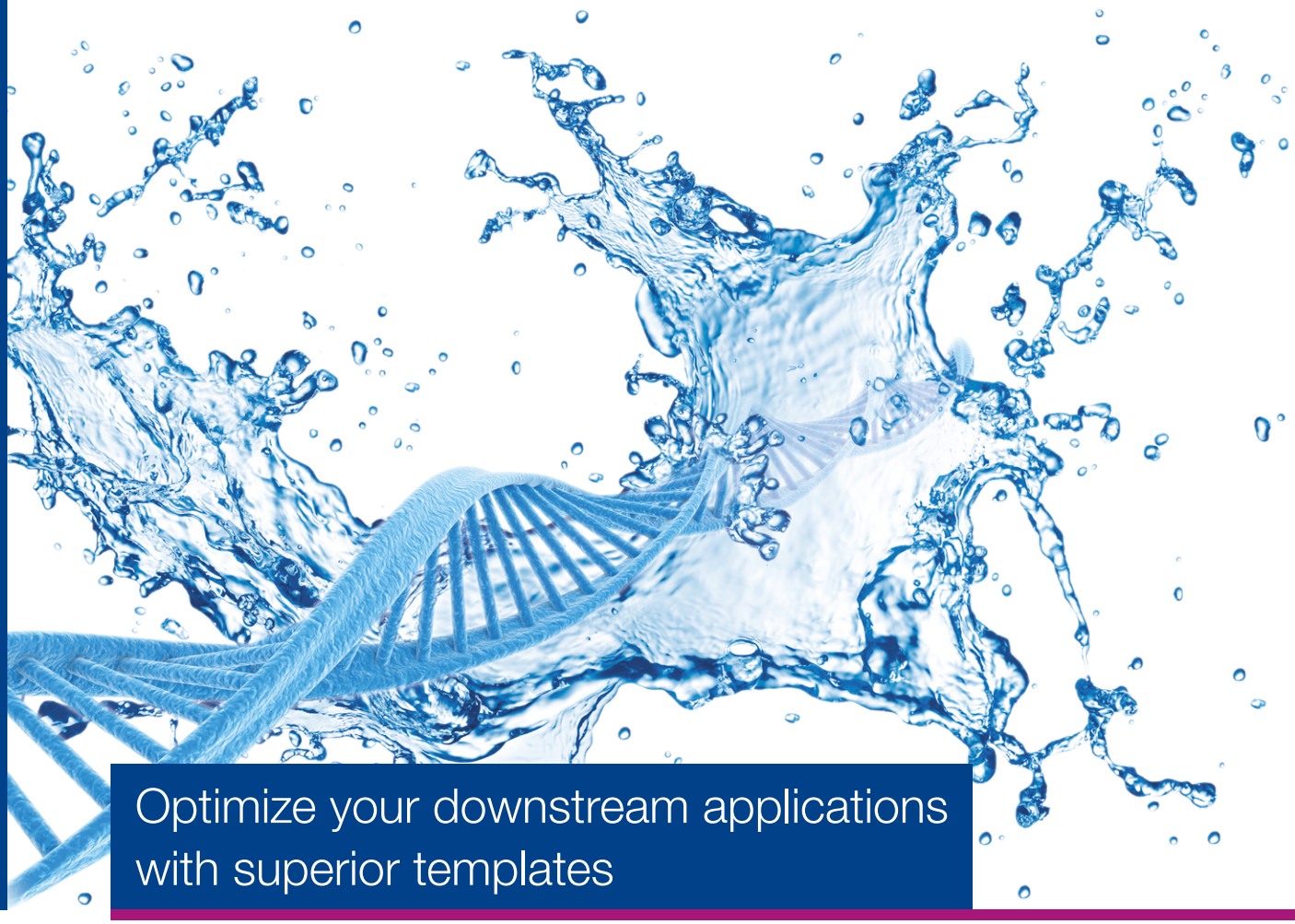
Bioanalysis

MACHEREY-NAGEL

DNA and RNA Clean-up guide



Optimize your downstream applications with superior templates

- Fast and easy to handle procedures
- Complete removal of contaminants
- From small to large scale for highest flexibility

