NORGEN BIOTEK CORP.

The Sample Preparation Experts

PURIFICATION KITS FOR STEM CELL RESEARCH

The New Standard in RNA Purification, Best-in-Class, Pure & Simple

Over 40 kits for the isolation of Total RNA including microRNA from any specimen without phenol

Human Embryonic Stem Cells (hESCs)

www.norgenbiotek.com

An ISO 13485:2003, ISO 9001:2008 & ISO 15189:2012 Certified Company

Purification Kits for Stem Cell Research

Ordering Information

Website: www.norgenbiotek.com
Phone: 905-227-8848
Toll Free in North America: 1-866-667-4362
Fax: 905-227-1061
Email: orders@norgenbiotek.com

Address:
Norgen Biotek Corp.
3430 Schmon Parkway
Thorold, ON
Canada, L2V 4Y6

Norgen Biotek is dedicated to providing our customers with first class sample preparation kits for RNA, microRNA, DNA, protein and exosome purification, clean-up and concentration, as well as preservatives for nucleic acid (DNA and RNA stabilization in various bodily fluids for both research and diagnostic applications; and to providing dedicated and expert support services to our customers and commercial partners worldwide.

ISO 9001:2008 ISO 13485:2003 ISO 15189:2012 CE

Norgen is an **ISO 9001:2008, ISO 13485:2003 and ISO 15189:2012** registered company, indicating our commitment to quality.

V 1.0

Cover image courtesy of *Russo E.* (2005) PLoS Biol 3(7): e234.

Total RNA Purification Micro Kit — Cat. # 35300

Rapid purification of total RNA -including microRNA - from small input amounts

This kit extracts total RNA from low cell number samples and elutes in a convenient 20 µL elution for a number of downstream applications. This kit is suitable for the isolation of total RNA from a range of samples including small input of cells, needle biopsies, LCM, CTC and other low cell number samples. Extract high quality and purity RNA with excellent RIN values and A260/A280 suitable for downstream applications including qRT-PCR, RT-PCR, microarrays, NGS and more.

Features and Benefits

- Extract high quality & purity total RNA including miRNA without phenol: isolate all RNA in one fraction
- Elute extracted total RNA in small volume (20 µL)
- Bind, elute and efficiently extract all RNA irrespective of size or GC content, without bias.
- Very sensitive & linear down to a few cells without the need for carrier RNA
- Convenient & fast spin column format
- Isolate from a wide variety of specimens

Feature	Specifications
Maximum Column Binding Capacity	35 µg
Maximum Column Loading Volume	650 µL
Minimum Elution Volume	20 µL
Size of RNA Purified	All sizes, including small RNA (< 200 nt)
Maximum amount of starting material: Animal Cells Animal Tissues LCM	 5 x 10^5 cells 3 mg (for most tissues) Up to 5 x 10^5 cells
Time to Complete 10 Purifications	20 minutes
Average Yields HeLa Cells (1 x 10^5 cells)	1.5 µg

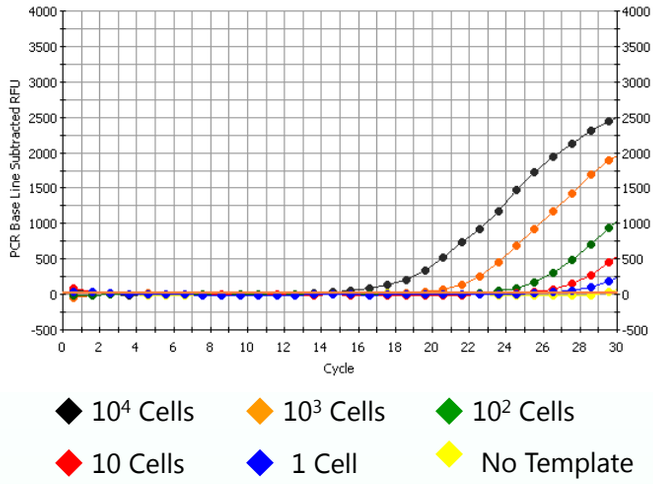


Figure 1. Great Isolation Sensitivity. Norgen's Total RNA Purification Micro Kit allows sensitive RNA extraction from as little as a single cell. Total RNA was extracted from a decreasing number of HeLa cells. Five µL of the eluted RNA was used as the template in a 20 µL RT-qPCR reaction to detect the human S14 transcript. The S14 was detected from as little as a single cell.

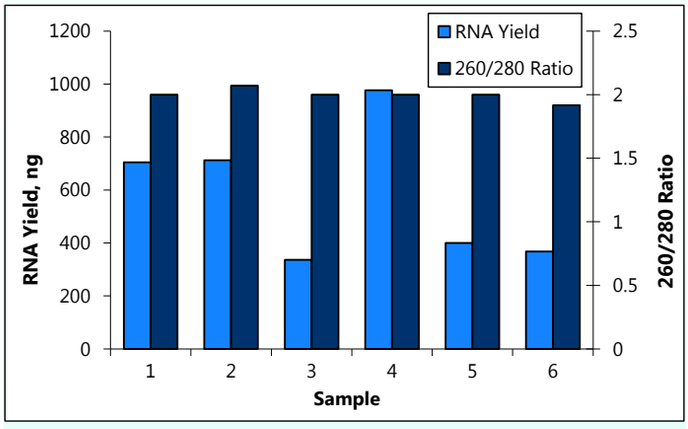


Figure 2. High Quality RNA Isolated from Laser-Captured Microdissection (LCM). Norgen's Total RNA Purification Micro Kit allows sensitive but high quality RNA extraction from small inputs such as Laser-Captured Microdissection (LCM). Total RNA was isolated from 6 different LCM samples. RNA yield and quality (260/280 ratio) were assessed by NanoVue spectrophotometry. Norgen's Total RNA Purification Micro Kit recovered good amounts of RNA with excellent 260/280 ratio.

Ordering information

Description	Cat #	Size
Total RNA Purification Micro Kit	35300	50 prep

Purification Kits for Stem Cell Research

Single Cell RNA Purification Kit

Cat. # 51800

Rapid purification of total RNA - including microRNA - from small input amounts

Very sensitive kit designed to work with as low as a single cell and up to 100,000 cells. The special design of the micro spin-column allows a small elution volume of as little as 8 µL.

Rapid 15 minute method for the isolation and purification of total RNA (including miRNA) from small input amounts of cultured animal cells, CTC, stem cells, immuno-sorted cells, and microdissected samples including laser-capture microdissection (LCM). The purified RNA is of the highest purity and integrity, and can be used in a number of qRT-PCR and digital PCR and other whole transcriptome applications.

Features and Benefits

- Fast and easy processing using rapid micro spin-column format
- Small elution volume of 8 µL ready for direct utilization in qRT-PCR reactions
- Isolate total RNA including microRNA in a concentrated, ready to use format
- Isolate high quality total RNA from a variety of sources
- RNA can be isolated from a single cell to 100,000 cells

Feature	Specifications
Maximum Column Binding Capacity	10 µg
Maximum Column Loading Volume	650 µL
Minimum Elution Volume	8 µL
Size of RNA Purified	All sizes, including small RNA (<200 nt)
Acceptable Amount of Starting Material: Animal Cells LCM	 1 to 2 x 10^5 cells Up to 2 x 10^5 cells
Time to Complete 10 Purifications	20 minutes
Average Yields HeLa Cells (1 x 10^5 cells)	1.5 µg

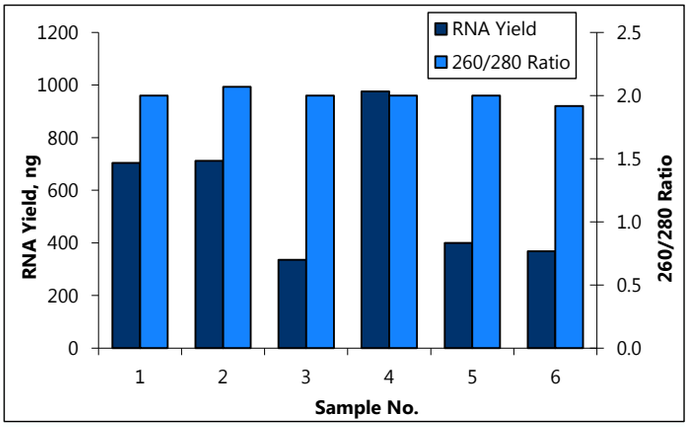


Figure 1. High Quality RNA Isolated from Laser-Captured Microdissection (LCM). Norgen's Single Cell RNA Purification Kit allows sensitive but high quality RNA extraction from small inputs such as Laser-Captured Microdissection (LCM). Total RNA was isolated from 6 different LCM samples. RNA yield and quality (260/280 ratio) were assessed by NanoVue spectrophotometry. Norgen's Single Cell RNA Purification Kit recovered good amounts of RNA with excellent 260/280 ratio.

