

MasterPure™ DNA Purification Kit

Cat. No. MCD85201

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1. Introduction

The MasterPure™ DNA Purification Kit provides all of the reagents necessary to recover DNA from a wide variety of biological sources. This kit utilizes a rapid desalting process¹ to remove contaminating macromolecules, avoiding toxic organic solvents. The purified DNA can be used subsequently in many applications including hybridization, restriction enzyme digestion, and PCR amplification. We offer several products for PCR that incorporate the MasterAmp™ PCR Enhancement Technology⁺, which substantially improves product yield and decreases nonspecific product formation.

2. Product Specifications

Storage: Store the Proteinase K and RNase A at -20°C in a freezer without a defrost cycle. Store the remainder of the kit at room temperature.

Storage Buffers: Proteinase K is supplied in a 50% glycerol solution containing 50 mM Tris-HCl (pH 7.5), 100 mM NaCl, 0.1 mM EDTA, 10 mM CaCl_2 , 0.1% Triton® X-100, and 1 mM dithiothreitol; RNase A is supplied in a 50% glycerol solution containing 25 mM sodium acetate (pH 4.6).

Quality Control: The MasterPure DNA Purification Kit is function-tested by purifying DNA from *E. coli*. DNA quality and yield are assayed by agarose gel electrophoresis, spectrophotometry, fluorimetry, and use as a template for PCR.

3. Kit Contents

Desc.	Concentration	Quantity
The MasterPure DNA Purification Kit contains enough reagents to perform 200 DNA purifications.		
Red Cell Lysis Solution		120 ml
Tissue and Cell Lysis Solution		60 ml
2X T and C Lysis Solution		50 ml
MPC Protein Precipitation Reagent		55 ml
RNase A	@ 5 $\mu\text{g}/\mu\text{l}$	400 μl
Proteinase K	@ 50 $\mu\text{g}/\mu\text{l}$	200 μl
TE Buffer	17 ml	
(10 mM Tris-HCl [pH 7.5], 1 mM EDTA)		

All MasterPure DNA Purification Kit components are also available separately.

4. Related Products

The following products are also available:

- MasterPure™ Complete DNA and RNA Purification Kits
- MasterPure™ RNA Purification Kit
- MasterPure™ Plant RNA Purification Kit
- MasterPure™ Plant Leaf DNA Purification Kits
- MasterPure™ Yeast DNA Purification Kits
- BuccalAmp™ DNA Extraction Kits
- MasterAmp™ PCR Optimization Kits
- MasterAmp™ *Taq*, *Tth*, *Tfl*, and AmpliTherm™ DNA Polymerases
- FailSafe™ PCR System

5. General Considerations

1. **Tissue Sources:** We have used the kit to isolate DNA from a variety of sources including: bovine liver, human HL-60 tissue culture cells, paraffin-embedded breast tumor tissue (see below), human whole blood and plasma, saliva, mouse tail, corn and geranium leaf, *E. coli*, and lambda phage. Tissues other than those mentioned here are likely to be compatible with the kit with some optimization.
2. **Isolation of DNA from Paraffin-embedded Tissue:** DNA molecules isolated from preserved, paraffin-embedded tissues is generally of poor quality. The degree of degradation of these samples limits analysis to mainly techniques involving amplification. To obtain DNA from embedded tissues that is amenable to PCR, we recommend preserving the tissues in either acetone, 95% ethanol or 95% buffered formalin, with fixation times of less than 24 hours.² Choose PCR primers such that the resultant amplification products are less than or equal to 300 bp in length. The use of xylene or Hemo-D to extract the paraffin has been shown to increase DNA yields, and an alternate protocol is provided.
3. **Sample Size:** Users can purify nucleic acid from samples of various sizes by proportionately adjusting the amount of reagents to the amount of starting material. With larger samples, centrifugation conditions (time and speed) may also need to be adjusted.
4. **Proteinase K Treatment:** We recommend including the Proteinase K treatment to increase the efficiency of lysis, though for some samples this treatment is unnecessary (e.g., blood). If minimizing the time of purification is desirable, users may determine if Proteinase K treatment is required.
5. **Nuclease Treatment:** The removal of RNA from DNA preparations with RNase A is unnecessary for many applications. This step may be eliminated from the protocol depending upon the intended use of the DNA. If the removal of contaminating nucleic acid is necessary, we recommend performing these steps as outlined in the protocol. Note, however, for some samples, adjustments in nuclease concentration or time of incubation may improve the quality of the purified nucleic acid.
6. **Complete RNA Removal:** If complete removal of RNA is required for your application, refer to the Complete RNA Removal protocol (Part K).

