

Pooled platelet concentrates: How about 12 – 15 min collection time?

Johan Lagerberg, Stéphanie Groot, Ido Bontekoe, Pieter van der Meer, Dirk de Korte

Product and Process Development, Sanquin Blood Bank,
Amsterdam, the Netherlands

Disclosure

I have nothing to disclose.

12-15' BC. General rule: don't use

- Not evidence based (as far as we know), but in (European) regulation like Council of Europe Guide:

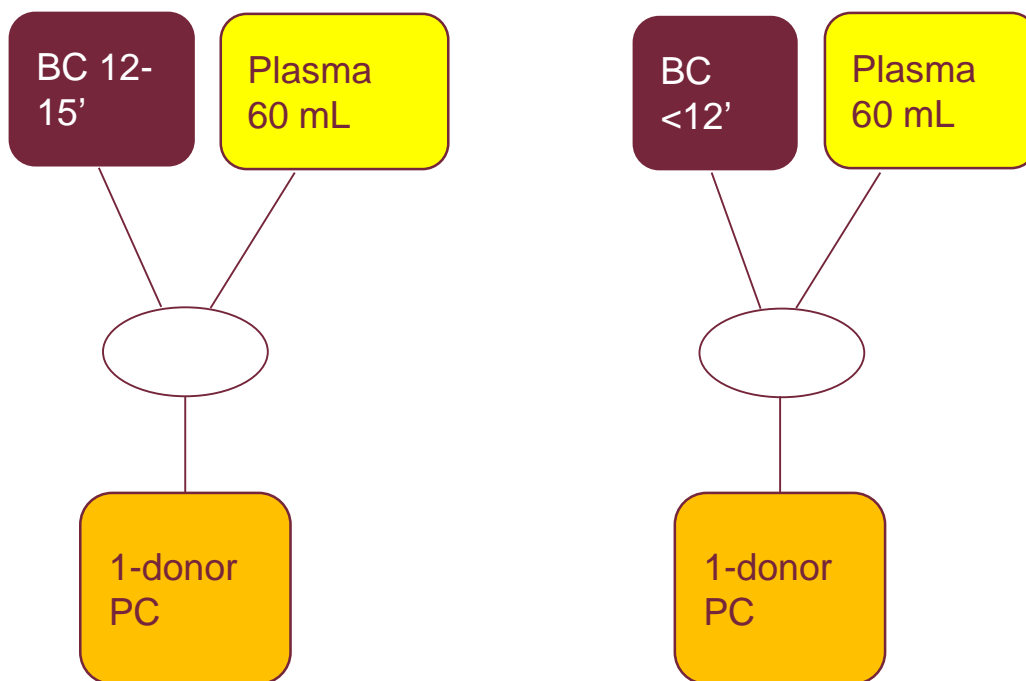
“Donation of a whole blood unit should ideally not last more than 10 minutes. If the duration of the collection is longer than 12 minutes, the blood should not be used for the preparation of platelets.”
- Possible reasons:

Activation of coagulation and/or platelets before mixing with anticoagulant; Lower platelet recovery
- Visible clots in buffy coat?

Not aware of this phenomenon
- Challenge the rule, prevent unnecessary rejection of buffy coats
 - Study 1: single platelet concentrates
 - Study 2: pooled platelet concentrates

Study 1, single PCs

- Preparation of single platelet concentrates (sPCs) from buffy coats with 12'-15' collection time for the whole blood unit, with autologous plasma
 - sPCs: 800 – 1400x10⁹ /L platelets



In vitro testing

- Swirl
- PLT count, MPV
- pH, blood gas, glucose, lactate
- CD62P
- Annexin A5
- Aggregation : ADP, collagen, arachidonic acid
- TEG 5000
 - 1) PC diluted to $0.1 \times 10^9/\text{L}$ in S/D AB Omniplasma
 - 2) Calcium: 20 μL 0.2 M CaCl_2
 - 3) Activator: Citrated Kaolin



Results single-PCs

	12' - 15'	Control
	n = 9	n = 10
	mean \pm s.d.	mean \pm s.d.
Donors		
% Male	11*	60
Age	40 \pm 16	46 \pm 17
Blood pressure	126 \pm 25	121 \pm 15
	74 \pm 18	70 \pm 11
PC day 1		
Volume, mL	67 \pm 5	68 \pm 12
[PLT], 10 ⁹ /mL	1323 \pm 346	1153 \pm 502
PLT, x10 ⁹	89 \pm 25	75 \pm 25
MPV, fL	9,3 \pm 0,8	9,2 \pm 0,7
WBC, x10 ⁶	2,4 \pm 1,7	3,3 \pm 2,4
pH	7,03 \pm 0,04*	7,07 \pm 0,03

* p < 0,05

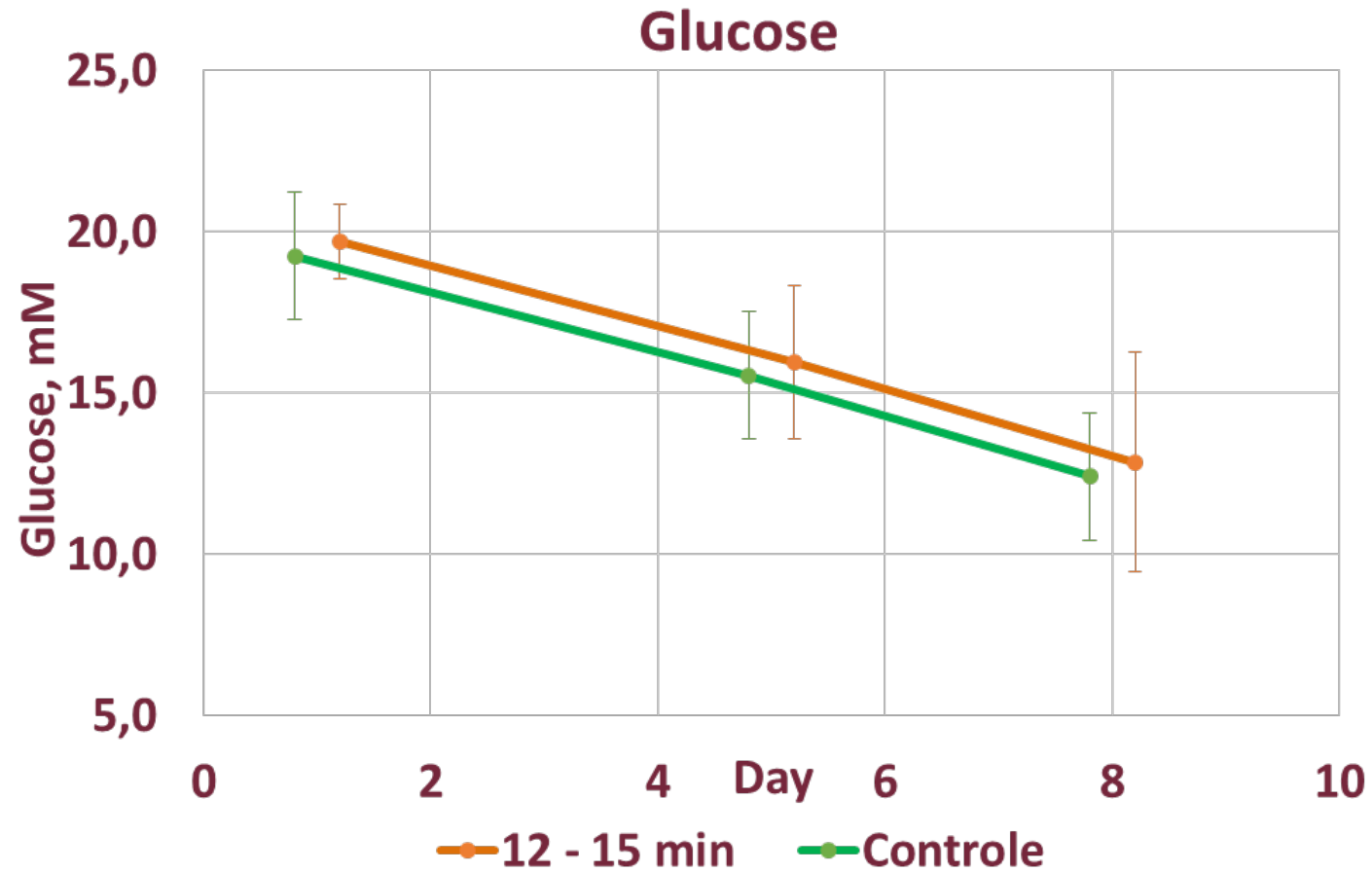
Results single-PCs

- In both arms: units sPCs $>80 \times 10^9$ excluded
 - above capacity of storage bag, resulting in pH lower than 6.0 at day 8 and no swirl.
 - Final analysis storage parameters with $n=6$

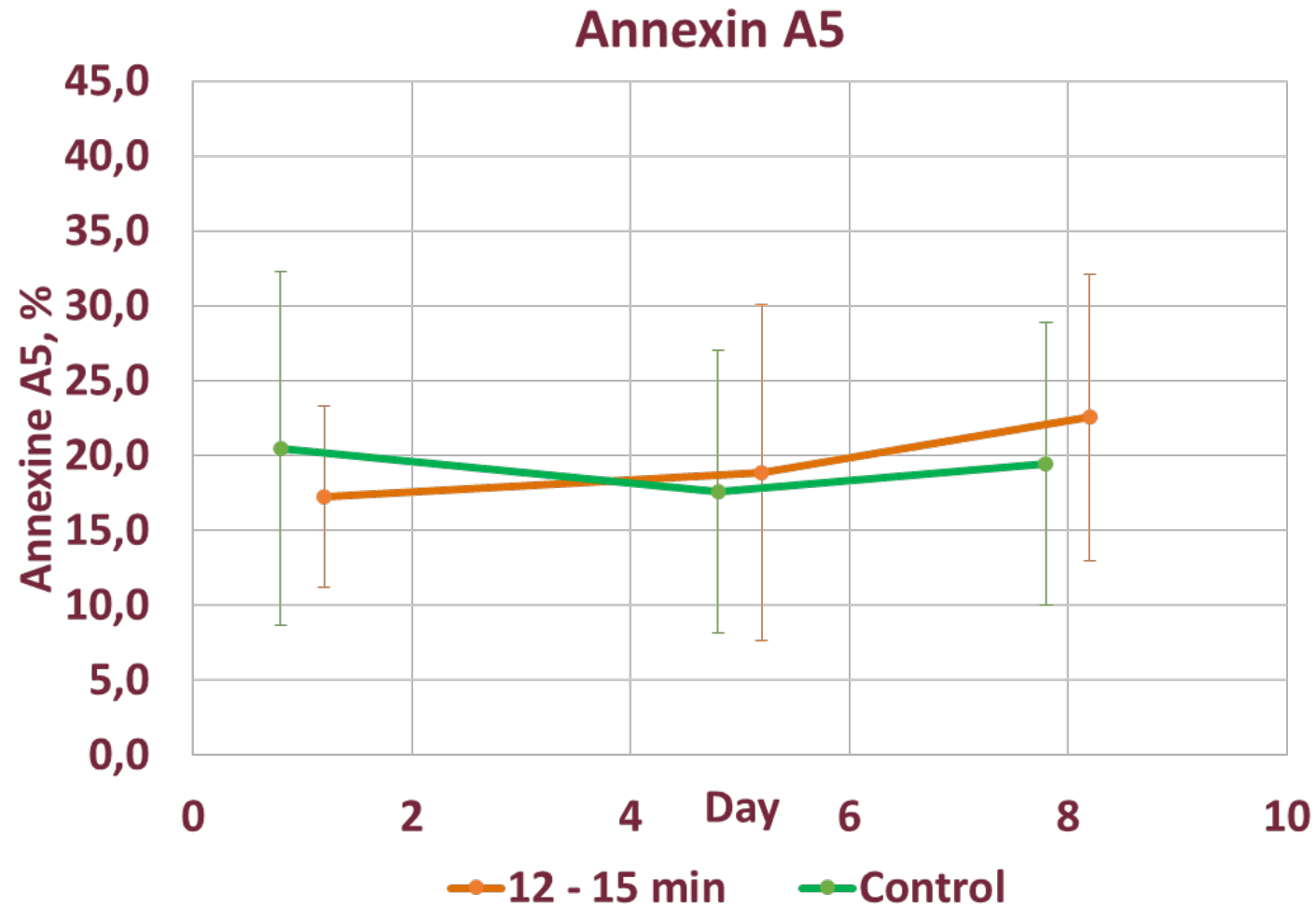
During 8 days storage

- For all parameters tested: no differences during storage
 - CBC comparable
 - Metabolism
 - Activation/apoptosis markers
 - Aggregation
 - TEG

Results single-PCs



Results single-PCs



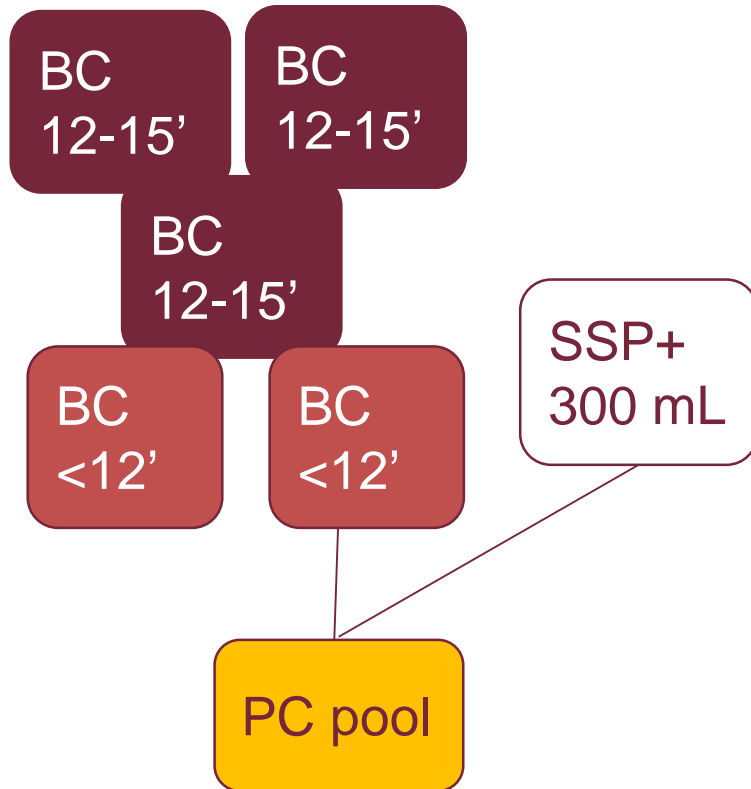
Discussion Study 1

- More females in 12'-15'-group
- No differences between single PCs derived from buffy coats obtained from whole blood donations with normal (average 8 min) collection time or prolonged (12-15 min) collection time

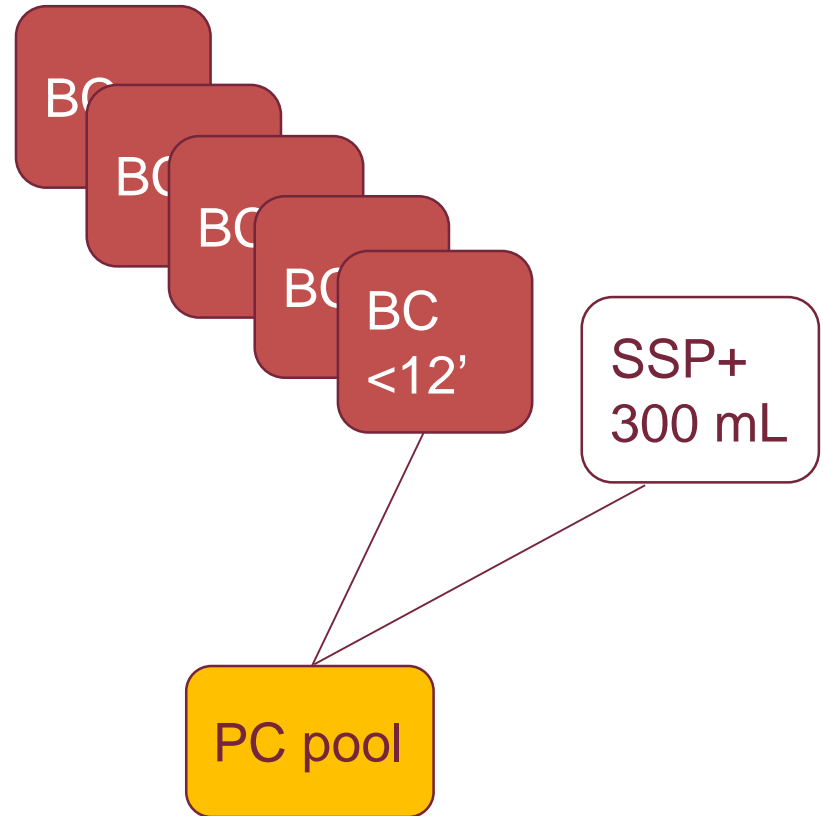
Study 2 design

- How about pools?
- Enhance the possible effect by selecting ≥ 3 '12-15 BC' to produce an ABO compatible 5-donor pool PC

5-donor PC



n = 5



n = 5 control

Results pooled-PCs

- In total 5 pools prepared with ≥ 3 '12-15 min BC'
- Prepared with SSP+ (about 35% plasma)

During 8 days storage

- For all parameters tested: no differences
 - CBC comparable
 - Metabolism
 - Activation/apoptosis markers
 - Aggregation
 - TEG

5-donor TC

	12-15 min n = 5	< 12 min n = 5	Requirement
Drawing time (mm:ss) Female, %	11:12 ± 3:22* 80	7:14 ± 1:38 68	
Day 1 Volume, ml PLT, x10 ⁹ pH (37°C)	361 ± 9 351 ± 46 7.03 ± 0.02	364 ± 17 390 ± 72 7.03 ± 0.02	250-400 >250 6.3 – 7.5
Day 8 pH (37°C) Lactate (mmol/L) CD62P, % pos cells Annexin A5, % pos cells Hypotonic shock response, % Swirl	7.17 ± 0.03 9.2 ± 0.6 20.1 ± 7.0 8.9 ± 1.9 77 ± 22 3 ± 0	7.13 ± 0.15 10.3 ± 3.8 18.9 ± 7.0 7.6 ± 1.4 66 ± 16 3 ± 0	6.3 – 7.5 < 30 < 20 Present Present

*:p<0.05 (one-way ANOVA and Dunnett's post test)

Conclusions

- PCs prepared from 12-15 min BCs:
 - complied to the Guidelines up to day 8 of storage;
 - were comparable to control PCs (from BC <12');
 - in ABO incompatible units: minor clumps visible (day 8).
- Based on *in vitro* parameters there is no reason to reject '12-15 min BCs' for the production of pooled platelet products

Question

- Which data would be necessary to convince regulatory bodies to skip the <12 min collection time requirement?
International collaboration (BEST Collaborative)?

Acknowledgements

- ✓ Donors
- ✓ Production department (selection of BCs)
- ✓ Eva Haage (donor forms)
- ✓ Davina Sijbrands

Thank you for your attention

Multiplate (Roche)

- 5 channels
- Automatic pipet
- Easy software
- Whole blood and platelet aggregation (impedance)

