



# **Genomic DNA from Tissue**

## **User Manual**











NucleoSpin® Tissue

January 2010/Rev. 11

# Genomic DNA Purification from Tissue

## Protocol-at-a-glance (Rev. 11)

### NucleoSpin® Tissue

1	Prepare sample		Cut 25 mg into small pieces
2	Pre-lyse sample		180 µl T1 25 µl Proteinase K  56°C 1 – 3 h
3	Lyse sample		200 µl B3  70°C 10 min
4	Adjust DNA binding conditions		210 µl 96 – 100% ethanol
5	Bind DNA	 	Load all  11,000 x g 1 min
6	Wash silica membrane	 1 <sup>st</sup> and 2 <sup>nd</sup> 	1 <sup>st</sup> wash      500 µl BW 2 <sup>nd</sup> wash      600 µl B5  11,000 x g 1 min
7	Dry silica membrane		11,000 x g 1 min
8	Elute highly pure DNA	 	100 µl BE (70°C)  RT 1 min  11,000 x g 1 min

---

## Table of contents

1	Components	5
1.1	Kit contents	5
1.2	Reagents, consumables, and equipment to be supplied by user	6
1.3	About this User Manual	6
2	Product description	7
2.1	The basic principle	7
2.2	Kit specifications	7
2.3	Elution procedures	8
3	Storage conditions and preparation of working solutions	9
4	Safety instructions – risk and safety phrases	10
5	Standard protocol for human or animal tissue and cultured cells	11
6	Support protocols	14
6.1	Support protocol for mouse or rat tails	14
6.2	Support protocol for bacteria	15
6.3	Support protocol for yeast	16
6.4	Support protocol for dried blood spots (e.g., NucleoCards, FTA® cards, Guthrie cards)	17
6.5	Support protocol for genomic DNA and viral DNA from blood samples	18
6.6	Support protocol for hair roots	19
6.7	Support protocol for paraffin-embedded tissue	20
6.8	Support protocol for genomic DNA from stool	21
6.9	Support protocol for viral DNA (e.g., CMV) from stool	22
6.10	Support protocol for detection of <i>Mycobacterium tuberculosis</i> or <i>Legionella pneumophila</i> in sputum or bronchoalveolar lavage	24
6.11	Support protocol for detection of EHEC bacteria in food (e.g., fresh cows' milk)	25
6.12	Support protocol for purification of bacterial DNA (e.g., <i>Chlamydia trachomatis</i> ) from cultures, biological fluids, or clinical specimens	26
6.13	Support protocol for purification of bacterial DNA (e.g., <i>Borrelia burgdorferi</i> ) from urine	27
6.14	Support protocol for purification of viral DNA (e.g., CMV) from urine	28

6.15	Support protocol for purification of genomic DNA from insects	30
6.16	Support protocol for purification of genomic DNA from dental swabs	31
6.17	Support protocol for purification of genomic DNA from buccal swabs	32
7	Appendix	34
7.1	Troubleshooting	34
7.2	Ordering information	36
7.3	Product use restriction/warranty	37

# 1 Components

## 1.1 Kit contents

NucleoSpin® Tissue			
Cat. No.	10 preps	50 preps	250 preps
	740952.10	740952.50	740952.250
Lysis Buffer T1	5 ml	20 ml	100 ml
Buffer B1*	6 ml	12 ml	60 ml
Buffer B2*	1.5 ml	3 ml	15 ml
Wash Buffer BW	6 ml	30 ml	2 x 75 ml
Wash Buffer B5 (Concentrate)*	4 ml	2 x 7 ml	2 x 40 ml
Elution Buffer BE**	3 ml	15 ml	75 ml
Proteinase K (lyophilized)*	6 mg	30 mg	2 x 75 mg
Proteinase Buffer PB	0.8 ml	1.8 ml	8 ml
NucleoSpin® Tissue Columns (light green rings)	10	50	250
Collection Tubes (2 ml)	20	100	500
Labels for Lysis Buffer B3	1	1	1
User Manual	1	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

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

### Reagents

- 96 – 100% ethanol

### Consumables

- 1.5 ml microcentrifuge tubes for sample lysis and DNA elution
- Disposable tips

### Equipment

- Manual pipettors
- Centrifuge for microcentrifuge tubes
- Vortex mixer
- Heating-block for incubation at 70°C
- Equipment for sample disruption and homogenization (see section 2.5)
- Personal protection equipment (lab coat, gloves, goggles)

## 1.3 About this User Manual

It is strongly recommended reading the detailed protocol sections of this User Manual if the **NucleoSpin® Tissue** kit is used for the first time. 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).

## 2 Product description

### 2.1 The basic principle

With the **NucleoSpin® Tissue** method genomic DNA can be prepared from tissue, cells (e.g., bacteria), and many other sources. Lysis is achieved by incubation of the sample material in a proteinase K/SDS solution. Appropriate conditions for binding of DNA to the silica membrane in the **NucleoSpin® Tissue Columns** are created by the addition of chaotropic salts and ethanol to the lysate. The binding process is reversible and specific to nucleic acids. Contaminations are removed by subsequent washing with two different buffers. Pure genomic DNA is finally eluted under low ionic strength conditions in a slightly alkaline elution buffer.

### 2.2 Kit specifications

- **NucleoSpin® Tissue** is designed for the rapid, small-scale preparation of highly pure genomic DNA from any tissue, cells, bacteria, yeast, forensic samples, serum, plasma, or other body fluids. It is also suitable for preparation of DNA from human or animal blood. The purified DNA can be used directly for PCR, Southern blotting, or any kind of enzymatic reactions.
- The kit allows purification of up to 35 µg of pure genomic DNA with an  $A_{260}/A_{280}$  ratio between 1.7 and 1.9. The **NucleoSpin® Tissue Column** is capable of binding up to 60 µg of genomic DNA.
- For lysis of certain bacterial and yeast strains, additional enzymes may be necessary which are not part of this kit. See the relevant support protocol for details.

