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RSUP Dr. SARDJITO





WEBINAR

Advantages of Apheresis Blood Component

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Swirling Test

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<http://rebrand.ly/webinardarah>

Sabtu, 29 Februari 2020
09⁰⁰ - 10³⁰



Apheresis blood components: an advantage?

Hans Vrielink, MD, PhD



Conflict of interest / disclosures

Organizational committee: Accommodation and stay, part of travelling costs

Haemonetics & Transmedic: Part of travelling costs

Outline

Whole blood derived components

Versus

Apheresis derived components

- Red blood cells
- Plasma
- Platelets



Whole blood



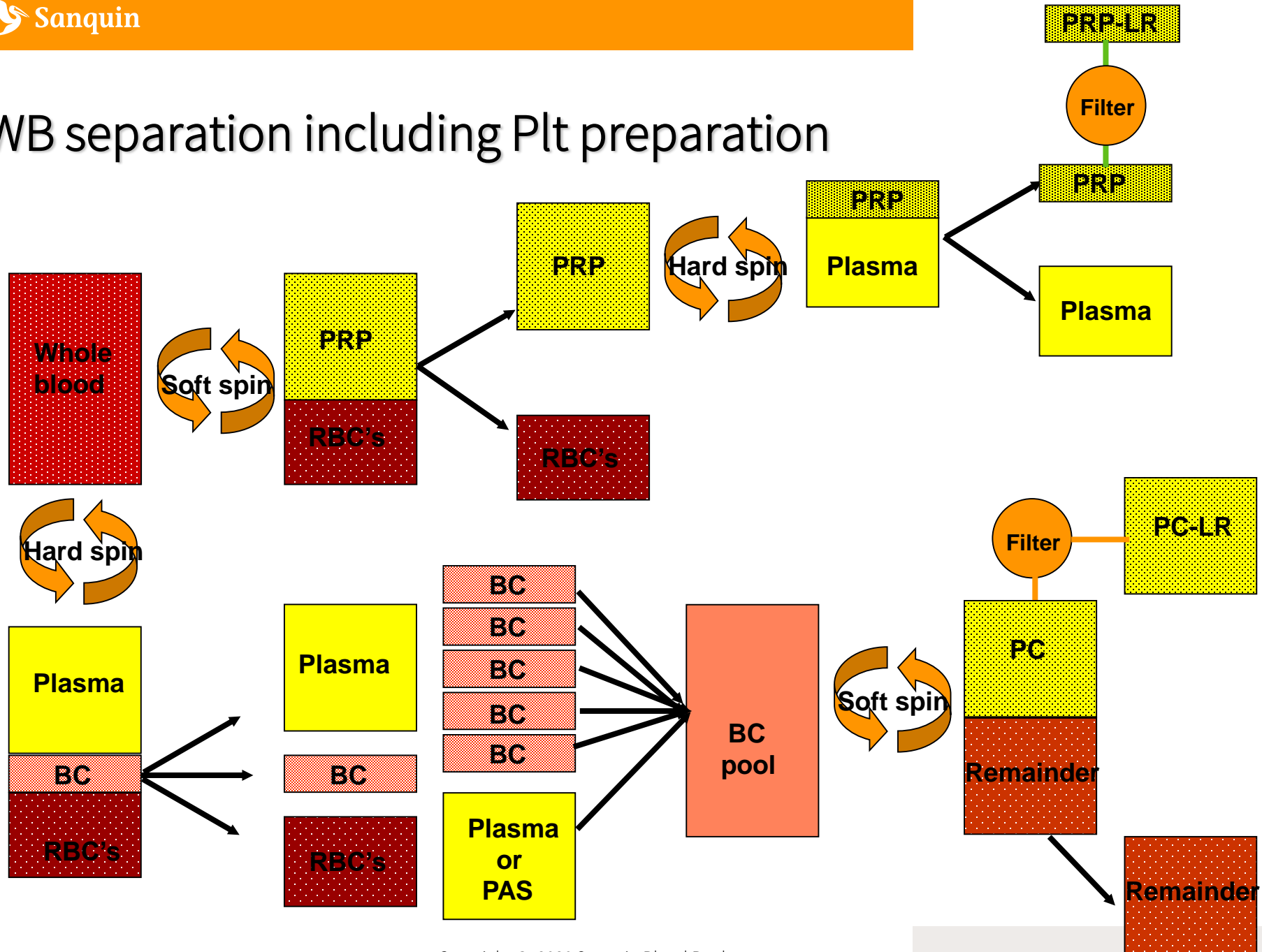
<https://www.stemexpress.com/human-blood-products/whole-blood-fresh-edta.html>

“Indications for whole blood transfusion is limited to acutely hemorrhaging individuals,” and “.... Studies supporting this approach include military trauma where they are able to transfuse very fresh (<24 hours old)”

<https://reference.medscape.com/drug/whole-blood-999509>

→ Splitting into various components needed

WB separation including Plt preparation



Blood components for transfusion

- Red blood cells
- Plasma
- Platelets

Whole blood derived plt



Pool of # buffycoats



Single PRPs

Plasma from whole blood donation

Whole blood donations

- PRP method
 - 350 mL donation → 135 mL plasma
 - 400 mL donation → 160 mL plasma
 - 450 mL donation → 185 mL plasma
 - 500 mL donation → 210 mL plasma
- BC method
 - 350 mL donation → 165 mL plasma
 - 400 mL donation → 210 mL plasma
 - 450 mL donation → 230 mL plasma
 - 500 mL donation → 280 mL plasma



-/- ≈ 30-70 mL per donation

Plasma from whole blood donation

Whole blood donations

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 - 350 mL donation → 135 mL plasma
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Whole blood collections

- Max 500 mL (excl anticoagulant)
- “a standard donation of whole blood (including samples) must not exceed 15% of the calculated blood volume of the donor”

Blood volume various populations

	Male		Female	
Cambodia	163	58,5	153	52,0
		4076		3179
China	171	70,5	159	59,4
		4708		3580
Indonesia	163	59,5	152	54,8
		4108		3247
Laos	160	57,9	151	52,4
		3971		3143
Malaysia	168	71,1	156	63,5
		4633		3636
Singapore	172	71,9	160	59,4
		4786		3607
Thailand	168	67,2	156	60,8
		4507		3546
Vietnam	164	58,4	153	50,8
		4102		3139
USA	177	90,9	164	78,0
		5565		4335



Whole blood collections

- Max 500 mL (excl anticoagulant)
- “a standard donation of whole blood (including samples) must not exceed 15% of the calculated blood volume of the donor”

→ 15% of 3,250 mL = 487 mL including samples



→ 400-450 mL?

