Quality Analysis of RNA Extracted from Blood Samples Using TANBead Blood RNA Extraction kit

I. Introduction

Blood from animal for use as a source of RNA offers several benefits for biomarker discovery and genome-wide gene expression profiling studies. When compared with other tissues, it appears relatively easy to obtain. However, isolating abundant and useful RNA from blood is hampered by several challenges due to inhibitors, such as hemoglobin, immunoglobulin G (IgG) and RNases. The process of removing inhibitor and get high purity of RNA is complicated, time-consuming, labor-intensive, and limited in terms of overall throughput in manual methods. To offer scientists a better solution for blood RNA extraction, TANBead nanotechnology designed an advanced product to isolate RNA based on good laboratory and RNase-free technique using optimized magnetic particles and reagents. TANBead Blood RNA Extraction kit allows isolation of high-quality total RNA from 50 µl up to 500 µl fresh whole blood using a simplified, automated protocol.

II. Advantages

- Isolate 1 to 96 samples of fresh or frozen blood in less than one hour when used with the TANBead extractor series.
- Automation-ready, phenol-free extraction, no cross-contamination.
- Purify total RNA directly from whole blood without prior recovery of white blood cells.
- High-quality total RNA, with A260/A280 values between 1.8 and 2.2, low genomic DNA contamination.
- Completely removes RNase and inhibitors.
- Purified RNA suitable for multiple downstream applications, such as cDNA synthesis, real-time PCR, Northern blotting, next generation sequencing methods (NGS) and transcriptome sequencing via RNAseq.

III. Application data

To verify RNA quantity and quality, human RNA was extracted from 100 µl human whole blood with the TANBead Blood RNA extraction kit. The yield of RNA isolated by TANBead's kit is around 600-756 ng **(Table 1)**. The below amplification graph **(Figure 1 and Figure 2)** showed the high quality of purified RNA, which was verified by GAPDH RT-qPCR assays. In addition, the qPCR result of 10-fold serial dilution of template indicated that a low presence of inhibitors in the elution **(Figure 3)**.

Table 1. The quantification results of human blood RNA extraction by various TANBead Extractor series.

Machine series	Conc. (ng/µl)	Total RNA amount (ng)	CV(%)	260/280
M8	9.45±0.18	756±11.77	1.91%	2.0±0.1
M9600	9.09±0.29	727±22.82	3.19%	1.9±0.1
M4800	8.66±0.16	693±12.88	1.84%	2.0±0.1
SLA-E132	8.47±0.21	677±13.80	2.48%	2.0±0.1
SLA-32	7.5±0.26	600±17.05	3.51%	1.8±0.1
SLA-D14800	7.89±0.23	631±18.58	2.94%	2.1±0.1

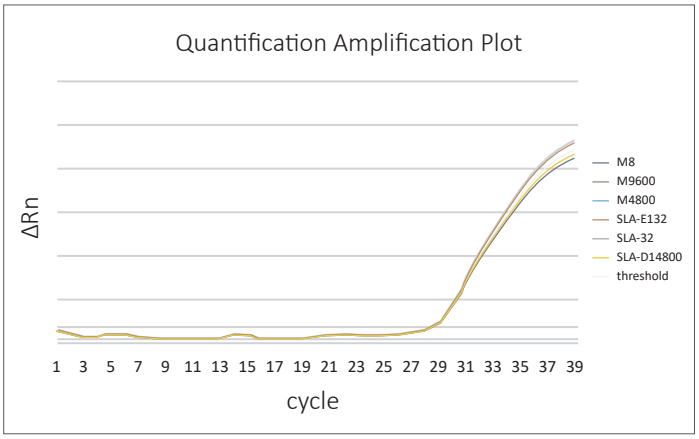

Figure 1. Real-time RT-PCR analysis of RNA isolated using TANBead Blood RNA kit by various TANBead Extractor series.

Representative results are shown for assay using KAPA SYBR FAST One-Step qRT-PCR Master Mix (2X) Kit for GAPDH by various TANBead extractors. The Cq mean value of variants is 29.03 ± 0.67.