**Table 1: Kit specifications at a glance**

Parameter	NucleoSpin® Tissue
Sample material	1 – 25 mg / $10^2$ – $10^7$ cells
Typical yield	20 – 35 µg
Elution volume	60 – 100 µl
Binding capacity	60 µg
Preparation time	20 min/4 – 6 preps (after lysis)
Format	Mini spin column

## 2.3 Elution procedures

In addition to the standard method (recovery rate about 70 – 90%) several modifications are possible to increase yield, concentration, and convenience. Use elution buffer preheated to 70°C for one of the following procedures:

- **High yield:** Perform two elution steps with the volume indicated in the individual protocol. About 90 – 100% of bound nucleic acid can be eluted.
- **High concentration:** Perform one elution step with 60% of the volume indicated in the individual protocol. Concentration of DNA will be ca. 30% higher than with standard elution. The yield of eluted nucleic acid will be about 80%.
- **High yield and high concentration:** Apply half the volume of elution buffer as indicated in the individual protocol, incubate for 3 min and centrifuge. Apply a second aliquot of elution buffer, incubate and centrifuge again. Thus, about 85 – 100% of bound nucleic acid is eluted in the standard elution volume at a high concentration.
- **Convenient elution:** For convenience, elution buffer of ambient temperature may be used. This will result in a somewhat lower yield (approximately 20%) compared to elution with heated elution buffer.

Elution may also be performed with Tris-EDTA-buffer (TE) of pH equal or higher than 8. This will increase DNA stability especially during long term and/or multi use storage at 4°C or ambient temperature by inhibition of omnipresent DNases. However, EDTA interferes, depending on the final concentration, with certain downstream applications. Note: Elution Buffer BE (5 mM Tris/HCl, pH 8.5) provided with the kit does not contain EDTA.

For optimal performance of isolated DNA in downstream applications we recommend elution with the supplied elution buffer and storage, especially long term, at -20°C. Freeze-thaw cycles will have no effect on most downstream applications. (Possible exceptions are detection of trace amounts of DNA or long-range PCR (e.g., > 10 kbp). Multiple freeze-thaw cycles or storing DNA at +4°C or room temperature may influence detection sensitivities or reaction efficiencies due to DNA shearing or adsorption to surfaces.)



### 3 Storage conditions and preparation of working solutions

#### Attention:

*Buffers B1, B3, and BW contain guanidine hydrochloride! Wear gloves and goggles!*

- All kit components can be stored at room temperature (18 – 25°C) and are stable up to one year.
- During storage, especially at low temperatures, a white precipitate may form in Buffer T1, B1, or B3. Such precipitates can be easily dissolved by incubating the bottle at 50 – 70°C before use.

Before starting any **NucleoSpin® Tissue** protocol prepare the following:

- **Lysis Buffer B3:** Transfer the total contents of **Buffer B1** to **Buffer B2** and mix well. Place the labels for Lysis Buffer B3 on the bottle. The resulting Lysis Buffer B3 is stable for up to one year at room temperature.
- **Wash Buffer B5:** Add the indicated volume of ethanol (96 – 100%) 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) for up to one year.
- **Proteinase K:** Add the indicated volume of Proteinase Buffer PB to dissolve lyophilized **Proteinase K**. Proteinase K solution is stable at -20°C for up to 6 months.

NucleoSpin® Tissue			
Cat. No.	10 preps 740952.10	50 preps 740952.50	250 preps 740952.250
Wash Buffer B5 (Concentrate)	4 ml Add 16 ml ethanol	2 x 7 ml Add 28 ml ethanol to each bottle	2 x 40 ml Add 160 ml ethanol to each bottle
Proteinase K	6 mg Add 260 µl Proteinase Buffer	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 **NucleoSpin® Tissue** kits contain hazardous contents.

*Wear gloves and goggles and follow the safety instructions given in this section.*

Component	Hazard contents	Hazard symbol		Risk phrases	Safety phrases	
B1	Guanidine hydrochloride	✘ Xn*		Harmful if swallowed - Irritating to eyes and skin	R 22-36/38	
BW	Guanidine hydrochloride + isopropanol <25%	✘ Xn*		Flammable - Harmful if swallowed - Irritating to eyes and skin.	R 10-22-36/38	S 7-16-25
Proteinase K	Proteinase K, lyophilized	✘ Xn Xi*		Irritating to eyes, respiratory system and skin, may cause sensitization by inhalation	R 36/37/38-42	S 22-24-26-36/37

### Risk phrases

- R 10 Flammable  
 R 22 Harmful if swallowed  
 R 36/37/38 Irritating to eyes, respiratory system and skin  
 R 36/38 Irritating to eyes and skin  
 R 42 May cause sensitization by inhalation

### Safety phrases

- S 7 Keep container tightly closed  
 S 16 Keep away from sources of ignition - No smoking!  
 S 22 Do not breathe dust  
 S 24 Avoid contact with the skin  
 S 25 Avoid contact with the eyes  
 S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice  
 S 36/37 Wear suitable protective clothing and gloves

\* 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.

## 5 Standard protocol for human or animal tissue and cultured cells

### Before starting the preparation:

- Check if Buffer B3, Buffer B5 and Proteinase K were prepared according to section 3.
- Set an incubator or water bath to 56°C.
- Preheat Elution Buffer BE to 70°C.

### 1 Prepare sample

#### Tissue

Cut **25 mg** human or animal **tissue** into small pieces. Place the sample in a microcentrifuge tube (not provided).

**Proceed with step 2.**

*Samples that are difficult to lyse can be ground under liquid nitrogen or may be treated in a mechanical homogenizer (Polytron, Ultra Turrax): Add 25 mg of tissue to a 1.5 ml microcentrifuge tube (not provided), add 50 – 75 µl phosphate buffered saline (PBS) and homogenize.*

#### Cultured cells

Resuspend up to **10<sup>7</sup> cells** in a final volume of **200 µl Buffer T1**. Add **25 µl Proteinase K** solution and **200 µl Buffer B3**. Incubate the sample at 70°C for 10 – 15 min.

