



# Genomic DNA from blood

## User manual

NucleoSpin® Dx Blood

CE



*In Vitro* Diagnostic Medical Device



740899.50, 740899.250



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











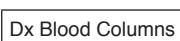

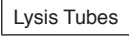
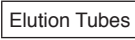

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# 1 Components











## 1.1 Kit contents











NucleoSpin® Dx Blood					
REF			50 preps 740899.50	250 preps 740899.250	
Buffer B3			13 mL	65 mL	
Wash Buffer BW			30 mL	2 x 75 mL	
Wash Buffer B5 (Concentrate)*				7 mL	2 x 20 mL
Elution Buffer BE**			13 mL	60 mL	
Proteinase Buffer PB			1.8 mL	8 mL	
Proteinase K (lyophilized)*			30 mg	2 x 75 mg	
NucleoSpin® Dx Blood Columns (red rings - plus Collection Tubes)			50	250	
Collection Tubes (2 mL)			3 x 50	3 x 250	
Lysis Tubes (1.5 mL)			50	5 x 50	
Elution Tubes (1.5 mL)			50	5 x 50	
User manual			1	1	

\* For preparation of working solutions and storage conditions see section 3.

\*\* Composition of Elution Buffer BE: 5 mM Tris/HCl, pH 8.5

Genomic DNA from blood

										
EN	Do not reuse	Use by	Batch code	Catalogue number	Contains sufficient for <n> tests	Manufacturer	In Vitro Diagnostic Medical Device	Consult Instructions for use	Temperature limitation	Irritant
DE	Nicht zur Wiederverwendung	Verwendbar bis	Char- genbe- zeich- nung	Bestell- nummer	Inhalt ausrei- chend für <n> Tests	Herstel- ler	In vitro-Diagnos- tikum	Ge- brauchs- anwei- sung beach- ten	Tempe- ratur- begren- zung	Reizend
ES	No reutili- zar	Fecha de cadu- cidad	Código de lote	Número de cata- logo	Con- tenido suficien- te para <n> ensayos	Fabri- cante	Pro- ducto sanitario para diagnós- tico in vitro	Consul- te las instruc- ciones de uso	Límite de tempe- ratura	Irritante
IT	Non riutiliz- zare	Utilizza- re entro	Codice del lotto	Numero di cata- logo	Conte- nuto suf- ficiente per "n" saggi	Fabbri- cante	Dispo- sitivo medico- diagno- stico in vitro	Consul- tare le istruzio- ni per l'uso	Limiti di tempe- ratura	Irritant
FR	Ne pas réutiliser	Utiliser jusque	Code du lot	Réfé- rence du cata- logue	Contenu suffisant pour "n" tests	Fabri- cant	Dis- positif médical de dia- gnostic in vitro	Consul- ter les instruc- tions d'utilisa- tion	Limites de tempé- rature	Irritante
NL	Niet opnieuw gebruiken	Houd- baar tot	Lot num- mer	Cata- logus nummer	Inhoud vol- doende voor "n" testen	Fabri- kant	Medisch hulpmid- del voor in vitro diagnos- tiek	Raad- pleeg de ge- bruiks- aanwij- zing	Tempe- ratuurli- miet	Irritie- rend
DA	Må ikke genbruges	Holdbar til	Lotnum- mer	Katalog- nummer	Inde- holder tilstræk- keligt til „n“ test	Produ- cent	Medi- cinsk udstyr til in vitro diagno- stik	Se brugsan- visning	Tempe- raturbe- græns- ning	Lokalirri- terende
EL	Μην κάνετε επανα- ληπτική χρήση	Ημερο- μηνία λήξης	Αριθμός Παρτι- δας	Αριθμός καταλό- γου	Περιε- χόμενο επαρκές για «ν» εξετά- σεις	Κατα- σκευα- στής	In Vitro Διαγνο- στικό Ιατρο- τεχνολο- γικό προϊόν	Συμβου- λευτείτε τις οδηγίες χρήσης	Περιο- ρισμοί θερμο- κρασίας	Διαβοη- τικό
PT	Não reutilizar	Prazo de vali- dade	Código do lote	Referên- cia de catálogo	Conteú- do suf- ficiente para "n" ensaios	Fabri- cante	Dispo- sitivo médico para dia- gnóstico in vitro	Consulte as in- struções de utili- zação	Limites de tempe- ratura	Irritante

