Healthier Future for
Humanity with Genomic Technology

BIONEER
Innovation • Value • Discovery

Oligonucleotide Synthesis

Individual needs, high throughput or bulk quantities,
Bioneer has your oligo bases covered.

Ver.5 (EN) | 2023-08-01

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Superior quality, and great price

Bioneer, founded in 1992, is one of the world's leading suppliers of synthetic oligonucleotides. In-house production of raw materials (phosphoramidites, reagents & solvents) along with automated synthesis and purification systems result in superior-quality oligo at a great price.

Features and Benefits

- **Accurate Concentration**
  Delivery of exact concentration by using **Accuoligo*® technology, an automatic dosing dispenser to prevent the loss of oligo during transportation and opening

- **High-quality Oligo**
  Supply of nuclease-free, DNA-free oligo by synthesizing in a clean room and eliminating truncated failures including n-1 mer with our proprietary Bio-RP high-purity purification system

- **Mass Production Capability**
  Ability to produce maximum of 30,500 synthetic genes per day

- **Free MALDI-TOF Quality Control**
  Bioneer is one of the few oligo producers that checks all oligonucleotides (single or high throughput orders) by MALDI-TOF and provides mass data with each oligo – free of charge

- **Fast Supply**
  We know that time is of the essence and we always do our best to please. In our production process, quality is our first priority, followed very closely by time. We ship as soon as the product is ready and have 24-hour production.
  - Standard Oligo: 1 ~ 2 days
  - Modification / Dual Label Probes: 3~4 days
  - *Extendamers*™: 7~10 days

What is *AccuOligo*® technology?

All Oligo Synthesis services are conducted in a clean room and applied with the *AccuOligo*® system which is supplied in nuclease-free, DNA-free dried form. In the case of conventional synthesis services, there is a chance that dried oligos may fall during their delivery from shaking and impacts. If the containers are opened during the delivery, parts of oligos may fall out, leading to yield loss. This may be much more severe when ordered in plates as cross-contaminations may occur.

***AccuOligo*® technology** allows the synthesized oligonucleotides to stick at the bottom of the tube even under intense vibrations. (Dried oligonucleotide composition of the new patent application' Patent 2006 Registration Number 10-0777249)

- Preventing dislodging and loss of oligos during production, packaging and shipping
- Containing "Leak Inhibitors" not affecting protocols such as PCR, Sequencing, Enzyme cutting, etc.
- Overcoming the phenomenon of which trace amounts of oligos being attached to the lid of the container
- Avoiding contamination between each well in a plate

Since Bioneer manufactures all the components of our oligo, we manage the quality control every step of the way-ensuring that you receive only the highest quality product. Every Bioneer oligo is purified free of charge utilizing our unique Bio-RP cartridge purification technology.

Oligo Synthesis Center in Bioneer Headquarter, South Korea

Purification Options

All Oligos synthesized by Bioneer are purified using the Bio-RP purification system, this service is available free of charge on all oligos. We also offer HPLC and PAGE purification for a higher level of purity.

- **Bio-RP (Free-of-charge on all scales):**
  - Better than ethanol precipitation or Sephadex G-25 column chromatography
  - Bio-RP not only desalts but also removes virtually all of the failed products of synthesis.
  - Near HPLC quality.

- **HPLC (High-Performance Liquid Chromatography)**
  - For applications such as cloning, site-directed mutagenesis, or qPCR.
  - RP-HPLC purification for added purity.
  - > 90% purification efficiency (range varies according to the length of oligos).

- **PAGE (Polyacrylamide Gel Electrophoresis)**
  - Recommended purification method for long oligos, up to 200 mer.
  - > 95% purification efficiency.
  - Ultra-pure oligo, but lower yields than OPC and HPLC.

Did you know?

Oligo desalting vs Bio-RP Purification:

Most oligos sold are merely deprotected/desalted.
The process of deprotection/desalting only partially purifies the oligo and leaves behind many impurities* and failure products (truncated oligos that will not amplify and can even interfere with certain applications). These can lead to artificially inflated OD readings that increase with oligo length.

