
Technical Information

Comparison of the yield and quality of genomic DNA and RNA purified using AllPrep® kits or dedicated kits for a single nucleic acid type

Introduction

Simultaneous purification of high-quality genomic DNA and RNA from a single biological sample is in demand because it maximizes the use of precious sample material. The AllPrep kits have optimized parallel nucleic acid purification protocols that do not require division of the sample into two parts.

The aim of this study was to compare the yield and quality of genomic DNA and RNA purified from single samples using AllPrep kits to those purified using dedicated DNA or RNA prep kits, such as the DNeasy® and RNeasy® kits.

Material and Methods

Samples of nine different rat tissue types were collected and stabilized in RNAlater®. Nucleic acids were then purified from 10 mg tissue. Genomic DNA (gDNA) was purified using the AllPrep DNA/RNA Mini Kit, AllPrep DNA/RNA/miRNA Universal Kit or DNeasy Blood & Tissue Kit. Total RNA was purified using the AllPrep DNA/RNA Mini Kit, AllPrep DNA/RNA/miRNA Universal Kit or RNeasy Mini Kit. The standard protocols for the respective kits were used and all the experiments were run in three to eight replicates.

The gDNA and RNA yields were determined using a QIAxpert® Spectrophotometer. The gDNA quality was analyzed on a 0.8% agarose gel. The RNA quality was determined using an Agilent® 2100 Bioanalyzer.

Results

Genomic DNA yield and quality

Table 1 shows the yields of gDNA from 10 mg samples of various rat tissue types.

Sample type	DNeasy Blood & Tissue Kit	AllPrep DNA/RNA Mini Kit	AllPrep DNA/RNA/miRNA Universal Kit
Liver	10–30 µg	10–30 µg	Not assessed
Spleen	10–30 µg	10–30 µg	Not assessed
Kidney	15–25 µg	15–25 µg	Not assessed
Lung	5–10 µg	5–10 µg	Not assessed
Brain	2–10 µg	2–10 µg	Not assessed
Tail	15–20 µg	1–3 µg	15–20 µg
Heart	4–10 µg	0–1 µg	4–10 µg
Skeletal muscle	2–5 µg	0 µg	2–5 µg
Adipose tissue	5–10 µg	0–1 µg	5–10 µg

Table 1. Yields of genomic DNA from eight replicate purifications from 10 mg of tissue.

The yields of gDNA from the liver, spleen, kidney, lung and brain samples were comparable in the AllPrep DNA/RNA Mini Kit and the DNeasy Blood & Tissue Kit eluates. However, with difficult-to-lyse tissues, such as tail, heart, skeletal muscle and adipose tissues, the gDNA yield was higher with the DNeasy Blood & Tissue Kit than with the AllPrep DNA/RNA Mini Kit, but comparable with the AllPrep DNA/RNA/miRNA Universal Kit.

The DNeasy Blood & Tissue Kit and the AllPrep DNA/RNA/miRNA Universal Kit both have protocols where lysis is enzymatically assisted with proteinase K. Therefore, they return good yields from difficult-to-lyse, fiber- or lipid-rich samples.

To compare the integrity and overall quality of gDNA eluates, the samples were analyzed on a 0.8% agarose gel. All of the tested tissues showed similar integrity and overall quality of gDNA independent of the kit used (Figure 1).

