

Refrigerated centrifuge calibration for maximum platelet and plasma yield in a blood bank

Sir,

Platelet yield by centrifugation separation from whole blood depends on donor platelet count, whole blood separation techniques, speed, acceleration, deceleration, and time used for platelet preparation.^[1,2] It is necessary that every center adopts its centrifuge setting for maximum platelet yield. The final platelet concentration of the random donor platelet (RDP) product has much bearing on the therapeutic efficacy in the recipient. Our center uses cryofuge 6000i for component preparation. After a minor maintenance of the equipment, we found that the initial settings which were 1400 rpm for 9 minutes with 9 acceleration and 7 deceleration were not yielding satisfactory quality parameters. We tried 6 different combinations for platelet-rich plasma (PRP) preparation, i.e., only light spin was altered and our second heavy spin was constant (3400 rpm for 10 minutes with 9 acceleration and 7 deceleration). During routine bleeding, 2 ml EDTA sample was collected along with pilot sample and complete blood count (CBC) were done by cell counter. On each setting, about 5 samples were collected. Whole blood was centrifuged at 6 different settings as shown in Table 1. After centrifugation, PRP was expressed from whole blood bag into platelet transfer bag and the mother bag was clamped. The PRP bag was mixed thoroughly to get a homogenous representative sample from the PRP bag under sterile closed-system conditions. The representative PRP sample was sent for CBC using cell counter.

Calculations

Whole blood volume = 350 ml

PRP volume was obtained by weighing PRP bag after light spin and converting it into volume.

Formula

Average yield in platelet bag, average plasma yield, average total platelet in PRP^[4] bag, and average total platelet in RDP bags are assessed as depicted in Table 1.

All the values have been detailed and enumerated in Table 2. By analysis, we established that setting number IV has given maximum platelet and plasma yield, average total platelet in PRP bag and in RDP bag.

It is always imperative to choose the program with minimal duration and rpm which gives the most acceptable yield.

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Conflicts of interest

There are no conflicts of interest.

Table 1: Average platelet yield, average plasma yield, average total platelet yield in platelet-rich plasma bag and average total platelet in random donor platelet bags by different settings

Setting	RPM	Time (min)	Acceleration	Deceleration	Average total platelet in PRP bag ($\times 10^{10}$)	Average total platelet in RDP bag ($\times 10^{10}$)	Average platelet yield (%)	Average plasma yield (%)
I	1900	4	9	7	6.9	6.4	75	44
II	1400	9	9	7	4.3	4.3	50	45
III	1900	4	9	7	5.2	3.8	51.8	37
IV	1900	4	7	7	7.5	8.3	76	53.6
V	1800	5	9	7	5.6	5.7	60	48
VI	1800	6	9	7	6.3	5.1	61.3	51

PRP=Platelet-rich plasma, RDP=Random donor platelet, RPM=Revolutions per minute

Table 2: Calculation of platelet yield in platelet-rich plasma and platelet concentrate

Step	Parameter	Formula
Step 1	Calculation of PRP volume	(Total PRP weight - bag weight)/specific gravity of PRP
Step 2	Platelet yield in PRP bag ^[3]	(PRP platelet count \times volume of PRP)/(whole blood platelet count \times whole blood volume) $\times 100$
Step 3	Plasma yield	PRP volume/whole blood volume $\times 100$
Step 4	Total platelet content of PRP bag	Platelet count $\times 10^9 \times$ volume of PRP
Step 5	Total platelet content of RDP bag	Platelet count $\times 10^9 \times$ RDP bag volume

PRP=Platelet-rich plasma, RDP=Random donor platelet

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