										
SV	Återanvänd ej	Använd för	Lot nummer	Katalognummer	Räcker till „n“ antal tester	Tillverkare	Medicintekniska produkter för in vitro diagnostik	Se handhavandebeskrivningen	Temperaturbe-gränsning	Irriterande

## 1.2 Reagents, consumables, and equipment to be supplied by user

### Reagents

- 96–100% ethanol (to adjust DNA binding conditions and to prepare Wash Buffer B5)

### Consumables

- Disposable pipet tips (aerosol barrier pipet tips are recommended to avoid cross-contamination)

### Equipment

- Manual pipettors
- Centrifuge for microcentrifuge tubes
- Vortex mixer
- Thermal heating block or water bath (for samples lysis at 70°C)
- Personal protection equipment (e.g., lab coat, gloves, goggles)

## 1.3 About this user manual

It is strongly recommended that first-time users of the **NucleoSpin® Dx Blood** kit read the detailed protocol sections of this user manual. Experienced users, however, may refer to the Protocol-at-a-glance instead. The Protocol-at-a-glance is designed to be used only as a supplemental tool for quick referencing while performing the purification procedure.

All technical literature is available on the internet at [www.mn-net.com](http://www.mn-net.com).

Please contact Technical Service regarding information about changes of the current user manual compared to previous revisions.

## 2 Product description

### 2.1 Intended use

The **NucleoSpin® Dx Blood** kit is a generic system for the isolation and purification of genomic DNA from human whole blood samples for subsequent *in vitro* diagnostic purposes. The kit can be used with fresh and frozen human whole blood treated with EDTA, citrate, or heparin, from common blood collection systems.

The kit is designed to be used with any downstream application employing enzymatic amplification and detection of DNA (e.g., PCR). Any diagnostic results generated using the DNA isolated with the **NucleoSpin® Dx Blood** kit in conjunction with an *in vitro* diagnostic assay should be interpreted with regard to additional clinical or laboratory findings.

To minimize irregularities in diagnostic results, suitable controls for downstream applications (e.g., extraction controls, positive / negative controls) should be used.

The **NucleoSpin® Dx Blood** kit is intended for use by professional users such as technicians and physicians experienced and trained in molecular biological techniques including experience with whole blood samples and DNA isolation.

The **NucleoSpin® Dx Blood** kit does not provide a diagnostic result. It is the sole responsibility of the user to use and validate the kit in conjunction with a downstream *in vitro* diagnostic assay.

### 2.2 Product use limitations

The **NucleoSpin® Dx Blood** kit is not for use with tissue or stool samples, cell-free body fluids such as plasma, serum, urine, or cerebrospinal fluid. The kit performance has not been evaluated with buffy coat, cultured or isolated cells, swabs, dried blood spots, and viral DNA. The kit is also not specified for the isolation and purification of bacterial, fungal, or parasite nucleic acids.

### 2.3 Quality control

In accordance with MACHEREY-NAGEL's Quality Management System, each lot of **NucleoSpin® Dx Blood** kit is tested against predetermined specifications to ensure consistent product quality.

## 2.4 Introduction and kit specifications

**NucleoSpin® Dx Blood** is based on well-established NucleoSpin® silica-membrane technology and provides an easy way to isolate genomic DNA from 200 µL of whole blood samples. Purified DNA is ready-to-use for downstream PCR amplification.

The **NucleoSpin® Dx Blood** procedure is based on a series of simple steps:

First, the blood samples are lysed in the presence of chaotropic salts and Proteinase K. The genomic DNA in the lysate is then bound to a **NucleoSpin® Dx Blood Column**. Subsequently, the membrane with bound nucleic acids is washed and finally highly pure genomic DNA is eluted.