Blood volume various populations

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Plateletapheresis

Whole blood derived plt



Single dose donation



Pool of # buffycoats

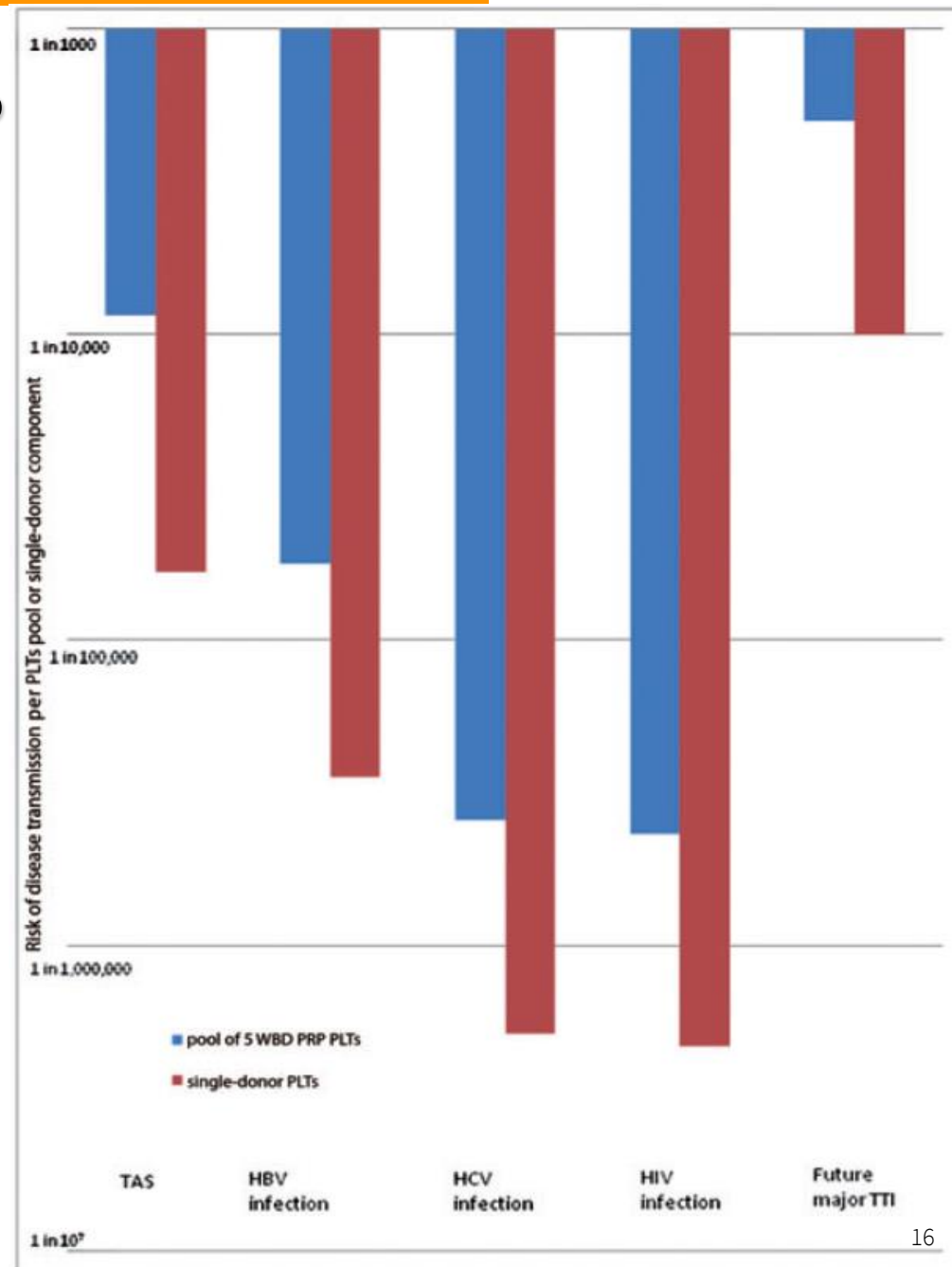


Single PRPs

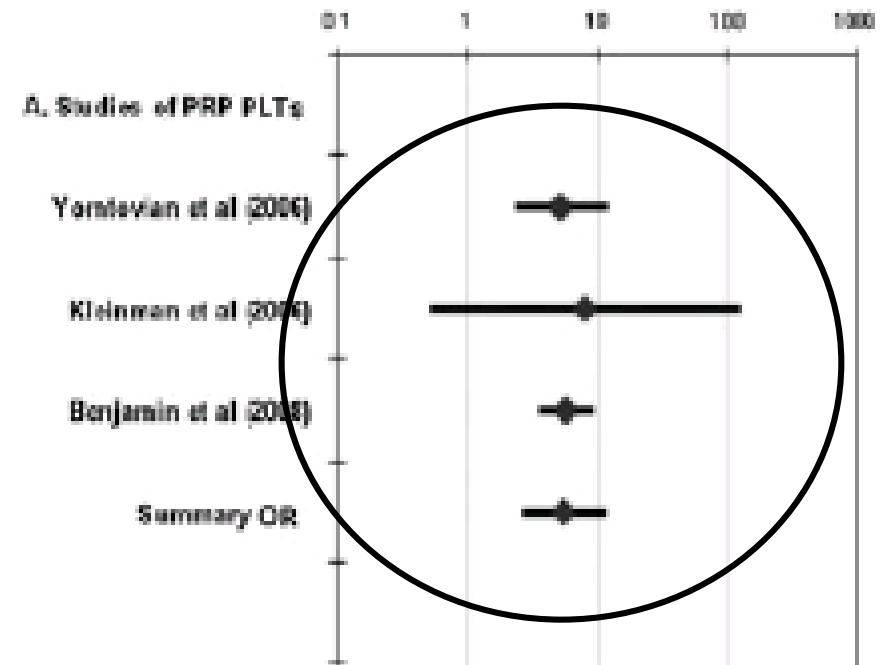
PRP vs. BC platelets

	PRP-platelets	BC-platelets
Volume (mL)	62.3±22.7 (22-135)	68.8±23.0 (32-133)
# of Plt (x10 ¹⁰ /unit)	7.6±3.0 (3.2-16.2)	7.3±3.0 (0.6-16.4)
# of WBC (x10 ⁷ /unit)	4.7±0.5 (3.4-4.8)	2.1±0.4 (1.6-2.7)

