Ver.0 (EN)
2019-07-01

All about **Bioneer's**

Custom Services

Molecular Biology & Protein Expression

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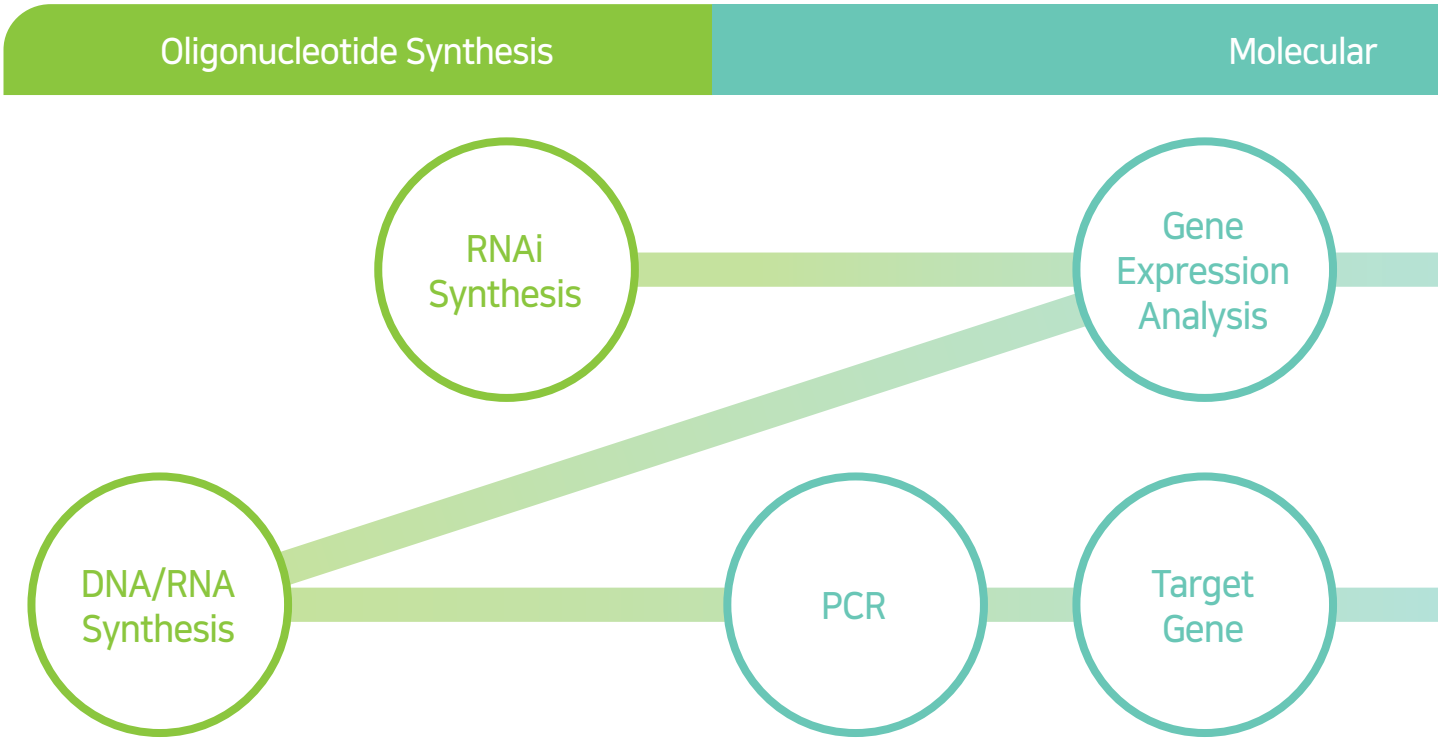
BIONEER
Innovation • Value • Discovery

Contents

With the long years of expertise, Bioneer have developed unique, well-established patented technologies and production systems.
We provide customized services through 1:1 consultation with our experts who have accumulated experiences in the field of biotechnology for a long time.
All our services are conducted under ISO 9001 quality management system for accurate, reproducible results.



DNA/RNA Synthesis

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HT-Oligo™
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Custom RNA Oligo

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Control miRNA

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qPCR Array Service
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Primer & Probe Design Service
Single Gene qPCR Primer Set

Service Overview

Biology | Protein Synthesis

Gene Cloning → Sequencing → Protein Synthesis

Gene Synthesis

Gene Synthesis
Rapid Gene Synthesis
AccuGeneBlock
Gene Cloning
Mutagenesis
Codon Library Mutagenesis

Sanger Sequencing

Standard Sequencing
Full-length Sequencing
Difficult Sequencing
Additional Service

mRNA Profiling

Cell-free Protein Synthesis

Standard Protein Synthesis
One-day Protein Synthesis
Standard Gene to Protein
Cloning-free Gene to Protein

DNA/RNA Synthesis

Oligonucleotide Synthesis

01

DNA/RNA Synthesis

List of Services

Standard Oligo	Dual-labeled Probes	Custom RNA Oligo
HT-Oligo™	*Extendamers*™	
Modification Oligo	Large Scale Oligo	

Key Features

- Provide exact concentration of oligos by utilizing our patented *Accuoligo*® technology
- Supply DNase, RNase, DNA-free oligos by synthesizing in a clean room
- Undergo strict quality control using a total of 7 MALDI-TOF spectrometers to perform full QC inspection
- Utilizes the world's first automated production line by processing all protocols from order to synthesis, QC, and packaging automatically using "Computer Aided Manufacturing (CAM) System", allowing consistent quality of oligos

What is *AccuOligo*® Technology?

AccuOligo® is our patented technology which prevents dried oligos from falling or slipping from the tubes during their transit. While the conventional synthesis service had a danger of dried oligos falling from the top of the tube due to impacts and shakes, leading to loss of yield after opening it, *AccuOligo*® technology not only allows to deliver the oligos with precise concentration and yield by allowing them to stick at the bottom even at intense vibrations, but also to prevent cross-contamination between the wells when packaged in plates. Furthermore, all the components used to prevent the falling of oligos do not affect experimental results such PCR, sequencing, or enzyme cutting.

Purification System

- **Bio-RP:** Bio-RP is a proprietary, high-quality purification method developed by Bioneer which allows to supply nuclease-free oligos by synthesizing in a clean room and eliminating truncated failures including n-1 mer.
- **HPLC:** HPLC allows to extract oligos being about 30 mer long with high purity over 90%. This method is recommended for fluorescent dye modification or protocols requiring high-quality oligos such as cloning, site directed mutagenesis, and quantitative gene detection.
- **PAGE:** PAGE method is for isolating up to 200 mer of long oligos having high purity over 95% by using electrophoresis on polyacrylamide gel.

Contact Us

E-mail: oligo-support@bioneer.co.kr, Tel: +82-42-930-8777

Standard Oligo

◎ Description

Standard Oligonucleotide synthesis service is for ordering oligos of 130 mer or less. Various synthetic scales and purification methods can be selected depending on the applications. Selectable purification services include Bio-RP, HPLC, PAGE, etc.

◎ Ordering Information

Synthesis Scale (nmol)	Base Limitation (mer)	Guaranteed Yield(O.D.) Based on 20 bases			Service Period (Working Day)		
		Bio-RP	PAGE	HPLC	Bio-RP	PAGE	HPLC
25	15 - 60	2	1	1.5	2	3	3
50	10 - 75	4	2	2.5	2	3	3
200	5 - 110	8	6	7	2	3	3
1,000	5 - 130	30	18	25	2	3	3
10,000	5 - 50	300	150	200	2	3	3
15,000	5 - 50	Inquire			3	4	4

* The synthesis scale (nmol) represents the start volume of synthesis. Therefore, all the final yield after synthesis and purification depends on the oligo length, synthesis efficiency, and nucleotide sequences.

HT-Oligo™

◎ Description

HT-Oligo™ (High Throughput Oligonucleotide) synthesis service can synthesize more than 96 different types of oligos simultaneously at a reasonable price. Furthermore, for this synthesis, we provide concentration normalization service for free.

◎ Ordering Information

Synthesis Scale (nmol)	Base Limitation (mer)	Guaranteed Yield(O.D.) Based on 20 bases			Service Period (Working Day)		
		Bio-RP	PAGE	HPLC	Bio-RP	PAGE	HPLC
25	15 - 60	2	1	1.5	2	3	3
50	10 - 75	4	2	2.5	2	3	3
200	5 - 110	8	6	7	2	3	3
1,000	5 - 130	30	18	25	2	3	3
10,000	5 - 50	300	150	200	Inquire		
15,000	5 - 50	Inquire			Inquire		

Modification Oligo

◎ Description

Modification Oligo service provides various 3′, 5′, or internal modification oligonucleotide synthesis service ranging from biotin-labeled primers to fluorescence-labeled primers to be used for real-time PCR analysis.

◎ Ordering Information

Synthesis Scale (nmol)	Base Limitation (mer)	Guaranteed Yield(O.D.)	Service Period (Working Day)
50	10 - 75	Varies depending on the types of modifications done	4
200	5 - 110		
1,000	5 - 50		
10,000	5 - 50		
15,000	5 - 50		

* Refer to our Bioneer website (www.bioneer.com) for more information on the type of modification that can be done.

Dual-labeled Probes

◎ Description

Duel-labeled Probe service synthesizes oligos with a fluorescent dye (reporter) positioned at the 5′ end while a quencher is on the 3′ end. Those are mostly used for Real-time PCR analysis, but can also be used for multiplex analysis, done through searching several genes at once, by using various fluorescent materials. Our Dual-labeled Probes guarantees high quality products by performing MALDI-TOF Mass spectrometer QC method and fluorescence test using fluoroskan.

◎ Ordering Information

Synthesis Scale (nmol)	Base Limitation (mer)	Guaranteed Yield(O.D.)	Service Period (Working Day)
50	10 - 75	Varies depending on the types of modifications done	4 - 5
200	5 - 110		
1,000	5 - 50		
10,000	5 - 50		
15,000	5 - 50		

Extendamers™

◎ Description

Extendamers™ (Long Oligonucleotides) synthesis service is for ordering long oligos with 130~200 bp, which is mainly applied in cloning, siRNA, and gene construction.

◎ Ordering Information

Base Limitation (mer)	Guaranteed Yield(O.D.)		Service Period (Working Day)	
	Bio-RP	PAGE	Bio-RP	PAGE
130 - 200	3 - 4	0.25 - 0.3	5 - 6	7 - 8

Large Scale Oligo

◎ Description

Large Scale Oligonucleotide (Bulk Oligo) service is for ordering oligos with 15,000 nmol scales. By using our proprietary instrument developed solely by us, Bulk Oligo Synthesizer, we can provide comprehensive range of oligo scales ranging from mg to kg units, along with advanced oligo synthesis and purification technologies for antisense researches and large-scale protocols such as decoy and RNAi oligo.