DNA and RNA Clean-up guide

DNA and RNA Clean-up products from MACHEREY-NAGEL

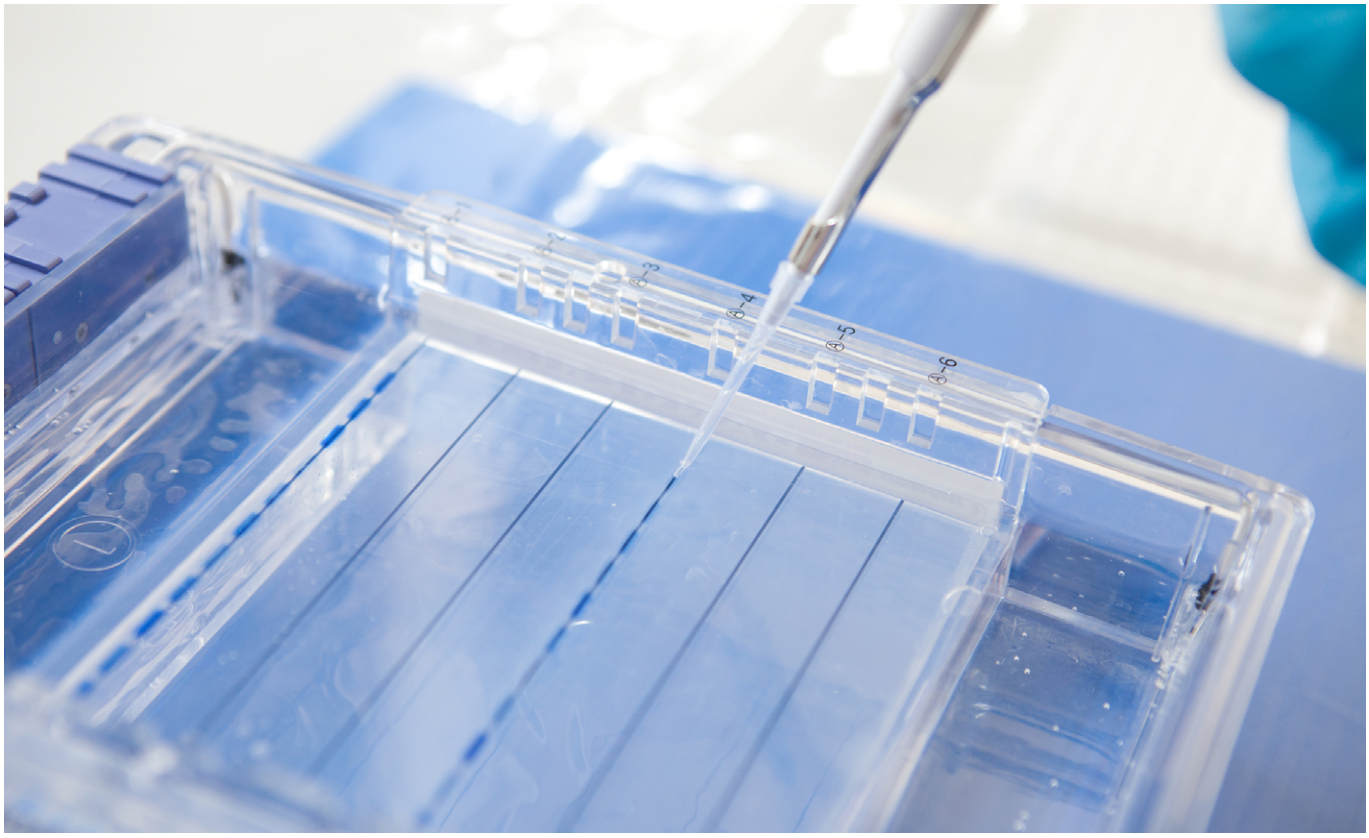
DNA and RNA Clean-up are some of the most commonly performed lab procedures. New technologies such as NGS have increased the demand for Clean-up products significantly as well as simple and fast Clean-up procedures are more important than ever before.

Furthermore, the spectrum of samples is getting larger as researchers are interested in cleaning up DNA and RNA, small and large samples, as well as purification of one sample or a multitude of samples.

