AccuTool™
Partnership with ToolGen

Best Solution
for CRISPR Genome-Editing

BIONEER
Innovation • Value • Discovery
X
ToolGen

Accurate Tool of
CRISPR-Cas9 System

AccuTool™

Partnership with ToolGen

AccuTool™
CRISPR Services

1. Design

- gRNA design service
- Donor design service

2. Construction & Synthesis

- RNP (RiboNucleoProtein): aRGEN & Cas9
- Plasmid: dRGEN-sgRNA & pRGEN-Cas9

3. Donor Synthesis

- Single strand DNA Donor
- Double strand DNA Donor

4. Validation

- NGS In/del analysis
- Mutation detection (T7E1 assay) Kit

Plus. All-in-one Kit

- CRISPR-Cas9 Starter Kit
- Safe Harbor Knock-In Kit

AccuTool™ | Accurate Tool of CRISPR-Cas9 System

Global Leader in Genome Editing Technology

CRISPR-Cas9 technology is a powerful 3rd generation genome editing tool that has improved performance to be more economical and efficient than the 1st and 2nd genome editing tools: Zinc Finger Nuclease (ZFN) and Transcription Activator-Like Effector Nuclease (TALEN).

The CRISPR-Cas9 system uses a guide RNA and a Cas9 nuclease. While the former binds accurately to its specific target DNA region, the latter cuts it, resulting in a site-specific double-strand breaks (DSBs). Genomes can be manipulated while they are being repaired.

AccuTool™ is a genome editing tool developed after the collaboration with ToolGen, being one of the leading companies when it comes to genome editing. BIONEER offers not only Cas9 nuclease, but also design, synthesis, and validation services for guide RNA.

Background Technology

Derived from adaptive immune systems of a microbiome, CRISPR (Clustered regularly interspaced short palindromic repeats)-Cas9 genome editing tool cuts the target DNA region and allows the DNA to be repaired naturally. It is also known as "RGENs" (RNA-guided engineered nuclease), as it consists of gRNA (guide RNA) and Cas9 nuclease. This technology provides easier and more efficient ways for precise manipulation of genomes. gRNA consists of crRNA and tracrRNA. The crRNA has a 20-nt target-complementary sequence, while the tracrRNA has the recognition sequence necessary for Cas9-binding **(Figure 1)**.

The gRNA guides Cas9 nuclease to the target DNA region, which binds to the complementary sequence in the target DNA region. During this step, the target DNA must contain a PAM (Protospacer adjacent motif) sequence at the 3'-end. After the gRNA forms a complex with the Cas9 nuclease and binds to the target DNA region with the complemtary base pairing, the Cas9 nuclease will recognize the PAM sequence, which results in DSBs at the 3 bp upstream of the PAM sequence **(Figure 2)**.

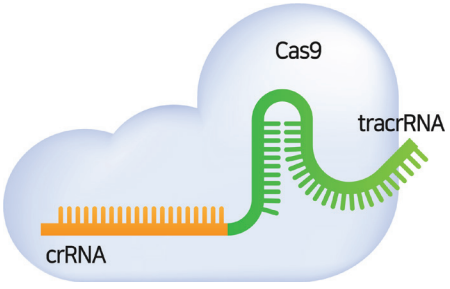


Figure 1. Diagram of gRNA and Cas9 nuclease complex
The gRNA consists of crRNA and tracrRNA. While the former contains a 20-nt target-complementary sequence, the latter contains a scaffold sequence allowing to form a complex with the Cas9 nuclease.

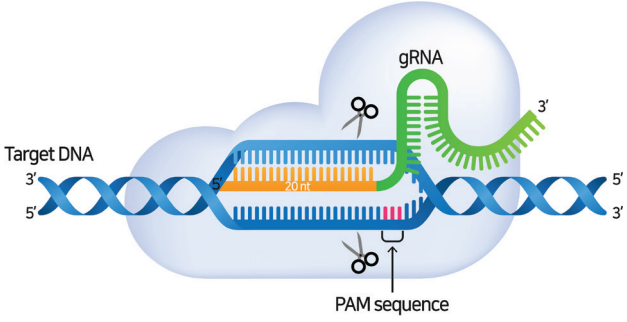


Figure 2. A schematic diagram of CRISPR-Cas9 System
RNA-guided Cas9 nuclease recognizes the PAM sequence (5'-'NGG'-3') at the 3'-end of the target DNA region and creates DSBs at the 3 bp upstream of the PAM sequence.

DSBs are repaired by means of two pathways: Non-homologous end-joining (NHEJ) or Homology-directed repair (HDR) pathways. If a donor template is not present, DSBs will be repaired through NHEJ pathway. The NHEJ pathway causes a gene knock-out by frameshifts and premature stop codons created from the indels, insertions and deletions of bases in a gene.

On the other hand, when donor templates are present, HDR pathway will take place. Compared with the other case, they can provide more accurate modification and insertion of new genes **(Figure 3)**.