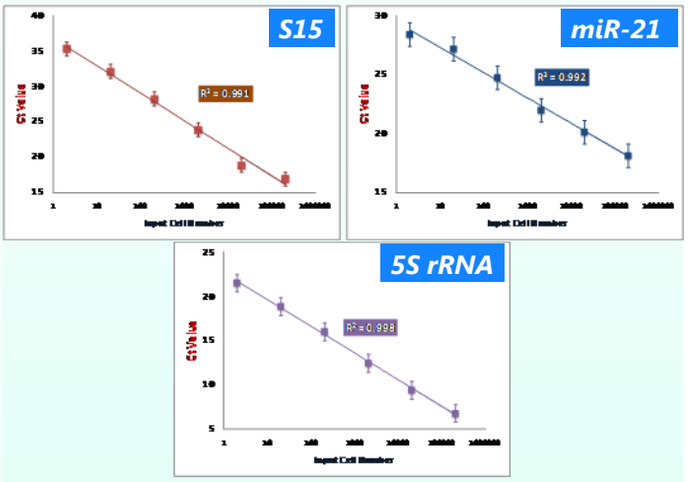


Figure 2. Consistent and Linear Recovery of All Sizes of RNA down to Single Cell Input. Norgen's Single Cell RNA Purification Kit allows sensitive RNA extraction from as little as a single cell with great linearity. Total RNA was extracted from a decreasing number of HeLa cells using Norgen's Single Cell RNA Purification Kit. The extracted RNA was subjected to RT-qPCR to detect all sizes of RNA, including the human S15 (mRNA), 5S rRNA transcript (small RNA) and miR-21 (microRNA). RNA isolated by Norgen's Single Cell RNA Purification Kit showed very high consistency (over 99%) of recovery of each RNA transcript tested at all cell input numbers down to single cell.

Ordering information

Description	Cat #	Size
Single Cell RNA Purification Kit	51800	50 prep

RNA/Protein Purification Kit

Cat. # 24100

For purification of total RNA (including microRNA) and total proteins from the same sample

This kit provides a rapid, single column method for the isolation and purification of total RNA (including miRNA) and proteins sequentially from a single sample of up to 500,000 cells, and small tissue (up to 5 mg). The total RNA and proteins are both column purified in under 25 minutes using a single column. RNA is of high quality and yield and would be suitable for NGS, RT-qPCR and microarrays. Proteins are eluted in buffer and are ready for downstream applications such as Western Blots, Mass Spec and some ELISA applications. The proteins will not require precipitation, or any further cleaning and there are no difficult to resuspend pellets.

Features and Benefits

- Sequentially purify total RNA and proteins from a single sample without phenol
- Ideal for low cell number input and few mg of tissues
- High quality & purity RNA including miRNA
- Proteins are column purified and require no further purification
- Purify RNA/proteins from cultured animal cells, tissues
- Rapid and efficient single spin column procedure

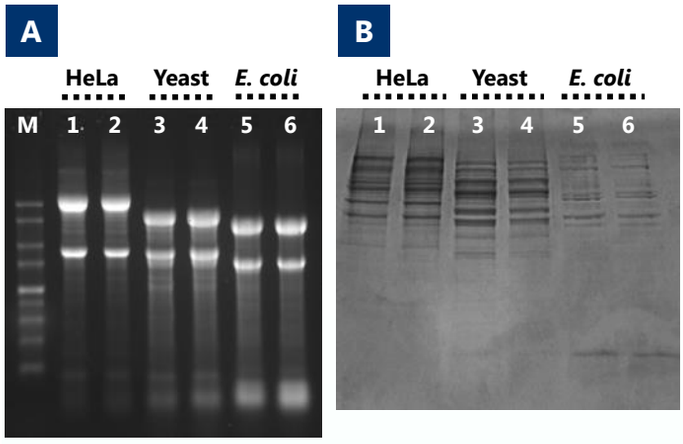


Figure 1. Sequential Isolation of RNA and Proteins from HeLa cells, Yeast cells and *E. coli*. Total RNA and total proteins were isolated sequentially from 10^6 HeLa cells, 5 x 10^6 yeast cells and 5 x 10^7 *E. coli* cells using Norgen's kit. Panel A is a 1X MOPS 1.5% agarose gel showing the total RNA. Lane M is Norgen's 1 kb RNA Ladder, Lanes 1 and 2 contain the elution from the HeLa cells, Lanes 3 and 4 contain the elution for the yeast cells, and Lanes 5 and 6 contain the elution for the *E. coli* cells. Five microliters of each of the 50 µL RNA elutions were loaded. Panel B is a 10% SDS-PAGE gel containing the total proteins that were isolated. Lanes 1 and 2 contain the HeLa proteins, Lanes 3 and 4 contain the yeast proteins and Lanes 5 and 6 contain the *E. coli* proteins. Ten microliters of the 100 µL protein elutions were loaded. The RNA and proteins are intact and of the highest quality, and can be used in a number of different downstream applications.

Feature	Specifications
Binding Capacity Per Spin Column	RNA: Up to 50 µg Protein: Up to 200 µg
Maximum Loading Volume Per Spin Column	650 µL
Size of RNA Purified	All sizes, including < 200 nt
Time to Complete 10 Purifications	25 minutes
HeLa Cells (1 x 10^6 Cells)	RNA: 15 µg Protein: 150 µg
Liver (5 mg)	RNA: 12.5 µg Protein: 55 µg

Ordering information

Description	Cat #	Size
RNA/Protein Purification Kit	24100	50 prep

Purification Kits for Stem Cell Research

RNA/DNA Purification Kit

Cat. # 48700

For sequential isolation of total RNA and genomic DNA from the same sample

The kit provides a rapid method for the isolation and purification of total RNA and DNA sequentially from a single sample of cultured animal cells and tissues, blood, bacteria, yeast, or fungi. The lysate is passed over two columns: 1) a DNA column and 2) an RNA column. Total RNA of all sizes is purified, including microRNA. Both DNA and RNA are of the highest purity and yield.

This kit is ideal for researchers who are interested in studying the genome and transcriptome of a single sample, such as for studies of microRNA profiling, gene expression including gene silencing experiments or mRNA knockdowns, studies involving biomarker discovery, and for characterization of cultured cell lines. Norgen's RNA/DNA Purification Kit is especially useful for researchers who are isolating macromolecules from precious, difficult to obtain or small samples such as biopsy materials or single foci from cell cultures, as it eliminates the need to fractionate the sample. Furthermore, analysis will be more reliable since the RNA and DNA are derived from the same sample, thereby eliminating inconsistent results. The purified macromolecules are of the highest purity and can be used in a number of different downstream applications.

