Platelets Background Information

Current UVA BBTMS Platelets Transfusion Guidelines (Clinical Practice Guidelines: Guideline 2.040: Blood Component Transfusion)

1. Adults and Pediatrics
   a. Platelet count < 10,000 - 20,000/µL
   b. Platelet count < 50,000/µL & bleeding
   c. Platelet count < 50,000/µL & **immediately prior to** invasive procedure
   d. Platelet count < 100,000/µL & CNS or retinal bleeding
   e. Platelet count < 100,000/µL & **immediately prior to** invasive CNS or retinal procedure
   f. Platelet dysfunction (e.g. documented aspirin)
   g. Patient has received > 1 blood volume of fluids, including transfusions, within past 24 hours
   h. Stem Cell Transplant patients:
      i. Platelet count < 10,000/µL & inpatient
      ii. Platelet count < 20,000/µL & outpatient
      iii. Platelet count < 20,000/µL & fever
      iv. Platelet count < 30,000-50,000/µL & bleeding
2. Neonates
   a. Platelet count < 30,000/µL
   b. Platelet count < 50,000/µL & bleeding
   c. Platelet count < 50,000/µL & **immediately prior to** invasive procedure
   d. Platelet count < 100,000/µL on ECMO
   e. Platelet count < 150,000/µL on ECMO & bleeding
3. See the BBTMS Website for more information and the Evaluating for Platelet Refractoriness document

Platelets Dosing

1. Adult dose is one unit of Platelets Pheresis or one unit of pooled Platelets
2. Pediatric dose 10mL/kg body weight up to 10-15 kg body weight, then adult dose
3. Neonate dose 10mL/kg body weight + 7mL for tubing
   a. Expected increment is 50,000-100,000/ µL

Platelets Basics

1. The UVAHS BBTMS provides over 5,300 adult doses of platelets each year
2. All platelet components are Leukocytes Reduced
3. Platelets Pheresis units are titered for anti-A and anti-B isohemagglutinin levels
   a. UVAHS BBTMS requires this titer to be less than 100 when providing an ABO incompatible unit
   b. E.g., Group O platelets must have anti-A titer < 100 when dispensed for a group A recipient

Component	Approximate Volume	Content	Storage	Shelf Life*	Expected Increment
Platelets Pheresis	250mL	≥ $3x10^{11}$ platelets	20-24^{O}C (room temperature) with continuous agitation	5 days from time of collection	30,000-60,000/µL
WBD† Platelets	50mL	≥ $5.5x10^{10}$ platelets		5 days from time of collection	10,000/µL
Pooled Platelets‡	200mL	≥ $3x10^{11}$ platelets		4 hours from time of pooling	30,000-60,000/µL

*Due to donor and product testing at the collection facility, units have shelf life of fewer than 4 days upon receipt at the UVA BBTMS
†WBD = whole blood derived. These are only available on special request with BBTMS physician approval.
‡Pooled Platelets contain 4 units of WBD Platelets for an adult dose. These are only available on special request with BBTMS physician approval.

Platelets Response Calculations

1. **Corrected Count Increment (CCI):**
   a. Platelet count increment is the 15-60 minute post-transfusion minus pre-transfusion platelet counts. E.g. 35,000/µL – 10,000/µL = 25,000/µL (or 25 x 10^9/L) platelet count increment Body surface area (BSA) is in m^2 and calculated with height (Ht) in cm and weight (Wt) in kg. For conversions use 2.5cm/in and 1kg/2.2 lbs. An average adult has a BSA of approximately 2.0 m^2.
   b. Number (No.) of platelets transfused is presumed to be $3x10^{11}$. This is the minimum required to meet FDA criteria in a unit of Platelets Pheresis (PP). For best calculation, obtain the specified platelet count for unit transfused, e.g., use 4.2 if the unit had $4.2x10^{11}$.
   c. Refractoriness is suspected when the CCI for 15-60 min post transfusion platelet count is:
      i. < 5.0-7.5 x 10^9 m^2/L (< 5,000-7,500 m^2/µL) after two consecutive platelet transfusions
      ii. On rare occasion, a 24 hour post-transfusion platelet count is used for the increment and then CCI < 4.5 x 10^9 m^2/L (4,500 m^2/µL) suggests refractoriness.
   d. Example: Man with BSA 2.0 m^2, transfused 1 unit PP and platelet count increases from 10,000/µL to 35,000/µL. [(35-10)x 2.0]/3 = (25x2.0)/3 = 50/3 = 16.7 (probably not refractory)