**Proceed with step 4.**

### 2 Pre-lyse sample

Add **180 µl Buffer T1** and **25 µl Proteinase K** solution. Vortex to mix. Be sure that the samples are completely covered with lysis solution.

*If processing several samples, Proteinase K and Buffer T1 may be premixed directly before use. Do never mix Buffer T1 and Proteinase K more than 10 – 15 min before addition to the sample: Proteinase K tends to self-digestion in Buffer T1 without substrate.*



**+ 180 µl T1**  
**+ 25 µl**  
**Proteinase K**

Incubate at **56°C** until complete lysis is obtained (**at least 1 – 3 h**). Vortex occasionally during incubation or use a shaking incubator.

*Samples can be incubated overnight as well. If RNA-free DNA is crucial for downstream applications, an RNase digest may be performed: Add 20 µl RNase A (20 mg/ml) solution (not included; see ordering information) and incubate for an additional 5 min at room temperature.*



**56°C**  
**1 – 3 h**  
  
**or**  
  
**56°C**  
**overnight**

### 3 Lyse sample

Vortex the samples. Add **200 µl Buffer B3**, vortex vigorously and incubate at **70°C for 10 min**. Vortex briefly.

*If insoluble particles are visible, centrifuge for 5 min at high speed (e.g., 11,000 x g) and transfer the supernatant to a new microcentrifuge tube (not provided).*



**+ 200 µl B3**  
  
**70°C**  
**10 min**

### 4 Adjust DNA binding conditions

Add **210 µl ethanol (96 – 100%)** to the sample and vortex vigorously.

*After addition of ethanol a stringy precipitate may become visible. This will not affect the DNA isolation. Be sure to load all of the precipitate on the column in the following step.*

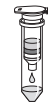


**+ 210 µl ethanol**

### 5 Bind DNA

For each sample, place one **NucleoSpin® Tissue Column** into a Collection Tube. Apply the sample to the column. Centrifuge for **1 min** at **11,000 x g**. Discard the flow-through and place the column back into the Collection Tube.

*If the sample is not drawn completely through the matrix, repeat the centrifugation step at 11,000 x g. Discard flow-through.*



**Load samples**



**11,000 x g**  
**1 min**

**6 Wash silica membrane**

**1<sup>st</sup> wash**

Add **500 µl Buffer BW**. Centrifuge for **1 min** at **11,000 x g**. Discard flow-through and place the column back into the Collection Tube.



**+ 500 µl BW**  
**11,000 x g**  
**1 min**

**2<sup>nd</sup> wash**

Add **600 µl Buffer B5** to the column and centrifuge for **1 min** at **11,000 x g**. Discard flow-through and place the column back into the Collection Tube.



**+ 600 µl B5**  
**11,000 x g**  
**1 min**

**6 Dry silica membrane**

Centrifuge the column for **1 min** at **11,000 x g**.

Residual ethanol is removed during this step.



**11,000 x g**  
**1 min**



**7 Elute highly pure DNA**

Place the NucleoSpin® Tissue Column into a 1.5 ml microcentrifuge tube (not provided) and add **100 µl pre-warmed Buffer BE (70°C)**. Incubate at room temperature for 1 min. Centrifuge **1 min** at **11,000 x g**.

*For alternative elution procedures see section 2.3.*



**+ 100 µl BE**  
**(70°C)**

**RT**  
**1 min**



**11,000 x g**  
**1 min**

## 6 Support protocols

### 6.1 Support protocol for mouse or rat tails

#### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

#### 1 Prepare sample

Cut **two 0.6 cm-pieces of mouse tail** and place them in a 1.5 ml centrifuge tube (not provided).

*If processing rat tails, one 0.6 cm-piece is sufficient.*

---

#### 2 Pre-lyse sample

Add **180 µl Buffer T1** and **25 µl Proteinase K** and vortex. Incubate at **56°C overnight** or until complete lysis is obtained. Vortex occasionally during incubation or use a shaking water bath. To remove residual bones or hair, centrifuge for **5 min at high speed (e.g., 11,000 x g)**. Transfer **200 µl supernatant** to a new tube.

*If processing several samples, Proteinase K and Buffer T1 may be premixed directly before use. Do never mix Buffer T1 and Proteinase K more than 10 – 15 min before addition to the sample: Proteinase K tends to self-digestion in Buffer T1 without substrate.*

---

#### 3 Lyse sample

Add **200 µl Buffer B3** to the lysate and vortex vigorously.

*Buffer B3 and ethanol (see step 4) can be premixed before addition to the lysate.*

---

#### 4 Adjust DNA binding conditions

Add **210 µl ethanol** to the lysate and vortex vigorously.

---

Proceed with step 5 of the standard protocol (see section 5.1).

---

## 6.2 Support protocol for bacteria

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Up to 1 ml of bacterial culture can be used for the preparation depending on, for example, density of culture, culture medium, and bacterial strain.

Centrifuge up to **1 ml culture** for **5 min** at **8,000 x g**. Remove supernatant.

---

### 2 Pre-lyse sample

Resuspend the pellet in **180 µl Buffer T1** by pipetting up and down. Add **25 µl Proteinase K**. Vortex vigorously and incubate at 56°C until complete lysis is obtained (at least 1 – 3 h). Vortex occasionally during incubation or use a shaking incubator.