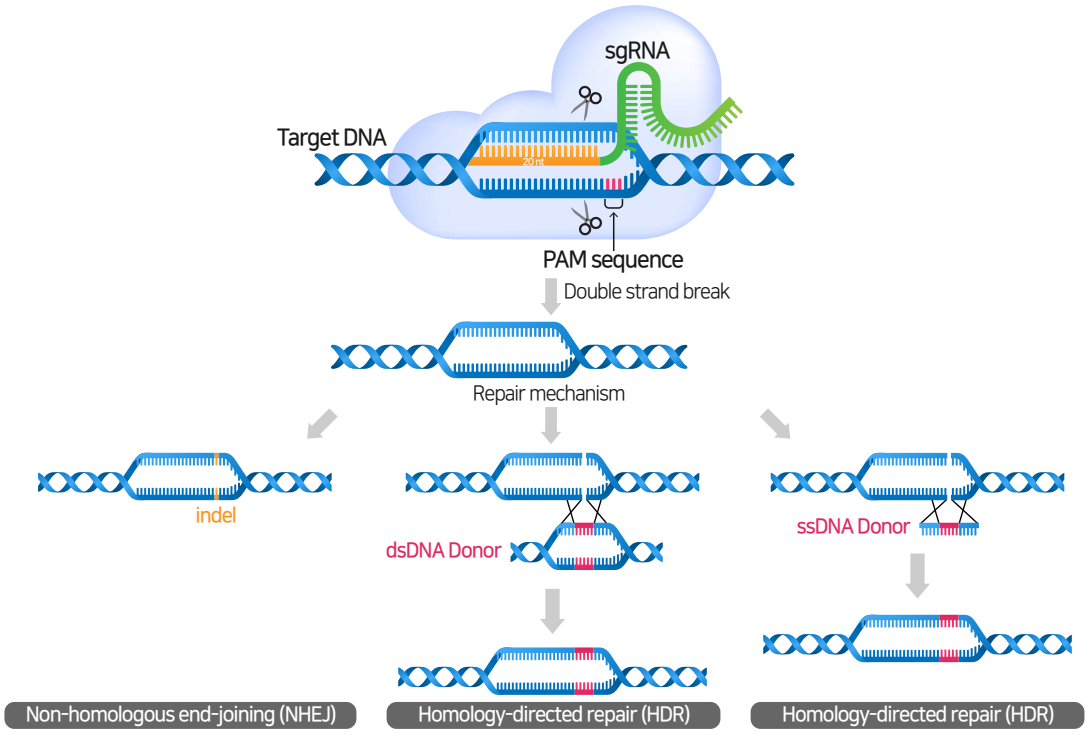
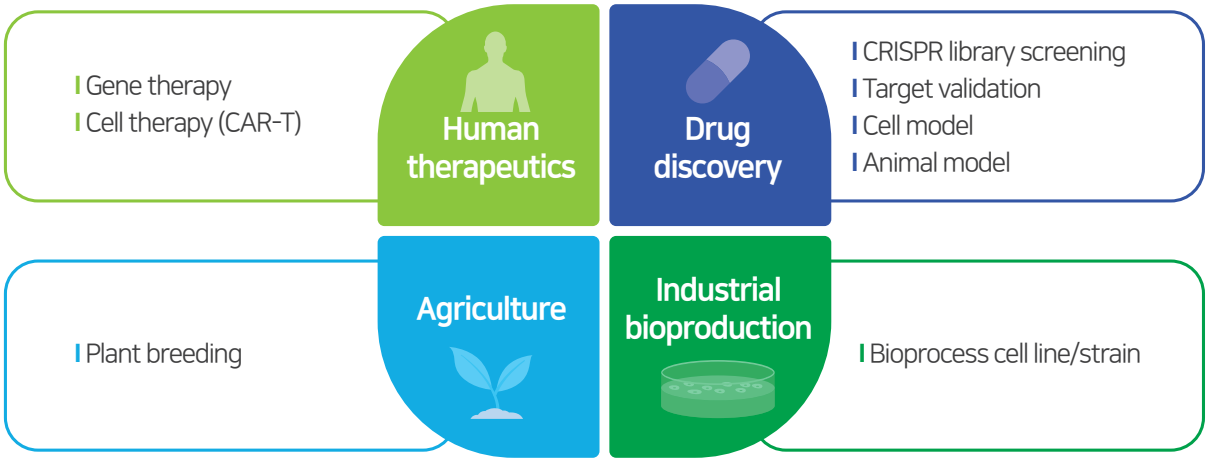


Figure 3. A step-by-step diagram showing CRISPR-Cas9-mediated DSBs repair mechanisms

There are two types of pathways for repairing DSBs: NHEJ and HDR. The NHEJ pathway creates chromosomal indels (insertions and deletions) during the repair of DSB's terminal. On the other hand, the HDR pathway uses homologous sequences of donors, either in the form of dsDNA or ssDNA, which allows more accurate gene insertion than the other.

Applications with CRISPR-Cas9 Technology

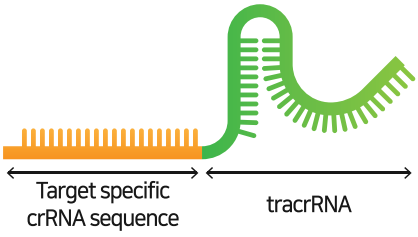


Bioneer and ToolGen provide a total solution of Genome editing!

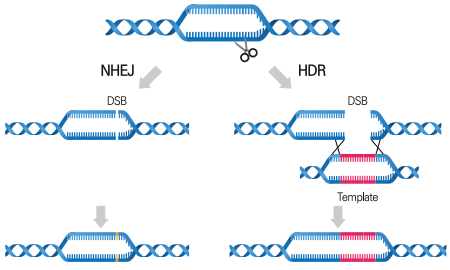
CRISPR-Cas9 Guidelines

1 Design CRISPR-gRNA

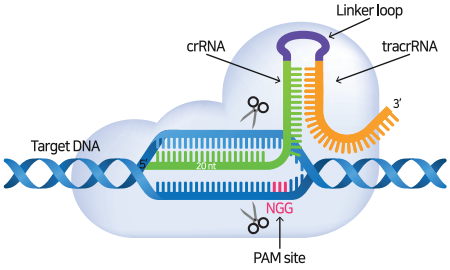
6 Validation



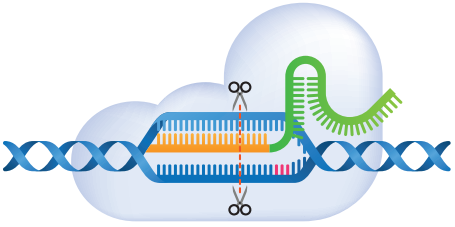
2 sgRNA synthesis



5 Gene Knock-In/Out through repair system



3 sgRNA + Cas9 Protein



4 Site specific DNA cleavage

CRISPR-Cas9 Experimental Guide

STEP 1 The first step of genome editing is **designing the gRNAs (*AccuTool*™ gRNA design service)** which guides the Cas9 nuclease to the target DNA region.

STEP 2 If you wish to use the NHEJ pathway, we can provide the most suitable gRNA and Cas9 nucleases to be directly transfected to the target cells for your researches.

- **aRGEN (RNP) (*AccuTool*™ gRNA & Cas9 Protein (RNP))**
- **dRGEN (Plasmid) (*AccuTool*™ gRNA & Cas9 (Plasmid))**
- **2-part gRNA (*AccuCRISPR*™ 2-part gRNA)**

STEP 3 If you wish to use the HDR pathway, not only the gRNA and Cas9 nuclease, but also the **donor template must be designed (*AccuTool*™ Donor design service)** to be transfected to your target cells.

- **Donor synthesis (*AccuTool*™ Donor DNA)**
  - + Safe Harbor Knock-In Kit **(*AccuTool*™ Safe Harbor Knock-In Kit)** is also available for inserting your gene of interest into the human *AAVS1* site/mouse *Rosa26* site by using the verified gRNA and HDR donor vector.
  - + If this is the first time designing a CRISPR-Cas9 experiments, we recommend trying the **All-In-One Kit (*AccuTool*™ CRISPR-Cas9 Starter Kit)** which contains all the required materials and protocols.

