MACHEREY-NAGEL

NucleoMag® DNA Microbiome

Automated purification of DNA from soil and human stool samples on the Eppendorf® ep*Motion*® 5075t/5073t

Introduction

Human health is defined and modulated by microbial populations within and outside of our bodies. Furthermore, the microbiome of the soil and biofilm in our environment has a significant impact on ecosystem health.

One of the most important procedures in microbiome and metagenomics research is the extraction of high quality DNA representative of all species present in a sample. The MACHEREY-NAGEL NucleoMag® DNA Microbiome kit is designed to purify DNA from a variety of sample inputs, including stool, soil and biofilms for microbiome and metagenome analysis and employs unique, patented inhibitor removal technology.

To ensure an efficient lysis, even from hard to lyse organisms, we recommend combining NucleoMag® DNA Microbiome with mechanical homogenization by bead beating (ceramic beads, MN Bead Tubes Type A). The very efficient, ceramic bead-based lysis procedure achieves unbiased mechanical lysis and makes the NucleoMag® DNA Microbiome procedure ideal for microbiome studies.

Product at a glance

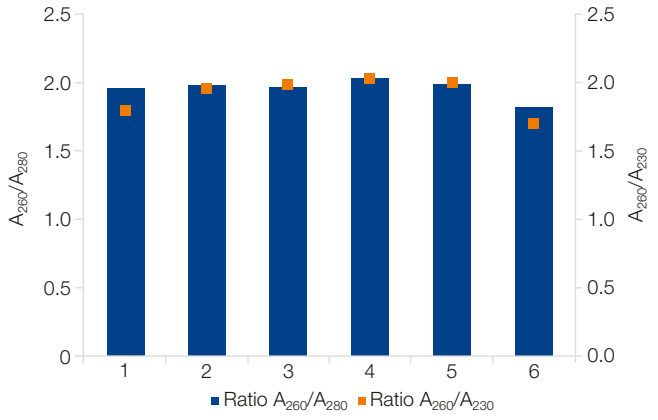
NucleoMag® DNA Microbiome	
Technology	Magnetic beads
Sample material	50–200 mg soil, stool, biolfilm (including swabs)
Preparation time	Approx. 140 min for 96 samples
Typical yield	1–30 µg DNA (depending on sample)
Elution volume	50–200 µL

Material and methods

A full disruption of the sample material is required to acquire optimum yields of DNA from the samples. Therefore, 200 mg of various soil samples or a spatula tip of human stool samples were transferred to MN Bead Tubes Type A (ceramic beads) and mixed with lysis buffer and RNAase. For soil samples, the addition of Enhancer SX ensures optimal conditions to bind the DNA. Sample disruption was performed on MN Bead Tube Holder in combination with a Vortex-Genie® 2 for 4–5 minutes operating at full speed. A subsequent precipitation step ensures that contaminants and inhibitors are removed very efficiently from the samples. All subsequent DNA purification steps have been performed on the ep*Motion*® 5073t or 5075t with no need for any user intervention.

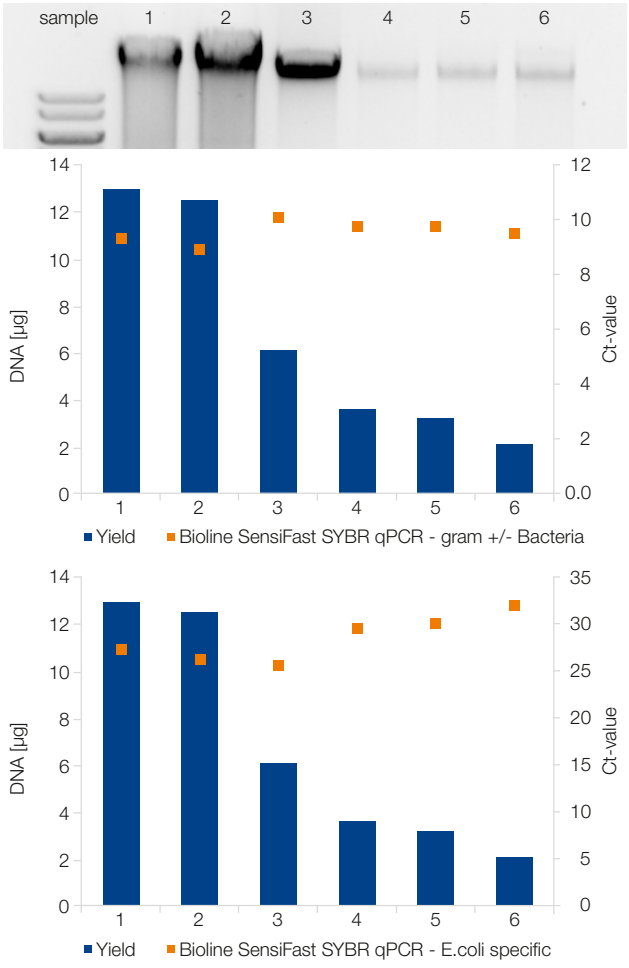
Application data – human stool samples

Stool samples are often used to study the gut microbiome and its effect on health, but also as clinical specimens for a variety of purposes, including the identification of numerous disease-causing bacteria and for biomarker detection. Sample collection is simple, painless and sometimes large numbers of samples need to be analyzed. Those developments in molecular diagnostics and next-generation sequencing-based analysis, result in a demand for high-quality DNA extracted from stool in an automated, high-throughput manner that is devoid of PCR inhibitors. Here we demonstrate that the NucleoMag® DNA Microbiome kit from MACHEREY-NAGEL in combination with the ep*Motion*® 5073t or 5075t quickly and reliably purifies high-quality host and pathogenic genomic DNA from stool samples.



