

DNA Extraction from Whole Blood on Hamilton's Microlab® STAR™

High yield & quality from 1 mL whole blood in less than 2 hours automated

Kiranmai Durvasula¹, Jeff Roeder¹, Travis Butts¹
¹Omega Bio-tek, Inc.

Introduction

Nucleic acid extraction from whole blood is the initial step for so many genomic-based diagnostic workflows including biomarker discovery, newborn screening, and pharmacogenetics. Extracting large amounts of high quality genomic DNA is crucial for downstream applications such as qPCR, microarray analysis, and next-generation sequencing. This creates the need for reliable extraction methods from large volume blood samples (>250 µL) which can be extremely demanding and time consuming, thus creating bottlenecks within processes.

Omega Bio-tek's Mag-BIND® Blood & Tissue DNA HDQ 96 Kit offers a solution for such difficult procedures and has been successfully validated on Hamilton's Microlab® STAR™. The system uses a completely automated protocol, which improves accuracy by eliminating errors that can occur during manual processing and can extract pure DNA from ninety-six 1 mL whole blood samples in under 2 hours.

Materials & Methods

DNA was extracted from 2 sets of identical whole blood samples on the same day. One set was processed using Company Q's automated system with Company Q's chemistry, and one set was processed using the Hamilton Microlab® STAR™ with Omega Bio-tek's Mag-BIND® Blood & Tissue DNA HDQ 96 Kit. For the Hamilton/Omega procedure, whole blood tubes were inserted into sample carriers where the instrument scanned barcodes from the individual blood tubes. 1,000 µL of each blood sample was then aspirated and dispensed into 250 µL aliquots in the same well position of 4 different 96-well deep well plates. Cell lysis was achieved by heating and shaking the

samples using Hamilton's heater-shakers. Magnetic beads and binding solution were then added to capture the DNA from the sample lysates. Four quick wash steps were performed and then DNA was eluted in 10 mM Tris-Cl (pH 8.5). No drying step was required to remove ethanol, allowing for faster processing and more reliable results. DNA purity was analyzed with the Thermo Scientific NanoDrop® 2000c and quantity was assessed with Promega's QuantiFluor® dsDNA system.