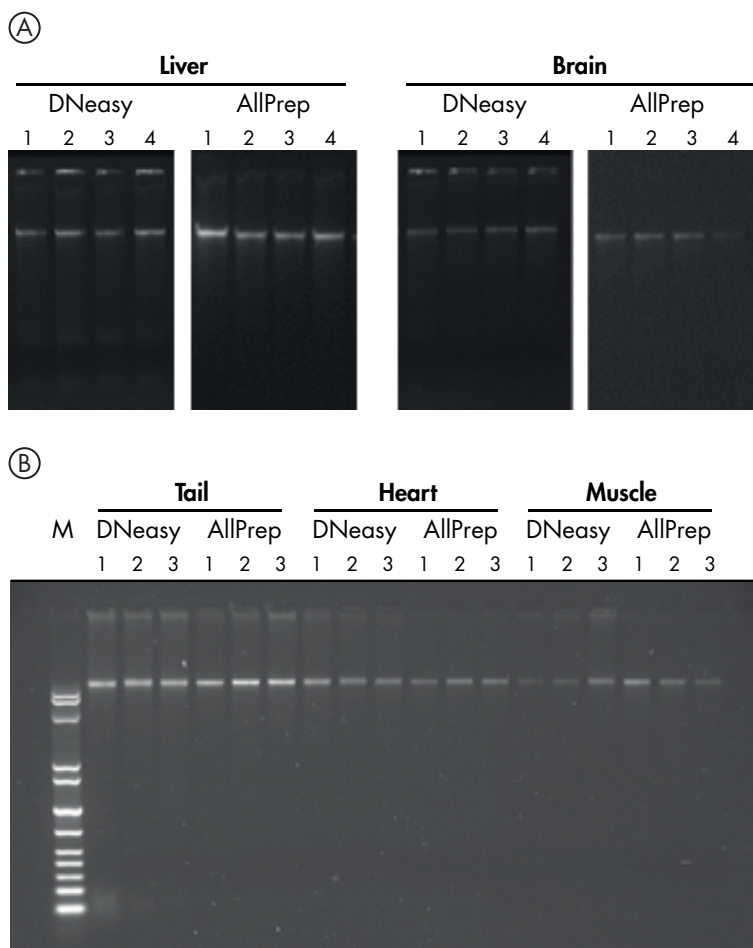


Figure 1. Quality of gDNA extracted from rat tissue samples. **A** Comparison of quality of gDNA purified with the AllPrep DNA/RNA Mini Kit and the DNeasy Blood & Tissue Kit. Samples analyzed on a 0.8% agarose gel. **B** Comparison of quality of gDNA purified with the AllPrep DNA/RNA/miRNA Universal Kit and the DNeasy Blood & Tissue Kit. Samples analyzed on a 0.8% agarose gel.

RNA yield and quality

Table 2 shows the yields of RNA from 10 mg samples of various rat tissue types.

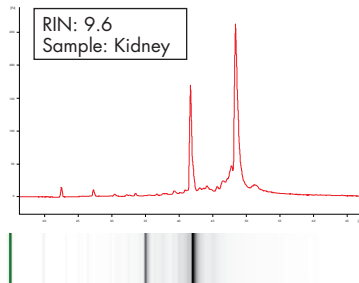
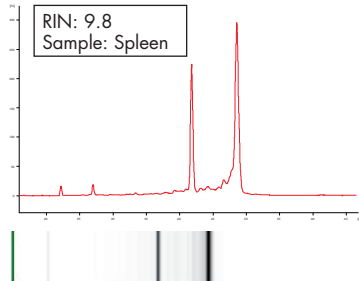
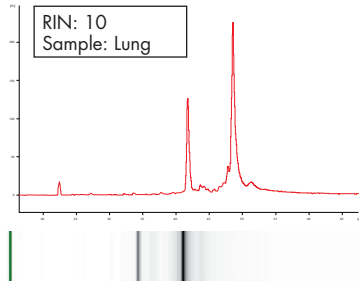
Sample type	RNeasy Mini Kit	AllPrep DNA/RNA Mini Kit
Liver	40–100 µg	40–100 µg
Spleen	20–40 µg	20–40 µg
Kidney	20–60 µg	20–60 µg
Lung	10–20 µg	10–20 µg
Brain	5–20 µg	5–20 µg
Tail	4–10 µg	4–10 µg
Heart	4–8 µg	4–8 µg
Skeletal muscle	0–1 µg	0–1 µg
Adipose tissue	2–8 µg	2–4 µg

Table 2. Yields of total RNA from eight replicate purifications from 10 mg of tissue.

