

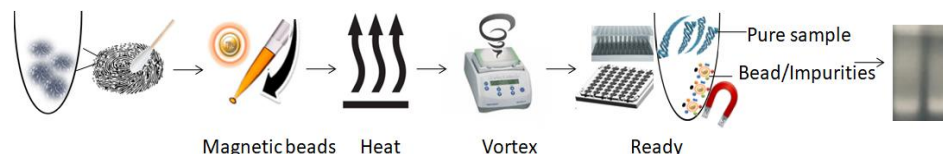


One-Step Fingerprint DNA Purification Kit

Fingerprint or touch DNA is obtained from shed skin cells and other biological material left behind on surfaces during physical contact. This type of DNA evidence can be useful in forensic investigations, but fingerprint samples can present several challenges. One of the main problems is that only a relatively low percentage of fingerprints have been successfully amplified and typed using traditional DNA extraction methods. These methods often involve a multi-step process that is time-consuming, can lead to poor integrity of the DNA, and can result in significant DNA loss. Additionally, traditional methods can also require the use of toxic organic solvents. To overcome these challenges, Bioclone has developed new one-step fingerprint DNA purification systems, such as the BcMag™ One-Step Fingerprint DNA Purification Kit, which utilizes negative selection chromatography magnetic beads to quickly capture and remove impurities from cell lysate, leaving the DNA untouched. This method is designed to be fast, efficient, and easy to use, with minimal risk of DNA loss or carryover of extraction buffers. It only requires one tube, no liquid transfer, and no carrier RNA, allowing for rapid processing of hundreds of samples in less than 30 minutes without the need for expensive equipment. This one-step purification system is considered revolutionary in solving the problems associated with traditional fingerprint DNA purification methods.

Principle and Workflow

The principle of the BcMag™ One-Step Fingerprint DNA Purification Kit is based on negative selection chromatography using magnetic beads. The kit utilizes specially designed magnetic beads with a proprietary surface chemistry that can capture impurities, such as PCR inhibitors, from the sample. Once mixed with the sample, the magnetic beads bind to the impurities and form a magnetic beads-impurity complex. The workflow of the purification process involves three main steps: **Sample Preparation:** The biological sample is lysed and processed to release the DNA. **Purification:** The lysate is mixed with the magnetic beads, and the impurities are captured by the beads. The magnetic beads-impurity complex is then magnetically removed from the solution by using a magnet. **Elution:** The pure DNA remains in the solution and can be easily transferred by simply pipetting the DNA-containing solution to a new tube. Overall, the BcMag™ One-Step Fingerprint DNA Purification Kit provides a fast and straightforward DNA extraction method with only one tube, no liquid transfer, and no requirement for carrier RNA, allowing for rapid processing of hundreds of samples in less than 30 minutes without the need for expensive equipment.

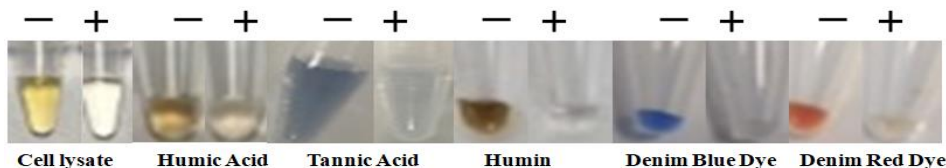


BcMag™ One-Step Fingerprint DNA Purification Kit is designed to provide high-quality DNA that is suitable for a wide range of downstream applications. The purified DNA is free of contaminants and PCR inhibitors, which can interfere with downstream reactions and reduce the sensitivity of PCR-based assays. Some of the features and advantages of this kit include:

- **Rapid and efficient purification protocol:** The one-step protocol eliminates the need for multiple washing and elution steps, and the use of carrier RNA is not required.
- **High-throughput:** The kit allows for the processing of 96 samples in less than an hour, making it suitable for high-throughput applications.
- **High nucleic acids recovery rates:** The kit is designed to minimize DNA loss during extraction.
- **Effectively removes inhibitors:** The kit can remove a wide range of inhibitors, including polyphenolic compounds, humic/fulvic acids, acidic polysaccharides, tannins, melanin, heparin, detergents, denim dyes, and divalent cations such as Ca²⁺, Mg²⁺.
- **Cost-effective:** The kit eliminates the need for columns, filters, laborious repeat pipetting, and organic reagents, making it a cost-effective option.
- **Compatible with automated liquid handling systems:** The kit is compatible with many different automated liquid handling systems, making it a suitable option for high-throughput applications.



- Overall, the BcMag™ One-Step Fingerprint DNA Purification Kit offers a fast, efficient, and cost-effective method for purifying DNA from fingerprint or touch DNA samples.



Handling and Storage: Store the kit components according to the table below on arrival.

Products

| Components | Storage | 50 preps, Cat # AG-101 | 100 preps, Cat # AG-102 |
|---|---------|------------------------|-------------------------|
| BcMag™ U-DNA Beads | 4°C | 2.5 ml | 5.0 ml |
| 10x Lysis Buffer (100mM Tris-HCl, PH 9.0) | 4°C | 0.6 ml | 1.2 ml |
| Proteinase K | -20°C | 12.5 mg | 25 mg |
| DTT(1M) | -20°C | 15.4 mg | 30.8 mg |
| Proteinase K Suspension Buffer | 4°C | 1.0 ml | 2.0 ml |

PROTOCOL

The following protocol is an example. The protocol can be scaled up or down as needed.

Notes

- DNA Yield: Varies (depends on sample size and type)
- DNA Size: Varies (depends on the quality of starting material)
- Since there is no concentration step in the protocol, the concentration of the nucleic acid depends on the quality and quantity of the sample used.
- Quantification of the nucleic acids: Use only fluorescence methods such as qPCR, Qubit, and Pico Green.
- OD260 methods such as Nanodrop and UV-spectrophotometry are not-suitable.
- For long-term storage, store the extracted nucleic acids at -20°C.

Materials Required by the User

| Item | Source |
|---|---|
| Magnetic Rack for centrifuge tube ** Based on sample volume, the user can choose one of the following magnetic Racks | <ul style="list-style-type: none"> BcMag™ Rack-2 for holding two individual 1.5 ml centrifuge tubes (Bioclone, Cat. # MS-01) BcMag™ Rack-6 for holding six individual 1.5 ml centrifuge tubes (Bioclone, Cat. # MS-02) BcMag™ Rack-24 for holding twenty-four individual 1.5-2.0 ml centrifuge tubes (Bioclone, Cat. # MS-03) BcMag™ Rack-50 for holding one 50 ml centrifuge tube, one 15 ml centrifuge tube, and four individual 1.5 ml centrifuge tubes (Bioclone, Cat. # MS-04) |
| BcMag™ 96-well Plate Magnetic Rack. | <ul style="list-style-type: none"> BcMa™ 96-well Plate Magnetic Rack (side-pull) compatible with 96-well PCR plate and 96-well microplate or other compatible Racks (Bioclone, Cat#: MS-06) |
| Adjustable Single and Multichannel pipettes | |
| Centrifuge with swinging bucket | |
| Addition items are required if using 96-well PCR plates/tubes | |
| Vortex Mixer ** The user can also use other compatible vortex mixers. However, the Time and speed should be optimized, and the mixer should: Orbit ≥1.5 mm-4 mm, Speed ≥ 2000 rpm | |
| Eppendorf™ MixMate™ | Eppendorf, Cat#:5353000529 |
| Tube Holder PCR 96 | Eppendorf, Cat#: 022674005 |
| Tube Holder 1.5/2.0 mL, for 24 × 1.5 mL or 2.0 mL | Eppendorf, Cat#: 022674048 |
| Smart Mixer, Multi Shaker | BenchTop Lab Systems, Cat#:5353000529 |
| 1.5/2.0 mL centrifuge tube | |



96-well PCR Plates or 8-Strip PCR Tubes

PCR plates/tubes

**** IMPORTANT!** If using other tubes or PCR plates, ensure that the well diameter at the bottom of the conical section of PCR Tubes or PCR plates must be ≥ 2.5 mm.