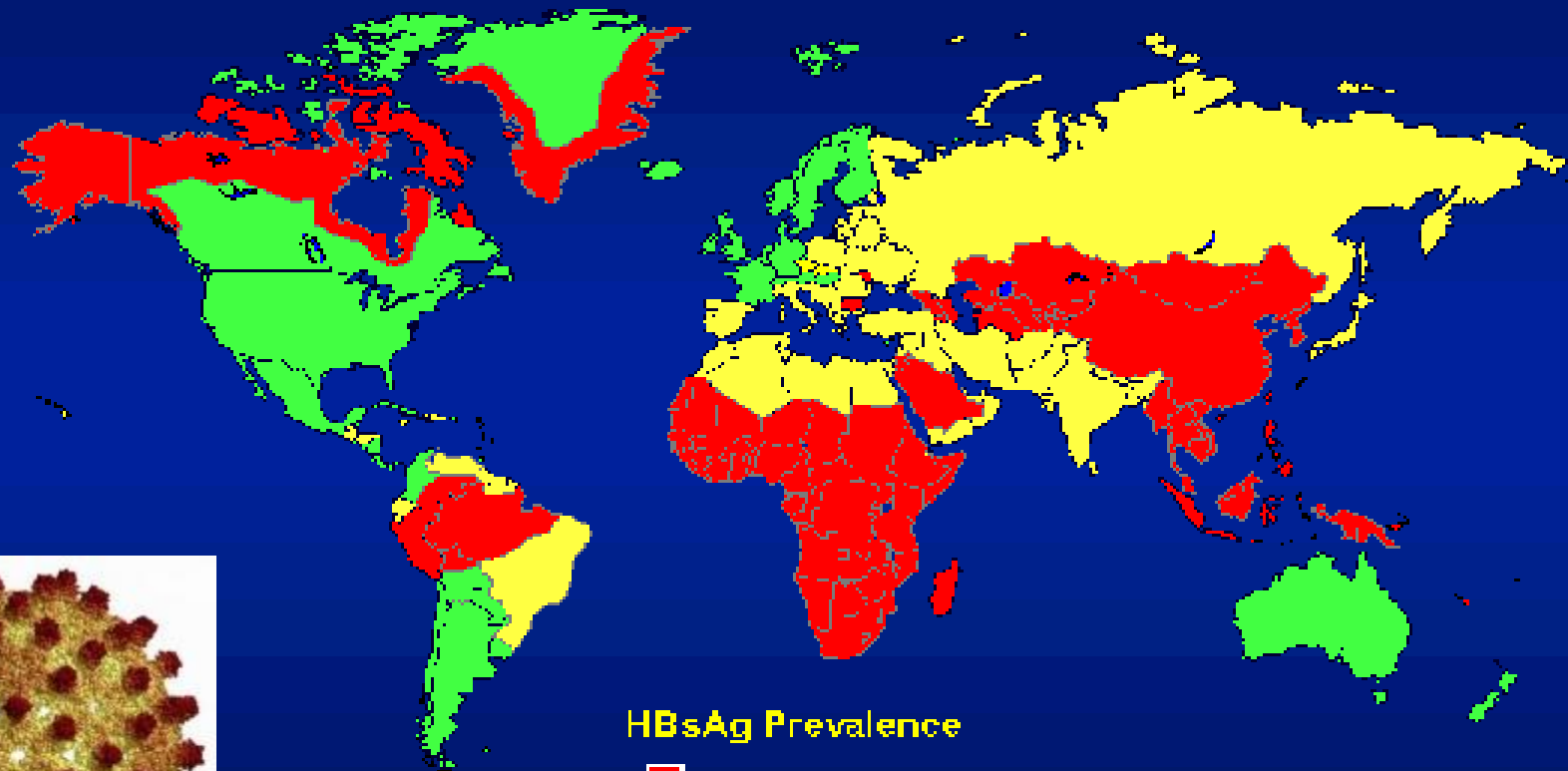
Increase of risk SDP → PRP



Bacterial contamination of WB vs SD plt

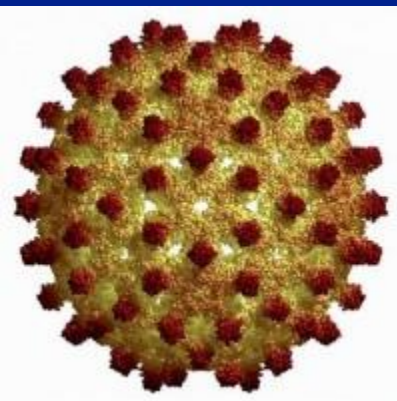


Geographic Distribution of Chronic HBV Infection



HBsAg Prevalence

- ≥8% - High
- 2-7% - Intermediate
- <2% - Low

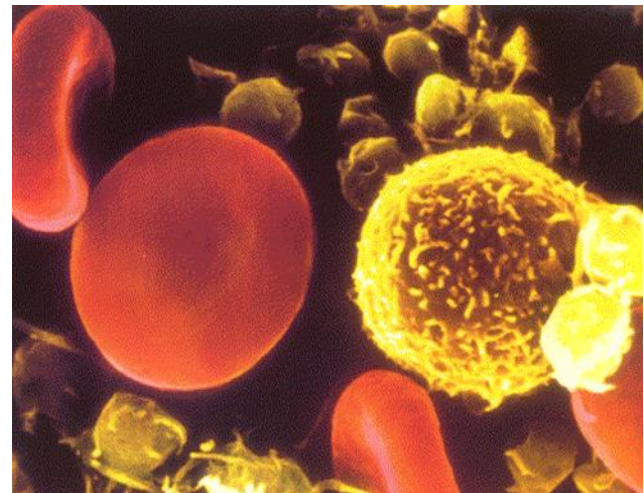


WB derived plt versus apheresis

Leukoreduced platelet products derived from whole blood or obtained by apheresis can be comparable

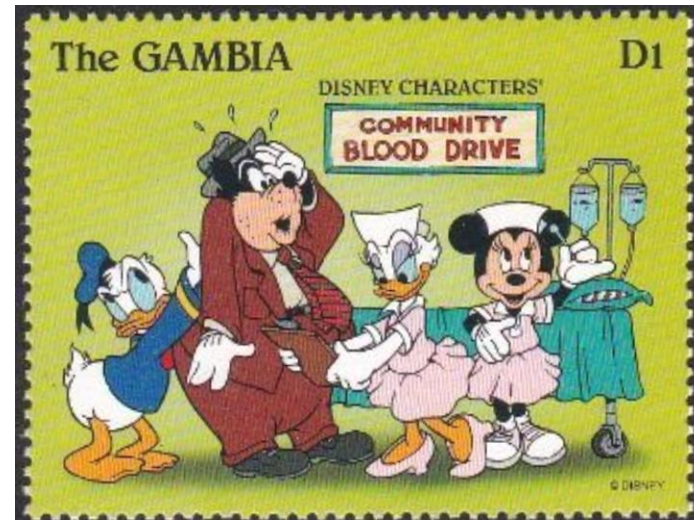
- BC derived with sterile connections
- Apheresis plt in favor over PRPs
- Location depending (TTIs)

→ BC or apheresis derived platelets are preferred



Collection of units of RBCs

Whole blood donations
Erythrocytapheresis



<https://s-media-cache-ak0.pinimg.com/736x/d9/86/18/d986189032aeb1a630e8c647a3db7161.jpg>

RBC apheresis




HAEMONETICS®
 THE Blood Management Company

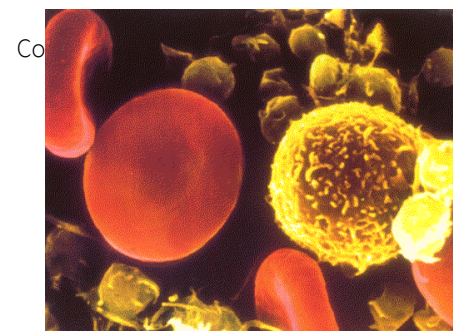


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KABI**





Apheresis

Method of obtaining one or more blood components by machine processing of whole blood in which the residual components of the blood are returned to the donor during or at the end of the process.

Reference

Guide to the preparation, use and quality assurance of blood components

European committee on Blood Transfusion

2017-19th Ed.

RBC apheresis



Foto: Hans Vrielink

EU Standards

TBV > 4,500 mL

- Women → > 1.80 m & > 80 kg
- Men → > 1.70 m & > 65 kg

Hgb > 14.0 g/dL (> 8.7 mmol/L)

- The Hgb level must not fall below 11.0 g/dL (6.8 mmol/L)
(drop in case of double RBC collection app 3 g/dL (2 mmol/L))

Max volume

- Must not exceed 400 mL (without re-suspension solution) per collection procedure



Blood volume various populations

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<https://www.worlddata.info/average-bodyheight.php>

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RBC apheresis

Whole blood versus Apheresis



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O-neg donor



Plasma

- $\pm 5\%$ body weight
- Composition
 - $\pm 91\%$ water
 - salts
 - minerals
 - carbohydrates
 - fats
 - proteins (>100 different)
- Function: various

Water			91%
PLASMA-PROTEINS	Albumin	3.2 – 5.0 g	per 100 ml
	Fibrinogen	0.20 – 0.45 g	per 100 ml
	Globulins		
	Alfa	0.40 – 0.98 g	per 100 ml
	Bèta	0.56 – 1.06 g	per 100 ml
	Gamma	0.44 – 1.04 g	per 100 ml
	Glucose	61 - 130 mg	per 100 ml
	Cholesterol	128 - 347 mg	per 100 ml
	Bilirubin	0 – 1.1 mg	per 100 ml
	Urea	13.8 – 39.8 mg	per 100 ml
Sodium			310 - 356 mg per 100 ml
Potassium			12 - 21 mg per 100 ml
Calcium			8.2 – 11.6 mg per 100 ml
Iron			0.04 – 0.21 mg per 100 ml
Chloride			355 - 381 mg per 100 ml ²⁷

Collection of plasma

For infusion

To achieve larger volumes of plasma

For fractionation



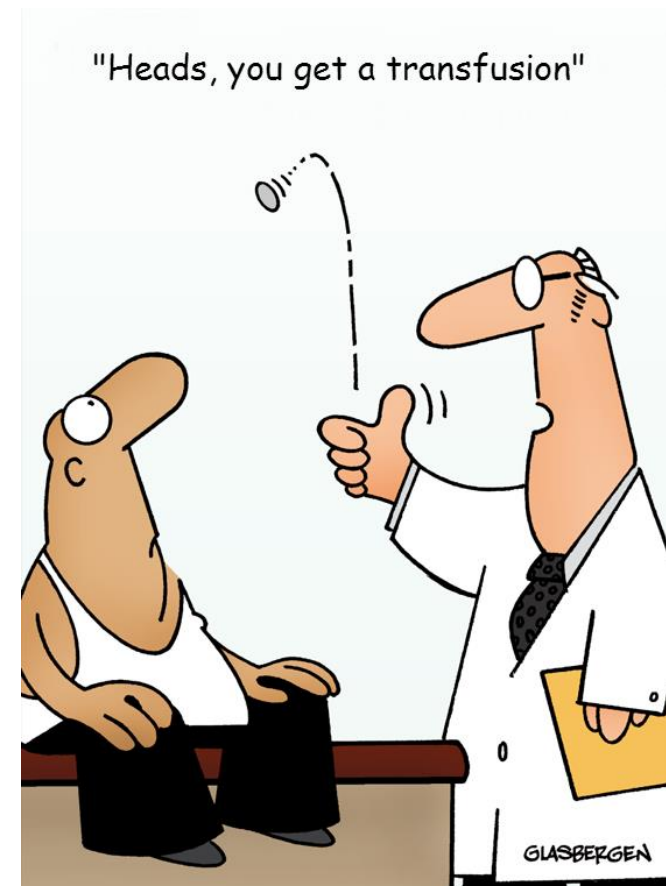
<https://s-media-cache-ak0.pinimg.com/736x/ab/71/d2/ab71d23f85e023b1848631de9ecf3cc1.jpg>

Plasma for infusion

Evidence for the administration of plasma was only found for a limited number of indications.

Stanworth SJ, et al. Br J Haematol 2004; 126: 139-52.

Roback JD, et al. Transfusion 2010;50: 1227-39.



Collection of larger volumes of plasma

Specific antibodies

- Cured Ebola patients
- HLA
- HNA
- HPA
- RBC antibodies
- HBV / other viruses
- Tetanus / Rabies

Research purposes

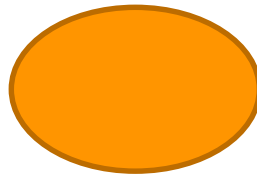
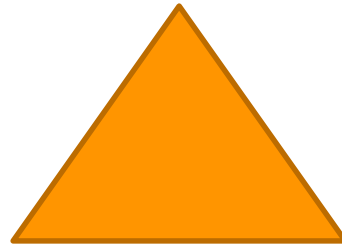
- IgA
-



<http://medicalxpress.com/news/2015-04-ebola-survivors-donate-plasma-tackle.html>

.....

Plasma for fractionation



Icons: www.Dreamstime.com



Examples of plasma proteins for clinical use

Plasma Component	Reasons for Use
Factor VIII	hemophilia A
Factor IX	hemophilia B
Factor X	congenital deficiency
Factor XIII	congenital deficiency
PCC complex	anticoagulant overdose factor II and factor X if Factor X not available deficiencies liver disease
Immunoglobulin	passive prophylaxis immune deficiency disorders some types of immune thrombocytopenic purpura Guillain–Barré syndrome Polyneuropathies
Antithrombin III	congenital deficiency & disseminated intravascular coagulation
Fibrinogen	congenital deficiency massive haemorrhage
C1 inhibitor	hereditary angioedema
Albumin	Hypoalbuminemia Ascites Restoring of blood volume in trauma, burns and surgery patients
Alpha-I-antitrypsin	hereditary deficiencies emphysema and COPD cirrhosis

Plasma for fractionation

To achieve

Specific clotting factors

- FVIII
- FIX
- FII, VII, IX, X
- Von Willebrand factor
-

Immunoglobulins

- Anti-D
- IgG (intramuscular / intravenous use)
- Specific (HAV, HBV, Tetanus, Varicella Zoster, Variola,)



Sanquin, The Netherlands

Plasma for fractionation (continued)

Others

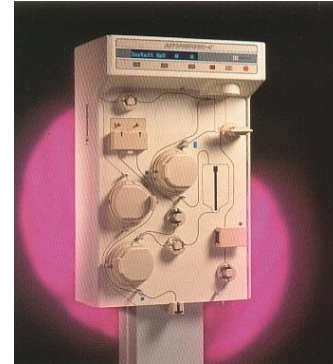
- C1 esterase inhibitor
-

Albumin

- 4-5% solutions (40 – 50 gram per liter)
- 20-25% solutions (200-250 gram per liter)

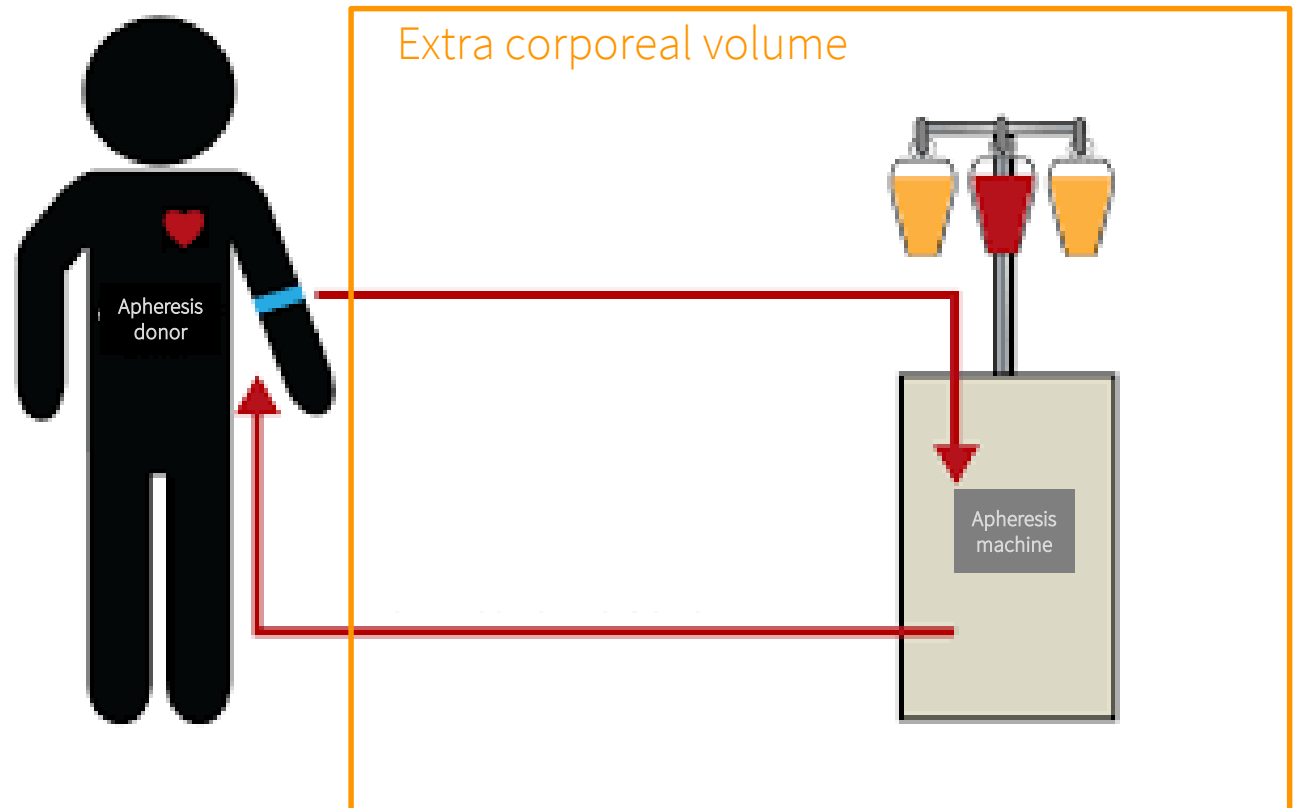
Apheresis equipment (plasmapheresis)

- Fresenius Kabi
- Haemonetics
- Nigale
- Scinomed



Adverse Events

Collection
Processing
Return



ECV and donor apheresis

USA: No limits

 Sanquin

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ECV and donor apheresis

Most persons without significant cardiovascular or pulmonary disease will tolerate an ECV up to 15%.



Source: National Institutes of Health and National Heart, Lung, and Blood Institute, 2010

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ECV and donor apheresis

USA: No limits

Europe: “The maximal ECV must never be higher than 20%.”

UK Red Book: “During apheresis procedures the ECV should not exceed 15% TBV (excluding anticoagulant).”



Guide (standards)

“In any apheresis procedure involving collection of plasma, platelets and/or red cells in one apheresis procedure, the total volume of all components collected (plasma, platelets and red cells) must not exceed 16% of total blood volume, with a maximum of 750 mL (exclusive of anti-coagulant), unless fluid replacement is undertaken.”

Plasmapheresis

- Maximally 750 mL collected (=840 gram incl AC)
- Max 16% TBV



TBV various populations

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Cambodia	163	58,5	153	52,0
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Standards – plasmapheresis donors

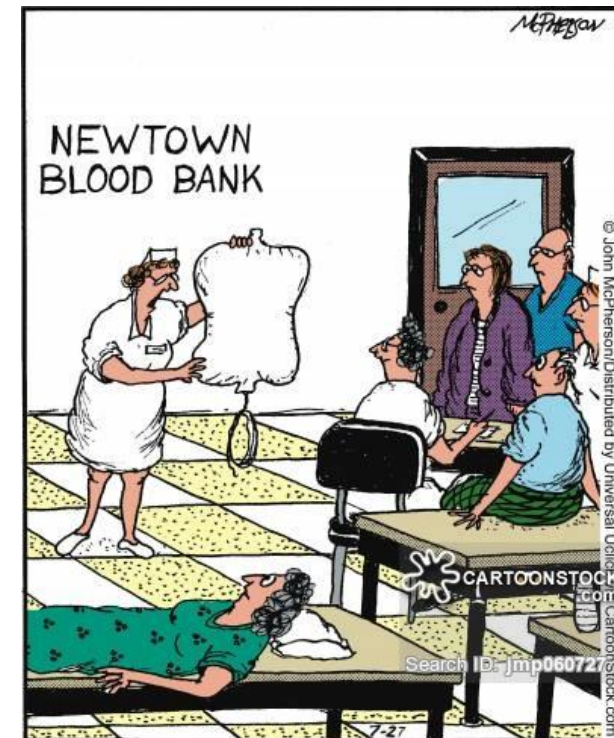
Max ECV 20%

Max 16% TBV collected until max 750 mL uncoagulated plasma

TBV should be calculated for donors 50-65 kg (Nadlers formula)



Personalized collections



"OK, who wants to be a hero?!"

Personalized collections: female donors

AF TE NEMEN GEWICHT (grammen) PLASMADONATIE (VROUWEN, PC&2)																										
	55	56	57	58	59	60	61	62	63	64	66	66	67	68	69	70	71	72	73	74	76	76	77	78	79	
1,60	430	430	440	450	460	480	470	480	490	490	600	510	520	520	530	640	540	550	560	570	670	580	590	600	600	1,60
1,61	430	440	450	450	460	470	480	480	490	500	610	510	520	530	540	640	550	560	570	570	680	590	600	600	610	1,61
1,62	440	450	450	460	470	480	480	490	500	510	610	520	530	530	540	660	560	560	570	580	680	590	600	610	620	1,62
1,63	450	450	460	470	470	480	480	490	500	510	620	530	530	540	550	680	560	570	580	590	680	600	610	620	620	1,63
1,64	450	460	470	470	480	480	490	500	510	520	630	530	540	550	560	680	570	580	580	590	800	610	610	620	630	1,64
1,65	460	470	470	480	490	490	500	510	520	520	630	540	550	550	560	670	580	580	590	600	810	610	620	630	640	1,65
1,66	460	470	480	490	490	500	510	520	520	530	640	550	550	560	570	680	580	590	600	610	810	620	630	630	640	1,66
1,67	470	480	490	490	500	510	520	520	530	540	660	550	560	570	570	680	590	600	600	610	820	630	630	640	650	1,67
1,68	480	490	490	500	510	510	520	530	540	540	660	560	570	570	580	680	600	600	610	620	830	630	640	650	660	1,68
1,69	480	490	500	510	510	520	530	540	540	550	680	570	570	580	590	800	600	610	620	630	830	640	650	650	660	1,69
1,70	490	500	510	510	520	530	540	540	550	560	670	570	580	590	600	800	610	620	620	630	840	650	650	660	670	1,70
1,71	500	510	510	520	530	540	540	550	560	560	670	580	590	590	600	810	620	620	630	640	860	650	660	670	680	1,71
1,72	510	510	520	530	540	540	550	560	560	570	680	590	590	600	610	820	620	630	640	650	860	660	670	680	680	1,72
1,73	510	520	530	530	540	560	560	560	570	580	680	590	600	610	620	820	630	640	650	650	880	670	680	680	690	1,73
1,74	520	530	530	540	550	680	560	570	580	590	680	600	610	620	620	830	640	650	650	660	870	680	680	690	700	1,74
1,75	530	530	540	550	560	680	570	580	590	590	800	610	620	620	630	840	650	650	660	670	870	680	690	700	700	1,75
1,76	530	540	550	560	560	670	580	590	590	600	810	620	620	630	640	860	650	660	670	670	880	690	700	700	710	1,76
1,77	540	550	560	560	570	680	590	590	600	610	820	620	630	640	650	860	660	670	670	680	890	700	700	710	720	1,77
1,78	550	560	560	570	580	680	590	600	610	620	820	630	640	650	650	880	670	680	680	690	700	700	710	720	730	1,78
1,79	560	560	570	580	590	680	600	610	620	620	830	640	650	650	660	870	680	680	690	700	700	710	720	730	730	1,79
1,80	560	570	580	590	590	800	610	620	620	630	840	650	650	660	670	880	680	690	700	710	710	720	730	730	740	1,80
1,81	570	580	590	590	600	810	620	620	630	640	860	650	660	670	680	880	690	700	710	710	720	730	740	740	750	1,81
1,82	580	590	600	600	610	820	620	630	640	650	860	660	670	680	680	890	700	710	710	720	730	740	740	750	760	1,82
1,83	590	600	600	610	620	830	630	640	650	650	880	670	680	680	690	700	710	710	720	730	740	740	750	760	770	1,83
1,84	600	600	610	620	630	830	640	650	660	660	870	680	690	690	700	710	710	720	730	740	740	750	760	770	770	1,84
1,85	600	610	620	630	630	840	650	660	660	670	880	690	690	700	710	720	720	730	740	750	760	760	770	770	780	1,85
1,86	610	620	630	630	640	860	660	660	670	680	890	690	700	710	720	720	730	740	750	750	760	770	770	780	790	1,86
1,87	620	630	640	640	650	880	670	670	680	690	890	700	710	720	720	730	740	750	750	760	760	770	780	780	800	1,87
1,88	630	640	640	650	660	870	670	680	690	700	700	710	720	730	730	740	750	760	760	770	780	780	790	800	810	1,88
1,89	640	650	650	660	670	870	680	690	700	700	710	720	730	730	740	760	760	760	770	780	790	790	800	810	820	1,89
1,90	650	650	660	670	680	880	690	700	710	710	720	730	740	740	750	780	760	770	780	790	790	800	810	820	820	1,90
1,91	660	660	670	680	680	880	700	710	710	720	730	740	740	750	760	770	770	780	790	800	800	810	820	830	830	1,91
1,92	660	670	680	690	690	700	710	720	720	730	740	750	750	760	770	770	780	790	800	800	810	820	830	830	840	1,92
1,93	670	680	690	690	700	710	720	720	730	740	760	750	760	770	780	780	790	800	810	810	820	830	840	840	840	1,93
1,94	680	690	700	700	710	720	730	730	740	750	780	760	770	780	790	790	800	810	810	820	830	840	840	840	840	1,94
1,95	690	700	710	710	720	730	740	740	750	760	780	770	780	790	790	800	810	820	820	830	840	840	840	840	840	1,95
1,96	700	710	710	720	730	740	740	750	760	770	770	780	790	800	800	810	820	830	830	840	840	840	840	840	840	1,96
1,97	710	720	720	730	740	760	750	760	770	780	780	790	800	810	810	820	830	830	840	840	840	840	840	840	840	1,97
1,98	720	730	730	740	750	780	760	770	780	780	780	800	810	810	820	830	840	840	840	840	840	840	840	840	840	1,98
1,99	730	740	740	750	760	780	770	780	790	790	800	810	820	820	830	840	840	840	840	840	840	840	840	840	840	1,99
2,00	740	740	750	760	770	770	780	790	800	800	810	820	830	830	840	840	840	840	840	840	840	840	840	840	840	2,00
2,01	750	750	760	770	780	780	790	800	810	810	820	830	840	840	840	840	840	840	840	840	840	840	840	840	840	2,01
2,02	760	760	770	780	790	780	800	810	820	820	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	2,02
	55	56	57	58	59	60	61	62	63	64	66	66	67	68	69	70	71	72	73	74	76	76	77	78	79	

Personalized collections: male donors

AF TE NEMEN GEWICHT (grammen) PLASMADONATIE (MANNEN, PC82)																							
	50	51	52	63	54	55	56	57	68	59	60	61	62	83	64	65	66	67	88	69	70	71	
1,65	520	520	530	640	540	550	560	570	670	580	590	600	600	810	620	620	630	640	860	650	660	670	1,65
1,66	520	530	540	640	550	560	570	570	680	590	590	600	610	820	620	630	640	650	860	660	670	670	1,66
1,67	530	540	540	660	560	570	570	580	680	590	600	610	620	820	630	640	640	650	880	670	670	680	1,67
1,68	540	540	550	680	570	570	580	590	680	600	610	620	620	830	640	640	650	660	870	670	680	690	1,68
1,69	540	550	560	670	570	580	590	590	800	610	620	620	630	840	640	650	660	670	870	680	690	690	1,69
1,70	550	560	560	670	580	590	590	600	810	620	620	630	640	840	650	660	670	670	880	690	690	700	1,70
1,71	560	560	570	680	590	590	600	610	820	620	630	640	640	860	660	670	670	680	880	690	700	710	1,71
1,72	560	570	580	680	590	600	610	620	820	630	640	640	650	880	670	670	680	690	880	700	710	720	1,72
1,73	570	580	590	680	600	610	620	620	830	640	640	650	660	870	670	680	690	690	700	710	720	720	1,73
1,74	580	590	590	800	610	620	620	630	840	640	650	660	670	870	680	690	690	700	710	720	720	730	1,74
1,75	590	590	600	810	620	620	630	640	840	650	660	670	670	880	690	700	700	710	720	720	730	740	1,75
1,76	590	600	610	820	620	630	640	650	860	660	670	670	680	880	700	700	710	720	720	730	740	750	1,76
1,77	600	610	620	820	630	640	650	650	880	670	670	680	690	700	700	710	720	720	730	740	750	750	1,77
1,78	610	620	620	830	640	650	650	660	870	670	680	690	700	700	710	720	730	730	740	750	750	760	1,78
1,79	620	630	630	840	650	650	660	670	880	680	690	700	700	710	720	730	730	740	760	750	760	770	1,79
1,80	630	630	640	860	650	660	670	680	880	690	700	710	710	720	730	730	740	750	780	760	770	780	1,80
1,81	630	640	650	880	660	670	680	680	880	700	710	710	720	730	730	740	750	760	780	770	780	790	1,81
1,82	640	650	660	880	670	680	690	690	700	710	710	720	730	740	740	750	760	760	770	780	790	790	1,82
1,83	650	660	660	870	680	690	690	700	710	720	720	730	740	740	750	760	770	770	780	790	790	800	1,83
1,84	660	670	670	880	690	690	700	710	720	720	730	740	740	760	760	770	770	780	780	800	800	810	1,84
1,85	670	670	680	880	700	700	710	720	720	730	740	750	750	780	770	770	780	790	800	800	810	820	1,85
1,86	680	680	690	700	700	710	720	730	730	740	750	750	760	770	780	780	790	800	800	810	820	830	1,86
1,87	680	690	700	710	710	720	730	730	740	750	760	760	770	780	780	790	800	810	810	820	830	840	1,87
1,88	690	700	710	710	720	730	740	740	760	760	760	770	780	780	790	800	810	810	820	830	840	840	1,88
1,89	700	710	720	720	730	740	740	750	780	770	770	780	790	780	800	810	820	820	830	840	840	840	1,89
1,90	710	720	720	730	740	750	750	760	770	770	780	790	800	800	810	820	830	830	840	840	840	840	1,90
1,91	720	730	730	740	750	760	760	770	780	780	790	800	810	810	820	830	830	840	840	840	840	840	1,91
1,92	730	740	740	760	760	760	770	780	780	790	800	810	810	820	830	840	840	840	840	840	840	840	1,92
1,93	740	740	750	780	770	770	780	790	780	800	810	820	820	830	840	840	840	840	840	840	840	840	1,93
1,94	750	750	760	770	780	780	790	800	800	810	820	830	830	840	840	840	840	840	840	840	840	840	1,94
1,95	760	760	770	780	780	790	800	810	810	820	830	830	840	840	840	840	840	840	840	840	840	840	1,95
1,96	770	770	780	780	790	800	810	820	820	830	840	840	840	840	840	840	840	840	840	840	840	840	1,96
1,97	770	780	790	800	800	810	820	830	830	840	840	840	840	840	840	840	840	840	840	840	840	840	1,97
1,98	780	790	800	810	810	820	830	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	1,98
1,99	790	800	810	820	820	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	1,99
2,00	800	810	820	830	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	2,00
2,01	810	820	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	2,01
2,02	820	830	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	2,02
	50	51	52	63	54	55	56	57	68	59	60	61	62	83	64	65	66	67	88	69	70	71	



Plateletapheresis

Whole blood derived plt



Single dose donation



Pool of # buffycoats



Single PRPs

Apheresis equipment (plateletapheresis)

- Fresenius Kabi
- Haemonetics
- Terumo BCT (Caridian BCT)



Plateletapheresis



Single dose donation
Donor > 150,000 plt/ μ L

Plateletapheresis



Double dose donation

Donor needs sufficient platelet precount prior to donation

Plateletapheresis



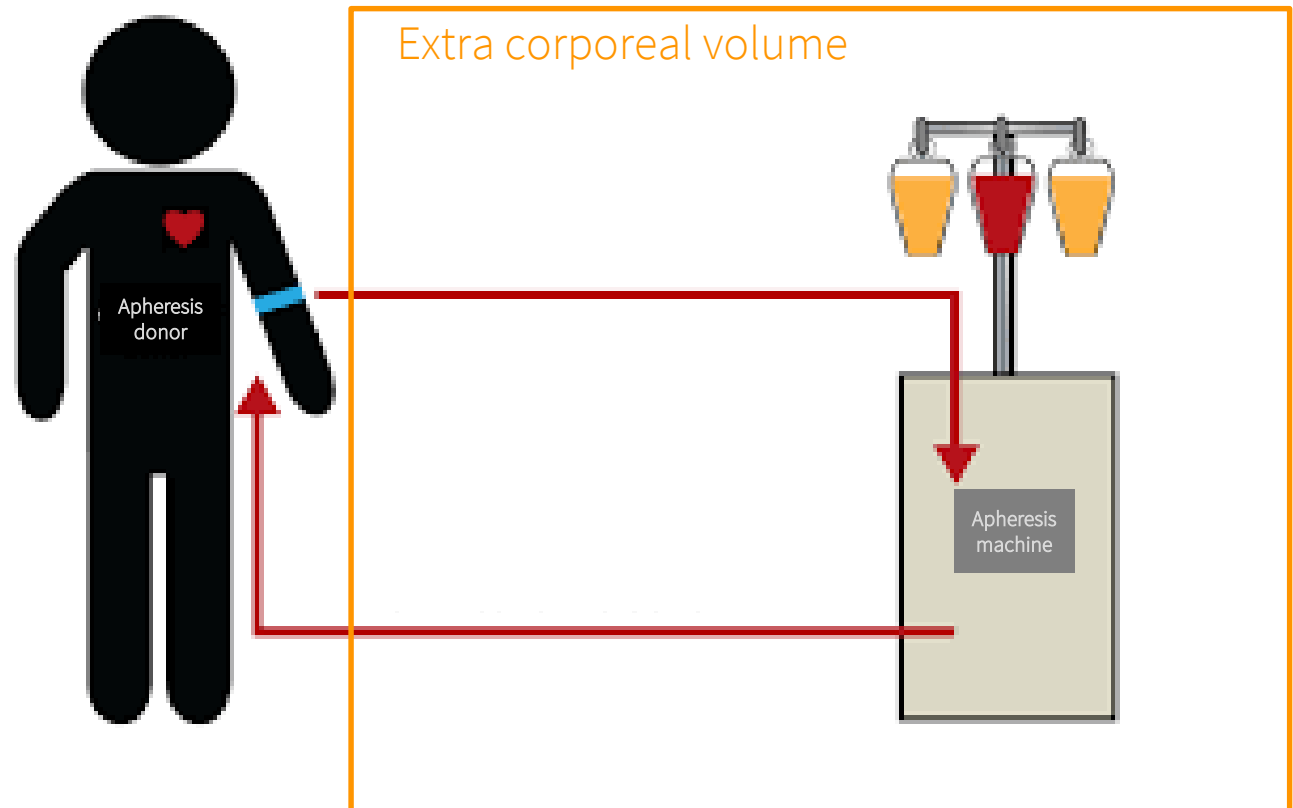
Triple dose donation

Donor needs sufficient platelet precount prior to donation

Donor needs to have sufficient blood volume

Apheresis

Collection
Processing
Return



Guide (standards)

“In any apheresis procedure involving collection of plasma, platelets and/or red cells in one apheresis procedure, the total volume of all components collected (plasma, platelets and red cells) must not exceed 16% of total blood volume, with a maximum of 750 mL (exclusive of anti-coagulant), unless fluid replacement is undertaken.”

Plateletapheresis

- Maximally 750 mL collected (=840 gram incl AC)
- Max 16% TBV

Blood volume various populations

	Male		Female	
Cambodia	163	58,5	153	52,0
		4076		3179
China	171	70,5	159	59,4
		4708		3580
Indonesia	163	59,5	152	54,8
		4108		3247
Laos	160	57,9	151	52,4
		3971		3143
Malaysia	168	71,1	156	63,5
		4633		3636
Singapore	172	71,9	160	59,4
		4786		3607
Thailand	168	67,2	156	60,8
		4507		3546
Vietnam	164	58,4	153	50,8
		4102		3139
USA	177	90,9	164	78,0
		5565		4335

Which donor?

Preferably voluntary non-remunerated donor

- → just ask
- Informed consent
- Make appointment for procedure

Family donor → in case of refractorines



Photo: Korean Red Cross Blood Services



No reaction on plt transfusion

- Bleeding
- DIC
- Splenomegaly
- Medication
- Fever
- Infection
- Sepsis
- Antibodies

Plt dose 2-3 times a day

Platelet refractoriness and antibodies


- Anti-A / anti-B
- HLA-antibodies
- HPA-antibodies

CCI

Two successive ABO compatible platelet transfusions

- 1 hour CCI < 7.5

- Usually HLA antibodies
- Sometimes HPA antibodies
- Rarely HLA & HPA antibodies

 Sanquin

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HLA antibodies

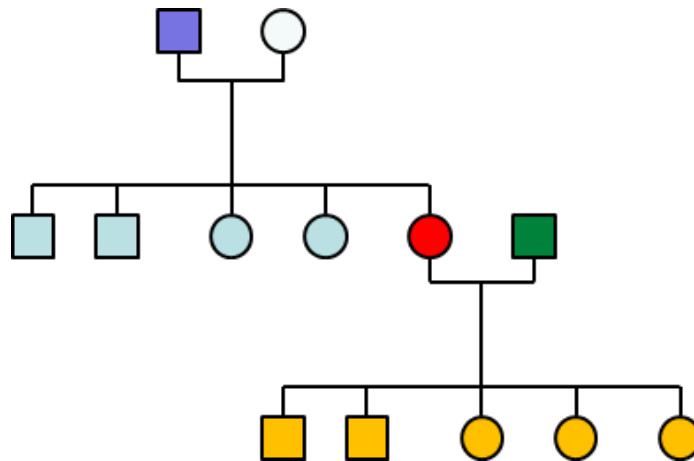
Pregnancy	increase with number of pregnancies
Blood transfusion	whole blood non-leukoreduced blood components
Organ transplant	

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Anti-HLA, and than?

- Apheresis platelets from HLA compatible donors

When you don't have HLA compatible donors



Which donor?

Preferably voluntary non-remunerated donor

- → just ask
- Informed consent
- Make appointment for procedure

Family donor → in case of refractorines

ABO blood group



Photo: Korean Red Cross Blood Services



ABO and platelets

- ABO antigens on donor platelets, versus anti-A / anti-B in patient
- Anti-A / anti-B in product

Major ABO incompatible plt transfusion

- Lower CCI $\pm 40\%$ decrease in CCI
→ Removal starts 10-30 minutes posttransfusion
- Recovery $\pm 20\text{-}30\%$ decrease compared to ABO identical
- Inhibited plt aggregation
- Decreased hemostasis

Heal, Ann Hematol 1993

Holland, Lab Medicine 2006

Dunbar, et al, Curr Opin Hematology 2012








Blumberg, Lancet 2012

Jimenez, Transfusion 2003

Not with minor ABO incompatibility

→ Can cause positive DAT (82%)

Which donor? → AB0 blood group

BLOOD GROUP	A	B	AB	O
GENOTYPES	AA and AO	BB and BO	AB	OO
ANTIGENS ON PLATELETS	 A antigens	 B antigens	 A and B antigens	 No A, No B (H)
ANTIBODIES IN BLOOD	 Anti-B	 Anti-A	No anti-B No anti-A	 Anti-A and Anti-B
CAN RECEIVE BLOOD FROM	A and O	B and O	A, B, AB and O	O
CAN GIVE BLOOD TO	A and AB	B and AB	AB	A, B, AB and O



Which donor?

Preferably voluntary non-remunerated donor

Family donor → irradiation blood component

Blood group O and A donors are preferred. AB and AB is possible

Rhesus D → only female patients childbearing age

Preferably male donor

Preferably successful whole blood donations in history

Precount donor $>150 \times 10^9/\text{L}$ (preferably $>250 \times 10^9/\text{L}$)

Leukocytes and blood components

Donors: $3-10 \times 10^9$ leukocytes / L (3,000 – 10,000 cells / mm^3 or / μL)

Component non leukoreduced:

- $<10^{8-9}$ /unit

Component leukoreduced

- $<5 \times 10^6$ /unit (100%)
- $<10^6$ /unit (95%)

~~Leukodepletion~~

In summary

Whole blood derived components

Versus

Apheresis derived

- Red blood cells
- Plasma
- Platelets

Apheresis blood components: an advantage?

Hans Vrielink, MD, PhD



Are apheresis blood components an advantage?

It might be

Apheresis is expensive but:

- Plasma → to achieve sufficient source plasma
- Platelets → single donor units needed
→ when not enough WB is available
- RBC → not so much in Asian situation
→ might be when specific antigens are needed



<https://www.zonnebloem.nl/maassluis/activiteiten/2017/04/busrit-door-de-bollenvelden-112405>

Questions?