Bio-RP purification removes all these contaminants and failure products, resulting in an oligo that is near HPLC purity. The advantage to you is that our product contains only quality oligos without impurities that can inhibit some PCR reactions and potentially skew qPCR reactions. We have the same amount of active oligo as our competitors; they just have more "other" inflating their OD. To demonstrate this, plates of Oligos of various sizes were tested for concentration in 2 steps:

1) AFTER A DEPROTECTION/DESALTING STEP ONLY
2) AFTER BIO-RP PURIFICATION. (Fig. 1)

The results of these tests show that the amount of failed sequences and impurities* increase with length (as expected), but are not removed by deprotection/desalting alone. This results in inflated OD readings for oligos depending on oligo size. (Table 1)

*Impurities in desalted oligos may include Acetonitrile, pyridine, iodine, ethylthiotetrazole, dichloromethane, acetic acid, acrylonitrile, benzamide, and isobutyramide

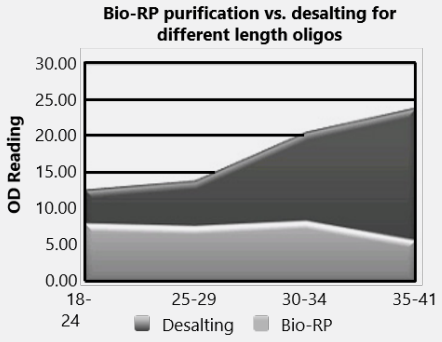

Fig 1. Plates of Oligos of various lengths were tested for concentration after desalting and then by Bio-RP cartridge purification. Note inflated OD readings when deprotection/desalting alone is used.

Oligo Size	18-24	24-29	30-34	35-41
OD Inflation	38%	45%	60%	77%

Table 1. Average OD inflation is seen for oligos of various sizes when protection/desalting alone is employed. Note for longer oligos, up to 77% of the product does not consist of functional oligo.

DNA Synthesis

◎ List of Services/Products

Standard Oligo	Dual-labeled Probes	*AccuEBQ*® Probes
HT-Oligo™	*Extendamers*™	MGB Probes
Modification Oligo	Large Scale Oligo	

◎ Key Features

1. Accurate Concentration

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Ability to produce maximum of 30,500 synthetic genes per day.

4. Free MALDI-TOF Quality Control

Bioneer is one of the few oligo producers that checks all oligonucleotides (single or high throughput orders) by MALDI-TOF and provides mass data with each oligo – free of charge.

5. Fast Supply

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- Standard Oligo: 1 ~ 2 days
- Modification / Dual Label Probes: 3 ~ 4 days
- *Extendamers*™: 7 ~ 10 days

Contact Us

Email: oligo-support@bioneer.com, Tel: +82-42-930-8574

Standard Oligo

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.
- Synthesis Scale (nmole): 25 / 50 / 200 / 1,000 / 10,000 / 15,000

Synthesis Scale (nmole)	Number of Synthesizable Base (mer)	Guaranteed Amount (OD) Based on 20 basis		
		BioRP	PAGE	HPLC
25	15 - 60	2	1	1.5
50	10 - 75	4	2	2.5
200	5 - 110	8	6	7
1,000	5 - 130	30	18	25
10,000	5 - 50	300	150	200
15,000	5 - 50	Inquiry		

HT-Oligo™ (High-throughput Oligo)

HT-Oligo™ Synthetic service is for ordering more than 96 oligos at once quickly at a reasonable price.

Bioneer is unrivaled in its ability to address the needs of customers requiring very large numbers of oligonucleotides on a less frequent basis. The high-throughput oligo enables low-cost, and fast oligonucleotides that suit your needs.

Modification Oligo

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.
- Synthesis Scale (nmole): 50 / 200 / 1,000 / 10,000 / 15,000
- Guaranteed amount depends on the modification

Dual-labeled Probes

Synthesis of oligos having the reporter positioned at the 5′ end and the quencher on the 3′ end.
Those are mostly used for real-time PCR analysis, but can also be used for multiplex analysis, done by searching several genes at once, by using various fluorescent materials.
- Synthesis Scale (nmole): 50 / 200 / 1,000 / 10,000 / 15,000
- Guaranteed amount depends on the modification

Extendamers™

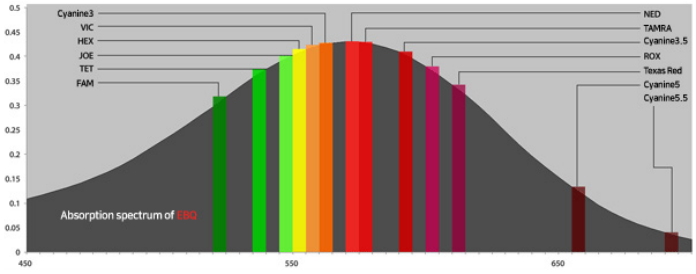
Extendamers™ (Long Oligonucleotides) synthesis service is for ordering long oligos with 130 ~ 200 bp, which is mainly applied in cloning, siRNA, and gene construction.
- Synthesizable base (mer): 130 - 200