◎ Ordering Information

Guaranteed Yield (mg)	Base Limitation (mer)	Service Period (Working Day)	
		Bio-RP	HPLC
50	5 - 50	10	10
100			
250			
500			
1,000			

Custom RNA Oligo

◎ Description

Custom RNA Oligo service provide synthesis of RNA sequences in single strand or double strand forms as our customers wish. Purification methods in this service can be selected between Bio-RP and HPLC while various modification of up to 32 different 3' overhang selection can be made. Moreover, customers can select annealing, drying or ready-to-use options to determine how their RNA is finalized and provided.

◎ Ordering Information

Guaranteed Yield (mg)	Base Limitation (mer)	Service Period (Working Day)	
		Bio-RP	HPLC
10	5 - 85	2 - 3	3 - 4
20			
50			
100			

* Both Sense and anti-sense RNAs in single-stranded form are provided and dried at the same concentration.
* Annealing buffer is provided by default.
* Additional costs will be charged for ordering siRNA in an annealing form.
* All synthetic RNAs are shipped with MALDI-TOF QC Data.

CRISPR Cas9/Cpf1-gRNA

Oligonucleotide Synthesis

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CRISPR Cas9/Cpf1-gRNA

List of Services/Product

CRISPR Cas9-gRNA	CRISPR Cpf1-gRNA	*AccuCRISPR*™-Cas9 tracrRNA

Key Features

- ◎ Ready-to-use guide RNAs to be immediately used for experimental purposes with nucleases (without the need of cloning process)
- ◎ Guaranteed high-quality products through synthesis in a clean room
- ◎ Advanced RNA oligo synthesis technology
- ◎ Comprehensive gRNA design compatible with various CRISPR nuclease

What is CRISPR Cas9/Cpf1-gRNA?

The CRISPR Cas9/Cpf-gRNA system is genome editing technology that can modify genes using nuclease (Cas9 or Cpf1) and gRNA (guide RNA) complex. Our CRISPR Cas9/Cpf1-gRNA service can synthesize gRNA with the sequence that the customers desire. The ordered gRNA can be used in the form of ribonucleoprotein (RNP) with Nuclease (Cas9 or Cpf1). Since the RNP form can be rapidly degraded by endogenous protease or RNase, It has the advantage of lower off-target. With our rich experiences on oligo synthesis, we provide CRISPR gRNA service with the best quality that have passed our QC tests by synthesizing in our advanced clean-room facility and purifying with MALDI-TOF mass spectrometry.

<table>
<tr><th colspan="2"></th><th colspan="2">CRISPR-Cas9 System</th><th>CRISPR-Cpf1 system</th></tr>
<tr><td rowspan="3">Construction</td><td>Nuclease</td><td colspan="2">Cas9</td><td>Cpf1</td></tr>
<tr><td rowspan="2">Guide RNA</td><td>crRNA</td><td rowspan="2">or Chimeric RNA (sgRNA)</td><td rowspan="2">crRNA</td></tr>
<tr><td>tracrRNA</td></tr>
<tr><td colspan="2">PAM sequence</td><td colspan="2">NGG</td><td>TTTN</td></tr>
<tr><td colspan="2">Cutting method</td><td colspan="2">Blunt ends</td><td>5’overhang</td></tr>
</table>

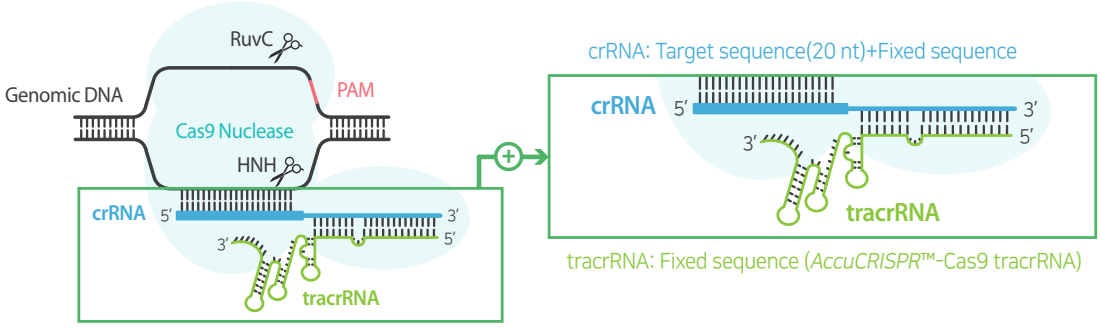
Contact Us

E-mail: CRISPR@bioneer.co.kr, Tel: +82-42-930-8752

CRISPR Cas9-gRNA

◎ Description

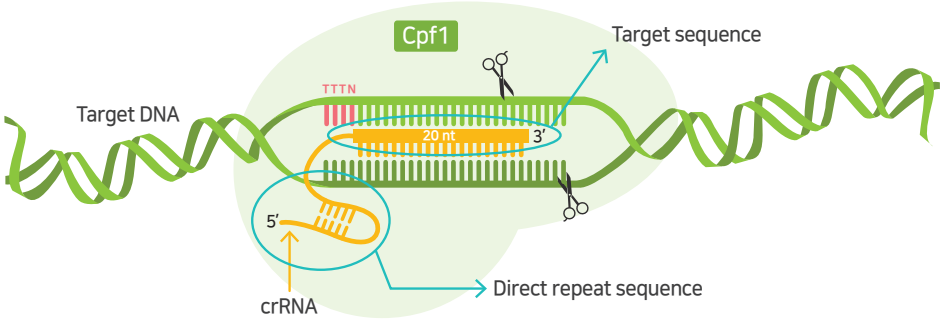
The gRNA in the CRISPR-Cas9 system consists of crRNA and tracrRNA containing Cas9 nuclease binding sequences. We sell crRNA and tracrRNA together so that our customer can easily construct a crRNA-tracrRNA complex in a ribonucleoprotein form to be directly used in the CRISPR system.



CRISPR Cpf1-gRNA

◎ Description

Bioneer provides gRNA that can be used on two types of Cpf1: AsCpf1 and LbCpf1. By inputting 20 nt target-specific sequences in our online order page, the fixed direct repeated sequences are automatically added in the order. After receiving the Cpf1 gRNA(crRNA), it can be used in the form of RNP (Ribonucleoprotein).



AccuCRISPR™-Cas9 tracrRNA

◎ Description

AccuCRISPR™-Cas9 tracrRNA works in the form of duplex with crRNA. As it has a fixed sequence, simply select its scale and quantity during your orders to be used with crRNA for your CRISPR system.

◎ Ordering Information

Cat. No.	Product Description
S-5120-5	*AccuCRISPR*™-Cas9 tracrRNA (5 nmole)
S-5120-10	*AccuCRISPR*™-Cas9 tracrRNA (10 nmole)

siRNA/miRNA Synthesis

Oligonucleotide Synthesis

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siRNA / miRNA Synthesis

List of Services/Products

Genome-wide Predesigned siRNA & Primer

AccuTarget™ Genome-wide Predesigned siRNA Library
AccuTarget™ Real-Time PCR Primer Library

Premade siRNA Set & Primer

AccuTarget™ Human Premade siRNA Sets
AccuTarget™ Real-Time PCR Primers for Premade siRNA Sets

Control siRNA

AccuTarget™ Control siRNAs (Positive / Negative)

Custom siRNA

AccuTarget™ Custom Designed siRNA Synthesis

miRNA Mimics & Inhibitors

AccuTarget™ Human miRNA Mimic / Inhibitor

Control miRNA

AccuTarget™ Control miRNAs (Positive / Negative)

Key Features

◎ Provide 164,643 presigned siRNA for 54,881 target genes of Human, mouse, rat and 1,786 human mature miRNA present in the miRBase Sequence Database (version 22)

◎ Guarantee more than 80% with the siRNA designed with validated Turbo si-Designer

◎ Undergo strict quality control by synthesizing in a clean room

What is Turbo si-Designer?

Turbo si-Designer is a siRNA design program developed by collaboration between BIONEER corporation and National Genome Information Center (NGIC). It uses algorithms to find the best siRNA target sites to construct predesigned siRNA with more than 80% guaranteed knockdown efficiency.

Contact Us

E-mail:siRNA-support@bioneer.co.kr, Tel: +82-42-930-8777

AccuTarget™ Genome-wide Predesigned siRNA Library

◎ Description

AccuTarget™ Genome-wide Predesigned siRNA Library uses Turbo si-Designer to design siRNA for 18,462 human genes, 19,859 mouse genes, and 16,560 rat genes, allowing us to immediately synthesize and ship the desired products to our customers. Furthermore, we have minimized the off-target effect to maximize the siRNA knockdown efficiencies and guaranteed to inhibit more than 80% of the target expression levels for three out of two siRNA for the same genes.

◎ Ordering Information

Product Description	Purification	Guaranteed Yield (nmol)	Service Period (Working Day)
AccuTarget™ Genome-wide Predesigned siRNA Library	Bio-RP/HPLC	10	2 - 3
		20	
		50	
		100	

AccuTarget™ Real-Time PCR Primer Library

◎ Description

AccuTarget™ Real-Time PCR Primer Library is a Real-time PCR primer for 11,154 human predesigned siRNA. All primers of this product have passed the amplification efficiency tests and QC tests using MALDI-TOF mass spectrometer.

◎ Ordering Information

Cat. No.	Product Description
PHS-P01	*AccuTarget*™ Real-Time PCR Primer for Individual Gene, 100 reactions
PHS-P02	*AccuTarget*™ Real-Time PCR Primer for Individual Gene, 200 reactions

AccuTarget™ Human Premade siRNA Sets

◎ Description

AccuTarget™ Human Premade siRNA set consists of 54,144 types of siRNAs that can be immediately used in transfection. This siRNA library set is constructed with 25 biological pathways (or gene family) specialized in research purposes such as specific cellular processes, cancers, and diseases. Furthermore, it can be either provided separately with 10, 20, 50, or 100 nmol or a whole set with 0.1, 0.25, 0.5, or 1 nmol each.

