September 2008

QIAamp® Investigator BioRobot® Kit Handbook

For automated purification of DNA from forensic casework and human identity samples using the BioRobot Universal System

QIAGEN®

Sample & Assay Technologies

QIAGEN Sample and Assay Technologies

QIAGEN is the leading provider of innovative sample and assay technologies, enabling the isolation and detection of contents of any biological sample. Our advanced, high-quality products and services ensure success from sample to result.

QIAGEN sets standards in:

- Purification of DNA, RNA, and proteins
- Nucleic acid and protein assays
- microRNA research and RNAi
- Automation of sample and assay technologies

Our mission is to enable you to achieve outstanding success and breakthroughs. For more information, visit www.qiagen.com.

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Kit Contents

QIAamp Investigator BioRobot Kit	**(12)**
Catalog no.	**965942**
Number of preps	**12 x 96**
QIAamp 96 Plates	12
S-Blocks	14
Elution Microtubes CL	12 x 96
Caps for Elution Microtubes	3 x 50
2 ml Tubes	2 x 50
Caps for 2 ml Tubes	2 x 50
Disposable Troughs, 30 ml	2 x 10
Disposable Troughs, 80 ml	4 x 10
250 ml Bottle for Buffer ATL	1
Proteinase K	8 x 6 ml
Buffer ATL	6 x 460 ml
Buffer AL*	5 x 330 ml
Buffer AW1* (concentrate)	6 x 151 ml
Buffer AW2† (concentrate)	8 x 127 ml
Top Elute Fluid	48 x 1.48 ml
Q-Card‡	1
Handbook	1

* Contains a guanidine salt. Not compatible with disinfectants containing bleach. See page 6 for safety information.

† Contains sodium azide as a preservative.

‡ Do not discard the Q-Card. The information encoded in the bar code on the Q-Card is needed to start a run on the BioRobot Universal System.

Storage

All components of the QIAamp Investigator BioRobot Kit can be stored dry at room temperature (15–25°C) for up to 1 year.

The QIAamp Investigator BioRobot Kit contains a proteinase K solution that can be stored at room temperature (15–25°C). To store for extended periods of time, we recommend keeping the proteinase K at 2–8°C.

Quality Control

In accordance with QIAGEN's ISO-certified Quality Management System, each lot of QIAamp Investigator BioRobot Kit is tested against predetermined specifications to ensure consistent product quality.

Product Use Limitations

The QIAamp Investigator BioRobot Kit is intended for molecular biology applications. This product is neither intended for the diagnosis, prevention, or treatment of a disease, nor has it been validated for such use either alone or in combination with other products. Therefore, the performance characteristics of the product for clinical use (i.e., diagnostic, prognostic, therapeutic, or blood banking) are unknown.

All due care and attention should be exercised in the handling of the products. We recommend all users of QIAGEN® products to adhere to the NIH guidelines that have been developed for recombinant DNA experiments, or to other applicable guidelines.

Product Warranty and Satisfaction Guarantee

QIAGEN guarantees the performance of all products in the manner described in our product literature. The purchaser must determine the suitability of the product for its particular use. Should any product fail to perform satisfactorily due to any reason other than misuse, QIAGEN will replace it free of charge or refund the purchase price. We reserve the right to change, alter, or modify any product to enhance its performance and design. If a QIAGEN product does not meet your expectations, simply call your local Technical Service Department or distributor. We will credit your account or exchange the product — as you wish. Separate conditions apply to QIAGEN scientific instruments, service products, and to products shipped on dry ice. Please inquire for more information.

A copy of QIAGEN terms and conditions can be obtained on request, and is also provided on the back of our invoices. If you have questions about product specifications or performance, please call QIAGEN Technical Services or your local distributor (see back cover or visit www.qiagen.com).

Safety Information

When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, please consult the appropriate material safety data sheets (MSDSs). These are available online in convenient and compact PDF format at www.qiagen.com/Support/MSDS.aspx where you can find, view, and print the MSDS for each QIAGEN kit and kit component.

CAUTION: DO NOT add bleach or acidic solutions directly to waste containing Buffer AL or Buffer AW1.

Buffer AL and Buffer AW1 contain guanidine hydrochloride, which can form highly reactive compounds when combined with bleach. If liquid containing these buffers is spilt, clean with suitable laboratory detergent and water. If the spilt liquid contains potentially infectious agents, clean the affected area first with laboratory detergent and water, and then with 1% (v/v) sodium hypochlorite.

The following risk and safety phrases apply to the components of the QIAamp Investigator BioRobot Kit.

Buffer AL and Buffer AW1

Contains guanidine hydrochloride: harmful, irritant. Risk and safety phrases:* R22-36/38, S13-26-36-46

Proteinase K

Contains proteinase K: sensitizer, irritant. Risk and safety phrases:* R36/37/38-42/43, S23-24-26-36/37

24-hour emergency information

Emergency medical information in English, French, and German can be obtained 24 hours a day from:

Poison Information Center Mainz, Germany

Tel: +49-6131-19240

* R22: Harmful if swallowed; R36/38: Irritating to eyes and skin; R36/37/38: Irritating to eyes, respiratory system and skin; R42/43: May cause sensitization by inhalation and skin contact; S13: Keep away from food, drink and animal feedingstuffs; S23: Do not breathe spray; S24: Avoid contact with the skin; S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S36: Wear suitable protective clothing; S36/37: Wear suitable protective clothing and gloves; S46: If swallowed, seek medical advice immediately and show container or label.

Technical Assistance

At QIAGEN, we pride ourselves on the quality and availability of our technical support. Our Technical Service Departments are staffed by experienced scientists with extensive practical and theoretical expertise in sample and assay technologies and the use of QIAGEN products. If you have any questions or experience any difficulties regarding the QIAamp Investigator BioRobot Kit or QIAGEN products in general, please do not hesitate to contact us.

QIAGEN customers are a major source of information regarding advanced or specialized uses of our products. This information is helpful to other scientists as well as to the researchers at QIAGEN. We therefore encourage you to contact us if you have any suggestions about product performance or new applications and techniques.

For technical assistance and more information, please see our Technical Support Center at www.qiagen.com/Support or call one of the QIAGEN Technical Service Departments or local distributors (see back cover or visit www.qiagen.com).

Introduction

The QIAamp Investigator BioRobot Kit enables automated purification of genomic DNA from samples encountered in forensic, human identity, and biosecurity applications. The purification procedure provides high-quality DNA from 24 to 96 forensic samples in batches of 8. Various samples, including dried blood spots, surface swabs (e.g., blood, semen, saliva, and epithelial cells), stains on fabric (e.g., blood- or saliva-stained fabrics), cigarette butts, tobacco, chewing gum, and envelopes, can be processed together in a single run. The robust purification procedure provides high process safety and helps to prevent cross-contamination. For increased convenience and flexibility, there is the option of walkaway sample lysis and DNA purification or, if required, lysis can be performed manually followed by walkaway purification of DNA.