The type of lysis step does not affect RNA purification efficiency, so the average RNA yield from all tissue types tested was comparable regardless of the kit used.

To compare the integrity and overall quality of the RNA, the samples were assessed using an Agilent 2100 Bioanalyzer. All of the samples were analyzed using an Agilent RNA 6000 Nano chip and 1 µl of each RNA eluate (Figure 2). The analysis showed high-quality RNA in all eluates. Electropherograms and gel images show sharp peaks for 18S and 28S ribosomal RNA. The RNA integrity number (RIN) values for all of the samples were comparable regardless of the kit used.

Ⓐ RNeasy



Ⓑ Allprep

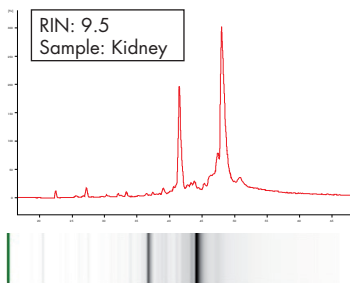
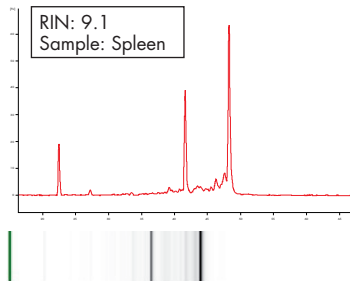
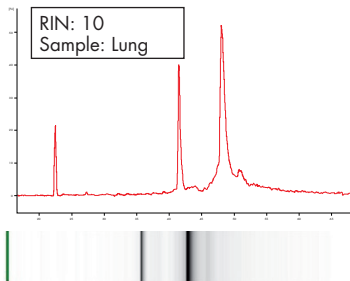
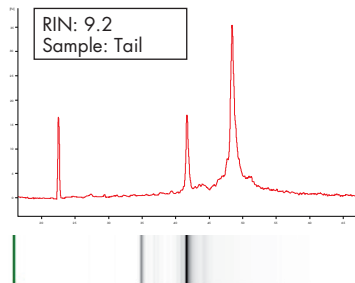


Figure 2. Analysis of the RNA eluates. One μ l of each RNA eluate was applied to an RNA Nano chip and analyzed on an Agilent 2100 Bioanalyzer. Electropherograms from all of the RNA eluates show sharp peaks for the 18S and 28S ribosomal RNA.

Ⓐ RNeasy



Ⓑ Allprep

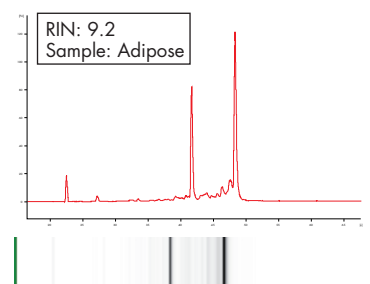
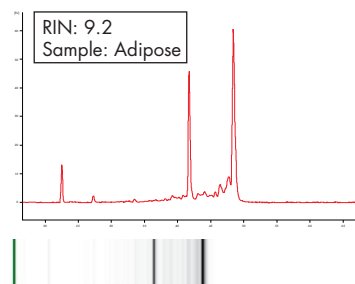
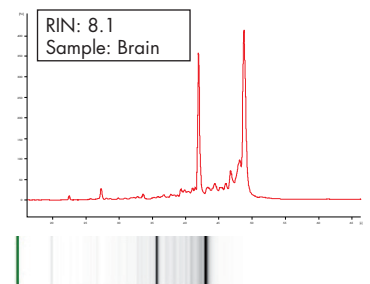
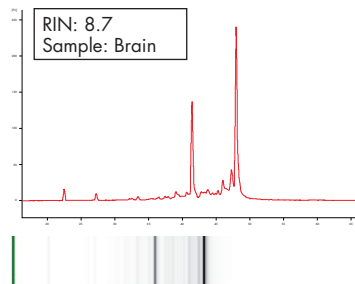
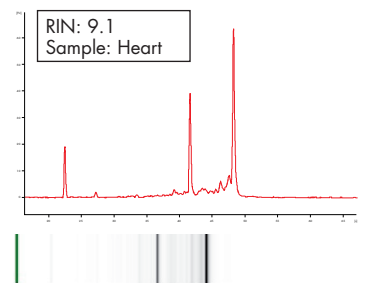
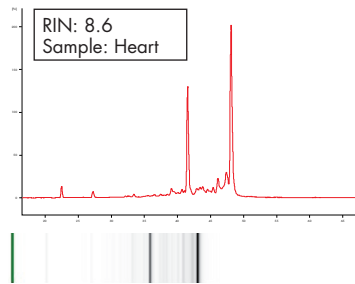
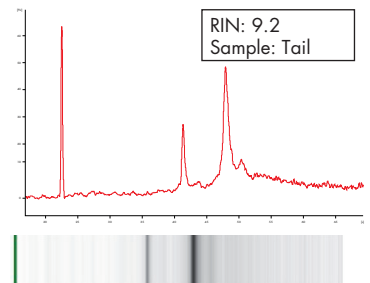