*Samples can be incubated overnight as well.*

*If RNA-free DNA is crucial for downstream applications, an RNase digest may be performed: Add 20 µl RNase A (20 mg/ml) solution (not included; see ordering information) and incubate for an additional 5 min at room temperature.*

**Hard-to-lyse bacteria:** *Some strains, especially Gram-positive bacteria, are more difficult to lyse. In such cases, a preincubation with a lytic enzyme is necessary: Resuspend the pelleted cells in 20 mM Tris/HCl; 2 mM EDTA; 1% Triton X-100; pH 8 (instead of Buffer T1) supplemented with 20 mg/ml lysozyme or 0.2 mg/ml lyso-staphin and incubate for 30 – 60 min at 37°C. Add 25 µl Proteinase K, incubate at 56°C until complete lysis is obtained.*

---

Proceed with step 3 of the standard protocol (see section 5.1).

## 6.3 Support protocol for yeast

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Check that sorbitol buffer and lyticase or zymolase (not provided with the kit) is available for sample pre-lysis.
  - Set an incubator or water bath to 30°C and 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Harvest **3 ml YPD yeast culture** ( $OD_{600} \leq 10$ ) by centrifugation for **10 min** at **5,000 x g**. Wash the cells once with **1 ml 10 mM EDTA, pH 8**. Remove the supernatant and pellet the cells by centrifugation (**5,000 x g, 10 min**).

---

### 2 Pre-lyse sample

Resuspend the pellet in **600 µl sorbitol buffer** (1.2 M sorbitol; 10 mM CaCl<sub>2</sub>; 0.1 M Tris/HCl pH 7.5; 35 mM β-mercaptoethanol). Add **50 U lyticase or zymolase\***. Incubate at **30°C** for **30 min**. This step degrades the yeast cell wall creating spheroplasts. Spheroplast formation may be checked microscopically. Centrifuge the mixture for **10 min** at **2,000 x g** remove supernatant and resuspend the pelleted spheroplasts in **180 µl Buffer T1**. Add **25 µl Proteinase K** solution and vortex vigorously. Incubate at **56°C** until complete lysis is obtained (at least 1 – 3 h). Vortex occasionally during incubation or use a shaking water bath.

*Samples can be incubated overnight as well.*

*If RNA-free DNA is crucial for downstream applications, an RNase digest may be performed: Add 20 µl RNase A (20 mg/ml) solution (not included; see ordering information) and incubate for an additional 5 min at room temperature.*

---

Proceed with step 3 of the standard protocol (see section 5.1).

---

\* Other protocols use 5 – 200 U lyticase or zymolase depending on enzyme quality or brand. Increasing the enzyme concentration may be required if spheroplasts are not formed.



## 6.4 Support protocol for dried blood spots (e.g., NucleoCards, FTA® cards, Guthrie cards)

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Cut out one or two **dried blood spots** as accurately as possible. Cut spots into small pieces and place them in a 1.5 ml microcentrifuge tube (not provided).

*The area of the dried blood spots should be between 15 and 30 mm<sup>2</sup>.*

---

### 2 Pre-lyse sample

Add **180 µl Buffer T1** and mix by vortexing. Place the samples in a water bath or heating block and heat for **10 min at 94°C**. Let the sample cool down. Add **25 µl Proteinase K** solution. Spin the samples briefly, vortex and incubate at **56°C** for **1 h**. Vortex occasionally during incubation or use a shaking water bath.

Make sure that the samples are completely covered with lysis buffer during incubation.

---

### 3 Lyse sample

Add **200 µl Buffer B3**, vortex vigorously to mix and incubate at **56°C** for **10 min**.

---

Proceed with step 4 of the standard protocol (see section 5.1).

## 6.5 Support protocol for genomic DNA and viral DNA from blood samples

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1-2 Prepare sample / Pre-lyse sample

Not necessary

---

### 3 Lyse blood sample

Pipette **25 µl Proteinase K** and up to **200 µl blood**, buffy coat or body fluid sample (equilibrated to room temperature) into 1.5 ml microcentrifuge tubes (not provided).

*For sample volumes less than 200 µl, add PBS to adjust the volume to 200 µl. If purifying DNA viruses, we recommend starting with 200 µl serum or plasma. If cultured cells are used, resuspend up to 5 x 10<sup>6</sup> cells in a final volume of 200 µl PBS.*

Add **200 µl Buffer B3** to the samples and vortex the mixture vigorously (10 – 20 s).

Incubate samples at **room temperature** for **5 min**. Mix.

Incubate samples at **70°C** for **10 – 15 min**.

*The lysate should become brownish during incubation with Buffer B3. Increase incubation time with Proteinase K (up to 30 min) and vortex once or twice vigorously during incubation if processing older or clotted blood samples.*

---

### 4 Adjust DNA binding conditions

Add **210 µl ethanol (96 – 100%)** to each sample and vortex again.

---

### 5 Bind DNA

For each preparation, take one **NucleoSpin® Tissue Column** placed in a Collection Tube and load the sample. Centrifuge **1 min** at **11,000 x g**. If the samples are not drawn through the matrix completely, repeat the centrifugation at higher g-force (< 15,000 x g). Discard Collection Tube with flow-through.

---

Proceed with step 6 (Wash silica membrane) of the standard protocol (see section 5.1).

---

## 6.6 Support protocol for hair roots

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Cut off the hair roots from the hair sample (up to 100) and collect them in a 1.5 ml microcentrifuge tube (not provided).

---

### 2 Pre-lyse sample

Add **180 µl Buffer T1** to the hair roots and freeze the samples in liquid nitrogen. Thaw samples in a **56°C water bath**. Repeat this procedure 4 times. Add 25 µl Proteinase K solution, mix by vortexing, and incubate **6 – 8 h** or **overnight** at **56°C**. Use a shaking water bath or vortex occasionally.

---

Proceed with step 3 of the standard protocol (see section 5.1).

## 6.7 Support protocol for paraffin-embedded tissue

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 37°C and 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Prepare small sections (up to 25 mg) from blocks of fixed, embedded tissue. If possible, trim excess paraffin from the block before slicing. Handle the sections with tweezers or toothpicks and place the samples into microcentrifuge tubes.

