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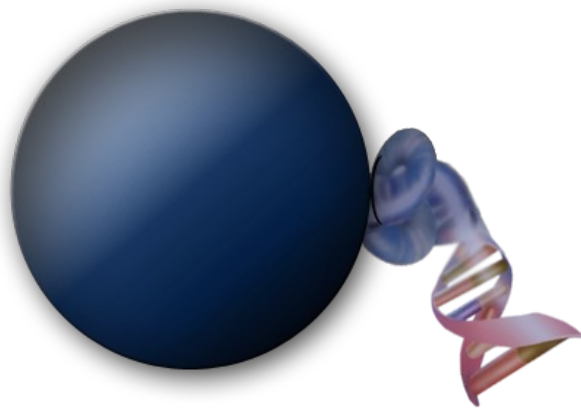
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# MagSi-DNA Body Fluid

**Art.No.**

**MDKT00140096**

**MDKT00140960**



**Product Manual**

**Version 8.0 | 25/02/2020**

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## 1. General Information

### 1.1 Intended Use

**MagSi-DNA Body Fluid** is intended for Research Use Only (RUO). The kit is suited for qualified personnel only.

The kit is intended for manual and automated isolation of genomic DNA from whole blood and saliva samples. Processing time for the preparation of 96 samples is about 40 minutes. The kit requires no phenol/chloroform extraction or alcohol precipitation and eliminates the need for repeated centrifugation, vacuum filtration or column separation. It allows safe handling of potentially infectious samples, and is designed to avoid sample-to-sample cross-contaminations. The obtained DNA can be used directly for downstream applications such as PCR, or any kind of enzymatic reaction.

**MagSi-DNA Body Fluid** is suitable for use with fresh or frozen blood treated with either EDTA or citrate. It is possible to extract DNA from heparin treated whole blood, but this may result in inhibition of subsequent applications involving thermocycling. The kit is also suitable for DNA extraction from fresh or preserved saliva.

**MagSi-DNA BF** beads are optimized for use in isolating total DNA. The beads are easy to handle and are supplied in a optimized storage buffer for increased suspension time.

The kit can be processed completely at room temperature.

### 1.2 Kit specifications

The kit provides reagents for extraction of 3–10 µg DNA from 200 µL whole blood samples with an  $A_{260}/A_{280}$  ratio of  $>1.7$  and  $A_{260}/A_{230}$  ratio of  $>1.5$ , with typical concentrations of 20–60 ng/µL. Depending on the elution volume used, concentrations of 10–160 ng/µL can be obtained.

The DNA obtained can be stored at 2–8°C. For long-term use, storage at -20°C is recommended. To maintain the high-molecular weight nature of the isolated DNA, it is recommended to avoid multiple freeze-thaw cycles.

### 1.3 Basic principle

Cells are lysed under denaturing conditions by adding Lysis Buffer U1 and Proteinase K. After incubation, MagSi-DNA BF beads are added and binding conditions are adjusted by addition of Binding Buffer U1 so that DNA binds to the magnetic beads. After magnetic separation and discard of the supernatant, the beads are washed three times to remove contaminants and salts. A drying step makes sure all traces of ethanol are removed. Finally, purified DNA is eluted with low-salt elution buffer and can directly be used for downstream applications.

## 2. Materials

### 2.1 Kit Contents

		96 preps MDKT00140096	10 x 96 preps MDKT00140960
Lysis Buffer U1	●	20 mL	200 mL
Binding Buffer U1	●	40 mL	400 mL
Proteinase K		For 1 mL working solution	For 10 mL working solution
MagSi-DNA BF		2 mL	20 mL
Wash Buffer I	●	2 x 80 mL	2 x 800 mL
Wash Buffer II	●	80 mL	800 mL
Elution Buffer	●	20 ml	200 mL
Manual		1	1

For DNA extraction protocols without a drying step (Protocol 4.2), Wash Buffer III can be ordered separately (Art.No. MD70041). Please contact magtivio for further information.