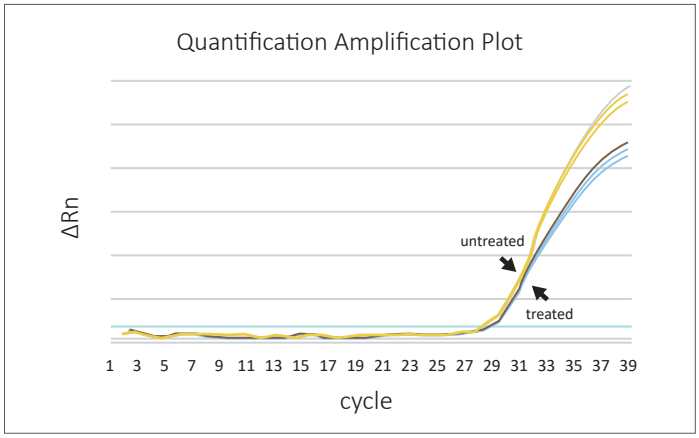

Figure 2. Determine the contamination of genomic DNA in isolated RNA by DNase treatment.

Representative results are shown for assay using KAPA SYBR FAST One-Step qRT-PCR Master Mix (2X) Kit for GAPDH. The templates were treated with or without DNase. The genomic DNA was slightly detected in isolated RNA. The Cq mean value of untreated group is 28.83 ± 0.67; the Cq mean value of treated group is 29.08 ± 0.45.

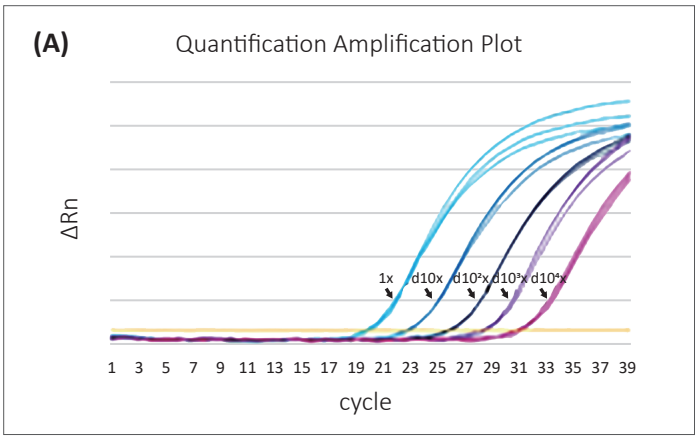

Figure 3. Amplification of a 10-fold serial dilution of RNA isolated using TANBead Blood RNA kit.

A. Representative results are shown for assay using KAPA SYBR FAST One-Step qRT-PCR Master Mix (2X) Kit for GAPDH. B. The ΔCq between dilutions was filled in of the linear range, suggesting that the assay was not interfered by the high concentration template. The Cq mean value of each amplification is 20.22 ± 0.18, 23.52 ± 0.15, 26.00 ± 0.14, 29.11 ± 0.14, and 31.93 ± 0.43.

IV. Specifications

Sample materials: Fresh or frozen whole blood					
Model	M9600	M4800	M8	SLA32/E132	SLA-D14800
Sample volume	50-200 µl				50-500 µl
Elution volume	80 µl				
Preparation time	60 mins/ 96 samples	45 mins/ 48 samples	45 mins/ 8 samples	60 mins/ 32 samples	55 mins/ 48 samples
Application	cDNA synthesis, Real-time PCR, Northern blotting				

V. Conclusion

The TANBead Blood RNA kit completely removes RNase, contaminants, and enzyme inhibitors, provides high-yield and quality of RNA with minimum contamination of DNA suitable for many downstream applications.

TANBead® Blood RNA Kit

Specification	
Samples	Whole blood
Operation time	30-40 min
Reagent kits	621 series
Extraction system	Maestrom 8 / Maestrom 48 series / Maestrom 96 series
Applications	RT-PCR and qRT-PCR

Taiwan Advanced Nanotech
Taiwan Advanced Nanotech Inc.
6F., No. 188, Wenhe Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
No. 2, Aly. 12, Ln. 81, Longshou St., Taoyuan Dist., Taoyuan City 330, Taiwan (R.O.C)
+886-3-3167568 +886-3-3173369 success@tanbead.com