Features and Benefits

- Sequentially isolate and purify total RNA and DNA from a single sample
- Two column system: one for DNA and one for RNA
- The RNA column is for the purification of total RNA including microRNA
- No need to split the lysate, or to use phenol or precipitation methods
- Rapid and efficient spin column procedure - it takes only 30 minutes

Feature	Specifications
Maximum Binding Capacity	50 µg for RNA 20 µg for DNA
Maximum Column Loading Volume	650 µL
Size of RNA Purified	All sizes, including small RNA (< 200 nt)
Time to Complete 10 Purifications	30 minutes
RNA Yield HEK 293 Cells (1 x 10^6 cells) HEK 293 Cells (1 x 10^6 cells) Liver (15 mg) Liver (15 mg)	 10-15 µg RNA 2-4 µg DNA 30-35 µg RNA 4-6 µg DNA

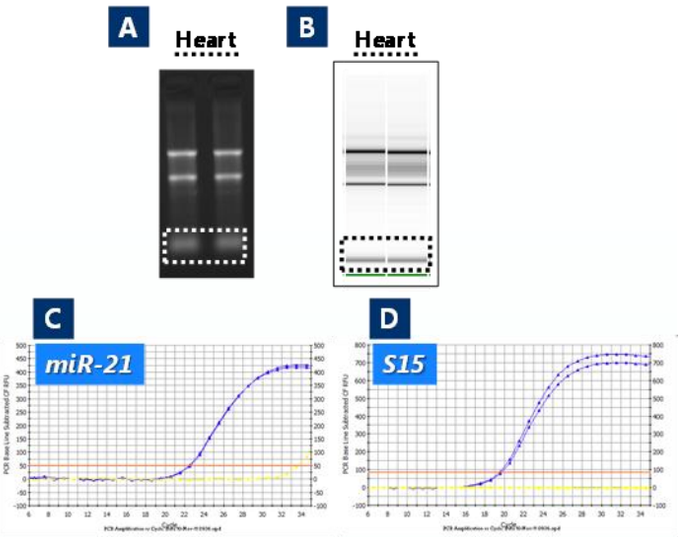


Figure 1. Recovery of True Total RNA including microRNA from Hamster Heart. Panel A is a 1X MOPS 1% agarose gel showing the RNA that was isolated from 2 different samples of 10 mg hamster heart using Norgen's RNA/DNA Purification Kit. Norgen's RNA/DNA Purification Kit isolated large RNA (represented by 28S and 18S rRNA) with high integrity. Moreover, it provided the added benefit of recovering small RNA without any additional protocol. Panel B is a result from a bioanalyzer resolution of the eluted RNA. Similar to the agarose gel, Norgen's RNA/DNA Purification Kit showed the added benefit of recovering small RNA. The effectiveness of small RNA recovery was also demonstrated by gene-specific RT-qPCR. One microgram of RNA was used in RT-qPCR reactions for human *S15* (for Large RNA) and *miR-21* (for microRNA) genes. The RNA isolated by Norgen's RNA/DNA Purification Kit showed detection of both small RNA (Panel C) and the large RNA (Panel D).

Ordering information

Description	Cat #	Size
RNA/DNA Purification Kit	48700	50 prep

RNA/DNA Purification Micro Kit

Cat. # 50300

For sequential isolation of total RNA and genomic DNA from the same sample from small input amounts

This kit provides a rapid method for the isolation and purification of total RNA and DNA sequentially from a single sample of cultured animal cells of less than 500 tissues, blood, bacteria, yeast, fungi. The lysate is passed over two columns: 1) a DNA column and 2) an RNA column. The purified RNA includes all RNA sizes including microRNA. Both DNA and RNA are of the highest purity and yield and are eluted in as little as 20 µL.

The RNA/DNA Purification Micro Kit is ideal for researchers who are interested in studying the genome and transcriptome of a single sample, such as for studies of microRNA profiling, gene expression including gene silencing experiments or mRNA knockdowns, studies involving biomarker discovery, and for characterization of cultured cell lines. Norgen's RNA/DNA Purification Kit is especially useful for researchers who are isolating macromolecules from precious, difficult to obtain or small samples such as biopsy materials or single foci from cell cultures, as it eliminates the need to fractionate the sample. Furthermore, analysis will be more reliable since the RNA and DNA are derived from the same sample, thereby eliminating inconsistent results. The purified macromolecules are of the highest purity and can be used in a number of different downstream applications.

Features and Benefits

- Sequentially isolate and purify total RNA and DNA from a single sample
- Two specialized small diameter columns: 1) for DNA and 2) for RNA
- The RNA column is for the purification of Total RNA including microRNA
- Ideal for cell number inputs of 500,000 and as little as 5 cells
- Elute DNA or RNA in as little as 20 µL for clean and concentrated sample
- No need to split the lysate, or to use phenol or precipitation methods

Feature	Specifications
Maximum Column Binding Capacity	35 µg for RNA 10 µg for DNA
Maximum Column Loading Volume	650 µL
Elution Volume	20-50 µL
Size of RNA Purified	All sizes, including small RNA (< 200 nt)
Time to Complete 10 Purifications	30 minutes
Average Yields HeLa Cells (5 x 10^5 cells) HeLa Cells (5 x 10^5 cells)	 RNA: 10-12 µg DNA: 1-2 µg

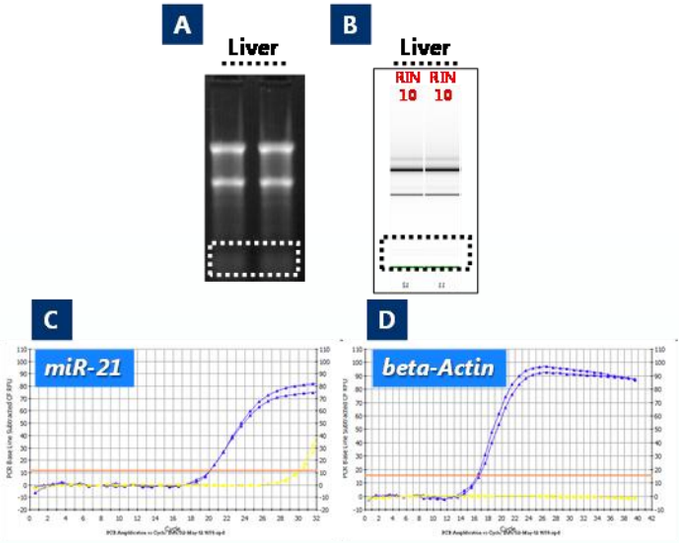


Figure 1. Recovery of True Total RNA including microRNA from Hamster Liver. Panel A is a 1X MOPS 1% agarose gel showing 3 µL of 20 µL eluted RNA that was isolated from 2 different samples of 5 mg hamster liver using Norgen's RNA/DNA Purification Micro Kit. Norgen's RNA/DNA Purification Micro Kit isolated large RNA (represented by 28S and 18S rRNA) with high integrity. Moreover, it provided the added benefit of recovering small RNA without any additional protocol. Panel B is a result from a bioanalyzer resolution of the eluted RNA. Similar to the agarose gel, Norgen's RNA/DNA Purification Micro Kit showed the added benefit of recovering small RNA while isolating very high quality RNA. The effectiveness in small RNA recovery was also demonstrated by gene-specific RT-qPCR. One microgram of RNA was used in RT-qPCR reactions for beta-Actin (for Large RNA) and miR-21 (for microRNA) genes. The RNA isolated by Norgens RNA/DNA Purification Micro Kit showed detection of both small RNA (Panel C) and the large RNA (Panel D).

Ordering information

Description	Cat #	Size
RNA/DNA Purification Micro Kit	50300	50 prep

Purification Kits for Stem Cell Research

RNA/DNA/Protein Purification Plus Kit — Cat. # 47700

For sequential isolation of total RNA, genomic DNA and total proteins from the same sample using a 2 column system

This kit provides a rapid spin-column method for the isolation and purification of total RNA, genomic DNA and proteins sequentially from a single sample of cultured animal cells, small tissue samples, blood, bacteria, yeast, fungi or plants.

The kit employs two columns: 1) for gDNA purification and 2) for RNA purification utilizing silicon carbide columns (superior for the binding of all RNA sizes including miRNA). The proteins are also purified on the second column after RNA elution. The proteins are eluted in buffer and are ready for downstream application without any further clean up required. The proteins can be quantified directly, used in western blots, ELISA or mass spectrometry.