6. DNA Purification Protocols

The following protocol is provided for the purification of DNA from several biological sources (see General Considerations). Lyse the fluid or tissue as outlined in Part A, and then proceed with the remainder of the protocol as outlined in Part B. Additional purification protocols begin on page 8. If complete removal of RNA is required for your application, follow the protocol for Complete Removal of RNA (Part K).

A. Lysis of Fluid or Tissue Samples

Thoroughly mix the various Lysis Solutions to ensure uniform composition before dispensing.

Fluid Samples (e.g., saliva, semen)

1. Collect samples and either process immediately or freeze at -70°C .
2. Dilute 1 μl of Proteinase K into 150 μl of 2X T and C Lysis Solution for each sample.
3. Transfer 150 μl of the fluid sample to a microcentrifuge tube and add 150 μl of 2X T and C Lysis Solution containing the Proteinase K and mix thoroughly.
4. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
5. Cool the samples to 37°C and add 1 μl of 5 $\mu\text{g}/\mu\text{l}$ RNase A to the sample; mix thoroughly.
6. Incubate at 37°C for 30 minutes.
7. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part B.

Cell Samples (e.g., mammalian cell culture, buccal cells, *E. coli*)

1. Dilute 1 μl of Proteinase K into 300 μl of Tissue and Cell Lysis Solution for each sample.
2. Pellet cells by centrifugation (0.5-1 $\times 10^6$ mammalian cells; 0.1-0.5 ml of an overnight culture of *E. coli*) and discard the supernatant, leaving approximately 25 μl of liquid.
3. Vortex mix 10 seconds to resuspend the cell pellet.
4. Add 300 μl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
5. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
6. Cool the samples to 37°C and add 1 μl of 5 $\mu\text{g}/\mu\text{l}$ RNase A to the sample; mix thoroughly.
7. Incubate at 37°C for 30 minutes.
8. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part B.

Tissue Samples (e.g., plant or animal tissues)

1. Collect 1-5 mg of tissue and either process immediately or freeze the samples at -70°C .
2. Dilute 1 μl of Proteinase K into 300 μl of Tissue and Cell Lysis Solution for each sample.
3. Homogenize fresh tissue or grind frozen tissues in liquid nitrogen and transfer to a microcentrifuge tube.

4. Add 300 µl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
5. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
6. Cool the samples to 37°C and add 1 µl of 5 µg/µl RNase A to the sample; mix thoroughly.
7. Incubate at 37°C for 30 minutes.
8. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part B.

Whole Blood Samples (with RBC lysis)

1. Draw 5 ml of blood into an EDTA Vacutainer® tube. Transfer 200 µl of whole blood into a microcentrifuge tube.
2. Add 600 µl of Red Cell Lysis Solution. Invert 3 times to mix and then flick the bottom of the tube to suspend any remaining material.
3. Incubate at room temperature for 5 minutes and then vortex mix briefly. Continue incubating at room temperature for an additional 5 minutes followed again by brief vortex mixing.
4. Pellet the white blood cells by centrifugation for 25 seconds in a microcentrifuge.
5. Remove most of the supernatant, leaving approximately 25 µl of liquid. Vortex mix to suspend the pellet.
6. Resuspend the white blood cells in 300 µl of Tissue and Cell Lysis Solution by pipetting the cells up and down several times.
7. Add 1 µl of RNase A and mix thoroughly.
8. Incubate at 37°C for 30 minutes.
9. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part B (below).