Large Scale (Bulk)

Large Scale Oligonucleotide (Bulk Oligo) Service is for ordering oligos with a scale of 15 umole or higher.
We can provide a synthesis of oligonucleotides in comprehensive range of scales from mg to kg units, along with advanced oligo synthesis and specialized purification technologies, to be used for antisense research and large- scale protocols such as decoy and RNAi oligo.
- Synthesis Scale (mg): 50 / 100 / 250 / 500 / 1,000

EBQ(Excellent Bioneer Quencher)

Are you having trouble choosing the right quencher for your probe's reporter dye?
Then try using our EBQ quencher, "total solution" for your quencher problems!

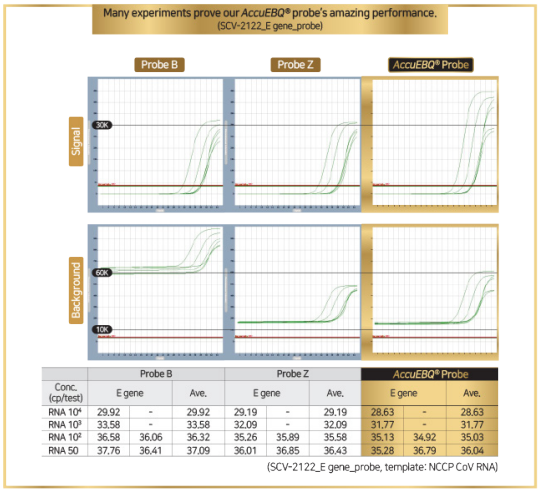


Types of reporter-dyes that can be quenched by EBQ

EBQ (Excellent Bioneer Quencher) is a Dark Quencher that has been newly developed by Bioneer. Having the stronger and wider absorption area than traditional quenchers, our EBQ can quench a variety of dual-probe reporter-dye(fluorophore) effectively. Furthermore, the structure of the quencher is constructed to maintain its stability during the change in pH and temperature. Showing an extensive absorbance range of 400 ~ 700 nm for effective quenching of emission signal *AccuEBQ*® Probes from dyes, with the maximum absorption occurring at 570 nm, it can effectively quench various types of reporter dye from FAM to Cyanine5.5 using one EBQ.

AccuEBQ® Probes

AccuEBQ® Probe feature 5′ Reporter Dye and 3′ EBQ Quencher, with an EBQ quencher in the middle of 10 ~ 11th position of the sequence to increase dye quenching efficiency even for long probes having 25 or more bases.



Conc. (cp/test)	Probe B			Probe Z			AccuEBQ® Probe		
	E gene		Ave.	E gene		Ave.	E gene		Ave.
RNA 10^4	29.92	-	29.92	29.19	-	29.19	28.63	-	28.63
RNA 10^3	33.58	-	33.58	32.09	-	32.09	31.77	-	31.77
RNA 10^2	36.58	36.06	36.32	35.26	35.89	35.58	35.13	34.92	35.03
RNA 50	37.76	36.41	37.09	36.01	36.85	36.43	35.28	36.79	36.04

(SCV-2122_E gene_probe, template: NCCP CoV RNA)

In case of the traditional dual-labeled probes,
the dye quenching efficiency gradually decrease for the probes having 25 or more base pairs.

To solve this problem
we have applied EBQ probes in the internal position of the probes to shorten the distance from the 5′ reporter dye and 3′ quencher. This provides high dye quenching performance, reducing the background and increasing the signal detection during qPCR experiments.

MGB Probes

MGB is an abbreviation for minor groove binder and it increases the melting temperature without increasing the probe length. A specific probe can be designed. Bioneer offers high quality, efficient MGB oligos with competitive turnaround times and no minimum order quantities.

- 10 ~ 12 days delivery service
- Guaranteed higher minimum yield than competitors

Modification	Guaranteed Yield (nmole)		
5′-FAM-3′-MGB	10	25	50
5′-VIC-3′-MGB	10	25	50
5′-VIC-3′-TAMRA	10	25	50

Q & A

Q1. How do I store my oligos? How long can I keep them?

