

NucleoMag[®] Blood 200 µL

Rapid, high-throughput DNA purification from 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.

The sensitivity, speed and analytical depth of biomolecular methods like qPCR, NGS and microarray analysis have vastly improved in the past years. The need for automated, high throughput nucleic acid purifications due to its high precision, reproducibility and performance has increased constantly.

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 the KingFisher[™] technology, this system is able to conduct nucleic acid purifications from lysate to eluate within 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.

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



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	1–96 samples (≤ 200 µL 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.

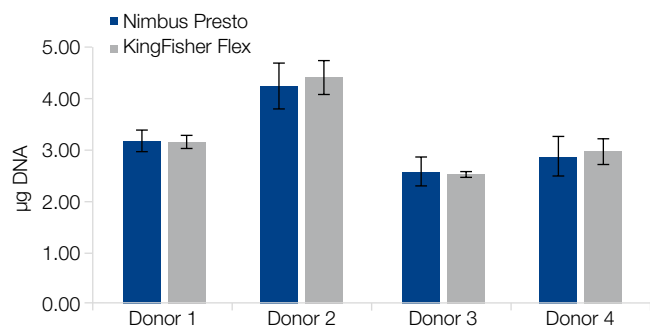
Whole blood (fresh, frozen, treated with EDTA or citrate) is lysed at room temperature with Lysis Buffer MBL1 and Proteinase K. Following on-deck lysis incubation, binding of DNA to the NucleoMag[®] B-Beads is achieved by the addition of Binding Buffer MBL2.

We demonstrate this automated purification workflow for human blood samples from four different donors. The tailored protocol allows flexible processing of up to 96 samples per run.

NucleoMag[®] Blood 200 µL

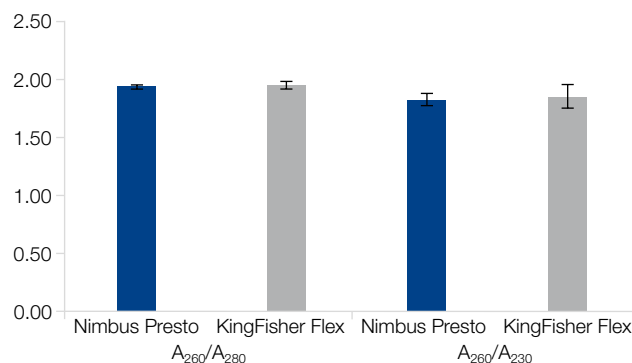
Technology	Magnetic beads
Sample material	≤ 200 µL whole blood (fresh or frozen, EDTA or citrate treated)
Elution volume	50 – 100 µL
Typical yield	2–8 µg (from 200 µL depending on sample type and quality)
Preparation time	Approx. 70 min (excl. lysis) / 96 samples

Application data



Reliable isolation of genomic DNA isolated from blood samples

DNA was isolated in quadruplicates from blood samples of four different donors using the KingFisher Flex and NIMBUS Presto systems. DNA yields were determined photometrically. Both systems deliver comparable DNA yields between 3 and 5 µg per sample in this set of experiments.



Competitive purity of genomic DNA isolated from blood samples

Purity of DNA eluates purified either with the NIMBUS Presto system or the KingFisher Flex was determined photometrically by measuring the OD ratios at 260/280 nm and 260/230 nm. Both systems deliver comparable DNA purities in this set of experiments (16 preparations per method).

	1	2	3	4	5	6	7	8	9	10	11	12
A	NTC	*	23.70	*	23.88	*	23.82	*	23.43	*	23.05	*
B	*	20.67	*	23.52	*	23.63	*	23.71	*	22.91	*	22.88
C	23.00	*	23.09	*	23.42	*	23.96	*	23.25	*	22.66	*
D	*	23.00	*	23.46	*	23.86	*	23.59	*	23.03	*	22.95
E	22.84	*	22.38	*	23.89	*	23.77	*	23.22	*	22.90	*
F	*	22.64	*	23.09	*	23.5	*	23.41	*	22.75	*	22.58
G	22.89	*	21.52	*	22.83	*	23.10	*	23.16	*	22.72	*
H	*	22.87	*	23.02	*	23.35	*	23.18	*	22.79	*	23.21

- Sample (*C_T; NTC=negative control)
- No sample (*C_T; undetermined)

No crosscontamination detected by qPCR assay

Genomic DNA and empty (no DNA) control samples (200 µL each) were arranged in a checkerboard pattern on a 96-well deepwell plate and subjected to the NucleoMag[®] Blood 200 µL kit procedure on the NIMBUS Presto workstation. Presence of DNA in the eluates was examined by qPCR with a Taqman[®] PCR probe for a 250 bp β-Actin amplicon using the SensiFast[™] Probe Lo-ROX kit from Bioline on an Applied Biosystems[®] 7500 Real-Time PCR System. Absence of qPCR signal (*C_T undetermined) in the empty control samples indicates a cross contamination free workflow.

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

MACHEREY-NAGEL and Hamilton deliver a tailored solution for your automated isolation of genomic DNA from blood samples. We adapted the NucleoMag[®] Blood 200 µL procedure on the NIMBUS Presto workstation to meet the requirements of high throughput 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
- Benefit from the high-speed extraction procedure of the integrated KingFisher[™] Presto unit
- Reliable recovery and performance in downstream assays

Ordering information

Product	Specifications	Pack of	REF
NucleoMag [®] Blood 200 µL	Magnetic bead-based kit for the isolation of genomic DNA from blood; including NucleoMag [®] B-Beads, buffers, Proteinase K	1 x 96 preps 4 x 96 preps	744501.1 744501.4
NIMBUS Presto	Automated liquid handling platform with 4 pipetting channels, a CO-RE gripper, barcode scanner and many additional features		Hamilton*

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* 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.