Add **1 ml n-octane or xylene** to each tube. Vortex vigorously and incubate at room temperature for about 30 min. Vortex occasionally.

Centrifuge at **11,000 x g** for **3 min**. Pipette off supernatant.

Add **1 ml ethanol (96 – 100%)** to each tube. Close and mix by inverting several times. Centrifuge at **11,000 x g** for **3 min**. Pipette off supernatant.

Repeat the ethanol washing step. Pipette off as much of the ethanol as possible.

Incubate the open tube at **37°C** until the ethanol has evaporated (**~ 15 min**).

---

Proceed with step 2 of the standard protocol (see section 5.1).

## 6.8 Support protocol for genomic DNA from stool

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Add **250 mg feces** to **1 ml TE buffer** (10 mM Tris/Cl; 1 mM EDTA, pH 8). Resuspend the sample by vigorous vortexing (**30 s**).

Centrifuge the sample for **15 min** at **4,000 x g**. Discard supernatant.

Resuspend the pellet in **0.2 – 1 ml Buffer T1**. Use as much buffer as necessary for good resuspension of the sample.

*The prepared pellet contains, among other constituents, cells from the digestive tract and bacteria.*

Transfer **200 µl** of the **resuspended sample** to a new microcentrifuge tube.

---

Proceed with the addition of 25 µl Proteinase K in step 2 of the standard protocol (see section 5.1).

*Human cells, bacterial cells, and cells of pathogens in the stool lyse during the incubation step at 56°C with Proteinase K with different efficiency. For the detection of cells that are difficult to lyse (e.g., some bacteria and parasites) it can be beneficial to perform an additional incubation at increased incubation temperature (up to 95°C; 5 – 10 min). DNA yield will often be higher with such an additional incubation step at high temperature. However, note that the ratio of human to non-human DNA will typically change due to the increased release of bacterial/pathogen DNA.*

## 6.9 Support protocol for viral DNA (e.g., CMV) from stool

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Suspend the stool sample in **0.9% NaCl** (ca. 0.5 g in max. 4 ml)

**Centrifuge** aliquots of the stool sample for **5 min** at **800 x g** at **RT** (e.g., 4 ml: 4 x 1 ml in a 1.5 ml microcentrifuge tube). Carefully reunite supernatant (do not touch the pellet).

Filtrate supernatant through 0.22 – 0.45 µm sterile filter. Fractionate the filtrate and centrifuge for **1 min** at **11,000 x g**.

---

### 2 Pre-lyse sample

Carefully remove the supernatant by decanting. Add **400 µl Buffer T1** and **35 µl Proteinase K** and mix by vortexing.

---

### 3 Lyse sample

Add **400 µl Buffer B3** and mix by vortexing. Incubate for at least **30 min** at **70°C**.

---

### 4 Adjust DNA binding conditions

Add **420 µl ethanol (96 – 100%)** and mix by vortexing.

---

### 5 Bind DNA

For each sample, place one **NucleoSpin® Tissue Column** into a Collection Tube. Load the NucleoSpin® Tissue Column successively. Centrifuge for **1 min** at **4,500 x g**. Discard the flow-through and place the column back into the Collection Tube.

*If the sample is not drawn completely through the matrix, repeat the centrifugation step at 11,000 x g. Discard flow-through.*

---

## 6 Wash silica membrane

### 1<sup>st</sup> wash

Add **600 µl Buffer BW**. Centrifuge for **1 min** at **4,500 x g**. Discard flow-through and place the column back into the Collection Tube.

### 2<sup>nd</sup> wash

Add **600 µl Buffer B5** to the column and centrifuge for **1 min** at **4,500 x g**. Discard flow-through and place the column back into the Collection Tube.

### 3<sup>rd</sup> wash

Add **600 µl Buffer B5** to the column and centrifuge for **2 min** at **11,000 x g**. Discard flow-through.

---

## 7 Dry silica membrane

Place The NucleoSpin® Tissue Column into a new Collection Tube and incubate with open lid for **1 – 2 min** at **70°C**.

Residual ethanol is removed during this step.

---

## 8 Elute highly pure DNA

Place the NucleoSpin® Tissue Column into a 1.5 ml microcentrifuge tube (not provided) and add **100 µl prewarmed Buffer BE (70°C)**. Incubate with closed lid for **3 – 5 min** at **70°C**. Centrifuge for **1 min** at **4,500 x g**.

*For alternative elution procedures see section 2.3.*

---

Use 10 µl DNA extract for a 20 µl PCR reaction mix.

Add inhibition control mix (10 µl DNA extract with human DNA) and amplify with for example actin-/β-globin-/ or other human specific primer.

---

## 6.10 Support protocol for detection of *Mycobacterium tuberculosis* or *Legionella pneumophila* in sputum or bronchoalveolar lavage

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
  - Prepare N-acetyl cystein/NaOH (2 g NaOH; 1.45 g sodium citrate; 0.5 g N-acetyl cystein. Add water to 100 ml).
- 

### 1 Prepare sample

Add **200 – 500 µl sputum** or bronchoalveolar lavage to an **equal volume N-acetyl cystein/NaOH**. Vortex gently to mix.

Incubate the mixture for **25 min** at **room temperature** with shaking.

Adjust the **volume to 25 ml** with **sterile water**.

Centrifuge for **30 min** at **4,000 x g**. Discard the supernatant.

Resuspend the pellet in **0.5 – 1 ml Buffer T1** (depending on sample viscosity).

Transfer **200 µl of the resuspended sample** to a new microcentrifuge tube (not provided).

---

Proceed with step 2 of the standard protocol (see section 5.1).



## 6.11 Support protocol for detection of EHEC bacteria in food (e.g., fresh cows' milk)

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

To a sterile 1 liter flask, add **25 ml milk** and **225 ml prewarmed (37°C) mTSB medium** (supplied with Novobiocin). Incubate the mixture in a shaking water bath for **5 – 6 h** or overnight at **37°C**.