◎ Ordering Information

Product Description	Purification	Guaranteed Yield
AccuTarget™ Human Premade siRNA Set	Bio-RP/HPLC	1 siRNA (0.1, 0.25, 0.5, 2 nmol)
		2 siRNAs (0.1, 0.25, 0.5, 2 nmol)
		3 siRNAs (0.1, 0.25, 0.5, 2 nmol)
AccuTarget ™ Human Premade siRNA Subset		0.1, 0.25, 0.5, 2 nmol
AccuTarget ™ Human Druggable siRNA Library Set		0.1, 0.25, 0.5, 2 nmol (minimum order 10 siRNAs)

Gene Family Functional Class	Human Genes		Gene Family Functional Class	Human Genes	
	No. of Genes	No. of siRNA		No. of Genes	No. of siRNA
Antioxidant	38	114	Lyase	123	369
Apoptosis	290	870	Motor	122	366
Cancer	1,158	3,471	NF-kB pathway	37	111
Caspase	37	111	Nucleic acid binding	2,573	7,719
Cell cycle	112	336	Oxidoreductase	551	1,653
Cyclase	21	63	Peptidase	491	1,473
Cytochrome P450	52	156	Phosphatase	188	564
Deaminase	22	66	Receptor	1,516	4,548
GPCR signaling pathway	727	2,181	Transferase	1,428	4,284
Helicase	114	342	Transporter	1,021	3,063
Isomerase	104	312	Tubulin	20	60
Kinase	699	2,097	Ubiquitin	77	231
Ligase	272	816			

AccuTarget™ Real-Time PCR Primers for Premade siRNA Sets

◎ Description

AccuTarget™ Real-Time PCR Primers for Premade siRNA Sets are provided in 11,154 primer sets according to the signaling classification by gene function.

◎ Ordering Information

Product Description	The Number of Genes	Rxn/Gene
AccuTarget™ Human Real-Time PCR Primer Set	11,154 genes	50 reactions

* For more information, visit our Bioneer website (www.bioneer.com).

AccuTarget™ Control siRNAs (Positive / Negative)

◎ Description

AccuTarget™ Positive Control siRNA has a high knockdown efficiency being more than 90% for its target genes. Moreover, *AccuTarget*™ Negative Control siRNA is a non-targeting siRNA with low homology for all genes of humans, mice, and rats to be used as a negative control for knockdown experiments.

◎ Ordering Information

Cat. No.	Product Description	Purification	Guaranteed Yield
Positive Control siRNA			
SP-1001/1002/1003	*AccuTarget*™ GAPDH Positive Control siRNA	Bio-RP	5/10/20 nmol
SP-1011/1012/1013	*AccuTarget*™ GAPDH Positive Control siRNA	HPLC	
SP-2001/2002/2003	*AccuTarget*™ GFP Positive Control siRNA	Bio-RP	
SP-2011/2012/2013	*AccuTarget*™ GFP Positive Control siRNA	HPLC	
SP-3001/3002/3003	*AccuTarget*™ Luciferase Positive Control siRNA	Bio-RP	
SP-3011/3012/3013	*AccuTarget*™ Luciferase Positive Control siRNA	HPLC	
SP-4001/4002/4003	*AccuTarget*™ Mouse Lamin A/C Positive Control siRNA	Bio-RP	
SP-4011/4012/4013	*AccuTarget*™ Mouse Lamin A/C Positive Control siRNA	HPLC	
SP-5001/5002/5003	*AccuTarget*™ Mouse cyclophilin B c Positive Control siRNA	Bio-RP	
SP-5011/5012/5013	*AccuTarget*™ Mouse cyclophilin B c Positive Control siRNA	HPLC	
Negative Control siRNA			
SN-1001/1002/1003	*AccuTarget*™ Negative Control siRNA	Bio-RP	5/10/20 nmol
SN-1011/1012/1013	*AccuTarget*™ Negative Control siRNA	HPLC	
SN-1021/1022/1023	*AccuTarget*™ Fluorescein-labeled Negative Control siRNA	HPLC	
Control siRNA Sets			
SS-1001/1002/1003	*AccuTarget*™ GAPDH / GFP / Luciferase Control siRNA Set	Bio-RP	5 nmol PC + 2 nmol NC
SS-1011/1012/1013	*AccuTarget*™ GAPDH / GFP / Luciferase Control siRNA Set	HPLC	

AccuTarget™ Custom Designed siRNA Synthesis

◎ Description

AccuTarget™ Custom Designed siRNA Synthesis service synthesizes siRNA with the requested sequences by customers. Not only we use Turbo si-designer for the siRNA design, but also can apply various modifications to your RNA sequences as they want.

◎ Ordering Information

Cat. No.	Product Description	Purification	Guaranteed Yield
S-1017-1/2/3/4	*AccuTarget*™ Custom Designed siRNA Synthesis	Bio-RP	10/20/50/100 nmol
S-1018-1/2/3/4	*AccuTarget*™ Custom Designed siRNA Synthesis	HPLC	

* For more information on the available modification services, visit our Bioneer website (www.bioneer.com).

AccuTarget™ Human miRNA Mimic & Inhibitor

◎ Description

AccuTarget™ miRNA mimic is a double-stranded RNA oligonucleotide that is chemically synthesized and manufactured from 1,786 human mature miRNA present in the miRbase Sequence Database (version 22). *AccuTarget*™ miRNA Inhibitor is a single-stranded synthetic RNA designed to target each of human miRNA and inhibits its functions. Ready-to-transfect miRNA shows the same activity as endogenous miRNA in the cells after its transfection, while miRNA inhibitor suppresses target miRNA activity to be used in the loss-of-function studies of miRNA.

◎ Ordering Information

Cat. No.	Product Description	Purification	Guaranteed Yield
Custom miRNA			
SMM-001/002/003	*AccuTarget*™ miRNA Mimic	Bio-RP	5/10/20 nmol
SMI-001/002/003	*AccuTarget*™ miRNA Inhibitor	Bio-RP	
Library miRNAs			
SML-1001/1002/1003/1004	*AccuTarget*™ miRNA Mimic	Bio-RP	0.25/0.5/1/2 nmol
SML-2001/2002/2003/2004	*AccuTarget*™ miRNA Inhibitor	Bio-RP	

AccuTarget ™ Control miRNAs

◎ Description

AccuTarget™ miRNA Housekeeping Positive Control targets 3'UTR(untranslated region) of a housekeeping gene GAPDH with over 90% of knockdown efficiency. Also, miRNA Negative Control has a minimum sequence identity for all miRNA in humans, mice, and rats.

◎ Ordering Information

Cat. No.	Product Description	Purification	Guaranteed Yield
Positive Control siRNA			
SMC-1001/1002/1003	*AccuTarget*™ miRNA Housekeeping Positive Control (GAPDH)	Bio-RP	5/10/20 nmol
Negative Control miRNA			
SMC-2001/2002/2003	*AccuTarget*™ miRNA Mimic Negative Control #1	Bio-RP	5/10/20 nmol
SMC-3001/3002/3003	*AccuTarget*™ miRNA Mimic Negative Control #2	Bio-RP	
SMC-4001/4002/4003	*AccuTarget*™ Fluorescein-labeled miRNA Mimic Negative Control #1	HPLC	
SMC-5001/5002/5003	*AccuTarget*™ Fluorescein-labeled miRNA Mimic Negative Control #2	HPLC	
SMC-2101/2102/2103	*AccuTarget*™ miRNA Inhibitor Negative Control #1	Bio-RP	
SMC-3101/3102/3103	*AccuTarget*™ miRNA Inhibitor Negative Control #2	Bio-RP	
SMC-4101/4102/4103	*AccuTarget*™ Fluorescein-labeled miRNA Inhibitor Negative Control #1	HPLC	
SMC-5101/5102/5103	*AccuTarget*™ Fluorescein-labeled miRNA Inhibitor Negative Control #2	HPLC	

In vivo siRNA delivery using SAMiRNA™

Oligonucleotide Synthesis

01

In vivo siRNA delivery using SAMiRNA™

List of Service

SAMiRNA™ Custom Service

Key Features

- The world's only technology delivering the native siRNA/miRNA through the single molecule nanoparticle transporter substance
- **No side effects:** a safe drug delivery system with no innate immune and inflammatory responses
- **Low toxicity:** Only ~ 100 mpk of NOAEL in mouse
- Preferential delivery to tumors and inflammatory tissues: suitable for solid tumors, fibrotic diseases
- Advanced mechanism: single step automated synthesis process without the need of additional formulation or complicated quality control tests.

Contact Us

E-mail:siRNA@bioneer.co.kr, Tel: +82-42-930-8777

SAMiRNA™ Custom Service (Self-Assembled-Micelle-inhibitory-RNA)

◎ Description

SAMiRNA™ is a RNAi drug substance in the form of nanoparticle that uses an innovative new technology developed by our company which has overcome the limitation of traditional siRNA-based therapeutic technology to safely deliver the siRNA to the *in vivo* target organ and cells efficiently. As the world's only siRNA prodrug, SAMiRNA™ is a revolutionary RNAi substance composed of a single molecule structure of a nanoparticle which maintains its stability even when it is injected to the blood-stream. It can be selectively delivered to the cancerous and diseased cells. As it enters the target cell, it is converted to siRNA which in turn degrade the cancer-inducing RNA.

Most of the siRNA therapeutic technologies currently undergoing clinical trial require liposome-based formulation or encapsulation step of the synthesized siRNA as the delivery vehicle to transport into the target tissue. However, at this time, not only it is difficult to control the loading efficiency of synthesized siRNA into the liposome, but as siRNA normally has low loading efficiency, the drug has to undergo complicated QC process for isolation and purification of the packaged siRNA for mass production. Furthermore, some reports state that some lipid components consisting the liposome have toxicity including innate immune response.

Unlike this liposome-based formulation, SAMiRNA™ has overcome the liposome siRNA drugs by being prepared as a single entity in a fully automated synthesis system by self-assembling in an aqueous solution to be made into a stable nanoparticle without formulation. The therapeutic effect of this product for cancer or fibrosis has been already tested by mouse model experiments. Moreover, SAMiRNA™ has less toxicity than the conventional siRNA carriers, allowing our product to be more advantageous than the others as the new generation drug candidate.

