

PHASE 1: CRISPR/Cas9 KO Plasmid Transfection

This protocol is recommended for a single well from a 6-well tissue culture plate. Adjust cell and reagent amounts proportionately for wells or dishes of different sizes.

- In a 6-well tissue culture plate seed 1.5×10^5 – 2.5×10^5 cells in 3 ml of antibiotic-free standard growth medium per well, 24 hours prior to transfection. Grow cells to a 40-80% confluency. Initial cell seeding and cell confluency after 24 hours are determined based on the rate of cell growth of the cells used for transfection. Healthy and subconfluent cells are required for successful CRISPR/Cas9 KO Plasmid transfection.

- Prepare the following solutions:

NOTE: The optimal Plasmid DNA:UltraCruz® Transfection Reagent ratio should be determined experimentally beginning with 1 µg of Plasmid DNA and between 5-15 µl of UltraCruz® Transfection Reagent. Once the Transfection Reagent volume is optimized to minimize cell toxicity, Plasmid DNA concentrations can vary between 1-3 µg per well. If the optimal UltraCruz® Transfection Reagent volume is 10 µl, then Plasmid DNA concentrations ranging from 1-3 µg/10 µl should be tested. For example, test Plasmid DNA/UltraCruz® Transfection Reagent amounts: 1 µg/10 µl, 2 µg/10 µl, and 3 µg/10 µl. The appropriate amount of Plasmid DNA/UltraCruz® Transfection Reagent complex used per well should be tested to determine which amount provides the highest level of transfection efficiency.

NOTE: If transfecting more than one plasmid (i.e. CRISPR/Cas9 KO Plasmid with HDR Plasmid), mix plasmids at equivalent ratios.

Solution A: For each transfection, dilute 1-3 µg of Plasmid DNA into Plasmid Transfection Medium: sc-108062 to bring final volume to 150 µl. Pipette up and down to mix. Let stand for 5 minutes at room temperature.

Solution B: For each transfection, dilute 5-15 µl of UltraCruz® Transfection Reagent: sc-395739 with enough Plasmid Transfection Medium: sc-108062 to bring final volume to 150 µl. Pipette up and down to mix. Let stand for 5 minutes at room temperature.

NOTE: Do not add antibiotics to the Plasmid Transfection Medium: sc-108062.

- Add the Plasmid DNA solution (Solution A) dropwise directly to the dilute UltraCruz® Transfection Reagent (Solution B) using a pipette. Vortex immediately and incubate for no less than 20 minutes at room temperature.
- Prior to transfection, replace media with fresh antibiotic-free growth medium. Add the 300 µl Plasmid DNA/UltraCruz® Transfection Reagent Complex (Solution A + Solution B) dropwise to well.
- Gently mix by swirling the plate.
- Incubate the cells for 24-72 hours under conditions normally used to culture the cells. No media replacement is necessary during the first 24 hours post-transfection. Add or replace media as needed 24-72 hours post-transfection.
- After incubation, successful transfection of CRISPR/Cas9 KO Plasmid may be visually confirmed by detection of the green fluorescent protein (GFP) via fluorescent microscopy and/or Western blot with GFP Antibody (B-2): sc-9996. Successful co-transfection of the CRISPR/Cas9 KO Plasmid and HDR Plasmid, may be visually confirmed by detection of the red fluorescent protein (RFP) via fluorescent microscopy and/or Western blot.
- For cells transfected with CRISPR/Cas9 KO Plasmid, assay cells 48-72 hours after transfection step.
- For cells co-transfected with CRISPR/Cas9 KO Plasmid and HDR Plasmid go to Phase 2.

NOTE: If puromycin selection or Cre Vector transfection are not applicable see Phase 4.

PHASE 2: Puromycin Selection

NOTE: If cells were co-transfected with CRISPR/Cas9 KO Plasmid and HDR Plasmid, cells can be selected with media containing puromycin.

