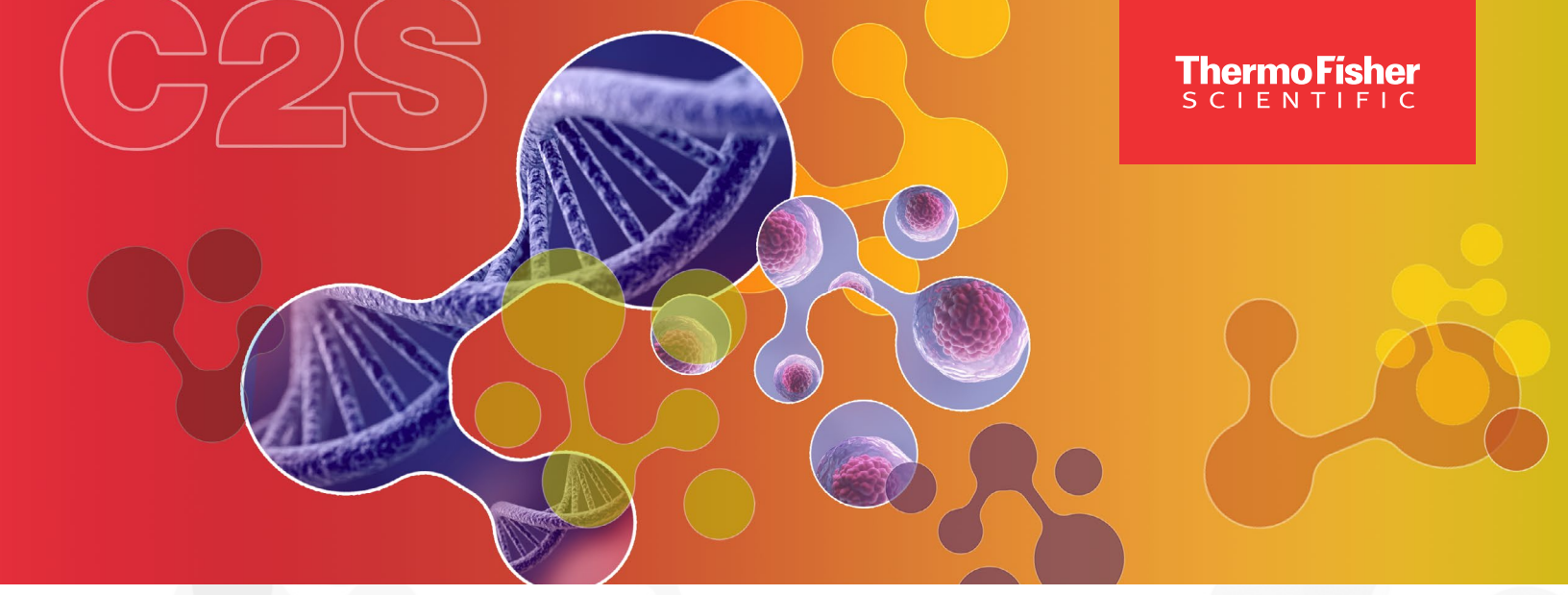


ThermoFisher SCIENTIFIC

Tips and tricks for CRISPR-Cas9 success

The discovery of CRISPR-Cas9 gene editing technology completely transformed life science research in 2012 by introducing a precise and efficient “cut-and-paste” tool for inserting or removing portions of DNA.

CRISPR-Cas9 best practices

Set yourself up for success with these expert tips for each stage of the CRISPR-Cas9 workflow.

Use optimal gRNA design

Design and test 3 guide RNAs (gRNAs) for every target to help maximize editing efficiency for a greatly increased chances of success.

Select most efficient delivery method for your cells

Based on your specific cell types, select the best delivery method: lipid-mediated transfection, electroporation, or viral transduction.

Confirm and validate editing efficiency

Confirm cleavage efficiency with a genomic cleavage detection (GCD) assay or validate edits using other sequencing methods such as next-generation sequencing and Sanger sequencing.