SAMiRNA	Order Scale of SAMiRNA (nmol)	Number of Mouse (intravenous injections)
Custom Designed SAMiRNA	100	5 mg/ kg → 5 mouse / 1 mg/ kg → 25 mouse
	500	5 mg/ kg → 25 mouse / 1 mg/ kg → 125 mouse
	1000	5 mg/ kg → 50 mouse / 1 mg/ kg → 250 mouse
Control SAMiRNA	100	5 mg/ kg → 5 mouse / 1 mg/ kg → 25 mouse
	500	5 mg/ kg → 25 mouse / 1 mg/ kg → 125 mouse
	1000	5 mg/ kg → 50 mouse / 1 mg/ kg → 250 mouse
Fluorescence conjugated SAMiRNA (FITC, Cyanine 5.5 etc)	100	5 mg/ kg → 5 mouse / 1 mg/ kg → 25 mouse
	500	5 mg/ kg → 25 mouse / 1 mg/ kg → 125 mouse
	1000	5 mg/ kg → 50 mouse / 1 mg/ kg → 250 mouse

MALDI-TOF MS Analysis

Oligonucleotide Synthesis

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MALDI-TOF MS Analysis

List of Service

MALDI-TOF MS Analysis Service

Key Features

◎ **Trustworthy methology:** Provide reliable data through periodically qualified MALDI-TOF Mass spectrometer

◎ **Accurate data:** Purify samples by desalting pre-treatment to remove salt, impurities, etc. in the samples

◎ **Rich experience:** Undergo accurate and fast analysis results based on 20 years of experience in oligo nucleotide synthesis and quality control

Contact Us

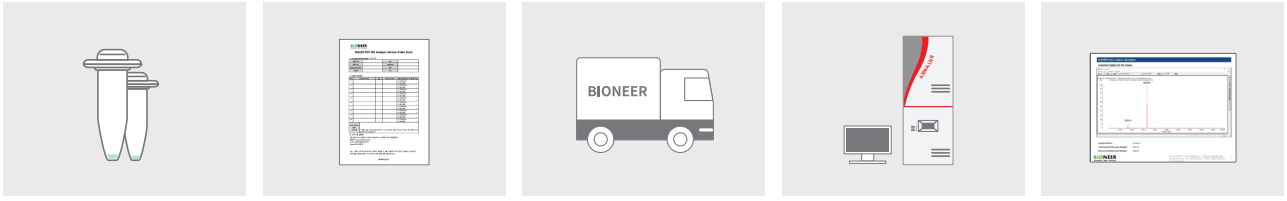
E-mail:maldims@bioneer.co.kr, Tel: +82-42-930-8554

MALDI-TOF MS Analysis Service

◎ Description

MALDI-TOF MS analysis involves ionization of biomolecules and large organic molecules with lasers to measure their molecular weight using matrix. This allows to quickly analyze polymeric materials without sample degradation. Our analysis service uses MALDI-TOF Mass spectrometers to provide reliable molecular weight analysis results only within two days with our rich experiences and expertise after receiving the single strand oligonucleotide from our customers.

◎ Workflow



* The Service Order Form can be downloaded from our Bioneer website (www.bioneer.com).

* Please print out the completed form and sent it together with the sample to be analyzed to the following address: 8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea, Bioneer Quality Management Team.

◎ Ordering Information

Cat. No.	S-2400
Sample target	Single strand oligo nucleotide (DNA, RNA)
Required amount of measurement	500 pmol~1 nmol
Maximum measuring range	1000 - 15,000 Da (within about 50 mer)
Using matrix	3-hydroxy-2-pyridinecarboxylic acid
Analysis period	Within 2 days after receipt of sample
Result of analysis	Send report (attachment) by e-mail

DNA/RNA Amplification

Molecular Biology

02

DNA / RNA Amplification

List of Service

AccuPower® Customized DNA/RNA Amplification Kit

Key Features

◎ Draw reliable results from repetitive DNA/RNA amplification tests

◎ Manufactures DNA/RNA amplification kits specially made for each customer

◎ Provide simplified procedures containing all the components necessary for PCR packaged and mixed in tubes/plates for reactions to be performed immediately just by adding the template DNA/RNA and D.W.

◎ Maintain enzyme activity for a month at room temperature, a year in a freezer by using our patented stabilizer

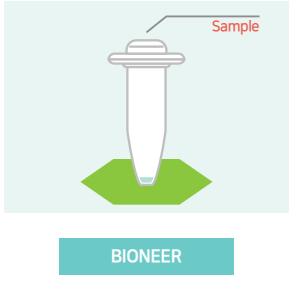
Contact Us

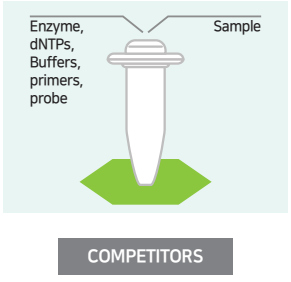
E-mail:customized_service@bioneer.co.kr, Tel: +82-42-930-8577

AccuPower® Customized DNA/RNA Amplification Kit

◎ Description

AccuPower® Customized DNA/RNA Amplification Kit Service provides tailor-made DNA/RNA amplification PreMix products optimized to draw out highly reproducible results under customer's experiential conditions by undergoing multiple PCR tests. This has a great advantage of high reaction specificity and PCR amplification efficiency, along with minimized amplified products from non-specific reactions and primer-dimer formation. Comprehensive types of premixes for various types of PCR reactions can be ordered, such as complex genomics, cDNA templates, low-copy targets, multiplex PCR, and etc. Moreover, each tube contains mixtures, consisting of all the necessary reactants like DNA polymerase, dNTPs, reaction buffers, and thermostable PPase, mixed together and vacuum dried with the ordered primer sets, packaged with amounts sufficient for one PCR run for it to be easily started just be adding the template and the D.W.





Company	BIONEER	R Company
Convenience	+++ (Vacuum dry)	+++ (Frozen liquid type; requires mixing)
Stability	+++ (Over 1year in freezer)	++ (Less than 6mouths in freezer)
Cross-contamination resistance	+++	++
Autimation	+++ (Simple process & instrumentation)	+

◎ Ordering Information

Production Period	Single	~ 10 working days
	2-3 Multiplex	~ 12 working days
	4 Multiplex	~ 16 working days
	5 Multiplex	Inquire
Minimum Quantity	1,920 tests (480 x 4 plates)	

* The time taken for the manufacture will be longer if no template is provided.
* The duration for the QC tests is not included in the production period.
* The fee for the oligo synthesis is billed separately from the quoted price.

Gene Expression Analysis

Molecular Biology

02

Gene Expression Analysis

List of Services

- *AccuPower*® qPCR Array Service
- *AccuPower*® Customized qPCR Panel Kit
- Primer & Probe Design Service
- Single Gene qPCR Primer Set

Key Features

◎ Directly use the results in SCI papers as all the procedures are conducted strictly to the MIQE guideline

◎ Perform service according to the customer's needs and quickly provide the customized publication grade analysis results

◎ Use 12,000 pairs of human primer libraries with proven amplification efficiency to provide accurate results

What is MIQE Guideline?

MIQE (Minimum Information for Publication of Quantitative Real-time PCR Experiments) Guideline* is an evaluation standard agreed upon by qPCR experts around the world for quality control of the "qPCR Gene Expression Analysis" papers. A step-by-step checklist is presented throughout the entire experiment to determine and evaluate the reliability, accuracy, and reproducibility of the qPCR experiments. This service provides all the information of the conducted experiences to the customers for them to evaluate the results by themselves.

*Bustin, S.A., et al. 2009. The MIQE Guidelines: Minimum Information for Publication of Quantitative Real-Time PCR Experiments, *Clinical Chemistry* 55:4, 611-622.

qPCR Array Library

Primer Library is designed using primer blast and its bioinformatics tool. It is classified into 10 categories, including an unknown set of genes. See qPCR Array Library when selecting the target gene.

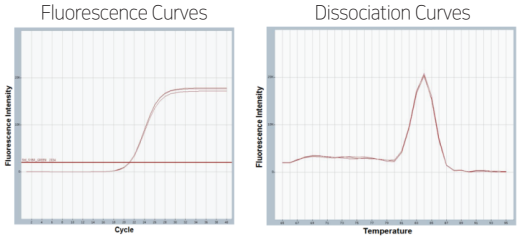


Figure 1. Primer validation result (Example. ACTB gene)

qPCR Array Library Categories	
1. Cancer	6. Signal transduction
2. Cellular differentiation & Regulation	7. Stem cell & Cell development
3. Disease	8. Toxicology & Drug metabolism
4. Immunology	9. Biological process
5. Metabolism	10. Unknown genes

Contact Us

E-mail:qPCRarray@bioneer.com, Tel: +82-42-930-8673

AccuPower® qPCR Array Service

◎ Description

qPCR Array Service undergoes quantitative analysis on various gene expression. We provide this service for gene analysis requested by customers and pathways for numerous diseases and metabolism.
The qPCR Array combines real-time PCR, being the most sensitive and reliable analysis for gene expression, and microarray, allowing to profile multiple gene expression patterns once. This can enable accurate quantitative analysis of multiple genes at a low cost.

◎ Workflow

1. Consultation and Sample shipping

The starting stage differs by the types of the requested sample. We accept cells, tissues, blood, total RNA, cDNA, etc. Please refer to our homepage or contact us to discuss more information on sample preparation.

2. Total RNA extraction and gDNA removal

We choose the suitable RNA extraction kit for maximized quality and purity of total RNAs depending on the types of sample. Furthermore, we treat the sample with RNase free DNase I to eliminate gDNAs that may affect the mRNA quantification analysis.

3. Quality Check

As impurities in the total extracted RNA can inhibit the PCR, thus affecting the amplification efficiency, we use spectrophotometers to measure both the quantity and purity of nucleic acids. Not only that, as it is difficult to accurately quantify the degraded DNA, capillary gel electrophoresis will be also used to measure the RNA quality score (RQS). All the measurements will be recorded in the reports and sent to the customers. We proceed to the next step only when the purity and degree of degradation of the RNA satisfy the recommended value (RQS > 8.0).

4. cDNA synthesis

We synthesize the full-length cDNA, even from RNAs with complex secondary structures, to get accurate expression analysis results using our two patented technologies: Thermostable RTase (*RocketScript*™) and Cyclic Temperature Reverse Transcription (CTRT). We use different RT primers, Oligo dT or Random primers (dN6, dN12), depending on the customer's research purposes.

5. qPCR

We use *Exicycler*™ 96 Real-Time Quantitative Thermal Cycler having our patented highly-sensitive optical detection system to draw exceptionally reliable qPCR data. We also have all our equipment regularly inspected and managed under ISO regulations While the qPCR primer sets, the standard specimen mixed with various cDNA, are used with stratagene reference total RNA(Human, Mouse, Rat) or the specimen provided by the customers to check the target specific amplification.