MN as reliable partner

Due to our enormous experience, MACHEREY-NAGEL is known as pioneer in the field of DNA and RNA purification. In addition, MN teams of research experts are continuously working to adapt our product portfolio to evolving customer needs. Therefore, MN provides ready to use kits for any Clean-up procedure independent of scale. The procedures are fast and easy to use, greatly simplifying your experiments.

Feel free to contact our Customer Service Center and take advantage of a highly experienced team of scientific experts from MACHEREY-NAGEL.



DNA and RNA Clean-up guide

Kits for DNA and RNA Clean-up technologies

Sample material	Scale	Product	Page
PCR mixture	XS	NucleoSpin® Gel and PCR Clean-up XS	4
	Mini	NucleoSpin® Gel and PCR Clean-up	4
	Midi	NucleoSpin® Gel and PCR Clean-up Midi	4
	Maxi	NucleoSpin® Gel and PCR Clean-up Maxi	4
	8-well	NucleoSpin® 8 PCR Clean-up	5
	96-well	NucleoSpin® 96 PCR Clean-up	5
		NucleoFast® 96 PCR	6
	Flexible	NucleoMag® NGS Clean-up and Size Select	7
Gel slice	XS	NucleoSpin® Gel and PCR Clean-up XS	4
	Mini	NucleoSpin® Gel and PCR Clean-up	4
	Midi	NucleoSpin® Gel and PCR Clean-up Midi	4
	Maxi	NucleoSpin® Gel and PCR Clean-up Maxi	4
NGS reaction mixtures	Flexible	NucleoMag® NGS Clean-up and Size Select	7
DNA solution	XS	NucleoSpin® gDNA Clean-up XS	8
	Mini	NucleoSpin® gDNA Clean-up	8
	Mini	NucleoSpin® Inhibitor Removal	9
RNA solution	XS	NucleoSpin® RNA Clean-up XS	10
	Mini	NucleoSpin® RNA Clean-up	10
	Midi	NucleoSpin® RNA Midi*	10
	Maxi	NucleoSpin® RNA Clean-up Maxi	10
	Flexible	NucleoMag® NGS Clean-up and Size Select	7
Sequencing reaction mix	Mini	NucleoSEQ®	11

*RNA clean up using support protocol: See user manual for details.

Clean-up technologies

	NucleoSpin®	NucleoSpin® 8	NucleoSpin® 96	NucleoFast®	NucleoMag®	NucleoSEQ®
Technology	Silica membrane	Silica membrane	Silica membrane	Ultrafiltration	Magnetic bead	Gel filtration
Format	XS, Mini, Midi, Maxi	8-well strip	96-well plate	96-well plate	Flexible	Mini
Processing	Centrifugation	Vacuum / centrifugation	Vacuum / centrifugation	Vacuum / centrifugation	Magnet	Centrifugation

Icon annotation

Mini spin column for microcentrifuge tubes (1.5 mL or 2 mL). A funnel shaped thrust ring is holding a silica membrane of 2.0 mm diameter for xtra small elution volumes

Mini spin column for microcentrifuge tubes (1.5 mL or 2 mL)

15 mL NucleoSpin® Midi Column for centrifuges

50 mL NucleoSpin® Maxi Column for centrifuges

Superparamagnetic beads

Mini spin columns in 8-well strip format

Mini spin columns in 96-well plate format

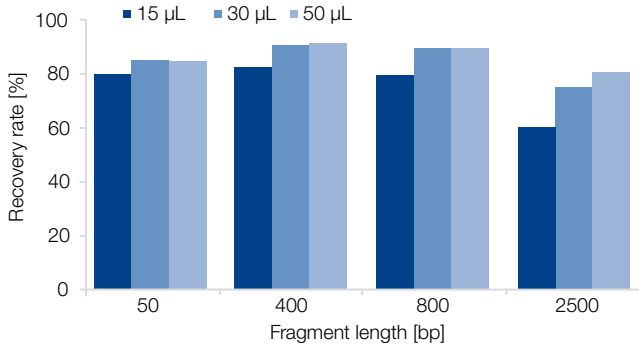
NucleoSpin® Gel and PCR Clean-up

PCR Clean-up and gel extraction – the two in one kit

- High recoveries for small fragments down to 50 bp
- Separate buffers for single stranded DNA / RNA or SDS containing samples available
- Purify DNA from up to 10 mL reactions or 10 g agarose gels

