BioDynami

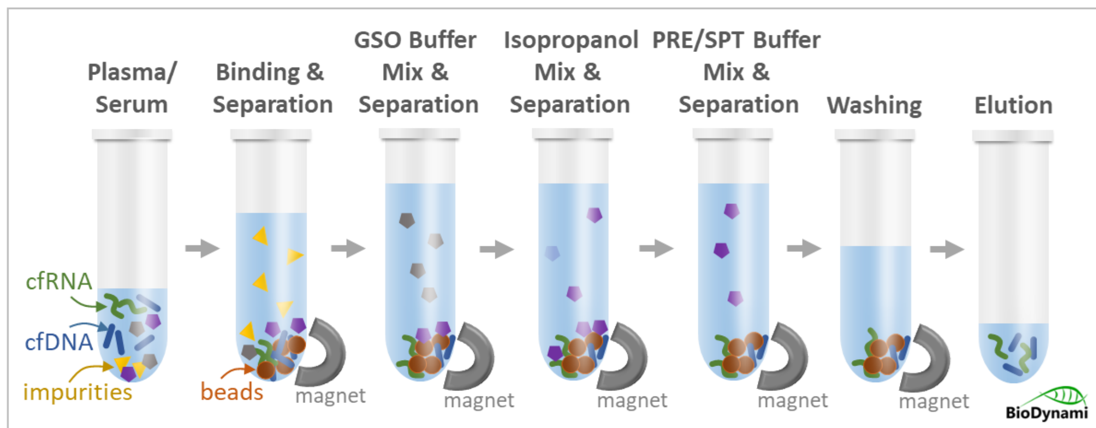
Plasma/Serum Cell-free DNA/RNA Extraction Kit (Magnetic Beads)

Catalog No.	50102S	50102L
Rxns*	10	40

*Based on 1 ml of sample volume

Description

The **Plasma/Serum Cell-free DNA/RNA Extraction Kit (Magnetic Beads)** is developed for the efficient isolation of cell-free DNA (cfDNA) and cell-free RNA (cfRNA) from fresh or frozen plasma and serum samples.



The analysis of cfDNA and cfRNA in these biofluids is a powerful tool for disease diagnosis, particularly in oncology. These nucleic acid fragments, released into the bloodstream during normal physiological processes such as apoptosis, as well as from necrotic cancer cells, hold immense clinical value as non-invasive biomarkers. Liquid biopsy using cfDNA/RNA is now a well-established method for both cancer diagnosis and prognosis, enabling the detection and monitoring of disease through a simple blood draw.

cfDNA fragments are typically short, averaging around 170 base pairs (bp), which corresponds to the length of DNA wrapped around a mononucleosome. The fragmentation pattern of DNA in circulation can be influenced by various pathological conditions, including cancer development, infection, immune reactions, and inflammation, further enhancing its diagnostic potential.

Our kit leverages proprietary Solid Phase Reversible Immobilization (SPRI) magnetic bead technology, optimized specifically for the superior recovery of minute quantities of cfDNA and cfRNA from cell-free fluids. The streamlined protocol eliminates the need for time-consuming centrifugation or vacuum steps. Purified fragments can be eluted in volumes as low as 10 µl, maximizing concentration for sensitive downstream assays.

The extracted, high-quality cfDNA and cfRNA are fully compatible with a wide range of demanding applications, including next-generation sequencing (NGS), bisulfite sequencing, PCR, and qPCR.

Features

- High-quality cfDNA and cfRNA extraction
- Simple beads-based technology
    - No column needed
    - No vacuum needed
- Elution volume as low as 10 µl
- Removal of unwanted components and other impurities

	Specifications
Sample type	Fresh or frozen plasma/serum
Sample volume	1 ml
Technology	Magnetic beads
Purity	cfDNA/RNA is NGS and PCR ready. Typical A260/A280 is around 1.8. Note: sample quantification or purity assessment using a spectrophotometer is not recommended due to the limited amount of DNA/RNA.
Yield range	Typical yield: 0.5 ng to 20 ng from healthy donors
Fragment sizes	From 100 bp to >10 kb genomic DNA and RNA
Elution volume	As low as 10 µl is OK

Component

Catalog No.	50102S	50102L
Plasma Beads	17.5 mL	70 mL
SPT Buffer	3 mL	12 mL
Proteinase K	0.2 mL	0.8 mL
GSO Buffer	40 mL	160 mL
PRE Buffer	1 mL	4 mL
Elution Buffer	0.4 mL	1.6 mL

Storage Condition

- Store Plasma Beads, Proteinase K, and SPT Buffer at 4°C, stable up to 12 months.
- Store GSO Buffer, PRE Buffer and Elution Buffer at room temperature, stable up to 12 months.

