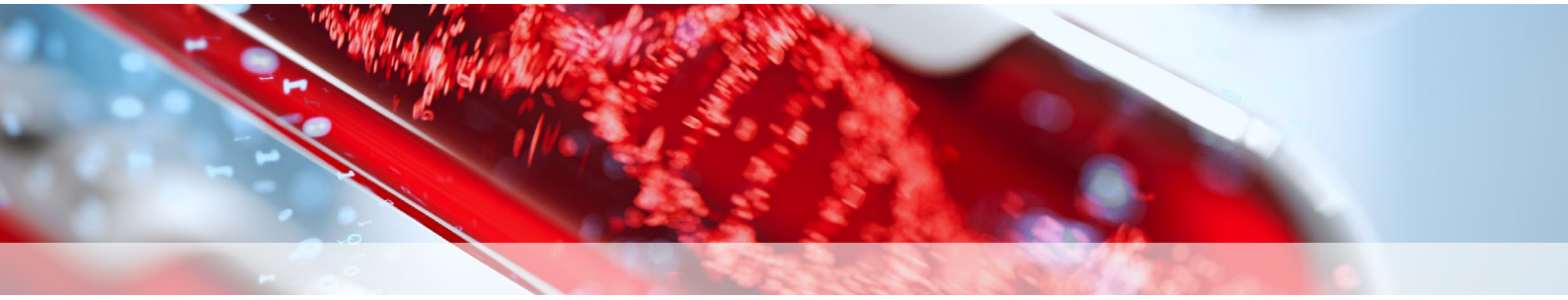
MACHEREY-NAGEL

NucleoMag® Blood 3 mL

Rapid, medium-throughput DNA purification from large volume blood samples using the Hamilton NIMBUS® Presto workstation



Introduction

The isolation of genomic DNA is the initial step for molecular genetic analysis of blood samples. Routine applications using DNA from blood samples include genotyping, HLA typing, biomarker discovery, patient screenings, and pharmacogenetics.

To enable state of the art molecular diagnostics, the sensitivity and performance of biomolecular detection methods like qPCRs, next-generation sequencing, and microarray analysis, is constantly improved. A main aspect to face these workflow requirements is to facilitate the extraction of highly pure DNA in substantial amounts.

The Hamilton NIMBUS Presto workstation combines the advantages of automated liquid handling and magnetic rod processing instruments. It eliminates time consuming manual pre-filling of plates and thereby remarkably reduces hands-on time for nucleic acid purifications. At the same time, by using KingFisher™ technology, this system is able to conduct nucleic acid purifications from lysis to final elution within approx. 70 minutes.

Together with Hamilton, MACHEREY–NAGEL has established its NucleoMag® technology on the NIMBUS Presto system. Here, we demonstrate the utility and advantages of combining these technologies to fully automate your high-throughput DNA sample preparation from whole blood samples.

Your advantages at a glance

- Proven NucleoMag® lysis and purification procedure suitable for fresh, frozen and EDTA blood samples
- Automated plate prefilling and plate handling by the Hamilton NIMBUS liquid handling system
- High speed nucleic acid purification by the integrated KingFisher™ Presto instrument
- Ready to use DNA for all common downstream applications

NucleoMag® Blood 3 mL	
Technology	Magnetic beads
Sample material	≤ 3 mL whole blood (fresh or frozen, EDTA or citrate-treated)
Elution volume	1000 µL
Typical yield	100–130 µg (from 3 mL depending on sample type and quality)
Preparation time	Approx. 70 min / 24 samples

The NIMBUS Presto workstation combines liquid handling and magnetic rod processing for fully automated, high-throughput nucleic acid extractions.

NIMBUS Presto workstation	
Technology	Automated liquid handling platform (Hamilton NIMBUS) with integrated magnetic rod processing unit (KingFisher™ Presto)
Capacity	1–24 samples (≤ 3 mL sample volume)
Processable volume	50 – 5000 µL
Footprint	L 1359 mm | W 709 mm | H 889 mm

Material and methods

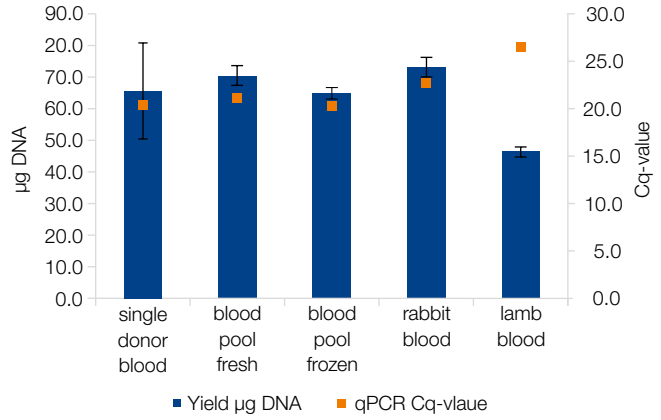
The isolation procedure is based on reversible adsorption of nucleic acids to paramagnetic NucleoMag® B-Beads under appropriate buffer conditions. The DNA purification is performed by a KingFisher™ Presto unit, which is integrated into a NIMBUS liquid handling system.