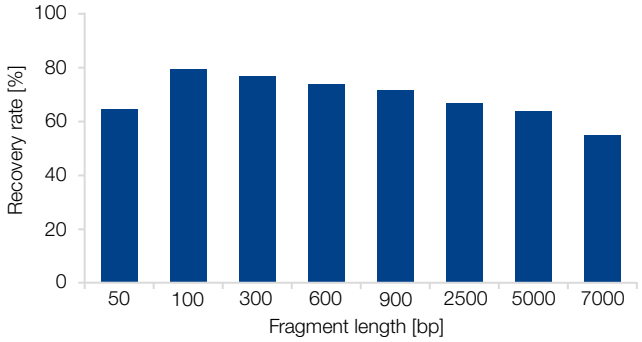
	XS NucleoSpin® Gel and PCR Clean-up XS	Mini NucleoSpin® Gel and PCR Clean-up	Midi NucleoSpin® Gel and PCR Clean-up Midi	Maxi NucleoSpin® Gel and PCR Clean-up Maxi
Technology	Silica membrane technology	Silica membrane technology	Silica membrane technology	Silica membrane technology
Sample material	< 200 µl PCR reaction mixture < 200 mg TAE / TBE agarose gel	< 400 µL PCR reaction mixture < 400 mg TAE / TBE agarose gel	< 4 mL PCR reaction mixture < 4 g TAE / TBE agarose gel	< 10 mL PCR reaction mixture < 10 g TAE / TBE agarose gel
Fragment size	50 bp–approx. 20 kbp	50 bp–approx. 20 kbp	50 bp–approx. 20 kbp	50 bp–approx. 20 kbp
Typical recovery	70–95 %	70–95 %	70–95 %	70–95 %
Elution volume	6–12 µL	15–30 µL	200–400 µL	1000 µL
Binding capacity	5 µg	25 µg	75 µg	250 µg
Preparation time	10 min/6 preps	10 min/6 preps	25 min/6 preps	30 min/6 preps

Application data



PCR Clean-up: High recovery down to 50 bp

High recovery rates were achieved with the NucleoSpin® Gel and PCR Clean-up Mini for fragments down to 50 bp, demonstrating the ability to reliably purify even short fragments into as little as 15 µL of elution volume (15 µL elution volume in dark blue, 30 µL elution volume in blue, and 50 µL in light blue).



Gel extraction: High recovery for a wide range of fragment sizes

A high extraction yield was reliably reached across the fragment size span using MACHEREY-NAGEL's NucleoSpin® Gel and PCR Clean-up Mini kit.

Reference list

Ordering information

Product	Preps	REF
NucleoSpin® Gel and PCR Clean-up XS	10 / 50 / 250	740611.10 / .50 / .250
NucleoSpin® Gel and PCR Clean-up	10 / 50 / 250	740609.10 / .50 / .250
NucleoSpin® Gel and PCR Clean-up Midi	20	740986.20
NucleoSpin® Gel and PCR Clean-up Maxi	20	740610.20
Related products		
Buffer NTB (for Clean-up of SDS containing samples)	150 mL / 1000 mL	740595.150 / .1
Buffer NTC (for Clean-up of single stranded DNA)	125 mL	740654.100

DNA and RNA Clean-up guide

NucleoSpin® 8 / 96 PCR Clean-up

Flexible PCR Clean-up in medium to high throughput format

- Complete removal of primers and primer dimers
- Flexible 8-well strip format and 96-well plates available
- Scripts for full automation available

Contact us for automation support!