High-quality DNA obtained from six different human fecal samples

Purity of six individual human fecal samples were determined by UV spectroscopy.

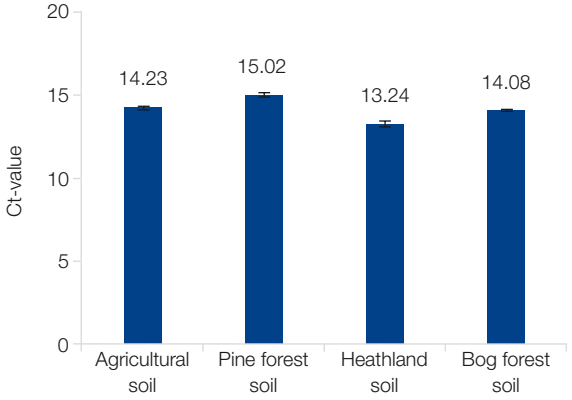


Automated purification of DNA from human stool samples on the ep*Motion*® 5073t

A: DNA was purified from a spatula tip from six individual human stool samples using the NucleoMag DNA Microbiome kit on the ep*Motion*® 5073t system. Integrity of genomic DNA was visualized via gel electrophoresis (10 µL per lane; 1 % TAE gel). B: qPCR analysis was performed with equal volumes of purified DNA detecting either - gram + / - Bacteria or *E. coli* using the SensiFAST™ SYBR Lo-ROX qPCR assays from Bioline on an Applied Biosystems® 7500 Real-Time PCR System. The results demonstrate a reliable qPCR-performance.

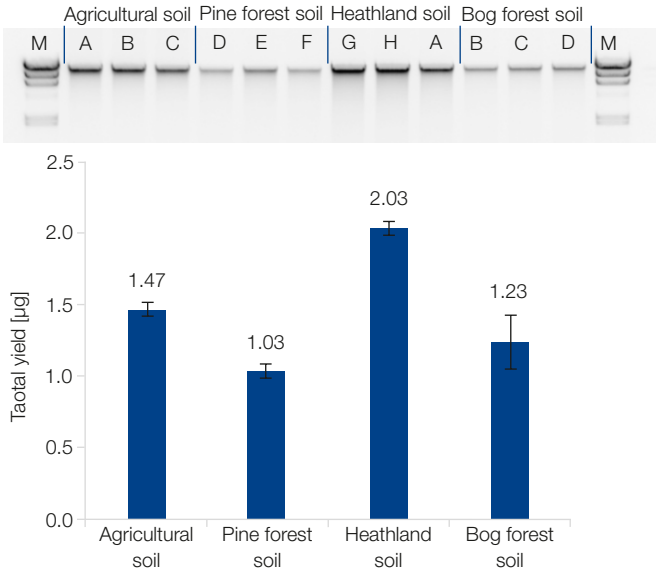
Application data – soil samples

One gram of soil is thought to contain around 100 million microorganisms, including bacteria, fungi, viruses and archaea. These microbes are necessary for recycling dead plants and animals and are therefore essential for soil health and agricultural sustainability. NucleoMag® DNA Microbiome has been optimized for purifying microbial nucleic acids from a variety of soil types, including agricultural soil, pine forest soil and heathland soil. Here we show that the superior inhibitor removal and efficient lysis with enhancer SX allows you purify high quality DNA from soil microbial communities.



DNA purified from soil samples shows reliable qPCR performance

A subsequent qPCR analysis for the bacterial 16s rRNA gene was performed with the SensiFAST™ SYBR Lo-ROX qPCR assay from Bioline on an Applied Biosystems® 7500 Real-Time PCR System. The results demonstrate a reliable qPCR-performance.



Automated purification of DNA from various soil samples on the ep*Motion*® 5075t

A: Agarose gel electrophoresis images recovered after processing samples on the ep*Motion*® 5075t system liquid handling system with the NucleoMag® DNA Microbiome kit. Samples include agricultural soil, pine forest soil, heathland soil, bog forest soil. 200 mg of soil was processed and extracted samples were analyzed in a 1.0 % (w/v) agarose/ethidium bromide gel. M: λ DNA/HindIII Marker. B: DNA yield recovered after processing each replicate on the ep*Motion*® 5075t system liquid handling system with the NucleoMag® DNA Microbiome kit.

Automate your DNA purification for microbiome analysis

MACHEREY-NAGEL and Eppendorf demonstrate that human stool samples and various soil samples can be purified consistently and reliably using the NucleoMag® DNA Microbiome kit on the ep*Motion*® 5073t or 5075t system liquid handling system. The effective recovery, as well as the outstanding repeatability and consistency in concentration and yield, demonstrate this. NucleoMag® DNA Microbiome extracts high-quality DNA from microbial communities from a wide range of sample sources, resulting in a cost-effective, hands-free approach for high-throughput DNA purification for microbiome studies.

Ordering information

Product	Specifications	Pack of	REF
NucleoMag® DNA Microbiome	Magnetic bead based kit for the purification of microbial DNA from bacteria, or yeast; contains NucleoMag® B-Beads, buffers.	1 x 96 4 x 96	744330.1 744330.4
MN Bead Tubes Type A	2 mL screw cap micro tubes prefilled with 0.6–0.8 mm ceramic beads; recommended for soil, stool, and biofilm samples.	50	740786.50
MN 96 Bead Plate Type A	Rack of prefilled tube strips (12 strips with 8 tubes each) containing 0.6–0.8 mm ceramic beads; suitable in conjunction with mixer mill; recommended for soil, stool, and biofilm samples.	4 x 96 24 x 96	740850.4 740850.24
MN Bead Tube Holder	Rubber-foam adapter for processing MN Bead Tubes with Vortex-Genie 2.	1 piece	740469