R	TAGTAGGTCTCATAGTGCCACAATCAGCTATCCATCAGTCGAGAATTGGCTCCCACGG
TRE3G-LoxP-STOP-LoxP-Cre	CreNLS-R-ACTA	TAGGTCTCATAGTTTAGACCTTCCGCTTCTTCTTATCGCCATCTTCCAGCAGGCGCACC
TRE3G-LoxP-STOP-LoxP-Cre	TRE-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG
TRE3G-LoxP-STOP-LoxP-Cre	TRE3G-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG
TRE3G-LoxP-STOP-LoxP-Cre	TRE-3G-R	TAGTAGGTCTCAGGTCACTTTACGAGGGTAGGAAGTGGTACG
TRE3G-LoxP-STOP-LoxP-Cre	A3G-1-F	TAGTAGGTCTCAGACCTAGAGATCCGCGGCCGC
TRE3G-LoxP-STOP-LoxP-Cre	A3G-m-R	TAGTAGGTCTCAGTTTCGTGTCTGCCCCGCA
TRE3G-LoxP-STOP-LoxP-Cre	A3G-m-F	TAGTAGGTCTCAAAACCTACCTGTGCTATGAGGTGGAGCGGATGCACAACG
TRE3G-LoxP-STOP-LoxP-Cre	A3G-2-R	TAGTAGGTCTCACCTTTTTCTGCTCGCCGCTCAGGAAGGCGGGCT
TRE3G-LoxP-STOP-LoxP-Cre	A3G-3-F	TAGTAGGTCTCAAAGGCCATCGTGGACCTGCTGT
TRE3G-LoxP-STOP-LoxP-Cre	A3G-3-R	TAGTAGGTCTCATAGTAGGCACAGTCGAGGCTGA
TRE3G-ABE8e-SpG	TRE3G-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG
TRE3G-ABE8e-SpG	TRE-3G-R-GACC	TAGTAGGTCTCAGGTCACTTTACGAGGGTAGGAAGTGGTACG

TRE3G-ABE8e-SpG	ABE(TRE-F)-gacc	TATGTGGTCTCAGACCGGAGAGCCGCCACCATGA
TRE3G-ABE8e-SpG	SpG-1-R	TATGAGGTCTCACCACGTACATATCCCGCCCATTCTGCAGG
TRE3G-ABE8e-SpG	SpG-2-F	TAGTGGTCTCAGTGGACCAGGAACTGGACATCAACCGGC
TRE3G-ABE8e-SpG	SpG-2-R	TAGTGGTCTCATAGTTTAGACTTTCCTCTTCTTCTTGGGGCCGCTGTCACCTCCCA
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	TRE3G-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	TRE-3G-R-GACC	TAGTAGGTCTCAGGTCACTTTACGAGGGTAGGAAGTGGTACG
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	loxP-F	TAAGTAGGTCTCAGACCGGTCGACCCGCCACCAA
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	loxP-R	TAGTAGGTCTCATGGGCTGCAGGTCGAGG
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	ABE-F	TAGTAGGTCTCACCCAAGCCGCCACCATGAAACG
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	SpG-1-R	TATGAGGTCTCACCACGTACATATCCCGCCCATTCTGCAGG
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	SpG-2-F	TAGTGGTCTCAGTGGACCAGGAACTGGACATCAACCGGC
TRE3G-LoxP-STOP-LoxP-ABE8e-SpG	SpG-2-R	TAGTGGTCTCATAGTTTAGACTTTCCTCTTCTTCTTGGGGCCGCTGTCACCTCCCA
TRE3G-PE2	TRE3G-R	TAGTAGGTCTCAGGTCACTTTACGAGGGTAGGAAGTGGTACG
TRE3G-PE2	TRE3G-F	TAGTAGGTCTCACTCATTCGTCTTCAAGAATTCCTCGAG