Whole blood (fresh, frozen, treated with EDTA or citrate) is lysed at room temperature with Lysis Buffer MBL1 and Proteinase K. Following on-deck lysis incubation, binding of DNA to the NucleoMag® B-Beads is achieved by the addition of Binding Buffer MBL2.

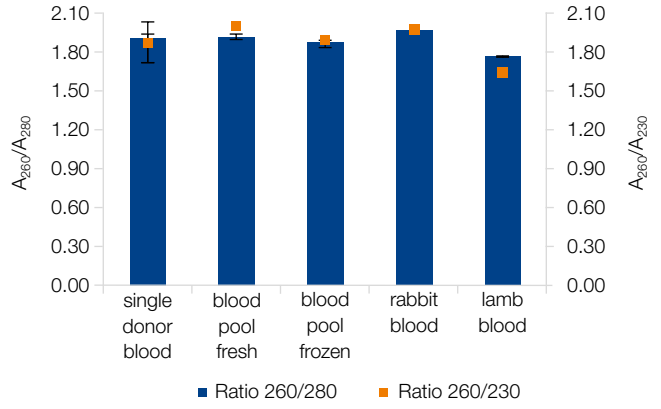
We demonstrate this automated purification workflow for human blood samples from different blood specimens. The tailored protocol allows flexible processing of up to 24 samples per run.

Application data

A

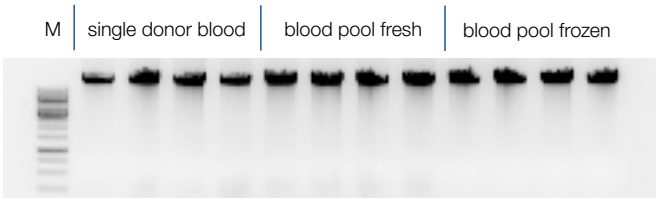


B



Reliable isolation of genomic DNA isolated from blood samples

DNA was isolated in quadruplicates from different human blood samples (fresh blood, pooled fresh blood, pooled frozen blood) and rabbit or lamb blood using the NIMBUS Presto systems. (A) The total yield of nucleic acids was determined by UV spectrometry (dark blue bars) and showed an avarage yield of 46-73 µg. A subsequent qPCR analysis (orange squares) was performed with a Taqman® Probe for a 250 bp ß-Actin amplicon using the SensiFast™ Probe Lo-ROX kit from Bioline on an Applied Biosystems® 7500 Real-Time PCR System. (B) The purity was determined by UV-spectrometry resulting in an average A_{260}/A_{280} value of 1.83 ± 0.2 (dark blue bars) and in an average A_{260}/A_{230} value (orange squares) of 1.95 ± 0.15.



Integrity of isolated nucleic acids

The integrity of the isolated nucleic acids from fresh (single donor; samples 1–4; blood pool, samples 5–8) and frozen (blood pool, samples 9–12) blood sampels was analzyed by gel electrophoresis (10 µL per eluate; 1 % TAE gel; M: GeneRuler™ 1 Kb DNA Ladder – Thermo Scientific).

A rapid, fully automated solution for DNA purification from large volume blood samples

MACHEREY-NAGEL and Hamilton deliver a tailored solution for your automated isolation of genomic DNA from blood samples. We have adapted the NucleoMag® Blood 3 mL procedure on the NIMBUS Presto workstation to meet the requirements of electrophoresis laboratories.

The powerful combination of the NucleoMag® technology and the NIMBUS Presto workstation has several advantages over standard nucleic acid purification procedures:

- Save hands-on time by using automated plate-prefilling and plate-handling performed by the NIMBUS workstation
- Benefit from the high-speed extraction procedure of the integrated KingFisher™ Presto unit
- Reliable recovery and performance in downstream assays from various blood sample material
- Speed up your DNA extraction by processing of 24 blood samples with a volume of 3 mL in ~70 minutes (including sample lysis)

Ordering information

Product	Specifications	Pack of	REF
NucleoMag® Blood 3 mL	Magnetic bead-based kit for the isolation of genomic DNA from blood; including NucleoMag® B-Beads, buffers, Proteinase K	1 x 96 preps	744502.1
NIMBUS Presto	Automated liquid handling platform with 4 pipetting channels, a CO-RE Gripper, barcode scanner, and many additional features		Hamilton*

* For more detailed information, please visit www.hamiltoncompany.com/robotics. To find a Hamilton subsidiary or distributor in your area, please visit www.hamiltoncompany.com/contacts.