User Manual

GenElute™-E Single Spin Tissue DNA Kit

For Purification of Genomic DNA from Tissue Samples

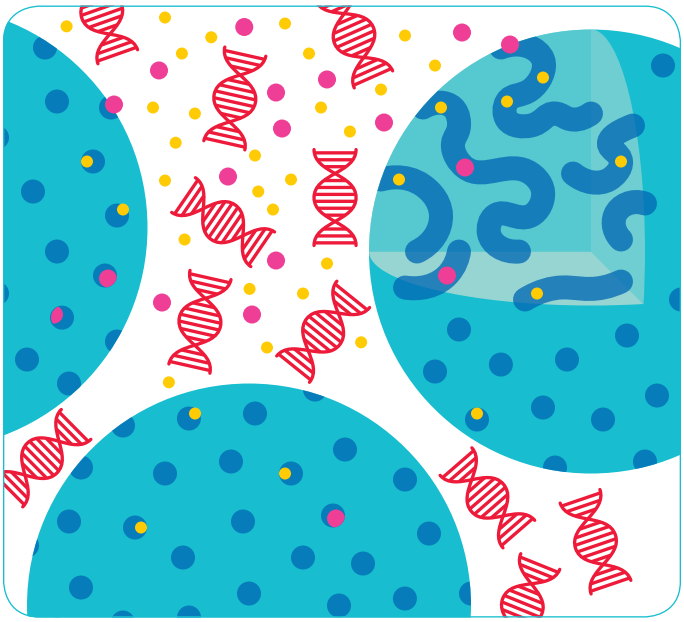
EC300

What's Inside:

For research use only.

Introduction

GenElute™-E Single Spin Kit is a nucleic acid purification system that eliminates the need for high salt binding and ethanol wash steps, yielding DNA and RNA preparations with fewer impurities for more robust results. GenElute™-E DNA and RNA purification kits employ a **negative chromatography** method dependent on size exclusion to separate large DNA and RNA nucleic acid molecules from smaller protein, lipid, and ionic components in cell, tissue, blood, and other samples.



Using negative chromatography, Single Spin columns efficiently absorb and retain sample contaminants while allowing nucleic acids to flow through the column, reducing the number of steps and plastic materials required for purification. The key is the novel lysis that allows negative chromatography to be used for high quality nucleic acid purification.

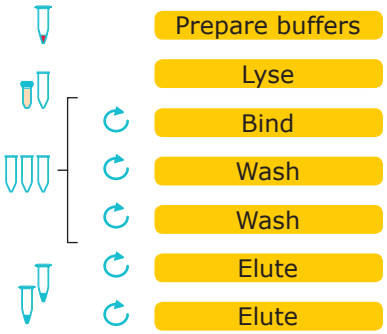
Three key advantages over silica:

- Simplified workflow
- Superior performance
- Waste reduction

A Simplified Workflow

Purification in one spin, eliminating all wash steps and reducing tube handling for more efficient, safer sample processing.

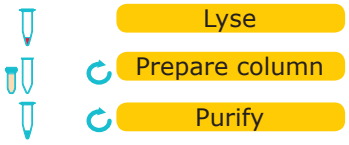
Silica Procedure



Multiple spins
and tube transfers

Lysis
45 minutes to overnight
Purification
45 minutes hands-on time
6 centrifugation steps

GenElute™-E Single Spin Technology



- ✓ Reduced time
- ✓ Reduced handling
- ✓ Reduced waste

Lysis
10 to 40 minutes
Purification
3 minutes hands-on time
1 centrifugation step

Reduced Waste for a Better Environment

With fewer plastic tubes and no hazardous liquids, GenElute™-E DNA and RNA purification kits provide an eco-friendly alternative to silica-based purification.