Sample collection

In criminal cases, sampling techniques are critical for gathering the best evidence. Swabbing, rather than taping, is the preferred sample collection method for recovering DNA. Swabs are also preferable to cuttings because they better collect and release samples than tape. However, getting the most accurate results depends on using suitable swabs for the job.

Type of swabs

Cotton swabs are the most commonly used for collecting specimens at crime scenes. We recommend **DNA, DNase, and RNase-free** Double Precision tips.

Swabbing for Fingerprint DNA

- If using a dry swab, use a sterile pipette to extract distilled water from the vial and apply 30µl to the side of the tip. Use no more than 30µl and do not immerse the swab in water.
- Apply the fine tip to the sample area and rotate the swab with moderate pressure. Only rotate the specimen once to avoid compromising the sample by redepositing it.
- Use a dry swab to collect the remainder of the specimen from the same spot.
- Cut the swab tip with scissors and place it in a clean PCR tube.



B. Premix Beads solution Preparation

IMPORTANT!

1. Before pipetting, shake or Vortex the bottle to completely resuspend the Magnetic Beads.
2. Do not allow the magnetic beads to sit for more than 2 minutes before dispensing.
3. Proteinase K preparation: Provide protease K as lyophilized powder and dissolve at a 20 mg/ml concentration in Proteinase K Suspension Buffer. For example, 12.5 mg dissolved in 625 µl of Proteinase K Suspension Buffer. Divide the stock solution into small aliquots and store at -20°C. Each aliquot can be thawed and refrozen several times but should then be discarded.
4. DTT solution preparation: Provide DTT as powder and dissolve at a concentration of 1M in dH₂O. For example, 15.4 mg dissolved in 100µl dH₂O. It is stable for years at -20°C. Prepare in small aliquots, thaw it on ice, and use and discard. Store them in the dark (wrapped in aluminum foil) at -20°C. Do not autoclave DTT or solutions containing it. Avoid multiple freeze-thaw cycles.
5. Dilute DTT to a concentration of 10 mM from stock with dH₂O and use it immediately. Discard unused DTT solution.
6. Prepare a fresh Master Mix following Table 2 for the number of samples to be processed, plus 10% more (e.g., if you have 10 samples, prepare a Master Mix for 11). Add the following components to the reservoir.

Table 2. Premix Beads solution

| Component | One well (100 µL reaction volume) |
|------------------------|-----------------------------------|
| BcMag™ U-DNA Beads | 50 µL |
| 10x Lysis Buffer | 10 µL |
| Proteinase K (20mg/ml) | 12.5 µL |
| DTT (10 mM) | 3 µL |
| Sample | X |
| DH ₂ O | X |
| Total | 100 µL |

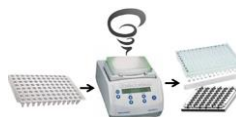
C. Isolation procedure

IMPORTANT!

- Pipet up and down premix beads solution in a reagent reservoir until the solution is homogeneous before dispensing.



- Do not allow the magnetic beads to sit for more than 5 minutes before dispensing.)
1. Transfer 25-30µl premix beads solution (Table 2) to the sample tube.
 2. Mix the sample well by pipetting or vortex.
 3. Place the PCR plate/tube into a thermocycler and incubate at:
 - a. 65°C for 15 minutes
 - b. 80°C for 10 minutes
 4. Remove the PCR plate/tube from the thermocycler and then mix the sample with beads by slowly pipetting up and down 20-25 times or Vortex the sample at 2000 rpm for 5 minutes (see picture).