Formalin-Fixed, Paraffin-Embedded (FFPE) Tissues (see General Considerations)

1. Remove a section of tissue using a clean microtome blade; if possible, trim excess paraffin.
2. Place 10-50 mg of 10- to 35-µm thick paraffin sections into an appropriate tube. If using a larger amount of tissue, adjust the reagent volumes accordingly.
3. Dilute 2 µl of Proteinase K into 300 µl of Tissue and Cell Lysis Solution for each sample, and mix.
4. Add 300 µl of Tissue and Cell Lysis Solution containing the Proteinase K to the sample and mix.
5. Incubate at 65°C for 30 minutes; followed by a brief (10 seconds) vortex mix.
6. Cool the samples to 37°C and add 1 µl of RNase A to the sample; mix thoroughly.
7. Incubate at 37°C for 30 minutes.
8. Place the samples on ice for 3-5 minutes and then proceed with total DNA precipitation in Part B.

7. Alternate Protocol for Formalin-Fixed, Paraffin-Embedded (FFPE) Tissues

Note: *this protocol uses xylene or Hemo-D to extract the paraffin.*

1. Remove a section of tissue using a clean microtome blade; if possible, trim excess paraffin.
2. Place 10-50 mg of 10- to 35- μm thick paraffin sections into an appropriate tube. If using a larger amount of tissue, adjust the reagent volumes accordingly.
3. Add 1-5 ml of xylene or Hemo-D to extract the paraffin and incubate at room temperature for 10 minutes. Pour off the solvent.
4. Repeat Step 3.
5. Add 1-5 ml of 100% ethanol and incubate at room temperature for 10 minutes. Pour off the ethanol.
6. Repeat Step 5.
7. Aspirate all of the remaining ethanol.
8. Dilute 2 μl of Proteinase K into 300 μl of Tissue and Cell Lysis Solution for each sample, and mix.
9. Add 300 μl of Tissue and Cell Lysis Solution containing the Proteinase K to the sample and mix.
10. Incubate at 65°C for 30 minutes; followed by a brief (10 seconds) vortex mix.
11. Cool the samples to 37°C and add 1 μl of RNase A to the sample; mix thoroughly.
12. Incubate at 37°C for 30 minutes.
13. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part D.

B. Precipitation of Total DNA (for all biological samples)

1. Add 175 μl of MPC Protein Precipitation Reagent to 300 μl of lysed sample and vortex mix vigorously for 10 seconds.
2. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
3. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
4. Add 500 μl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
5. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
6. Carefully pour off the isopropanol without dislodging the DNA pellet.
7. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
8. Resuspend the DNA in 35 μl of TE Buffer.

8. Total Nucleic Acid Purification Protocols

The following protocol is provided for the purification of total nucleic acid from several biological sources (see General Considerations). Lyse the fluid or tissue as outlined in Part C, and then proceed with the remainder of the protocol as outlined in Part D. Additional purification protocols begin on page 8. If complete removal of RNA is required for your application, follow the protocol for Complete Removal of RNA (Part K).

C. Lysis of Fluid or Tissue Samples

Thoroughly mix the various Lysis Solutions to ensure uniform composition before dispensing.

Fluid Samples (e.g., saliva, semen)

1. Collect samples and either process immediately or freeze at -70°C .
2. Dilute 1 μl of Proteinase K into 150 μl of 2X T and C Lysis Solution for each sample.
3. Transfer 150 μl of the fluid sample to a microcentrifuge tube and add 150 μl of 2X T and C Lysis Solution containing the Proteinase K and mix thoroughly.
4. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
5. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part D.

Cell Samples (e.g., mammalian cell culture, buccal cells, *E. coli*)

1. Dilute 1 μl of Proteinase K into 300 μl of Tissue and Cell Lysis Solution for each sample.
2. Pellet cells by centrifugation (0.5-1 $\times 10^6$ cells; 0.1-0.5 ml of an overnight culture of *E. coli*) and discard the supernatant, leaving approximately 25 μl of liquid.
3. Vortex mix 10 seconds to resuspend the cell pellet.
4. Add 300 μl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
5. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
6. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part D.

Tissue Samples (e.g., plant or animal tissues)

1. Collect 1-5 mg of tissue and either process immediately or freeze the samples at -70°C .
2. Dilute 1 μl of Proteinase K into 300 μl of Tissue and Cell Lysis Solution for each sample.
3. Homogenize fresh tissue or grind frozen tissues in liquid nitrogen and transfer to a microcentrifuge tube.
4. Add 300 μl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
5. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
6. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part D.