Normally, the oligos should last a year at -20℃.
For long-term use, we recommend dividing the samples into a nuclease-free tube and using only the amount of oligos needed for your protocol.
In particular, RNA oligo is more easily decomposed by bio-particles in the air, so it is advised to open the lid on a clean surface during usage.
All oligos in Bioneer are manufactured in a clean room, allowing the oligos to be stored for a long amount of time.
Additionally, DNA is decomposed and precipitated by small amounts of heavy metal ions such as Fe ions, so it can be stored longer by dissolving it in TE (10 mM Tri-HCl (pH 8.0), 0.1 mM EDTA) buffer rather than dissolving it in sterilized distilled water.

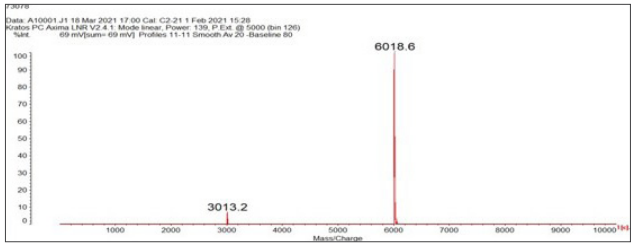
Storage Condition	Shelf Life (Month)
at RT in water	2
at 4℃ in water	9
at -20℃ in water	18
at -20℃ (Dry)	24

* Quality Guarantee : 6 months under suggested storage condition (under -20℃)

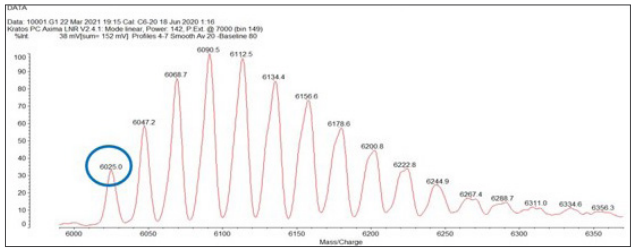
Q2. What Buffers should be used to dissolve lyophilized oligos?

Excessive salts, such as Na+ and K+, dissolved in buffers may act as an inhibitor during PCR. We recommend using TE buffer, DEPC-D.W. and ultra-pure water to dissolve lyophilized oligos. Do not use PBS buffers. Also, lyophilized oligos are highly soluble to water, but some sequence combinations may lower their solubility. In this case, incubate for 10~15 minutes in 60~70℃ water bath. Then, try again after the vortexing and centrifuging.

• Molecular weight analysis of DNA(Molecular Weight: 6025) with MALDI-TOF MASS after dissolving with different kinds of buffer



1. DNA dissolved with TE-Buffer, DEPC-D.W.
   - Compared with the main molecular weight(6025), a main peak (6018.6) and a half peak(3013.2) were detected in the range of ±0.6%.
   - In normal cases, MALDI-TOF MASS detects two types of peaks for oligos: main peak and a half peak.



2. DNA dissolved with PBS Buffer
   - Compared with the main molecular weight(6025), the main peak (6025.6) was detected in the range of ±0.6%, but large amount of salt peak can be also seen.
   - The excessive amount of salt will reduce the PCR efficiency.

Q3. I accidently left my oligo solution over a week in a room temperature. Is it still safe to use?

As mentioned earlier, under normal circumstances, your oligos will still be safe to use, unless those are contaminated by airborne bio-particles. If you suspect the latter case, you can request us to conduct a MALDI-TOF analysis.

Q4. How should I store the fluorescent dye modified oligos?

Fluorescent dyes gradually degrade when exposed to luminescence.
This is also the case for those attached to oligo, making them vulnerable to even under the light of normal laboratories.
It is recommended to store them in a shaded container and a dark room capable of completely blocking the light.

Preferred TE Buffer Reconstitution & Storage pH for Fluorescent Probes	
6-FAM, HEX, TET, ROX, and TAMRA	TE Buffer pH 7.5 or 8.0
Cy3, Cy3.5, Cy5, and Cy5.5	TE Buffer pH 7.0 or 7.5
Cy dyes rapidly degrade in acidic pH	

siRNA/miRNA Synthesis

◎ List of Services/Products

Custom siRNA
AccuTarget™ Custom Designed siRNA Synthesis

Premade siRNA Set & Primer
AccuTarget™ Premade siRNA Sets
AccuTarget™ qPCR Primers for Premade siRNA Sets

Control siRNA
AccuTarget™ Control siRNAs (Positive / Negative)

Genome-wide Predesigned siRNA & Primer
AccuTarget™ Genome-wide Predesigned siRNA Library
AccuTarget™ qPCR Primer Library

miRNA Mimics & Inhibitors
AccuTarget™ Human miRNA Mimic / Inhibitor

Control miRNA
AccuTarget™ Control miRNAs (Positive / Negative)

◎ Key Features

1. siRNA
- Provides 132,000 predesigned siRNAs for 44,000 target genes in Human / Mouse / Rat.
- Life phenomena and disease related Gene family, library subset by pathway are available to purchase.
- 54,144 siRNAs prepared for immediate experimental use.