6. Analyzing and providing results

We carry out relative quantitative analysis of qPCR by using $2^{-\Delta\Delta Ct}$ method. Customers will receive Excel files having the following data: raw Ct values, melting curve analysis, p-values, fold changes, scatter plots, volcano plots, and heat map images. If the customer has installed *Exicycler*™ analysis software, we can also provide qPCR raw data. Additionally, information on primers such as genetic information, amplicon size, and PCR conditions following the MIQE can be also provided upon the customer's request.

◎ Ordering Information

Customized Service		≤ 16 genes	≤ 32 genes	≤ 96 genes
cDNA Sample	Minimum Volume	200 µl	400 µl	900 µl
RNA Sample	Minimum Volume /Minimum Concentration	15 µl / 100 ng/µl		
	Total RNA Amount	> 5 µg	> 10 µg	> 20 µg
Service Period		2 weeks	2~3 weeks	3~5 weeks

* Service period may be prolonged if the request is made by using the primer not owned by Bioneer.
* Please inquire Single gene qPCR separately.
* For details about the request, visit the Bioneer website(www.bioneer.com)

AccuPower® Customized qPCR Panel Kit

Description

AccuPower® Customized qPCR Panel Kit has a batch of proven primer pairs that can be easily used for analysis just by adding cDNA samples and 2X Master Mix. Additionally, we can provide customized plate layout designed and made according to the customer's needs. We have our specialized experts to manufacture the plates according to the MIQE (Minimum Information for Publication of Quantitative Real-time PCR Experiments) Guidelines* for accurate, reliable, and quick analysis results to be used in SCI papers.

*Bustin, S.A., et al. 2009. The MIQE Guidelines: Minimum Information for Publication of Quantitative Real-Time PCR Experiments, *Clinical Chemistry* 55:4, 611-622

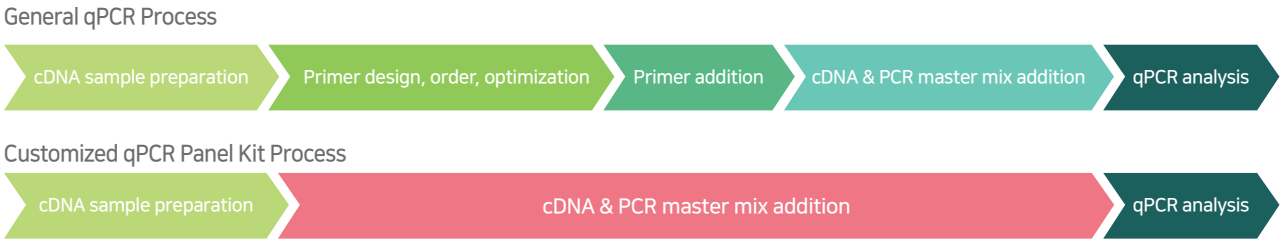


Figure 1. Comparison with the general qPCR and customized qPCR panel kit.

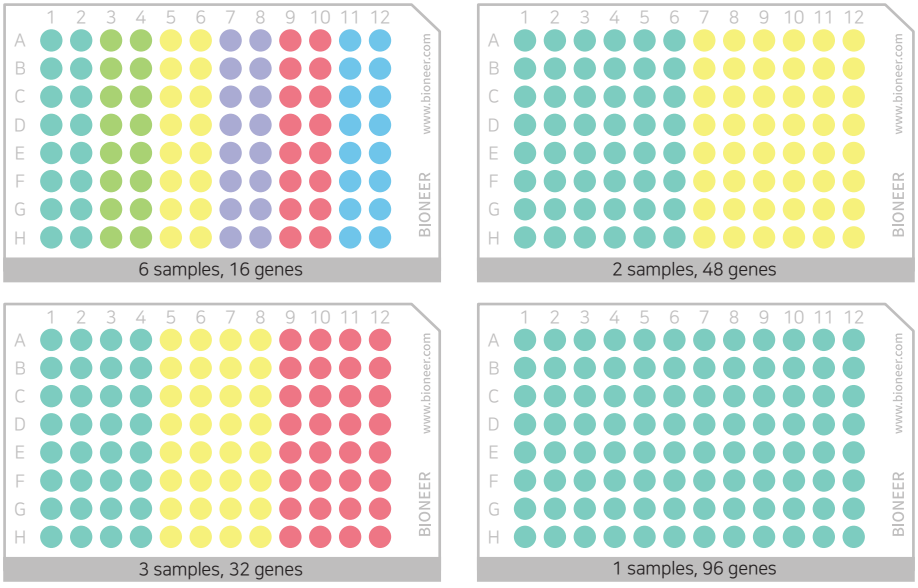


Figure 2. Examples of customized qPCR panel kit by number of genes.

Ordering Information

The Number of Genes	1 - 16 genes	17 - 32 genes	33 - 96 genes
Minimum Order Quantity	3 plates	4 plates	9 plates
Service Period	Inquire		

* The service can be only ordered through email. Please download the order form in our website (www.bioneer.com) and send it to us.
* Services requested with the primers not owned by Bioneer will take longer time than usual.
* Refer to our qPCR Array Library for the target gene selection (genes not found in the library is also available.).
* All the qPCR primer sets have been validated by *Exicycler*™ 96 and *AccuPower*®2X *GreenStar*™ Master Mix.

Primer & Probe Design Service

◎ Description

Accurate primer and probe designs are essential for obtaining a reliable real-time PCR data. Nevertheless, those processes require years of experience and knowledge in gene tests and construction.
Through our continuous researches and development, our gene expression analysis team has gained about 12,000 validated primer pairs to obtain accurate expression analysis results. With this expertise, our experts can quickly provide the best optimized primer designs & probes fitting customers' research purposes the most.

◎ Ordering Information

You can find the service information in our Bioneer website (www.bioneer.com). Please send the application form through our email (qPCRarray@bioneer.com).

Number of Genes	Two primary genes	For two additional genes
Service Period	Reports are sent on the very day	Adds one more day
Cat. No.	S-6000	

Single Gene qPCR Primer Set

◎ Description

Our Single Gene qPCR Primer Sets not only validate primers for gene expression analysis, but also synthesize and delivers them to the customers. Qualification processes are the most important step in obtaining reliable real-time PCR analysis data. To make precise and accurate qPCR primers for expression analysis, it not only requires constructive designs, but also needs numerous validation tests. Thus, even the most experienced experts require considerable time and money.
Our experts in Bioneer meticulously test the target specificity and amplification efficiency of the primers strictly based on the sequences provided by the customers. Then, they will be synthesized and delivered. All the tests will comply with MIQE Guidelines, the guide for reliable qPCR test results. Primers will be synthesized and sent with the amount sufficient for 200 qPCR tests. Our products can be immediately used in research papers without requiring the customers to do any validation tests prior to their experiments.
If the customers do not know, or cannot provide their primer sequences, we can still synthesize, verify, and ship the sets by sending us the target genomic information for expression analysis with "Primer & Probe Design Service," which will require a separate charge.

◎ Ordering Information

You can find the service information in our Bioneer website (www.bioneer.com). Please send the application form through our email (qPCRarray@bioneer.com).

Cat. No.	Product Description
S-6042-S200	Single Gene qPCR Primer Set
Related products	
K-3140	*AccuPrep*® Universal RNA Extraction Kit (100 rxn)
K-2201	*AccuPower*® *RocketScript*™ Cycle RT PreMix (dT_{20}) (96 T, 20 µl)
K-6254	*AccuPower*® 2X *GreenStar*™ qPCR Master Mix (-ROX Dye) (5 ml)

*Single Gene qPCR Primer Set is optimized for the above products.

Gene Synthesis

Molecular Biology

02

Gene Synthesis

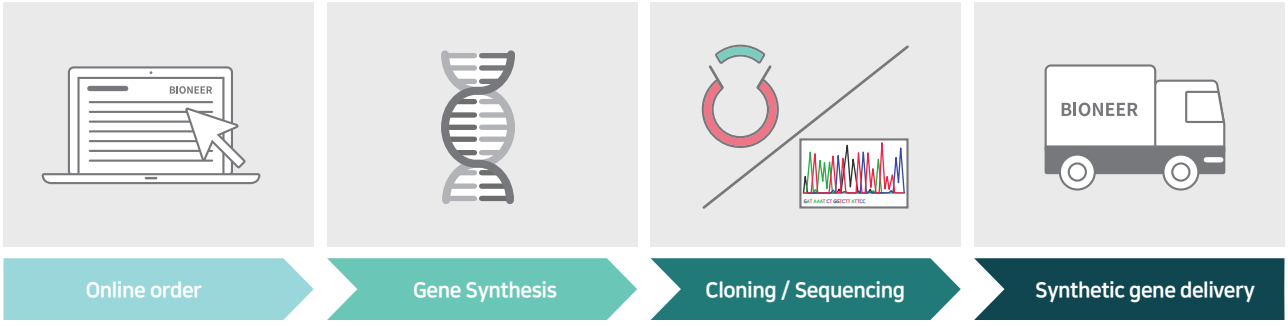
List of Services

Gene Synthesis Service	Gene Cloning Service
Rapid Gene Synthesis Service	Mutagenesis Service
AccuGeneBlock Service	Codon Library Mutagenesis Service

Key Features

- ◎ Use integrated production system utilizing high-speed oligo synthesizer allowing to quickly synthesize uniformed quality of oligos from raw materials
- ◎ Guarantee 100% sequence accuracy using Automatic DNA sequencer (ABI 3730)
- ◎ Provides codon optimization services with our accumulated experience and techniques
- ◎ Select from wide range of choices for compatible vectors according to the desired applications at a reasonable price

Workflow



Contact Us

E-mail:geneorder@bioneer.com, Tel: +82-42-930-8793, 8515

Gene Synthesis Service

◎ Description

Gene Synthesis Service synthesizes and provides genes with 100% accuracy only by the gene or protein sequence information.

◎ Ordering Information

Service Period	1 – 1,200 bp	(Guarantee) 12 working days
	1,201 – 2,000 bp	(Guarantee) 17 working days
	2,001 – 3,000 bp	(Guarantee) 22 working days
	3,001 bp –	Inquire
Delivery Form	2 ~ 5 ug of lyophilized plasmid (*Low copy plasmid: 1~2 μg)	
Cloning Vector	Basic vector –pBHA	
	Other - Inquire	
Subcloning	Combined with Gene Cloning Service if the order contains commercial or custom vectors	
Additional Service	Plasmid Amplification Service	

* The service period will be extended along with the price increase if the sequences contain complicated structures such as high or low GC, repeats, homo-polymeric runs, etc.
* Genes inhibiting *E.coli* growth or producing substances toxic to its cellular system will be delivered either in the mutated form of plasmid DNA or in the form of PCR products.
* Please use the "Gene to Protein Service" to undergo protein synthesis and purification after our gene synthesis service to obtain the proteins directly.
* Visit our Bioneer website (www.bioneer.com) for more information on vectors.