### 2.2 Reagents, consumables and equipment to be supplied by the user

#### Reagents:

- diH<sub>2</sub>O (to reconstitute Proteinase K)

#### Consumables/equipment:

Protocol	Manual use	Automated use
Sample containers	1.5 or 2 mL microtubes	Recommended: Riplate®SW 96, PP, 2ml, (Ritter, 43001-0020) Nunc™ 96-well Polypropylene DeepWell™ Storage Plate 2.0mL, (Thermo Scientific, Cat.No. 278752)
Magnetic separation	MM-Separator M12 + 12 P Art.No. MDMG0001	MM-Separator 96 DeepWell Art.No. MDMG0013
Final container	1.5 or 2 mL microtubes	96-well microplate
Mixing	Tube Vortexer	Microplate shaker (min. 1000 RPM)

**Consumables for processing on the KingFisher Flex instrument**

Product	Art. No.	Contents
2 ml Deepwell Plate with square wells for KingFisher™	MDPL00200060	60 pieces
200 µL square-well Elution Plate for KingFisher™	MDPL00190060	60 pieces
96 well Tip-Comb for KingFisher™	MDPL00210060	60 pieces

## 3. Kit usage

### 3.1 Storage Conditions

Kit components **Proteinase K** (lyophilized) and **MagSi-DNA BF** should be stored at 2-8°C. Store ready solutions of Proteinase K at -20°C. All other components of the kit should be stored at room temperature (18-25°C). When stored under the conditions mentioned, the kit is stable for up to 1 year, but no longer than the expiry date on the label. Do not freeze!

### 3.2 Preparation of reagents

- Reconstitute Proteinase K:
  - MDKT00140096 (96 preps), add **1 mL** of **diH<sub>2</sub>O** to **Proteinase K** and vortex to dissolve. Store solutions of Proteinase K at -20°C
  - MDKT00140960 (10x96 preps), add **10 mL** of **diH<sub>2</sub>O** to **Proteinase K** and vortex to dissolve. Store solutions of Proteinase K at -20°C
- If there is any precipitate present in the buffers, warm the buffer to 25-37°C to dissolve the precipitate before use.
- Immediately before use, resuspend MagSi-DNA BF by vortexing for 20 seconds.
- Samples should be thoroughly mixed before aliquotation

### 3.3 Safety instructions

Take appropriate safety measures, such as wearing a suitable lab coat, disposable gloves, and protective goggles. Follow local legal requirements for working with biological materials.

More information is found in the safety data sheets (SDS), available at [www.magtivio.com](http://www.magtivio.com) under each magtivio kit and kit component.

Infectious potential of liquid waste left over after using the MagSi-DNA Body Fluid was not tested. Even though contamination of waste with residual infectious material is unlikely, it cannot be excluded completely. Therefore, liquid waste should be handled as being potentially infectious, and discarded according to local safety regulations.

### 3.4 Considerations

1. To avoid cross-contamination and DNA degradation, change pipette tips after each use and use nuclease-free filter-tips.
2. Avoid leaving bottles open to prevent contamination or evaporation of the kit reagents.
3. Do not combine components of different kits unless the lot numbers are identical.
4. Process only as many samples in parallel as the magnetic separator allows.
5. The elution can be done in smaller volumes of Elution Buffer. Although this may result in higher DNA concentrations, overall yield may be lower. The yield may also be increased by prolonging the incubation time, and with pre-heated Elution Buffer (56°C).
6. The Elution Buffer does not contain EDTA (the end user may wish to use other elution buffers containing

EDTA, or Tris and EDTA, though).

7. Avoid using blood samples containing coagulates or precipitates, as this may result in poor quality DNA.
8. The kit is compatible with whole blood treated with EDTA and citrate. Heparin is co-isolated and may interfere with subsequent DNA analyses.
9. When extracting DNA from saliva, eluates may appear turbid due to fine particulates from saliva. Although these particulates typically do not cause inhibition in subsequent PCR analyses, the particulates can be easily removed by a brief centrifugation step.
10. A complementary wash buffer for MagSi-DNA Body Fluid to replace the drying step can be ordered separately, Wash Buffer III (WB3), Art.No. MD70041. Wash Buffer III eliminates risks of inhibition by residual alcohols, and may increase DNA purity.
11. It may occur that a small amount of beads is accidentally transferred with the final DNA sample, but most likely this will not inhibit subsequent applications. However, if desired another separation step can be performed to remove the beads.

### 3.5 Magnetic Separation systems

MagSi-DNA Body Fluid has been designed for use on the MM-Separator 96 DeepWell and MM-Separator M12 + 12 P. The MM-Separator M12 + 12 P (Art.No. MDMG0001) allows simultaneous processing of up to 12 samples in 2 mL microcentrifuge tubes. For processing in 96 deepwell plates, use the MM-Separator 96 DeepWell (Art.No. MDMG0013).

For use with other magnetic separators, please contact the technical support at [support@magtivio.com](mailto:support@magtivio.com).

MagSi-DNA Body Fluid is compatible with KingFisher™ Flex Magnetic Particle Processor by Thermo Scientific™. Protocols and consumables are available on request.

