TissueRuptor® and TissueLyser II Disruption Systems

For low- to high-throughput disruption of biological samples

QIAGEN provides 2 systems for fast, effective sample disruption: the TissueRuptor, which disrupts samples one at a time, and the TissueLyser II, which disrupts up to 192 samples simultaneously. A wide variety of samples, including animal and plant tissues, bacteria, and yeast, can be disrupted to release high-quality DNA, RNA, and protein for subsequent purification and analysis.

Benefits of QIAGEN® sample disruption systems:

- Fast disruption of samples in minutes
- Effective, reproducible disruption and homogenization
- No cross-contamination of samples
- Compatibility with a wide range of sample types
- Integrated in QIAGEN tissue management workflow

Enabling access to biological content

Genotyping, gene expression, and proteomics applications demand effective disruption of biological samples to ensure high yields of DNA, RNA, and protein. The TissueRuptor and TissueLyser II deliver thorough and rapid disruption of samples to fully release biomolecules, and also simultaneously homogenize samples to facilitate subsequent purification procedures (Table 1).

Table 1. TissueRuptor and TissueLyser II at a glance

	TissueRuptor	TissueLyser II
Sample throughput	1 sample at a time	Up to 48 or 192 samples per run
Disruption technology	Rotor–stator	Bead mill
Disruption time	>30 seconds	2–5 minutes per run

Complete solution for tissue management

The TissueRuptor and TissueLyser II are integral parts of QIAGEN's complete solution for tissue management — from sample collection to DNA, RNA, and protein purification. Optimized protocols integrate sample disruption with biomolecule purification, enabling a streamlined, efficient workflow. A range of automated solutions allow purification and analysis of biomolecules, including the QIAcube® for automated processing of QIAGEN spin-column kits and the QIAxcel for automated multicapillary gel electrophoresis of DNA and RNA.

TissueLyser II and TissueLyser Adapter Sets.

Table 2. Features of the TissueLyser II*

Feature
More compact size
Enhanced drive
More memory storage
Powerful 150 W engine
Strengthened brackets for adapters

* The TissueLyser II replaces the TissueLyser.

TissueRuptor and TissueRuptor Disposable Probes.

QIAGEN®

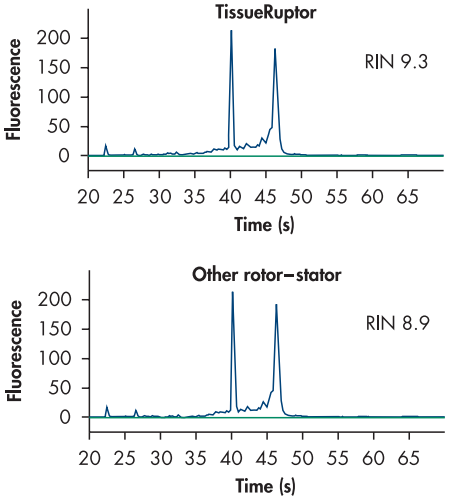

Figure 1. Pure RNA with high RIN values. Frozen liver samples (30 mg each) were disrupted at full speed for 30 seconds using either the TissueRuptor with disposable probes or a traditional rotor–stator homogenizer with a steel generator probe. Total RNA was purified using the RNeasy® Plus Mini Kit and analyzed on the Agilent® 2100 bioanalyzer. The high RNA Integrity Number (RIN) indicates the high quality of the RNA.

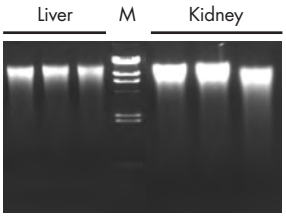

Figure 2. Reproducible purification of genomic DNA. Frozen liver and kidney samples (30 mg each) were disrupted in lysis buffer at full speed for 30 seconds using the TissueRuptor. Genomic DNA was purified using the AllPrep® DNA/RNA Mini Kit and analyzed by agarose gel electrophoresis. **M**: GelPilot® Lambda *Hin*dIII marker (QIAGEN, cat. no. 239185).

