NucleoSpin® 96 RNA

Automated high throughput RNA purification using silica membrane-based kits with Waters™ liquid handling robot Andrew+™ and Extraction+™ vacuum module

Application benefits

Elevate your nucleic acid purification processes using MACHEREY-NAGEL's DNA/RNA purification kits in conjunction with Waters Andrew+ automated liquid handling system:

- Flexible sample numbers: process up to 96 samples in parallel
- Consistent recovery of RNA ensuring reliable reproducibility in both yield and purity
- For any questions regarding reagents or automation support please contact: support@mn-net.com

Keywords

RNA, nucleic acid extraction, automated RNA purification, animal tissue, cell culture, liquid handling system, high-purity, high-yield, transcriptome

Andrew+

The Andrew+ offers versatility through the incorporation of various modules, pipettes, gripper and vacuum chamber. The configuration allows for the processing of silica-membrane-based NucleoSpin® 96 DNA/RNA as well as NucleoBond® Midi extraction kits.

Introduction

High-throughout extraction of RNA from human cells or animal tissue is pivotal for large-scale transcriptomic profiling and high-throughput RNA sequencing. These methods enable the identification of unique gene expression patterns and common expression signatures, useful in research areas such as medical research. For transcriptomic analyses, including qRT-PCR and RNA-seq, the bottleneck is often the quality of the RNA. High quality and integrity RNA is crucial as starting material for these downstream applications. Therefore, these methods depend on reliable, high-throughput extraction workflows that ensure accurate and reproducible data.

In general, RNA extraction is often challenging due to mainly three factors 1) degradation of RNAs by ubiquitous RNases, 2) low yields and purities and 3) contamination of genomic DNA. To overcome these challenges, MACHEREY-NAGEL offers an established method for the silica-membrane-based RNA purification from animal tissues and cells for 96 samples – NucleoSpin® 96 RNA – which delivers high RNA yields and integrity. The kit combines fast, automated processing with established and reliable RNA purifications.

In cooperation with Waters pipetting robot Andrew+ with the Extraction+ module as vacuum chamber, MACHEREY-NAGEL's NucleoSpin® 96 RNA kit enables the automated vacuum processing of 96-well plates. This novel protocol allows high throughput RNA purifications with high yields, purities and integrities.

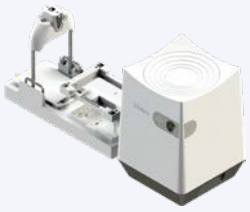
Products at a glance

NucleoSpin® 96 RNA	
Technology	Silica membrane technology
Sample material	< 2 × 10^6 cultured cells, < 20 mg human / animal tissue
Target molecules	RNA
Typical yield	10 – 40 µg depending on sample material and quality
Fragment size	> 200 nt
Preparation time	Approx. 90 – 100 min/plate

Andrew+	
Technology	Automated liquid handling utilizing wireless connected electronic pipettes and a dynamic deck configuration consisting of up to 11 dominos on a conventional bench space. Protocol execution via the OneLab™ software.
Sample numbers	1 – 96 samples
Deck position	For vacuum applications using the Extraction+ module consisting of a remote connected vacuum pump, manifold for SPE processing and gripper.

NucleoSpin® 96 kits now automated on Andrew+ with the Extraction+ vacuum chamber module

- Verified protocols
- Step-by-step protocol in OneLab
- Rapid and easy nucleic acid purifications
- High RNA yields



Extraction+ module

Material and methods

The extraction of RNA from animal tissue and cultured cells was carried out utilizing MACHEREY-NAGEL's NucleoSpin® 96 RNA kit on an Andrew+ platform using the vacuum module Waters Extraction+. The biologically-verified protocol allows for flexibility in sample numbers, accommodating 8 – 96 purifications per run. Briefly, tissue samples were lysed in RA1 buffer supplemented with TCEP and disrupted in a Dispomix (500 – 4000 rpm / 40 sec). Clarification was performed by centrifugation. In contrast, the lysis of HeLa cells was performed by pipetting cells in RA1 buffer supplemented with TCEP up and down.