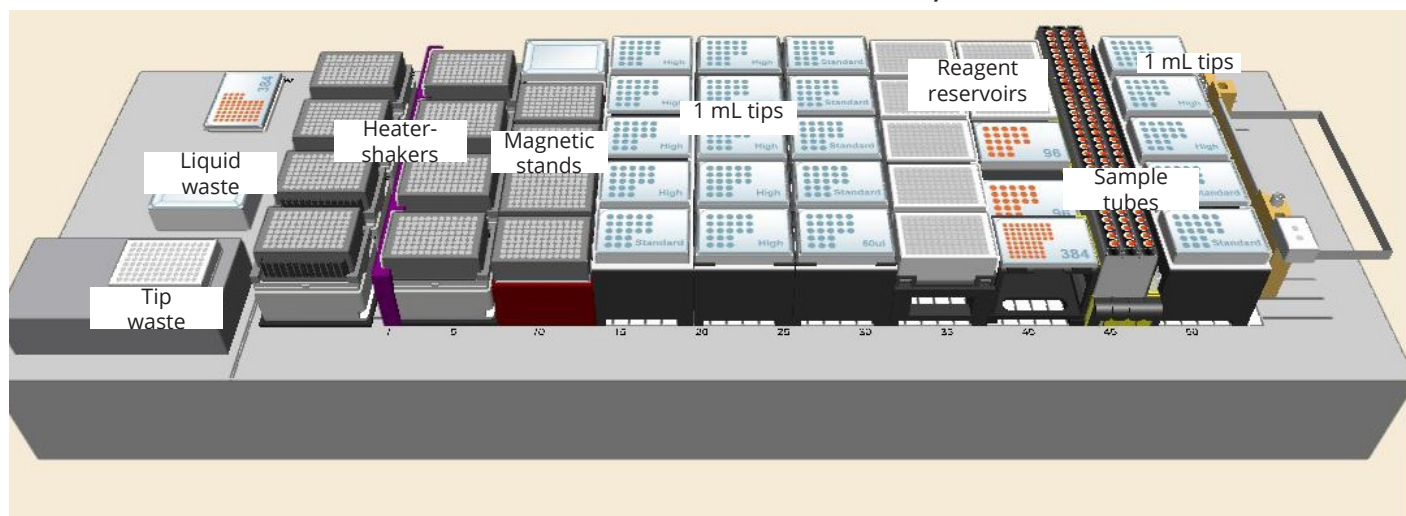
Instrument Configuration Specifications

Hamilton equipment	Hamilton Microlab STAR configured with 96-channel head, 8-channel independent pipetting heads, heater-shaker units, iSWAP arm, liquid waste module
Plasticware	Nalgene Nunc 96-well plates (278752) Hamilton 1,000 µL tips (182085) Hamilton 300 µL reservoir (56669-01)
Reagents	Omega Bio-tek's Mag-BIND® Blood & Tissue DNA HDQ 96 Kit

Results

Automation of genomic DNA purification from whole blood on the Hamilton Microlab STAR with Omega Bio-tek's chemistry allows for recovery of large amounts of high quality genomic DNA. The Hamilton/Omega procedure decreased overall processing time by simultaneously extracting from 96 samples compared to batches of 24 processed by Company Q. The Hamilton/Omega instrument scripting has been optimized to allow for maximum throughput, DNA quality and yield. Minimal user intervention is required as the system goes from whole

Hamilton Microlab® STAR™ Deck Layout



blood to purified DNA without any user pause steps after initial inputs are received.

Table 1. Genomic DNA extracted from 1 mL whole blood on the Hamilton STAR with Omega Bio-tek's chemistry. DNA was analyzed with Promega's QuantiFluor® dsDNA system.

Sample	Yield (µg)	Yield (µg)
	Omega Bio-tek	Company Q
1	49.69	18.0
2	30.88	31.1
3	18.26	10.0
4	25.16	20.8
5	38.55	29.1
6	24.02	23.9
7	33.58	34.6
8	25.39	21.3
9	37.34	26.4
10	53.87	25.8
Average	33.67	24.1

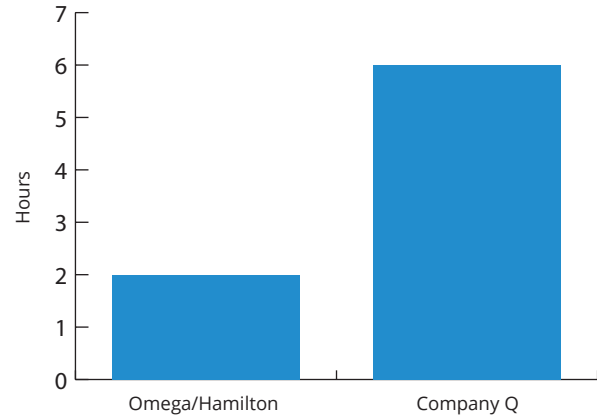


Figure 2. Total processing time reported from customer for ninety-six 1 mL whole blood samples from blood tubes to purified DNA.

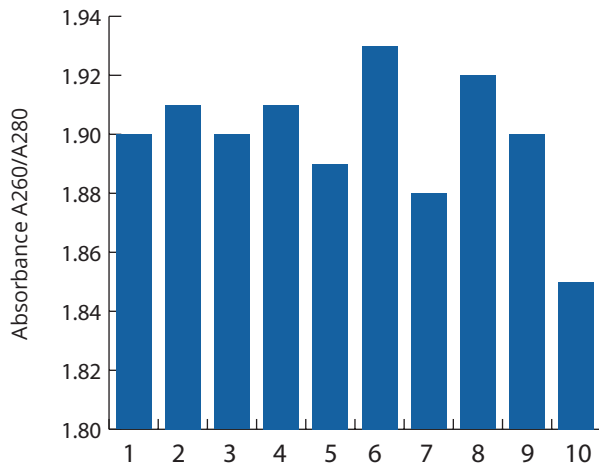


Figure 1. Genomic DNA extracted from 1 mL whole blood on the Hamilton STAR with Omega Bio-tek chemistry. DNA was analyzed on Thermo Scientific's NanoDrop® 2000c.



400 Pinnacle Way, Suite 450
Norcross, GA 30071

www.omegabiotek.com
info@omegabiotek.com
(800) 832-8896

Product Information

Description	Product No.	Preps
Mag-BIND® Blood & Tissue DNA HDQ 96 Kit	M6399-00	1 x 96
	M6399-01	4 x 96