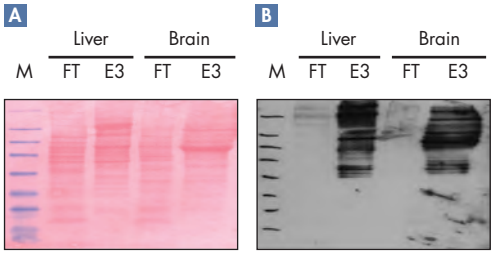

Figure 3. Successful purification of phosphoproteins from rat liver and brain. Frozen rat liver and brain (approximately 30 mg each) were disrupted at medium speed for 30–60 seconds in 350 µl PhosphoProtein Lysis Buffer. The homogenized samples were then diluted with 1500 µl PhosphoProtein Lysis Buffer and incubated at 4°C for 30 minutes, with brief vortexing every 10 minutes. Phosphoproteins were purified using the PhosphoProtein Purification Kit and detected by western blotting. A Transfer membrane stained with Ponceau S, and B western blot. **M**: markers; **FT**: flow-through; **E3**: elution fraction 3.

TissueRuptor

The TissueRuptor is a handheld rotor–stator homogenizer that provides rapid and effective disruption of individual samples. Disruption at full speed for as little as 30 seconds with a TissueRuptor Disposable Probe is usually sufficient to release nucleic acids or proteins from starting material.*

Benefits of the TissueRuptor:

- Rapid, effective disruption of a range of sample types
- Optimized disruption protocols
- Disposable probes help to eliminate cross-contamination
- Seamless integration with QIAGEN sample technologies
- Time savings through use of disposable probes

For most tissues, disruption and homogenization using the TissueRuptor gives comparable results to traditional rotor–stator homogenization (Figure 1). However, in contrast to traditional rotor–stator homogenization, the TissueRuptor uses disposable probes, which enable visual control of the disruption procedure and can be discarded after use to save cleaning time and reduce cross-contamination.

Effective disruption of tissue samples using the TissueRuptor allows reproducible purification of high-quality DNA and RNA using QIAGEN nucleic acid purification kits (Figures 1, 2, and 4). A wide range of animal tissues can be processed, including difficult-to-lyse tissues such as fiber-rich and fatty tissues. Proteins can also be successfully purified from tissues disrupted using the TissueRuptor (Figure 3).

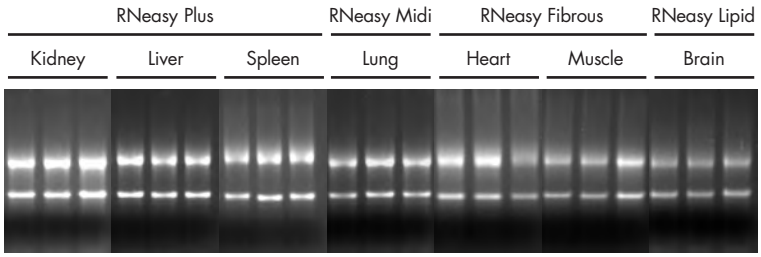

Figure 4. Efficient disruption and homogenization of animal tissues. The following tissues were disrupted at full speed for 30 seconds using the TissueRuptor: frozen kidney, liver, and spleen (10 mg each); frozen lung (250 mg); stabilized heart, muscle, and brain (10 mg each). Samples were either disrupted in lysis buffer (kidney, liver, spleen, lung, heart, and muscle) or QIAzol® Lysis Reagent (brain). Total RNA was purified using the RNeasy Plus Mini Kit (**RNeasy Plus**), the RNeasy Midi Kit (**RNeasy Midi**), the RNeasy Fibrous Tissue Mini Kit (**RNeasy Fibrous**), or the RNeasy Lipid Tissue Mini Kit (**RNeasy Lipid**). Purified RNA was analyzed by formaldehyde agarose gel electrophoresis. The gels show the high yields and quality of the RNA following disruption using the TissueRuptor.

* For plant tissues that are more difficult to disrupt, the TissueLyser II is recommended.