*Preparation of mTSB medium: 30 g Tryptic Soy Broth (Gibco), 1.5 g bile salts No. 3 (Oxoid), 1.5 g KH<sub>2</sub>PO<sub>4</sub>. Add 900 ml H<sub>2</sub>O. Filter the medium and adjust the pH with 2 M NaOH to 7.4. Add water to 1 liter and autoclave for 15 min at 121°C.*

Centrifuge **100 ml culture** for **40 min** at **6,000 x g**.

Gently pour off the supernatant and resuspend the pellet in 2 ml sterile water. Centrifuge for **10 min** at **10,000 x g**.

---

### 2 Pre-lyse sample

Resuspend the pellet in **180 µl Buffer T1** and add **25 µl Proteinase K** solution.

---

Carry out the standard protocol, beginning with step 3 (see section 5.1).

---

After elution of the DNA, proceed with the following step.

Precipitate the DNA by adding **20 µl 3.2 M sodium acetate** and **400 µl ethanol** to **200 µl eluate**. Centrifuge for **30 min** at **11,000 x g**. Discard supernatant and wash the pellet with **1 ml 70% ethanol** and resuspend in **10 µl sterile water**.

---

## 6.12 Support protocol for purification of bacterial DNA (e.g., *Chlamydia trachomatis*) from cultures, biological fluids, or clinical specimens

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

- Isolation of bacterial DNA from **bacterial cultures or biological fluids**: Pellet bacteria by centrifugation for **5 min** at **13,000 x g** and proceed with step 2 of the standard protocol, see section 5.
  - Isolation of bacterial DNA from **eye, nasal or pharyngeal swabs**: Collect samples, add 2 ml PBS containing a common fungicide, and incubate for **several hours** at **room temperature**. Pellet bacteria by centrifugation for **5 min** at **13,000 x g**.
- 

Proceed with step 2 of the standard protocol (see section 5.1).

## 6.13 Support protocol for purification of bacterial DNA (e.g., *Borrelia burgdorferi*) from urine

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Centrifuge **1 ml urine** sample at **13,000 x g** for **30 min**. Discard supernatant, add again **1 ml urine** sample to the pellet and centrifuge at **13,000 x g** for **30 min**. Repeat this steps a third time.

*The sample material should be fresh and storage at -20°C to -80°C is only recommended for a couple of days. After thawing incubate the sample at 40°C as long as all precipitates are dissolved. Urine tends to form precipitates when stored at low temperatures.*

---

Proceed with step 2 of the standard protocol (see section 5.1).

## 6.14 Support protocol for purification of viral DNA (e.g., CMV) from urine

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Centrifuge aliquots of the urine sample for **10 min** at **full speed** (e.g., 4 ml: 4 x 1 ml in a 1.5 ml microcentrifuge tube). Carefully decant supernatant.

*If frozen urine samples are used precipitates may appear after defrosting, which must be dissolved before the centrifugation step. This can be done through a 30 min incubation step at 37-40°C. If a complete solution does not happen let the precipitate sediment and proceed with step 1 of the support protocol using only the supernatant.*

---

### 2 Pre-lyse sample

Resuspend the pellet in **180 µl Buffer T1** and **25 µl Proteinase K**.

Two possible working procedures:

**A:** Resuspend the first pellet in 180 µl Buffer T1 and 25 µl Proteinase K. Transfer the resuspended solution of the first tube to the second tube and the resuspended solution of the second tube to the third tube and so on. Finally continue with step 3.

**B:** Resuspend each pellet as mentioned above and proceed with step 3. In this case the solutions are pooled and the spin column has to be loaded successively.

---

### 3 Lyse sample

Add **200 µl Buffer B3**, vortex and incubate at least for **20 min** at **70°C**.

---

### 4 Adjust DNA binding conditions

Add **210 µl ethanol (96 – 100%)** to the sample and vortex vigorously.

---

## 5 Bind DNA

For each sample, place one **NucleoSpin® Tissue Column** into a Collection Tube. Apply the sample to the column. Centrifuge for **1 min** at **4,500 x g**. Discard the flow-through and place the column back into the Collection Tube.

---

## 6 Wash silica membrane

### 1<sup>st</sup> wash

Add **500 µl Buffer BW**. Centrifuge for **1 min** at **4,500 x g**. Discard flow-through and place the column back into the Collection Tube.

### 2<sup>nd</sup> wash

Add **600 µl Buffer B5** to the column and centrifuge for **2 min** at **11,000 x g**. Discard flow-through and place the column back into the Collection Tube.

---

## 7 Dry silica membrane

Incubate with open lid for **1 – 2 min** at **70°C**.

Residual ethanol is removed during this step.

---

## 8 Elute highly pure DNA

Add **70 µl prewarmed Buffer BE (70°C)**, close the lid and incubate for further **3 – 5 min** at **70°C**. Centrifuge for **1 min** at **4,500 x g**.

---

## 6.15 Support protocol for purification of genomic DNA from insects

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Homogenize not **more than 50 mg insects** under liquid nitrogen and transfer the powder into a 1.5 ml microcentrifuge tube (not provided).

---

Proceed with step 2 of the standard protocol (see section 5.1).

## 6.16 Support protocol for purification of genomic DNA from dental swabs

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Place swab material (paper, cotton, brushes, plastic) in a 1.5 ml microcentrifuge tube (not provided).

---

### 2 Pre-lyse sample

Add **180 µl Buffer T1** and **25 µl Proteinase K** to each sample. Close the microcentrifuge tube and spin briefly for **15 s** at **1,500 x g** in order to get the swab material completely submerged. Incubate at room temperature for **5 min**. Vortex the tube vigorously for **15 s** and spin briefly for **15 s** at **1,500 x g**.