GenElute™-E purification kits greatly reduce the amounts of plastic-based components packaged with each kit and consumed while executing protocols in the lab. All tedious binding and washing steps associated with silica-based procedures are omitted, with no use of hazardous materials such as chaotropic salts or organic solvents that require special disposal. Plastic waste is reduced by 55% compared to a common silica kits, resulting in disposal cost savings and reduced environmental impact.

GenElute™-E Single Spin nucleic acid purification kits provide easier workflows for DNA and RNA isolation, better nucleic acid quality with fewer impurities, and reduced plastic and hazardous waste disposal compared to silica bind-wash-elute spin prep kits.

GenElute™-E Single Spin Purification supports:

- Significantly reduced plastic waste
- No hazardous bind and wash steps
- Responsible and sustainable nucleic acid purification
- Disposal cost savings

GenElute™-E kits

Supplier X

Specifications

Sample Input	1-20 mg
Sample Type	Human and animal tissues
Sample Condition	Fresh, frozen, stabilized
Required time after lysis	2 minutes
Purified Nucleic Acid	DNA > 200 bp
Elution Volume	90-110 µl
The purified genomic DNA is ready for immediate use in downstream applications:	• Restriction digestions • PCR and qPCR • Southern blots • Sequencing reactions

Intended Use

For single-step purification of genomic DNA from tissue samples. This protocol has been developed for 1 – 20 mg human and animal tissue samples. 10 mg is generically recommended (for certain species, optimization of input amount may be required). For high DNA content (e g., spleen, liver, kidney): 5 mg is recommended. For low DNA content (e g., muscle, cartilage): 20 mg is recommended.

Typical Results

Table 1.

Sample Type	Typical Yield (µg/ 10mg)
mouse heart	5-10
mouse kidney	5-25
mouse lung	5-20
mouse liver	10-15
mouse brain	2-5
mouse fat	0.5-1.5
mouse muscle	3-5
mouse ear punch	15-30
mouse toe	5-10
rat brain	5-10
rat spleen	5-20
rat muscle	2-10
rat fat	0.1-1
tilapia fins	0.5-1
tilapia gils	0.5-5
tilapia muscle	5-15

Typical yields reflect µg of gDNA per 10mg of initial sample. Due to sample variability, results may vary.

Figure 1

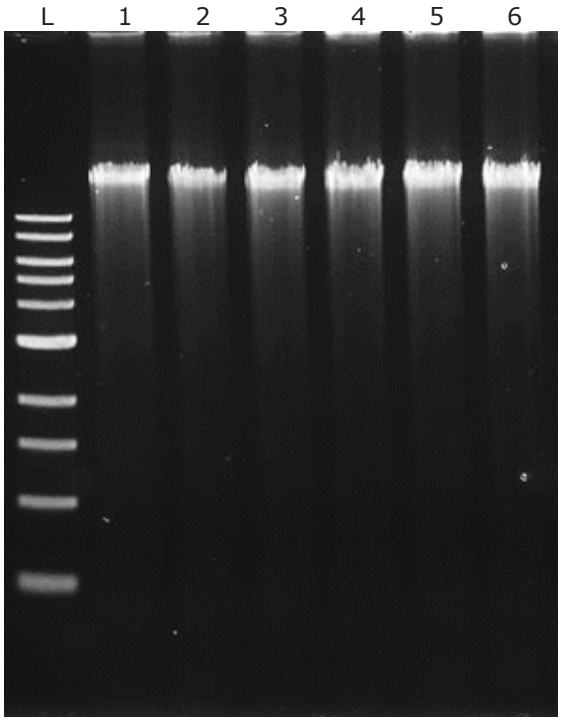


Table 2.

Sample ID Replicate #	Concen-tration (ng/µl)	260/280	260/230	Mass (ng)
1	156.1	1.89	2.04	13820.3
2	147.5	1.88	2.06	12426.3
3	167.7	1.89	2.07	12847.9
4	177.7	1.86	2.15	16571.1
5	189.1	1.87	2.08	15197.2
6	191.5	1.88	2.09	15108.6

Spectrophotometric results of six replicates of gDNA isolation from 7.5 mg of mouse kidney per isolation using GenElute™-E Single Spin Tissue DNA Kit. Gel electrophoresis shown in Figure 1 on the previous page. Due to sample variability, results may vary.