TissueLyser II

The TissueLyser II, a more compact and robust version of the well-established TissueLyser, is a bead mill that rapidly and effectively disrupts up to 48 or 192 samples at the same time. Effortless disruption is achieved through high-speed shaking with beads, which beat and grind samples. The TissueLyser II enables fast access to DNA, RNA, and protein in multiple biological samples, providing the optimal starting point for high-throughput applications in fields such as systems biology.

Benefits of the TissueLyser II:

- Convenient and secure disruption process
- Adapter sets for disruption of up to 192 samples per run
- Wide range of accessories available
- Reproducible results with difficult-to-lyse tissues
- Fully integrated with QIAGEN sample technologies

The TissueLyser II is well-suited for high-throughput sample disruption, providing highly reproducible results in many downstream applications, such as RNA purification from difficult-to-lyse animal tissues and plant tissues (Figures 5 and 6) and DNA purification from animal tissues (Figure 7). For RNA applications, stabilization of freshly harvested tissues in RNA*later*® RNA Stabilization Reagent effectively prevents RNA degradation during disruption with the TissueLyser II. For applications requiring purification of DNA, RNA, and protein, these 3 analytes can be immediately stabilized in freshly harvested tissues using Allprotect Tissue Reagent.*

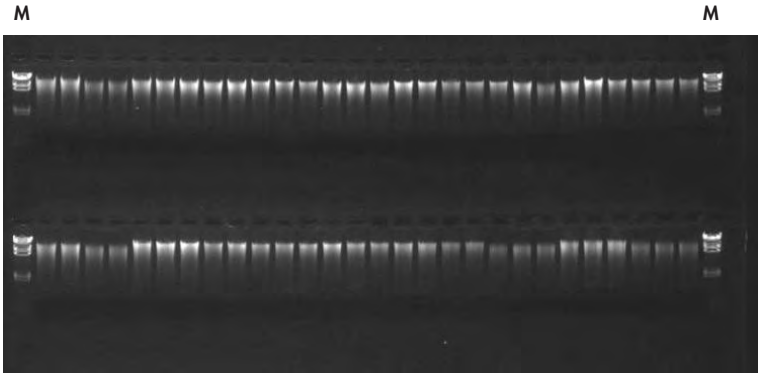

Figure 7. Reproducible DNA purification from animal tissue. From a single rat, the heart was excised and cut into 96 x 25 mg pieces, which were then disrupted using the TissueLyser II (2 x 15 seconds). Automated DNA purification was carried out on the QIAcube using the DNeasy® Blood & Tissue Kit (with Reagent DX to minimize lysate foaming). Analysis of 48 samples on an agarose gel showed consistent amounts of DNA from each sample. **M**: GelPilot Lambda *Hin*dIII marker.

* RNA*later* RNA Stabilization Reagent (cat. nos. 76104 and 76106 for 50 ml and 250 ml, respectively) and Allprotect Tissue Reagent (cat. no. 76405) are available from QIAGEN. RNA*later* TissueProtect Tubes (resealable tubes prealiquoted with RNA*later* Reagent) are also available; please inquire.