Reagent & Equipment Needed (not provided in this reagent)

- Magnetic particle concentrator
- Vortexer
- Heat block, incubator, or water bath
- 96-well plates or 96-deep well plates, microfuge tubes
- 80% isopropanol (prepare before use)
- 80% ethanol (prepare before use)
- RNase A, if needed
- DNase I, if needed

Protocol A (DNA and RNA extraction)

1) Add 1.75 ml of the Plasma Beads and 20 µl of Proteinase K to the 15 ml tubes containing 1 ml of plasma samples. **Note: Invert or shake the beads bottles thoroughly to resuspend the beads. Slow pipetting of the viscous beads is needed for precise aliquot.** Vortex to thoroughly mix beads with the sample. Incubate at 56°C for 40 min. Vortex briefly every 10 min.
2) Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette. Avoid removing beads.
3) Add 4 ml of the GSO Buffer, mix by vortexing. Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette.
4) Add 1 ml of the 80% isopropanol, mix by vortexing. Transfer samples to new 1.5 ml tubes and put the tubes on the magnet for 2 min. Discard the supernatant, dry for 1 min, and remove any residue solution using a pipette with fine tips.
5) Add 100 µl of PRE Buffer, vortex to resuspend beads, incubate for 3 min.
6) Add 300 µl of SPT Buffer, mix by vortexing for 30 sec, incubate for 15 min. Put samples on the magnet for 5 min, and remove the supernatant slowly and completely using a pipette.
7) Add 800 µl of 80% ethanol, incubate for 2 min. Put samples on the magnet and discard the supernatant. Repeat the 80% ethanol washing one more time.
8) Dry the beads for 8-12 min and remove any residue solution using a pipette with fine tips**. Note: DO NOT over dry the beads. Move to step 9 immediately if beads start to crack.**
9) Add 10-40 µl of Elution Buffer (10 mM Tris, pH 8.0), TE buffer, Low TE buffer, or water, and resuspend the beads completely by pipetting or vortexing. Incubate for 3 min.
10) Put samples on the magnet for 2 min and transfer the supernatant (containing DNA and RNA) to new tubes.

Protocol B (DNA extraction only)

1) Add 1.75 ml of the Plasma Beads, 20 µl of Proteinase K, and 2 µl of RNase A (10 mg/ml; not provided in the kit) to the tubes containing 1 ml of plasma samples. **Note: Invert or shake the beads bottles thoroughly to resuspend the beads. Slow pipetting of the viscous beads is needed for precise aliquot.** Vortex to thoroughly mix beads with the sample. Incubate at 56°C for 40 min. Vortex briefly every 10 min.
2) Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette. Avoid removing beads.
3) Add 4 ml of the GSO Buffer, mix by vortexing. Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette.
4) Add 1 ml of the 80% isopropanol, mix by vortexing. Transfer samples to new 1.5 ml tubes and put the tubes on the magnet for 2 min. Discard the supernatant, dry for 1 min, and remove any residue solution using a pipette with fine tips.
5) Add 100 µl of PRE Buffer, vortex to resuspend beads, incubate for 3 min.
6) Add 300 µl of SPT Buffer, mix by vortexing for 30 sec, incubate for 15 min. Put samples on the magnet for 5 min, and remove the supernatant slowly and completely using a pipette.
7) Add 800 µl of 80% ethanol, incubate for 2 min. Put samples on the magnet and discard the supernatant. Repeat the 80% ethanol washing one more time.
8) Dry the beads for 8-12 min and remove any residue solution using a pipette with fine tips. **Note: DO NOT over dry the beads. Move to step 9 immediately if beads start to crack.**
9) Add 10-40 µl of Elution Buffer (10 mM Tris, pH 8.0), TE buffer, or Low TE buffer, and resuspend the beads completely by pipetting or vortexing. Incubate for 3 min.
10) Put samples on the magnet for 2 min and transfer the supernatant (containing DNA and RNA) to new tubes.

Protocol C (RNA extraction only)

1) Add 1.75 ml of the Plasma Beads and 20 µl of Proteinase K to the tubes containing 1 ml of plasma samples. **Note: Invert or shake the beads bottles thoroughly to resuspend the beads. Slow pipetting of the viscous beads is needed for precise aliquot.** Vortex to thoroughly mix beads with the sample. Incubate at 56°C for 40 min. Vortex briefly every 10 min.
2) Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette. Avoid removing beads.
3) Add 4 ml of the GSO Buffer, mix by vortexing. Put samples on the magnet for 5 min and remove the supernatant slowly and completely using a pipette.
4) Add 1 ml of the 80% isopropanol, mix by vortexing. Transfer samples to new 1.5 ml tubes and put the tubes on the magnet for 2 min. Discard the supernatant, dry for 1 min, and remove any residue solution using a pipette with fine tips.
5) DNase I (not provided in the kit) digestion:
   a) Add 90 µl of water, vortex to resuspend beads, incubate for 3 min.
   b) Add 10 µl of 10X DNase I buffer, 1 µl of DNase I, vortex gently to mix
   c) Incubate 37°C for 15 min.
6) Add 300 µl of SPT Buffer, mix by vortexing for 30 sec, incubate for 15 min. Put samples on the magnet for 5 min, and remove the supernatant slowly and completely using a pipette.
7) Add 800 µl of 80% ethanol, incubate for 2 min. Put samples on the magnet and discard the supernatant. Repeat the 80% ethanol washing one more time.
8) Dry the beads for 8-12 min and remove any residue solution using a pipette with fine tips. **Note**: **DO NOT over dry the beads. Move to step 9 immediately if beads start to crack**.
9) Add 10-40 µl of water, Elution Buffer (10 mM Tris, pH 8.0), TE buffer, or Low TE buffer, and resuspend the beads completely by pipetting or vortexing. Incubate for 3 min.
10) Put samples on the magnet for 2 min and transfer the supernatant (containing RNA) to new tubes.

Quality Control

Magnetic beads components passed stringent functional quality test.

Product Use Limitation

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