Features and Benefits

- Sequentially purify total RNA (and miRNA), DNA and proteins from a single sample
- No sample splitting or need to use phenol or precipitation methods
- Purify RNA/DNA/Protein from cultured animal cells, tissues, blood, bacteria, yeast, fungi or plants
- Rapid and efficient spin column procedure - all done in 30 minutes
- Proteins are purified on column and are soluble in the elution buffer. No further cleaning is required

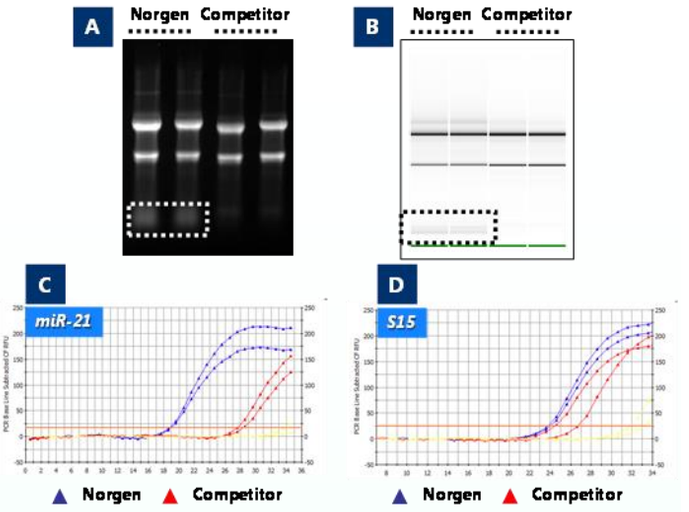


Figure 1. Recovery of True Total RNA including microRNA from HEK-293 Cells. Panel A is a 1X MOPS 1% agarose gel showing the RNA that was isolated from 2 different samples of ~ 800,000 HEK-293 cells using either Norgen's RNA/DNA/Protein Purification Plus Kit or a competitor's multiple-analyte purification kit. Both kits isolated large RNA (represented by 28S and 18S rRNA) with high integrity but Norgen's RNA/DNA/Protein Purification Plus Kit provided the added benefit of recovering small RNA without any additional protocol. Panel B is a result from a bioanalyzer resolution of the eluted RNA. Similar to the agarose gel, Norgen's RNA/DNA/Protein Purification Plus Kit showed the added benefit of recovering small RNA. The difference in small RNA recovery was also demonstrated by gene-specific RT-qPCR. One microgram of RNA was used in RT-qPCR reactions for human S15 (for Large RNA) and miR-21 (for microRNA) genes. The RNA isolated by Norgen's RNA/DNA/Protein Purification Plus Kit showed similar Ct value to RNA isolated by the competitor's kit for the large RNA (Panel D). However, Norgen's RNA/DNA/Protein Purification Plus Kit showed superior recovery of small RNA including microRNAs as depicted by the miR-21 RT-qPCR (Panel C).

Feature	Specifications
Maximum Column Binding Capacity	50 µg for RNA 20 µg for DNA 200 µg for protein
Maximum Column Loading Volume	650 µL
Size of RNA Purified	All sizes, including small RNA (< 200 nt)
Size of DNA Purified	≥ 30 kb
Maximum Amount of Starting Material: Animal Cells Animal Tissues Blood Bacteria Yeast Fungi Plant Tissues	 5×10^6 cells 25 mg (for selected tissues) 100 µL 1×10^9 cells 1×10^8 cells 50 mg 50 mg
Time to Complete 10 Purifications	30 minutes

Ordering information

Description	Cat #	Size
RNA/DNA/Protein Purification Plus Ki	47700	50 prep

RNA/DNA/Protein Purification Plus Micro Kit — Cat. # 51600

For sequential isolation of total RNA (including miRNA), genomic DNA and total proteins from the same sample using a 2 column system

This kit provides a rapid spin-column method for the isolation and purification of total RNA, DNA and proteins sequentially from a single sample of cultured animal cells, small tissue samples, microdissected samples including LCM, stem cells, sorted cells, and CTC. The total RNA, genomic DNA and proteins are all column purified in less than 30 minutes. The RNA and DNA can be eluted in as little as 20 µL while the protein can be eluted in as little as 50 µL. This kit provides the same performance as if the samples were isolated from dedicated kits. The proteins are eluted in buffer, so that there are no pellets to resuspend and the proteins are directly ready for quantification, Western Blots, and mass spectrometry.
This kit is ideal for researchers who are interested in system biology and are studying the genome, proteome and transcriptome of a single sample. Norgen's RNA/DNA/Protein Purification Plus Micro Kit is especially useful for researchers who are isolating macromolecules from precious, difficult to obtain or small samples such as biopsy materials, LCM or single foci from cell cultures, as it eliminates the need to fractionate the sample. Furthermore, analysis will be more reliable since the RNA, DNA and proteins are derived from the same sample, thereby eliminating inconsistent results. The purified RNA, DNA and proteins are of the highest integrity and can be used in a number of downstream applications.

Features and Benefits

- Sequentially purify RNA (and miRNA), DNA and proteins from a single sample
- Small elution volume down to 20 µL with a specialized column
- No sample splitting, no need to use phenol or precipitation methods
- Proteins are purified on column and are soluble in the elution buffer
- Proteins require no further cleaning - ready for Western blot and Mass spectrometry
- Suitable for cells, tissues, stem cells, CTC, small input of samples
- Rapid and efficient spin column procedure

Feature	Specifications
Maximum Column Binding Capacity	35 µg for RNA 10 µg for DNA 100 µg for protein
Maximum Column Loading Volume	650 µL
Size of RNA Purified	All sizes, including small RNA (< 200 nt)
Size of DNA Purified	≥ 30 kb
Time to Complete 10 Purifications	30 minutes

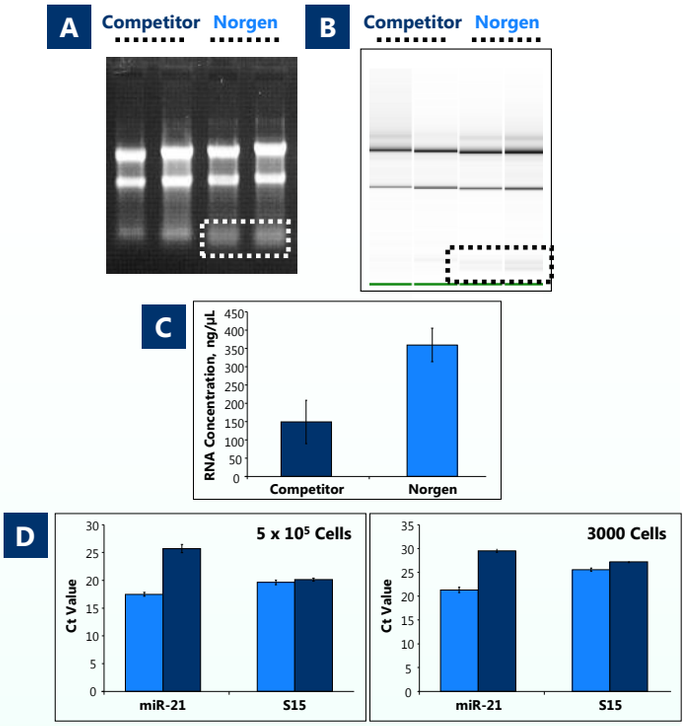


Figure 1. Recovery of True Total RNA including microRNA from HeLa Cells. Panel A is a 1X MOPS 1% agarose gel showing the RNA that was isolated from 2 different samples of ~500,000 HeLa cells using either Norgen's RNA/DNA/Protein Purification Plus Micro Kit or a competitors multiple-analyte purification kit. Both kits isolated large RNA (represented by 28S and 18S rRNA) with high integrity but Norgen's RNA/DNA/Protein Purification Plus Micro Kit provided the added benefit of recovering small RNA without any additional protocols. Panel B is a result from a bioanalyzer resolution of the eluted RNA. Similar to the agarose gel, Norgen's RNA/DNA/Protein Purification Plus Micro Kit showed the added benefit of recovering small RNA as well as a much higher concentration of RNA (Panel C). The difference in small RNA recovery was also demonstrated by gene-specific RT-qPCR. Two microliters of RNA isolated from both 500,000 and 3,000 HeLa cells were used in RT-qPCR reactions for human S15 (for Large RNA) and miR-21 (for microRNA) genes. The RNA isolated by Norgens RNA/DNA/Protein Purification Plus Micro Kit showed similar or better (lower) Ct value than RNA isolated by the competitors kit for the large RNA. More importantly, Norgen's RNA/DNA/Protein Purification Plus Micro Kit showed superior recovery of small RNA including microRNAs as depicted by the miR-21 RT-qPCR (Panel D).

Ordering information

Description	Cat #	Size
RNA/DNA/Protein Purification Plus Micro Kit	51600	50 prep

Purification Kits for Stem Cell Research

RNA Clean-Up and Concentration Micro-Elute Kit — Cat. # 61000

For rapid and efficient clean-up and concentration of total RNA, including microRNA, without phenol from small input volumes

Norgen's RNA Clean-Up and Concentration Micro-Elute Kit provides a rapid method for the purification, cleanup and concentration of RNA for NGS Library preparation and excellent processing of up to 45 µg of RNA isolated using different methods including phenol/guanidine-based protocols, and from various upstream enzymatic reactions such as DNase treatment, labeling and *in vitro* transcription. The minimum recommended elution volume is 8 µL, which enables the concentration of small amounts of all sizes of RNA, from large mRNA and ribosomal RNA down to microRNA (miRNA) and small interfering RNA (siRNA). The RNA is preferentially purified from other reaction components such as proteins, RNases and nucleotides, without the use of phenol or chloroform. The purified RNA is of the highest integrity, and can be used in a number of downstream applications including end-point or quantitative reverse transcription PCR, Northern blotting, RNase protection and primer extension, expression array assays and next generation sequencing.