5. Centrifuge at 3500 rpm for 5 minutes.
6. Place the sample plate/ tube on the magnetic separation plate for 30 seconds or until the solution is clear.
7. Transfer the supernatant to a clean plate /tube while the sample plate remains on the magnetic separation plate. The sample is ready for downstream applications. Using 1-5 ul in a 25µl RT-PCR or qPCR.

D. Troubleshooting

| Problem | Probable cause | Suggestion |
|----------------------|--|--|
| Low DNA/RNA Recovery | Poor starting sample material. | <ul style="list-style-type: none"> • Use better-quality of the sample. • Add more samples |
| Ct value delays | Too many PCR inhibitors in the sample. | <ol style="list-style-type: none"> 1. Add 25-50 µL BcMag™ U-DNA Beads to the extract solution and mix by slowly pipetting up and down 20-25 times or Vortex the sample at 2000 rpm for 5 minutes. Place the sample plate/ tube on the magnetic separation plate for 30 seconds or until the solution is clear. 2. Transfer the supernatant to a clean plate /tube while the sample plate remains on the magnetic separation plate. Using 1-5 ul in a 25µl RT-PCR or qPCR. The sample is ready for downstream applications. |
| | Recovery DNA is so low. | <ul style="list-style-type: none"> • Use better-quality the sample. • Add more samples. |

Related products

| Products and Catalog Number | |
|--|--|
| Genomic DNA and RNA Purification | |
| One-Step Mammalian Cell DNA Purification Kit, Cat. No. AA101 | One-Step Saliva Viral RNA-DNA Purification Kit, Cat. No. AR101 |
| Cell-Free DNA Purification Kit, Cat. No. AC101 | Bone-Teeth DNA Purification Kit, Cat. No. AB101 |
| One-Step FFPE & FNA DNA purification Kit, Cat. No. AJ-101 | Rootless Hair DNA Purification Kit, Cat. No. AD101 |
| One-Step Bacteria DNA Purification Kit, Cat. No. AE101 | One-Step Buccal Cell DNA Purification Kit, Cat. No. AG101 |
| One-Step Blood DNA Purification Kit, Cat. No. AF101 | One-Step Touch DNA Purification Kit, Cat. No. AS101 |
| One-Step Fungi & Yeast DNA Purification Kit, Cat. No. AL101 | Sexual Assault Casework DNA Purification Kit, Cat. No. AT101 |
| One-Step Insect DNA Purification Kit, Cat. No. AM101 | One-Step Fingerprint DNA Purification Kit, Cat. No. AZ101 |
| One-Step Mouse Tail DNA Purification Kit, Cat. No. AN101 | One-Step Dandruff DNA Purification Kit, Cat. No. AAA101 |
| One-Step Plant DNA Purification Kit, Cat. No. AQ101 | Quick mRNA Purification Kit, Cat. No. MMS101 |
| DNA & RNA Sample Preparation | |
| One-Step NGS Cleanup Kit, Cat. No. AO101 | One-Step DNA-RNA Removal Kit, Cat. No. CA103 |
| One-Step RNA Removal Kit, Cat. No. AU101 | One-Step DNA/RNA Cleanup Kit, Cat. No. AH101 |
| One-Step PCR Cleanup Kit, Cat. No. AP101 | One-Step Sequencing Cleanup Kit, Cat. No. AI101 |
| Quick Oligo-DNA Conjugation Kit, Cat. No. CA101 | One-Step Fluorescent Labeling Cleanup Kit, Cat. No. AK101 |
| One-Step DNA-RNA Removal Kit, Cat. No. AV101 | One-Step Single-Stranded DNA Removal Kit, Cat. No. AW101 |
| One-Step PCR Inhibitor Removal Kit, Cat. No. AX101 | Pure Miniprep Plasmid DNA Purification Kit, Cat. No. AY101 |