$$\mathbf{CCI} = \frac{\mathbf{(Platelet\ count\ increment)} \times \mathbf{BSA}}{\mathbf{No.\ of\ platelets\ transfused}} \qquad \mathbf{BSA} = \sqrt{\frac{\mathbf{Ht} \times \mathbf{Wt}}{\mathbf{(3600)}}}$$

2. **Posttransfusion [Percent] Platelets Recovery (PPR):**
   a. Platelet count increment is the 15-60 minute post-transfusion minus pre-transfusion platelet counts (see CCI).
   b. Blood Volume (BV) is in liters (L).
   c. Number (No.) of platelets transfused is presumed to be $3x10^{11}$ or the exact count if known (see CCI.)
   d. Refractoriness suspected when PPR <50% of expected increment (see increment in table above).
   e. Example: Man with BV 5.0L, transfused 1 unit PP and platelet count increases from 10,000/µL to 45,000/µL. [(45-10)x5.0]/3 = (35x5.0)/3 = 175/3 = 58% (probably not refractory)

$$\mathbf{PPR} = \frac{\mathbf{(Platelet\ count\ increment)} \times \mathbf{BV}}{\mathbf{No.\ of\ platelets\ transfused}}$$

Platelets Testing

1. **Direct Platelet Antibody Testing** detects IgG attached to (coating) patient's circulating platelets. This test does not distinguish whether the affected platelets are native to the patient or from a donor following transfusion.
   a. An example would be IgG autoantibodies due to idiopathic thrombocytopenic purpura.
2. **Indirect Platelet Antibody Testing** detects free IgG, anti-platelet antibodies in patient's plasma.
   a. The antibody specificity may correlate to a cognate human leukocyte antigen (HLA) or a human platelet antigen (HPA)
      i. About 10% of women will develop an IgG, anti-HLA antibody during a first pregnancy.
3. **Platelet Crossmatch Testing** incubates the patient's plasma with donor platelets to assess for reactivity. The compatible (nonreactive) or least incompatible units are selected for transfusion. Sometimes all units crossmatched are incompatible.
   a. Please consult the BBTMS before ordering this testing.
4. **Human Leukocyte Antigen (HLA) and Percentage Panel Reactive Antibodies (PRA) Testing**
   a. If the BBTMS finds either of the following (i or ii), then HLA and/or PRA testing may be recommended:
      i. Reactivity on the indirect platelet antibody test with all reagent platelets
      ii. Incompatibility on all or most platelet crossmatch testing results
   b. **HLA** typing for Class I loci: HLA-A, HLA-B and HLA-C antigens expressed by the patient.
      i. Platelets will express HLA-A and HLA-B (platelets also weakly express HLA-C)
   c. **PRA** assays determine the identity and percentage (e.g, 10-90%) of antigens against which the patient has formed antibodies. PRA>20% suggests immunization and PRA >70% severe immunization requiring HLA compatible platelets. Results may be reported in one of two ways (whichever is the shorter list):
      i. A list of antigens against which patient has formed antibodies and which should be avoided for transfused platelets, suggesting the crossmatch will be incompatible
      ii. A list of antigens for which patient does not have antibodies and should be sought out for transfused platelets, suggesting the crossmatch will be compatible.
         (1) This list is usually provided when patient is broadly reactive such as a PRA > 75%
5. **If you suspect that your patient might be refractory to platelet transfusions then call the BBTMS (924-2273) for a consultation.**
   a. See the BBTMS Website for more information and the Evaluating for Platelet Refractoriness document