Features and Benefits

- Concentration of small amounts of RNA into 8 µL
- Ideal for concentrating RNA samples prior to NGS library preparation
- Concentrate from larger elution volumes to more manageable elution volumes
- Ideal for concentrating RNA purified from exosomes, plasma, serum, urine, and other bodily fluids, and any RNA samples initially purified in large volumes
- Efficient RNA cleanup from enzymatic reactions – labeling, DNase treatment and *in vitro* transcription
- Cleanup of RNA isolated using different methods, including phenol/chloroform extractions
- Fast and easy processing using rapid spin-column format in 15 minutes
- Suitable for all sizes of RNA, including microRNA (miRNA) without bias

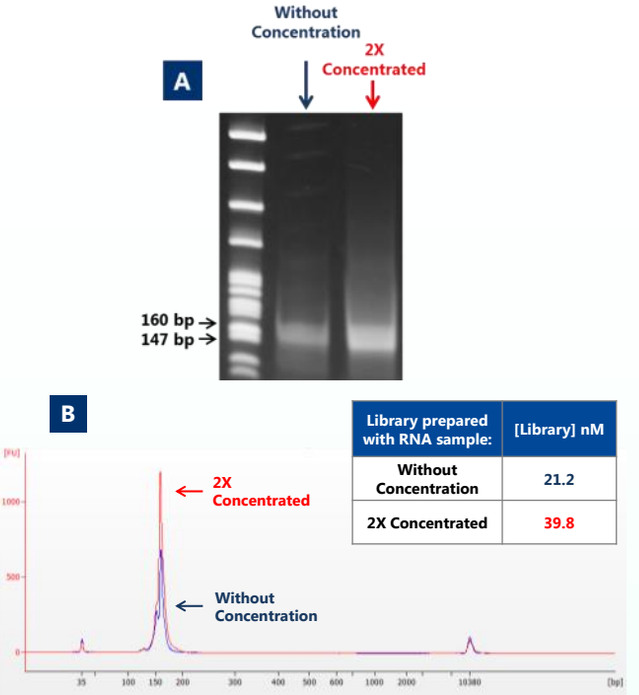


Figure 1. Concentration of RNA prior to Next Generation Sequencing (NGS) applications. Total RNA was purified from 200 µL of plasma collected on EDTA blood tubes using Norgen's Total RNA Purification Kit (Cat. 17200) and eluted in 50 µL of elution solution. The same RNA was also concentrated two-fold using the Micro-Elute RNA Column by eluting in 25 µL of elution solution. Five microliters of both the RNA without additional concentration and the 2X concentrated RNA were used as inputs to generate RNA libraries (using the NEBNext® Small RNA Library Prep Set for Illumina® and following manufacturers instructions) for small RNA NGS on the MiSeq (Illumina) platform. A) The prepared small RNA libraries were visualized on a 6% TBE polyacrylamide gel, where the library prepared with 2X concentrated RNA contained more ligated/indexed miRNA cDNA (147-160 bp) products than the library prepared using the RNA without concentration. B) The cDNA was extracted from excised gel bands and interrogated using the Agilent 2100 Bioanalyzer (High Sensitivity DNA Assay). As would be expected based on input, the small RNA library prepared with the 2X concentrated RNA sample was approximately two times more concentrated than the library prepared with RNA without prior concentration (39.8 vs 21.2 nM, respectively).

Feature	Specifications
Maximum Column Binding Capacity	45 µg
Size of RNA Purified	All sizes, including small RNA (<200 nt)
Maximum Amount of starting Material	45 µg of RNA
Minimum Elution Volume	8 µL
Time to Complete 10 Purifications	20 minutes
Average Recovery	≥ 90%

Ordering information

Description	Cat #	Size
RNA Clean-Up and Concentration Micro-Elute Kit	61000	50 prep

TruScript Reverse Transcriptase and Kits — Cat. # 54440, 54420, 54400

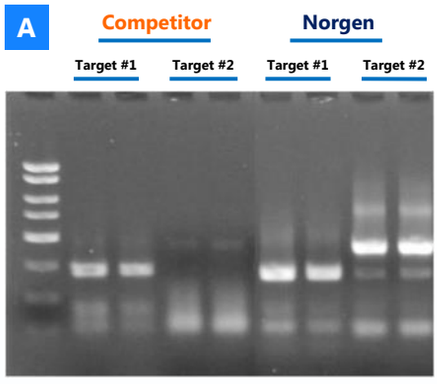
All-in-One, Ready-to-use First Strand cDNA Synthesis Kits

TruScript Reverse Transcriptase is Available in Three Convenient Formats:

1. TruScript Reverse Transcriptase Kit (Cat.#54440): This kit contains 5X RT Buffer and a vial of TruScript Enzyme Mix (200 units/µL). This enzyme can be used for reverse-transcription reactions with any user-supplied primers.
2. TruScript First Strand cDNA Synthesis Kit (Cat.#54420): This is an all-in-one, ready-to-use product for simple set-up of reverse transcription of total RNA (both poly A- or non-poly A-containing transcripts). The kit contains the 2x Reaction Mix and the TruScript Enzyme Mix. The 2x Reaction Mix contains a blend of buffer, nucleotides and primers (oligo dT and random hexamers) for effective cDNA synthesis from total RNA transcripts.
3. TruScript First Strand cDNA Synthesis Kit for mRNA (Cat.#54400): This is an all-in-one, ready-to-use product for simple set-up of reverse transcription of messenger RNA (poly A-containing transcripts). The kit contains the 2x Reaction Mix and the TruScript Enzyme Mix. The 2x Reaction Mix contains a blend of buffer, nucleotides and oligo dT primer for the effective cDNA synthesis from total RNA transcripts or enriched mRNA sample.

Features and Benefits

- Convenient – With the ready-to-use Master Mix, the user needs only to add template to the master mix and enzyme in order to set up the reverse transcriptase reaction
- Time Savings - Set up RT reactions in a shorter time since less pipetting steps are required
- Cost Efficient – No need to buy separate enzymes, dNTPs and buffers. All are included with the ready-to-use Master Mix kits
- High Sensitivity and Yield – the optimized Master Mix allows for highly sensitive amplifications with high yields of PCR products
- Robust Enzyme – broad range of working temperatures from 37°C to 60°C. Capable of amplifying difficult templates with a high degree of reproducibility



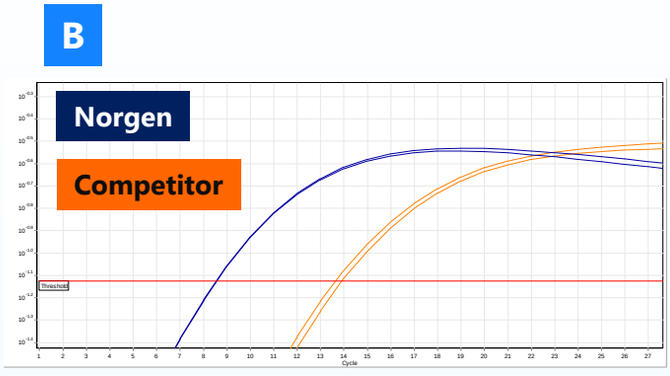


Figure 1. Robust Reverse Transcription of All RNA Transcripts. Norgen's TruScript Reverse Transcriptase is a mutant version of Moloney Murine Leukemia Virus (M-MuLV) Reverse Transcriptase that can produce cDNA from different kinds of RNA transcripts, including those with high difficulty or a high degree of secondary structure. In Panel A, TruScript Reverse Transcriptase was compared with a competitor's M-MuLV Reverse Transcriptase for RT-PCR of two different RNA transcripts. Norgen's TruScript showed good amplification for both targets while the competitor failed to amplify Target #2 with good quantity. In Panel B, TruScript Reverse Transcriptase was compared with a competitor's M-MuLV Reverse Transcriptase in an RT-qPCR reaction. Norgen's TruScript Reverse Transcriptase provided a better amplification as shown with a lower Ct value.

