Nucleic acid extraction with the Arcis Sample Prep Kit

Introduction

The Arcis Sample Prep Kit is a ready-to-use kit comprising two reagents that enables pre-analytical processing of a variety of biological sample types, including whole blood, saliva, bacteria and plant cells. DNA/RNA extraction can be so simple; the Arcis Sample Prep Kit allows the user to go from cells to downstream nucleic acid investigations in only three minutes, without the need for isolation or purification.

The protocol consists of just two steps that can be easily automated with the ASSIST PLUS pipetting robot, offering the user a convenient solution for nucleic acid extraction. Sterile working conditions are essential, especially for RNA extractions. The ASSIST PLUS meets the requirements for working under sterile conditions, as its small footprint means that it can be easily placed in a laminar flow cabinet.

Key benefits:

- Automating the Arcis Sample Prep Kit eliminates the risk of cross-contamination between samples and ensures a consistent workflow.
- The ASSIST PLUS guides the user through the protocol, making the pipetting process less error-prone and the results more reproducible.

- VIAFLO and VOYAGER electronic pipettes, in combination with ASSIST PLUS, provide unmatched pipetting ergonomics.
- The universal deck of the ASSIST PLUS allows easy adjustment and positioning of all kinds of individual labware, including blood test tube racks.

Step-by-step procedure:

Note: Make sure that all samples have thawed completely before starting this procedure!

In this protocol, DNA is extracted from whole blood samples using the Arcis Sample Prep Kit and the ASSIST PLUS. The pipetting robot operates a VOYAGER 8 channel 125 µl electronic pipette with 125 µl Sterile, Filter, Low Retention GripTips. The use of Low Retention GripTips ensures optimal handling of viscous liquids, such as blood samples.

Note: The protocol is divided into two parts:

- Blood sample transfer
- Nucleic acid extraction with the Arcis Sample Prep Kit

Figure 1: Arcis Sample Prep Kit (50 rxn) consists of Lysis Buffer and Wash Buffer.

Blood sample preparation

Experimental set-up program 1 (ARCIS_Transfer_WholeBlood)

Deck position B: 96 deep well plate - empty
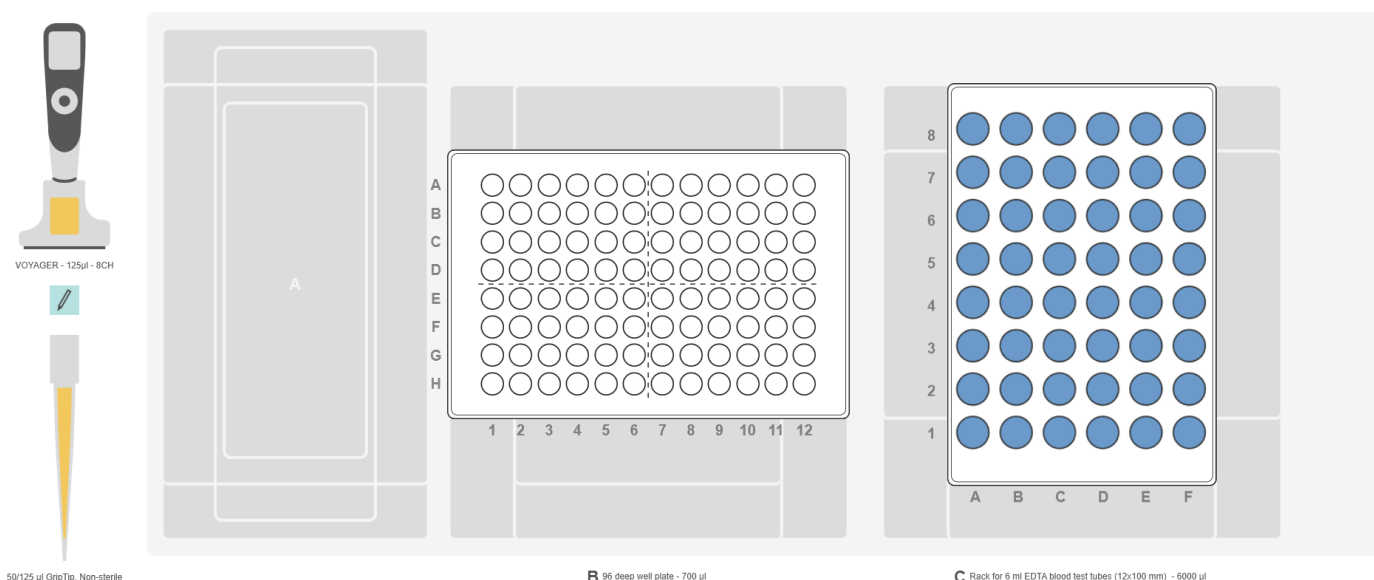**Deck position C**: Rack for 6 ml EDTA blood test tubes (12 x 100 mm) – 6000 µl

VOYAGER - 125µl - 8CH

50/125 µl GripTip, Non-sterile

B 96 deep well plate - 700 µl

C Rack for 6 ml EDTA blood test tubes (12x100 mm) - 6000 µl

Figure 2: Set-up for blood sample transfer

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1. Aliquot the blood samples

STEP: Transfer the blood samples from the collection tubes.