2. miRNA
- *AccuTarget*™ miRNA mimic is a chemically synthesized double-stranded RNA oligonucleotide.
- The miRNA mimic is synthesized from human mature microRNA based on the latest version of miRBase Sequence Database (ver. 22).
- *AccuTarget*™ miRNA inhibitor are single-stranded synthetic inhibitors having complementary sequences to target human microRNAs.

Contact Us

Email: siRNA-support@bioneer.co.kr, Tel: +82-42-930-8574

Technical

Turbo si-Designer - Bioneer's proprietary siRNA design algorithm

The most important aspect of siRNA research is to find an siRNA target site with optimal efficiency in the mRNA sequence of the disease-causing gene. Bioneer started the "siRNA Design algorithm" development project with the support of the Ministry of Industry, Trade and Industry in October 2003 and jointly developed the siRNA design algorithm, Turbo si-Designer, which has excellent efficacy with the National Genome Information Center (NGIC). Using the innovative Turbo si-Designer, we have built an *AccuTarget*™ Genome-wide predesigned siRNA database with excellent knockdown efficiency.

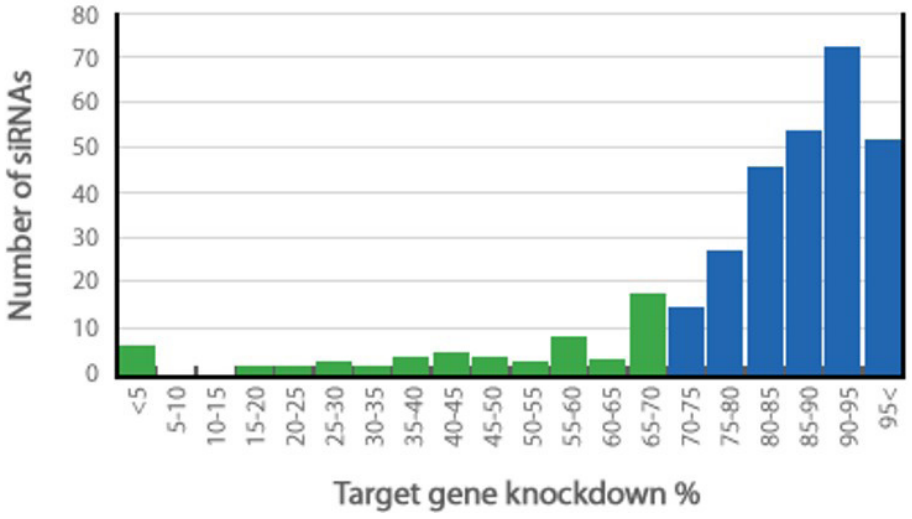


Figure 1. siRNA Knockdown efficiency of *AccuTarget* ™ Genome-wide Predesigned siRNA. *AccuTarge*t ™ Predesigned siRNAs are highly effective. To determine the siRNA Knockdown efficiency of predesigned siRNAs, HeLa cells were transfected with siRNAs at 100 nM concentration. 24 hours post-transfection, total RNA was isolated and the level of target mRNA was measured by qRT-PCR. This data demonstrates the effectiveness of the Turbo si-Designer algorithm: 83.8% of the tested siRNAs induced >70% siRNA Knockdown and 38.1% of the tested siRNAs elicited >90% knockdown.

The Bioneer's Guarantee

When you purchase three siRNAs for the same gene, Bioneer guarantees a knockdown effciency of more than 80% in the target mRNA level for two out of three siRNAs. If there is no more than 80% knockdown efficiency at the mRNA level of the target gene, we provide two siRNAs free of charge.

* However, the following supporting data required by the head office must be submitted separately.

1. siRNA Knockdown efficiency data: NC (*AccuTarget*™ Negative Control) and siRNA concentration at 100 nM
2. Transfection efficiency data: PC (*AccuTarget*™GAPDH/GFP/Luciferase siRNA) and NC (*AccuTarget*™ Fluorescein-labeled Negative Control)

Custom RNA

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

- Highly customizable synthesis
  - Customers can choose scale, purification methods, labeling, and modification
  - Various modification of up to 32 different 3' overhang selection

AccuTarget™ Genome-wide Predesigned siRNA Library

Bioneer siRNAs are designed with unique algorithms to selectively target knockdown across the entire genome. It is manufactured in an RNase-free clean room and has proven to be highly efficient and stable after undergoing a strict QC process. Using the highly efficient Turbo si-Designer, 132,000 predesigned siRNAs have been designed for 44,000 target genes in Human, Mouse and Rat.