STEP 4 Finally, we also provide a **Validation Service (*AccuCRISPR*™ Validation Service)** to assess the gene editing efficiency of gRNA by using our Mutation Detection kit or NGS.

1. Design

AccuTool™ gRNA & Donor Design Service provides designs of gRNA and Donor template optimized for an efficient CRISPR-Cas9 genome editing.

gRNA Design: The most important part of CRISPR-Cas9

Designing accurate gRNA is the key to successful genome editing using the CRISPR-Cas9 system. gRNA is a single-stranded RNA composed of tracrRNA, which forms a complex with Cas9 nuclease, and a 20-nt crRNA that binds to the target DNA region with complementary base pairing **(Figure 1)**.
Simply altering the target sequence of gRNA can change the active region of Cas9 nuclease.
Therefore, designing and synthesizing gRNA is the most fundamental step in CRISPR-Cas9 experiments.

Donor designs are the key for a successful knock-In experiment

Homology-directed repair (HDR) is a major DSBs repair system, capable of performing gene knock-in/out, replacement, and point mutations.
The Knock-in, which inserts a target gene into a specific part of the genome, restores DSBs by inserting a donor template containing a homologous sequence, so precise genome editing is possible through the HDR system.
For researchers having difficulties with designing the donor, our Donor design service can provide the donor template sequences having the best knock-in efficiency. You may order this donor template sequence in the form of ssDNA or dsDNA.

Turnaround Time: 1 week

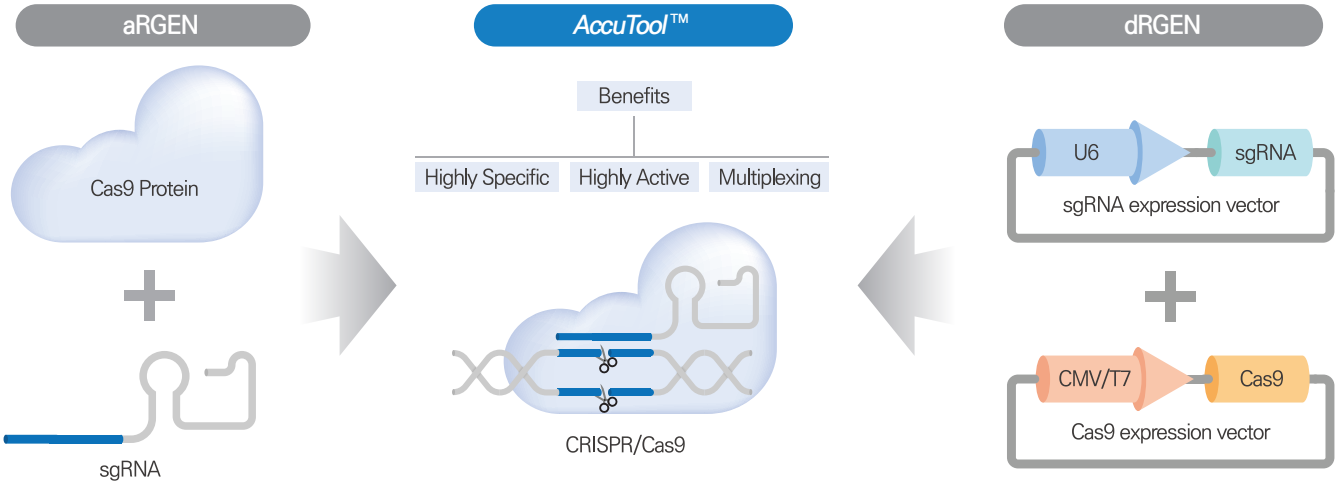
RGEN Target	Direction	Mismatch			
		0 bp	1 bp	2 bp	3 bp
TCCCCACCATGCCTAGCCTTTGG	+	1	0	0	13
CCTCACCATGCCTAGCCCTTTGGG	+	1	0	0	19
GAGAACTGGTCCCAAAGGCTAGG	–	1	0	0	6

Design Report

2. Construction & Synthesis

RNA-Guided Endonuclease (RGEN) is a new generation of engineered nuclease based on the CRISPR-Cas9 system. It is an innovative tool for genome editing composed of Cas9 nuclease and gRNA.

By recognizing the target sequence (19-20 bp) and PAM sequence (5'-NGG-3'), RGEN can easily edit any genomic regions. The target DNA region can be effectively cleaved during either *in vivo* or *in vitro* genome editing applications (knock-in/out, and locus deletion).



CRISPR-Cas9 Ribonucleoprotein (aRGEN)	CRISPR-Cas9 Plasmid (dRGEN)
▸ Ready-to-inject ▸ KO animal production by embryo injection ▸ Direct delivery into culture cells	▸ Ready-to-transfect ▸ Plasmid-based system ▸ Compatible with general transfection protocols

2. Construction & Synthesis | RNP (aRGEN)

RNP complex of gRNA and Cas9 protein

The target-specific gRNA and Cas9 protein can form a stable ribonucleoprotein (RNP) complex, and further into a target-specific nuclease that can be active in both *in vitro* and *in vivo*. The complex can be used on your cell of interest that are difficult to be transfected like primary cells. Furthermore, after the transfection, it has a short lifetime in the cell, minimizing off-target effects. With this, *AccuTool*™ gRNA & Cas9 protein (RNP) will provide the most effective and detailed methodologies.