Whole Blood Samples (with RBC lysis)

1. Draw 5 ml of blood into an EDTA Vacutainer tube. Transfer 200 µl of whole blood into a microcentrifuge tube.
2. Add 600 µl of Red Cell Lysis Solution. Invert 3 times to mix and then flick the bottom of the tube to suspend any remaining material.
3. Incubate at room temperature for 5 minutes and then vortex mix briefly. Continue incubating at room temperature for an additional 5 minutes followed again by brief vortex mixing.
4. Pellet the white blood cells by centrifugation for 25 seconds in a microcentrifuge.
5. Remove most of the supernatant, leaving approximately 25 µl of liquid. Vortex mix to suspend the pellet.
6. Resuspend the white blood cells in 300 µl of Tissue and Cell Lysis Solution by pipetting the cells up and down several times.
7. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part D.

Formalin-Fixed, Paraffin-Embedded (FFPE) Tissues (see General Considerations)

1. Remove a section of tissue using a clean microtome blade; if possible, trim excess paraffin.
2. Place 10-50 mg of 10- to 35-µm thick paraffin sections into an appropriate tube. If using a larger amount of tissue, adjust the reagent volumes accordingly.
3. Dilute 2 µl of Proteinase K into 300 µl of Tissue and Cell Lysis Solution for each sample, and mix.
4. Add 300 µl of Tissue and Cell Lysis Solution containing the Proteinase K to the sample and mix.
5. Incubate at 65°C for 30 minutes; followed by a brief (10 seconds) vortex mix.
6. Cool the samples to 37°C and add 1 µl of RNase A to the sample; mix thoroughly.
7. Incubate at 37°C for 30 minutes.
8. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part D.

9. Alternate Protocol for Formalin-Fixed, Paraffin-Embedded (FFPE) Tissues

Note: This protocol uses xylene or Hemo-D to extract the paraffin.

1. Remove a section of tissue using a clean microtome blade; if possible, trim excess paraffin.
2. Place 10-50 mg of 10- to 35-µm thick paraffin sections into an appropriate tube. If using a larger amount of tissue, adjust the reagent volumes accordingly.
3. Add 1-5 ml of xylene or Hemo-D to extract the paraffin and incubate at room temperature for 10 minutes. Pour off the solvent.
4. Repeat Step 3.

5. Add 1-5 ml of 100% ethanol and incubate at room temperature for 10 minutes. Pour off the ethanol.
6. Repeat Step 5.
7. Aspirate all of the remaining ethanol.
8. Dilute 2 µl of Proteinase K into 300 µl of Tissue and Cell Lysis Solution for each sample, and mix.
9. Add 300 µl of Tissue and Cell Lysis Solution containing the Proteinase K to the sample and mix.
10. Incubate at 65°C for 30 minutes; followed by a brief (10 seconds) vortex mix.
11. Place the samples on ice for 3-5 minutes and then proceed with total nucleic acid precipitation in Part B.

D. Precipitation of Total Nucleic Acids (for all biological samples)

1. Add 175 µl of MPC Protein Precipitation Reagent to 300 µl of lysed sample and vortex mix vigorously for 10 seconds.
2. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
3. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
4. Add 500 µl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
5. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
6. Carefully pour off the isopropanol without dislodging the DNA pellet.
7. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
8. Resuspend the total nucleic acids in 35 µl of TE Buffer.

10. Additional Purification Protocols

The following protocol is provided for the purification of DNA from plasma.

E. Lysis of Plasma or Serum

Thoroughly mix the Tissue and Cell Lysis Solution to ensure uniform composition before dispensing.

1. Collect plasma samples. Transfer 50 µl of plasma into a microcentrifuge tube.
2. Dilute 2 µl of Proteinase K into 400 µl of Tissue and Cell Lysis Solution for each sample.
3. Add 400 µl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
4. Incubate at 65°C for 60 minutes; vortex mix every 5 minutes.
5. Cool the samples to 37°C and add 1 µl of 5 µg/µl RNase A to the sample; mix thoroughly.
6. Incubate at 37°C for 30 minutes.
7. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part F below.

