VACUETTE® Blood Collection System

Handling Recommendations

www.gbo.com/preanalytics
Table of Contents

Foreword ............................................................................................................. 3
Preparing for Blood Collection ............................................................................. 4
Selection of a Puncture Site .................................................................................. 5
Venipuncture ......................................................................................................... 6
Recommended Order of Draw for Multiple Specimen Collection ....................... 9
Troubleshooting ................................................................................................... 10
Mixing of Specimen Material and Labelling of Tubes .......................................... 11
Transport ............................................................................................................. 12
Centrifugation ....................................................................................................... 12
Opening/Closing VACUETTE® Blood Collection Tubes with Safety Caps .......... 13
VACUETTE® Handling of Testing Material .......................................................... 14
Tube Dimensions ................................................................................................ 16
VACUETTE® Safety Caps ..................................................................................... 16
Application Areas for VACUETTE® Tubes ........................................................ 17
VACUETTE® Supportive Education and Training Material ................................. 18
VACUETTE® Blood Collection System - An Overview of the Essential Points ...... 19

Foreword

For decades glass was the raw material used for the production of evacuated blood collection tubes. However, in the mid 1980s, Greiner Bio-One recognized the safety risks for medical personnel that are associated with the use of glass, and was the first producer with the technical competence to make an innovative specimen collection system manufactured from PET, a virtually unbreakable highly transparent plastic.

See for yourself the advantages that “The ORIGINAL” can offer:

- Worldwide technological leadership in the production of specimen collection systems made of plastic
- Special thick-walled tube design to guarantee a longer shelf-life
- Innovative safety products to protect your health
- Complete product range made of virtually unbreakable plastic
- Flexibility for custom-made solutions with highest quality standards

"ONE STEP AHEAD"

VACUETTE® users profit from one of the most modern and highly efficient production facilities in the world. The continual development of new technologies and the state of the art production facilities demonstrate the innovative strengths of the company.

VACUETTE® - "Take the ORIGINAL"

VACUETTE® users profit from one of the most modern and highly efficient production facilities in the world. The continual development of new technologies and the state of the art production facilities demonstrate the innovative strengths of the company.

An ingenious quality management system guarantees the high standards of Greiner Bio-One. The use of VACUETTE® products ensures the safety of the user as well as the health and wellbeing of a magnitude of healthcare workers and patients.
Preparing for Blood Collection

a) Patient identification
This is performed by a comparison between the patient’s test order form and the patient identification number, barcode, wristband number or other objective criteria.

b) Position
The patient should be suitably positioned for venipuncture (either sitting or recumbent), the position should be maintained for a minimum of 15 minutes prior to performing the venipuncture.

c) Preparation of the Collection Material
Prior to performing the venipuncture, the following items must be prepared:
- **VACUETTE®** Blood Collection System (consists of **VACUETTE®** Multiple Use Drawing Needles/VISIO Plus needles, **VACUETTE®** QUICKSHIELD Safety Tube Holder or standard tube holder and **VACUETTE®** Blood Collection Tubes)
- Sterile disposable gloves
- Sterile swab
- Disinfectant or alcohol solution
- Adhesive bandages
- **VACUETTE®** Tourniquet
- **VACUETTE®** Sharps Disposal Container
- Label for patient identification (timing of labelling varies from country to country)

Priority list:

1. Blood collection from the antecubital area of the arm
2. Blood collection from the dorsal side of the hand
3. Blood collection from the dorsal surface of the foot

Prior to making the final selection of a site for venipuncture, an inspection of the proposed area is necessary. The selection sequence should correspond to the priority list; whereby 1) and 2) are suitable in 95% of cases and provide a satisfactory outcome.
**Venipuncture**

1. Palpate the vein.

2. Vein stasis with a tourniquet – maximum duration 1 minute.

3. Disinfect the puncture site (allow the disinfectant to thoroughly dry).

4. Venipuncture – perform venipuncture according to instructions. The patient arm should be inclined in a downward position.

5. With the second hand, the vacuum tube should be inserted into the holder (the tube cap must point upwards and kept in position). Ensure that the rubber stopper is fully penetrated. Release tourniquet as soon as blood begins to flow.

---

For patients with prominent veins it is recommended to use the following **VACUETTE®** standard blood collection products:

- **VACUETTE® Multiple Use Drawing Needle** with uniquely sharpened faceting (three needle gauges available in 20, 21 and 22 G) for a patient friendly, pain free blood collection.