### Samples

The kit can be used with 200 µL fresh or frozen human whole blood treated with EDTA, citrate, or heparin, from common blood collection systems. Cryoprecipitates formed during thawing of frozen samples may clog the **NucleoSpin® Dx Blood Column**. If such precipitates are visible avoid aspirating them when loading the lysate to the binding column.

Typically, 200 µL human whole blood will yield 3–5 µg genomic DNA, depending on the white blood cell count of the sample.

A selection of suitable blood collection devices is shown below:

<b>Table 1: Selection of suitable blood collection systems</b>	
<b>Blood collecting system</b>	<b>Manufacturer</b>
S-Monovette® Li-Heparin	Sarstedt
S-Monovette® EDTA	Sarstedt
S-Monovette® Citrat	Sarstedt
VACUETTE® EDTA	GREINER BIO-ONE
BD VACUTAINER® K2E	BD
K3 EDTA	DELTA LAB
K2 EDTA	APTACA

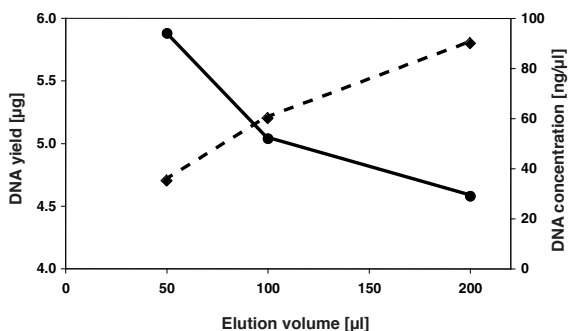
**Table 2: Kit specifications at a glance**

Parameter	NucleoSpin® Dx Blood
Sample material	Fresh and frozen human whole blood treated with EDTA, citrate, or heparin, from common blood collection systems
Sample volume	200 µL
Typical DNA yield	3–5 µg depending on white blood cell count
Typical DNA quality	Ratio $A_{260}/A_{280}$ 1.7–1.9 Ratio $A_{260}/A_{230}$ 1.8–2.3
Elution volume	50–200 µL
Typical DNA concentration	40–60 ng/µL
Processing	Centrifugation

## 2.5 Elution procedures

DNA is eluted from the **NucleoSpin® Dx Blood Columns** with 50 to 200 µL Elution Buffer BE. Overall DNA yield increases with increasing elution volume, whereas the DNA concentration decreases (see Figure 1).

Typically, up to 10 µL of the eluate can be used as template in a 50 µL PCR mix without affecting PCR performance. It is recommended storing eluted DNA at -20 °C. Several freeze-thaw cycles will not interfere with most downstream applications.



**Figure 1: Impact of elution volume on overall DNA yield (dashed line) and concentration (solid line). Elution was performed with 50, 100, and 200 µL.**

### 3 Storage conditions and preparation of working solutions

#### Attention:

- Check all components for damages after receiving the kit. If kit contents, like buffer bottles or blister packages are damaged, contact MACHEREY-NAGEL technical support and customer service, or your local distributor.
- Do not use damaged kit components.
- Upon arrival the **NucleoSpin® Dx Blood** kit should be stored at room temperature (18–25 °C). It is NOT required to open the kit on delivery and remove individual components for separate storage.
- **NucleoSpin® Dx Blood Columns** can be used until the expiration date specified on the kit box.