Rapid Gene Synthesis Service

◎ Description

Rapid Gene Synthesis Service provides synthetic genes just within 5 to 8 days after the order date.

◎ Ordering Information

Service Period	1 - 500 bp	5 working days
	501 – 1,500 bp	8 working days
Delivery Form	2 ~ 5 ug of lyophilized plasmid	
Cloning Vector	pBHA	
Additional Service	Plasmid Amplification Service	

* Synthesis of genes having complex sequences such as high or low GC, repeats, homo-polymeric runs, etc. may be limited. In this case, Please use our General Gene Synthesis service.
* Synthesis of genes inhibiting *E.coli* growth or producing toxic substances to its cellular system may be limited. In this case, Please use our General Gene Synthesis service. We cannot guarantee the service time if we find those characteristics during the synthesis process.
* 40% of discount will be applied if the synthesis is completed after our guarantee period.

AccuGeneBlock Service

◎ Description

AccuGeneBlock Service provides synthetic genes less than 1 kb in the form of double stranded DNA within at least 3 days.

◎ Ordering Information

Service Period	500 bp or less	Average 3 - 5 working days
	501 – 1,000 bp	Average 4 - 6 working days
Delivery Form	500 ng ~ 1 ug of lyophilized PCR product (3' A-tailing or blunt end form)	
Additional Service	Amplification Service	

* Synthesis of genes having complex sequences such as high or low GC, repeats, homo-polymeric runs, etc. may be limited. In this case, Please use our General Gene Synthesis service.
* Only 1 Kb or less genes can be synthesized.
* All the products are shipped after a meticulous sequence check.

Gene Cloning Service

◎ Description

Gene Cloning service provides a simple, straightforward cloning and sequence check using our long periods of expertise in the field of molecular biology.

◎ Ordering Information

Available Materials	Plasmid DNA	≥ 10 µl, 150-200 ng/µl
	PCR Product	≥ 10 µl, 50 ng/µl
Service Period	1 - 8 kb (vector+insert)	Average 5 - 10 working days
	8 - 11 kb (vector+insert)	Average 10 - 15 working days
	11 kb - (vector+insert)	Inquire
Additional Service	Plasmid Amplification Service *Excluded for low copy plasmid service	
	Discount when combined with Gene Synthesis Service	

* The price and period can increase depending on the structures and characteristics of the genes.
* Vector costs will be charged separately if the cloning service is requested with a commercial vector.
* Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.
* A fee of 50% of the total cost will be charged for the cancelation.
* If you want us to pause the service due to your personal reasons, we can hold for 1 month at maximum. Afterwards, we will automatically cancel your order and charge 50% of the total cost.

Mutagenesis Service

◎ Description

Mutagenesis service synthesizes mutant genes essential for studies on structures of proteins and improvements on enzyme functions. This can be used with Gene Synthesis Service to prepare your researches quickly and easily.

◎ Ordering Information

Available Materials	Plasmid DNA	≥ 10 µl, 150-200 ng/µl
Service Period	- 1 kb	Average 5 -10 working days
	1 kb - 3 kb	Average 10 - 15 working days
	3 kb - 5 kb	Average 15 - 25 working days
	5 kb -	Inquire
Additional Service	Plasmid Increase Service	
	Discount when combined with gene synthesis	

* The price and period can increase depending on the structure and characteristics of the gene.
* Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.

Codon Library Mutagenesis Service

◎ Description

Codon Library Mutagenesis Service can provide gene libraries by codon-based mutagenesis based on the codon bias of a species of the customer's interest. Simply select the species to express the genes and specify the location of the codons, along with the name of the amino acids for us to undergo the codon mutation process in the DNA form according to the codon usage of the selected species. A maximum of 7 consecutive codons can be selected for the mutation sites (maximum of 21 bp for DNA).

◎ Ordering Information

Available Materials	Plasmid DNA	≥ 10 µl, 150-200 ng/µl
Service Period	- 1 kb	Average 5 - 10 working days
	1 kb - 3 kb	Average 10 - 15 working days
	3 kb - 5 kb	Average 15 - 25 working days
	5 kb -	Inquire
Additional Service	Plasmid Amplification Service	
	Discount when combined with gene synthesis	

* The price and period may increase depending on the ordered structure and characteristics of the gene.
* Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.

Sanger Sequencing

Molecular Biology

02

Sanger Sequencing

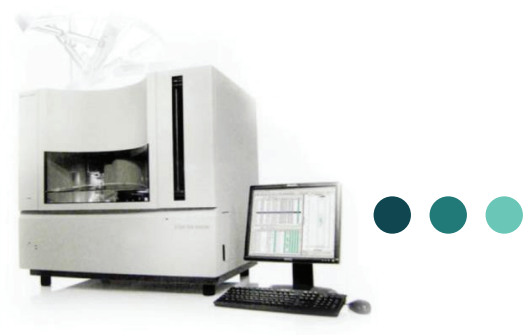
List of Services

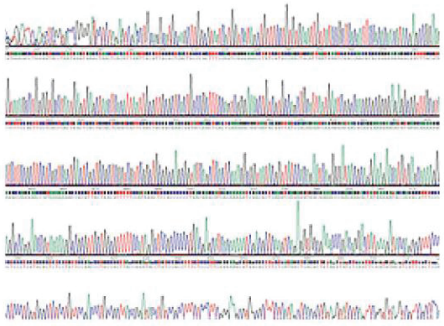
- Standard Sequencing Service
- Difficult Sequencing Service
- Full-length Sequencing Service (primer walking)
- Additional Service

Key Features

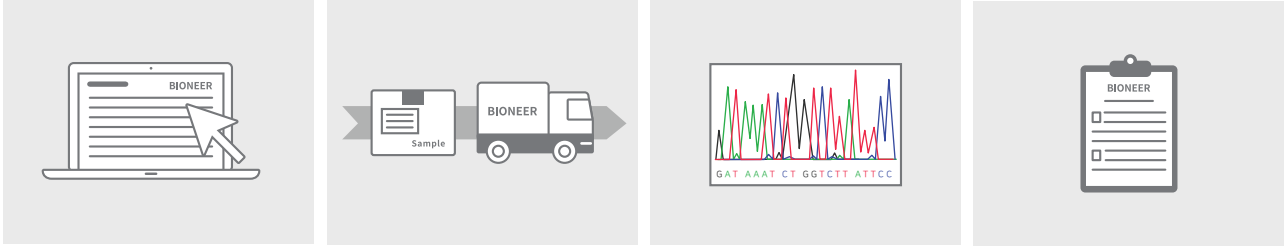
◎ High quality data with accurate results through automated process
(Phred Score (QV): ≥ 20, Guaranteed read lengths: ≥ 700bp)

◎ Supply of commonly used universal primer capable of being selected upon order





Workflow



Contact Us

E-mail:sequencing@bioneer.co.kr, Tel: +82-42-930-8777

Sanger Sequencing

◎ Description

Standard Sequencing

Standard Sequencing Service undergo analysis of desired plasmid or PCR product regions using a primer optimized for most of the normal samples.

Full-length Sequencing (Primer walking)

Full Length Sequencing Service utilizes primer walking to analyze plasmids, long inserts, or PCR products. The service time depends on the size, but it takes about a week for a plasmid being about 3 kb long. The data will be provided in the form of contig file for each single data and assembly while the primer and its design will be sent in a dried form after the analysis.

Difficult Sequencing

This product is for analyzing templates difficult to be done using the Standard Sequencing service such as those having GC/AT rich regions, repeated sequences, secondary structures, etc. This service is optimized using our long time experiences and techniques by utilizing different conditions and reagents from the Standard Sequencing Service.

Additional Service

Optional choices of services can be provided depending on the requested type of sample, such as PCR purification, Gel-extraction, and PCR clean-up.

◎ Ordering Information

Sample and primer preparation

Sample Type	Concentration	Volume/rxn	Purity
Plasmid DNA	≥ 100 ng/μl	≥ 10 μl	A_{260}/A_{280}: ~1.8 A_{260}/A_{230}: 2.0-2.2
PCR product	≥ 50 ng/μl	≥ 10 μl	
Non-purified PCR product	≥ 50 ng/μl	≥ 20 μl	
Genomic DNA	≥ 30 ng/μl	≥ 30 μl	

Primer Type	Concentration	Volume/rxn
Specific primer	5 pmol/μl (5 μm)	5 μl
Universal primer	Simply write the primer name if owned by our company; free primers are available for use.	
Ordered primer	Can order with oligo and sequencing service at the same time	

* Please prepare the sample in a 1.5 ml tube or plate based on 1 rxn basis also with an amount sufficient for a re-reaction.
* Samples and primers will be discarded after a month. Please ask us separately if you want us to store them longer.
* Although you can keep the primers, we are not responsible for their degradation caused by long-term storage. We recommend to change the primers every month and freeze them in several tubes.

mRNA Profiling

Molecular Biology

02

mRNA Profiling

List of Services

Next-generation RNA Sequencing (RNA-seq) + Gene Expression Analysis Service (qPCR Array Service)

Key Features

◎ Undergo RNA-seq and qPCR array to provide both single-step gene discover and verification services at once

RNA Seqeuncing
- Total RNA Sequencing
- mRNA Sequencing
- Small RNA Sequencing

+

Gene Expression Analysis Service

<Service>
qPCR Array Service

<Primer Optimization Service>
qPCR Array System: Customized qPCR panel kit
Single Gene qPCR Primer Set

Workflow

E-mail order→ Sample shipment→ RNA extraction and QC → Library Prep. → NGS → Data report→ qPCR Array Service sample shipment → RNA extraction and QC → cDNA synthesis → qPCR and data analysis → Data report

Contact Us

RNA-seq E-mail: NGS_support@bioneer.co.kr, Tel: +82-42-930-8553

qPCR Array Service E-mail:qPCRarray@bioneer.com, Tel: +82-42-930-8673

mRNA Profiling Service

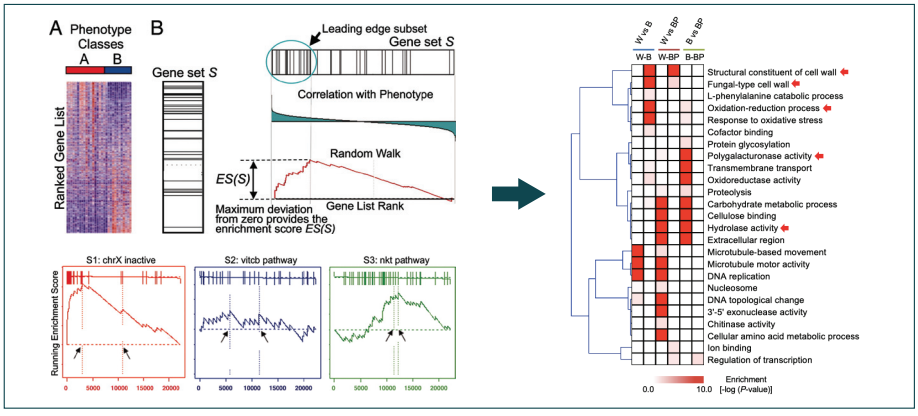
◎ Description

RNA-seq and qPCR Array Systems are high quality services performed by our experienced experts. Not only we can provide RNA Sequencing Service to check the differences between the sample expression values, but also offer differentiated analysis packages (such as Gene Expression, DEG, GO, etc.) from rich bioinformatics infrastructure. Furthermore, our qPCR Array Service complies with the MIQE Guidelines* made for real-time PCR experts to quickly deliver accurate real-time PCR data which can be directly published in research papers.