### 3.6 Shaker settings

The speed settings for the microplate shaker described in the protocols that follow were defined with a specific instrument and microplate. When first using a plate shaker for incubation steps, the speed settings have to be set carefully for each specific plate to prevent cross contamination and spillage. Setting the speed of the shaker can be done by loading a microplate with a volume of dyed water equal to the working volume during each step, and step-wise increasing the shaker speed until droplets are observed on the surface of the plate. Set the shaker speed lower again.

### 3.7 Product use limitations

MagSi-DNA Body Fluid is intended for Research Use Only. Do not use for other purposes than intended. The kit components can be used only once.

No guarantee is offered when using sample material other than whole blood or saliva. The kit is not validated for isolating DNA from for instance stool, tissue samples, bacteria, fungi or viruses, and is also not validated for the isolation of RNA.

The end-user has to validate the performance of the kit for any particular use, since the performance characteristics of the kits have not been validated for any specific application. Magtivio kits may be used in clinical diagnostic laboratory systems after the laboratory has validated the complete diagnostic system as required by CLIA' 88 regulations in the U.S. or equivalents in other countries.

The product is intended for use by trained personnel. The isolated DNA can be used in most genomic applications, such as restriction digestion, PCR, sequencing.

Diagnostic results generated using the sample preparation procedure should only be interpreted with regard to other clinical or laboratory findings. Adequate controls should be used in each set of isolations, especially when used for diagnostic purposes.



## 4. Protocols

### 4.1 Manual DNA extraction from 200 µL whole blood or saliva (with drying step)

Before starting:

- Check if Proteinase K was prepared according to section 3.2.
  - Vortex magnetic beads thoroughly into a homogeneous suspension.
1. Transfer 200 µL sample into a deepwell microplate or microtubes. If the volume is lower than 200 µL, bring the volume up to 200 µL with 1 x PBS buffer or distilled water.
  2. Add 200 µL **Lysis Buffer U1** ● and 10 µL **Proteinase K**. Incubate samples for 10 minutes under shaking.
  3. Add 400 µL **Binding Buffer U1** ● and 20 µL **MagSi-DNA BF**. Incubate on a shaker for 5 min at 1000 RPM.
  4. Place the samples on the magnetic separator and wait for 1 min to collect the beads. Remove supernatants.
  5. Remove the sample plate from the magnetic separator and add 800 µL **Wash Buffer I** ● to the tubes. Incubate on a shaker for 1 min at 1000 RPM. Place the tubes in a magnetic separator and wait for 1 min to collect the beads. Remove the supernatants.
  6. Repeat step 5 one more time with 800 µL **Wash Buffer I** ● and one time with 800 µL **Wash Buffer II** ●.
  7. Dry the beads on air for **10 min** to evaporate the ethanol completely.
  8. Remove the sample plate from the magnetic separator and add **50-200 µL Elution Buffer** ●. Incubate on a shaker for 5 min at 1000 RPM.
  9. Place the tubes in a magnetic separator and wait for 1 minute to collect the beads. Transfer the eluates to new tubes. The DNA in the eluate is now ready to use.
    - If the transferred eluates appear turbid, briefly centrifuge the samples and carefully transfer the eluates.
    - If the transferred eluates contain magnetic particles, place the tubes on the magnetic separator again, separate for 1 minute and transfer the eluates.
    - The DNA can be eluted with a lower volume of Elution Buffer (depending on the expected yield of genomic DNA). The minimum volume for elution is 30 µL and this can reduce the yield. If a large amount of DNA is expected, the volume of Elution Buffer can be increased.

## 4.2 Manual DNA extraction from 200 $\mu$ L whole blood or saliva (with WB III\*)

\*Wash Buffer III (Art.No. MD70041) needs to be ordered separately.

Before starting:

- Check if Proteinase K was prepared according to section 3.2.
  - Vortex magnetic beads thoroughly into a homogeneous suspension.
1. Transfer 200  $\mu$ L sample into microtubes. If the volume is lower than 200  $\mu$ L, bring the volume up to 200  $\mu$ L with 1 x PBS buffer or distilled water.
  2. Add 200  $\mu$ L **Lysis Buffer U1** ● and 10  $\mu$ L **Proteinase K**. Incubate on a shaker for 10 min at 1000 RPM.
  3. Add 400  $\mu$ L **Binding Buffer U1** ● and 20  $\mu$ L **MagSi-DNA BF**. Incubate on a shaker for 5 min at 1000 RPM.
  4. Place the samples on the magnetic separator and wait for 1 min to collect the beads. Remove supernatants.
  5. Remove the sample plate from the magnetic separator and add **800  $\mu$ L Wash Buffer I** ● to the tubes. Incubate on a shaker for 1 min at 1000 RPM. Place the tubes in a magnetic separator and wait for 1 min to collect the beads. Remove the supernatants.
  6. Repeat step 5 one more time with 800  $\mu$ L **Wash Buffer I** ● and one time with 800  $\mu$ L **Wash Buffer II** ●.
  7. With the samples on the magnet, slowly add 800  $\mu$ L **Wash Buffer III** ●. Wait for 30 seconds and carefully remove the supernatant again. Do not resuspend beads and do not exceed 60 seconds as this may cause early DNA elution. When using the kit manually, it is recommended to not treat samples with Wash Buffer III simultaneously.
  8. Remove the sample plate from the magnetic separator and add **50-200  $\mu$ L Elution Buffer** ●. Incubate on a shaker for 5 min at 1000 RPM.
  9. Place the tubes in a magnetic separator and wait for 1 minute to collect the beads. Transfer the eluates to new tubes. The DNA in the eluate is now ready to use.
    - If the transferred eluates appear turbid, briefly centrifuge the samples and carefully transfer the eluates.
    - If the transferred eluates contain magnetic particles, place the tubes on the magnetic separator again, separate for 1 minute and transfer the eluates.
    - The DNA can be eluted with a lower volume of Elution Buffer (depending on the expected yield of genomic DNA). The minimum volume for elution is 30  $\mu$ L and this can reduce the yield. If a large amount of DNA is expected, the volume of Elution Buffer can be increased.

### 4.3 Manual DNA extraction from 500 µL Oragene saliva sample

Before starting:

- *Incubate the samples at 50°C in a water incubator for a minimum of 1 hour or in an air incubator for a minimum of 2 hours to ensure that DNA is adequately released and nucleases are permanently inactivated. This incubation step may be performed at any time after the sample is collected and before it is purified. The samples can also be incubated overnight for convenience.*
- *Mix the sample in the Oragene kit by inversion and gentle shaking for a few seconds to ensure that viscous samples are properly mixed.*
- *Vortex magnetic beads thoroughly into a homogeneous suspension.*

1. Transfer 500 µL Oragene sample into microtubes.
  2. Add 400 µL **Binding Buffer U1** ● and 20 µL **MagSi-DNA BF**. Incubate on a shaker for 5 min at 1000 RPM.
  3. Place the samples on the magnetic separator and wait for 1 min to collect the beads. Remove supernatants.
  4. Remove the sample plate from the magnetic separator and add 800 µL **Wash Buffer I** ● to the tubes. Incubate on a shaker for 1 min at 1000 RPM. Place the tubes in a magnetic separator and wait for 1 min to collect the beads. Remove the supernatants.
  5. Repeat step 4 one more time with 800 µL **Wash Buffer I** ● and one time with 800 µL **Wash Buffer II** ●.
  6. Dry the beads on air for **10 min** to evaporate the ethanol completely.
  7. Remove the sample plate from the magnetic separator and add **50-200 µL Elution Buffer** ●. Incubate on a shaker for 5 min at 1000 RPM.
  8. Place the tubes in a magnetic separator and wait for 1 minute to collect the beads. Transfer the eluates to new tubes. The DNA in the eluate is now ready to use.
- *If the transferred eluates appear turbid, briefly centrifuge the samples and carefully transfer the eluates to new tubes.*
  - *The DNA can be eluted with a lower volume of Elution Buffer (depending on the expected yield of genomic DNA). The minimum volume for elution is 30 µL and this can reduce the yield. If a large amount of DNA is expected, the volume of Elution Buffer can be increased.*






## 4.4 DNA extraction from 200 µL whole blood on the KingFisher Flex™

### 4.4.1 KingFisher BindIt software protocol


Please contact magtivio for the most recent BindIt software method files. We provide the corresponding files for direct upload on the KingFisher magnetic particle processors. A PDF description of the method file is included. Refer to the BindIt software manual regarding the upload procedure of the supplied software files to the instrument.

### 4.4.2 Preparation of processing plates

Initial plate filling for instrument set-up:

Plate	Type*)	Reagent	Volume
Sample Plate	2 ml Deepwell Plate with square wells for KingFisher™	Proteinase K Blood or saliva sample Lysis Buffer U1 	10 µL 200 µL 200 µL
Wash Buffer I - 1	2 ml Deepwell Plate with square wells for KingFisher™	Wash Buffer I 	800 µL
Wash Buffer I - 2	2 ml Deepwell Plate with square wells for KingFisher™	Wash Buffer I 	800 µL
Wash Buffer II	2 ml Deepwell Plate with square wells for KingFisher™	Wash Buffer II 	800 µL
Elution Buffer	200 µL square-well Elution Plate for KingFisher™	Elution Buffer 	150 µL
Tip plate	2 ml Deepwell Plate with square wells for KingFisher™	Empty, for loading Tip-Comb only	N/A

To be added after the initial lysis step on the KingFisher Flex magnetic particle processor

Plate	Type*)	Reagent	Volume
Sample Plate	2 ml Deepwell Plate with square wells for KingFisher™	MagSi-DNA BF beads Binding Buffer U1 	20 µL 400 µL

\*) We strongly recommend to use only the plates which are intended to use on the KingFisher magnetic particle processor. Using insuitable plates may result in extraction failure or instrument damage.