	8-well NucleoSpin® 8 PCR Clean-up	96-well NucleoSpin® 96 PCR Clean-up
Technology	Silica membrane technology	Silica membrane technology
Sample material	< 100 µL PCR reaction mixture	< 100 µL PCR reaction mixture
Fragment size	50 bp–approx. 10 kbp	50 bp–approx. 10 kbp
Typical recovery	75–95 %	75–95 %
Elution volume	75–150 µL	75–150 µL
Binding capacity	15 µg	15 µg
Preparation time	30 min/6 strips	45 min/plate

Reference

Guimaraes *et al.*, 2016 “A cost-effective high-throughput metabarcoding approach powerful enough to genotype ~44,000 year-old rodent remains from Northern Africa” Molecular Ecology

Ordering information

Product	Preps	REF
NucleoSpin® 8 PCR Clean-up	12 x 8 / 60 x 8	740668 / .5
NucleoSpin® 8 PCR Clean-up Core Kit*	48 x 8	740463.4
NucleoSpin® 96 PCR Clean-up	1 x 96 / 2 x 96 / 4 x 96 / 24 x 96	740658.1 / .2 / .4 / .24
NucleoSpin® 96 PCR Clean-up Core Kit*	4 x 96	740464.4

*Kits with basic content focusing on automation platforms. Additional accessories can be combined as needed.

NucleoFast® 96 PCR

Cost and time efficient 96-well ultrafiltration kit for PCR Clean-up

- Ready to use DNA for sequencing and microarray spotting
- No well to well cross-contamination
- Very easy and time saving procedure

	NucleoFast® 96 PCR
Technology	Ultrafiltration
Sample material	20–300 µL PCR reaction mixture
Fragment size	> 150 bp
Typical recovery	40–95 %
Recovery volume	25–100 µL
Binding capacity	15 µg
Preparation time	25 min/plate

Reference

Chelkha et al., 2020 “Vermamoeba vermiformis CDC-19 draft genome sequence reveals considerable gene trafficking including with candidate phyla radiation and giant viruses.” Scientific Reports

Rosenberg *et al.*, 2018 “A recurrent point mutation in PRKCA is a hallmark of chordoid gliomas.” Nature Communications

Ordering information

Product	Preps	REF
NucleoFast® 96 PCR	4 x 96	743500.4
Related product		
NucleoFast® 96 PCR Plates	10 x 96 / 50 x 96	743100.10 / .50

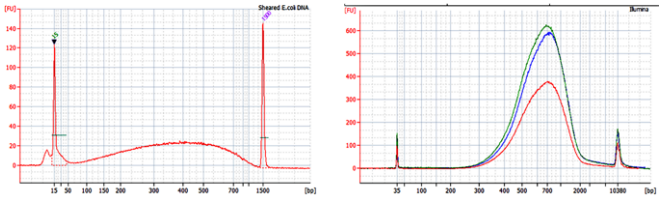
NucleoMag® NGS Clean-up and Size Select

Magnetic bead-based DNA and RNA Clean-up

- Tunable size selection from 150 bp to 800 bp – highest flexibility for customer specific applications
- Efficient Clean-up of NGS library preparation reactions
- Suitable also for PCR, RNA and cDNA Clean-up

	Mag NucleoMag® NGS Clean-up and Size Select
Technology	Magnetic bead technology
Applications	Size selection for next-generation-sequencing workflows, PCR Clean-up, RNA or cDNA Clean-up after purifications or enzymatic reactions (i.e. IVT or DNA digestion)
Fragment size	150 bp–800 bp (tunable)
Recovery	70–100 %
Elution volume	10–100 µL
Product sizes	5 mL, 50 mL, 500 mL