* Bustin, S.A., et al. 2009. The MIQE Guidelines: Minimum Information for Publication of Quantitative Real-Time PCR Experiments, *Clinical Chemistry* 55:4, 611-622.

RNA-Seq (NGS)

• Gene Set Enrichment Analysis



• Functional Annotation

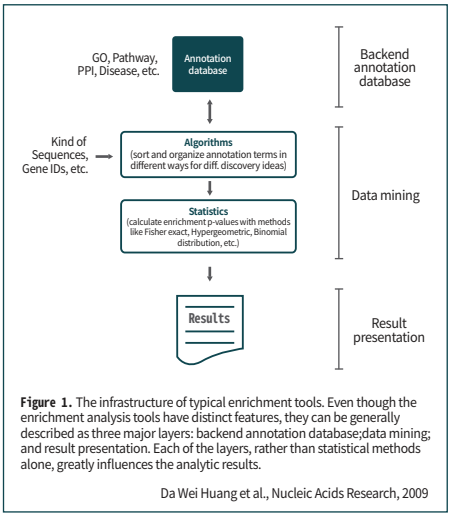
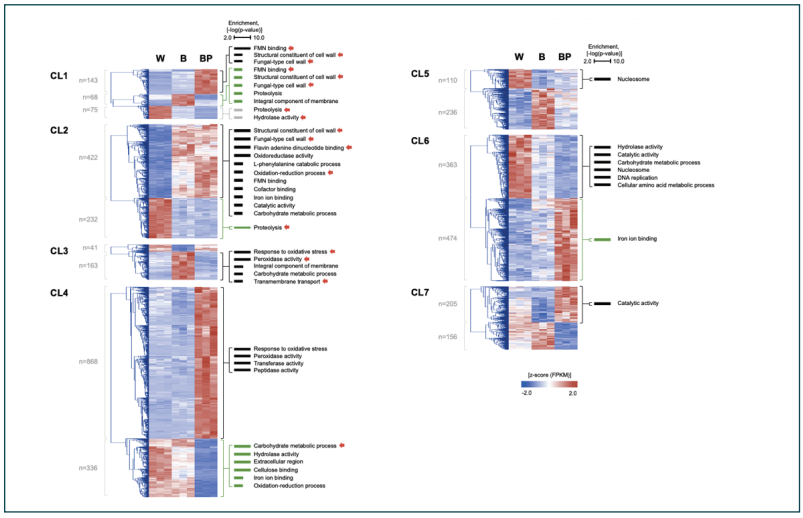


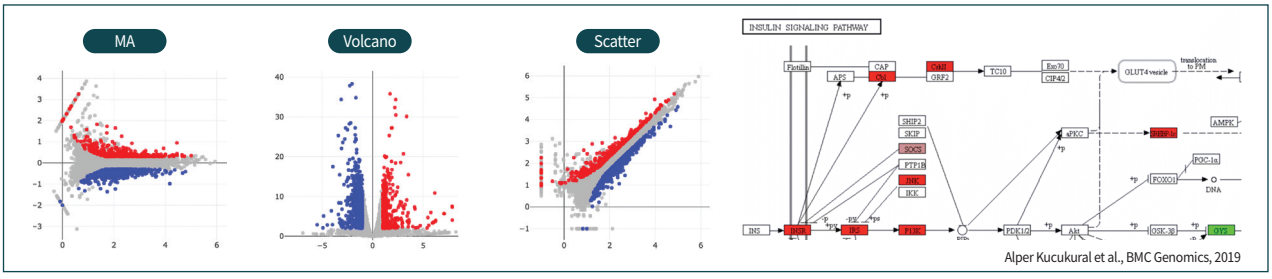
Figure 1. The infrastructure of typical enrichment tools. Even though the enrichment analysis tools have distinct features, they can be generally described as three major layers: backend annotation database;data mining; and result presentation. Each of the layers, rather than statistical methods alone, greatly influences the analytic results.

Da Wei Huang et al., Nucleic Acids Research, 2009

• Tissue-Specific Gene Analysis



• Pathway Analysis

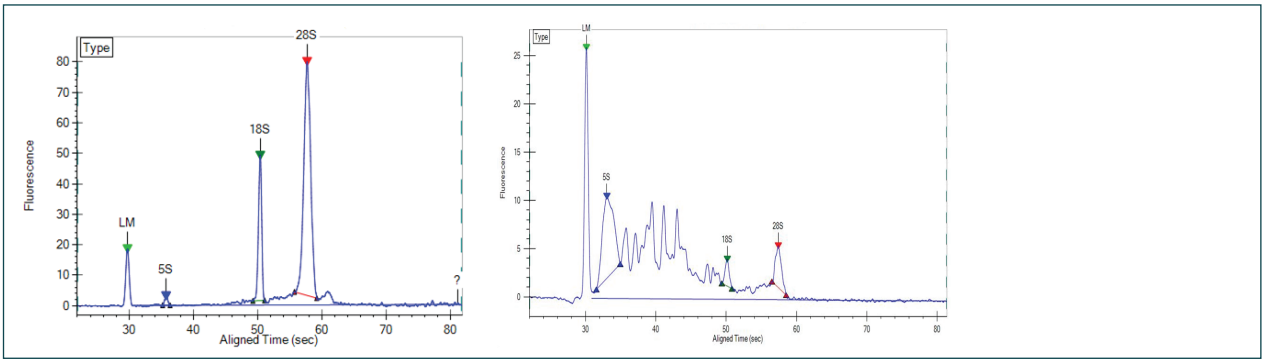


Alper Kucukural et al., BMC Genomics, 2019

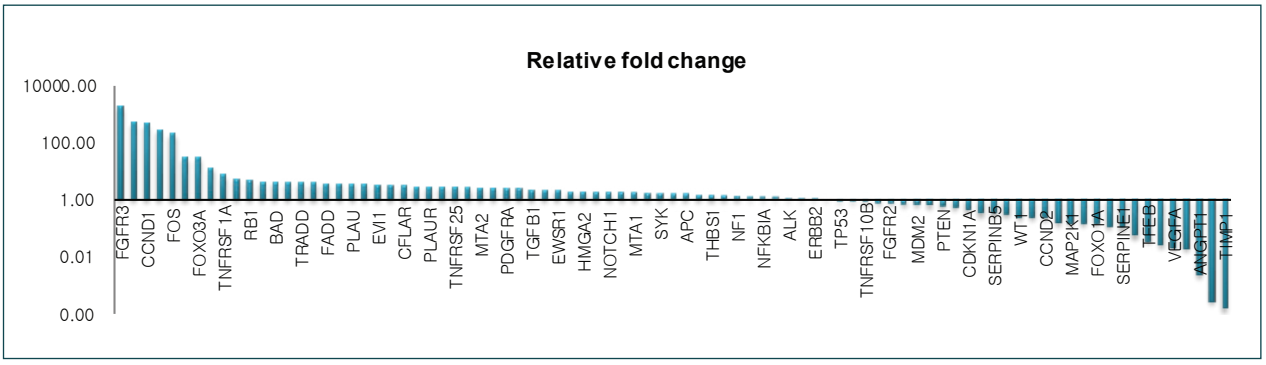
mRNA Profiling Service

qPCR Array Service

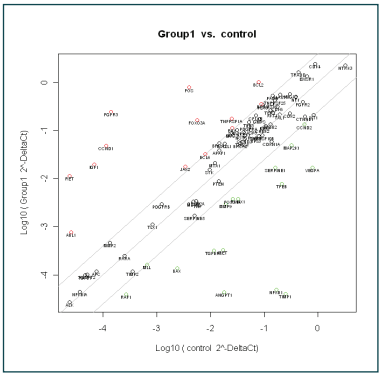
• RNA Quality Check



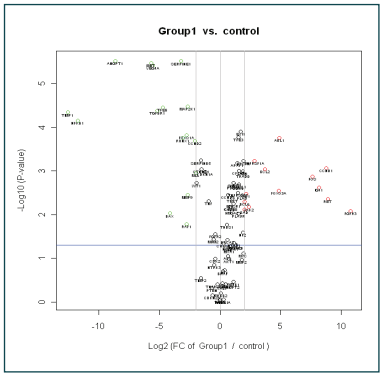
• Fold change



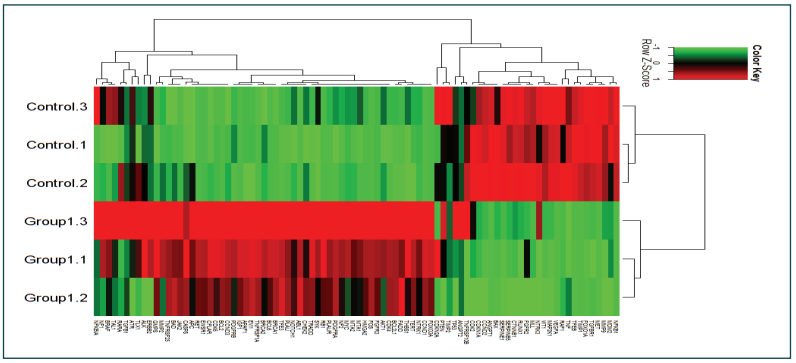
• Scatter Plot



• Volcano Plot



• Heat map



mRNA Profiling Service

◎ Ordering Information

Sample Preparation

1. RNA sample

Quickly proceed in an RNase-free environment during the RNA extraction. You must remove the genomic DNA for us to go through accurate analysis. If both RNA-seq and qPCR array services have been requested for the same type of samples, please provide each of them separately with the sufficient amounts and store them at -80℃.