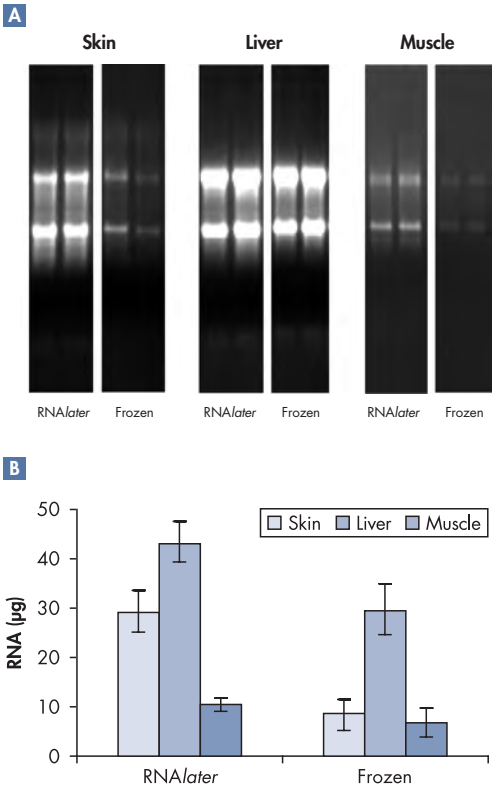

Figure 5. Efficient disruption and homogenization of animal tissues. Tissues (20 mg) were either frozen (**Frozen**) or stabilized in RNA*later* RNA Stabilization Reagent (**RNA*later***), and then disrupted using the TissueLyser II (2 x 2 minutes for liver and muscle; 2 x 5 minutes for skin). RNA was purified using the RNeasy Mini Kit (liver), RNeasy Fibrous Tissue Mini Kit (skin), or RNeasy Lipid Tissue Mini Kit (muscle). **A** Analysis on a 1.2 % formaldehyde agarose gel shows sharp ribosomal RNA bands, indicating intact RNA. **B** RNA yields were quantified by A_{260} nm absorbance measurements.

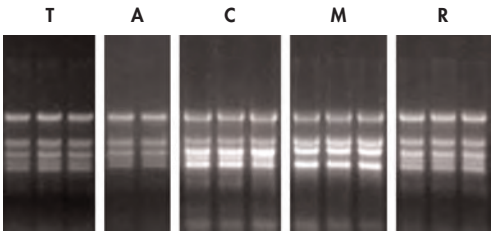

Figure 6. Reproducible RNA purification from plant tissues. Frozen plant leaves were disrupted using the TissueLyser II (2 x 1 minute). RNA was purified using the RNeasy Plant Mini Kit and analyzed on a 1.2 % formaldehyde agarose gel. The ribosomal RNA bands were sharp and of equal intensity, indicating reproducible purification of intact RNA. **T**: Tomato (100 mg); **A**: Arabidopsis (25 mg); **C**: Cotton (100 mg); **M**: Maize (100 mg); **R**: Rape (100 mg).

Ordering Information

Product	Contents	Cat. no.
TissueRuptor	Handheld rotor–stator homogenizer, 5 TissueRuptor Disposable Probes	Inquire
TissueRuptor Disposable Probes (25)	25 nonsterile plastic disposable probes for use with the TissueRuptor	990890
TissueLyser II	Universal laboratory mixer-mill disruptor	85300
TissueLyser accessories — fully compatible with both the TissueLyser II and TissueLyser		
TissueLyser Adapter Set 2 x 24	Adapter set for disruption of up to 48 samples in 2 ml microcentrifuge tubes on the TissueLyser	69982
TissueLyser Adapter Set 2 x 96	Adapter set for disruption of up to 192 samples in Collection Microtubes (racked) on the TissueLyser	69984
Grinding Jar Set, S. Steel (2 x 10 ml)	Two grinding jars with stainless steel grinding ball for disruption of large samples on the TissueLyser	69985
Grinding Jar Set, Teflon® (2 x 10 ml)	Two grinding jars with Teflon grinding ball for disruption of large samples on the TissueLyser	69986
Stainless Steel Beads, 5 mm (200)	200 stainless steel beads (5 mm diameter) for use with the TissueLyser	69989
Tungsten Carbide Beads, 3 mm (200)	200 tungsten carbide beads (3 mm diameter) for use with the TissueLyser	69997
TissueLyser Single-Bead Dispenser, 5 mm*	For dispensing individual beads (5 mm diameter) into 2 ml microcentrifuge tubes	69965
TissueLyser 5 mm Bead Dispenser, 96-Well*	For dispensing 96 beads (5 mm diameter) in parallel into Collection Microtubes (racked)	69975
Collection Microtubes (racked)	Nonsterile polypropylene tubes (1.2 ml); 960 in racks of 96	19560
Collection Microtube Caps	Nonsterile polypropylene caps for Collection Microtubes (racked); 960 in strips of 8	19566

* Bead dispensers for dispensing beads of other sizes are also available; please inquire.

The RNeasy Mini Kit is intended for general laboratory use. No claim or representation is intended to provide information for the diagnosis, prevention, or treatment of a disease. All other products are intended for research use. No claim or representation is intended to provide information for the diagnosis, prevention, or treatment of a disease.

"RNA*later*®" is a trademark of AMBION, Inc., Austin, Texas and is covered by various U.S. and foreign patents.

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