Principle and procedure

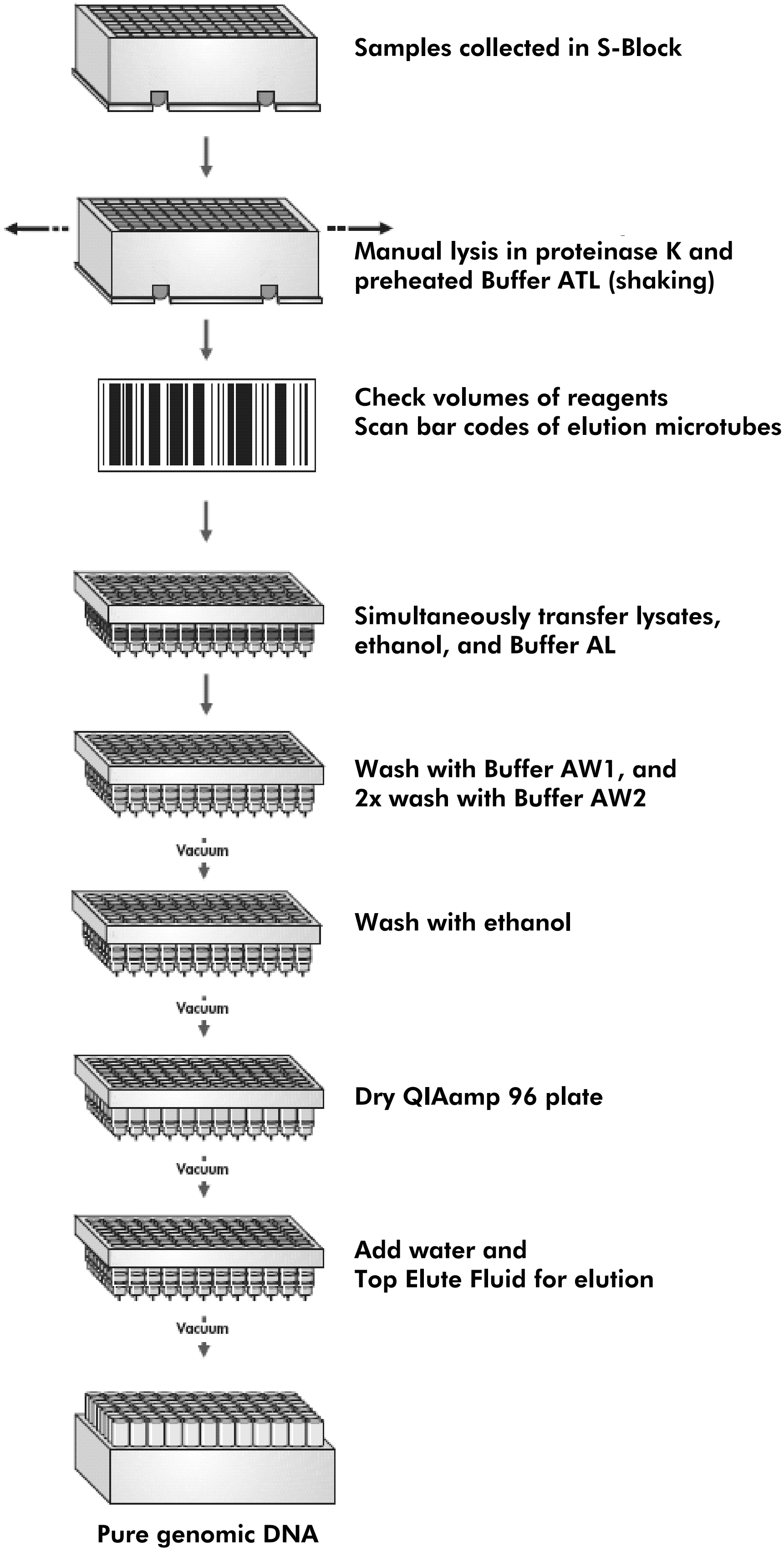
Lysis with proteinase K

Samples are lysed under denaturing conditions at elevated temperatures. Lysis is performed in the presence of proteinase K and Buffer ATL. Addition of Buffer AL enhances lysis efficiency.

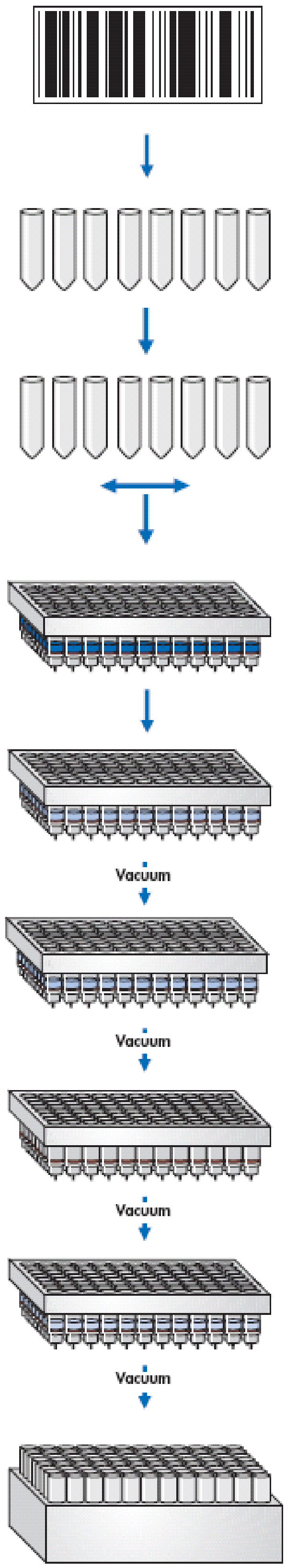
Adsorption to QIAamp 96 silica membranes

Binding conditions are adjusted by adding ethanol to the lysates to ensure optimal binding of DNA to the QIAamp 96 membrane. Lysates are applied to the QIAamp 96 plate, and DNA is adsorbed onto the silica membranes as the lysates are drawn through by vacuum pressure. Two different wash buffers are used followed by a wash step with ethanol, which increases the purity of the eluted DNA. Salt and pH conditions ensure that proteins and other contaminants, which can inhibit PCR and other downstream enzymatic reactions, are not retained on the QIAamp 96 membrane. Highly pure DNA is eluted under vacuum in a single step using 50–150 μl water. Recovery is enhanced by overlaying with Top Elute Fluid. Genomic DNA can be conveniently stored for years and transported at room temperature in QIAsafe DNA Tubes and 96-Well Plates (see page 42 for ordering information).

QIAamp Investigator BioRobot Kit Procedure Using Manual Sample Lysis



QIAamp Investigator BioRobot Kit Procedure Using Automated Sample Lysis



Check volumes of reagents
Scan bar codes of elution microtubes and tubes containing samples*

Samples collected in tubes

Add hot Buffer ATL and proteinase K

Shake samples

Simultaneously transfer lysates, ethanol, and Buffer AL

Wash with Buffer AW1, and 2x wash with Buffer AW2

Wash with ethanol

Dry QIAamp 96 plate

Add water and Top Elute Fluid for elution

Pure genomic DNA

* Scaning of bar codes not possible when processing swabs.

Description of protocols

This handbook contains 2 types of protocol:

- Several pretreatment protocols (pages 22–30) describing manual sample lysis prior to DNA purification on the BioRobot Universal System
- A DNA purification protocol (page 31) describing how to set up the BioRobot Universal System and start a fully automated run

Pretreatment protocols

Since the type of samples that can be processed using the QIAamp Investigator BioRobot Kit can vary greatly, there is also a variety of different pretreatment protocols, optimized for specific sample types.

We recommend performing manual sample lysis as described in the pretreatment protocols (pages 22–30) when working with dried blood spots or with irreplaceable casework samples containing low amounts of DNA. After manual sample lysis, samples are then processed as described in the DNA purification protocol (page 31).