Ordering information

Description	Cat #	Size
TruScript Reverse Transcriptase	54440	10,000 Units
TruScript First Strand cDNA Synthesis Kit	54420	50 Reactions
TruScript First Strand cDNA Synthesis Kit for mRNA	54400	50 Reactions

Purification Kits for Stem Cell Research

ValueScript Reverse Transcriptase — Cat. # 54460

Norgen's ValueScript Reverse Transcriptase is a mutant version of Moloney Murine Leukemia Virus (M-MuLV) Reverse Transcriptase. It has reduced RNase H activity and increased thermal stability. Norgen's ValueScript Reverese Transcriptase is of high purity and thus can function in cDNA synthesis with high thermal stability, high fidelity and high specificity. It has an optimal working temperature of 42°C, with cDNA product sizes of up to 12 kb. Hence it is suitable for all sizes of RNA transcripts, including all messenger RNA down to small RNA including microRNA (with appropriate extension either through tailing or use of extending reverse primers). For specific microRNA cDNA synthesis, please see our microScript microRNA cDNA Synthesis Kit (Cat.# 54410).

Features and Benefits

- Cost Efficient - Competitively-priced, high quality reverse transcriptase
- High Sensitivity and Yield - Highly sensitive amplifications with high yields of PCR products
- Robust Enzyme - Norgen's ValueScript Reverse Transcriptase is capable of amplifying transcripts of different sizes as well as difficult templates with a high degree of reproducibility.

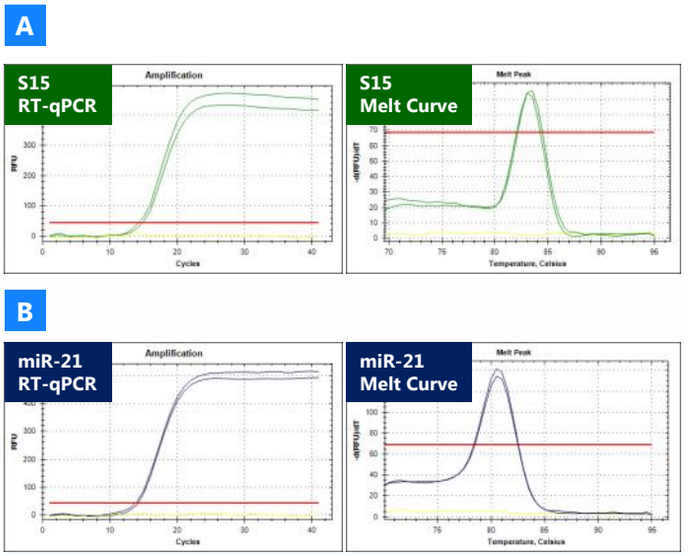


Figure 1. Robust Reverse Transcription of All RNA Transcripts. Norgen's ValueScript Reverse Transcriptase is a mutant version of Moloney Murine Leukemia Virus (M-MuLV) Reverse Transcriptase that can produce cDNA from different kinds of RNA transcripts, including those with high difficulty or high degree of secondary structures. Figure 1 shows the use of ValueScript Reverse Transcriptase for RT-qPCR of two different RNA transcripts from HeLa total RNA. Norgen's ValueScript shows good amplification for both mRNA (S15, Panel A) and microRNA (miR-21, Panel B) with good Ct values and a distinct melt curve pattern.

Kit Components	
ValueScript Reverse Transcriptase (200 units / µL)	50 µL
5x RT Buffer	1 mL
Nuclease-Free Water	1 mL
Product Insert	1

Ordering information

Description	Cat #	Size
ValueScript Reverse Transcriptase	54460	10,000 units

microScript microRNA cDNA Synthesis Kit — Cat. # 54410, 54415

Norgen's microScript microRNA cDNA Synthesis Kit is an all-in-one, ready-to-use product for the reverse transcription of microRNA from either Total RNA preparations or enriched microRNA preparations. The kit contains the 2x Reaction Mix and the microScript microRNA Enzyme Mix. The kit utilizes Norgen's microScript Reverse Transcriptase, a mutant version of Moloney Murine Leukemia Virus (M-MuLV) Reverse Transcriptase. It has reduced RNase H activity and increased thermal stability.

The workflow of Norgen's microScript microRNA cDNA Synthesis Kit involves a simple, single-tube set-up by the mixing of 2x Reaction Mix, Enzyme Mix and the RNA template. The reaction can then be carried out in a thermocycler. A poly (A) tail is first added to the RNA template, followed by cDNA synthesis using an adapter primer. In addition to the ease-of-use, the single-tube set-up provides superb consistency and sensitivity. The cDNA could be used in a PCR or qPCR amplification using a Universal PCR Reverse Primer and the forward primer that contains the sequence of the microRNA of interest. A single cDNA preparation could be used for PCR amplification of a number of different microRNAs. In addition, the cDNA preparation could be used for PCR or qPCR detection (using gene-specific forward and reverse primers) of mRNA or large RNA if total RNA preparation was the starting template. This could allow for parallel evaluation of expression level of microRNAs and microRNA-targets.

Features and Benefits

- Convenient
- One cDNA Synthesis, Multiple microRNAs and microRNA-targets analyzed
- Time Savings
- Cost Efficient
- High Sensitivity and Yield
- Robust Enzyme
- Available in 12 or 50 reaction size

Component	Cat. 54415	Cat. 54410
microScript microRNA Enzyme Mix	12 µL	50 µL
2x Reaction Mix	120 µL	500 µL
Universal PCR Reverse Primer	60 µL	250 µL
Nuclease-Free Water	1.25 mL	2 x 1.25 mL
Product Insert	1	1

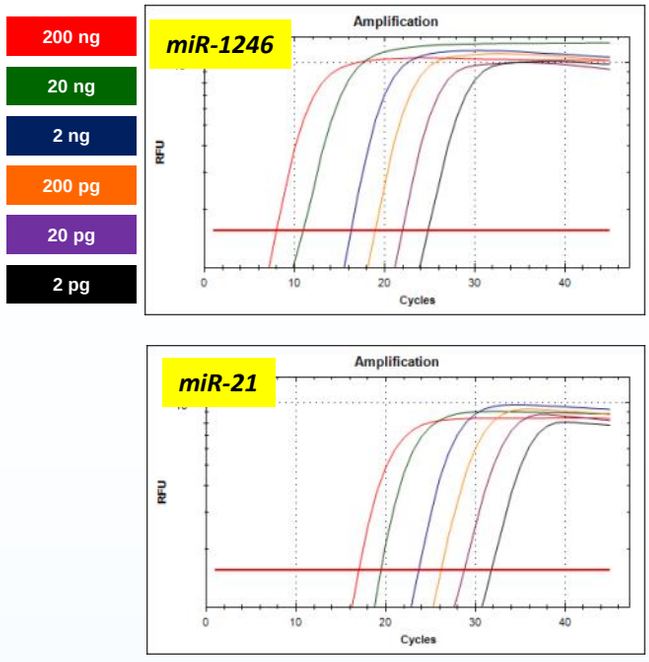


Figure 1. High Sensitivity with Robust Amplification of microRNAs from Different Amounts of RNA Input using Norgen's microScript microRNA cDNA Synthesis Kit. Norgen's microScript microRNA cDNA Synthesis Kit was used in an RT-qPCR reaction to amplify the human miR-1246 and miR-21 from a dilution series of HeLa total RNA isolated using Norgen's Total RNA Purification Kit. The PCR target was robustly amplified from a broad range of RNA inputs, from the 200 ng down to 2 pg.

Ordering information

Description	Cat #	Size
microScript microRNA cDNA Synthesis Kit	54410	50 rxns
microScript microRNA cDNA Synthesis Kit	54415	12 rxns

Low Abundance DNA Quantification Kit — Cat. # 57200

Norgen's Low Abundance DNA Quantification Kit offers a PCR-based detection procedure to quantify DNA of a wide spectrum of concentrations, including the lower ng per µL, pg per µL and sub-pg per µL range. The kit consists of a specially designed primer mix, that is used in conjunction with the provided 2x PCR Master Mix, to amplify human DNA from different types of inputs (such as various liquid biopsies). The kit is compatible with any Real -Time PCR system with the addition of fluorescent nucleic acid stains such as SYBR Green. The unknown DNA is accurately quantified by using a standard curve constructed from the provided DNA Standard.