- **VACUETTE® QUICKSHIELD Safety Tube Holder** especially safe as the fingers remain behind the needle tip at all times. The protective cap is pre-attached to the holder, remaining stable. Once activated, there is no chance of the protective cap coming off.

- **VACUETTE® Standard Tube Holder** with ergonomic design. The specially adjusted surface area allows for improved handling of the holder during blood collection.

- **VACUETTE® Blood Collection Tubes** available exclusively in PET plastic. All tubes are available with a safety cap. The use of a vacuum system eliminates the possibility of backflow occurring during blood collection.
Venipuncture

For patients with difficult veins and respectively patients presenting an increased infection risk, it is recommended to use the following VACUETTE® products:

- **VACUETTE® Safety Blood Collection Set**
  To protect your health. The simple to use safety mechanism provides reliable protection against needlestick injuries. The Safety Blood Collection Set is available as a standard version or as two pre-assembled versions (with Luer adapter and with tube holder).

- **VACUETTE® QUICKSHIELD Complete PLUS**
  The practical Safety Tube Holder with pre-assembled VISIO PLUS needle for optical control of correct venipuncture. The needle protection cap is activated outside of the vein with the aid of a solid support or with the thumb.

- **VACUETTE® HOLDEX® Single-Use Holder**
  With eccentric nozzle. This holder is especially suitable for difficult vein conditions. The puncture is guaranteed through the off-centre cannula connection providing an optimal puncture angle for a patient friendly blood collection. The HOLDEX® Single-Use Holder can be used together with a Luer needle or with a blood collection set.

Recommended Order of Draw for Multiple Specimen Collection

1. **Blood Culture Tube**
2. **Coagulation Tube***
3. **Serum**
4. **Heparin**
5. **EDTA**
6. **Glucose**
7. **All others**

* Coagulation tubes may be the first tube to be drawn for routine testing only (PT and aPTT).

Note:
Always follow your facility’s protocol for order of draw.
Trouble Shooter

**No blood flows into the tube**

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The bevel of the needle tip is sucked against the wall of the vein</td>
<td>Gently rotate the needle within the lumen of the vein</td>
</tr>
<tr>
<td>The needle penetrated the vein wall</td>
<td>Gently pull both the tube holder and the needle backwards</td>
</tr>
<tr>
<td>The needle is not fully within the vein</td>
<td>Gently push the needle forwards</td>
</tr>
<tr>
<td>The tourniquet was too tight or in place too long</td>
<td>Loosen the tourniquet</td>
</tr>
<tr>
<td>The tube was already used, or was previously opened</td>
<td>Dispose of and select a new tube</td>
</tr>
</tbody>
</table>

**Blood flow ceases midway through the collection**

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tube was removed from the holder too soon</td>
<td>Reinsert the tube into the holder until the vacuum is totally depleted</td>
</tr>
<tr>
<td>Suction is too strong for the vein (collapsed vein)</td>
<td>Pull the tube out of the holder for a second and then reinsert it</td>
</tr>
<tr>
<td>The needle position has altered during the procedure, or the needle is outside the vein</td>
<td>Repeat venipuncture at different site when haemotoma occurs</td>
</tr>
</tbody>
</table>

**Haemolytical sample material**

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too long stasis of the vein (longer than 1 minute)</td>
<td>Exact control of stasis time (maximum 1 minute)</td>
</tr>
<tr>
<td>Transfer from a syringe into a tube</td>
<td>For safe blood transfer, use the VACUETTE® Blood Transfer Unit</td>
</tr>
<tr>
<td>Too intense mixing of the sample</td>
<td>Gently invert the tube 8 times (Coagulation tubes 4 times)</td>
</tr>
<tr>
<td>Tubes, that are not adequately filled</td>
<td>Ensure that the tube is correctly filled to the fill mark on the tube label</td>
</tr>
</tbody>
</table>

**Mixing of Specimen Material and Labelling of Tubes**

Following blood collection, all tubes should be gently inverted 8 times (coagulation tubes 4 times). Thorough mixing is necessary to ensure adequate performance of the tube contents (additive) with the blood sample. A full inversion is when the air bubble moves from one end of the tube to the other.

In order to ensure unique identification of the specimens, it is necessary to use a barcode system to label the tubes or write on the tube labels.
**Transport**

The recommended transport and storage temperature for tubes prior to use is 4-25°C (40-77 °F). Exceeding the recommended storage temperature may lead to impairment of the tube quality.