Before starting the **NucleoSpin® Dx Blood** protocol prepare the following:

- **Wash Buffer B5:** Add the indicated volume of ethanol (96–100 %, see table below or on the bottle) to **Wash Buffer B5 Concentrate**. Mark the label of the bottle to indicate that ethanol was added. Store Wash Buffer B5 at room temperature (18–25 °C) until the expiration date.
- Lyophilized **Proteinase K** can be stored at room temperature (18–25 °C) until the expiration date without decrease in performance. Before first use of the kit, add the indicated volume of **Proteinase Buffer PB** to dissolve lyophilized Proteinase K. Reconstituted Proteinase K should be stored at -20 °C for up to 6 months, but only until the expiration date.
- During storage, especially at low temperatures, a white precipitate may form in Buffer B3 and Buffer BW. Such precipitates can be easily dissolved by incubating the bottle at 70 °C for 5 min before use.

NucleoSpin® Dx Blood		
	50 preps	250 preps
REF	740899.50	740899.250
Wash Buffer B5 (Concentrate)	7 mL Add 28 mL ethanol	2 x 20 mL Add 80 mL ethanol to each bottle
Proteinase K	30 mg Add 1.35 mL Proteinase Buffer	2 x 75 mg Add 3.35 mL Proteinase Buffer to each vial

## 4 Safety instructions – risk and safety phrases

The following components of the **NucleoBond®** kits contain hazardous contents.  
*Wear gloves and goggles and follow the safety instructions given in this section.*

### 4.1 Risk and safety phrases

Component	Hazard contents	Hazard symbol	Risk phrases	Safety phrases
Inhalt	Gefahrstoff	Gefahrstoffsymbol	R-Sätze	S-Sätze
B3	Guanidine hydrochloride <i>Guanidinhydrochlorid</i>	✘ Xn*	22-36	26-39
BW	Guanidine hydrochloride <i>Guanidinhydrochlorid</i>	✘ Xn*	10-22-36	16-26-39
Proteinase K	Proteinase K, lyophilized <i>Proteinase K, lyophilisiert</i>	✘ Xn	36/37/38-42	22-26-36/37

#### Risk phrases

- R 10 Flammable.  
*Entzündlich.*
- R 22 Harmful if swallowed.  
*Gesundheitsschädlich beim Verschlucken.*
- R 36 Irritating to eyes.  
*Reizt die Augen.*
- R 36/37/38 Irritating to eyes, respiratory system, and skin.  
*Reizt die Augen, Atmungsorgane und die Haut.*
- R 42 May cause sensitization by inhalation  
*Sensibilisierung durch Einatmen möglich.*

#### Safety phrases




- S 16 Keep, away from source of ignition – No smoking!  
*Von Zündquellen fernhalten.*
- S 22 Do not breathe dust.  
*Staub nicht einatmen.*
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
*Bei Berührung mit den Augen gründlich mit Wasser abspülen und Arzt konsultieren.*

\* Hazard labeling not necessary if quantity per bottle below 125 g or mL (certificate of exemption according to 67/548/EEC Art. 25, 1999/45/EC Art. 12 and German GefStoffV § 20 (3) and TRGS 200 7.1). For further information see Material Safety Data Sheet.

- S 36/37      Wear suitable protective clothing and gloves.  
*Bei der Arbeit geeignete Schutzhandschuhe und Schutzkleidung tragen.*
- S 39          Wear eye / face protection.  
*Schutzbrille / Gesichtsschutz tragen.*

## 4.2 GHS classification

Only harmful features need not be labeled with H and P phrases until 125 mL or 125 g.  
*Mindergefährliche Eigenschaften müssen bis 125 mL oder 125 g nicht mit H- und P-Sätzen gekennzeichnet werden.*

Component	Hazard contents	GHS symbol		Hazard phrases	Precaution phrases
Inhalt	Gefahrstoff	GHS Symbol		H-Sätze	P-Sätze
B3	Guanidine hydrochloride 36–50 % <i>Guanidinhydrochlorid 36–50 %</i>		Warning <i>Achtung</i>	302-319	280-301+312-305+351+338-330-337+313
BW	Guanidine hydrochloride 36–50 % + isopropanol 20–50 % <i>Guanidinhydrochlorid 36–50 % + Isopropanol 20–50 %</i>		Warning <i>Achtung</i>	226-302-319	210-233-280-301+312-305+351+338-330-337+313-403+235
Proteinase K	Proteinase K, lyophilized <i>Proteinase K, lyophilisiert</i>		Danger <i>Gefahr</i>	334	261-304+341-342+311