For other samples, proceed directly to the DNA purification protocol (page 31) and choose the option for automated sample lysis when setting up the BioRobot Universal System.

Equipment and Reagents to Be Supplied by User

When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.

For all protocols

- BioRobot Universal System, cat. no. 9001094
- Application Pack, Investigator, cat. no. 9017720
- Disposable Filter-Tips, 1100 µl (960), cat. no. 9012598
- Ethanol (96–100%)*
- Deionized water

For protocols using manual sample lysis

- Shaker–incubator capable of reaching 56°C: we recommend the Thermomixer comfort (cat. no. 5355 000.011) and a thermoblock for MTPs and Deepwell plates (cat. no. 5363 000.012) or a thermoblock for 24 x 2 ml tubes (cat. no. 5362 000.019) from Eppendorf (www.eppendorf.com)†
- If lysing samples in S-Blocks, additional S-Blocks (cat. no. 19585) are required
- If lysing samples in tubes, microcentrifuge tubes (1.5 ml or 2 ml) are required

For DNA purification from dried blood spots

- QIAcard™ FTA® Spots (see ordering information on page 40) or other filter paper for collecting blood samples
- Harris UNI-CORE 3.00 mm Punch Kit or Harris UNI-CORE 6.00 mm Punch Kit (see ordering information on page 40) or other manual paper punch to cut out discs from blood-stained filter paper

* Do not use denatured alcohol, which contains other substances such as methanol or methylethylketone.

† This is not a complete list of suppliers and does not include many important vendors of biological supplies.

For DNA purification from swabs

- Sterile Foam-Tipped Swabs (cat. no. 159340) or other swabs
- If performing automated sample lysis, 14 ml round-bottomed tubes are required: we recommend 14 ml reaction tubes (cat. no. 187261) or 15 ml reactions tubes (cat. no. 187262) from Greiner Bio-One (www.greinerbioone.com)*

For DNA purification from fabric or hair

- 1 M dithiothreitol (DTT)

* This is not a complete list of suppliers and does not include many important vendors of biological supplies.

Important Notes

Processing swabs

When the option for automated sample lysis is selected, the BioRobot Universal System can process swabs in round-bottomed 14 ml tubes. Shafts of swabs with nonejectable heads should be snapped off at the level of the tube top. Allow the swab or brush to air-dry for at least 2 hours after collection.

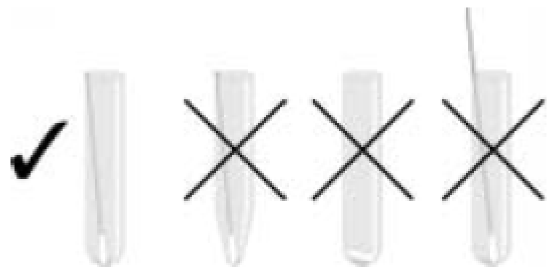


Figure 1. Correct insertion of swabs in sample tubes. Swabs should be placed in round-bottomed tubes, and if the shaft of the swab protrudes over the top of the tube, it should be snapped off at the level of the tube top to avoid contact with the robotic arm. Tubes with conical bottoms should not be used, as swabs cannot move freely in them. For the same reason, swab shafts should not be broken off so short that the swabs can wedge in the bottom of the tubes.

Preparation of reagents

Sufficient reagents are supplied with the QIAamp Investigator BioRobot Kit to isolate DNA from 12 runs each of 96 samples.

Proteinase K

Proteinase K solution should be stored at room temperature (15–25°C). To store for extended periods of time, we recommend keeping the proteinase K at 2–8°C.

Protocols using automated sample lysis: 1 volume of proteinase K must be diluted with 1.17 volumes of distilled water before use. The exact volume of diluted proteinase K needed depends on the number of samples per run and is calculated by the QIAsoft software. For example, for one run of 96 samples, four 2 ml tubes are needed, each containing 1.553 ml diluted proteinase K (715.7 µl proteinase K and 837.4 µl distilled water). Close the tubes, and mix by pulse-vortexing for 15 seconds. Centrifuge briefly to remove drops from the insides of the caps. After the run, some diluted proteinase K may be left in the 2 ml tubes. **Keep the remaining proteinase K for use during the next run.** Leftover proteinase K can be stored at 4°C for up to 3 months.

Protocols using manual sample lysis: Proteinase K is used **undiluted**.

Buffer AL

Buffer AL is supplied as a single reagent in a stock bottle (store at 15–25°C). Mix before use by shaking the bottle carefully, avoiding extensive foaming. Unused portions of Buffer AL can be stored at room temperature for use in the next run.

The QIAsoft software indicates how much Buffer AL is required during setup of the BioRobot Universal System before a run is started. The indicated volume of Buffer AL should be transferred into a disposable trough. Remove any large bubbles with a pipet tip.

Ethanol

Before starting a run, reconstituted Buffer AW2 must be added to the bottle containing ethanol (1:1000 dilution), to allow the BioRobot Universal System to detect the fill level in the ethanol bottle by conductivity measurements. The QIAsoft software indicates how much ethanol is required during setup of the BioRobot Universal System before a run is started.

Buffer ATL

Unused portions of Buffer ATL can be stored at room temperature (15–25°C) for use in the next run. One bottle of Buffer ATL contains sufficient buffer for 2 runs of 96 samples. However, approximately 30 ml Buffer ATL is used to flush the system tubing of the BioRobot Universal System during each run. Processing 96 samples over more than one run (e.g., two 48-sample runs) will therefore require more buffer than a single 96-sample run. If several runs of fewer than 96 samples are performed, additional Buffer ATL must be purchased (see ordering information, page 41). The QIAsoft software indicates how much Buffer ATL is required during setup of the BioRobot Universal System before a run is started.

Buffer AW1

Add 200 ml of ethanol (96–100%) to a bottle of Buffer AW1 concentrate, as described on the bottle. Unused portions of reconstituted Buffer AW1 should be stored at room temperature (15–25°C) for use in the next run. Buffer AW1 is stable for 1 year when stored at room temperature.

One bottle of Buffer AW1 contains sufficient wash buffer for 2 runs of 96 samples. However, approximately 30 ml Buffer AW1 is used to flush the system tubing of the BioRobot Universal System during each run. Processing 96 samples over more than one run (e.g., two 48-sample runs) will therefore require more buffer than a single 96-sample run. If runs of fewer than 96 samples are performed, it may be necessary to purchase additional Buffer AW1 (see ordering information, page 41). The QIAsoft software indicates how much

Buffer AW1 is required during setup of the BioRobot Universal System before a run is started.

Note: Always mix Buffer AW1 by shaking the bottle before starting the procedure.

Note: The Buffer AW1 bottles supplied with this kit are labeled with a bar code to enable identification by the BioRobot Universal System. If additional Buffer AW1 is purchased, it will be supplied in a bottle without a bar code and should be poured into an empty bar code labeled Buffer AW1 bottle.

Buffer AW2

Add 300 ml of ethanol (96–100%) to a bottle of Buffer AW2 concentrate, as described on the bottle. Unused portions of reconstituted Buffer AW2 should be stored at room temperature (15–25°C) for use in the next run. Buffer AW2 is stable for 1 year when stored at room temperature.