Storage and Stability

Kit Storage

Store SmartLyse™ T Protease (P) and RNase A Tissue (R) at 2-8 ºC. The remaining components should be stored at room temperature. Use the kit within 12 months of receipt.

Sample Storage and Variability

Nucleic acid degrades over time, potentially leading to reduced fragment length and overall yield. Therefore, it is best if samples are acquired from fresh material. Often when working with samples, this is not feasible. Stabilizing the sample through the addition of stabilizing reagents and/or by immediately freezing the sample and storing it at -20ºC or -70ºC can assist in improving results.

However, it is important to keep in mind that individual samples are not homologous during collection and samples often vary between different tissue species as well as among different parts of the tissue itself. Consider optimization of sample homogenization or adjusting the lysis time when working with more difficult sample types.

Disposal

GenElute™-E kits adhere to the principles of "SMASH Packaging", our plan that drives improvement in the sustainability of our packaging through less packaging, more sustainable materials and easier recycling.

The box and insert material comes from sustainably managed forests and/or more than 70% of recycled content. The kit componet bags are composed of starch-based, compostable material. Please recycle.

Kit components exposed to samples should be disposed of with biological waste. Other kit materials should be disposed of according to all applicable international, federal, state, and local regulations.

Materials and Equipment Needed

Kit Contents

- Tissue Lysis Buffer (LB)
- SmartLyse™ T Protease (P)
- Clearing Solution T (CS)
- RNase A Tissue (R)
- 1x Tris Buffer (T)
- Spin Columns

Not Supplied in Kit

- Microcentrifuge with rotor for 1.5 mL and 2 mL reaction tubes.

  Important: Set centrifuge to relative centrifugal force, rcf (x g). If needed, calculate equivalent rpm by the formula:

  rpm = 1,000 x √(g/(1.12 x r)),
  where r = radius of rotor in mm
  and g is the required g-force.

- Thermal shaker with agitation, capable of heating to 60 °C and 80 °C.

  Alternative: Heating Block or heat chamber.

- Vortex device.
- Pipets for 10 µL and 200 µL scales, corresponding pipet tips.
- One reaction tube (1.5 mL) per sample for the lysis step.
- One reuseable reaction tube (2 mL) per sample for Spin Column preparation.
- One reaction tube (1.5 mL) per sample for collection of the purified DNA.
- GenElute™-E Cap Puncher (optional)

Preparation before starting

- Heat the thermal shaker or heating block/chamber to 60 °C.
- Set the microcentrifuge to 1,000 x g.

Standard Protocol

Lysis

1. Add 1 – 20 mg of tissue sample to reaction tube.

   Note: To avoid degradation, keep samples on ice or in a cooling block during sample loading.

   - If possible, cut tissue into small pieces to speed up lysis.
   - For stabilized tissue samples briefly rinse with water to remove traces of stabilization solution before adding samples to the reaction tube.

2. For each sample, add 90 µL Tissue Lysis Buffer LB and 5 µL SmartLyse™ T Protease P. If working with more than two samples, prepare a Lysis Master Mix with 10% excess volume for the number of samples (see table).

   Lysis Master Mix

Number of samples	1	6 (+10%)	12 (+10%)
Tissue Lysis Buffer LB	90 µL	594 µL	1,188 µL
SmartLyse™ T Protease P	5 µL	33 µL	66 µL
Final Volume	95 µL	627 µL	1,254 µL

3. Place the reaction tube(s) in the thermal shaker and incubate at 60 °C for 30 minutes with maximum agitation.

   If using Heating Block or heat chamber, vortex halfway through incubation time to re-suspend, and return to incubation.

Meanwhile during lysis, proceed with "Spin Column Preparation".