### Hazard phrases

- H 226          Flammable liquid and vapour.  
*Flüssigkeit und Dampf entzündbar.*
- H 302          Harmful if swallowed.  
*Gesundheitsschädlich bei Verschlucken.*
- H 319          Causes serious eye irritations.  
*Verursacht schwere Augenreizung.*
- H 334          May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
*Kann bei Einatmen Allergie, asthmaartige Symptome oder Atembeschwerden verursachen.*

### Precaution phrases

- P 210          Keep away from heat / sparks / open flames / hot surfaces. – No smoking.  
*Von Hitze / Funken / offener Flamme / heißen Oberflächen fernhalten. – Nicht rauchen.*
- P 233          Keep container tightly closed.  
*Behälter dicht verschlossen halten.*
- P 261          Avoid breathing dust.  
*Einatmen von Staub vermeiden.*
- P 280          Wear protective gloves / eye protection.  
*Schutzhandschuhe / Augenschutz tragen.*

- P 301+312 IF SWALLOWED: Call a POISON CENTER or doctor /physician if you feel unwell.  
*Bei Verschlucken: Bei Unwohlsein Giftinformationszentrum oder Arzt anrufen.*
- P 304+341 IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing.  
*Bei Einatmen: Bei Atembeschwerden an die frische Luft bringen und in einer Position ruhigstellen, die das Atmen erleichtert.*
- P 305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
*Bei Kontakt mit den Augen: Einige Minuten lang behutsam mit Wasser spülen. Vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter spülen.*
- P 330 Rinse mouth.  
*Mund ausspülen.*
- P 337+313 If eye irritation persists: Get medical advice / attention.  
*Bei anhaltender Augenreizung: Ärztlichen Rat einholen / ärztliche Hilfe hinzuziehen.*
- P 342+311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor / physician.  
*Bei Symptomen der Atemwege: Giftinformationszentrum oder Arzt anrufen.*
- P 403+235 Store in a well ventilated place. Keep cool.  
*An einem gut belüfteten Ort lagern. Kühl halten.*

For further information please see Material Safety Data Sheets ([www.mn-net.com](http://www.mn-net.com)).  
*Weiterführende Informationen finden Sie in den Sicherheitsdatenblättern ([www.mn-net.com](http://www.mn-net.com)).*

When working with the **NucleoSpin® Dx Blood** kit wear suitable protective clothing (e.g., lab coat, disposable gloves, and protective goggles). For more information consult the appropriate Material Safety Data Sheets (MSDS available online at <http://www.mn-net.com/msds>).

**Caution:** Guanidine hydrochloride in Lysis Buffer B3 and Wash Buffer BW can form highly reactive compounds when combined with bleach! Thus, do not add bleach or acidic solutions directly to the sample preparation waste.

The waste generated with the **NucleoSpin® Dx Blood** kit has not been tested for residual infectious material. A contamination of the liquid waste with residual infectious material is highly unlikely due to strong denaturing lysis buffer and Proteinase K treatment but it cannot be excluded completely. Therefore, liquid waste must be considered infectious and should be handled and discarded according to local safety regulations.

## 5 Genomic DNA purification with NucleoSpin® Dx Blood

The procedure below provides instructions for processing a single blood sample. However, several samples can be processed at the same time; the number depends on the capacity of the microcentrifuge used.