One bottle of Buffer AW2 contains sufficient wash buffer for more than one run of 96 samples. However, approximately 30 ml Buffer AW2 is used to flush the system tubing of the BioRobot Universal System during each run. Processing 96 samples over more than one run (e.g., two 48-sample runs) will therefore require more buffer than a single 96-sample run. If runs of fewer than 96 samples are performed, it may be necessary to purchase additional Buffer AW2 (see ordering information, page 41). The QIAsoft software indicates how much Buffer AW2 is required during setup of the BioRobot Universal System before a run is started.

Note: Always mix Buffer AW2 by shaking the bottle before starting the procedure.

Note: The Buffer AW2 bottles supplied with this kit are labeled with a bar code to enable identification by the BioRobot Universal System. If additional Buffer AW2 is purchased, it will be supplied in a bottle without a bar code and should be poured into an empty bar code labeled Buffer AW2 bottle.

Top Elute Fluid

For each run of 96 samples, 4 tubes of Top Elute Fluid (1.48 ml each) are required. Top Elute Fluid is stable when stored at room temperature (15–25°C). Top Elute Fluid left over after a run should be discarded and should not be reused for subsequent runs.

Even if fewer than 96 samples are prepared at a time, it is still necessary to place all 4 tubes each containing 1.48 ml of Top Elute Fluid onto the worktable of the BioRobot Universal System. If necessary, additional Top Elute Fluid can be purchased (see ordering information, page 41).

Using plasticware on the BioRobot Universal System

S-Blocks

Fourteen S-Blocks are supplied with the kit. For a run with automated sample lysis, one S-Block is required. For a run with manual sample lysis, either one or two S-Blocks are required (see page 41 for ordering information for additional S-Blocks).

When loading the S-Blocks with samples, remember that each lysate is transferred from a position in the S-Block to the same position in the QIAamp 96 plate (e.g., lysate is transferred from position A1 of the S-Block to position A1 of the QIAamp 96 plate).

When loading the BioRobot worktable, make sure that position A1 is located at the upper-left corner. Discard the S-Block after use.

QIAamp 96 plates

Twelve QIAamp 96 plates are supplied with the kit. For each run, one QIAamp 96 plate is required. When loading the BioRobot worktable, make sure that position A1 is located at the upper-left corner. Discard the QIAamp 96 plate after use.

Partially using a QIAamp 96 plate

The QIAamp 96 plate can be used for runs of 24–96 samples (sample number must be a multiple of 8).

If only part of a QIAamp 96 plate is used (e.g., the first 48 wells), seal the unused wells with a tape sheet from a tape pad (cat. no. 19570), and leave them sealed throughout the purification procedure. Ensure that complete columns of 8 samples are processed. After use, we recommend discarding the partially used QIAamp 96 plate. If you want to reuse the QIAamp 96 plate, keep the unused wells sealed, and store the QIAamp 96 plate at 4°C in the blister pack in which it was supplied.

When sealing the QIAamp 96 plate with a tape sheet from the tape pad, remember that each lysate is transferred from a position in the S-Block to the same position in the QIAamp 96 plate (e.g., lysate is transferred from position A1 of the S-Block to position A1 of the QIAamp 96 plate).

When reusing partially used plates, label used wells with a waterproof marker pen, and remove the tape sheet covering the unused wells. Cover the used wells with a tape sheet from the tape pad before starting the purification procedure.

Elution microtubes CL

Twelve racks of Elution Microtubes CL are supplied with the kit. For each run, one rack of elution microtubes is required. When loading the BioRobot worktable, make sure that the bar code of the elution microtube rack faces to the right. After the purification procedure, the eluates can be directly used in downstream applications. Alternatively, the eluates can stored for up to 24 hours at 2–8°C, or for longer at –20°C or –80°C. Use the caps for elution microtubes to seal the elution microtubes. These caps are optimized for use at low temperatures (e.g., –20°C or –80°C).

Disposable troughs

Disposable troughs are required for sample processing on the BioRobot Universal System. For each run, two 80 ml disposable troughs and one 20 ml disposable trough are required. Discard the disposable troughs after use.

Setting up the BioRobot Universal System

The QIAsoft 5 software guides you through worktable setup. For a summary of worktable setup, see Tables 1 and 2 and Figure 2.

Table 1. Positions of reagents and buffers on the BioRobot Universal System

Item	Position
Proteinase K	Positions A, C, E, and G in the 8-tube reagent holder (2 ml) (Subslot B of MP Slot 9)
Buffer AL	80 ml disposable trough in the 5-trough reagent holder (Subslot A of MP Slot 8)
Buffer AL	20 ml disposable trough in the 1-trough reagent holder (Subslot A of MP Slot 9)
Ethanol (96–100%)	Reagent carousel
Buffer ATL	Reagent carousel
Buffer AW1	Reagent carousel
Buffer AW2	Reagent carousel
Water	20 ml disposable trough in the 1-trough reagent holder (Subslot A of MP Slot 9)
Top Elute Fluid	Positions A, C, E, and G of the 8-tube reagent holder (1.5 ml) (Subslot C of MP Slot 9)
System liquid	Reagent carousel
Samples, in S-Block*	Cooling and heating system (VariTherm Slot)
Samples, in 14 ml tubes†	24-tube shaker adapter (high-speed shaker system)

* If manual sample lysis was carried out, samples are loaded onto the worktable in an S-Block.

† If automated sample lysis will be carried out, samples are loaded onto the workable in 14 ml tubes. The high-speed shaker system can accommodate up to four 24-tube shaker adapters.

Table 2. Positions of accessories on the BioRobot Universal System worktable

Item	Position	Holder/adapter
Elution Microtubes CL	MP Slot 21	Blue elution microtube adapter
QIAamp 96 plate	QIAplate Holder silver 11	Silver multiwell-plate holder
Channeling adapter	QIAplate Holder black 16	Black multiwell-plate holder
80 ml disposable troughs	Subslots A and B of MP Slot 8	Holder for 5 disposable troughs (80 ml) in reagent-holder tray
20 ml disposable trough	Subslot A of MP Slot 9	Holder for 1 trough (20 ml) in reagent-holder tray
Rack of disposable filter-tips	Varies with sample number	Red tip-tray holders
S-Block, with samples*	Cooling and heating system (VariTherm Slot)	Silver heat transfer adapter
14 ml tubes, with samples†	High-speed shaker system	24-tube shaker adapter

* If manual sample lysis was carried out, samples are loaded onto the worktable in an S-Block.

† If automated sample lysis will be carried out, samples are loaded onto the workable in 14 ml tubes. The high-speed shaker system can accommodate up to four 24-tube shaker adapters.