   Note: If samples are not completely lysed after the time period described above, continue with the next step. Residual cellular debris will not interfere with the purification performance.

   Note: For some tissue types, lysis is already complete after 15 minutes. Therefore, this step may be shortened accordingly.

4. After incubation at 60 °C, increase the temperature to 80 °C and incubate for additional 10 minutes with maximum agitation.

   Optional: After having performed lysis, add 1 µL RNase A Tissue ® to each lysed sample and vortex for 3 seconds. Incubate for 2 minutes at room temperature to remove RNA traces.

5. Add 10 µL Clearing Solution T CS. Vortex for 3 seconds. The sample will become cloudy.

6. Centrifuge for 2 minutes at maximum speed.

Spin Column Preparation

7. Vortex the GenElute™-E Spin Column briefly and place into a 2 mL reaction tube. Let stand for 10 to 20 minutes.

8. Loosen the screw cap of the Spin Column and snap off bottom closure of the Spin Column. The screw cap must stay loosened half a turn to avoid generation of a vacuum. Place the Spin Column back into the 2 mL reaction tube.

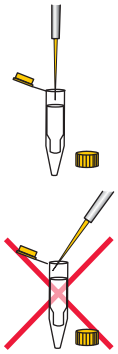
9. Centrifuge for 1 minute at 1,000 x g. Discard the 2 mL reaction tube containing Spin Column buffer.

10. Place the prepared GenElute™-E Spin Column into a new 1.5 mL reaction tube for collection of the purified DNA and place back into the rack.

Purification of DNA

11. Transfer a maximum of 100 µL of lysis supernatant containing the DNA into the prepared GenElute™-E Spin Column as illustrated:

    - Open cap and pipet the sample slowly (5 sec) onto the center of the resin bed of the prepared Spin Column.
    - Close screw cap and loosen again half a turn.

    Important: Do not re-close the screw cap of the Spin Column completely.

    Note: During loading of lysate, do not touch the resin bed with your pipette tip. Residual cellular debris may be loaded and will not interfere with purification.

12. Centrifuge for 1 minute at 1,000 x g. The purified DNA flows through the Spin Column into the 1.5 mL storage tube. Discard the Spin Column.

The collected DNA can be used immediately or kept at 2 - 8 °C or for long-term storage at –20 °C. For spectrophotometric analysis, use the 1x Tris Buffer Ⓣ supplied with the kit.

Cap Puncher Protocol

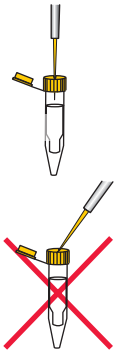
1. Perform Standard Protocol steps 1-6.

Spin Column Preparation

7. Vortex the GenElute™-E Spin Column briefly and place into a 2 mL reaction tube. Let stand for 10 to 20 minutes.
8. Use of the Cap Puncher: Punch a hole into the Spin Column cap and lift the Spin Column together with the Cap Puncher out of the 2 mL collection tube. Snap off bottom closure of the Spin Column and detach the Cap Puncher by twisting clockwise while pulling out. Place the punched Spin Column back into the 2 mL reaction tube.
9. Centrifuge for 1 minute at 1,000 x g. Discard the 2 mL reaction tube containing the Spin Column buffer.
10. Place the prepared GenElute™-E Spin Column into a new 1.5 mL reaction tube for collection of the purified DNA and place back into the rack.

Purification of DNA

11. Transfer a maximum of 100 µL of lysis supernatant containing the DNA into the prepared GenElute™-E Spin Column:



- Insert pipet tip vertically through the hole in the Spin Column cap.
- Pipet the sample slowly (5 sec) into the Spin Column.

Note: Residual cellular debris may be loaded and will not interfere with purification.

12. Centrifuge for 1 minute at 1,000 x g. The purified DNA flows through the Spin Column into the 1.5 mL storage tube. Discard the Spin Column.