### Before starting the preparation:

- Check if Buffer B5 and Proteinase K were prepared according to section 3.
- Check that 96–100% ethanol (denatured or non-denatured) is available to adjust DNA binding conditions.
- Set an incubator (e.g., heating block) or water bath to 70 °C.
- Equilibrate the blood samples to room temperature (18–25 °C). Make sure that the samples are mixed well.
- If a precipitate has formed in Lysis Buffer B3 or Buffer BW, incubate the buffer at 70 °C until the precipitate is dissolved.
- Generally, do not mix reagents and columns from different kits and lots.
- Equilibrate Elution Buffer BE to room temperature (18–25 °C).
- Do not add Proteinase K solution directly to Lysis Buffer B3. Proteinase K has to be mixed with the blood sample before addition of Buffer B3.
- All centrifugation steps should be carried out at room temperature (18–25 °C).

## 5.1 Protocol-at-a-glance

Supplemental protocol-overview:

Carefully read the detailed protocol (section 5.2) before starting the procedure.

<b>Lyse blood samples</b>	1	25 µL Proteinase K	
	2	200 µL blood	
	3	200 µL B3, mix	
	4	RT, 5 min	
	5	7 °C, 10 min, mix	
	6	2,000 x g, 1 s	
<b>Adjust DNA binding conditions</b>	7	210 µL ethanol, mix	
	8	2,000 x g, 1 s	
<b>Bind DNA</b>	9	Load lysate	
	10	11,000 x g, 1 min	
	11	Transfer the NucleoSpin® Dx Blood Column to a new Collection Tube	
<b>Wash silica membrane</b>	12	500 µL BW	
	13	11,000 x g, 1 min	
	14	Transfer the NucleoSpin® Dx Blood Column to a new Collection Tube	
	15	600 µL B5	
	16	11,000 x g, 1 min	
<b>Dry silica membrane</b>	17	Transfer the NucleoSpin® Dx Blood Column to a new Collection Tube	
	18	11,000 x g, 1 min	
<b>Elute DNA</b>	19	Transfer the NucleoSpin® Dx Blood Column to an Elution Tube	
	20	50 – 200 µL BE	
	21	11,000 x g, 1 min	

## 5.2 Procedure

1. Pipette **25 µL Proteinase K** solution into a Lysis Tube (1.5 mL, provided).
2. Add **200 µL blood** sample into the Lysis Tube. Mix.
3. Add **200 µL Buffer B3** to the Lysis Tube, close the lid, and mix by pulse-**vortexing** vigorously for 10 s.  
*Do not premix Buffer B3 and Proteinase K!*
4. Incubate at **room temperature** (18–25 °C) for **5 min** (±1 min).
5. Incubate the Lysis Tube at **70 °C** (±2 °C) for **10 min** (±1 min). After incubation mix by pulse-**vortexing** vigorously for 5 s.
6. **Briefly centrifuge** Lysis Tube (approx. 1 s at 2,000 x g) to remove drops from the lid (short spin only).
7. Add **210 µL ethanol** (96–100 %) to the sample. Close the lid and mix by pulse-vortexing for 5 s.  
*Make sure that the ethanol and the lysate is mixed well.*
8. **Briefly centrifuge** Lysis Tube (approx. 1 s at 2,000 x g) to remove drops from the lid (short spin only).
9. Carefully **load the entire lysate** to the **NucleoSpin® Dx Blood Column** placed in a Collection Tube and close the lid.
10. **Centrifuge 1 min at 11,000 x g.**  
*If the lysate is not completely drawn through the membrane, repeat the centrifugation at higher g-force (15,000–20,800 x g for 1 min). If the lysate still does not pass the membrane completely, discard the sample and repeat the isolation with new sample material.*
11. Place the **NucleoSpin® Dx Blood Column** into a new Collection Tube (2 mL, provided) and discard the Collection Tube with flow-through from the previous step.
12. Open the **NucleoSpin® Dx Blood Column** and add **500 µL Buffer BW** to the column. Close the lid.  
*Note: Make sure that residual lysate is washed away with Buffer BW.*
13. **Centrifuge 1 min at 11,000 x g.**
14. Place the **NucleoSpin® Dx Blood Column** into a new Collection Tube (2 mL, provided) and discard the Collection Tube with flow-through from the previous step.

