



Whole Blood Sample Collection and Preservation of Cell-Free Circulating DNA and Cell-Free Circulating RNA

- ✓ Preserve cf-DNA & cf-RNA for 30 days at ambient temperature
- ✓ Preserve Circulating Tumor Cells (CTCs) for 14 days at ambient temperature
- ✓ Formaldehyde-free preservative, no cross-linking of DNA
- ✓ Prevent apoptosis of blood cells and fragmentation of genomic DNA
- ✓ Prevent hemolysis
- ✓ Produce high quality/quantity of plasma cf-DNA/cf-RNA
- ✓ No plasma volume loss during shipping
- ✓ Vacuumed to draw 8.4 mL of blood in 10 mL tubes
- ✓ PET tubes to avoid breakage during transit

cf-DNA/cf-RNA Stabilization for Liquid Biopsy Applications including NIPT and NGS

Norgen Biotek's new cf-DNA/cf-RNA Preservative Tubes are easy-to-use tubes for collection, preservation, storage and transport of whole blood. It preserves cf-DNA and cf-RNA for up to 30 days and can be stored and shipped at room temperature. Compatible with common DNA and RNA purification methods and automation.

cf-DNA Stable for 30 days at Ambient Temperature

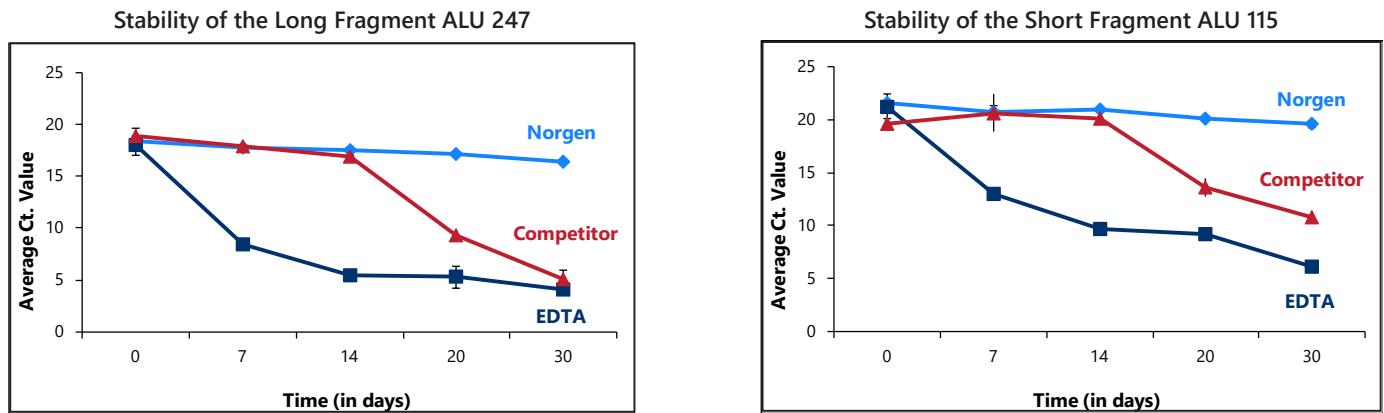


Figure 1. Effect of ambient temperature storage on cf-DNA (pDNA), exemplified by the short Alu (115bp) fragment, and genomic DNA (gDNA), exemplified by the large Alu (247 bp) fragment. Blood samples were drawn into either: 1) EDTA tubes, 2) Competitor tubes or 3) Norgen's cf-DNA/cf-RNA Preservative Tubes and stored at room temperature. Levels of the ALU gene (115 bp) representing the pDNA and the ALU gene (247 bp) representing the gDNA should stay the same during the stabilization period indicating proper stabilization and no hemolysis. No stabilization of cf-DNA and extensive hemolysis was observed in plasma collected on EDTA tubes and stored at room temperature. Competitor showed no significant stabilization after 14 days, whereas cf-DNA was stable for 30 days at room temperature for Norgen's cf-DNA/cf-RNA Preservative Tubes.