Incubate the tubes at **70°C** in an incubator for **10 min**. Place a weight on top of the tube in order to prevent the caps from popping off. Shift the temperature to **95°C** for **5 min**. Spin briefly for **15 s** at **1,500 x g** to collect any sample from the lids. Open the microcentrifuge tubes.

*Depending on the bacterial strains that are to be detected, incubation at 95°C can be skipped.*

---

### 2a Separate lysis solution from buccal swabs

#### Alternative A:

Place a **NucleoSpin® Filter** (not provided; see ordering information) into a Collection Tube (2 ml). Transfer the swab tip (cut off swab shaft) and the remaining solution onto the NucleoSpin® Filter. Centrifuge for **1 min** at **11,000 x g**. Discard the NucleoSpin® Filter. Continue with flow-through.

#### Alternative B:

Transfer as much as possible of the lysate solution to a 1.5 ml microcentrifuge tube (not provided). Discard swab and continue with recovered solution.

---

Proceed with step 3 of the standard protocol (see section 5.1).

---

## 6.17 Support protocol for purification of genomic DNA from buccal swabs

### Before starting the preparation:

- Check if Buffer B3, Buffer B5, and Proteinase K were prepared according to section 3.
  - Set an incubator or water bath to 56°C.
  - Before elution, preheat Elution Buffer BE to 70°C.
- 

### 1 Prepare sample

Collect the samples with cotton, dacron® (Daigger), or C.E.P. swabs (Gibco BRL). Scrape firmly against the inside of each cheek several times and let the swabs air dry.

*The respective individual should not have consumed food or drink within 30 min before collection of the sample.*

---

### 2 Pre-lyse sample

Place the dry swab material in 2 ml microcentrifuge tubes (not provided). Add **400 – 600 µl PBS** and **25 µl Proteinase K** solution to the swabs.

The volume of PBS is depending on the type of swab used: for cotton and dacron, swabs, 400 µl are sufficient; for C.E.P. swabs, 600 µl are necessary.

Mix by vortexing 2 x 5 s and incubate **10 min** at **56°C**.

---

### 2a Separate lysis solution from buccal swabs

#### Alternative A:

Place a **NucleoSpin® Filter** (not provided; see ordering information) into a Collection Tube (2 ml). Transfer the swab tip (cut off swab shaft) and the remaining solution onto the NucleoSpin® Filter. Centrifuge for **1 min** at **11,000 x g**. Discard the NucleoSpin® Filter. Continue with flow-through.

#### Alternative B:

Transfer as much as possible of the lysate solution to a 1.5 ml microcentrifuge tube (not provided). Discard swab and continue with recovered solution.

---



### 3 Lyse sample

Add **one volume Buffer B3** (400 or 600 µl; depending on the swab type/volume of PBS buffer used) and vortex vigorously. Incubate the samples at **70°C** for **10 min**.

*Note: Depending on the number of preparations, additional Buffer B3 might be needed (see ordering information).*

---

### 4 Adjust DNA binding conditions

Add **one volume 96 – 100% ethanol** (400 or 600 µl, depending on the swab type) to each sample and mix by vortexing.

---

### 5 Bind DNA

Transfer **600 µl of the samples** from the 2 ml microcentrifuge tubes into **NucleoSpin® Tissue Columns**. Centrifuge at **11,000 x g** for **1 min**. If the samples are not drawn through completely, repeat the centrifugation. Discard flow-through.

Place the columns back into the Collection Tubes and repeat step 5 once or twice, depending on the lysis volume.

---

When all of the lysate has been applied to the columns, proceed with step 6 of the standard protocol (section 5.1).

---

## 7 Appendix

### 7.1 Troubleshooting

Problem	Possible cause and suggestions
No or poor DNA yield	<i>Incomplete lysis</i>
	<ul style="list-style-type: none"> <li>• Sample not thoroughly homogenized and mixed with Buffer T1/ Proteinase K. The mixture has to be vortexed vigorously immediately after the addition of Buffer T1.</li> <li>• Decreased Proteinase K activity: Store dissolved Proteinase K at -20°C for 6 months.</li> </ul>
	<i>Reagents not applied properly</i>
	<ul style="list-style-type: none"> <li>• Prepare Buffer B3, Buffer B5, and Proteinase K solution according to instructions (see section 3). Add ethanol to the lysates before loading them onto the columns.</li> </ul>
	<i>Suboptimal elution of DNA from the column</i>
	<ul style="list-style-type: none"> <li>• Preheat Buffer BE to 70°C before elution. Apply Buffer BE directly onto the center of the silica membrane.</li> <li>• Elution efficiencies decrease dramatically, if elution is done with buffers with a pH &lt;7.0. Use slightly alkaline elution buffers like Buffer BE (pH 8.5).</li> <li>• Especially when expecting high yields from large amounts of material, we recommend elution with 200 µl Buffer BE and incubation of the closed columns in an incubator at 70°C for 5 min before centrifugation.</li> </ul>
Poor DNA quality	<i>Incomplete lysis</i>
	<ul style="list-style-type: none"> <li>• Sample not thoroughly homogenized and mixed with Buffer T1/ Proteinase K. The mixture has to be vortexed vigorously immediately after the addition of Buffer T1.</li> <li>• Decreased Proteinase K activity: Store dissolved Proteinase K at -20°C for 6 months.</li> </ul>

- Poor DNA quality  
(continued)
- Reagents not applied properly*
- Prepare Buffer B3, Buffer B5, and Proteinase K solution according to instructions (see section 3). Add ethanol to the lysates before loading them on the columns.
- RNA in sample*
- If RNA-free DNA is desired, add 10  $\mu$ l of RNase A solution (5 mg/ml; not supplied with the kit) before addition of Buffer B3 and incubate at 37°C for 5 min.
- 

- Too much sample material used
- Do not use more sample material than recommended (25 mg for most tissue types). If insoluble material like bones or hair remains in the lysate, spin down the debris and transfer the clear supernatant to a new microcentrifuge tube before proceeding with addition of Buffer B3 and ethanol.