TRE3G-PE2	Protac-PE-F	TAGTAGGTCTCAGACCATGAAACGGACAGCCGACGGAAGCGAGTT
TRE3G-PE2	Cas9-SpG-R	ATGATGGTCTCATCATGATGTTGCTGTAGAAGAAGTACTTGGCGGTAGC
TRE3G-PE2	Cas9-SpG-F	AGTAGGTCTCAATGAACTTTTTCAAGACCGAGATTACCCTGGCC
TRE3G-PE2	PE-1-R	TAGTAGGTCTCAGTCTCATGTAGCCGATACTCA
TRE3G-PE2	PE-2-F	TAGTAGGTCTCAAGACTTCAAAAGAGCCAGATGTTTCTCTAGGGTCCACATGGCT
TRE3G-PE2	PE-4-R	TAGTAGGTCTCATAGTAAGGCACAGTCGAGGCTGA
microdeleted Cre	Cre-F	ATAGTGGTCTCACTCAATGAATTTACTGACCGTACACCAAAATTTGCCTGC
microdeleted Cre	Cre-deletion-1-R	ACCAGGTTCGTTCACTCATGGAAAATAGCGATCGCTGCCAGGATA
microdeleted Cre	Cre-deletion-2-F	TAGTAGGTCTCAGATACGTAATCTGGCATTTCTGGGGATTGCTT
microdeleted Cre	Cre-R	ACTAGGTCTCTTAGTTTAGACTTTCCGCTTCTTCTTTGGATCGCCATCTTCCAGCAGGC
cre pegRNA	his6-U6-F	AGTGGTCTCACTCATGATAGTAGGAGGCTTGGTAGGT
cre pegRNA	His6-U6-R	TAGTAGGTCTCCCGGTGTTTCGTCCTTTCCA
His pegRNA	his6-U6-F	AGTGGTCTCACTCATGATAGTAGGAGGCTTGGTAGGT
His pegRNA	His6-U6-R	TAGTAGGTCTCCCGGTGTTTCGTCCTTTCCA
Virus a	EFS-F	CTCAGGTCTCACTATATTTGGCTCCGGTGCCCGTCAGTGGGCAGAGCG
Virus a	EFS-R	TAGTAGGTCTCATACCTGTGTTCTGGCGGCA
Virus a	VHL-R-d550	AGTGGGTCTCAACGGGAAAGCTGGGTAGATCAGT
Virus a	GAL4-F	TAGTAGGTCTCAGGTACACCGGTGCCACCATGC
Virus a	CMV-R57	TAGTAGGTCTCAGCAGAAGTGGGTTCTCTAGTTAGCC

Virus a	CMV-For-d459-v2	CTCAGGTCTCACCGTACGTATGTTCCCATAGTAACGCC
Virus a	P65-R	TAGTGGTCTCATAGTCAACAGGGCGCTAAAATCCATGTCGGCGATTGA
Virus a	BD2-F	TATAGGTCTCACTGCCACCGGTGCCACCATGC
Virus a	P65-R	TAGTGGTCTCATAGTCAACAGGGCGCTAAAATCCATGTCGGCGATTGA
Virus a	BD2-F	TATAGGTCTCACTGCCACCGGTGCCACCATGC
pUAS-1-EYFP	mini3G-F	TAGTAGGTCTCAGACTGGCGTGTACGGTGGGCGCCT
pUAS-1-EYFP	EYFP-R	ATACGTAGGTCTCATAGTTTACTTGTACAGCTCGTCCATGCC
Plasmids in SI	GAL4-F	TAGCATGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
Plasmids in SI	GAL4-R	TAGTAGGTCTCAAGCCCGATACAGTCAACTGTCTTTGACCTTTGTTACT
Plasmids in SI	ikzf1-F	TAGTAGGTCTCAGGCTCAGGCTCAATGGATGCTGATGAGGGTCAAGA
Plasmids in SI	ikzf1-R	TAGTAGGTCTCATAGTGCTCATGTGGAAGCGGTGCTCCCCT
Plasmids in SI	IZKF3-F	ATAGGTCTCAGGCTCAGGCTCAATGGAAGATATACAAACAAATGCGGAACTGAAAAGCA
Plasmids in SI	izkf3-R	TAGTAGGTCTCATAGTCTTCAGCAGGGCTCTGTGTTCTCCT
Plasmids in SI	GAL4-F	TAGCATGGTCTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
Plasmids in SI	GAL4-R	TAGTAGGTCTCATAGTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
Plasmids in SI	ikzf1-F	TAGTAGGTCTCACTCAATGGATGCTGATGAGGGTCAAGA
Plasmids in SI	ikzf1-R	TAGTAGGTCTCATCATTGAGCCTGAGCCGCTCATGTGGAAGCGGTGCTCCCCT