Features and Benefits

- Quantify DNA of a wide spectrum of concentrations, including the lower ng per µL, pg per µL and sub-pg per µL range
- Compatible with any Real-Time PCR system
- DNA is accurately quantified by using a standard curve constructed from the provided DNA standard

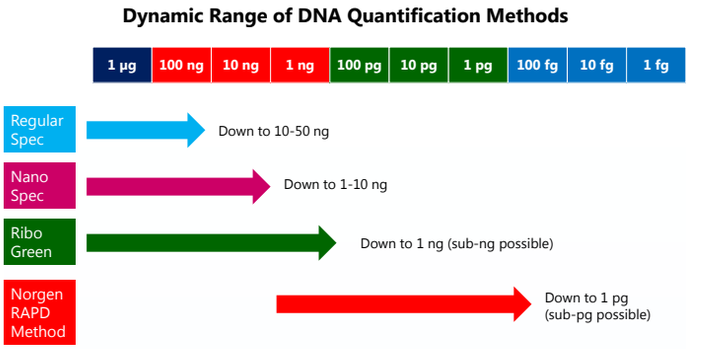


Figure 1. Sensitivity of DNA Quantification of the Low Abundance DNA Quantification Kit Compared to Other Methods. A diagram representing the dynamic range of different DNA quantification methods is presented here. The Low Abundance DNA Quantification Kit can quantify purified DNA from low abundance samples in the pg and sub-pg range.

Kit Components	
2X PCR Master Mix	1 mL
DNA Quantification Primer Set Mix	200 µL
Quantified DNA Standard	100 µL
Nuclease-Free Water	1.25 mL
Product Insert	1

Ordering information

Description	Cat #	Size
Low Abundance DNA Quantification Kit	57200	48 reactions

Low Abundance RNA Quantification Kit — Cat. # 58900

Norgen's Low Abundance RNA Quantification Kit offers a PCR-based detection procedure to quantify RNA of a wide spectrum of concentrations, including the lower ng per µL, pg per µL and sub-pg per µL range. The kit has two main enzymatic components – reverse transcription using Norgen's microScript Reverse Transcription system and PCR Master Mix used in conjunction with a specially formulized primer mixture, to amplify human RNA from different types of inputs (such as various liquid biopsies). The kit is compatible with any Real-Time PCR system with the addition of fluorescent nucleic acid stains such as SYBR Green. The unknown RNA is accurately quantified by using a standard curve constructed from the provided RNA Standard.

Features and Benefits

- Quantify RNA of a wide spectrum of concentrations, including the lower ng per µL, pg per µL and sub-pg per µL range
- Compatible with any Real-Time PCR system
- RNA is accurately quantified by using a standard curve constructed from the provided RNA standard

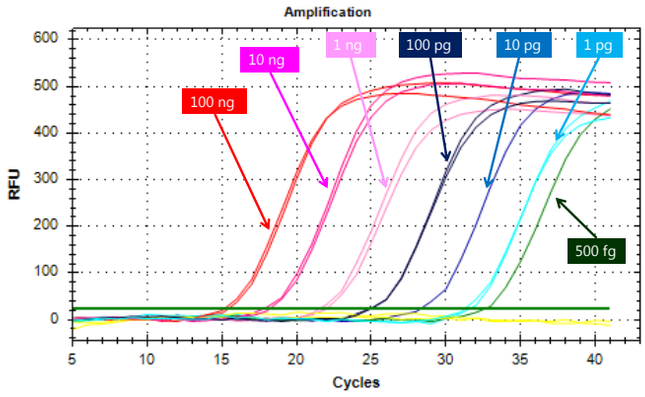


Figure 1. Sensitivity of RNA Quantification in the Picogram Range using the Low Abundance RNA Quantification Kit. A representative qPCR Baseline Graph showing the amplification of an RNA standard dilution series. The Low Abundance RNA Quantification Kit can quantify purified RNA from low abundance samples such as liquid biopsies (plasma or urine). As little as 500 fg of RNA can be quantified using Norgen's kit.

Kit Components	
microScript microRNA Enzyme Mix	50 µL
2x microScript Reverse Transcriptase Reaction Mix	0.5 mL
2X PCR Master Mix	1 mL
RNA Quantification Primer Set Mix	200 µL
Quantified RNA Standard	100 µL
Nuclease-Free Water	2 x 1.25 mL
Product Insert	1

Ordering information

Description	Cat #	Size
Low Abundance RNA Quantification Kit	58900	48 rxns

NGS Library Quantification Kit (for Small RNA-Seq) Cat. # 61600

Norgen's NGS Library Quantification Kit (for Small RNA-Seq) offers a PCR-based detection procedure to quantify NGS libraries (specifically Small RNA-Seq) of a wide spectrum of concentrations. The kit consists of a specially designed primer mix compatible with the Illumina system, that is used in conjunction with the provided 2X Real-Time PCR Master Mix to amplify a library of unknown concentration. The unknown library is accurately quantified by using a standard curve constructed from the provided DNA Standard (range from 20 pM to 2 fM) on a Real-Time PCR System. The kit is specially optimized to quantify Small RNA-Seq libraries with DNA standards that have similar size to a Small RNA-Seq library. However, it could also be used with other types of NGS libraries.

Features and Benefits

- Able to quantify NGS Library (Illumina) of a wide spectrum of concentrations, including sub-nanomolar concentrations
- DNA is accurately quantified by using a standard curve constructed from the provided DNA Standards
- Specially designed DNA standards for Small RNA-Seq library; also compatible to NGS library of other molecular weights

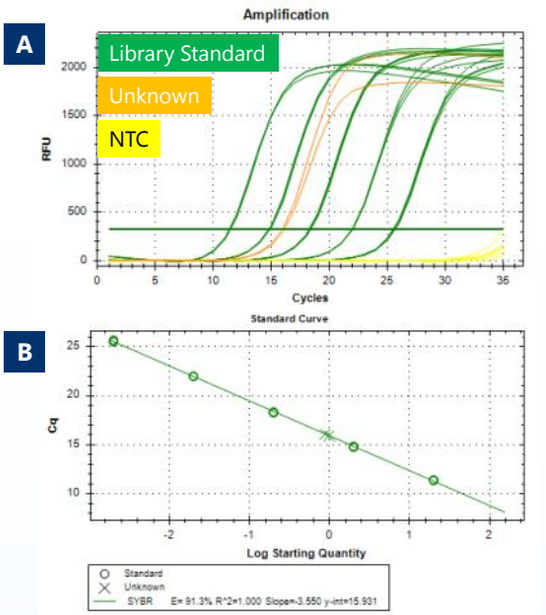


Figure 1. A representative qPCR baseline graph showing the successful amplification of Quantified NGS Library Standards (Green) with a range from 20 pM to 2 fM, using Norgens NGS Library Quantification Kit (for Small RNA-Seq) (Panel A). Duplicate amplification of a sample Small RNA-Seq library (at 1:10,000 dilution) was performed (Orange). The derived library concentration was 9.41 nM. Norgens NGS Library Quantification Kit (for Small RNA-Seq) is of good quality as shown with the high PCR efficiency and correlation in the standard curve (Panel B) with low background signals (No Template Control NTC as Yellow in Panel A).