Figure 2. Continued.

Conclusions

The objective of this study was to compare the genomic DNA and total RNA purification efficiencies of different sample preparation kits. The quality of the extracted nucleic acids was evaluated using agarose gel electrophoresis and Agilent 2100 Bioanalyzer analysis.

The results of this study revealed that the gDNA and RNA yield and quality of a wide range of tissue types is comparable between nucleic acids extracted simultaneously from one sample using the AllPrep DNA/RNA Mini Kit or AllPrep DNA/RNA/miRNA Universal Kit and nucleic acids extracted in individual procedures using the DNeasy Blood & Tissue Kit or RNeasy Mini Kit.

To gain high gDNA yields from difficult-to-lyse, fiber- and lipid-rich tissues, enzymatic lysis using proteinase K is essential, so the AllPrep DNA/RNA/miRNA Universal kit is recommended when multiple types of nucleic acid are needed from a single precious sample.

The AllPrep DNA/RNA Mini Kit and AllPrep DNA/RNA/miRNA Universal Kit provide a straightforward and convenient workflow for the purification of high-quality DNA and RNA from a single sample in less time and with the same quality as with the separate purification procedures.

Ordering Information

Product	Contents	Cat. no.
AllPrep DNA/RNA Mini Kit (50)	For 50 minipreps: AllPrep DNA Spin Columns, RNeasy Mini Spin Columns, Collection Tubes, RNase-Free Water and Buffers	80204
AllPrep DNA/RNA/miRNA Universal Kit (50)	For 50 preps: 50 AllPrep DNA Mini Spin Columns, 50 RNeasy Mini Spin Columns, Collection Tubes, and Buffers	80224
DNeasy Blood & Tissue Kit (50)	50 DNeasy Mini Spin Columns, Proteinase K, Buffers, Collection Tubes (2 ml)	69504
DNeasy Blood & Tissue Kit (250)	250 DNeasy Mini Spin Columns, Proteinase K, Buffers, Collection Tubes (2 ml)	69506
RNeasy Mini Kit (50)	50 RNeasy Mini Spin Columns, Collection Tubes (1.5 ml and 2 ml), RNase-free Reagents and Buffers	74104
RNeasy Mini Kit (250)	250 RNeasy Mini Spin Columns, Collection Tubes (1.5 ml and 2 ml), RNase-free Reagents and Buffers	74106
RNAlater RNA Stabilization Reagent (50 ml)	50 ml RNAlater RNA Stabilization Reagent for stabilization of RNA in 25 x 200 mg tissue samples	76104
RNAlater RNA Stabilization Reagent (250 ml)	250 ml RNAlater RNA Stabilization Reagent for stabilization of RNA in 125 x 200 mg tissue samples	76106

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at www.qiagen.com or can be requested from QIAGEN Technical Services or your local distributor.

Discover more at qiagen.com/AllPrep

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