

High Throughput Blood Processing Samples Using the New Thermo Scientific General Purpose Centrifuge

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KEY WORDS

- High Throughput Processing
- Plasma Preparation
- Molecular Diagnostic Test Methods
- BIOLiner Swinging Bucket Rotor
- General Purpose Centrifuge
- BD Vacutainer Tube

Introduction

Isolation of plasma from whole blood is a first step for various *in-vitro* molecular diagnostic assays. A current technique for plasma separation is to collect whole blood into blood collection tubes, such as the BD Vacutainer® tube containing anticoagulants (EthyleneDiamineTetraacetic Acid (EDTA) or anticoagulant Citrate-Dextrose (ACD) solution) then to separate it from the other blood components by centrifugation using a swinging bucket rotor.

The obtained plasma can be used in molecular diagnostic test methods, such as polymerase chain reaction (PCR) or branched DNA amplification techniques (bDNA), and for a wide range of research and clinical diagnostic applications where quality and integrity of undiluted plasma sample is required.

The procedure can be conducted using the new Thermo Scientific general purpose centrifuge series and the Thermo Scientific BIOLiner high capacity swinging bucket rotor. By using this equipment, productivity is increased by preparing an undiluted plasma sample and throughput is significantly maximized by spinning 196 5/7 mL blood tubes per run versus 96 to 120 tubes with competitive centrifuges (see table 1) and 148 10 mL blood tubes/run versus 64 to 120 with competitor models (see table 2).

This application brief describes a procedure for preparation of plasma from whole blood using the new Thermo Scientific general purpose cen-



Thermo Scientific general purpose centrifuge with BIOLiner adapter for vacutainer tubes

trifuge and the BIOLiner high capacity swinging bucket rotor. It also describes how to shorten processing time by increasing throughput during the preparation of plasma with BD Vacutainer PPT™ Plasma Preparation Tube.

Procedure

The procedure described below outlines the process for preparation of undiluted plasma¹ using the new general purpose centrifuge and the BIOLiner swinging bucket rotor with the multiple carrier for 5/7 mL or 10 mL sealed tubes.

1. After collecting whole blood in the BD PPT tube, gently invert the BD tube 8 - 10 times.



Thermo Scientific BIOLiner Swinging Bucket Rotor

2. After mixing, store the BD tube upright at room temperature until centrifugation.

Note: Blood samples should be centrifuged within 2 hours of blood collection for best results. With additional delay before centrifugation, red blood cell contamination of the separated undiluted plasma sample increases².
3. Centrifuge blood sample at room temperature (18-25 °C) at 1,100 x g for at least 10 min.
4. Open the tube immediately after centrifugation; carefully pipette the plasma into a separate container. When using the BD Vacutainer PPT Plasma Preparation Tube most of the erythrocytes and granulocytes and some of the lymphocytes and monocytes are separated away from the supernatant.

Recommendations :

- Do not speed the BD tubes over 10,000 x g as this may cause tube breakage and exposure to blood and possible injury.
- Use special designed sealed containers during centrifugation in order to avoid any exposure to biologic samples (viral hepatitis, HIV (AIDS), or other infectious diseases) or releasing of potentially hazardous materials.

Results

The new Thermo Scientific general purpose centrifuge combined with the BIOLiner swinging bucket rotor and BD Vacutainer tubes leads to reliable results and high quality undiluted plasma samples, enabling molecular diagnostic test and downstream clinical diagnostic applications.

Conclusion

The new general purpose centrifuge enables extremely fast processing of blood samples at the unique high capacity processing of the swinging bucket rotor with the multiple carrier for 5/7 mL sealed (196 x 5/7 mL blood tubes/run) or for 10 mL sealed tubes (148 x 10 mL blood tubes/run). The swinging bucket rotor includes a biocontainment lid to protect from aerosolization and spills during centrifugation.

With this unique high-productivity solution, achieve time savings of up to 56% (See Table 2) and up to 53% (See Table 1) when spinning 10 mL and 5/7 mL blood tubes respectively and the environment is protected from biocontamination.

Using this ideal new Thermo Scientific general purpose centrifuge, with the BIOLiner swinging bucket rotor and BD vacutainer tubes, ensures a high quality molecular test with the ability to increase throughput by increasing blood sample processing capacity.

References

1. Procedure according to BD protocol of the Kit or Assay Manufacturer's Instructions; Becton Dickinson and Company
2. NCCLS – Procedures for the Handling and Processing of Blood Specimens; Approved Standard-Third Edition, H18-A3 Vol. 24 No. 38, November 2004

Table 1: Time savings in hours and percentages when using four different centrifuges for plasma preparation into 5/7 mL blood tubes

CENTRIFUGES	CAPACITY 5/7 ML TUBES	THROUGHPUT TUBES CENTRIFUGED/DAY (40 SPINS)*	TIME NEEDED TO CENTRIFUGE 8000 TUBES	TIME SAVINGS EXPERIENCED (h AND %) WITH THE THERMO SCIENTIFIC GENERAL PURPOSE CENTRIFUGE	
Thermo Scientific General Purpose Centrifuge	196	7840	8h	/	/
Competitor B Centrifuge B	120	4800	13h	5h	38.5%
Competitor C Centrifuge C	96	3840	17h	9h	53%
Competitor D Centrifuge D	100	4000	16h	8h	50%

*Based on supposition that 5 spins can be performed/hour and that 10 min are needed to load/unload tubes/hour, i.e. with the Thermo Scientific general purpose centrifuge, this allowed us to perform 40 spins a day (~8h).

Note: Blood samples (5/7 mL tubes) were centrifuged at room temperature (18-25 °C) at 1,100 x g for at least 10 min.

Table 2: Time savings in hours and percentages when using four different centrifuges for plasma preparation into 10 mL blood tubes

CENTRIFUGES	CAPACITY 5/7 ML TUBES	THROUGHPUT TUBES CENTRIFUGED/DAY (40 SPINS)*	TIME NEEDED TO CENTRIFUGE 8000 TUBES	TIME SAVINGS EXPERIENCED (h AND %) WITH THE THERMO SCIENTIFIC GENERAL PURPOSE CENTRIFUGE	
Thermo Scientific General Purpose Centrifuge	148	5920	11h	/	/
Competitor B Centrifuge B	96	3840	17h	6h	35.3%
Competitor C Centrifuge C	64	2560	25h	14h	56%
Competitor D Centrifuge D	96	3840	17h	9h	53%

*Based on supposition that 5 spins can be performed/hour and that 10 min are needed to load/unload tubes/hour, i.e. with the Thermo Scientific general purpose centrifuge, this allowed us to perform 40 spins a day (~8h).

Note: Blood samples (10 mL tubes) were centrifuged at room temperature (18-25 °C) at 1,100 x g for at least 10 min.

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