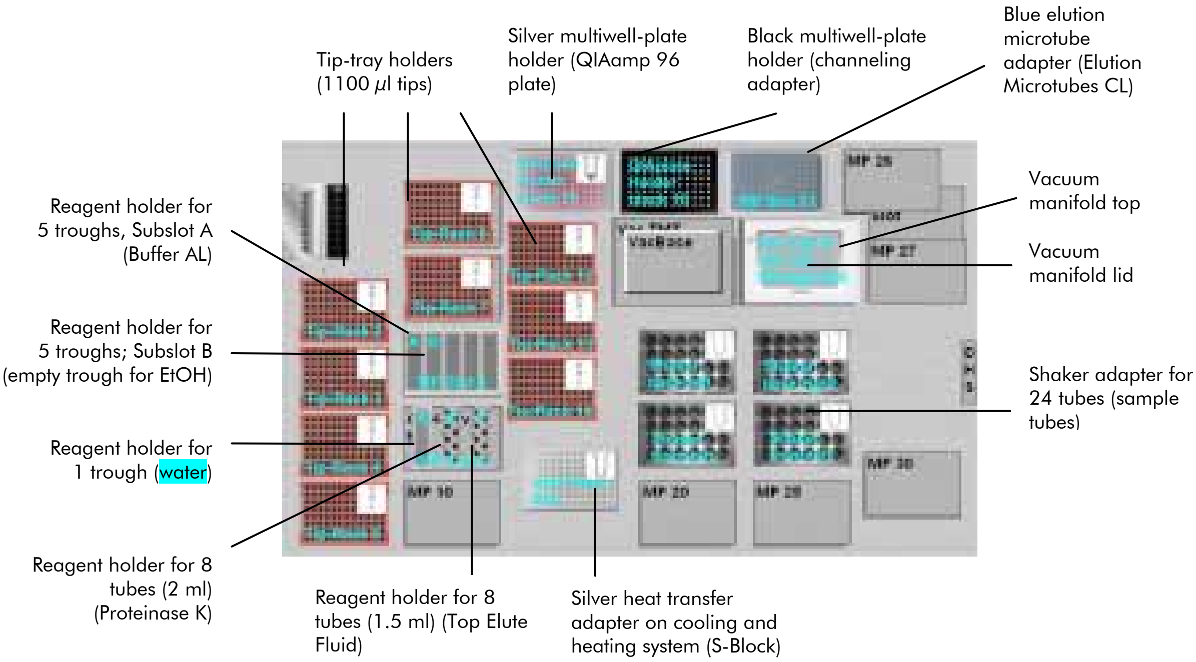


Figure 2. Worktable overview. A schematic diagram of worktable setup.

Protocol: Pretreatment for Dried Blood

This protocol is for manual lysis of dried blood spots prior to walkaway DNA purification on the BioRobot Universal System.

Starting material

Drying blood on filter paper is an effective form of storage, and samples prepared in this manner are cheaper and safer to transport. A disc (3 mm diameter) punched out from filter paper stained with dried blood contains white blood cells from approximately 5 µl whole blood.

To collect blood samples, we recommend using QIAcard FTA Spots, which provide proven Whatman® FTA technology to simplify the handling and processing of nucleic acids. After applying samples to QIAcard FTA Spots, DNA is stabilized in situ for years at room temperature. The QIAcard FTA Spots can be easily transported, archived, or processed immediately. Multibarrier pouches and desiccant provide safe and convenient transport and storage of QIAcard FTA Spots. Harris UNI-CORE Punches are recommended for punching QIAcard FTA Spots. With proper handling, the punches prevent sample carryover. For ordering information, see page 40.

Alternatively, blood samples can be collected using the following equipment: 903® Specimen Collection Paper (Schleicher & Schuell, cat. no. 10535104); 903 Generic Blood Collection Card (Schleicher & Schuell, cat. no. 10519015); FTA Classic Card (Whatman, cat. no. WB120305); Manual paper punch, 3 mm (Schleicher & Schuell, cat. no. 10495010).*

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

* This is not a complete list of suppliers and does not include many important vendors of biological supplies.

Procedure

1. **Collect each blood sample onto a QIAcard FTA Spot or onto a ring marked on filter paper. Allow the blood to air-dry.**

   Either untreated blood or blood containing an anticoagulant (EDTA, ACD, or heparin)* can be used.

2. **For each dried blood sample, use a Harris UNI-CORE Punch or a manual paper punch to cut out one 3 mm diameter disc, three 3 mm diameter discs, or one 6 mm diameter disc.**
3. **Transfer the disc(s) to either a 2 ml tube or the well of an S-Block.**
4. **Add 280 µl Buffer ATL and 20 µl undiluted proteinase K. Mix by vortexing (if using tubes) or by pipetting up and down several times (if using an S-Block).**

   Note: These liquid volumes have been calculated for low-absorbent paper, such as QIAcard FTA Spots. For blood collected on highly absorbent paper, higher amounts of Buffer ATL may be required to ensure transfer of 300 µl lysate in step 6. Simply add another 50 µl of Buffer ATL.

5. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for at least 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.

   For blood collected on 903 paper, an overnight incubation will increase DNA yields.

6. **Transfer 300 µl of each lysate to a new S-Block.**
7. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Blood Card UNIV" protocol.**

* When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.

Protocol: Pretreatment for Forensic Surface and Contact Swabs

This protocol is for manual lysis of forensic surface and contact swabs prior to walkaway DNA purification on the BioRobot Universal System. Samples collected on swabs, such as buccal cells, blood, semen, saliva, and epithelial cells, can be processed using this protocol.

Starting material

Swabs may be processed on the same day as collection or stored for future processing. While storage at –20°C is recommended, DNA of suitable quality for single-copy gene amplification has been documented from swabs stored at room temperature for 24 months.

QIAGEN provides sterile foam-tipped swabs for collection of saliva and buccal cells. The nonabrasive foam head is the same size as the sample area on QIAcard FTA Indicator Four Spots to facilitate sample application. For ordering information, see page 40.

Alternatively, samples can be collected using plastic swabs with cotton or Dacron® tips. Puritan® applicators with plastic shafts and cotton or Dacron tips are available from Hardwood Products Company (www.hwppuritan.com, item nos. 25-806 1PC and 25-806 1PD) and from Daigger (www.daigger.com, cat. nos. EF22008D and EF22008DA).* Nylon cytology brushes and other swab types may also be used.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **Allow the swab to air-dry for at least 2 h after sample collection.**
2. **If using swabs with nonejectable heads, use an appropriate tool (e.g., scissors) to carefully cut or break off the heads. Place each swab into a 2 ml tube or the well of an S-Block.**
3. **Prepare a Buffer ATL–proteinase K mix. For each sample, mix 480 µl Buffer ATL (if using swabs with nonejectable heads) or 580 µl Buffer**

* This is not a complete list of suppliers and does not include many important vendors of biological supplies.

ATL (if using swabs with ejectable heads) with 20 µl undiluted proteinase K.

4. **Transfer 500 µl or 600 µl of Buffer ATL–proteinase K mix to each sample tube or to each well of the S-Block.**
5. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.
6. **Transfer 300 µl of each lysate to a new S-Block.**
7. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Casework (manual lysis) UNIV" protocol.**

Protocol: Pretreatment for Chewing Gum

This protocol is for manual lysis of chewing gum samples prior to walkaway DNA purification on the BioRobot Universal System.

Starting material

The amount of biological sample material (including the weight of the chewing gum itself) should not exceed 30 mg.

Important points before starting

- Before beginning the procedure, read “Important Notes”, page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **Cut each chewing gum sample into small pieces. Transfer the pieces to a 1.5 ml tube or the well of an S-Block.**
2. **Add 300 µl Buffer ATL and 20 µl undiluted proteinase K. Mix by vortexing (if using tubes) or by pipetting up and down several times (if using an S-Block).**
3. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for at least 3 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.
4. **Transfer 300 µl of each lysate to a new S-Block.**
5. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the “QIAamp DNA Casework (manual lysis) UNIV” protocol.**

Protocol: Pretreatment for Cigarette Butts

This protocol is for manual lysis of cigarette butt samples prior to walkaway DNA purification on the BioRobot Universal System.