F. Precipitation of DNA (from plasma or serum lysis)

1. Place the samples on ice for 5 minutes.
2. Add 250 µl of MPC Protein Precipitation Reagent and vortex mix vigorously for 10 seconds.
3. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
4. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
5. Add 600 µl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
6. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
7. Carefully pour off the isopropanol without dislodging the DNA pellet.
8. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
9. Resuspend the DNA in 35 µl of TE Buffer.
10. Add 35 µl of PEG Precipitation Solution (19% PEG 8000, 1.2 M NaCl, 5 mM MgCl₂, 4 mM Tris, and 0.4 mM EDTA).
11. Mix and incubate for 15 minutes at room temperature.
12. Pellet the DNA by centrifugation for 15 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
13. Carefully remove the supernatant solution and discard.
14. Add 200 µl of 70% ethanol to the invisible pellet.
15. Carefully remove all of the ethanol.
16. Resuspend the DNA in 35 µl of TE Buffer.

The following protocol is provided for the purification of DNA from whole blood without the initial lysis of the red blood cells.

G. Lysis of Whole Blood (without RBC lysis)

Thoroughly mix the Tissue and Cell Lysis Solution to ensure uniform composition before dispensing.

1. Collect whole blood samples. Transfer 12.5 µl of blood into a microcentrifuge tube.
2. Dilute 2 µl of Proteinase K into 400 µl of Tissue and Cell Lysis Solution for each sample.
3. Add 400 µl of Tissue and Cell Lysis Solution containing the Proteinase K and mix thoroughly.
4. Incubate at 65°C for 15 minutes; vortex mix every 5 minutes.
5. Cool the samples to 37°C and add 1 µl of 5 µg/µl RNase A to the sample; mix thoroughly.
6. Incubate at 37°C for 30 minutes.
7. Place the samples on ice for 3-5 minutes and then proceed with DNA precipitation in Part H.

H. Precipitation of DNA (from whole blood lysis)

1. Place the samples on ice for 5 minutes.
2. Add 225 µl of MPC Protein Precipitation Reagent and vortex mix vigorously for 10 seconds.
3. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
4. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
5. Add 600 µl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
6. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
7. Carefully pour off the isopropanol without dislodging the DNA pellet.
8. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
9. Resuspend the DNA in 35 µl of TE Buffer.

The following protocol is provided for the purification of DNA from buffy coat of blood.

I. Lysis of Buffy Coat

Thoroughly mix the various Lysis Solutions to ensure uniform composition before dispensing.

1. Draw 5 ml of blood into an EDTA Vacutainer tube. Separate fractions by centrifugation at $1,000 \times g$ for 15 minutes and carefully transfer 600 µl of buffy coat (the white interface between the plasma and the red blood cells) to a microcentrifuge tube. Transfer of some red blood cells is not detrimental to the purification of nucleic acids from buffy coat. Vortex mix the buffy coat sample and transfer 300 µl of the sample to another microcentrifuge tube; process the two tubes in parallel.
2. Add 1.2 ml of Red Cell Lysis Solution to each tube, invert 3 times to mix, and flick the bottom of the tubes to suspend any remaining material.
3. Incubate at room temperature for 5 minutes and then vortex mix briefly. Continue incubating at room temperature for an additional 5 minutes, followed again by brief vortex mixing.
4. Pellet the white blood cells by centrifugation for 25 seconds in a microcentrifuge.
5. Remove most of the supernatant, leaving approximately 25 µl of liquid. Vortex mix to suspend the pellets.
6. Resuspend the white blood cells in 600 µl of Tissue and Cell Lysis Solution by pipetting the cells up and down several times.
7. Place the samples on ice for 3-5 min and then proceed with DNA precipitation in Part J.

J. Precipitation of DNA (from buffy coat)

1. Add 300 µl of MPC Protein Precipitation Reagent and vortex mix vigorously for 10 seconds.
2. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
3. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
4. Add 750 µl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
5. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
6. Carefully pour off the isopropanol without dislodging the DNA pellet.
7. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
8. Resuspend the DNA in 35 µl of TE Buffer.