Application data

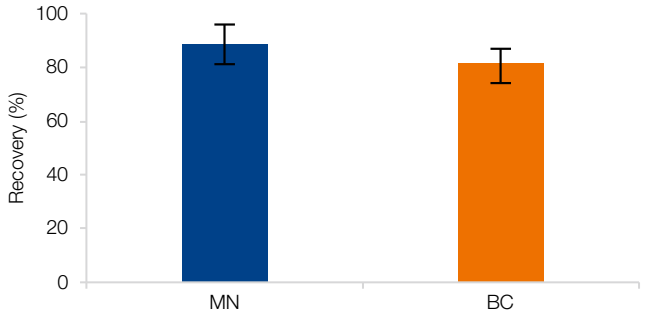


Fragment size analysis of prepared NGS libraries

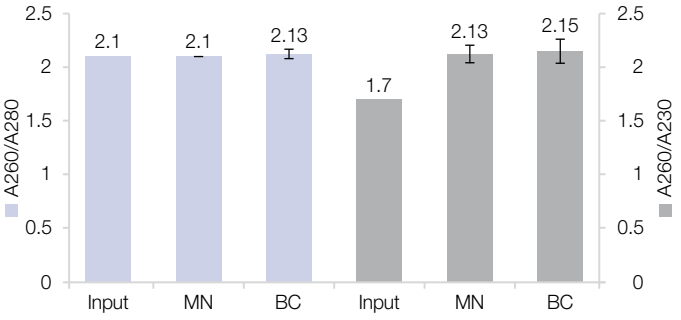
NGS libraries were prepared using Truseq™ DNA PCR Free kit from Illumina (red), AMPure® XP (blue) and NucleoMag® NGS Clean-up and Size Select (green) for Clean-up and size selection steps. (A) Input DNA, 1 µg sheared *E. coli* DNA. (B) Size distribution of DNA Fragments after library preparation as input for sequencing with expected fragment size of 650 bp (insert + adapters).

Data kindly provided by TAKARA BIO INC.

A



B



RNA Clean-up with reliable recovery rates as well as high purities

A) MACHEREY-NAGEL's (MN) NucleoMag® NGS Clean-up and Size Select beads as well as RNAClean® XP beads from Beckman Coulter (BC) were used for Clean-up of RiboRuler High Range Ladder, resulting in recovery rates of 88.6 ± 7,4 % (MN) and 81.5 ± 5,4 % (BC). B) RNA isolated from HeLa cells were used as input for Clean-up reactions which generated improved purities.

Reference list

Ordering information

Product	Product sizes	REF
NucleoMag® NGS Clean-up and Size Select	5 / 50 / 500 mL	744970.5 / .50 / .500

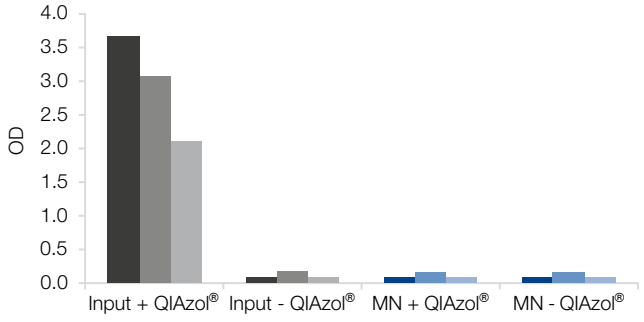
NucleoSpin® gDNA Clean-up

Effective post Clean-up and concentration of DNA

- Highly pure genomic DNA for successful downstream applications
- Easier and faster DNA concentration compared to microdialysis filtration units

	XS NucleoSpin® gDNA Clean-up XS	Mini NucleoSpin® gDNA Clean-up
Technology	Silica membrane technology	Silica membrane technology
Sample material	< 400 µL aqueous DNA solution (< 2 µg DNA)	< 150 µL aqueous DNA solution (< 25 µg DNA)
Fragment size	> 200 bp	> 200 bp
Typical recovery	60–70 %	80–90 %
Elution volume	6–15 µL	50–100 µL
Binding capacity	3 µg	50 µg
Preparation time	10 min/6 preps	10 min/6 preps

Application data



Efficient Clean-up of genomic DNA with minimal loss

DNA fragments with and without QIAzol® / TRIzol® contamination (1 %) were purified with the NucleoSpin® gDNA Clean-up kit (elution volume 50 µL). A spectrophotometric analysis of the input fractions (with and without QIAzol® contamination) in comparison to the purified samples demonstrates the efficient clean up with the NucleoSpin® gDNA Clean-up kit. The phenol contamination is removed entirely with minimum losses in final DNA yield, resulting in an absorbtion spectrum essentially identical to that of the non-contaminated input DNA (Input (- QIAzol®)). Bars colored in grey / blue correspond to A_{230}, medium grey / medium blue colored bars to A_{260}, and light grey / light blue colored bars to A_{280}.