Pro tip

Try this

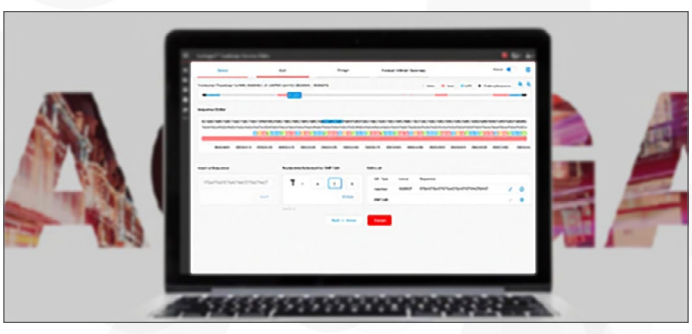
Achieve higher editing efficiency and fewer off-target effects by circumventing transcription and translation. Instead of using Cas9-expressing plasmids, opt for direct transfection of purified Cas9 protein and synthetic gRNA delivery.

Troubleshooting common CRISPR-Cas9 challenges

Having trouble? You’re not alone—here are a few of the most common hurdles researchers face when using CRISPR and how to handle them.

Low editing efficiency

Opt for purified Cas9 protein, like Invitrogen™ TrueCut™ Cas9 Protein v2, that’s engineered for the highest editing efficiency (>90%).

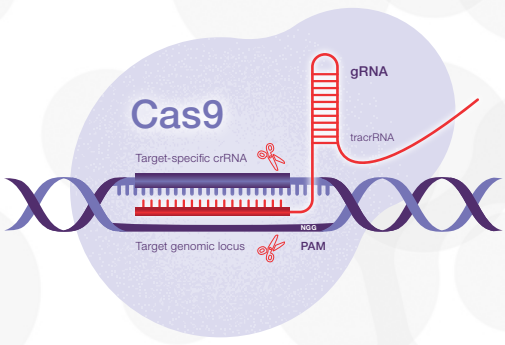


Design and test 3 gRNAs for every target to help maximize editing efficiency. Leverage software tools, like the Invitrogen™ TrueDesign™ Genome Editor, to design the most optimal gRNA for your intended gene target and cell types.

Use an optimized delivery system, like the Invitrogen™ Lipofectamine™ CRISPRMAX™ Transfection Reagent, to efficiently deliver your editing tool (Cas9 and gRNA) to your cells.

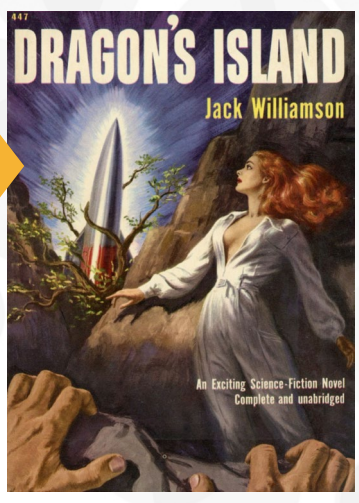
Off-target effects

Minimize off-target effects by carefully designing your CRISPR gRNA and avoid homology with other regions in the genome.



Use a synthetic gRNA and a high-fidelity Cas9 protein like Invitrogen™ TrueCut™ HiFi Cas9 Protein to further reduce off-target effects.

Did you know?



It was science fiction writer Jack Williamson who first popularized the term “genetic engineering” in his 1951 novel, Dragon’s Island, two years before Watson, Crick, and Franklin revealed the double helix structure of DNA and more than 70 years before CRISPR made precise gene editing possible in 2012.

Additional CRISPR tools and resources

To access additional resources like our comprehensive genome editing resource guide, validated protocols, and technical support, visit **thermofisher.com/crispr101**

For more quick guides with tips and tricks to popular protocols, subscribe to Connect to Science.

Learn more at **thermofisher.com/genomeediting**