The collected DNA can be used immediately or kept at 2-8 °C or for long-term storage at –20 °C. For spectrophotometric analysis, use the 1x Tris Buffer Ⓣ supplied with the kit.

Troubleshooting

Problem	Probable Cause	Solution
Low yield	Individual samples have inherent variability. In addition, there is variability across different sample types. Optimization needs to be performed by the user to validate for their sample type.	Degraded DNA fragments below < 60 bp are depleted during purification. Using fresh samples stored under appropriate conditions or stabilizing the samples will help to mitigate low sample yields.
	Insufficient sample homogenization or sample shearing can decrease sample yield.	Optimize tissue disruption to minimize shearing of the nucleic acid. Visually inspect that the sample is completely homogenized before using with GenElute™-E kits.
	Using too much sample may result in overloading the column's capacity for separation.	Use the recommended sample load. Optimization needs to be performed by the user to validate for their sample type.
	Using too little of the sample may result in low sample yields.	Use the recommended sample load. Optimization may need to be performed by the user if their sample type is low yielding.
	Small, possibly degraded, DNA-fragments (< 60 bp) and/or RNA (if RNase was used) are removed during purification. Since these components are co-purified with silica-based kits, there may be artificially lower oD 260 readings with GenElute™-E kits. Thus, the calculation of sample concentration and subsequent yield may appear lower.	Quantitation by measuring signal intensity of bands via gel electrophoresis fragment separation, using a fragment analyzer, or comparing qPCR Ct values will provide a more reliable measurement of full-length gDNA.
	Centrifugation speeds and spin times have been optimized to acquire the fraction of sample containing the nucleic acid.	Verify that centrifugation was performed under the recommended conditions.
	Incomplete lysis of the sample may lead to reduced yields. Lysis times may need to be extended depending on the sample type.	Additionally, the SmartLyse™ enzymes were optimized to work at the recommended temperature. Verify that the heating unit (ex. thermal shaker) is heating correctly.
	If the column preparation steps were performed incorrectly, then the separation resin will be packed incorrectly.	Verify that the preparation steps for the column were performed according to the protocol.
	When performing the Standard Protocol, without the use of the GenElute™-E Single Spin Cap Puncher, the cap may have been left untightened.	Verify that the spin column cap of the column is loosened half a turn to avoid vacuum generation.

Problem	Probable Cause	Solution
Low sample volume	Loading too low of sample or too high of sample may result in sample volume loss. The loaded sample volume is required to be within the recommended range as that volume is required to displace the column buffer.	If the sample volume available to be loaded onto the column is below the recommended range, as may occur with dehydrated sample types, then bring the sample within the recommended range using lysis buffer. If the sample volume available to be loaded onto the column is above the recommended range, then only load up to the recommended volume.
	Blocking of pipette tips by lysate debris during aspiration of the supernatant may result in a lower transfer volume and, consequently, in a lower DNA yield.	Loading of debris onto the column will not impact the ability of the column to purify the nucleic acid from the sample. However, avoid aspirating the debris into the pipette tip or use wide-bore tips to aspirate if the sample has an abundance of debris to prevent clogging.
260/230 ratios appear to be "too low."	In some cases, the 260/230 ratios may be below the recommended range.	Downstream assays have not been shown to be compromised by lower 260/230 ratios using nucleic acid isolated using GenElute™-E kits.
	Using too little of the sample may result in low 260/230 ratios.	Use the recommended sample load.
	Using too much of the sample may result in low 260/230 ratios.	Use the recommended sample load.
RNA residues are observed.	If the optional RNase protocol is not performed, then there may be RNA observed.	Perform the optional RNase protocol. Some samples may require an extended incubation due to variability across sample types.
Lysate leaks from the hole created by the Cap Puncher during loading	The sample needs to be loaded vertically, allowing the sample to be dispensed correctly into the column. Also, if there is not enough pressure applied using the Cap Puncher then the hole may not be large enough to load the sample.	Apply enough pressure using the Cap Puncher to create a hole and load sample vertically.
Columns with dried resin	In rare cases, the spin columns dry out during storage. This may be due to not storing the columns according to the recommended conditions.	Store GenElute™-E kits according to the recommended conditions.