Ordering information

Product	Preps	REF
NucleoSpin® gDNA Clean-up XS	10 / 50 / 250	740904.10 / .50 / .250
NucleoSpin® gDNA Clean-up	10 / 50 / 250	740230.10 / .50 / .250

NucleoSpin® Inhibitor Removal

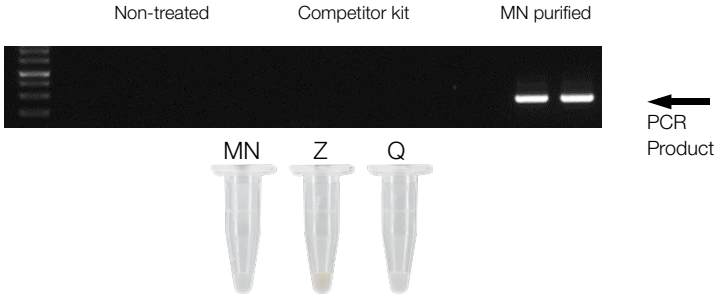
Get pure and amplifiable DNA for your downstream application

- Removes PCR inhibitors and discoloration
- Superior DNA recovery
- Two optimized protocols enable purification of even the most diverse sample

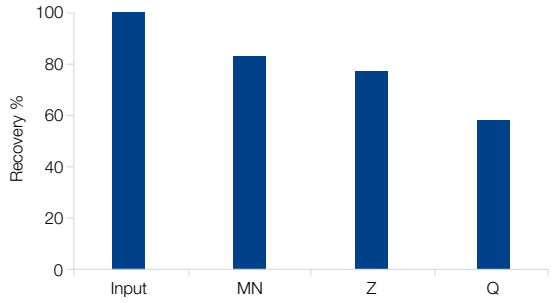
	Mini NucleoSpin® Inhibitor Removal
Technology	Silica membrane technology
Sample material	Contaminated DNA preparations from diverse sample source, up to 100 µL
Fragment size	200 bp – approx. 50 kbp
Typical recovery	Typically > 75 %
Elution volume	50–100 µL
Binding capacity	60 µg
Preparation time	15 min/6 preps

Application data

A



B



C

Heme contaminated samples

	Input	MN	Z
$A_{260/280}$	0.9	1.7	1.6
$A_{260/230}$	0.5	1.8	0.7

Humic acid contaminated samples

	Input	MN	Z
$A_{260/280}$	1.2	1.6	1.3
$A_{260/230}$	0.5	1.2	0.8

Polyphenol contaminated samples

	Input	MN	Z
$A_{260/280}$	1.1	1.7	1.4
$A_{260/230}$	0.4	2.3	0.5

Remove PCR Inhibitors and discoloration

A) DNA is efficiently amplified by PCR following purification with the NucleoSpin® Inhibitor Removal Kit. PCR amplification was completely inhibited for the non-treated but also for the sample processed with a competitor Clean-up kit. Equal amounts of DNA were used for each PCR and equivalent volumes were analyzed on an agarose gel. B) Superior DNA recovery with NucleoSpin® Inhibitor Removal Kit C) NucleoSpin® Inhibitor Removal Kit improves $A_{260/280}$ and $A_{260/230}$ ratios and qPCR results for a huge variety of known PCR inhibitors, including polyphenolic compounds, humic acids and heme.

Ordering information

Product	Preps	REF
NucleoSpin® Inhibitor Removal	10 / 50	740408.10 / .50

NucleoSpin® RNA Clean-up

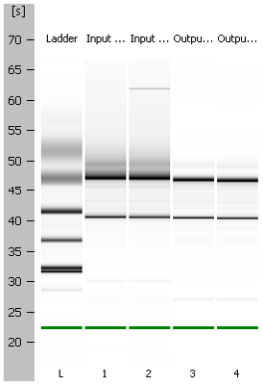
Highly efficient Clean-up and concentration of RNA samples

- Complete removal of PCR inhibitors
- Time saving procedure without DNase digestion and homogenization steps
- From XS to Maxi format – choose the needed format

	XS NucleoSpin® RNA Clean-up XS	Mini NucleoSpin® RNA Clean-up	Midi NucleoSpin® RNA Midi*	Maxi NucleoSpin® RNA Clean-up Maxi
Technology	Silica membrane	Silica membrane	Silica membrane	Silica membrane
Sample material	< 300 µL RNA solution (< 90 µg RNA)	< 200 µL RNA solutions	< 500 µL RNA solution	< 35 mg RNA solution
Fragment size	> 200 nt	> 200 nt	> 200 nt	> 200 nt
Typical recovery	85–95 %	85–95 %	85–95 %	85–95 %
Elution volume	5–30 µL	40–120 µL	500–1000 µL	1–5 mL
Binding capacity	110 µg	200 µg	700 µg	35 mg
Preparation time	20 min/6 preps	20 min/6 preps	25 min/6 preps	30 min/6 preps

*RNA Clean-up using support protocol: See user manual for details.