Avoid direct exposure to sunlight in storage and during transportation of samples, especially light-sensitive analytes such as Bilirubin.

For safe transport, it is recommended that the VACUETTE® Transport Boxes - especially developed for this purpose - be used in combination with the appropriate transport carton or transport bag.

---

**Centrifugation**

**Centrifugation recommendations for VACUETTE® Blood Collection Tubes**

<table>
<thead>
<tr>
<th></th>
<th>Centrifuge speed</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coagulation tubes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelet rich plasma (PRP)</td>
<td>150 g</td>
<td>5 min.</td>
</tr>
<tr>
<td>Platelet poor plasma (PPP)</td>
<td>1500 - 2000 g</td>
<td>10 min.</td>
</tr>
<tr>
<td>Platelet free plasma (PFP)</td>
<td>2500 - 3000 g</td>
<td>20 min.</td>
</tr>
<tr>
<td><strong>Serum tubes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum Sep Clot Activator</td>
<td>min. 1500 g</td>
<td>10 min.</td>
</tr>
<tr>
<td>Serum Beads Clot Activator</td>
<td>1800 g</td>
<td>10 min.</td>
</tr>
<tr>
<td><strong>Heparin tubes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heparin Sep</td>
<td>2000 - 3000 g</td>
<td>15 min.</td>
</tr>
<tr>
<td>EDTA Sep</td>
<td>1800 - 2200 g</td>
<td>10 min.</td>
</tr>
<tr>
<td>Homocysteine tubes</td>
<td>2000 - 2200 g</td>
<td>10 min.</td>
</tr>
</tbody>
</table>

**Important:**
The type of centrifuge being used can influence the properties of the gel barrier. Through the use of a swing-out rotor centrifuge in comparison to a fixed-angle centrifuge, a more solid gel barrier will be achieved. Centrifugation should be performed in a cooled centrifuge (15-24 °C).

Serum tubes should be centrifuged 30 minutes after blood collection. In certain blood samples, the clotting speed in serum tubes may be clearly delayed (i.e. anticoagulant therapy, missing coagulation factor, ...) the waiting period prior to centrifugation may be correspondingly delayed.

---

**Opening VACUETTE® Blood Collection Tubes**

1. Hold the tube firmly in one hand (use a solid base to support the arm).
2. Twist the safety cap with the other hand so the cap is loosened.
3. Carefully open Non-ridged tubes with a gentle pull motion. VACUETTE® PREMIUM Tubes are opened with a short twist movement.

Note: Too long storage of opened tubes can lead to evaporation and therefore false analysis results!

---

**Closing VACUETTE® Blood Collection Tubes**

1. Place the safety cap on the tube.
2. Press the cap onto the tube with the thumb (so it is firmly seated). VACUETTE® PREMIUM Tubes are closed with a short twist movement.
Please note, analyte stability depends on storage temperature and biological half-life.
## Tube Dimensions

**75 mm tubes**
- 13 mm Ø
  - 1 ml
  - 2 ml
  - 2,5 ml
  - 3 ml
  - 3,5 ml
  - 4 ml
  - 4,5 ml

**100 mm tubes**
- 13 mm Ø
  - 5 ml
  - 6 ml
  - 7 ml
  - 8 ml
  - 9 ml

### VACUETTE® Safety Caps

**Standard cap**
- 16 mm
- 13 mm

**Snap cap**
- for re-capping
- 13 mm tubes

- Prevents aerosol effect
- Absolute transport security
- Simple re-capping
- Prevent contact with patient blood