Plasmids in SI	IZKF3-F	TAGTAGGTCTCACTCAATGGAAGATATACAAACAAATGCGGAACTGAAAAGCACTCA
Plasmids in SI	izkf3-R	TAGTAGGTCTCATCATTGAGCCTGAGCCCTTCAGCAGGGCTCTGTGTTCTCCT
Plasmids in SI	CRBN-behind-F	AGGTCTCAGGTGGCGGCTCAATGGCCGGCGAAGGAGATCAGCAGGACGCTGCGCACAAC
Plasmids in SI	CRBN-behind-R	TAGTGGTCTCATAGTCAAGCAAAGTATTACTTTGTCTGGACTTATTTCA
Plasmids in SI	CRBN-Front-F	TAGTAGGTCTCACTCAATGGCCGGCGAAGGAGATCAGCAGGACGCTGCGCACAAC
Plasmids in SI	CRBN-Front-R	TAGTGGTCTCACACCCAAGCAAAGTATTACTTTGTCTGGACTTATTTCA
Plasmids in SI	FKBP12F36V-behind-F	TAGTAGGTCTCAGGTGGCGGCTCAATGGGAGTGCAGGTGGAAACC
Plasmids in SI	FKBP12F36V-behind-R	TAGTAGGTCTCATAGTTTCCAGTTTTAGAAGCTCCACATCGAAGACG
Plasmids in SI	FKBP12F36V-front-F	TATAGTGGTCTCACTCAATGGGAGTGCAGGTGGAAACC
Plasmids in SI	FKBP12F36V-front-R	TAGTAGGTCTCACACCTTCCAGTTTTAGAAGCTCCACATCGAAGACG
Plasmids in SI	GAL4-behind-F	TAGTAGGTCTCAGGTGGCGGCTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
Plasmids in SI	GAl4-behind-R	TAGTAGGTCTCATAGTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
Plasmids in SI	GAL4-front-F	AGTAGGTCTCACTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
Plasmids in SI	GAL4-front-R	TAGTAGGTCTCACACCCGATACAGTCAACTGTCTTTGACCTTTGTTACT
Plasmids in SI	VPR-front-F	TAGTAGGTCTCACTCAAGAGCTGACCCCAAGAAGAAGAG
Plasmids in SI	VPR-front-R	TAGGGTCTCACACCAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT

Plasmids in SI	VPR-behind-F	TAGTAGGTCTCAGGTGGCGGGTCGAGAGCTGACCCCAAGAAGAAGAG
Plasmids in SI	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
BRD9^{BD}-GAL4	d565-GAL4-F	TAGTAGGTCTCAGGTGGCGGCTCAATGAAGCTACTGTCTTCTATCGAACAAGCA
BRD9^{BD}-GAL4	GAL4-R	TAGTAGGTCTCATAGTCGATACAGTCAACTGTCTTTGACCTTTGTTACT
BRD9^{BD}-GAL4	BRD9BD-F	TAGTAGGTCTCACTCAGAGAGCACACCTATTCAGCAACTCCT
BRD9^{BD}-GAL4	BRD9D-R	TAGTAGGTCTCACACCGCTCATCATCTTAAAGCCTGCGTGAAGGATCT
TetR-FKBP12^{F36V}	tetR-1-F	TAGTGGTCTCACTCAATGAGTCGGCTGGATAAATCTAAAGTCATAAACTCTGCTCTGGA
TetR-FKBP12^{F36V}	tetR-1-R	TAGTAGGTCTCACGGTGGTAGGTGTCTCTCTTTCCT
TetR-FKBP12^{F36V}	tetR-2-F	TAGTAGGTCTCAACCGATTCTATGCCACCACTTCTGAGACAAGCA
TetR-FKBP12^{F36V}	tetR-2-R	TAGTGGTCTCACGATACTGAGCCGCCACCGGCCGGCCCGCCGCTTTCGCACTT
TetR-FKBP12F^{36V}	FKBP12F36V-behind-F	TAGTAGGTCTCAGGTGGCGGCTCAATGGGAGTGCAGGTGGAAACC
TetR-FKBP12^{F36V}	FKBP12F36V-behind-R	TAGTAGGTCTCATAGTTTCCAGTTTTAGAAGCTCCACATCGAAGACG
TetR-BRD9^{BD}	tetR-1-F	TAGTGGTCTCACTCAATGAGTCGGCTGGATAAATCTAAAGTCATAAACTCTGCTCTGGA
TetR-BRD9^{BD}	tetR-1-R	TAGTAGGTCTCACGGTGGTAGGTGTCTCTCTTTCCT
TetR-BRD9^{BD}	tetR-2-F	TAGTAGGTCTCAACCGATTCTATGCCACCACTTCTGAGACAAGCA
TetR-BRD9^{BD}	tetR-2-R	TAGTGGTCTCACGATACTGAGCCGCCACCGGCCGGCCCGCCGCTTTCGCACTT

TetR-BRD9^{BD}	tBRD9-behind-F	TAGTAGGTCTCAGGTGGCGGCTCAGAGAGCACACCTATTCAGCAACTCCT
TetR-BRD9^{BD}	tBRD9-behind-R	TAGTGGTCTCATAGTGCTCATCATCTTAAAGCCTGCGTGAAGGATCTTCT
tCRBN-1-VPR	CRBN-v7-F-c55	GATATGGTCTCACTCACTAAAAGATGATTCTCTTCCTTCAAATCCA
tCRBN-1-VPR	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
tCRBN-2-VPR	CRBN-2-F-d420	TAGTAGGTCTCAAATGGACAGAATCAAGAAACAGCTACGTGAATGGGATGA
tCRBN-2-VPR	VPR-behind-R	TAGGGTCTCATAGTAAACAAACTTGTGTCAAATATACTCAGCCCGGTGCTGATGTGCAT
tCRBN-2-VPR	CRBN-1-R-d420	TAGTAGGTCTCACATTAAGGTTTCAGCAGGCAACACACATTCGGGAA
tCRBN-2-VPR	CRBN-Front-F	TAGTAGGTCTCACTCAATGGCCGGCGAAGGAGATCAGCAGGACGCTGCGCACAAC

Sequences S3. DNA sequences of micro-deleted *Cre* used in this study (5’ to 3’ direction).

^ Deleted region

SV40 NLS (underlined)