Starting material

The amount of biological sample material (including the weight of the paper from the cigarette butt itself) should not exceed 40 mg. We recommend cutting out a 1 cm^2 piece of paper.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **For each sample, cut out a 1 cm^2 piece of outer paper from the end of the cigarette or filter. Cut this piece into 6 smaller pieces, and transfer them to a 1.5 ml tube or S-Block.**
2. **Add 300 µl Buffer ATL and 20 µl undiluted proteinase K. Mix by vortexing (if using tubes) or by pipetting up and down several times (if using an S-Block).**
3. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for at least 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.
4. **Transfer 300 µl of each lysate to a new S-Block.**
5. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Casework (manual lysis) UNIV" protocol.**

Protocol: Pretreatment for Envelopes

This protocol is for manual lysis of envelope samples prior to walkaway DNA purification on the BioRobot Universal System.

Starting material

The amount of biological sample material (including the weight of the envelope sample itself) should not exceed 40 mg. We recommend cutting out a 0.5–2.5 cm^2 piece of envelope.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **Cut out a 0.5–2.5 cm^2 piece from each envelope sample. Cut this piece into smaller pieces, and transfer them to a 1.5 ml tube or S-Block.**
2. **Add 300 µl Buffer ATL and 20 µl undiluted proteinase K. Mix by vortexing (if using tubes) or by pipetting up and down several times (if using an S-Block).**
3. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for at least 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.
4. **Transfer 300 µl of each lysate to a new S-Block.**
5. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Casework (manual lysis) UNIV" protocol.**

Protocol: Pretreatment for Stains on Fabric

This protocol is for manual lysis of stained fabric samples prior to walkaway DNA purification on the BioRobot Universal System. Fabric stained with saliva, blood, or semen can be processed using this protocol.

Starting material

The amount of biological sample material (including the weight of the fabric itself) should not exceed 40 mg. We recommend cutting out a 0.5 cm^2 piece of fabric.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **Cut out up to 0.5 cm^2 of stained material from each fabric sample. Cut this material into smaller pieces, and transfer them to a 2 ml tube or S-Block.**
2. **Add 280 µl Buffer ATL, 20 µl undiluted proteinase K, and 20 µl of 1 M DTT. Mix by vortexing (if using tubes) or by pipetting up and down several times (if using an S-Block).**
3. **Place the tubes or S-Block onto a shaker–incubator, and incubate at 56°C for at least 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes or to cover the S-Block with adhesive tape. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes or the S-Block.
4. **Transfer 300 µl of each lysate to a new S-Block.**
5. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Casework (manual lysis) UNIV" protocol.**

Protocol: Pretreatment for Hair

This protocol is for manual lysis of hair samples prior to walkaway DNA purification on the BioRobot Universal System.

Starting material

The amount of biological sample material should not exceed 40 mg. We recommend using 0.5–1 cm from the root ends of plucked hair samples.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- **Undiluted** proteinase K is required in this protocol.

Things to do before starting

- Set a shaker–incubator to 56°C.

Procedure

1. **For each sample, add 300 µl Buffer ATL, 20 µl undiluted proteinase K, and 20 µl of 1 M DTT to a 1.5 ml tube.**
2. **Cut and lyse the hair according to step 2a or 2b.**

2a. **Cutting and lysing hair roots:**
Cut off a 0.5–1 cm piece starting from the hair bulb, and transfer it to the 1.5 ml tube. Close the lid, and mix by pulse-vortexing for 10 s.

2b. **Cutting and lysing hair shafts (without roots):**
Cut the hair shaft into 0.5–1 cm pieces, and transfer them to the 1.5 ml tube. Close the lid, and mix by pulse-vortexing for 10 s.

3. **Place the tubes onto a shaker–incubator, and incubate at 56°C for at least 1 h with shaking at 900 rpm.**

   Note: Be sure to cap the tubes. After incubation, perform a brief centrifugation to collect liquid at the bottom of the tubes.
4. **Transfer 300 µl of each lysate to a new S-Block.**
5. **Proceed to the DNA purification protocol on page 31. Start from step 2 of the procedure. In the QIAsoft 5 software, select the "QIAamp DNA Casework (manual lysis) UNIV" protocol.**

Protocol: Purification of DNA

This protocol describes how to set up the BioRobot Universal System for automated DNA purification from 24–96 forensic reference or casework samples. The BioRobot Universal System provides the option of performing automated sample lysis. If this option is not required, manual sample lysis should be performed (see pages 22–30) prior to starting this protocol. Manual sample lysis is recommended for dried blood spots and for irreplaceable casework samples containing low amounts of DNA.

Important points before starting

- Before beginning the procedure, read "Important Notes", page 14.
- Ensure that you are familiar with operating the BioRobot Universal System.

Things to do before starting

- Ensure that all reagents have been prepared according to the instructions in "Preparation of reagents", pages 14–16.
- Check that Buffer AL and Buffer ATL do not contain a white precipitate. If necessary, incubate Buffer AL and Buffer ATL for 30 min at 70°C with occasional shaking to dissolve precipitate.

Procedure

1. **If you intend to carry out automated sample lysis, prepare your samples as decribed in step 1a or 1b. If you have already carried out manual sample lysis (see pages 22–30), proceed straight to step 2.**

1a. **Preparing swabs:**
Place each swab into a 14 ml round-bottomed tube. If the swab has a nonejectable head, snap off the shaft of the swab at the level of the tube top (see "Sample processing", page 14).

1b. **Preparing other samples (blood discs, stained fabrics, cigarette butts, tobacco, chewing gum, envelopes, and hair):**
Cut each sample into small pieces, and place them into a 14 ml tube.

2. **Make sure that the BioRobot Universal System is switched on.**

   The power switch is located on the lower right of the BioRobot Universal System front panel.

3. **Switch on the computer and monitor.**
4. **Launch the QIAsoft 5 Operating System.**

   The QIAsoft 5 software can be started from the Microsoft® Windows® "Start" menu, where it is located under Programs/QIAsoft 5/QIAsoft 5.

5. **Enter your user name and password in the “Login” dialog box, and click “OK” to access the QIAsoft 5 software.**
6. **Select the appropriate protocol from the protocol selection box in the “Execute” environment toolbar (see Table 3).**

Table 3. Choosing the appropriate protocol

Sample type	**Protocol**
Database samples: buccal swabs	QIAamp DNA Buccal Swab Investigator UNIV*
Database samples: dried blood spots	QIAamp DNA Blood Card UNIV†
Noncritical casework samples with high amounts of DNA	QIAamp DNA Casework (fully automated) UNIV*
Precious casework samples with low amounts of DNA	QIAamp DNA Casework (manual lysis) UNIV†

* Protocol provides automated sample lysis.

† Manual sample lysis must be performed before starting this protocol.

7. **Click  to start the protocol.**

   The QIAsoft 5 software will now take you through the remaining steps required to set up the BioRobot Universal System for your selected protocol. Follow the steps detailed in each protocol message before continuing.