- The working puromycin concentration for mammalian cell lines ranges from 1-10 µg/ml. Prior to using the puromycin antibiotic (sc-108071), titrate the selection agent to determine the optimal concentration for target cell line. Use the lowest concentration that kills 100% of non-transfected cells in 3-5 days from the start of puromycin selection.

- 48-96 hours post-transfection, aspirate the medium and replace with fresh medium containing puromycin at the appropriate concentration.
- Select cells for a minimum of 3-5 days. Approximately every 2-3 days, aspirate and replace with freshly prepared selective media.
- Cells may be assayed at this point.
- For excision of the puromycin gene, proceed to Phase 3.

PHASE 3: Cre Vector Transfection

This protocol is recommended for selected cells co-transfected with CRISPR/Cas9 KO Plasmid and HDR Plasmid, and for the removal of genetic material flanked by LoxP sites.

NOTE: Follow Phase I Plasmid Transfection protocol for Cre Vector: sc-418923 transfection.

PHASE 4: Cell Assay

Complete phenotypic and/or genotypic analysis may require isolation of single cell colonies to confirm complete allelic knockouts.

- For protein analysis, change media to standard growth medium 3 days prior to cell lysis. To lyse adherent cells, aspirate media, rinse cells with PBS, scrape and centrifuge cells at low speed to obtain a cell pellet. For suspension cells, transfer the culture to a centrifuge tube and centrifuge cells at low speed to obtain a cell pellet. Wash once with PBS and centrifuge again. For 100% confluent HEK 293 or HeLa cells, add 100 µl of RIPA Lysis Buffer System: sc-24948 to the pellet. For other cell lines or confluencies, the amount of RIPA Lysis Buffer System to use should be determined experimentally. Sonicate or shear cells. Incubate sample on ice for 10 minutes, vortex, and incubate again for 10 minutes on ice. Spin cells at 10000 RPM for 20 minutes at 4° C. Use the BCA Protein Assay Kit: sc-202389 to determine protein concentration.

- For RT-PCR analysis isolate RNA using the method described by P. Chomczynski and N. Sacchi (1987). Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction. Anal. Biochem. 162: 156-159) or a commercially available RNA isolation kit.

References: PMID: 24157548, PMID: 23287718

CRISPR KO SUPPORT REAGENTS

PRODUCT	CAT. #	DESCRIPTION	AMOUNT
UltraCruz® Transfection Reagent	sc-395739	Delivers CRISPR/Cas9 Plasmid, HDR Plasmid, or Cre Vector DNA into cells with minimal cell toxicity; enables highly efficient DNA transfection in a variety of cell lines including HeLa, A549, Jurkat and NIH/3T3.	0.2 ml; 10-40 transfections
Plasmid Transfection Medium	sc-108062	Reduced-serum medium suitable for addition to CRISPR/Cas9 Plasmid, HDR Plasmid, or Cre Vector suspension and Plasmid Transfection Reagent immediately prior to cell transfection; modification of Eagle's Minima I medium, buffered with HEPES and sodium bicarbonate, and supplemented hypoxanthine, thymidine, sodium pyruvate, L-glutamine, trace elements, growth factors and phenol red.	20 ml
Control CRISPR/Cas9 Plasmid	sc-418922	Control Scrambled gRNA CRISPR/Cas9 Plasmid is a negative control for experiments using target-specific CRISPR/Cas9 KO Plasmids; encodes a non-targeting scrambled gRNA that does not recognize any DNA sequence. The Cas9/gRNA complex will not bind or cleave genomic DNA.	20 transfections
Puromycin dihydrochloride	sc-108071	Selection and maintenance of cells transfected with the puromycin-N-acetyl-transferase (pac) gene.	25 mg
Cre Vector	sc-418923	Expresses Cre recombinase for the removal of genetic material inserted during HDR repair.	20 mg

CRISPR system support reagents are optimal for successful delivery of Santa Cruz Biotechnology, Inc.'s CRISPR/Cas9 KO Plasmids, HDR Plasmids and Cre Vector into mammalian cells. Amounts listed above are based on use of 6-well plates.