Kit Components	
2X Real-Time PCR Master Mix	1 mL
NGS Library Quantification Primer Set Mix	600 µL
Quantified NGS Library Standards (for Small-RNA Seq)	5 x 80 µL Standards
Product Insert	1

Ordering information

Description	Cat #	Size
NGS Library Quantification Kit (for Small RNA-Seq)	61600	100 rxns

Select Publications

Publication Title	Authors	Journal	Year
N6-methyladenosine marks primary microRNAs for processing	CR Alarcon, H Lee, H Goodarzi, N Halberg, SF Tavazoie	Nature	2015
Identification of molecular determinants of primary and metastatic tumour re-initiation in breast cancer	JB Ross, D Huh, Lb Noble, SE Tavazoi	Nature Cell Biology	2015
Endogenous tRNA-Derived Fragments Suppress Breast Cancer Progression via YBX1 Displacement	H Goodarzi, X Liu, H Nguyen, S Zhang, L Fish, SF Tavazoie	Cell	2015
Pyrvinium targets CD133 in human glioblastoma brain tumor-initiating cells	SK Singh, C Venugopal, R Hallett, P Vora, B Manoranjan, S Mahendram, M Qazi, N McFarlane, M Subapanditha, S Nolte, M Singh, D Bakhshinyan, N Greg, T Vijayakumar, B Lach, JP Provias, K Reddy, N Murty, B Doble, M Bhatia, JA Hassell	Clinical Cancer Research	2015
Artificial membrane-binding proteins stimulate oxygenation of stem cells during engineering of large cartilage tissue	JPK Armstrong, R Shakur, JP Horne, SC Dickenson, CT Armstrong, K Lau, J Kadiwala, R Lower, A Seddon, S Mann, JLR Anderson, AW Perriman, AP Hollander	Nature Communications	2015
MiRNA-Mediated Regulation of the SWI/SNF Chromatin Remodeling Complex Controls Pluripotency and Endodermal Differentiation in Human ES Cells	SL Wade, LF Langer, JM Ward, TK Archer	Stem Cells	2015
Transcriptome dynamics of developing photoreceptors in 3-D retina cultures recapitulates temporal sequence of human cone and rod differentiation revealing cell surface markers and gene networks	R Kaewkhaw, KD Kaya, M Brooks, K Homma, J Zou, V Chaitankar, M Rao and A Swaroop	Stem Cells	2015
Broad-Spectrum Therapeutic Suppression of Metastatic Melanoma through Nuclear Hormone Receptor Activation	N Pencheva, CG Buss, J Posada, T Merghoub, SF Tavazoie	Cell	2014
Metastasis-suppressor transcript destabilization through TARBP2 binding of mRNA hairpins	H Goodarzi, S Zhang, CG Buss, L Fish, S Tavazoie, SF Tavazoie	Nature	2014
Molecular Evidence for OCT4 Induced Plasticity in Adult Human Fibroblasts Required for Direct Cell Fate Conversion to Linease Specific Progenitors	R Mitchell, E Szabo, Z Shapovalova, L Aslostovar, K Makondo, M Bhatia	Stem Cells	2014
Innate immune response of human pluripotent stem cell-derived airway epithelium	BAS McIntyre, R Kushwah, R Mechael, Z Shapovalova, C Alev, M Bhatia	Innate Immunity	2014
Reversible Lineage-specific Priming of Human Embryonic Stem Cells Can Be Exploited to Optimize the Yield of Differentiated Cells	JB Lee, M Graham, TJ Collins, JH Lee, SH Hong, J McNicol, Z Shapovalova, M Bhatia	Stem Cells	2014

Select Publications

Publication Title	Authors	Journal	Year
Ovarian cell-like cells from skin stem cells restored estradiol production and estrus cycling in ovariectomized mice	BW Park, B Pan, D Toms, E Huynh, JH Byun, YM Lee, W Shen, GJ Rho, J Li	Stem Cells and Development	2014
Nicotine promotes apoptosis resistance of breast cancer cells and enrichment of side population cells with cancer stem cell-like properties via a signaling cascase involving galectin-3, alpha9 nicotinic acetylcholine receptor and STAT3	P Guha, G Bandyopadhyaya, SK Polumuri, S Chumsri, P Gade, DV Kalvacolanu, H Ahmed	Breast Cancer and Treatment	2014
Characterization and in-vitro differentiation potency of early-passage canine amnion- and umbilical cord-derived mesenchymal stem cells as related to gestational age	M Filoli Uranio, ME Dell'Aquila, M Caira, AC Guaricci, M Ventura, CR Catacchio, NA Martino, L Valentini	Molecular Reproduction and Development	2014
The assessment of CD146-bsaed cell sorting and telomere length analysis for establishing the identity of mesenchymal stem cells in human umbilical cord	D Kouroupis, SM Churchman, D McGonagle, EA Jones	F1000 Research	2014
microRNA-320/RUNX2 axis regulates adipocytic differentiation of human mesenchmal (skeletal) stem cells	D Hamam, D Ali, R Vishnubalaji, R Hamam, M Al-Nbaheen, L Chen, M Kassem, A Aldahmash, NM Alajez	Cell Death and Disease	2014
Associations between gastrointestinal toxicity, microRNA and cytokine production in patients undergoing myeloablative allogeneic stem cell transplantation	PL Pontoppidan, K Jordan, AL Carlsen, HH Uhving, K Kielsen, M Christensen, M Ifversen, CH Nielsen, P Sangild, NH Heegaard, C Heilmann, H Sengelov, K Muller	International Immunopharmacology	2014
Human placenta-derived neurospheres are susceptible to transformation after extensive in vitro expansion	D Amendola, M Nardella, L Guglielmi, L Cerquetti, E Carico, V Alesi, M Porru, C Leonetti, C Bearzi, R Rizzi, I D'Agnano, A Stigliano, G Novelli, B Bucci	Stem Cell Research & Therapy	2014
Chemokine-Mediated Robust Augmentation of Liver Engraftment: A Novel Approach	M Joshi, M Oltean, Pb Patil, D Hallberg, M Kleman, J Holgersson, M Olausson, S Sumitran-Holgersson	Stem Cells Translational Medicine	2014
Bacterial Adaptation through Loss of Function	A K Hottes, P L Freddolino, A Khare, Z N Donnell, J C Liu, S Tavazoie	PLoS Genetics	2013
Gli3-mediated hedgehog inhibition in human pluripotent stem cells initiates and augments developmental programming of adult hematopoiesis	B McIntyre, V Ramos-Meija, S Rampalli, R Mechael, JH Lee, C Alev, G Sheng, M Bhatia	Blood	2013

Select Publications

Publication Title	Authors	Journal	Year
Demarcation of Stable Subpopulations within the Pluripotent hESC Compartment	S Bhatia, C Pilquil, I Roth-Albin, J Draper	PLoS One	2013
Non-hematopoeitic cells represent a more rational target of *in vivo* hedgehog signaling affecting normal or acute myeloid leukemic progenitors	A.L. Boyd, K.R. Salci, Z. Shapovalova, B.AS McIntyre, Mickie Bhatia	Experimental Hematology	2013
Suitability of Human Tenon's Fibroblasts as Feeder Cells for Culturing Human Limbal Epthelial Stem Cells	G Scafetta, E Tricoli, C Siciliano, C Napoletano, R Puca, E M Vingolo, G Cavallaro, A Polistena, G Frati, E DeFalco	Stem Cell Reviews	2013
Assessment of umbilical cord tissue as a source of mesenchymal stem cell/endothelial cell mixtures for bone regeneration	D Kouroupis, SM Churchman, A English, PV Giannoudis, D McGonagle, EA Jones	Regenerative Medicine	2013
Gene regulation and priming by topoisomerase Iia in embryonic stem cells	S Thankurela, A Garding, J Jung, D Schubeler, L Burger, VK Tiwari	Nature Communications	2013
mRNAs and miRNAs profiling of mesenchymal stem cells derived from amniotic fluid and skin: the double face of the coin	R Lazzarini, F Olivieri, C Ferretti, M Mattioli-Belmonte, R Di Primio, M Orciani	Cell and Tissue Research	2013
Human fetal and adult bone marrow derived mesenchymal stem cells use different signalling pathways for the initiation of chondogenesis	K Brady, SC Dickinson, PV Guillot, J Polak, AW Blom, W Kafienah, AP Hollander	Stem Cells and Development	2013
Derivation of Neural Stem Cells from Human Adult Peripheral CD34+ Cells for an Autologous Model of Neuroinflammation	T Wang, E Choi, MCG Monaco, E Campanac, M Medynets, T Do, P Rao, KR Johnson, AG Elkanloun, G Von Geldern, T Johnson, S Subramaniam, D Hoffman, E Major, A Nath	PLoS One	2013
Yield Optimization and Molecular Characterization of Uncultured CD271+ Mesenchymal Stem Cells in the Reamer Irrigator Aspirator Waste Bag	SM Churchman, D Kouropis, SA Boxall, T Roshdy, HB Tan, D McGonagle, PV Giannoudis, EA Jones	European Cells and Materials	2013

Commitment to Quality

NORGEN BIOTEK CORP.

3430 Schmon Parkway, Thorold, ON L2V 4Y6 Canada
Phone: (905) 227-8848
Toll Free: 1-866-NORGENB (667-4362)
Fax: (905) 227-1061
email: info@norgenbiotek.com

www.norgenbiotek.com

An ISO 13485:2003, ISO 9001:2008 & ISO 15189:2012 Certified Company