- We have verified high target gene expression inhibition efficiency.
- We provide the Genome-wide Predesigned siRNA library for successful RNAi experiments.
- Available in 1, 5, 10, 20, 50, 100 nmole capacities and can be ordered and delivered within 2-4 days after order confirmation.

AccuTarget™ Human Premade siRNA Sets

AccuTarget™ Human Premade siRNA sets consist of 54,144 types of siRNAs that are readily available for transfection. These siRNA library sets are designed across 25 biological pathways or gene families, catering to research focused on specific cellular process, cancers, and diseases. Furthermore, it can be either provided separately with 10, 20, 50, or 100 nmol or as a complete set with 0.1, 0.25, 0.5, or 1 nmol for each siRNA.

AccuTarget™ qPCR Primer Library

AccuTarget™ qPCR 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.

AccuTarget™ qPCR Primers for Premade siRNA Sets

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

AccuTarget™ miRNA mimics & inhibitors

AccuTarget™ miRNA mimic is a chemically synthesized, double-stranded RNA oligonucleotide produced from 1,786 human mature miRNAs found in the miRbase Sequence Database (version 22). On the other hand, *AccuTarget*™ miRNA Inhibitor is a single-stranded synthetic RNA designed to target each of human miRNA and inhibits its functions. Ready-to-transfect miRNA exhibits the same activity as endogenous miRNA in the cells after its transfection, whereas the miRNA inhibitor suppresses the activity of the target miRNA, making it suitable for use in loss-of-function studies of miRNA.

AccuTarget™ Control siRNAs (Positive / Negative)

Accutarget™ Control siRNAs offer reliable tools for gene knockdown experiments.
The Positive Control siRNA exhibits high knockdown efficiency, exceeding 90% for target genes. On the other hand, the Negative Control siRNA is a non-targeting siRNA with low homology to human, mouse, and rat genes, ensuring specificity in knockdown studies. These control siRNAs serve as essential benchmarks to validate experimental conditions and ensure accurate evaluation of gene functions. *Accutarget*™ Control siRNAs serve as indispensable benchmarks to validate experimental conditions, ensuring precise and reliable outcomes in RNA interference studies.

- Positive control siRNA – Human GAPDH, GFP, Luciferase and Mouse Lamin A/C and cyclophilin Bc
- Negative control siRNAs – commonly used for Human, Mouse and Rat – are available
- Fluorescently labeled siRNA can be used for monitoring transfection efficiency with *AccuTarget*™ control siRNA (Positive & Negative)

Positive Control siRNA

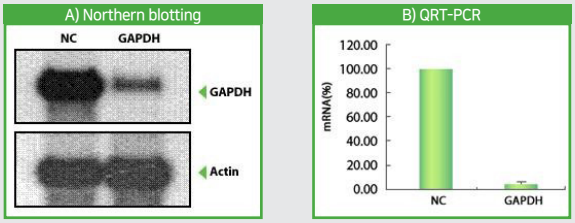


Fig. 1. HeLa cells were transfected with GAPDH and NC (negative control) siRNA. Twenty four hours post-transfection, total cellular RNA was isolated from transfected cells and subjected to Northern blot and real-time PCR analyses. Highly efficient knockdown of GAPDH mRNA can be easily achieved using our positive control GAPDH siRNA.

Negative Control siRNA

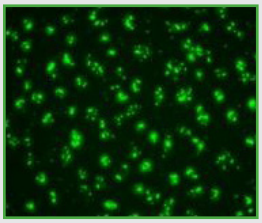


Fig. 2. HeLa cells transfected with FITC-labeled siRNA. (Cat No. SN-1021) was observed by confocal microscopy. The fluorescent cells indicate that the target cells were successfully transfected with the siRNA.

AccuTarget™ Control miRNAs

AccuTarget™ control miRNA is a valuable resource that allows researchers to fine-tune cell experimental conditions for miRNA mimic function studies. With the inclusion of miRNA positive and negative controls, researchers can effectively validate experimental settings and ensure the specificity of miRNA-mediated effects.
These controls serve as essential benchmarks, providing confidence in the accurate evaluation of miRNA functions and their impact on gene expression and cellular pathways during miRNA functional studies utilizing *AccuTarget*™ miRNA mimic.