· BIONEER'S aRGEN

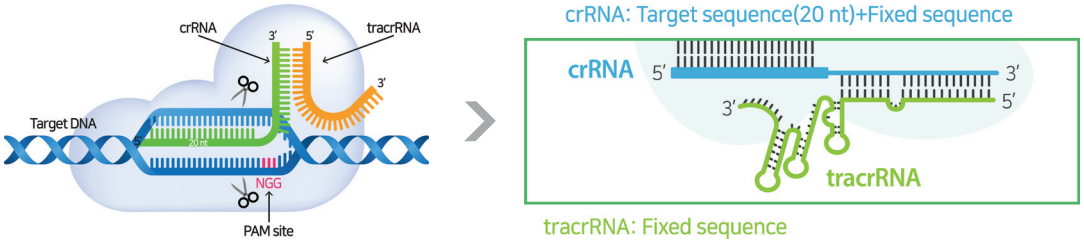
High knock-out efficiency

Apply to the target cells without any sample prep step

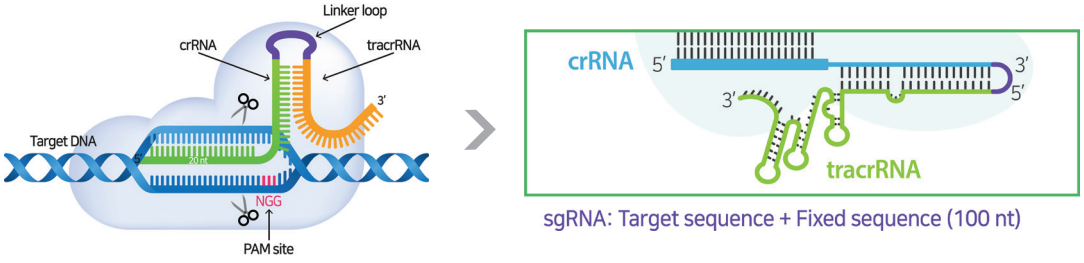
Fast delivery

aRGEN-sgRNA

1 2-Part guide RNA (crRNA:tracrRNA)



2 Single guide RNA (sgRNA)



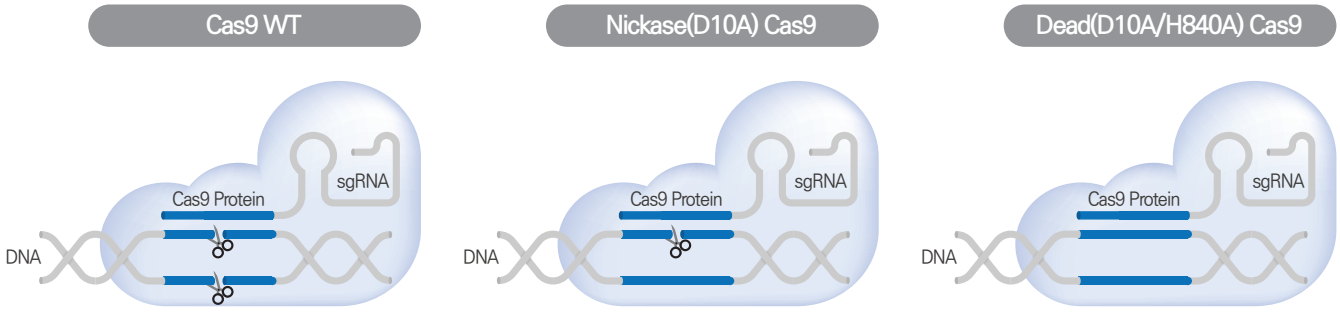
Guide RNA	2-Part guide RNA	Single guide RNA
	crRNA:tracrRNA	sgRNA
Features	Length-optimized for performance and easy manufacturing	Activate the endonuclease for cleavage of genomic DNA
Nuclease	Cas9 Protein	
PAM sequence	NGG	
Cutting mechanism	Blunt ends	

2. Construction & Synthesis | RNP (aRGEN)

Cas9 selection

·Recombinant Cas9 protein selection guide

Cas9 WT Protein	This protein is the most widely used Cas9 protein derived from Streptococcus pyogenes bacteria. It is an RNA-guided nuclease that creates a site-specific DSBs.
Nickase(D10A) Cas9 Protein	This protein is a variant of Cas9 protein differing by a point mutation (D10A). It can create a single-stranded nick in each DNA strand, resulting in DSBs on the target DNA region. Each of the cleaved ends forms overhangs instead of blunt ends, allowing control of the integration and insertion process of the genes.
Dead (D10A/H840A) Cas9 Protein	This protein is a variant of Cas9 protein differing by point mutations (D10A and H840A). It does not have endonuclease activity but still retains its ability to bind onto the target sequences. With this, dead (D10A/H840A) cas9 proteins can be used to control gene expression by forming a complex with transcriptional activators or repressors.
Sniper Cas9 Protein	This protein is a variant of SpCas9 which lowered the off-target effect and enhanced the on-target effect (high-specificity, low off-target).
Cyanine3-Cas9 Protein	The Cas9 WT and the dead (D10A/H840A) cas9 proteins are labeled with a fluorescent dye, Cyanine3, for customers to directly track their delivery to the target cells.



	Cleavage	Nick		Bind
		Single	Double	
NHEJ Mutagenesis (InDel)	O	X	O (insertion specificity)	X
HDR Genome Editing (Knock-in)		O (reduced efficiency)	O	X

·Cas9 nuclease

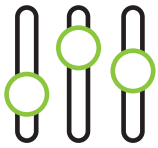
gRNA-Cas9 protein RNP complex	▸ gRNA-Cas9 protein RNP complex can be delivered to the cell of interest that are difficult to be transfected with electroporation. ▸ Transcription or translation is not needed for Cas9 and gRNA expression. Use the complex directly for easier genome editing. ▸ This product is recommended for researchers transfecting directly to a nucleus, using methods such as nucleofection and microinjection.	▸ These products do not affect cell-type-specific promoter activities. ▸ These products pose no risk of random integration to the host genome.
gRNA and Cas9 mRNA	▸ gRNA and Cas9 mRNA can be delivered to your cell of interest either by chemical transfection or electroporation. ▸ Transcription is not needed. Use the product directly for easier genome editing.	

2. Construction & Synthesis | Plasmid (dRGEN)

Plasmid sgRNA + Plasmid Cas9

AccuTool™ gRNA & Cas9 (Plasmid) service is a plasmid-based genome editing system that allows researchers to edit the genomes in an effortless way. It provides both custom sgRNA expression plasmids, with GFP plasmid as an optional choice, and human codon optimized Cas9 expression plasmids with WT/Nickase/Sniper types. sgRNA-GFP expression plasmids allow the confirmation of activity level in cells by fluorescent microscope. They can be delivered to your cell of interest by any standard methods like lipofection, nanoparticle, or electroporation to achieve highly efficient delivery.