### 4.4.3 Detailed instructions

Follow exactly the instructions as given below. **Do not change the order of reagent addition for the Sample Plate.** Label all plates thoroughly and unambiguously to avoid any misloading during the instrument loading procedure.

1. Equilibrate samples to room temperature. Mix well using a suitable tube roller mixer or similar device.
2. Add 10  $\mu\text{L}$  of reconstituted Proteinase K to each well of the Sample Plate. Dispense the Proteinase K with contact to the well bottom. Check optically if the Proteinase K is dispensed into each well.
3. Add 200  $\mu\text{L}$  of blood or saliva sample to each well of the Sample Plate. In case of using less than 200  $\mu\text{L}$  sample fill-up the samples with 1 x PBS buffer or water.
4. Add 200  $\mu\text{L}$  of **Lysis Buffer U1** ● to each well of the Sample Plate. Mix by pipetting up and down until a homogeneous mixture is visible (typically 3 – 4 times).  
Optionally: place the plate on a plate shaker and shake while preparing the remaining plates.
5. Prepare two plates for the 1<sup>st</sup> and 2<sup>nd</sup> wash step with **Wash Buffer I**. Add 800  $\mu\text{L}$  **Wash Buffer I** ● to each well of the corresponding deep-well plate.
6. Prepare one plate for the 3<sup>rd</sup> wash step with **Wash Buffer II**. Add 800  $\mu\text{L}$  **Wash Buffer II** ● to each well of the corresponding deep-well plate.
7. Prepare one plate for **Elution Buffer**. Add 150  $\mu\text{L}$  **Elution Buffer** ● to each well of the corresponding square-well elution plate.
8. Switch on the KingFisher Flex magnetic particle processor and select the "**MagSi-DNA Body Fluid**" protocol from the user defined protocols.
9. Start the protocol.
10. Load the plates to the instrument, following the instructions on the instrument display. Order of plates start with the tip plate and ends with the sample plate. Sample lysis starts immediately after loading the sample plate to the instrument.

Make sure that all plates are inserted in the same orientation (especially when using partially filled plates). Place the A1 well of each plate to the A1 mark on the instruments turntable.

11. After approx. 12 min the instrument stops and moves the sample plate to the plate loading position. Remove the plate and add 1<sup>st</sup>: 20  $\mu\text{L}$  **MagSi-DNA BF** magnetic beads and then 2<sup>nd</sup> : 400  $\mu\text{L}$  **Binding Buffer U1** ●
12. Reload the plate to the instrument and continue the purification process.
13. At the end of the method remove all plates from the instrument. Follow the information on the instrument display.

## 5. Troubleshooting

Problem	Possible causes	Comments and suggestions
Low DNA yield	Sample contains few leukocytes	- Try using larger or smaller blood sample volumes
	Incomplete lysis	- Increase incubation time for lysis - Make sure Lysis Buffer U1 does not contain precipitates - Blood sample may contain coagulates
	Inefficient binding to the magnetic particles	- Make sure Lysis Buffer U1 and Binding Buffer U1 do not contain precipitates - Use correct amount of all reagents - Increase mixing steps after adding Binding Buffer U1 - Mix sample during binding incubation
	Incomplete elution	- Drying of Wash Buffer II may have been incomplete - Try eluting twice with 100 $\mu$ L Elution Buffer
Degraded or sheared DNA	Incorrect storage of the sample material	- Sample should be collected and stored properly - Avoid repeated freezing and thawing of blood sample
Purified DNA samples are turbid	Saliva sample contains solid particulates	- Centrifuge briefly and transfer samples to a new container
Problems in downstream applications/ contamination in DNA sample	Ethanol in the eluted DNA	- Increase the drying time to 15 minutes - Use protocol 4.2 with Wash Buffer III
	Salt in the eluate (high adsorption at 230 nm)	- Make sure that supernatants are properly removed. - Wash Buffers should be stored and used at RT
	Magnetic beads remaining in the eluate	- Place the DNA eluates in the magnetic separator again, and transfer the supernatant to a new container.



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