15. Open the **NucleoSpin® Dx Blood Column** and add **600 µL Buffer B5** to the column. Close the lid.  
*Note: Make sure that residual wash buffer from the previous step is washed away with Buffer B5.*
16. **Centrifuge 1 min at 11,000 x g.**
17. Place the **NucleoSpin® Dx Blood Column** into a new Collection Tube (2 mL, provided) and discard the Collection Tube with flow-through from the previous step.
18. **Centrifuge 1 min at 11,000 x g.**  
*Residual ethanol is removed during this step.*
19. Place the **NucleoSpin® Dx Blood Column** in a clean Elution Tube (1.5 mL, provided) and discard the Collection Tube from the previous step.
20. Open the **NucleoSpin® Dx Blood Column** and add **50–200 µL Buffer BE** directly onto the center of the membrane.
21. **Centrifuge 1 min at 11,000 x g** to elute the DNA from the column.

## 6 Appendix

### 6.1 Troubleshooting

Problem	Possible cause and suggestions
No or poor DNA yield	<i>Low concentration of white blood cells in sample</i>
	<ul style="list-style-type: none"><li>The DNA yield depends on the number of white blood cells per sample. Blood samples with low white blood cell count yield low DNA amounts.</li></ul>
	<i>Incomplete sample lysis</i>
	<ul style="list-style-type: none"><li>Inhomogeneous blood sample or blood clots within the sample: Make sure that blood samples are collected following the instructions of the manufacturer of the blood collection tube. Make sure that only blood which can be easily transferred by pipetting is used as sample material. If necessary, homogenize the blood sample before use.</li><li>Sample not thoroughly mixed with Proteinase K and lysis buffer. The mixture has to be vortexed vigorously immediately after addition of Lysis Buffer B3.</li><li>Proteinase K digestion not optimal. Never add Proteinase K directly to Lysis Buffer B3.</li></ul>
	<i>Reagents not applied properly</i>
	<ul style="list-style-type: none"><li>Prepare buffers and Proteinase K solution according to instructions (section 3). Add ethanol to lysate before loading lysate on the column.</li></ul>
<i>Unappropriate centrifugation</i>	
<ul style="list-style-type: none"><li>Do not extend centrifugation time and speed in step 6 and 8. Only use a short spin to remove droplets from the lid.</li></ul>	
<i>Suboptimal elution of DNA from the column</i>	
<ul style="list-style-type: none"><li>Elution efficiency depends on elution buffer volume. For highest elution efficiency use 200 <math>\mu</math>L elution buffer; for highest DNA concentration use 50 <math>\mu</math>L elution buffer.</li></ul>	