Explore all the details about our RNA Oligos

If you need further information about purification, guaranteed yield, and shipping etc.
Please visit our website:
https://eng.bioneer.com/c-life-science/service/sirna-mirna

Ordering Info

All common Oligo modifications are available including those in the table. Our fluorogenic oligonucleotides for qPCR, are unsurpassed in quality and priced for value. In addition to the modifications listed in our ordering information tab, we may be able to accommodate custom oligos modifications to fit your needs. Please contact oligo-support@bioneer.com for more information on our modified oligos.

Modification Oligo (3′-Modification)

3′-Modification	
C18 atom spacer	Dabcyl
2′,3′-ddC	3′ Deoxypurine (2′-DeoxyNebu larine)
2,6-Diaminopurine	DBCO
2-Aminopurine	DIG
2′-F-rA	Desthiobiotin TEG
2′-F-rC	Dithiol
2′-F-rG	DNP (2,4-dinitrophenyl)-TEG
2′-F-rU	dSpacer
3′-dA	EBQ
3′-dC	EDTA-C2-dT
3′-dG	Epoch Eclips Quencher
3′-dT	FAM
5-F-dU	3′-Inverted dT
3′ Acrylamide (acrydite)	3′-Inverted dA
5-Nitroindole	3′-Inverted dC
AlexaFluor 488	3′-Inverted dG
AlexaFluor 532	JOE
AlexaFluor 546	Maleimide
AlexaFluor 594	3′ Methylene Blue
AlexaFluor 647	N3-Methyl dC
AlexaFluor 660	N4-Ethyl dC
AlexaFluor 750	N6-methyl-2′-deoxyadenosine
3′ AMCA (amino-methyl-coumarin-acetate)	O4-Methyl-dT
Ara-dC	O6-Methyl 2′-dG
3′ Azide	3′ PEG-2000
Azobenzene	Perylene-dU
BHQ1	Phosphate
BHQ2	Puromycine
Biotin	Pyrene-dU
Biotin-TEG	Rhodamine 6G
C12 spacer	ROX
C6 spacer	TAMRA
C3 spacer	Texas Red
C6 Amine	Thiol
C8-Alkyne-dC	Thymidine Glycol
C8-Alkyne-dT	Yakima Yellow
dT-Alkyne	Zebularine
Cholesteryl	2′-MOE-Methyl (A,C,G,T)
Cholesterol	3′ Anthraquinone
Cyanine 3	3′ BBQ
Cyanine 3.5	
Cyanine 5	
Cyanine 5.5	

Modification Oligo (5′-Modification)

5′-Modification	
18 atom spacer	Dabcyl
2′,3′-ddA	5′ Deoxypurine (2′-DeoxyNebu larine)
2′,3′-ddC	DBCO
2′,3′-ddG	DIG
2′,3′-ddT	Desthiobiotin TEG
2,6-Diaminopurine	Dithiol
2-Aminopurine	DNP (2,4-dinitrophenyl)-TEG
2′-F-rA	dSpacer
2′-F-rC	EDTA-C2-dT
2′-F-rG	Epoch Eclips Quencher
2′-F-rU	FAM
3′-dA	HEX
3′-dC	5′-Hexynyl
3′-dG	JOE
3′-dT	Maleimide
5-F-dU	5′ Methylene Blue
5′ Acrylamide (acrydite)	N3-Methyl dC
5-Nitroindole	N4-Ethyl dC
AlexaFluor 488	N6-methyl-2′-deoxyadenosine
AlexaFluor 532	O4-Methyl-dT
AlexaFluor 546	O6-Methyl 2′-dG
AlexaFluor 594	PC (photo-cleavable) Amine Linker
AlexaFluor 647	PC (photo-cleavable) Biotin Linker
AlexaFluor 660	5′ PEG-2000
AlexaFluor 750	Perylene-dU
5′ AMCA (amino-methyl-coumarin-acetate)	Phosphate
AminoOxy	Pyrene-Cap
Ara-dC	Pyrene-dU
Azobenzene	Rhodamine 6G
Atto 425	ROX
BHQ2	TAMRA
Biotin	TET
Biotin-TEG	Texas Red
5′ -BromoHexyl (Br)	Thiol
C3 spacer	Thymidine Glycol
C6 spacer	5′-triphosphate
C12 spacer	5′ -Yakima Yellow
5′ C12-Amine	Zebularine
C6 Amine	5′ Acridine
5′ C3-Amine	5′-OMe-dT
C2 Aldehyde	2′-MOE-Methyl(A,C,G,T)
C6-Psoralen	IRD700
C8-Alkyne-dT	IRD800
dT-Alkyne	GalNac
C8-Alkyne-dC	5′-MGB
Cholesteryl	p-nitrophenol
Cholesterol	5′ Cyanine7
Cyanine 3	5′ NED
Cyanine 3.5	5′-VIC
Cyanine 5	5′ NTA (Nitrilotriacetate)
Cyanine 5.5	

Modification Oligo (Internal-Modification)

Internal-Modification	
18 atom spacer	Perylene-dU
2,6-Diaminopurine	Pyrene-dU
2-Aminopurine	Serinol Amine
2'-F-rA	Spacer 9
2'-F-rC	Trebler Branching
2'-F-rG	Thymidine Glycol
2'-F-rU	Zebularine
2'-O-Methyl	4-thio-dT
3'-dA	5-Br-dC
3'-dC	5-Bromo dU
3'-dG	5-Hydroxy-dU
3'-dT	5-hydroxymethyl-dC
5-F-dU	5-hydroxymethyl-dU
5'-Nitroindole	5-Methyl dC
Internal Amino Modifier C6 dT	6-thio-dG
Ara-dC	8-Br-dA
Azide	8-Br-dG
Azobenzene	8-Oxo-dA
Atto 425	8-Oxo-dG
Biotin-TEG	Cyanine 3 dA
C3 spacer	Cyanine 3 dC
C6 spacer	Cyanine 3 dG
C12 spacer	Cyanine 3 dT
C8-Alkyne-dT	Cyanine 5 dA
C8-Alkyne-dC	Cyanine 5 dC
Deoxy Uridine	Cyanine 5 dG
Deoxypurine (2'-DeoxyNebularine)	Cyanine 5 dT
Desthiobiotin TEG	LNA(A,C,G,T)
Dithiol	L-DNA(A,C,G,T)
DNP (2,4-dinitrophenyl)-TEG	Pyrrolo-dC
dSpacer	2'-MOE-Methyl(A,C,G,T)
EDTA-C2-dT	BHQ1-dT
Epoch Eclips Quencher	BHQ2-dT
Fluorescein dT	Internal Biotin-dT
Ferrocene-dT	Dabcyl-dT
Inosine	EBQ-dT
Methylene Blue	Phosphorothioate (per insertion)
N3-Methyl dC	HEX-dT
N4-Ethyl dC	Tamra-dT
N6-methyl-2'-deoxyadenosine	Thiol-dT
O4-Methyl-dT	Serinol FAM
O6-Methyl 2'-dG	Lightcycler Red 640
PC (photo-cleavable)Linker	

Dual Labeled Probes

Dual labeled Probes	
5'-Cyanine 3_3'-BHQ1	5'-JOE_3'-BHQ2
5'-Cyanine 3_3'-BHQ2	5'-JOE_3'-DABSYL
5'-Cyanine 5_3'-BHQ2	5'-JOE_3'-TAMRA
5'-FAM_3'-BHQ1	5'-ROX_3'-BHQ1
5'-FAM_3'-BHQ2	5'-ROX_3'-BHQ2
5'-FAM_3'-DABCYL	5'-TAMRA_3'-BHQ1
5'-FAM_3'-TAMRA	5'-TAMRA_3'-BHQ2
5'-FAM_BHQ1-dT_Amine-3'	5'-TAMRA_3'-DABCYL
5'-FAM_Tamra-dT_PO4-3'	5'-TET_3'-BHQ1
5'-HEX_3'-BHQ1	5'-TET_3'-BHQ2
5'-HEX_3'-BHQ2	5'-TET_3'-DABCYL
5'-HEX_3'-DABCYL	5'-TET_3'-TAMRA
5'-HEX_3'-TAMRA	5'-Texas Red_3'-BHQ1
5'-JOE_3'-BHQ1	5'-Texas Red_3'-BHQ2

AccuEBQ®

5' Reporter Dye(s)	internal Quencher	Quencher
Cyanine 3	i-EBQ (Recommended between 10 and 11 bp)	EBQ
Cyanine 5		
FAM		
HEX		
JOE		
ROX		
TAMRA		
TET		
Texas Red		

MGB Probes

Modification	Guaranteed Yield (nmole)		
5'-FAM-3'-MGB	10	25	50
5'-VIC-3'-MGB	10	25	50
5'-VIC-3'-TAMRA	10	25	50

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