Micro-deleted *Cre*

Nucleoplasmin NLS

ATGCCAAAGAAGAAGCGGAAGGTCGGTGGCGGCTCACCCGGGGGTGGCGGCTCA
ATGAATTTACTGACCGTACACCAAAATTTGCCTGCATTACCGGTCGATGCAACGAGT
GATGAGGTTCGCAAGAACCTGATGGACATGTTCAGGGATCGCCAGGCGTTTTCTGAG
CATACCTGGAAAATGCTTCTGTCCGTTTGCCGGTCGTGGGCGGCATGGTGCAAGTTG
AATAACCGGAAATGGTTTCCCGCAGAACCTGAAGATGTTCGCGATTATCTTCTATAT
CTTCAGGCGCGCGGTCTGGCAGTAAAAACTATCCAGCAACATTTGGGCCAGCTAAA
CATGCTTCATCGTCGGTCCGGGCTGCCACGACCAAGTGACAGCAATGCTGTTTCACT
GGTTATGCGGCGGATCCGAAAAGAAAACGTTGATGCCGGTGAACGTGCAAAACAGG
CTCTAGCGTTCGAACGCACTGATTTCGACCAGGTTCGTTCACTCATGGAAAATAGCG
ATCGCTGCCAGGATA^CGTAATCTGGCATTTCTGGGGATTGCTTATAACACCCTGTTA
CGTATAGCCGAAATTGCCAGGATCAGGGTTAAAGATATCTCACGTACTGACGGTGG
GAGAATGTTAATCCATATTGGCAGAACGAAAACGCTGGTTAGCACCGCAGGTGTAG
AGAAGGCACTTAGCCTGGGGGTAACTAAACTGGTCGAGCGATGGATTTCCGTCTCTG
GTGTAGCTGATGATCCGAATAACTACCTGTTTTGCCGGGTCAGAAAAAATGGTGTTG
CCGCGCCATCTGCCACCAGCCAGCTATCAACTCGCGCCCTGGAAGGGATTTTTGAAG
CAACTCATCGATTGATTTACGGCGCTAAGGATGACTCTGGTCAGAGATACCTGGCCT
GGTCTGGACACAGTGCCCGTGTCGGAGCCGCGAGATATGGCCCGCGCTGGAGTT
TCAATACCGGAGATCATGCAAGCTGGTGGCTGGACCAATGTAAATATTGTCATGAAC
TATATCCGTAACCTGGATAGTGAAACAGGGGCAATGGTGCGCCTGCTGGAAGATGG
CGATCCAAAGAAGAAGCGGAAAGTCACTAGTGGTGGCGGCTCA*AAGCGTCCTGCTG*
*CTACTAAGAAAGCTGGTCAAGCTAAGAAAAAGAAA*TCTAGA

Sequences S4. DNA sequences of LoxP and Rox sites used in this study.

LoxP site (5’ to 3’ direction):
ATAACTTCGTATAGCATACATTATACGAAGTTAT

Rox site (5’ to 3’ direction):
TAACTTTAAATAATTGGCATTATTTAAAGTTA

Sequences S5. DNA sequences of pUAS promoters used in this study (5’ to 3’ direction).

pUAS-1:

5×GAL4 DBD binding sites
3G miniPromoter
CGGAGTACTGTCCTCCGAGCGGAGTACTGTCCTCCGAGCGGAGTACTGTCCTCCGAGCGGAGTACTGTCCTCCGAGCGGAGTTCTGTCCTCCGAGCGGAGACTCTAGACTGGCGTGTACGGTGGGCGCCTATAAAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCCTGGAGCAATTCCACAACACTTTTGTCTTATACCAACTTTCCGTACCACTTCCTACCCTCGTAAAGTGACC

pUAS-2:

8×GAL4 DBD binding sites
LateADE miniPromoter
CGATAGGTACCGAGTTTCTAGACGGAGTACTGTCCTCCGAGCGGAGTACTGTCCTCCGACTCGAGCGGAGTACTGTCCTCCGATCGGAGTACTGTCCTCCGCGAATTCCGGAGTACTGTCCTCCGAAGACGCTAGACGGAGTACTGTCCTCCGAGCGGAGTACTGTCCTCCGACTCGAGCGGAGTACTGTCCTCCGGCTAGCGGGGGCTATAAAGGGGGTGGGGGCGTTCGTCCTCACTCTAGATCTGCGATCTAAGTAAGCTTGGCATTCCGGTACTG

Supplementary Reference:

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