## Application Areas for VACUETTE® Tubes

<table>
<thead>
<tr>
<th>VACUETTE® tube type</th>
<th>Colour-coding of cap</th>
<th>Additive</th>
<th>Intended purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum</td>
<td></td>
<td>Clot Activator</td>
<td>Determinations in serum for clinical chemistry, microbiological serology, immunology, TDM</td>
</tr>
<tr>
<td>Serum Gel</td>
<td></td>
<td>Clot Activator and gel</td>
<td>Determinations in serum for clinical chemistry, microbiological serology, immunology, TDM</td>
</tr>
<tr>
<td>Serum Beads</td>
<td></td>
<td>Clot Activator and Beads</td>
<td>Determinations in serum for clinical chemistry, microbiological serology, immunology</td>
</tr>
<tr>
<td>Serum Crossmatch</td>
<td></td>
<td>Clot Activator</td>
<td>Determinations in serum for crossmatch testing</td>
</tr>
<tr>
<td>Plasma</td>
<td></td>
<td>Sodium Heparin</td>
<td>Determinations in heparinised plasma for clinical chemistry</td>
</tr>
<tr>
<td>Plasma Gel</td>
<td></td>
<td>Lithium Heparin and gel</td>
<td>Determinations in heparinised plasma for clinical chemistry</td>
</tr>
<tr>
<td>Plasma Beads</td>
<td></td>
<td>Lithium Heparin</td>
<td>Determinations in heparinised plasma for clinical chemistry</td>
</tr>
<tr>
<td>Plasma Crossmatch</td>
<td></td>
<td>K2 EDTA</td>
<td>Determinations in EDTA whole blood for haematology</td>
</tr>
<tr>
<td>EDTA</td>
<td></td>
<td>K3 EDTA</td>
<td>Determinations in EDTA whole blood for crossmatch testing</td>
</tr>
<tr>
<td>EDTA Gel</td>
<td></td>
<td>K2 EDTA / gel</td>
<td>Determinations in EDTA plasma for molecular biological identification of viruses, parasites and bacteria</td>
</tr>
<tr>
<td>Coagulation</td>
<td>Citrate Solution (3.2%)</td>
<td>Determinations in citrated plasma for coagulation testing</td>
<td></td>
</tr>
<tr>
<td>CTAD</td>
<td>CTAD (3.2%)</td>
<td>Determinations in citrated plasma for coagulation testing where the artificial entry of platelet factors into the plasma is avoided</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>Anticoagulant Glycolysis inhibitor</td>
<td>Determinations in stabilised anticoagulated whole blood or plasma for glucose and lactate testing</td>
<td></td>
</tr>
<tr>
<td>Trace Elements</td>
<td>Clot Activator Sodium Heparin</td>
<td>Determinations in serum / heparinised plasma for trace elements testing</td>
<td></td>
</tr>
<tr>
<td>Blood Grouping</td>
<td>ACD-A, ACD-B, CPDA</td>
<td>Determinations in ACD / CPDA whole blood for blood grouping</td>
<td></td>
</tr>
</tbody>
</table>
Education and training material

VACUETTE® offers a wide variety of supportive education and training material for the sample collection procedure. Amongst others, these include:

- VACUETTE® Tube Summary Chart .......................... Art. No. 980015
- VACUETTE® Hygiene Compendium .................. Art. No. 980056
- VACUETTE® Blood Collection Techniques Booklet .... Art. No. 980063
- VACUETTE® Safety Brochure .............................. Art. No. 980124
- VACUETTE® Preanalytics Manual ....................... Art. No. 980183
- VACUETTE® Analyte Chart ............................... Art. No. 980196
- VACUETTE® GBO Company Product Presentation DVD ... Art. No. 980434

VACUETTE® Blood Collection System
An Overview of the Essential Points

Checklist:

<table>
<thead>
<tr>
<th>Storage conditions in storeroom</th>
<th>4 – 25 °C, protected from direct sunlight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expiry Date</td>
<td>Not exceeding end of month stated on tube and packaging</td>
</tr>
<tr>
<td>Blood collection</td>
<td>According to Instructions for Use</td>
</tr>
<tr>
<td>Inversion of tubes immediately after blood collection</td>
<td>Gently 8 times (coagulation tubes 4 times)</td>
</tr>
<tr>
<td>Waiting period prior to centrifugation of serum tubes</td>
<td>Minimum 30 min.</td>
</tr>
<tr>
<td>Visual control of complete coagulation of serum tubes prior to centrifugation</td>
<td>In certain blood samples, the clotting speed in serum tubes may be clearly delayed (i.e. anticoagulant therapy, missing coagulation factor, ...) the waiting period prior to centrifugation may be correspondingly delayed</td>
</tr>
<tr>
<td>Centrifugation</td>
<td>According to Instructions for Use</td>
</tr>
<tr>
<td>Recentrifugation of Sep tubes</td>
<td>Avoid absolutely! Could lead to a change in the analysis results (i.e. potassium)</td>
</tr>
</tbody>
</table>

For further information please contact your nearest VACUETTE® distributor or visit us on our website www.gbo.com
For further information, please visit our website www.gbo.com/preanalytics or contact us: