TERUMO BLOOD AND CELL TECHNOLOGIES

Unlocking Potential

Can whole blood donors help alleviate platelet shortages?

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Abstract

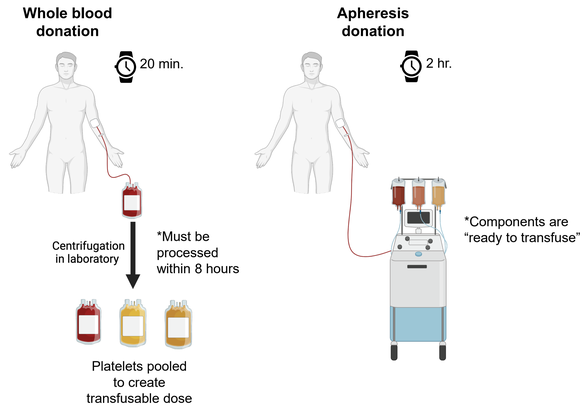
In the U.S., most platelets for transfusion are collected by apheresis, meaning that blood centers must retain apheresis donors or convert whole blood donors to apheresis donors to keep up with the high demand for platelet products. Many blood centers have struggled to meet this demand, largely due to the "aging out" of dedicated apheresis donors. Additionally, apheresis procedures are lengthy, limiting the number of donations per day. Supplementing the apheresis supply with whole blood-derived platelets (WBDPs) has been proposed as a method to mitigate platelet shortages. According to the National Blood Collection and Utilization Survey (NBCUS), in 2021, a total of 9.8 million units of whole blood were collected. Of these whole blood collections, 23% (2.25 million) were processed within 8 hours — the FDA-mandated processing time limit — to make cryoprecipitate. Assuming the same number of whole blood units could be processed within 8 hours to produce WBDP, and assuming that 5 intermediate platelet units are pooled to create one transfusable dose, production of WBDP could create an additional 450,000 platelet doses per year. Based on the national average split rate of 2.2 platelet products per procedure, this is equivalent to the number of platelet doses obtained from approximately 205,000 apheresis donations. Although many blood centers have moved away from producing WBDPs, recruitment of apheresis donors can be challenging. Whole blood donations are more convenient for donors, and WBDPs can potentially alleviate pressure on blood centers by providing supplemental platelets for transfusion.

Why are platelet donors needed?

- Over 2 million platelet transfusions occur in the U.S. each year.[1]
- Platelets can be transfused to prevent bleeding (prophylactically) or to stop active bleeding (therapeutically).
- Platelets are commonly used in the following specialties/patient populations:
  - Hematology/oncology
  - Trauma
  - Cardiac surgery
- Nearly 50% of platelet transfusion recipients have a type of cancer that affects the blood, bone marrow, and/or lymph nodes.[2]
- Up to 8 platelet units per week can be used by a patient undergoing chemotherapy.[2]

How are platelets collected?

- Platelets can be collected from healthy, eligible donors either by whole blood donation or by apheresis.
- Platelets collected from one whole blood donation must be pooled with those from 3 or 4 other donors to create a transfusable dose.
- Depending on donor parameters, one apheresis donation can produce a single (≥ 3.0×10^{11}), double (≥ 6.0×10^{11}), or triple (≥ 9.0×10^{11}) platelet dose.
- Apheresis donations take 1.5 to 2 hours, while a whole blood donation takes 15 to 20 minutes.



National platelet shortages

- Platelet utilization continues to rise while the number of presenting donors declines.[1-4]
- In a survey by Pandey et al. (2019), the frequency with which hospitals experience inadequate platelet supply was reported as follows[3]:

Frequency	Percentage of hospitals surveyed
Once or more per month	22.3%
Once per quarter	24.2%
Twice per year	14.4%
Once per year	7.1%
< Once per year	24.6%
Never/NA	5.8%
Other	1.5%

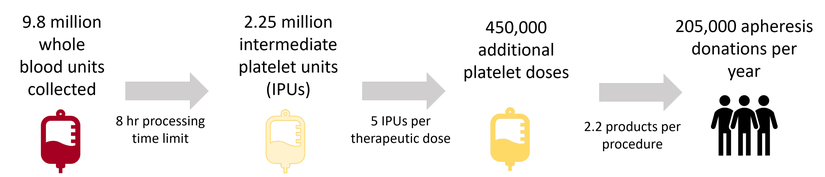
- Platelet shortages can delay medical procedures, which may lead to adverse patient outcomes.[3,4]

Whole blood vs. apheresis platelets

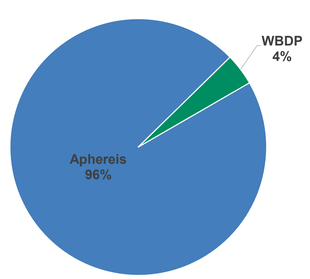
- Currently, almost all (96%) of the platelets distributed in the U.S. are collected by apheresis.[1]
- Number of WBDPs distributed has decreased over time due to financial constraints and customer preference.[1,4]
- Although apheresis platelets are indicated for certain patient populations, studies have shown WBDPs can be used interchangeably for most patients:[5-8]
  - Same hemostatic efficacy[5]
  - Same risk of alloimmunization[6]
  - Same risk of bacterial contamination[7,8]
- **Without WBDP programs in place, platelets from whole blood donations are discarded.**

WBDPs can supplement the apheresis platelet supply to improve availability

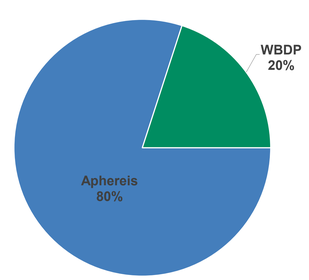
- Using the NBCUS 2021 data, a calculation was performed to estimate the potential impact of WBDP production on platelet availability.
- The following parameters/assumptions were used:
  - 9.8 million units of whole blood collected in 2021[1]
  - 2.25 million whole blood units (23% of all whole blood units collected) were processed within 8 hours[1]
  - 5 individual WBDP units are pooled to create a transfusable dose[9]
  - 2.2 platelet products are obtained from each apheresis procedure (national average split rate)[10]
- WBDP production could supplement the apheresis platelet supply by creating up to 450,000 additional platelet doses per year.
- This is equivalent to the number of platelet doses obtained from 205,000 apheresis donations per year.
- **Pooling platelets from whole blood donations may help alleviate strain on the platelet supply and reduce reliance on apheresis platelet donors.**



Current state of platelet distribution in the U.S.[1]



Future state of platelet distribution in the U.S.



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