· BIONEER'S dRGEN



Wide usage
Various Plasmid DNA of gRNA, Cas9

High stability
in lyophilized form

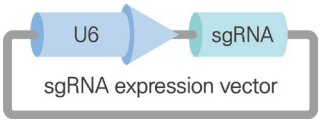
Apply to the target cells
without any sample prep step

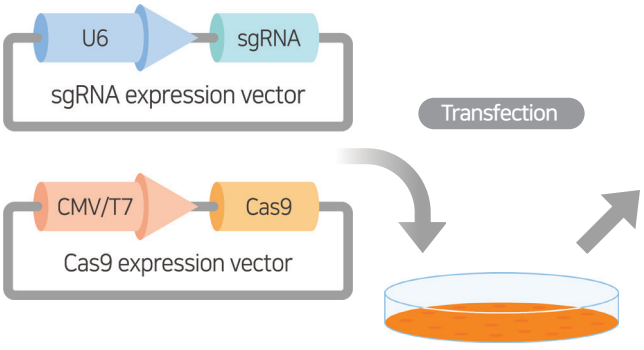
Fast delivery

sgRNA plasmid (dRGEN)

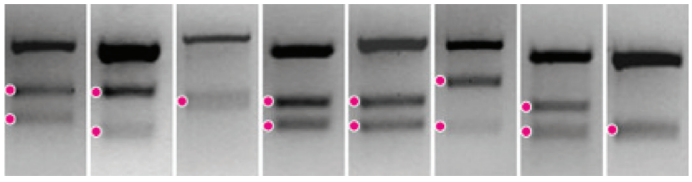
AccuTool™ gRNA & Cas9 (Plasmid) provides customers with Custom-dRGEN synthesis service, which injects a desired gRNA sequence into a basic sgRNA plasmid(dRGEN-U6-sgRNA), or a GFP plasmid (dRGEN-U6-sgRNA-GRP-CMV).

We provide positive control such as *EGFP*, *HPRT1*, *CCR5*. (ready-to transfection) as well.

dRGEN synthesis	sgRNA plasmid	
	sgRNA-GFP plasmid	



T7E1 assay (HEK 293T cells)



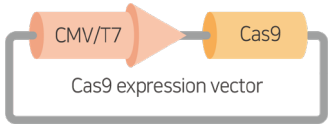
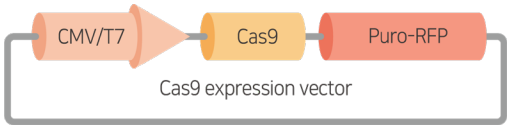
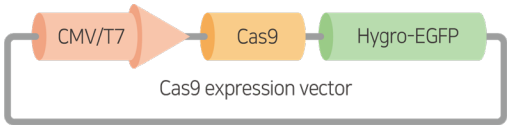
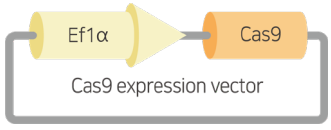
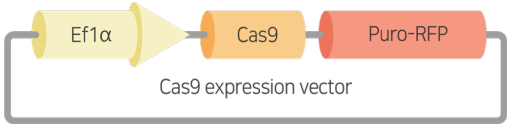
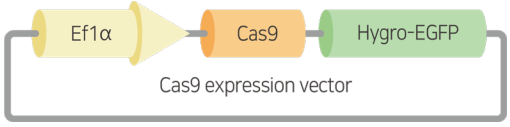
dRGEN_In/Del Analysis

	Total Sequences	Mutation Efficiency		Indel frequency
		Insertions	Deletions	
sgRNA #1	24911	5057	15719	20776 (83.4%)
sgRNA #2	48420	2919	40415	43334 (89.5%)
sgRNA #3	15563	559	9283	9842 (63.2%)
sgRNA #4	42276	1646	28355	30001 (71.0%)

2. Construction & Synthesis | Plasmid (dRGEN)

pRGEN-Cas9

·pRGEN Cas9-Customized vector

Cas9 (Nickase)/ Sniper Cas9	CMV/T7	Basic	
		Puro-RFP	
		Hygro-EGFP	
	Ef1α	Basic	
		Puro-RFP	
		Hygro-EGFP	

·Smallest size Cas9 from *Campylobacter jejuni*

CjCas9 is derived from *Campylobacter jejuni* (*C. jejuni*) and is the smallest Cas9 orthologue (2.9 kb), which improves upon the disadvantages of large-sized SpCas9 (4 kb), derived from *Streptococcus pyogenes* (*S. pyogenes*).
The small size of CjCas9 allows usage in clinical studies.

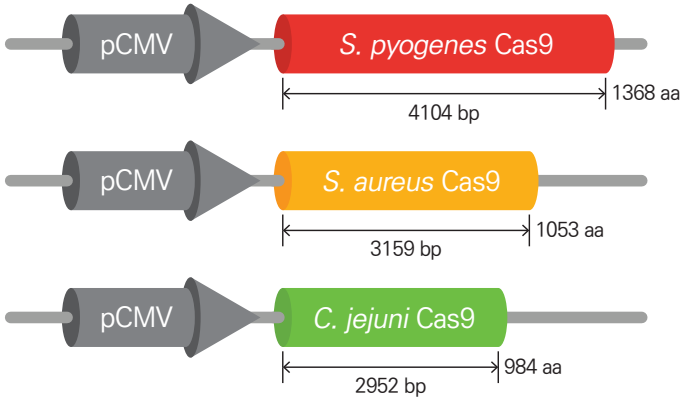


Figure 1. The smallest Cas9 Protein ever known to date

3. Donor Synthesis

· Single strand DNA Donor
· Double strand DNA Donor

Homology-directed repair (HDR) is a major DSB repair system, capable of performing gene knock-in/out, replacement, and point mutations. The Knock-in, which inserts a target gene into a specific part of the genome, restores DSB by inserting a donor template containing a homologous sequence, so precise genome editing is possible through the HDR system. The donor template used here contains homology arms on either side of the insertion (or desired to be modified) sequence. *AccuTool*™ Donor synthesis service is available in either double-stranded form (dsDNA Donor) or single-stranded form (ssDNA Donor). The efficiency of the HDR system may vary by target DNA region, donor template, etc. **(Figure 1)**.

ssDNA Donor	dsDNA Donor
⦿ Minimized off-target ⦿ Improved knock-in efficiency ⦿ Minimized cytotoxins, having a wide range of compatible cell types for knock-in ⦿ 100~150 bp ⦿ Optimal for introduction of point mutation small-tagged insert	⦿ Commonly used form of donor DNA ⦿ Affordable than single-stranded DNA type ⦿ Used for long homology arms ⦿ Optimal for introduction of large size fragment