cf-RNA Stable for 30 Days at Ambient Temperature

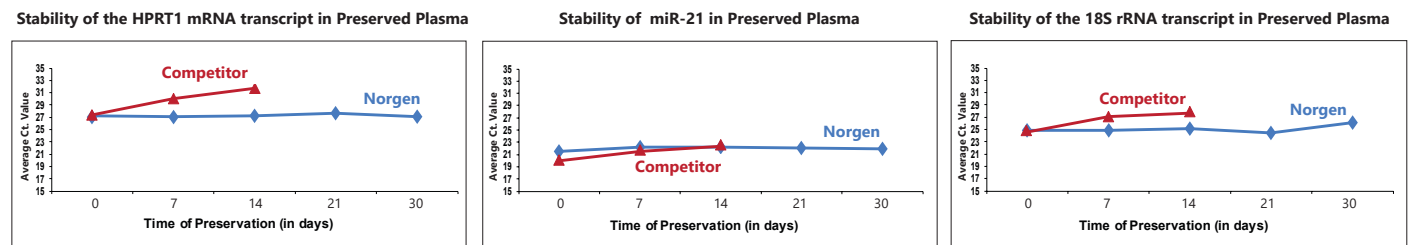


Figure 2. Effect of ambient temperature storage on cf-RNA, exemplified by the 18S rRNA transcript, HPRT1 mRNA transcript and miR-21. Blood samples were drawn into either: 1) Competitor tubes or 2) Norgen's cf-DNA/cf-RNA Preservative Tubes. Competitor's tubes were stored at room temperature for 14 days (as per...) whereas Norgen's cf-DNA/cf-RNA Preservative Tubes were stored for 30 days at room temperature. Levels of the 18S rRNA transcript, HPRT1 mRNA transcript and miR-21 should stay the same during the stabilization. Competitor showed significantly higher Ct values for the three targets after 7 days indicating cf-RNA degradation, whereas cf-RNA was stable for 30 days at room temperature for Norgen's cf-DNA/cf-RNA Preservative Tubes as observed by the stable Ct value during the stabilization period.

High cf-DNA Quantity from Norgen's Preserved Blood

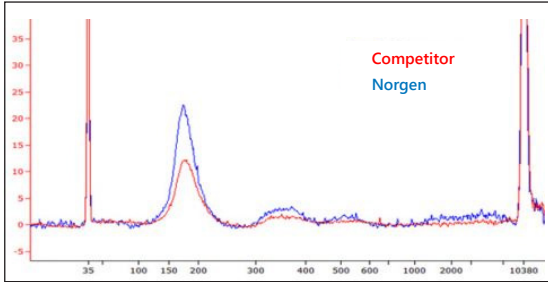


Figure 3. High Quantity of cf-DNA purified from plasma preserved using Norgen's cf-DNA/cf-RNA Preservative Tubes. Blood sample from the same donor was drawn into either Competitor tubes or Norgen's cf-DNA/cf-RNA Preservative Tubes and stored at room temperature for 7 days. The cf-DNA was then isolated from the entire plasma volume recovered from Norgen's tube (6.5mL) and from the Competitor tubes (3.5mL) using Norgen's Plasma/Serum Cell-Free Circulating DNA Purification Kits. As can be observed from the Agilent Bio-analyzer High Sensitivity DNA Chip trace, Norgen yielded more cf-DNA (Blue peak) as compared to the cf-DNA recovered from the competitor's preservative tube.

Prevent Hemolysis

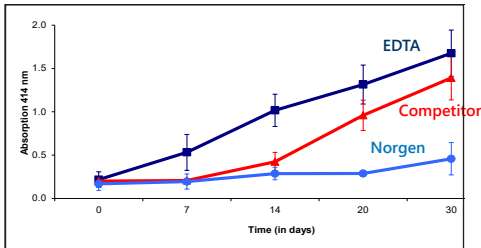


Figure 4. Hemolysis of collected blood measured over time. Blood samples drawn into three different tubes and stored up to 30 days. The amount of free hemoglobin, as measured at 414 nm, increased rapidly with each additional storage day in the EDTA tubes and Competitor tubes, and remained relatively constant in Norgen's cf-DNA/cf-RNA Preservative Tubes indicating that Norgen's tubes prevent hemolysis

Prevent gDNA Release into Plasma during Shipping/Transportation

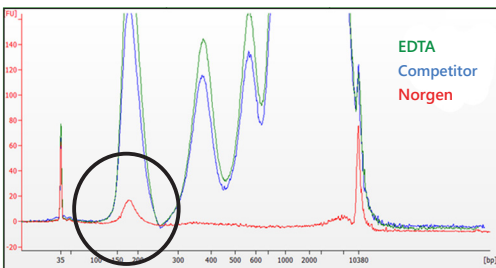


Figure 5. Prevent cell lysis and the release of gDNA and accumulation of apoptotic ladder in plasma. Blood samples were drawn into three different tubes (Norgen's, EDTA, and Competitor) and shipped. Norgen's cf-DNA/cf-RNA Preservative Tubes help prevent the release of high molecular weight gDNA into plasma while also minimizing the accumulation of contaminating apoptotic ladder from dying peripheral blood leukocytes during shipping as compared to both the competitor and EDTA tubes.

