BLOOD SAMPLE PREPARATION

The New Standard in RNA Purification, Best-in-Class, Pure & Simple
Purification of inhibitor-free RNA, microRNA and genomic DNA for any application

www.norgenbiotek.com
Isolation of high quality DNA or RNA from blood using Norgen’s nucleic acid isolation technologies. DNA can be isolated from fresh or frozen blood using a single column-based preparation (different sizes: Micro, Mini, Midi, Maxi or dried blood spots), alcohol precipitation (0.3 mL to 10 mL) or 96-well plate for high throughput isolations. Blood RNA can be isolated from whole blood or leukocytes using a single column-based preparation. All nucleic acids isolated by Norgen’s technology are of the highest quality and are suitable for sensitive downstream applications.

Sample Preparation Selection Table:

<table>
<thead>
<tr>
<th>Kit</th>
<th>Cat. #</th>
<th>Kit size</th>
<th>Sample size</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Preparation - DNA Isolation Kits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Genomic DNA Isolation Micro Kit</td>
<td>52100</td>
<td>50 preps</td>
<td>1-100 µL</td>
<td>2-6 µg</td>
</tr>
<tr>
<td>Blood Genomic DNA Isolation Mini Kit</td>
<td>46300, Dx46300*</td>
<td>50 preps</td>
<td>20-200 µL</td>
<td>4-12 µg</td>
</tr>
<tr>
<td>Blood Genomic DNA Isolation Midi Kit</td>
<td>51400</td>
<td>20 preps</td>
<td>300 µL – 2 mL</td>
<td>20-60 µg</td>
</tr>
<tr>
<td>Blood Genomic DNA Isolation Maxi Kit</td>
<td>31200</td>
<td>12 preps</td>
<td>3-10 mL</td>
<td>200-600 µg</td>
</tr>
<tr>
<td>Dried Blood Spot (DBS) Genomic DNA Isolation Kit</td>
<td>36000</td>
<td>50 preps</td>
<td>3 x 3mm punches</td>
<td>50-150 ng</td>
</tr>
<tr>
<td><strong>Alcohol Precipitation - DNA Purification Kits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood DNA Purification Kit - 30 mL</td>
<td>52500</td>
<td>100 preps (0.3 mL)</td>
<td>0.3-10 mL</td>
<td>~24 µg</td>
</tr>
<tr>
<td><strong>Single Preparation - RNA Isolation Kits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total RNA Purification Kit</td>
<td>17200, 37500, Dx17200*</td>
<td>50, 100 preps</td>
<td>Up to 200 µL</td>
<td>1-5 µg</td>
</tr>
<tr>
<td>Leukocyte RNA Purification Kit</td>
<td>21200</td>
<td>50 preps</td>
<td>10 µL – 2 mL</td>
<td>Up to 50 µg</td>
</tr>
<tr>
<td><strong>High Throughput DNA Preparation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Genomic DNA Isolation 96-Well Kit</td>
<td>50500</td>
<td>2 x 96-well plates</td>
<td>20-200 µL</td>
<td>4-12 µg</td>
</tr>
<tr>
<td><strong>Blood DNA Preservation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood DNA Preservation Buffer (3X)</td>
<td>29111, 29112</td>
<td>25, 100 mL</td>
<td>Variable</td>
<td>Variable</td>
</tr>
</tbody>
</table>

*CE-certified kit for in-vitro diagnostic purposes - not available in all regions - very similar protocol to non-Dx kit.
The Blood Genomic DNA Isolation Micro Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on spin column technology without the use of organic solvents. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is less than 30 minutes, and each kit contains sufficient materials for 50 preparations. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with sensitive downstream applications.

Features and Benefits
- **Isolate DNA from small volumes of blood** - Isolate DNA from inputs of 1 µL to 100 µL of blood
- **Isolate DNA from blood pathogens** - Isolate DNA from viral and bacterial blood pathogens
- **No Phenol-Chloroform extraction or alcohol precipitation** - Isolate genomic DNA without the use of harmful chemicals
- **Fast and easy processing** - Rapid spin-column format allows for the processing of multiple samples in 30 minutes.
- **Recover genomic DNA is suitable for downstream applications** - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- **High quality DNA with no RNA contamination** - No contamination or degradation of genomic DNA is observed.

Applications
- Quantitative PCR
- Genotyping
- SNP analysis
- Microarray analysis
- Next Generation Sequencing
- PCR-based pathogen detection

### Feature Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Blood Input</td>
<td>100 µL</td>
</tr>
<tr>
<td>Column Binding Capacity</td>
<td>&gt; 25 µg</td>
</tr>
<tr>
<td>Average Yield (100 µL of blood)</td>
<td>2-6 µg*</td>
</tr>
<tr>
<td>Elution Volume</td>
<td>20-100 µL</td>
</tr>
<tr>
<td>Analyte Purified</td>
<td>Genomic DNA, mitochondrial DNA, viral DNA</td>
</tr>
<tr>
<td>Format</td>
<td>Spin column</td>
</tr>
<tr>
<td>Time to Complete 10 Purifications</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

### Ordering Information

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>52100</td>
<td>50 preps</td>
</tr>
</tbody>
</table>
Figure 1. High Yields and amplification efficiency of Genomic DNA Isolated from 20 µL to 200 µL of Whole Blood. Genomic DNA was isolated from 20, 50, 100 and 200 µL of whole blood using Norgen’s Blood Genomic DNA Isolation Mini Kit and a leading competitor’s kit. (A) 15 µL from each 200 µL elution was loaded on 1% TAE agarose gel. Norgen’s Blood Genomic DNA Isolation Mini Kit demonstrated a better DNA yield than the leading competitor’s kit. The used ladder is Norgen’s UltraRanger 1kb DNA Ladder. (B) Nine µL of the DNA from each 200 µL of elution was used in a real-time PCR reaction (total reaction volume of 20 µL) with GAPDH TaqMan probe and primers. The real-time PCR was successful in amplifying the GAPDH gene, with a linear decrease in Ct value with the increase in blood input volume. Furthermore, Norgen-isolated DNA was amplified with a lower Ct value from all DNA isolated from the different blood input volumes, indicating the higher yield and purity of DNA isolated using Norgen’s kit.

Figure 2. Detection of Listeria monocytogenes in DNA isolated with Norgen’s Genomic DNA Isolation Mini Kit. DNA was isolated from blood spiked with 5 x 10^2 and 5 x 10^3 L. monocytogenes cells. One microliter of the DNA from each 200 µL of elution was used in a real-time PCR reaction (total reaction volume of 20 µL) with L. monocytogenes specific primer set (Norgen Biotek). The real-time PCR was successful in detecting the pathogen from the two spiked amounts. NTC is the no template control and the used ladder is Norgen’s FastRunner DNA Ladder.

Rapid preparation of genomic DNA from up to 200 µL of whole blood.

The Blood Genomic DNA Isolation Mini Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on spin column technology without the use of organic solvents. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is less than 30 minutes, and each kit contains sufficient materials for 50 preparations. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications.

Features and Benefits

- Isolate DNA from small volumes of blood - Isolate DNA from inputs of up to 200 µL of blood
- Isolate DNA from blood pathogens - Isolate DNA from viral and bacterial blood pathogens
- No Phenol-Chloroform extraction or alcohol precipitation - Isolate genomic DNA without the use of harmful chemicals
- Fast and easy processing - Rapid spin-column format allows for the processing of multiple samples in 30 minutes.
- Recovered genomic DNA is suitable for downstream applications - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- High quality DNA with no RNA contamination - No contamination or degradation of genomic DNA is observed.

Applications

- Quantitative PCR
- Genotyping
- SNP analysis
- Microarray analysis
- Next Generation Sequencing
- PCR-based pathogen detection

Feature Specifications
- Maximum Blood Input 200 µL
- Column Binding Capacity > 50 µg
- Average Yield (200 µL of blood) 4-12 µg*
- Elution Volume 50-200 µL
- Analyte Purified Genomic DNA, mitochondrial DNA, viral DNA
- Format Spin column
- Time to Complete 10 Purifications 30 minutes

*Yield will vary depending on the type of blood processed

Ordering information

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>46300</td>
<td>50 preps</td>
</tr>
<tr>
<td>Dx46300</td>
<td>50 preps</td>
</tr>
</tbody>
</table>
**Blood Genomic DNA Isolation Midi Kit**

**Rapid preparation of genomic DNA from up to 0.3 to 2 mL of whole blood.**

The Blood Genomic DNA Isolation Midi Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on spin column technology without the use of organic solvents. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is less than 45 minutes, and each kit contains sufficient materials for 20 preparations. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications.

**Features and Benefits**
- No Phenol-Chloroform extraction or alcohol precipitation - Isolate genomic DNA without the use of harmful chemicals
- Isolate DNA from blood pathogens - Isolate DNA from viral and bacterial blood pathogens
- Fast and easy processing - Rapid spin-column format allows for the processing of multiple samples in 45 minutes.
- Recovered genomic DNA is suitable for downstream applications - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- High quality DNA with no RNA contamination - No contamination or degradation of genomic DNA is observed.

**Applications**
- Quantitative PCR
- Genotyping
- SNP analysis
- Microarray analysis
- Next Generation Sequencing
- PCR-based pathogen detection

**Feature Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Blood Input</td>
<td>2 mL</td>
</tr>
<tr>
<td>Column Binding Capacity</td>
<td>&gt; 100 µg</td>
</tr>
<tr>
<td>Average Yield</td>
<td>60 µg*</td>
</tr>
<tr>
<td>Elution Volume</td>
<td>500 µL</td>
</tr>
<tr>
<td>Analyte Purified</td>
<td>Genomic DNA, mitochondrial DNA, viral DNA</td>
</tr>
<tr>
<td>Format</td>
<td>Spin column</td>
</tr>
<tr>
<td>Time to Complete 10 Purifications</td>
<td>45 minutes</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

**Ordering Information**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>51400</td>
<td>20 preps</td>
</tr>
</tbody>
</table>

Toll Free in North America: 1-866-667-4362  
www.norgenbiotek.com
**Rapid preparation of genomic DNA from up to 3 to 10 mL of whole blood.**

The Blood Genomic DNA Isolation Maxi Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on spin column technology without the use of organic solvents. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is less than 50 minutes, and each kit contains sufficient materials for 12 preparations. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications.

**Features and Benefits**

- **No Phenol-Chloroform extraction or alcohol precipitation** - Isolate genomic DNA without the use of harmful chemicals
- **Isolate DNA from blood pathogens** - Isolate DNA from viral and bacterial blood pathogens
- **Fast and easy processing** - Rapid spin-column format allows for the processing of multiple samples in 50 minutes.
- **Recovered genomic DNA is suitable for downstream applications** - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- **High quality DNA with no RNA contamination** - No contamination or degradation of genomic DNA is observed.

**Applications**

- Quantitative PCR
- Genotyping
- SNP analysis
- Microarray analysis
- Next Generation Sequencing
- PCR-based pathogen detection

**Feature Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Blood Input</td>
<td>10 mL</td>
</tr>
<tr>
<td>Column Binding Capacity</td>
<td>&gt; 500 µg</td>
</tr>
<tr>
<td>Average Yield</td>
<td>200-600 µg*</td>
</tr>
<tr>
<td>Elution Volume</td>
<td>1-2 mL</td>
</tr>
<tr>
<td>Analyte Purified</td>
<td>Genomic DNA, mitochondrial DNA, viral DNA</td>
</tr>
<tr>
<td>Format</td>
<td>Spin column</td>
</tr>
<tr>
<td>Time to Complete 10 Purifications</td>
<td>50-70 minutes</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

**Ordering information**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>31200</td>
<td>12 preps</td>
</tr>
</tbody>
</table>
**Single Preparation - DNA Isolation Kits**

### Dried Blood Spot (DBS) Genomic DNA Isolation Kit  
**Cat. # 36000**

**Figure 1. Genomic DNA Isolated from 3 x 3mm Diameter Circles.** Blood collected on EDTA was applied to Whatman’s 903 Protein Saver Card and allowed to dry for 1 week. DNA was isolated from 3 x 3 mm diameter circles per sample using Norgen’s Dried Blood spot Genomic DNA Isolation Kit. Following isolation, 15 µL from each 150 µL elution was loaded on 1% TAE agarose gel. Norgen’s Blood Genomic DNA Isolation Kit demonstrated a good DNA yield and integrity. The ladder corresponds to Norgen’s UltraRanger 1kb DNA Ladder.

**Figure 2. Purified DNA can be Amplified in a Real-time PCR (TaqMan) Reaction.** Genomic DNA was isolated from 3 x 3mm diameter circles per sample using Norgen’s Dried Blood Spot Genomic DNA Isolation Kit. Next, 3 µL (green line) & 9 µL (blue line) of the DNA from each of the 150 µL elutions was used in a real-time PCR reaction (total reaction volume of 20 µL) with GAPDH TaqMan probe and primers. The real-time PCR was successful in amplifying the GAPDH gene, indicating that the DNA is of a high quality and can be used in sensitive downstream applications. The black line is a no-template control.

---

**Rapid preparation of genomic DNA from dried blood spots**

The Dried Blood Spot (DBS) Genomic DNA Isolation Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on spin column technology without the use of organic solvents. The blood should be spotted and dried on suitable filter paper or specimen collection cards. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is 35 minutes. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications including Southern Blot analysis.

**Features and Benefits**

- **Isolate DNA from small volumes of blood** - Isolate DNA from dried blood spots, blood smears and blood spotted on most materials
- **No Phenol-Chloroform extraction or alcohol precipitation** - Isolate genomic DNA without the use of harmful chemicals
- **Fast and easy processing** - Rapid spin-column format allows for the processing of multiple samples in 35 minutes.
- **Recovered genomic DNA is suitable for downstream applications** - Purified genomic DNA is fully compatible with Southern Blot and PCR analysis.
- **High quality DNA with no RNA contamination** - No contamination or degradation of genomic DNA is observed.

**Applications**

- Quantitative PCR
- Genotyping
- SNP analysis
- PCR-based pathogen detection

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>3 x 3 mm diameter punches</td>
</tr>
<tr>
<td>Column Binding Capacity</td>
<td>&gt; 25 µg</td>
</tr>
<tr>
<td>Average Yield</td>
<td>150 ng*</td>
</tr>
<tr>
<td>Elution Volume</td>
<td>20-100 µL</td>
</tr>
<tr>
<td>Analyte Purified</td>
<td>Genomic DNA, mitochondrial DNA, viral DNA</td>
</tr>
<tr>
<td>Format</td>
<td>Spin column</td>
</tr>
<tr>
<td>Time to Complete 10 Purifications</td>
<td>35 minutes</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

**Ordering information**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>36000</td>
<td>50 preps</td>
</tr>
</tbody>
</table>
Figure 1. High Yields of Genomic DNA Isolated from 300 µL of Whole Blood. Genomic DNA was isolated from 300 µL of whole blood collected on different anticoagulants (Citrate, EDTA and Heparin, different donors) using Norgen’s Blood Genomic DNA Purification Kit. Following isolation, 10 µL from each 100 µL elution was loaded on 1% TAE agarose gel. Purified DNA has a good yield and integrity. The used ladder is Norgen’s UltraRanger 1kb DNA Ladder.

Figure 2. High purity of Genomic DNA Isolated from 300 µL of Whole Blood. Genomic DNA was isolated from 300 µL of whole blood collected on different anticoagulants (Citrate, EDTA and Heparin, different donors) using Norgen’s Blood Genomic DNA Purification Kit. Following isolation, OD260/280 ratio was measured using spectrophotometric method. Purified DNA from blood collected on the different anticoagulants has a good OD260/280 ratio > 1.7.

Figure 3. Purified DNA Can be Amplified in a Real-time PCR (TaqMan) reaction. Genomic DNA was isolated from 300 µL of whole blood collected on different anticoagulants (Citrate, EDTA and Heparin, different donors) using Norgen’s Blood Genomic DNA Purification Kit. Three and nine µL of the DNA from each 100 µL elution was used in a real-time PCR reaction (reaction volume of 20 µL) with GAPDH TaqMan probe and primers. The real-time PCR was successful in amplifying the GAPDH gene, indicating that the DNA is of a high quality and can be used in sensitive downstream applications. Furthermore, the 9 µL template showed lower Ct value than the 3 µL template, indicating that purified DNA is free of PCR contaminants.

Alcohol Precipitation - DNA Purification Kits

Blood DNA Purification Kit - 30 mL

Cat. # 52500

Fast and simple procedure for purifying high molecular weight genomic DNA from up to 10 mL of blood using alcohol-precipitation

The Blood DNA Purification Kit allows for the isolation of high molecular weight genomic DNA from the blood of various species, including humans. The kit can be used with blood inputs of 0.3 mL and up to 10 mL. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for a single sample is less than 30 minutes, and each kit contains sufficient materials to process 30 mL of blood (100 preparations from 0.3 mL of blood). The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications.

Features and Benefits

- Fast and Easy Processing - Rapid alcohol precipitation format allows for the processing of multiple samples in 30 minutes.
- Isolate a Diversity of DNA Species - Isolate high quality and high molecular weight genomic DNA
- Variable Volume Input - Isolate genomic DNA from 300 µL up to 10 mL of blood
- Recovered genomic DNA is suitable for downstream applications - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- High quality DNA with no RNA contamination - No contamination of genomic DNA is observed.

Applications

- Quantitative PCR
- Genotyping
- SNP analysis
- DNA archiving

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Blood Input</td>
<td>0.3 mL</td>
</tr>
<tr>
<td>Maximum Blood Input</td>
<td>10 mL</td>
</tr>
<tr>
<td>Average Yield from 1 mL of whole blood</td>
<td>24 µg*</td>
</tr>
<tr>
<td>DNA Size</td>
<td>Up to 200 kbp</td>
</tr>
<tr>
<td>Average Purity (OD260/280)</td>
<td>&gt; 1.7</td>
</tr>
<tr>
<td>Format</td>
<td>Alcohol precipitation</td>
</tr>
<tr>
<td>Time to Complete 10 Purifications</td>
<td>30-60 minutes (+ DNA rehydration)</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

Ordering Information

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>52500</td>
<td>100 preps (0.3 mL blood)</td>
</tr>
</tbody>
</table>

Toll Free in North America: 1-866-667-4362

www.norgenbiotek.com
Single Preparation - RNA Isolation Kits

Total RNA Purification Kit

Specific protocol for total RNA isolation from different types of blood samples

Total RNA Purification Kit Dx

CE-certified kit for in-vitro diagnostic purposes - not available in all regions

Figure 1. High Quality of Isolated RNA with Complete Size Range. Unlike most competitors’ kits, Norgen’s Total RNA Purification Kit allows for the isolation of all sizes of RNA, from the very large RNA down to the microRNA without the use of phenol. Total RNA was isolated from 1 x 10⁷ E. coli cells using Norgen’s Total RNA Purification Kit and a competitor’s kit. Panel A: Five microliters of the 50 µL isolated RNA was analyzed on an agarose gel. Panel B: One microliter of the 50 µL isolated RNA was analyzed on the Agilent® 2100 BioAnalyzer RNA Nano 6000 chip. Note the presence of small RNA species (red circle) in the samples isolated via Norgen’s kit and the absence of these RNA species in the competitor RNA preparation.

Figure 2. Recovery of True Total RNA including microRNA from 100 mL of Hamster Blood. Panel A is a 1X MOPS 1% agarose gel showing the RNA that was isolated from 3 different samples of 100 mL of Hamster using either Norgen’s Total RNA Purification Kit or RiboPure™-Blood Kit. Both kits isolated large RNA (represented by 28S and 18S rRNA) with high integrity but Norgen’s Total RNA Purification Kit provided the added benefit of recovering small RNA without any additional protocol (highlighted). Panel B is a result from a bioanalyzer resolution of the eluted RNA. Similar to the agarose gel, Norgen’s Total RNA Purification Kit showed the added benefit of recovering small RNA. Panel C showed that Norgen’s Total RNA Purification Kit recovered higher RNA yield. Panel D showed Norgen’s Total RNA Purification Kit recovered high quality RNA for sensitive downstream application. 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 Norgen’s Total RNA Purification Kit showed much better relative expression of the genes studied.

Rapid preparation of blood total RNA - including microRNA - without phenol

Principle
Purification is based on spin column using Norgen’s proprietary resin as the separation matrix. Briefly, the blood sample of interest is first lysed using the provided Lysis Solution, ethanol is added and the RNA is bound to Norgen’s column. Under these conditions only the RNA will bind to Norgen’s resin while most of the contaminating cellular proteins are removed in the flowthrough or retained on top of the resin. The bound RNA is then washed to remove any remaining impurities. Lastly, the purified total RNA is eluted into 50 µL of the provided Elution Buffer.

Norgen’s proprietary resin provides superior affinity to the full size range of RNA molecules, resulting in large and small RNA (miRNA) purification with better linearity and sensitivity. The purified RNA is of the highest integrity, and can be used in a number of downstream applications including real time RT-PCR, RT-PCR, Northern blotting, RNase protection and primer extension, expression profiling, miRNA cloning and amplification and Next Generation Sequencing.

Performance
Norgen’s Total RNA Purification Kit provides a rapid method for the isolation and purification of total RNA in as little as 20 minutes. The kit purifies all sizes of RNA, from large mRNA and ribosomal RNA down to microRNA (miRNA) and small interfering RNA (siRNA), without the use of phenol or chloroform. Norgen’s kit is the only kit on the market that isolates true total RNA, as other kits must use phenol to recover all sizes of RNA. Therefore Norgen’s kit offers significant advantages in functionality, savings on cost, ease-of-use, no hazardous organic waste, and no inhibitory effect on PCR amplifications as a result of residual phenol. With this kit both miRNA and mRNA can be studied from the same sample without further purifications, thus offering considerable advantages when comparing and relating expression of miRNA to other RNA. Furthermore, this is an excellent kit for the extraction of miRNA from all samples including plasma.

Applications
- Quantitative, real-time RT-PCR for both large mRNA and small RNA including miRNA
- RT-PCR for both large mRNA and small RNA including miRNA
- Expression profiling
- Next Generation Sequencing for RNA and miRNA
- miRNA from plasma for discovery
- microRNA cloning and amplification
- PCR-based virus detection
- PCR-based viable bacteria detection
- Northern blotting
- RNase protection
- Primer extension

Cat. # 17200 & 37500

Cat. # Dx17200

Toll Free in North America: 1-866-667-4362
www.norgenbiotek.com
Figure 3. Linear and Sensitive Isolation of Both Large and Small RNA. Norgen’s Total RNA Purification Kit allows consistent isolation of both large and small RNA from different input amounts. Total RNA was isolated from 10 to 100,000 HeLa cells using Norgen’s Total RNA Purification Kit (blue), a competitor’s silica-based kit (green) and a phenol-based RNA extraction method (red). Panel A: Relative expression of miR-21. Panel B: Relative expression of S15. Both were determined by RT-qPCR of total RNA samples. In brief, 1 µL of the 50 µL isolated RNA was then subjected to a 20 µL reverse transcription using miR-21 stem-loop reverse primer or oligo dT primer. Two microliters of the reverse transcription was used in a 20 µL real-time PCR reaction with primers to detect the human miR-21 (Panel A) and the S15 transcripts (Panel B). The resulting threshold cycle (Ct) values were plotted against input cell number. RNA isolated using Norgen’s Total RNA Purification had the best linearity (higher R²) and sensitivity (lower Ct) for both large RNA (S15) and small RNA (miR-21).

Figure 4. High Quality of RNA from Blood. Total RNA was isolated from 100 µL rat blood using Norgen’s Total RNA Purification Kit. One microliter of the 50 µL isolated RNA was analyzed on the Agilent® 2100 BioAnalyzer using an Agilent Nano 6000 chip. The integrity of RNA from all inputs with the presence of small RNA species. Norgen’s Total RNA Purification Kit consistently isolates high quality RNA from various inputs that score a RIN value between 8 and 10.
Consistent Isolation of High Quality Leukocyte RNA.
Norgen’s Leukocyte RNA Purification Kit isolates leukocyte RNA of high quality with great consistency. Total leukocyte RNA was isolated from 100 µL of hamster blood using Norgen’s Leukocyte RNA Purification Kit. A total of 6 replicates were performed, and 7 µL of the 50 µL purified RNA was then resolved on a 1.2% formaldehyde-agarose gel. As it can be seen, Norgen’s kit not only isolated high and consistent yields of total RNA, but the RNA was also of high quality as evidenced by intactness of the major 28S and 18S rRNA.

Higher Yield and Quality of Leukocyte RNA Isolated by Norgen’s Leukocyte RNA Purification Kit.
Norgen’s Leukocyte RNA Purification Kit isolates Leukocyte RNA that exceeds the yield and quality of competitors. Total RNA was isolated from 200 µL of hamster blood using Norgen’s Leukocyte RNA Purification Kit and a leading competitor’s kit. One microliter of the 50 µL purified RNA was resolved on an Agilent RNA Nano 6000 chip. The gel diagram (Upper panel) and the electropherogram (Lower panel) showed better quality of RNA isolated by Norgen’s kit. In particular, RNA isolated by Norgen’s Leukocyte RNA Purification Kit did not have any evidence of the RNA degradation that was present in RNA isolated by the competitor’s kit (Red Circle). In addition, Norgen’s kit isolated higher amounts of RNA (Blue Line) with the additional recovery of small RNAs including miRNA (Black Circle) which were not present in RNA isolated by the competitor’s kit.

Rapid extraction and purification of total RNA from leukocytes

Principle
Purification is based on spin column chromatography using Norgen’s proprietary resin as the separation matrix. Briefly, the red blood cells are first removed from the sample through differential red blood cell lysis, and the leukocytes are recovered through centrifugation. The leukocytes are lysed, and the leukocyte RNA is bound to Norgen’s column. Under these conditions only the RNA will bind to Norgen’s resin, while the DNA, proteins and other contaminants will be removed in the flowthrough. The bound RNA is then washed to remove any remaining impurities. Lastly, the purified RNA will be eluted into 50 µL of the provided Elution Buffer or water.

Performance
Norgen’s Leukocyte RNA Purification Kit provides a rapid method for the isolation and purification of total leukocyte RNA from mammalian blood samples in 40 minutes. Selective isolation of leukocyte RNA results in improved expression profiling and other downstream applications by removing the masking effects of some RNAs which are very abundant in whole blood, such as globin mRNAs. The kit is able to isolate total leukocyte RNA, including both large mRNA and all small RNA species containing microRNA (miRNA) and small silencing RNA (siRNA). The purified RNA is of the highest quality and can be used in a number of downstream applications.

Features and Benefits
- Fast and easy processing - Rapid spin-column format allows for the processing of 10 samples in 40 minutes.
- No phenol:chloroform extractions - Norgen’s Leukocyte RNA Purification Kit isolates RNA without the use of harmful chemicals such as phenol or chloroform.
- Recovered RNA is suitable for downstream applications - Purified RNA can be used in a number of downstream applications including real-time PCR, reverse transcription PCR, Northern blotting, RNase protection and primer extension, and expression array analysis requiring the use of intact RNA.
- Isolate total leukocyte RNA - All leukocyte RNA species are isolated, from large mRNA down to microRNA.
- Fractionate leukocytes from whole blood in minutes - Rapid removal of red blood cells from whole blood samples using differential red blood cell lysis.

Toll Free in North America: 1-866-667-4362
www.norgenbiotek.com
Figure 3. High Yield of a Diversity of RNA Species. Norgen’s Leukocyte RNA Purification Kit effectively recovers all sizes of RNA from large mRNA to small RNA including microRNAs. Total RNA was isolated from 200 µL of hamster blood sample using Norgen’s Leukocyte RNA Purification Kit and a leading competitor’s kit as illustrated in Figure 2. Two hundred nanograms of the purified RNA (both 50 µL elution volumes) was then used as the template in an RT-qPCR for detecting miR-21(Upper Panel) and for detecting the beta-actin gene (Lower Panel). In both graphs the blue lines correspond to Norgen isolated-RNA and the red lines correspond to competitor-isolated RNA.

Upper Panel: detection of the miR-21. Norgen’s kit isolated higher yields of microRNA, as indicated by the lower Ct values of the blue lines.

Lower Panel: detection of the beta-actin gene. Norgen’s kit successfully isolated a similar amount of the large RNA compared to the competitor’s kit indicating the full diversity of RNA species isolated.
High Throughput DNA Preparation

Blood Genomic DNA Isolation 96-Well Kit

Cat. # 46350

Rapid high-throughput preparation of genomic DNA from up to 200 µL of whole blood.

The Blood Genomic DNA Isolation 96-Well Kit allows for the isolation of genomic DNA from the blood of various species, including humans. Purification is based on 96-well spin column technology without the use of organic solvents. Typical yields of genomic DNA will vary depending on the cell density of the blood sample. Preparation time for 96 samples is about 45 minutes, and each kit contains sufficient materials for 192 preparations. The purified genomic DNA is compatible with sensitive downstream applications.

Features and Benefits

- **No Phenol-Chloroform extraction or alcohol precipitation** - Isolate genomic DNA without the use of harmful chemicals
- **Isolate DNA from blood pathogens** - Isolate DNA from viral and bacterial blood pathogens
- **Fast and easy processing** - Rapid spin-column format allows for the processing of 96 samples in 45 minutes.
- **Recovered genomic DNA is suitable for downstream applications** - Purified genomic DNA is fully compatible with restriction enzyme digestions, Southern Blot, PCR analysis, sequencing and microarray analysis.
- **High quality DNA with no RNA contamination** - No contamination or degradation of genomic DNA is observed.

Applications

- Quantitative PCR
- Genotyping
- SNP analysis
- Microarray analysis
- Next Generation Sequencing
- PCR-based pathogen detection

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Blood Input</td>
<td>200 µL</td>
</tr>
<tr>
<td>Binding Capacity</td>
<td>&gt; 50 µg</td>
</tr>
<tr>
<td>Average Yield (200 µL of blood)</td>
<td>2-8 µg*</td>
</tr>
<tr>
<td>Elution Volume</td>
<td>50-200 µL</td>
</tr>
<tr>
<td>Analyte Purified</td>
<td>Genomic DNA, mitochondrial DNA, viral DNA</td>
</tr>
<tr>
<td>Format</td>
<td>96-Well plate</td>
</tr>
<tr>
<td>Time to Complete 96 Purifications</td>
<td>45 minutes</td>
</tr>
</tbody>
</table>

*Yield will vary depending on the type of blood processed

Ordering information

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>46350</td>
<td>2 x 96-well plates</td>
</tr>
</tbody>
</table>
**Blood DNA Preservation**

**Blood DNA Preservation Buffer (3X)**

![Image of gel electrophoresis](image)

**Rapid and simple preservation of blood DNA at ambient temperatures**

Norgen's Blood DNA Preservation Buffer (3X) is a 3X aqueous storage buffer designed for rapid cellular lysis and subsequent preservation of DNA from fresh blood samples. The buffer prevents the growth of Gram-negative and Gram-positive bacteria and fungi, and also inactivates viruses allowing the resulting non-infectious samples to be handled and shipped safely. In addition, the buffer eliminates the need to immediately process or freeze samples and allows the samples to be shipped to centralized testing facilities at ambient temperature. The components of the buffer allow samples to be stored for one week under conditions where DNA degradation would occur normally. The buffer is intended to be used in clinical laboratories with the ability to preserve samples for use in downstream diagnostic assays.

**Performance**

- Norgen’s Blood DNA Preservation Buffer (3X) is a 3X solution. One volume of the buffer is added to two volumes of fresh blood followed by mixing by inversion for ten times.
- Specimens may be held or shipped to the testing laboratory at room temperature for up to 8 weeks. Specimens held longer should be kept at -20°C or lower until testing.
- Storage at -20°C or lower is recommended for archival samples and will provide optimal preservation. The preservation buffer will freeze at -20°C. Samples can be stored indefinitely at -80°C.
- Samples can be stored at room temperature (22°C) for up to 8 weeks without significant loss of DNA quality.
- DNA has also been successfully isolated from samples stored at 37°C for 2 weeks.

**Features and Benefits**

- No need to immediately process samples - The buffer eliminates the need to immediately process or freeze samples.
- DNA preservation for 2 weeks at room temperature – Intact, biologically active blood DNA has been isolated from samples stored in the Blood DNA Preservation Buffer (3X) for 8 weeks.
- Ship blood samples at room temperature – Blood samples stored in the Blood DNA Preservation Buffer (3X) can be safely shipped at room temperature with no signs of DNA degradation.
- Compatible with most DNA isolation methods – Blood DNA can be isolated from the preserved samples using a number of different methods, including Norgen’s Blood Genomic DNA Isolation Kits.

**Ordering information**

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>29111</td>
<td>25 mL</td>
</tr>
<tr>
<td>29112</td>
<td>100 mL</td>
</tr>
</tbody>
</table>

**Blood Sample Preparation Kits**

Toll Free in North America: 1-866-667-4362

www.norgenbiotek.com
A proportion of samples isolated by phenol-based methods are inhibited during enzymatic downstream analysis such as PCR, arrays and NGS.

TRY THE NON-PHENOL BASED METHOD

Non-phenol based method
Norgen

Phenol based method
Competitor

Better Diversity of miRNA Detected from Plasma. Norgen’s Total RNA Purification Kit isolates miRNA from plasma with better diversity than a leading competitor. Total RNA including miRNA was isolated from 100 µL of plasma using Norgen’s Total RNA Purification Kit or 625 µL of plasma using Competitor A’s leading miRNA Kit, and was applied to an NCode expression profiling kit. Microarray images suggested that Norgen’s Total RNA Purification Kit (left) isolates a better diversity of miRNA from a smaller input amount of plasma than the competitor’s miRNA kit (right). Image courtesy of LC Sciences, Houston. [www.lcsciences.com].
Commitment to Quality

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