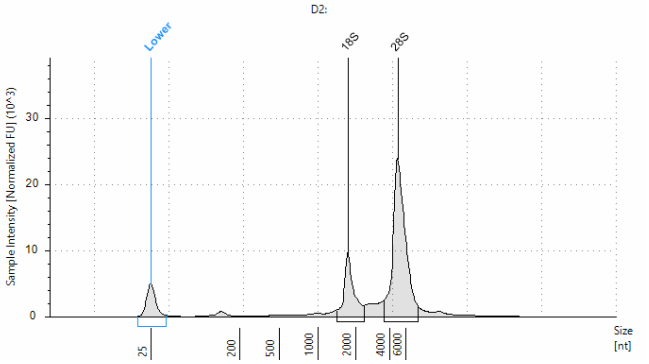
Afterwards, lysates were transferred into a 96-square well block. All subsequent steps are performed fully automated on the Andrew+ without manual intervention. Lysates were transferred onto the NucleoSpin® 96 RNA Binding Plate and the binding is performed on the Extraction+. After binding RNA to the silica membrane, contaminants such as salts or proteins were removed through three consecutive washing steps. The highly purified RNA was ultimately eluted in RNase-free H_2O. All pipetting steps were carried out by the Andrew+, utilizing the Extraction+ module for all vacuum filtration steps.

Application data

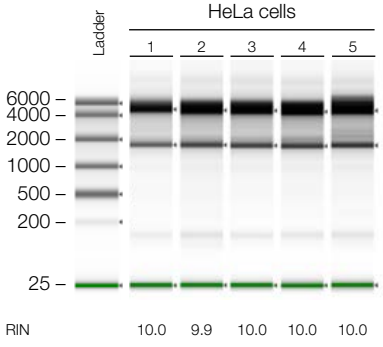
Exceptional quality of isolated RNA from HeLa cells

The NucleoSpin® 96 RNA and the Andrew+ combine the benefits of high-quality RNA extractions from animal tissue and mammalian cell cultures with a user-friendly and automated system. The combination is suitable for a wide range of animal tissue and cultured cells resulting in high yields and purities. Extraction of RNA from HeLa cells results in exceptional quality shown in the electropherogram and agarose gel analysis.

A)



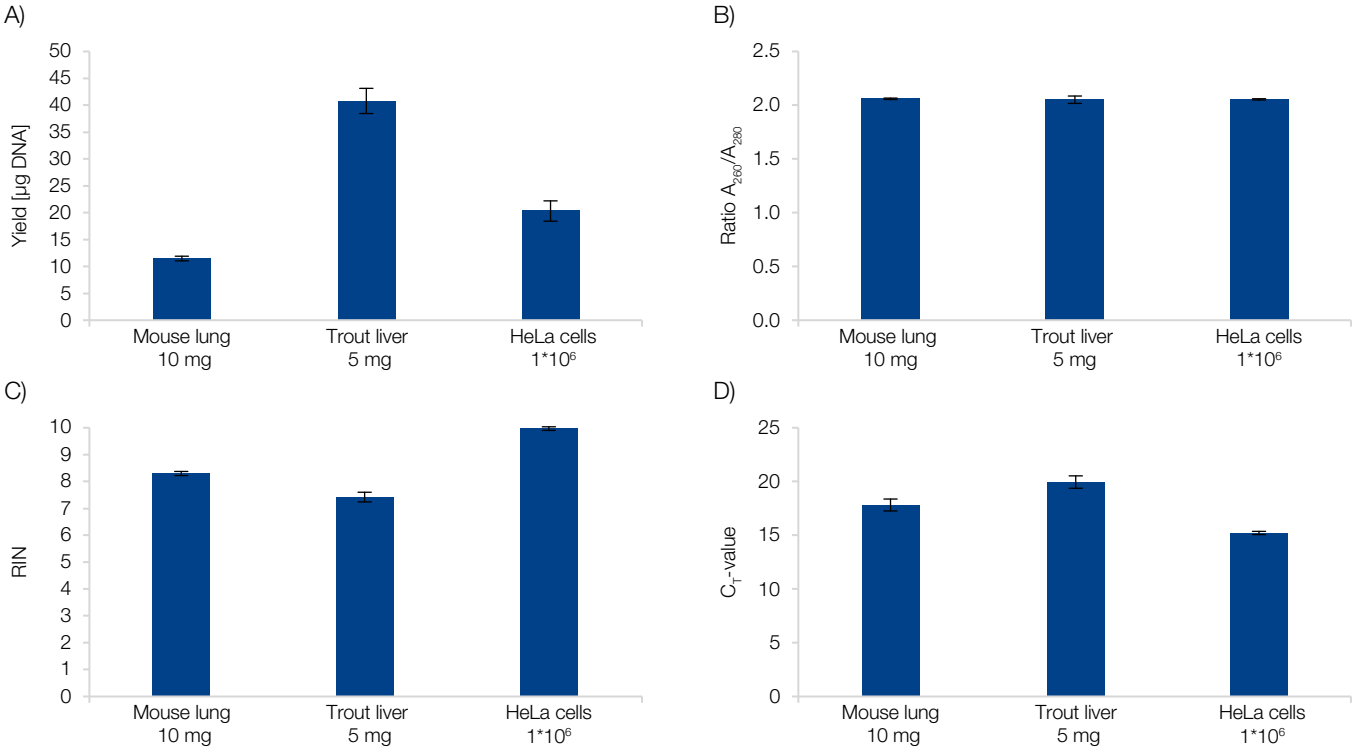
B)