Maximum Plasma Volume Recovery After Shipping



Figure 6. No plasma volume loss after shipping/transportation. Blood was drawn from 6 different donors into Norgen, Competitor, and EDTA tubes. One set was kept in the lab at room temperature and the other was packed in an insulated box and shipped from Thorold, ON via overnight air freight to Winnipeg, MB and then back to Thorold ON (elapsed time 72 h). The plasma volume recovered from Norgen's cf-DNA/cf-RNA Preservative Tubes did not change before shipping or after shipping (6-7 mL recovered plasma) whereas for both Competitor tubes and EDTA Tubes the plasma volume recovered before shipping was ~ 4mL and after shipping was ~ 2.5mL.

Stable at High Shipping Temperatures (37°C)

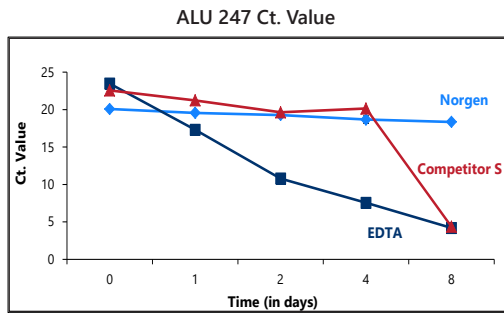


Figure 7. Effect of high temperature (37°C) storage for 8 days. Blood samples were drawn into either EDTA tubes, Competitor tubes or Norgen's cf-DNA/cf-RNA Preservative Tubes and stored at 37°C. cf-DNA was then isolated from processed plasma. cf-DNA stabilization was determined by real-time PCR using a long ALU gene (247 bp). Norgen's cf-DNA/cf-RNA Preservative Tubes stabilized samples for 8 days at 37°C as compared to both EDTA tubes (1 day) and the competitor (4 days).

Product Specifications

Description	Specs
Tube Size	16 x 100 mm
Tube Type	PET Tube
Blood Draw Volume	8.4 mL in 10 mL Tubes
Preservative Volume	1.6 mL
Recovered Plasma	Approximately 6-7 mL (not affected by shipping)

Description	Specs
Preservative	Non-formaldehyde proprietary preservative agent
Length of cf-DNA Preservation	Up to 30 days at room temperature (15-25°C) Up to 8 days at 37°C
Length of cf-RNA Preservation	Up to 30 days at room temperature (15-25°C)
Length of CTCs Preservation	Up to 14 days at room temperature (15-25°C)

Ordering Information

Description	Prep Size	Cat. #
cf-DNA Preservative Tubes	50 tubes	63950
cf-DNA Preservative Tubes	100 tubes	63960
cf-DNA/cf-RNA Preservative Tubes Dx (CE Marked)	50 Tubes	Dx63950

Norgen's preservation technology is patent pending.

Visit our website: www.norgenbiotek.com to view our complete line of reagents and innovative sample preparation kits.

Related Products

Description	Input Volume	Prep Size	Cat. #
Plasma/Serum Cell-Free Circulating DNA Purification Micro Kit	10 µL - 200 µL	50 preps	55500
Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit	200 µL - 500 µL	50 preps	55100
Plasma/Serum Cell-Free Circulating DNA Purification Midi Kit	1 mL - 4 mL	20 preps	55600
Plasma/Serum Cell-Free Circulating DNA Purification Maxi	5 mL - 10 mL	10 preps	55800
Plasma/Serum RNA Purification Mini Kit	50 µL - 200 µL	50 preps	55000
Plasma/Serum RNA Purification Midi Kit	250 µL - 1.5 mL	20 preps	56100
Plasma/Serum RNA Purification Maxi Kit	2 mL - 5 mL	10 preps	56200
Low Abundance DNA Quantification Kit		48 rxns	57200
Low Abundance RNA Quantification Kit		48 rxns	58900