   You will be prompted to enter information for the following options:

   - Whether sample lysis should be performed by the BioRobot Universal System or manually (to perform manual sample lysis, see pages 22–30)
   - Number of samples to be processed and their positions on the S-Block (24–96 samples can be processed in multiples of 8)
   - Elution volume (50–150 μl)
   - Whether a complete or partial load check should be performed
   - Whether you want to work without clog detection, with visual clog detection, or with automatic clog detection
   - Whether sample bar codes should be entered (bar codes can be entered either manually or in a table)

8. **A software message on the screen will indicate when the purification procedure is finished, and protocol messages will guide you through the steps for worktable cleanup.**
9. **The purified DNA is ready to use in downstream applications or can be stored at 2–8°C for 24 h or at –20°C or –80°C for longer periods.**
10. **Follow the maintenance instructions described in the "Maintenance" environment of the QIAsoft 5 software and in the *BioRobot Universal System User Manual*.**

Troubleshooting Guide

This troubleshooting guide may be helpful in solving any problems that may arise. For more information, see also the Frequently Asked Questions page at our Technical Support Center: www.qiagen.com/FAQ/FAQList.aspx. The scientists in QIAGEN Technical Services are always happy to answer any questions you may have about either the information and protocols in this handbook or sample and assay technologies (for contact information, see back cover or visit www.qiagen.com).

	Comments and suggestions
Little or no yield from single samples	
a) No DNA purified from the last samples of a run	At the end of a run, if any of the buffers, proteinase K, or ethanol have run out, insufficient amounts were supplied at the start of the run. Repeat the purification, increasing the volume of the relevant reagent.
b) Individual samples distributed at random over the QIAamp 96 plate yield no DNA	Ensure that swabs are rubbed at least 6 times over epithelial tissue. Repeat the purification procedure with new samples.
c) Clogging of samples during purification procedure	When performing manual lysis, avoid transferring any solid material from the lysates to the S-Block that will be placed on the BioRobot worktable. In addition, select the option for visual or automatic clog detection when setting up the BioRobot Universal System.
Little or no DNA in the eluates	
a) Precipitates formed in Buffer ATL and/or Buffer AL	Heat the buffers to 70°C for 30 min to dissolve precipitates, and repeat the purification procedure with new samples.
b) pH of water used for elution too low	Low pH may reduce the yield of DNA. Ensure that the pH of the water is at least pH 7.0.
c) Low-percentage ethanol used instead of 96–100%	Repeat the purification procedure with new samples, and use 96–100% ethanol. Do not use denatured alcohol, which contains other substances such as methanol or methylethylketone.

	Comments and suggestions
d) Isopropanol used instead of ethanol	We recommend the use of ethanol, as isopropanol leads to reduced yields. Do not use denatured alcohol, which contains other substances such as methanol or methylethylketone.
e) Insufficient sample lysis in Buffer ATL	Proteinase K was subjected to elevated temperatures for prolonged periods. Repeat the purification procedure using new samples and fresh proteinase K.
A_{260}/A_{280} ratio for purified DNA is too low	
a) Buffer AW1 or AW2 prepared incorrectly	Check that Buffer AW1 and Buffer AW2 concentrates were diluted with the correct volumes of ethanol. Repeat the purification procedure with new samples.
b) Buffer AW1 or AW2 prepared with 70% ethanol	Check that Buffer AW1 and Buffer AW2 concentrates were diluted with 96–100% ethanol. Do not use denatured alcohol, which contains other substances such as methanol or methylethylketone. Repeat the purification procedure with new samples.
c) Low yield	See "Little or no yield from single samples" and "Little or no DNA in the eluates", page 34.
DNA does not perform well in downstream enzymatic applications	
a) Little or no DNA in the eluate	See "Little or no DNA in the eluates", page 34 for possible reasons. Increase the amount of eluate added to the downstream reaction, if possible. If necessary, concentrate the DNA under vacuum, or repeat the purification procedure using new samples.
b) Too much DNA used in downstream application	Reduce the amount of eluate added to the downstream application (excess DNA can inhibit some enzymatic reactions).
c) Too little DNA used in downstream application	Increase the amount of eluate added to the downstream application.

	Comments and suggestions
d) Performance of DNA in downstream assays varies according to their original positions on the QIAamp 96 plate	Salt and ethanol components of Buffer AW1 or AW2 may have separated out after being left for a long period between runs. Always mix buffers thoroughly before each run.
e) Purified DNA contaminated with inhibitory substances	Check "A_{260}/A_{280} for purified nucleic acids is low", page 35, for possible reasons.
f) The subject ate or drank shortly before a buccal swab was taken	Transfer the eluate into a well of an S-Block. Repeat the purification procedure. This will remove any additional inhibitors from food or drink in the sample.
g) Buffer bottles placed in the wrong positions	Ensure that buffer bottles are placed in the correct slots in the reagent carousel, as described in the protocol messages during setup of the BioRobot Universal System. Make sure that the bar codes on the buffer bottles face outward, so that they can be scanned by the BioRobot Universal System.
h) Elution microtubes autoclaved before elution	Do not autoclave elution microtubes. Autoclaving may leach chemicals from the walls of elution microtubes that can inhibit some enzymatic reactions. Repeat the purification procedure with a new set of elution microtubes.

General handling

a) Bar codes not identified	The elution microtube rack was not positioned correctly. Turn the rack so that the bar code is on the right side, and enter the identification code manually.

	Comments and suggestions
b) Overflowing wells in the QIAamp 96 plate	Insufficient vacuum was applied. If fewer than 96 samples are purified simultaneously, ensure that unused wells in the QIAamp 96 plate are sealed with tape.
	Ensure that an adhesive tape sheet was used to seal unused wells in the QIAamp 96 plate. Do not use AirPore tape for this purpose, as it will allow air to pass through, reducing vacuum pressure. If AirPore tape was used, replace it with an adhesive tape sheet. Continue the protocol, if possible, or repeat the purification procedure with new samples.
c) Blocked wells in the QIAamp 96 plate	Check that the vacuum trap has not overflowed. If this is the case, the filter between the vacuum pump and the vacuum trap will be wet. Change the filter, empty the vacuum trap, and repeat the purification.
d) Variable elution volumes	The tubes containing Top Elute Fluid were not completely filled. Each vial should only be used once, even if only part of the plate was processed.
e) Z-movement blocked during tip disposal	The tip disposal bag in the tip disposal container was not emptied, leading to a tip jam. After the protocol has stopped, carefully shake the container in the position beneath the tip disposal station, and try to pull it out. Empty the tip disposal bag, and remove the jammed tips. Continue the protocol.
	The tip disposal bag was not inserted properly into the tip disposal container, leading to a tip jam. The bag must fit tightly to the wall of the container so that ejected tips fall down freely. Carefully shake the container in the position beneath the tip disposal station, and try to pull it out. Empty the tip disposal bag, remove the jammed tips, and make sure that the bag fits tightly to the container. Continue the protocol.

	Comments and suggestions
	The tip disposal container was not pushed back completely, leading to a tip jam. Remove the tip disposal container and the jammed tips, clean the container, and insert it again. Push it back until a metallic click is heard. Continue the protocol.
f) Vacuum error during elution	Sufficient vacuum was not reached. After the protocol has paused, open the worktable hood, and check if the QIAamp 96 plate fits snugly to the elution microtubes. If necessary, correct the position of the QIAamp 96 plate, close the hood, and continue the protocol.

Appendix: Determination of Concentration, Yield, Purity, and Length of DNA

Determination of concentration, yield, and purity

DNA yields are determined from the concentration of DNA in the eluate, measured by absorbance at 260 nm. Purity is determined by calculating the ratio of absorbance at 260 nm to absorbance at 280 nm. Pure DNA has an A_{260}/A_{280} ratio of 1.7–1.9.