Application data



Purification of high quality RNA from reaction mixtures

RNA quality (RIN) and quantity were analyzed with an Agilent® Bioanalyzer, Agilent® RNA 6000 Nano chip, and Agilent® RNA 6000 Nano reagent before and after clean-up. The crude RNA solution (lane 1 and 2) show low RNA concentrations around 85 ng/µL. Nevertheless, the RNA is not degraded and has a high RIN of about 9.4. Lane 3 and 4 show the corresponding RNA after DNase digestion and purification with NucleoSpin® RNA Clean-up XS. RNA quality is not affected by the whole procedure showing similar RIN and high recovery of about 95 % in a total volume of 20 µL.

Reference list

Ordering information

Product	Preps	REF
NucleoSpin® RNA Clean-up XS	10 / 50 / 250	740903.10 / .50 / .250
NucleoSpin® RNA Clean-up	10 / 50 / 250	740948.10 / .50 / .250
NucleoSpin® RNA Midi	20	740962.20
NucleoSpin® RNA Clean-up Maxi	20	740910.20

DNA and RNA Clean-up guide

NucleoSEQ®

Prefilled single spin columns for dye terminator removal

- Efficient removal of dye terminators without ethanol precipitation
- Convenient spin column format for fast sample processing
- Long term storage at room temperature

	Mini NucleoSEQ®
Technology	Gel filtration
Sample material	20 µL sequencing reaction mix
Preparation time	5 min/prep (without hydration of matrix)

Reference

Mervai *et al.*, 2018 “Diethylnitrosamine induces lung adenocarcinoma in FVB/N mouse.” BMC Cancer

Ordering information

Product	Preps	REF
NucleoSEQ®	10 / 50 / 250	740523.10 / .50 / .250

DNA and RNA Clean-up guide

Ordering information

Product	Preps	REF
PCR Clean-up and gel extraction		
NucleoSpin® Gel and PCR Clean-up XS	10 / 50 / 250	740611.10 / .50 / .250
NucleoSpin® Gel and PCR Clean-up	10 / 50 / 250	740609.10 / .50 / .250
NucleoSpin® Gel and PCR Clean-up Midi	20	740986.20
NucleoSpin® Gel and PCR Clean-up Maxi	20	740610.20
PCR Clean-up		
NucleoSpin® 8 PCR Clean-up	12 x 8 / 60 x 8	740668 / .5
NucleoSpin® 8 PCR Clean-up Core Kit*	48 x 8	740463.4
NucleoSpin® 96 PCR Clean-up	1 x 96 / 2 x 96 / 4 x 96 / 24 x 96	740658.1 / .2 / .4 / .24
NucleoSpin® 96 PCR Clean-up Core Kit*	4 x 96	740464.4
NucleoFast® 96 PCR	4 x 96	743500.4
NGS Clean-up and size selection	Pack of	
NucleoSpin® NGS Clean-up and Size Selection	5 / 50 / 500 mL	744970.5 / .50 / .500
Genomic DNA Clean-up	Preps	
NucleoSpin® gDNA Clean-up XS	10 / 50 / 250	740904.10 / .50 / .250
NucleoSpin® gDNA Clean-up	10 / 50 / 250	740230.10 / .50 / .250
NucleoSpin® Inhibitor Removal	10 / 50	740408.10 / .50
RNA Clean-up		
NucleoSpin® RNA Clean-up XS	10 / 50 / 250	740903.10 / .50 / .250
NucleoSpin® RNA Clean-up	10 / 50 / 250	740948.10 / .50 / .250
NucleoSpin® RNA Midi**	20	740962.20
NucleoSpin® RNA Clean-up Maxi	20	740910.20
Dye terminator removal		
NucleoSEQ®	10 / 50 / 250	740523.10 / .50 / .250

*Kits with basic content focusing on automation platforms. Additional accessories can be combined as needed.
**RNA clean up using support protocol: See user manual for details.

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