Product Ordering

Description	Qty	Catalogue No.
GenElute™-E Single Spin Blood DNA Kit	10	EC100-10RXN
	50	EC100-50RXN
	250	EC100-250RXN
GenElute™-E Single Spin Blood DNA High Yield Kit	10	EC200-10RXN
	50	EC200-50RXN
	250	EC200-250RXN
GenElute™-E Single Spin Tissue DNA Kit	10	EC300-10RXN
	50	EC300-50RXN
	250	EC300-250RXN
GenElute™-E Single Spin Cell Culture DNA Kit	10	EC400-10RXN
	50	EC400-50RXN
	250	EC400-250RXN
GenElute™-E Single Spin Plant DNA Kit	10	EC500-10RXN
	50	EC500-50RXN
	250	EC500-250RXN
GenElute™-E Single Spin DNA Cleanup Kit	10	EC600-10RXN
	50	EC600-50RXN
	250	EC600-250RXN
GenElute™-E Organic Solvent DNA Cleanup	10	EC700-10RXN
	50	EC700-50RXN
	250	EC700-250RXN
GenElute™-E Single Spin RNA Cleanup Kit	10	EC800-10RXN
	50	EC800-50RXN
	250	EC800-250RXN
GenElute™-E Tissue Stabilizer	100	EC111-100ML
	500	EC111-500ML
GenElute™-E RNA Gel Loading Buffer	1	EC222-1EA
	5	EC222-5EA
GenElute™-E Single Spin Tissue DNA 96 Kit	2	EC396-2EA
	8	EC396-8EA
GenElute™-E Single Spin Plant DNA 96 Kit	2	EC596-2EA
	8	EC596-8EA
GenElute™-E Single Spin Blood DNA 96 Kit	2	EC196-2EA
	8	EC196-8EA
GenElute™-E Single Spin Cap Puncher	1	EC9999-1EA

Precautions and Disclaimer

This product is for research use only. Please consult the Safety Data Sheet for information regarding hazards and safe handling practices.

Notice

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GenElute™-E Single Spin Checklist for Tissue DNA Kit

EC300

Prepare before starting

- ☐ Heat the thermal shaker or heating block/chamber to 60 °C.
- ☐ Set the microcentrifuge to 1,000 x g.

Lysis

- ☐ Add 1 – 20 mg of tissue to reaction tube.
- ☐ Add 90 µL Tissue Lysis Buffer (LB).
- ☐ Add 5 µL SmartLyse™ T Protease Mix (P).

Column prep during lysis

Incubate 30 minutes 60 °C 10 minutes 80 °C

Thermal Shaker maximum agitation

- ☐ Add 1 µL RNase A Tissue ®. Vortex to mix.
- ☐ Incubate at room temperature for 2 minutes.
- ☐ Add 10 µL Clearing Solution T (CS) and vortex shortly.
- ☐ Centrifuge 2 minutes at maximum speed.

Spin Column preparation **(during 60 °C and 80 °C incubation)**

- ☐ Vortex GenElute™-E Spin Column and place in a 2 mL tube.
- ☐ Let stand for 10–20 minutes.

Loosen screw cap of Spin Column.

OR

Punch a hole in the cap with the GenElute™-E Single Spin Cap Puncher.

- ☐ Snap off bottom closure.
- ☐ Place Spin Column back into 2 mL tube.
- ☐ Centrifuge 1 minute at 1,000 x g to collect Spin Column buffer.
- ☐ Place Spin Column in a 1.5 mL tube.

Purification of DNA

- ☐ Transfer lysate supernatant (maximum 100 µL) to prepared Spin Column.
- ☐ Centrifuge 1 minute at 1,000 x g to collect DNA.
- ☐ Collected DNA is ready to use.

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