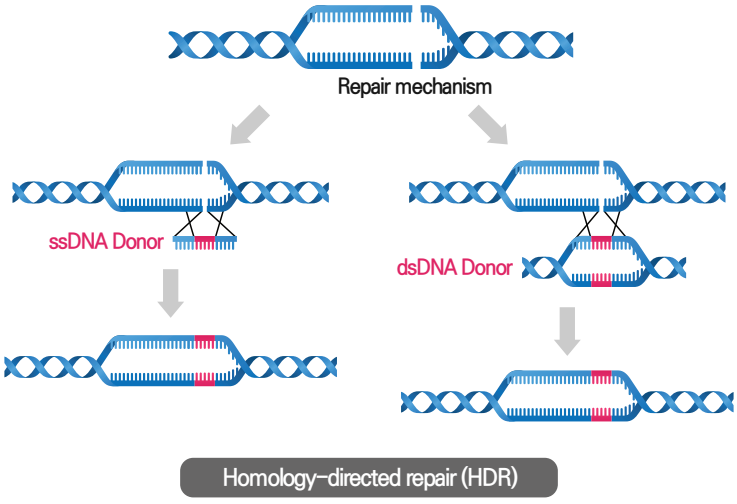


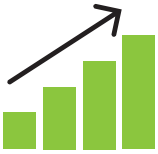
Figure 1. HDR pathway uses homologous donor template (dsDNA Donor or ssDNA Donor) to be inserted accurately.

Donor Synthesis Service

ssDNA or dsDNA can be synthesized according to the customer's request.
Donor templates can be customized and ordered from BIONEER's Donor Design Service.
For researchers having trouble, BIONEER designs the donor templates with high knock-in efficiency.

· BIONEER'S Donor

Perfect from design to synthesis



Optimization for Knock-in Success

With confidence in **any Donor insert!**

4. Validation

· NGS In/Del analysis
· Mutation detection analysis (T7E1 assay)

BIONEER provides In/del analysis service of synthesized RNA or DNA-type gRNA using a Mutation Detection Kit and the next generation sequencing (NGS) data to validate its genome editing efficiency.

In/del analysis service

AccuCRISPR™ In/del analysis service analyzes a specific genome site using targeted resequencing technique based on NGS, which can quickly get results at a reasonable price. Therefore, it is suitable for testing the genome editing efficiency of CRISPR-Cas9. The NGS results will be provided in the form of data reports, including the raw data. Those will be sent to the e-mail address written in the order form.

·BIONEER'S In/del service

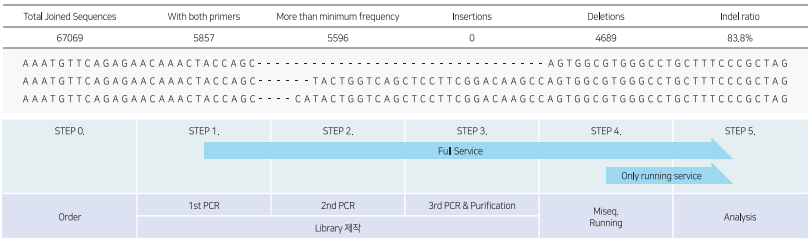
High-quality sequence analysis results
We provide 80 or more of Q30 (%) score.

Reliable data
We provide total reads of at least 10,000.

Clear In/del analysis service report

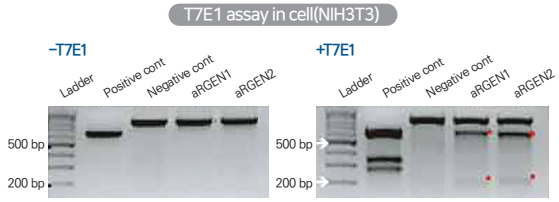
Only Mi-seq running

Only Mi-seq running will be done for the validation test. At least 1 plate (96 samples) must be requested for this service. Send us the prepared samples that are ready to be run, along with their accurate index and adaptor information. The results will be provided in the FASTQ file format.

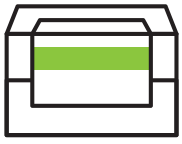


Mutation Detection Kit (T7E1)

This kit includes a T7E1 enzyme and positive controls that are mostly used in genotyping.



·BIONEER'S Mutation Detection Kit (T7E1)



All-in-one kit consisting of all products required for Mutation detection

High efficiency by amplifying PCR directly from cells

Easy-to-use

AccuTool™ CRISPR-Cas9 Starter Kit

We recommend these products to the following

- Those who are just starting CRISPR-Cas9 experiments
- Those who wish to start CRISPR-Cas9 experiments, but are unsure which products to use
- Those who plan CRISPR-Cas9 experiments using plasmid forms
- Those requiring small amounts of CRISPR-Cas9

AccuTool™ CRISPR-Cas9 Starter kit is an all-in-one kit recommended for researchers starting plasmid CRISPR-Cas9 experiments for the first time. This product contains all the materials essential for CRISPR-Cas9 experiments, including sgRNA, Cas9, Mutation Detection kit, etc.

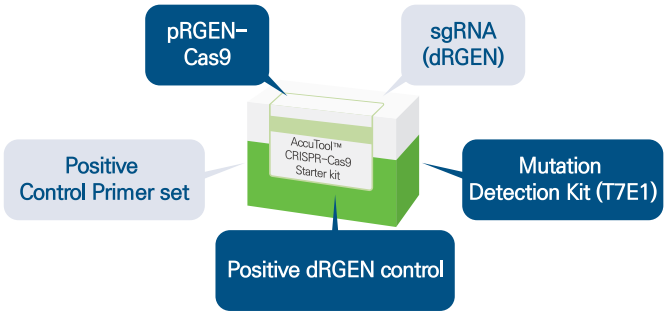


Figure 1. sgRNA expression vector

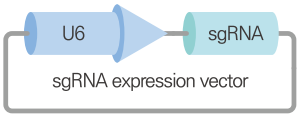
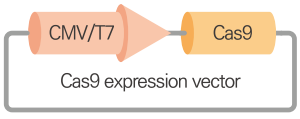


Figure 2. Cas9 expression vector

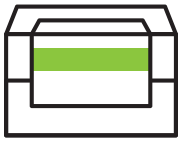


Both sgRNA and Cas9 will be given in the form of a plasmid, and three types of sgRNA will be also provided. This kit needs pre-designed sgRNA sequences. If they are not ready yet, you may try BIONEER's **Custom Design Service** to quickly prepare what you need.

Now feel free to experiment!

- The sgRNA is cloned into a sgRNA expression vector **(Figure 1)**.
- pRGEN-Cas9-CMV/T7 vector is provided in the plasmid form **(Figure 2)**.
- The positive control will be provided. You can select one from the following: *EGFP*, *CCR5*, *HPRT1*.
- Double-strand breaks (DSBs) will be formed with the optimized genome editing solution.
- The genome editing results can be checked easily with the Mutation Detection kit by using T7E1.