Absorbance readings at 260 nm should lie between 0.1 and 1.0 to be accurate. Sample dilution should be adjusted accordingly. Use elution buffer or water (as appropriate) to dilute samples and to calibrate the spectrophotometer. Measure the absorbance at 260 and 280 nm, or scan absorbance from 220–320 nm (a scan will show if there are other factors affecting absorbance at 260 nm). Both DNA and RNA are measured with a spectrophotometer.

Determination of DNA length

The length of genomic DNA can be determined by pulsed-field gel electrophoresis (PFGE) through an agarose gel. The DNA should be concentrated by alcohol precipitation and reconstituted by gentle agitation in approximately 30 μl TE buffer, pH 8.0,* for at least 30 minutes at 60°C. Avoid drying the DNA pellet for more than 10 minutes at room temperature since over-dried genomic DNA is very difficult to redissolve. Load 3–5 μg DNA per well. Standard PFGE conditions are as follows:

- 1% agarose gel in 0.5x TBE electrophoresis buffer*
- Switch intervals: 5–40 seconds
- Run time: 17 hours
- Voltage: 170 V

References

QIAGEN maintains a large, up-to-date online database of scientific publications utilizing QIAGEN products. Comprehensive search options allow you to find the articles you need, either by a simple keyword search or by specifying the application, research area, title, etc.

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* When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.

Ordering Information

Product	Contents	Cat. no.
QIAamp Investigator BioRobot Kit (12)	For 12 x 96 DNA preps: QIAamp 96 Plates, S-Blocks, Buffers, Proteinase K, Elution Microtubes CL, Caps, Disposable Troughs	965942
Application Pack, Investigator	Protocols and application-specific accessories for purification of nucleic acids from forensic samples and downstream assay setup	9017720
BioRobot Universal System	Robotic workstation, computer-controlled vacuum pump, computer, QIAsoft 5 Operating System, installation, 1-year warranty on parts and labor*	9001094
Accessories		
Sterile Foam-Tipped Swabs (100)	100 Sterile Foam-Tipped Swabs	159340
QIAcard FTA One Spot (100)	For 100 samples: 100 QIAcard FTA One Spots	159201
QIAcard FTA Two Spots (100)	For 100 x 2 samples: 100 QIAcard FTA Two Spots	159203
QIAcard FTA Four Spots (100)	For 100 x 4 samples: 100 QIAcard FTA Four Spots	159205
Multibarrier Pouch Large (100)	For transporting and storing QIAcard FTA Spots: 100 Multibarrier Pouches Large	159310
Multibarrier Pouch Small (100)	For transporting and storing QIAcard FTA Spots: 100 Multibarrier Pouches Small	159315
Desiccant (1000)	1000 Desiccant Packets (1 g each)	159320
Harris UNI-CORE 1.25 mm Punch Kit (4)	For punching QIAcard FTA Spots: 4 Harris UNI-CORE 1.25 mm Punches, Cutting Mat	159330

* Warranty PLUS 2 (cat. no. 9239573) recommended: 3-year warranty, 1 preventive maintenance visit per year, 48-hour priority response, all labor, travel, and repair parts.

Product	Contents	Cat. no.
Harris UNI-CORE 3.00 mm Punch Kit (4)	For punching QIAcard FTA Spots: 4 Harris UNI-CORE 3.00 mm Punches, Cutting Mat	159331
Harris UNI-CORE 6.00 mm Punch Kit (4)	For punching QIAcard FTA Spots: 4 Harris UNI-CORE 6.00 mm Punches, Cutting Mat	159332
Top Elute Fluid (48 x 1.48 ml)	48 x 1.48 ml Top Elute Fluid	1020460
QIAGEN Proteinase K (10 ml)	10 ml (>600 mAU/ml, solution)	19133
QIAGEN Proteinase K (2 ml)	2 ml (>600 mAU/ml, solution)	19131
Buffer AW1 (concentrate, 242 ml)	242 ml Wash Buffer (1) Concentrate	19081
Buffer AW2 (concentrate, 324 ml)	324 ml Wash Buffer (2) Concentrate	19072
Buffer ATL (200 ml)	200 ml Tissue Lysis Buffer for 1000 preps	19076
Elution Microtubes CL (24 x 96)	Nonsterile polypropylene tubes (0.85 ml maximum capacity, less than 0.7 ml storage capacity, 0.4 ml elution capacity); 2304 in racks of 96; includes caps	19588
Tape Pads (5)	Adhesive tape sheets for sealing multiwell plates and blocks: 25 sheets per pad, 5 pads per pack	19570
S-Blocks (24)	96-well blocks with 2.2 ml wells; 24 per case	19585
Disposable Filter-Tips, 1100 µl (960)	Conducting disposable filter-tips; pack of 960	9012598
Disposable Troughs, 20 ml (10)	Troughs for holding up to 20 ml of liquid; pack of 10	9232764
Disposable Troughs, 80 ml (10)	Troughs for holding up to 80 ml of liquid; pack of 10	9013653

Product	Contents	Cat. no.
QIAsafe DNA Tubes (50)	50 QIAsafe DNA Tubes in moisture-barrier foil packages	159104
QIAsafe DNA 96-Well Plates (10)	10 QIAsafe DNA 96-Well Plates in moisture-barrier foil packages, 10 QIAsafe Seals	159112
Related products		
QIAamp DNA Investigator Kit — for purification of total (genomic and mitochondrial) DNA from forensic and human identity samples		
QIAamp DNA Investigator Kit (50)	For 50 DNA preps: 50 QIAamp MinElute® Columns, Proteinase K, Carrier RNA, Buffers, Collection Tubes (2 ml)	56504

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Denmark ■ Orders 80-885945 ■ Fax 80-885944 ■ Technical 80-885942

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France ■ Orders 01-60-920-926 ■ Fax 01-60-920-925 ■ Technical 01-60-920-930 ■ Offers 01-60-920-928

Germany ■ Orders 02103-29-12000 ■ Fax 02103-29-22000 ■ Technical 02103-29-12400

Hong Kong ■ Orders 800 933 965 ■ Fax 800 930 439 ■ Technical 800 930 425

Ireland ■ Orders 1800-555-049 ■ Fax 1800-555-048 ■ Technical 1800-555-061

Italy ■ Orders 02-33430411 ■ Fax 02-33430426 ■ Technical 800-787980

Japan ■ Telephone 03-5547-0811 ■ Fax 03-5547-0818 ■ Technical 03-5547-0811

Korea (South) ■ Orders 1544 7145 ■ Fax 1544 7146 ■ Technical 1544 7145

Luxembourg ■ Orders 8002-2076 ■ Fax 8002-2073 ■ Technical 8002-2067

The Netherlands ■ Orders 0800-0229592 ■ Fax 0800-0229593 ■ Technical 0800-0229602

Norway ■ Orders 800-18859 ■ Fax 800-18817 ■ Technical 800-18712

Singapore ■ Orders 65-67775366 ■ Fax 65-67785177 ■ Technical 65-67775366

Spain ■ Orders 91-630-7050 ■ Fax 91-630-5145 ■ Technical 91-630-7050

Sweden ■ Orders 020-790282 ■ Fax 020-790582 ■ Technical 020-798328

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