Sample Requirements

- RNA-seq

Minimum Quantity	Minimum Concentration	Total RNA Quantity
200 ng	65 ng/μl	≥1 μg

- qPCR Array Service

Number of Analysis Genes	Minimum Volume	Minimum Concentration	Total RNAQuantity
≤ 16 genes	15 μl	100 ng/μl	> 5 μg
≤ 32 genes			> 10 μg
≤ 96 genes			> 20 μg

Sample Purity & Integrity Standard

	Method	Standard
Purity	Spectrophotometer	260/280nm > 1.8
Integrity	Capillary electrophoresis	RIN or RQS or RIS > 8.0 (NGS: > 7)
	Normal electrophoresis	28S/18S ratio 2:1

2. Tissue and Cell sample

For harvested cell pellets or extracted tissues, prepare the samples by using one of the following methods to minimize RNA degradation.

Method 1 Immediately freeze the samples with liquid nitrogen and store them at - 80℃.

Method 2 Process the samples with the RNA stabilization solution by following its manual and store them at - 80℃.

Method 3 Process with 1% Beta-mercaptoethanol in the Lysis buffer (Guanidinium thiocyanate buffer*). Add 400 μl of lysis buffer per 10^4 ~ 10^6 of cells, crush using a homogenizer, and store them at - 80℃ (*RB buffer in *AccuPrep*® Universal RNA Extraction Kit).

mRNA Profiling Service

3. Requesting blood or other samples

- Those will require consultation before processing the orders.
- We do not provide the service for cDNA as we cannot guarantee the accuracy of its RNA Seq analysis as it is difficult to undergo QC tests.

※ qPCR Array System: For Customized qPCR panel kits and Single Gene qPCR Primer Sets, download the order form from our Bioneer websites (www.bioneer.com) and send it to our gene expression team email (qPCRarray@bioneer.com)

Address to send the samples

- **RNA-seq:** 8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea, Bioneer Sequencing Team.
- **qPCR Array Service:** 8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea, Bioneer gene expression analysis Team.

Precautions

- Please refrain shipping on Friday or holiday eves to avoid any deterioration in sample qualities due to delays in deliveries.
- Please include enough dry ice to prevent RNA degradation during the shipment period.

Service period

- RNA-seq: about 4~6 weeks
- qPCR Array Service:

Number of Analysis Genes	Service Period
≤ 16 genes	about 2 weeks
≤ 32 genes	about 2~3 weeks
≤ 96 genes	about 3~5 weeks

* Service time can vary according to the methods used for sample extraction and data analysis.
* Samples will be discarded after 1 month of service termination.

Cell-free Protein Synthesis

Protein Synthesis

03

Cell-free Protein Synthesis

List of Services

- Standard Protein Synthesis Service
- One-day Protein Synthesis Service
- Standard Gene to Protein Service
- Cloning-free Gene to Protein Service

Key Features

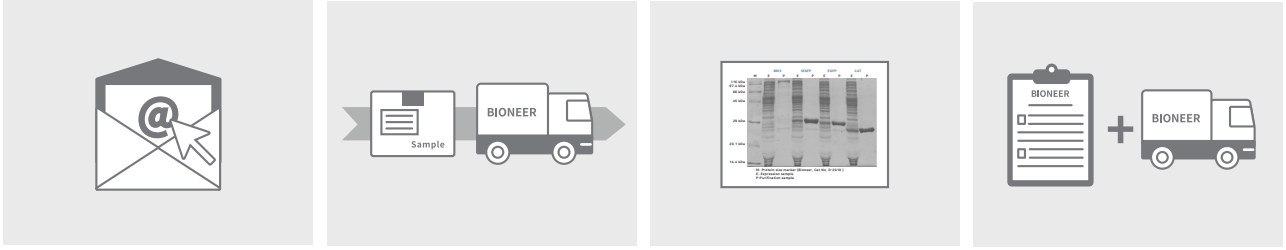
◎ Quickly provide purified proteins for customer's experimental purposes using *E. coli* cell-free protein expression

◎ Synthesize various kinds of proteins, even toxic ones that are unable to be done through cell culturing

◎ Can allow customers to synthesize proteins directly by themselves using our protein synthesis kit if necessary

What is cell-free protein expression system?

Cell-free protein expression system allows to express proteins from nucleic acids without culturing *E. coli*. The recombinant proteins are expressed and purified through *in-vitro* transcription, translation and magnetic separation using the protein synthesis kit with *E. coli* cell extract and *ExiProgen*™ instrument. This allows to synthesize not only enzymes, growth factors, hormones, antigen proteins and antibodies, but also toxic proteins that could not be produced through cell culture.



Contact Us

E-mail: sales@bioneer.co.kr or proteinorder@bioneer.com, Tel: +82-42-930-8777

Standard Protein Synthesis Service

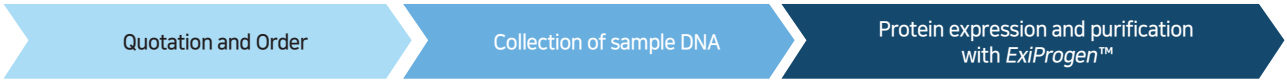
◎ Description

Our Standard Protein Synthesis Service can provide recombinant proteins within at least a week by using our automatic protein synthesis system (*ExiProgen*™ Protein Synthesis System) to synthesize various proteins such as enzymes, growth factors, hormones, antigen proteins, and antibodies.

◎ Workflow

According to the type of the requested template DNA, Protein Synthesis Service is divided into two different ways.

E. coli expression vectors (ex. T7-based expression vector)



Non-expression vectors (ex. Cloning vector/ target gene)

◎ Ordering Information

Amount of Samples	*E. coli* expression vector	0.3kb –4.0kb by ORF(open reading frame)
		> 10 μg ($A_{260/280}$: 1.7 - 2.0, $A_{260/230}$: >1.5)
	Non-expression vector	0.3kb –1.5kb by ORF(open reading frame)
		> 2 μg
Service Period	Average 7 – 14 working days	
Delivery Form	Data report	E-mail
	Protein	100 μg (0.1 - 1.0 mg/ml) of solution

* Providing plasmid DNA samples not reaching the standard for amount and purity conditions will charge additional costs as DNA amplification services must be done beforehand.
* Requesting non-expression vectors such as cloning vector of PCR products will charge additional costs as primary primer sets and template DNA preparation services must be done beforehand.
* The service price is for synthesis of 100 μg which is the total protein amount regardless of the target protein purity.

One-day Protein Synthesis Service

◎ Description

Our One-day Protein Synthesis Service provides synthesis result of recombinant proteins within a single day. We use our automatic protein synthesis systems (*ExiProgen*™ Protein Synthesis System) to synthesize various proteins such as enzymes, growth factors, hormones, and antigen proteins.

◎ Ordering Information

Amount of Sample	*E. coli* expression vector[1)]	> 10 μg ($A_{260/280}$: 1.7 - 2.0, $A_{260/230}$: > 1.5)
Service Period[2)]	1 working days	
Delivery Form[3)]	Data report	E-mail
	Protein	0.1 - 1.0 mg/ml of solution

1) Providing plasmid DNA samples not reaching the standard for amount and purity conditions will charge additional costs as DNA amplification services must be done beforehand.
2) Service period does not include the time taken during the shipment.
3) Synthesized proteins are provided after one reaction. Ordering more proteins will shift the service to the "Standard Protein synthesis Service".

Standard Gene to Protein Service

◎ Description

Standard Service synthesizes genes based on our Gene Synthesis Service by cloning into an expression vector for *E. coli*, followed by the protein synthesis service.

◎ Workflow

Online Order → *E. coli* Codon Optimized Gene synthesis → Protein synthesis → Gene and Protein delivery

◎ Ordering Information

Service Period	1 - 1,500 bp	Average 20 - 35 working days
	1,501 - 3,000 bp	Average 30 - 40 working days
Delivery Form	Gene	2 - 5 μg of lyophilized plasmid
	Protein[1)]	100 μg (0.1 - 1.0 mg/ml) of solution

1) We will only charge the set up fee after failing the protein synthesis while the gene synthesis fee will be charged normally, and send the synthesized genes along with the data report.

* Canceling your order within 5 days after receiving the confirmation email will charge 50% of the original price. while 80% of the fee will be charged after that time.

* Ordering complicated sequences such as those containing high or low GC content, repeats, or homopolymeric runs will charge additional costs.

Cloning-free Gene to Protein Service

◎ Description

Cloning-free Service provides proteins based on the PCR products after synthesizing genes using AccuGeneBlock Service. As cloning is not required, this service will take relatively shorter time compared to other services.

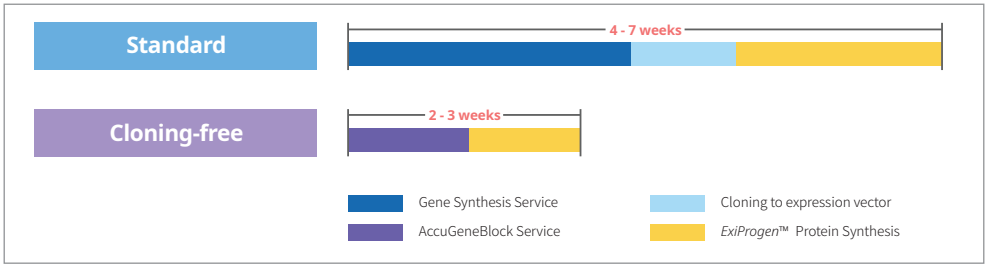


Figure 1. Comparsion of service time

◎ Workflow

Online Order → *E. coli* Codon Optimized Gene synthesis → Protein synthesis → Gene and Protein delivery

◎ Ordering Information

Service Period	Average 10 - 15 working days	
Delivery form	Gene	500 ng - 1 μg of lyophilized plasmid PCR product
	Protein[1)]	100 μg (0.1 - 1.0 mg/ml) of solution

1) We will only charge the set up fee after failing the protein synthesis while the gene synthesis fee will be charged normally, and send the synthesized genes along with the data report.

All about Bioneer's

Custom Services

BIONEER

Innovation • Value • Discovery

BIONEER
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