HOW TO: Place the blood collection tubes on **position C** and a 700 µl deep well plate on **position B**. Then select the ARCIS_SAMPLES program on the VOYAGER electronic pipette by pressing Run. The ASSIST PLUS immediately starts to transfer blood from the collection tubes into the deep well plate.

Tip: Use the Tip Travel feature of the ASSIST PLUS to keep the tip immersion depth constant during aspiration and dispensing, ensuring contamination-free and consistent liquid handling for more reproducible results, no matter how often the application is repeated.

INTEGRA

Nucleic acid extraction (Arcis Sample Prep Kit)

Experimental set-up program 2 (ARCIS_DNA_Extraction)

Deck position A: Dual Reservoir adapter with 2 x 10 ml multichannel reagent reservoirs for Reagent 1 (blue) and Reagent 2 (green)
Deck position B: 96 deep well plate - partially filled with 100 µl of blood samples (pink)
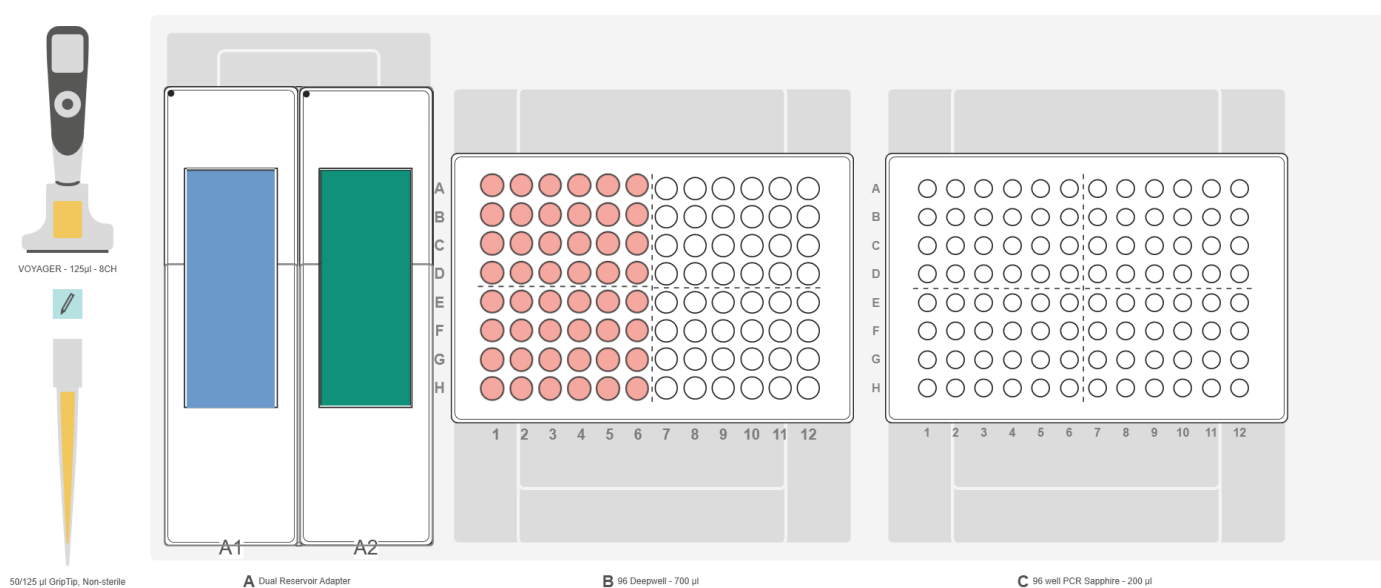**Deck position C**: 96 well PCR Sapphire - empty

Figure 3: Set-up for Arcis DNA extraction

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1. Reagent distribution

STEP: Aliquot Reagent 1 and Reagent 2.