Isolation of high-quality RNA from HeLa cells

RNA was isolated from HeLa cells using the NucleoSpin® 96 RNA kit on the Andrew+. 1 µL of purified RNA from HeLa cells (A) was analyzed on the Agilent TapeStation 4150 using RNA ScreenTapes. Images show one electropherogram as an example (A) and agarose gel analysis (B) of RNA isolated with the NucleoSpin® 96 RNA kit from HeLa cells.

Outstanding RNA yield and quality from various sample materials suitable for downstream applications



High yield and high quality RNA from various sample materials

RNA was extracted from animal tissue and mammalian HeLa cells. 10 mg mouse lung tissue, 5 mg trout liver tissue and 1 × 10^6 HeLa cells were used as sample input material (n = 8). Automated RNA extraction was performed on the Andrew+ using the NucleoSpin® 96 RNA kit. RNA quantity (A) and purity (B: Ratio A_{260}/ A_{280}) were determined photometrically. Results show high RNA yields and purities for different sample materials.
RNA integrity (C, RIN, n = 5) was analyzed on the Agilent TapeStation 4150 using RNA Screen Tapes. Subsequent qRT-PCR analysis (D) targeting GAPDH (mouse), RPL13 (trout) or beta-actin (HeLa) was conducted using the SensiFast™ probe Lo-ROX one-step kit from BioLine on an Applied Biosystems® 7500 Real-Time PCR System. Results show a high amplification of RNA across all sample materials, indicating high quality RNA and the efficient removal of inhibitors and bias free lysis of the samples (n = 8 each).

Speed up and automate your RNA extraction

MACHEREY-NAGEL and Andrew+ deliver an automated solution for your high throughput RNA extraction. We adapted the NucleoSpin® 96 RNA kit on the Andrew+ using the Extraction+ vacuum module to speed up your nucleic acid purification workflow.

- Flexible sample numbers (multiple of 8) and fast processing of 96 samples within 100 minutes lysis.
- Reliable performance and excellent yields using NucleoSpin® 96 RNA kit on the Andrew+ robot.

Andrew+ and MACHEREY-NAGEL as strong collaboration partners

The combined expertise of MACHEREY-NAGEL and the Andrew+ robot allowed the establishment of fully automated solutions for high-quality nucleic acid purifications. MACHEREY-NAGEL's NucleoSpin® and NucleoBond® technology enable rapid and easy nucleic acid purifications. Waters OneLab software offers a complete on-screen, step by step guide through the protocol and allows to track each protocol step. Together, we have established several solutions for fully automated genomic DNA extraction and plasmid DNA extractions from Mini to Midi formats.

For more information, please have a look at our partner pages.

www.mn-net.com/andrew

www.waters.com/labautomation

Want to schedule an e-demo?
Need additional information?

Contact the MN technical support!
support@mn-net.com
+49 (0) 2421 969 333

Ordering information

Product	Specifications	Pack of	REF
NucleoSpin® 96 RNA	Silica membrane-based kit for the isolation of ultrapure RNA from animal tissue, cells, human tissue, saliva, including NucleoSpin® RNA Plates, elution plates, wash plates, buffers, and rDNase (lyophilized)	1 × 96 / 4 × 96 / 24 × 96	740709.1 / .4 / .24
Andrew+ Pipetting Robot*	Automated liquid handling system for precise and reproducible pipetting workflows	1	176005081
Extraction+ module*	Vacuum-based module enabling automated filtration and nucleic acid purification	1	176005201
NucleoSpin® 96 RNA Filter plate	For filtration of cels and tissue homogenization, for use under vacuum or centrifugation	4 × 96-well filter plate	740711
NucleoProtect® RNA	RNA Stabilization solution	1 × 50 mL, 1 × 250 mL, 1 × 500 mL	740400.50 / .250 / .500
Elution plate U-bottom	96-well microplate with 300 µL u-bottom, including self-adhering foil	24	740486.24

* For more detailed information, please visit onelab.com/library.
To contact Waters, please visit www.waters.com/labautomation.

www.mn-net.com

MACHEREY-NAGEL GmbH & Co. KG · Valencienner Str. 11 · 52355 Düren · Germany
DE +49 24 21 969-0 info@mn-net.com
CH +41 62 388 55 00 sales-ch@mn-net.com
FR +33 388 68 22 68 sales-fr@mn-net.com
US +1 888 321 62 24 sales-us@mn-net.com