- Clogged columns
- Incomplete lysis*
- Sample not thoroughly homogenized and mixed with Buffer T1/ Proteinase K. The mixture has to be vortexed vigorously immediately after the addition of Buffer T1.
  - Decreased Proteinase K activity: Store dissolved Proteinase K at -20°C for 6 months.

- Reagents not applied properly*
- Prepare Buffer B3, Buffer B5, and Proteinase K solution according to instructions (see section 3). Add ethanol to the lysates before loading them on the columns.
- 

- Suboptimal performance of genomic DNA in enzymatic reactions
- Carry-over of ethanol or salt*
- Make sure to centrifuge  $\geq 1$  min at 11,000 x *g* in order to remove all of ethanolic Buffer B5 before eluting the DNA. If, for any reason, the level of Buffer B5 has reached the column outlet after drying, repeat the centrifugation.
  - Do not chill Buffer B5 before use. Cold buffer will not remove salt effectively. Equilibrate Buffer B5 to room temperature before use.
-

Suboptimal performance of genomic DNA in enzymatic reactions (*continued*)

*Contamination of DNA with inhibitory substances*

- Do not elute DNA with TE buffer. EDTA may inhibit enzymatic reactions. Repurify DNA and elute in Buffer BE.
- If the  $A_{260}/A_{280}$  ratio of the eluate is below 1.6, repeat the purification procedure: Add 1 volume Buffer B3 plus 1 volume ethanol (96 – 100%) to the eluate. Load the mixture onto a NucleoSpin® Tissue Column and proceed with step 5 of the standard protocol (see section 5.1).

## 7.2 Ordering information

Product	Cat. No.	Pack of
NucleoSpin® Tissue	740952.10/.50/.250	10/50/250 preps
NucleoSpin® Tissue XS	740901.10/.50/.250	10/50/250 preps
NucleoSpin® Blood	740951.10/.50/.250	10/50/250 preps
Buffer T1	740940.25	25 ml
Buffer B3	740920	100 ml
Buffer B5 Concentrate (for 100 ml Buffer B5)	740921	20 ml
Buffer BW	740922	100 ml
Proteinase K	740506	100 mg
RNase A	740505.50 740505	50 mg
NucleoSpin® DNA Trace	740942.4/.25	4/25 preps
Collection Tubes (2 ml)	740600	1000
NucleoCard	740403.10/.100	10/100 cards

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

### 7.3 Product use restriction/warranty

**NucleoSpin® Tissue** kit components were developed, designed, distributed, and sold **FOR RESEARCH PURPOSES ONLY**. They are suitable **FOR IN-VITRO USES ONLY**. No claim or representation is intended for its use to identify any specific organism or for clinical use (diagnostic, prognostic, therapeutic, or blood banking).

It is rather the responsibility of the user to verify the use of the **NucleoSpin® Tissue** kit for a specific application range as the performance characteristic of this kit has not been verified to a specific organism.

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 an extra copy.

MACHEREY-NAGEL does not warrant against damages or defects arising in shipping and handling (transport insurance for customers excluded), or out of accident or improper or abnormal use of this product; against defects in products or components not manufactured by MACHEREY-NAGEL, or against damages resulting from such non-MACHEREY-NAGEL components or products.

MACHEREY-NAGEL makes no other warranty of any kind whatsoever, and SPECIFICALLY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES OF ANY KIND OR NATURE WHATSOEVER, DIRECTLY OR INDIRECTLY, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, AS TO THE SUITABILITY, REPRODUCTIVITY, DURABILITY, FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, CONDITION, OR ANY OTHER MATTER WITH RESPECT TO MACHEREY-NAGEL PRODUCTS.

In no event shall MACHEREY-NAGEL be liable for claims for any other damages, whether direct, indirect, incidental, compensatory, foreseeable, consequential, or special (including but not limited to loss of use, revenue or profit), whether based upon warranty, contract, tort (including negligence) or strict liability arising in connection with the sale or the failure of MACHEREY-NAGEL products to perform in accordance with the stated specifications. This warranty is exclusive and MACHEREY-NAGEL makes no other warranty expressed or implied.

The warranty provided herein and the data, specifications and descriptions of this MACHEREY-NAGEL product appearing in MACHEREY-NAGEL published catalogues and product literature are MACHEREY-NAGEL's sole representations concerning the product and warranty. No other statements or representations, written or oral, by MACHEREY-NAGEL's employees, agent or representatives, except written statements signed by a duly authorized officer of MACHEREY-NAGEL are authorized; they should not be relied upon by the customer and are not a part of the contract of sale or of this warranty.

Product claims are subject to change. Therefore please contact our Technical Service Team for the most up-to-date information on MACHEREY-NAGEL products. You may also contact your local distributor for general scientific information. Applications mentioned in MACHEREY-NAGEL literature are provided for informational purposes only. MACHEREY-NAGEL does not warrant that all applications have been tested in MACHEREY-NAGEL laboratories using MACHEREY-NAGEL products. MACHEREY-NAGEL does not warrant the correctness of any of those applications.

Please contact:  
MACHEREY-NAGEL Germany  
Tel.: +49 (0) 24 21 969 270  
e-mail: TECH-BIO@mn-net.com

Last updated: 12/2006, Rev.02

---

**Trademarks:**

Dacron is a trademark of E.I. du Pont de Nemours and Company

FTA is a trademark of Whatman Ltd.

NucleoSpin is a trademark of MACHEREY-NAGEL GmbH & Co KG

All used names and denotations can be brands, trademarks, or registered labels of their respective owner – also if they are not special denotation. To mention products and brands is only a kind of information (i.e., it does not offend against trademarks and brands and can not be seen as a kind of recommendation or assessment). Regarding these products or services we can not grant any guarantees regarding selection, efficiency, or operation.