K. Complete Removal of RNA

1. Add 1 µl of RNase A to the sample; mix thoroughly.
2. Incubate at 37°C for 30 minutes.
3. Add 14 µl TE Buffer and 50 µl of 2X T and C Lysis Solution to each sample.
4. Place the samples on ice for 3-5 minutes. Add 100 µl of MPC Protein Precipitation Reagent and mix by vortexing vigorously for 10 seconds.
5. Pellet the debris by centrifugation at 4°C for 10 minutes at $\geq 10,000 \times g$ in a microcentrifuge.
6. Transfer the supernatant to a clean microcentrifuge tube and discard the pellet.
7. Add 200 µl of isopropanol to the recovered supernatant. Invert the tube several (30-40) times.
8. Pellet the DNA by centrifugation at 4°C for 10 minutes in a microcentrifuge.
9. Carefully pour off the isopropanol without dislodging the DNA pellet.
10. Rinse twice with 70% ethanol, being careful to not dislodge the pellet. Centrifuge briefly if the pellet is dislodged. Remove all of the residual ethanol with a pipet.
11. Resuspend the DNA in 35 µl of TE Buffer.

11. Troubleshooting DNA Purifications

Little or no DNA after resuspension in TE buffer

- 1) **Increase the amount of tissue or biological fluid.** Use the recommended amount of starting material or use the recommended ratio of tissue:lysis buffer as indicated in the protocol. Increase the amount of tissue, particularly if purifying DNA from a biological source other than those listed in the protocols.
- 2) **Increase the efficiency of cell lysis.** Either increase the amount of Proteinase K used during lysis or increase the time of incubation. In addition, vortex mix during Proteinase K treatment to facilitate lysis. If these adjustments fail, homogenize the tissue to more fully disrupt the cell membrane or wall.
- 3) **Decrease the amount of TE buffer.** Use less TE Buffer to resuspend precipitated nucleic acid.

- 4) **Avoid contamination by exogenous or endogenous nucleases.** Ensure that tissue or biological fluids were properly collected and stored. Use sterile technique.
- 5) **Ensure that DNA remains following isopropanol precipitation.** Make certain that the nucleic acid pellet adheres to the microcentrifuge tube during washing of the pellet with 70% ethanol.

A_{260}/A_{280} ratio is too low

- 1) **Decrease the amount of starting material.** The nucleic acid is contaminated with protein. Use less tissue or biological fluid; alternatively, dilute the nucleic acid to 300 μ l with Tissue and Cell Lysis Solution, and follow the protocol for Total Nucleic Acid Purification.

A_{260}/A_{280} ratio is too high

- 1) **Treat with ribonuclease.** The DNA is contaminated with RNA. If RNase A treatment was omitted, treat with RNase A. Note, that precipitation of DNA is extremely efficient, resulting in the precipitation of small oligomers of ribonucleotides. If these are undesirable, treat the DNA with RNase I (available separately) to degrade these oligomers and precipitate the DNA.

Loose protein pellet

- 1) **Cool sample before protein precipitation.** Cool the sample thoroughly on ice before adding the MPC Protein Precipitation Reagent. If the pellet remains loose, centrifuge again. Carefully decant to minimize transfer of precipitated protein.

Note: A small degree of transfer is generally not detrimental.

DNA rehydrates slowly

- 1) **Decrease drying time.** Remove residual ethanol with a pipet and air dry briefly. Suspend in TE Buffer and disrupt the DNA pellet gently with a pipet. If necessary, the DNA may be left at room temperature overnight to rehydrate. Use additional TE Buffer as required.

Residual RNA in DNA preparations

- 1) Remove RNA. If complete removal of RNA is required for your application, follow the protocol for Complete Removal of RNA (Part K).

12. References

1. Miller, S.A. *et al.*, (1988) *Nucl. Acids Res.* **16**, 1215.
2. Shimizu, H. and Burns, J.C. (1995) in: *PCR Strategies*, Innis, M.A. *et al.*, (eds.), Academic Press, San Diego, 2.

⁺Covered by U.S. Patent No. 6,270,962, European Patent No. 0742838, German Patent No. DE4411588C1, and other issued or pending applications in the U.S. and other countries that are either assigned or exclusively licensed to Epicentre.

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