HOW TO: Place two 10 ml multichannel reagent reservoirs into a dual reservoir adapter from INTEGRA on **position A**, the deep well plate with the preloaded blood samples on **position B**, and a new 96 well plate on **position C**. Fill the two 10 ml multichannel reagent reservoirs with Reagent 1 and 2, and change the program on the VOYAGER pipette to ARCIS_KIT. The ASSIST PLUS then starts to aliquot 150 µl of Reagent 1 in to the deep well plate (position B, columns 7-12) followed by the distribution of 20 µl of Reagent 2 in the 96 well plate (position C, columns 1-6).

Tip: A pre- and post-dispense step is recommended to increase the accuracy and precision of pipetting. The pre- and post-dispense volume should be between 3 and 5 % of the nominal volume of the pipette.

Tip: Save reagents by using the 10 ml multichannel reagent reservoir with SureFlo anti-sealing array. This allows you to aspirate from the very bottom of the reservoir in order to minimize the dead volume of the reagents.

2. Sample lysis	**STEP:** Add blood samples to Arcis Reagent 1.	**HOW TO:** Transfer 90 µl of each blood sample to the wells containing Reagent 1. After mixing, there is a one-minute incubation period before the samples are further processed or stored for processing later, according to the manufacturer's protocol (Arcis Sample Prep Kit). **Tip:** Be sure to mix Reagent 1 thoroughly with the blood samples to ensure a homogenous solution. **Note:** Nucleic acids are stable for 90 days at room temperature, provided there is no further processing.
3. Sample washing	**STEP:** Wash lysed samples with Arcis Reagent 2.	**HOW TO:** Continuing this protocol, use the ASSIST PLUS to automatically transfer 5 µl of the lysed blood samples (**position B**) to Reagent 2 in the new 96 well plate (**position C**) and mix them thoroughly. **Tip:** After addition of Reagent 2, the samples must be used immediately or frozen at -20 ºC. To reduce sample dilution, samples can be added to Reagent 2 at a ratio of 1:3, 1:2 or 1:1.

Remarks

- The PCR reaction can be run immediately or go directly to other downstream techniques. To continue with a PCR reaction, add the appropriate volume to the PCR master mix (e.g. 5 µl per 25 µl of PCR reaction).

- Users who only want to extract DNA from eight samples can place an 8 well PCR strip in a PCR 96 well cooling block (INTEGRA) instead of a 96 well plate.

- To process a higher number of samples consider using the kit for 500 reactions and choose the VIAFLO 96/384 to add reagents or samples simultaneously.

Conclusion

- Rapid nucleic acid extraction without the need to purify or isolate blood samples.

- VIALAB software can easily be adjusted to the labware required by the laboratory at any time.

- Automation of the workflow eliminates the risk of human error and increases the reproducibility of the results.

- The easy implementation of the Arcis Sample Prep Kit with the ASSIST PLUS pipetting robot accelerates pre-analytical processing in human and microbiological samples.

Materials

Manufacturer	Part Number	Description	Link
INTEGRA Biosciences	4505	ASSIST PLUS base unit	https://www.integra-biosciences.com/global/en/pipetting-robots/assist-plus
INTEGRA Biosciences	4722	VOYAGER 8 channel 125 µl pipette	https://www.integra-biosciences.com/global/en/pipetting-robots/assist-plus#parts-and-numbers
INTEGRA Biosciences	6565	125 µl Sterile, Filter, Low Retention GripTips	https://www.integra-biosciences.com/global/en/grip-tip-selector-guide
INTEGRA Biosciences	4547	Dual reservoir adapter	https://www.integra-biosciences.com/global/en/pipetting-robots/assist-plus
INTEGRA Biosciences	4372, 4332, 4371	2 x 10 ml multichannel reagent reservoirs with SureFlo anti-sealing array	https://www.integra-biosciences.com/global/en/reagent-reservoirs/multichannel-reagent-reservoirs
INTEGRA Biosciences	4543	Rack for 5 ml test tubes, 6 x 8 tubes	https://www.integra-biosciences.com/global/en/pipetting-robots/assist-plus#parts-and-numbers
INTEGRA Biosciences	6250	PCR 96 well cooling block	https://www.integra-biosciences.com/global/en/pipetting-robots/assist-plus#parts-and-numbers
CORNING	3741	Corning® Thermowell™ GOLD 0.2 ml 8 well PCR tube strips	https://www.sigmaaldrich.com/catalog/product/sigma/cls3741?lang=de&region=CH
ARCIS Biotechnology	UFL002	Arcis Sample Prep 50 rxn	https://arcisbio.com/our-products/arcis-dna-sample-prep-bulk-kit/
Eppendorf	0030501144	500 µl Deepwell Plate	