· BIONEER'S CRISPR-Cas9 Starter Kit



Easy to perform CRISPR-Cas9 experiments with **all-in-one Kit**

Easy-to-use

High stability in lyophilized form

AccuTool™ Safe Harbor Knock-In Kit

Safe Harbor is a genomic site allowing integration of the gene of interest into a specific region so that the novel inserted genes can be stably expressed. The Safe Harbor Knock-in kit contains a gRNA expression plasmid optimized for targeting the safe harbor site and an HDR donor vector for performing the knock-in with high efficiency. With this, this product can be used to insert genes for a stable expression.

Knock-in have risks of mutation and gene silencing caused by random integration within the host genome. Therefore, the new approach has been recently proposed to deliver the gene of interest to the 'Safe Harbor' site in the host genome **(Figure 1)**. The gene of interest can be expressed stably and consistently by inserting the gene of interest in the human *AAVS1* genome site or the mouse *Rosa26* genome site.

AccuTool™ Safe Harbor Knock-in kit contains gRNA expression vectors optimized for targeting human or mouse genomic safe harbor sites and an empty donor vector designed to effectively perform a target gene knock-in.

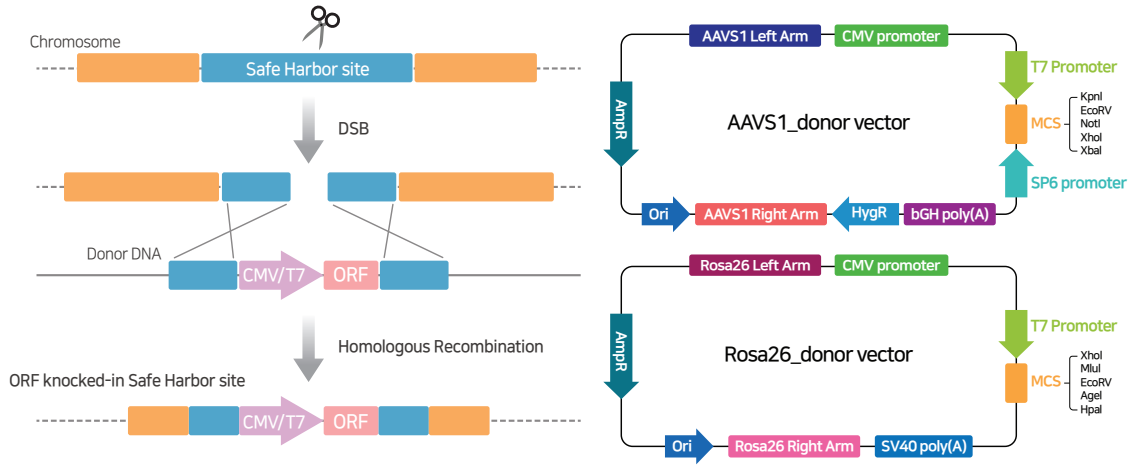


Figure 1. CRISPR-Cas9-based Knock-In mechanism
The donor vector containing the gene of interest, selection marker, or any other genetic elements is integrated into safe harbor site through the homologous recombination.

This product requires a donor vector cloned with the gene of interest to perform a knock-in. If you have any difficulties preparing your donor template, try using BIONEER's Gene Synthesis & Cloning Service.

AccuTool™ Safe Harbor Knock-In kit is divided into two products: *AccuTool*™ AAVS1 donor kit and *AccuTool*™ Rosa26 donor kit. Depending on the kit, it contains an AAVS1_donor vector or a Rosa26_donor vector for cloning the gene of interest. It can be used with Cas9 expression vectors to deliver them to the host cell.

Those can then create DSBs in either the *AAVS1* or *Rosa26* site to activate HDR pathway, a natural DNA repair mechanism. It is used for the integration of donor DNA into the genomic safe harbor site. Furthermore, this kit contains primers to check the successful integration with PCR.

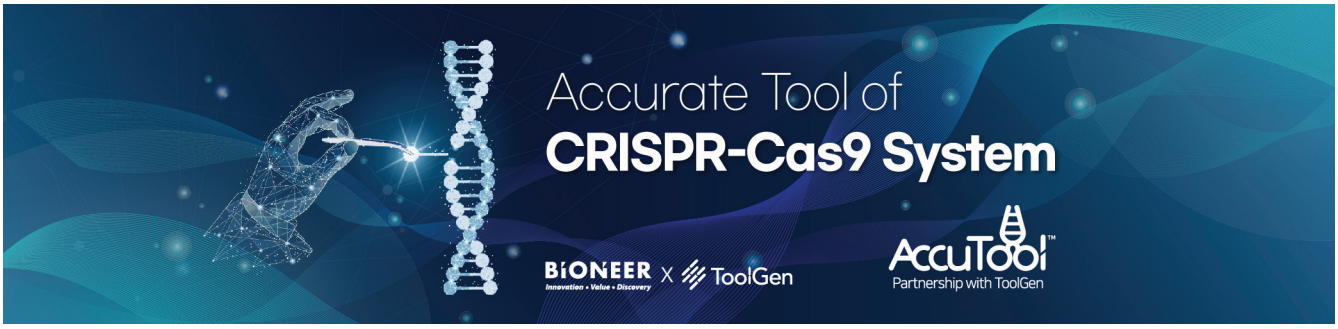
· BIONEER'S Safe Harbor Knock-in Kit

Easy to perform CRISPR-Cas9 experiments with **all-in-one Kit**

Minimize off-target integration

Using Safe Harbor gene sites, continuously and reliably **express genes without side effects**

