



Automated cfDNA Extraction Solution from 10 mL Plasma

A Pre-scripted Application Developed by Omega Bio-tek for the Dynamic Devices Lynx



Automated Cell-free DNA Extraction

24 x 10 mL samples
65 minutes



10 mL Plasma

1-10 mL
No sample splitting
75-200 μ L elution

Cell-free DNA (cfDNA) is a powerful tool for several clinical applications, including non-invasive prenatal testing (NIPT), early cancer detection, minimal residual disease (MRD) monitoring, transplant monitoring, and infectious disease diagnosis.

Due to the minimal presence of cfDNA in patients' bloodstreams, purification techniques involve processing large input volumes to extract sufficient material for analysis, while also requiring low elution volumes to yield higher concentrations of cfDNA. Current automated cfDNA purification methods are limited to processing 2-4 mL samples and often involve splitting samples across multiple processing plates to accommodate larger input volumes.

Omega Bio-tek and Dynamic Devices offer a novel automated cfDNA purification solution capable of processing plasma samples up to 10 mL without sample splitting. The workflow uses Dynamic Devices' Lynx LM1200 platform with the 24ST Pipetting Tool and 24XL MagRod head in conjunction with Omega Bio-tek's Mag-Bind® cfDNA Kit and E-Z Select® 24-Well Plates. The automated workflow is capable of processing 24 x 10 mL plasma samples in 65 minutes and can handle elution volumes ranging from 75-200 μ L.



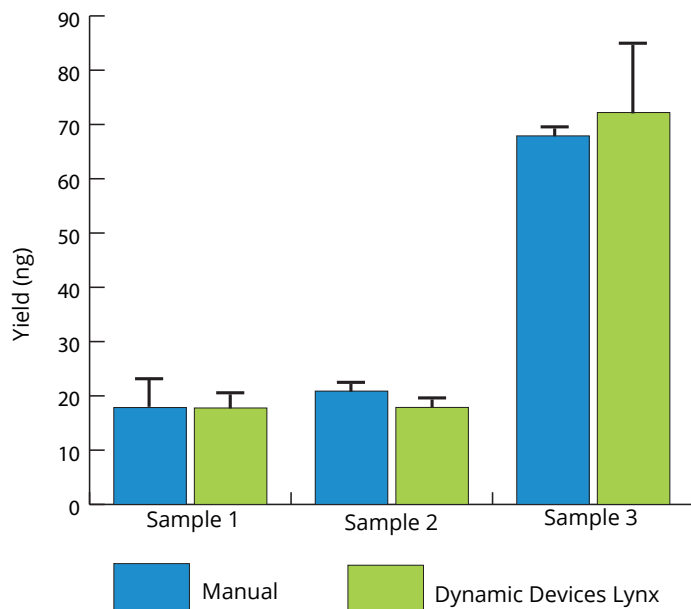


Figure 1. Average cfDNA (50-700 bp) yield values from 10 mL plasma samples.

Results

Purified cfDNA samples were extracted in triplicates from 3 different plasma samples both manually, following Omega Bio-tek's standard Mag-Bind® cfDNA protocol, and automated using the same chemistry on Dynamic Devices' Lynx system. Cell-free DNA yields were quantified using Agilent's 4150 TapeStation system, and the averages are shown in Figure 1. As expected, yields between the manual and automated conditions were comparable.

Quantitative PCR analysis was also performed on the purified cfDNA samples to evaluate purity of the samples. Different input amounts of template DNA (2 μ L and 6 μ L) were used to test for inhibition. The average Δ Ct between the input amounts of the manually purified samples was below the expected 1.5 value, indicating the presence of inhibitors; whereas the average Δ Ct between the different input amounts of the automated samples aligned with the expected value of 1.5, indicating the samples were pure DNA containing minimal amounts of inhibitors. There was no detectable fluorescence in the no template controls.

Table 1. Average Ct values from qPCR analysis of cfDNA extracted using manual or automated protocols.

Sample	Manual			Dynamic Devices Lynx		
	2 μ L	6 μ L	Δ Ct	2 μ L	6 μ L	Δ Ct
1	29.12 \pm 0.33	28.27 \pm 0.38	-0.85	29.28 \pm 0.48	27.73 \pm 0.50	-1.55
2	29.51 \pm 0.28	28.27 \pm 0.10	-1.24	29.64 \pm 0.17	28.22 \pm 0.16	-1.42
3	28.39 \pm 0.30	27.73 \pm 0.37	-0.67	28.52 \pm 0.25	26.96 \pm 0.14	-1.56

Conclusions

Omega Bio-tek and Dynamic Devices have collaborated to devise a robust and straightforward method for automating cfDNA purification from high-volume samples (up to 10 mL). This workflow eliminates upfront manual steps and the need for sample splitting across multiple processing plates, providing a true walk-away solution. cfDNA purified using this automated workflow is shown to be equivalent or better in terms of yield and purity compared to cfDNA purified from manual techniques.

E-Z Select® 24-Well Plate



Product Information

Description	Product No.	Size
Mag-Bind® cfDNA Kit	M3298-00	5 Preps
	M3298-01	50 Preps
	M3298-02	200 Preps
E-Z Select® 24-Well Plate	PS24N-25SWV-16	16 Plates