Problem	Possible cause and suggestions
Clogged DNA binding column	<p data-bbox="309 209 614 229"><i>Inhomogeneous blood sample</i></p> <ul data-bbox="309 244 982 429" style="list-style-type: none"> <li data-bbox="309 244 982 429">• Cryoprecipitate formed during thawing of frozen samples may clog the NucleoSpin® Dx Blood Column. If such precipitates are visible avoid aspirating them when loading the lysate to the binding column. Precipitates may also form in fresh blood samples. Make sure that the samples are mixed well. If the column clogs during the DNA binding step repeat the centrifugation at higher <i>g</i>-force (15,000–20,800 x <i>g</i> for 1 min).</li> </ul>
	<p data-bbox="309 469 614 489"><i>Reagents not applied properly</i></p> <ul data-bbox="309 504 982 579" style="list-style-type: none"> <li data-bbox="309 504 982 579">• Prepare buffers and Proteinase K solution according to instructions (section 3). Add ethanol to lysate and mix before loading them on columns.</li> </ul>
Poor DNA quality	<p data-bbox="309 628 552 649"><i>Incomplete sample lysis</i></p> <ul data-bbox="309 663 982 815" style="list-style-type: none"> <li data-bbox="309 663 982 738">• Sample not thoroughly mixed with Proteinase K solution and lysis buffer. The mixture has to be vortexed vigorously immediately after addition of lysis buffer.</li> <li data-bbox="309 767 982 815">• Proteinase K digestion not optimal. Do not add Proteinase K directly to Lysis Buffer B3.</li> </ul>
	<p data-bbox="309 863 708 884"><i>Old or clotted blood samples processed</i></p> <ul data-bbox="309 898 982 973" style="list-style-type: none"> <li data-bbox="309 898 982 973">• Make sure that only blood is used as sample material which can be easily transferred by pipetting. If necessary homogenize the blood sample before use.</li> </ul>
Suboptimal performance of genomic DNA in enzymatic reactions	<p data-bbox="309 1015 525 1035"><i>Carry-over of ethanol</i></p> <ul data-bbox="309 1050 982 1182" style="list-style-type: none"> <li data-bbox="309 1050 982 1182">• Be sure to remove all of ethanolic Buffer B5 before eluting the DNA. If the filling level of Wash Buffer B5 flow-through after the second wash reaches the column outlet for any reason, discard flow-through, place the column back into the Collection Tube, and centrifuge again.</li> </ul>
	<ul data-bbox="309 1206 982 1390" style="list-style-type: none"> <li data-bbox="309 1206 982 1390">• DNA eluates may contain traces of ethanol. However, no decrease in PCR performance was observed using DNA eluate of up to 20% of the PCR final volume as template (e.g., using 4 µL from 100 µL eluate as template in a 20 µL PCR). The maximum percentage of template volume in a PCR may vary depending on the robustness of the PCR system and has to be determined by the user.</li> </ul>

<b>Problem</b>	<b>Possible cause and suggestions</b>
Suboptimal performance of genomic DNA in enzymatic reactions <i>(continued)</i>	<p><i>Contamination of DNA with inhibitory substances</i></p> <ul style="list-style-type: none"> <li>• If preparing DNA from old or clotted blood samples, make sure that only blood is used as sample material which can be easily transferred by pipetting. If necessary, homogenize the blood sample before use.</li> </ul>

## 6.2 Ordering information

<b>Product</b>	<b>REF</b>	<b>Pack of</b>
NucleoSpin® Dx Blood	740899.50/.250	50/250

Visit [www.mn-net.com](http://www.mn-net.com) for more detailed product information.

### 6.3 Product use restriction/warranty

The **NucleoSpin® Dx Blood** Kit is a generic system for the isolation and purification of genomic DNA from human whole blood samples for subsequent *in vitro* diagnostic purposes.

The kit is designed to be used with downstream applications employing enzymatic amplification and detection of DNA (e.g., PCR). Any and all diagnostic results generated using the DNA isolated with the NucleoSpin® Dx Blood kit in conjunction with a diagnostic assay should be interpreted with regard to additional clinical or laboratory findings. The NucleoSpin® Dx Blood Kit does not provide a diagnostic result. It is the sole responsibility of the user to use and validate the kit in conjunction with a downstream *in vitro* diagnostic assay. ONLY MACHEREY-NAGEL products specially labeled as IVD are suitable for *In vitro*-diagnostic use.

NucleoSpin® Dx Blood kit is intended for use by professional users such as technicians and physicians experienced in and trained in molecular biological techniques including experience with whole blood samples and DNA isolation. For safety instructions please refer to the respective chapter in the user manual. NucleoSpin® Dx Blood kit shall exclusively be used in an adequate test environment, i.e. a suitable laboratory setting.

The respective user is liable for any and all damages resulting from application of the NucleoSpin® Dx Blood kit for use deviating from the intended use as specified in the user manual.

This MACHEREY-NAGEL product is shipped with documentation stating specifications and other technical information. MACHEREY-NAGEL warrants to meet the stated specifications. MACHEREY-NAGEL's sole obligation and the customer's sole remedy is limited to replacement of products free of charge in the event products fail to perform as warranted. Supplementary reference is made to the general business terms and conditions of MACHEREY-NAGEL, which are printed on the price list. Please contact us if you wish to get an extra copy.

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