Ordering Information



Product Description		Specification	Cat.No.
Custom Design Service			
1. guideRNA design service			
AccuTool™ gRNA design service		ea	ATC-0001
2. Donor design service			
AccuTool™ Donor design service		ea	ATC-0002
RNP(RiboNucleoProtein) : aRGEN & Cas9 protein			
1. aRGEN-Lyophilized sgRNA			
AccuTool™ sgRNA synthesis (aRGEN)		5 nmol	ATC-0005
Positive control (aRGEN synthesis)	*AccuTool*™ Positive control_EGFP sgRNA (aRGEN)	2 nmol	ATS-0006
	AccuTool™ Positive control_CCR5 sgRNA (aRGEN)	2 nmol	ATS-0007
	AccuTool™ Positive control_HPRT1 sgRNA (aRGEN)	2 nmol	ATS-0008
2. Recombinant protein			
Cas9 Protein	*AccuTool*™ Recombinant SpCas9 WT protein	50 µg	ATS-0010
		50 µg x 2	ATS-0011
		50 µg x 5	ATS-0012
	AccuTool™ Recombinant Cyanine3-SpCas9 WT protein	50 µg	ATS-0013
		50 µg x 2	ATS-0014
		50 µg x 5	ATS-0015
Cas9 nickase(D10A) Protein	*AccuTool*™ Recombinant SpCas9 Nickase (D10A) protein	50 µg	ATS-0016
		50 µg x 2	ATS-0017
		50 µg x 5	ATS-0018
Cas9 dead(D10A/840A) Protein	*AccuTool*™ Recombinant SpCas9 dead (D10A/H840A) protein	50 µg	ATS-0019
		50 µg x 2	ATS-0020
		50 µg x 5	ATS-0021
	AccuTool™ Recombinant Cyanine3-SpCas9 dead (D10A/H840A) protein	50 µg	ATS-0022
		50 µg x 2	ATS-0023
		50 µg x 5	ATS-0024
Sniper Cas9	*AccuTool*™ Recombinant Sniper Cas9 protein	50 µg	ATS-0025
		50 µg x 2	ATS-0026
		50 µg x 5	ATS-0027
3. Cas9 mRNA			
Cas9 mRNA	*AccuTool*™ Cas9 mRNA	10 µg	ATS-0040
	AccuTool™ Nickase(D10A) Cas9 mRNA	10 µg	ATS-0041
Plasmid : pRGEN-sgRNA & pRGEN-Cas9			
1. dRGEN Synthesis (sgRNA plasmid)			
dRGEN Synthesis	*AccuTool*™ sgRNA synthesis (dRGEN)	2 µg	ATC-0050
		50 µg	ATC-0051
	AccuTool™ sgRNA synthesis (dRGEN:GFP-CMV)	2 µg	ATC-0052
		50 µg	ATC-0053
Control dRGEN	*AccuTool*™ Positive control_EGFP sgRNA (dRGEN)	2 µg	ATS-0054
	AccuTool™ Positive control_CCR5 sgRNA (dRGEN)	2 µg	ATS-0055
	AccuTool™ Positive control_HPRT1 sgRNA (dRGEN)	2 µg	ATS-0056
2. pRGEN Cas9-Customized vector			
pRGEN Cas9-Customized vector	*AccuTool*™ pRGEN-Cas9-CMV/T7	5 µg / 50 µg	ATS-0060/0061
	AccuTool™ pRGEN-Cas9-CMV/T7 Puro-RFP	5 µg / 50 µg	ATS-0062/0063
	AccuTool™ pRGEN-Cas9-CMV/T7 Hygro-EGFP	5 µg / 50 µg	ATS-0064/0065
	AccuTool™ pRGEN-Cas9-Ef1a	5 µg / 50 µg	ATS-0066/0067
	AccuTool™ pRGEN-Cas9-Ef1a Puro-RFP	5 µg / 50 µg	ATS-0068/0069
	AccuTool™ pRGEN-Cas9-Ef1a Hygro-EGFP	5 µg / 50 µg	ATS-0070/0071
	AccuTool™ pRGEN-Cas9-CMV/T7 nickase(D10A)	5 µg / 50 µg	ATS-0072/0073
	AccuTool™ pRGEN-Cas9-CMV/T7 nickase(D10A) Puro-RFP	5 µg / 50 µg	ATS-0074/0075
	AccuTool™ pRGEN-Cas9-CMV/T7 (nickase(D10A) Hygro-EGFP	5 µg / 50 µg	ATS-0076/0077
	AccuTool™ pRGEN-Cas9-Ef1a nickase(D10A)	5 µg / 50 µg	ATS-0078/0079
	AccuTool™ pRGEN-Cas9-Ef1a nickase(D10A) Puro-RFP	5 µg / 50 µg	ATS-0080/0081
	AccuTool™ pRGEN-Cas9-Ef1a nickase(D10A) Hygro-EGFP	5 µg / 50 µg	ATS-0082/0083

Ordering Information

pRGEN Sniper Cas9-Customized vector	*AccuTool*™ pRGEN-sniper Cas9-CMV/T7	5 μg / 50 μg	ATS-0084/0085
	AccuTool™ pRGEN-sniper Cas9-CMV/T7 Puro-RFP	5 μg / 50 μg	ATS-0086/0087
	AccuTool™ pRGEN-sniper Cas9-CMV/T7 Hygro-EGFP	5 μg / 50 μg	ATS-0088/0089
	AccuTool™ pRGEN-sniper Cas9-Ef1a	5 μg / 50 μg	ATS-0090/0091
	AccuTool™ pRGEN-sniper Cas9-Ef1a Puro-RFP	5 μg / 50 μg	ATS-0092/0093
	AccuTool™ pRGEN-sniper Cas9-Ef1a Hygro-EGFP	5 μg / 50 μg	ATS-0094/0095
3. Smallest size Cas9 from *campylobacter jejuni*			
AccuTool™ dRGEN-CjCas9 (sgRNA plasmid)		2 μg / 50 μg	ATC-0100/0101
AccuTool™ pRGEN_CjCas9_CMV/T7		5 μg / 50 μg	ATS-0102/0103
Donor DNA			
1. Donor Synthesis			
Single strand Donor	*AccuTool*™ ssDNA Donor (~150 nt)	2 nmol	ATC-0105
	AccuTool™ ssDNA Donor (150~400 nt)	2 μg	ATC-0106
	AccuTool™ ssDNA Donor (401~2,000 nt)	2 μg	ATC-0107
Double strand Donor	*AccuTool*™ dsDNA Donor	2~5 μg	ATC-0108
Kit			
1. Starter Kit			
Starter kit	*AccuTool*™ CRISPR-Cas9 Starter Kit	1 ea	ATC-0110
2. Safe Harbor Knock-In Kit			
AAVS1 donor kit	*AccuTool*™ AAVS1 donor kit	1 ea	ATS-0115
Rosa26 donor kit	*AccuTool*™ Rosa26 donor kit	1 ea	ATS-0116
Validation			
1. Nest Generation Sequencing(NGS) service			
AccuCRISPR™ In/del analysis service		rxn	ATC-0120
AccuCRISPR™ Only Mi-seq running		1 plate	ATC-0121
2. Mutation Detection Kit			
AccuCRISPR™ Mutation Detection Kit (T7E1)		1 ea	ATS-0125

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Bioneer supports researchers' CRISPR experiments!

AccuTool™
Partnership with ToolGen

BIONEER
Innovation • Value • Discovery

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