

Granulocytentransfusies: In de praktijk van de bloedbank

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Clinical response to GTX



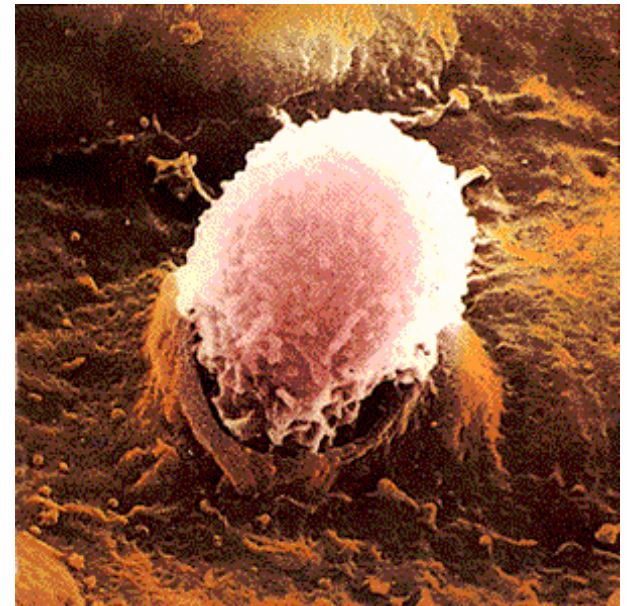
Pseudomonas & Citrobacter infection before GTX – unresponsive to ceftazadime, tobramycin and meronem

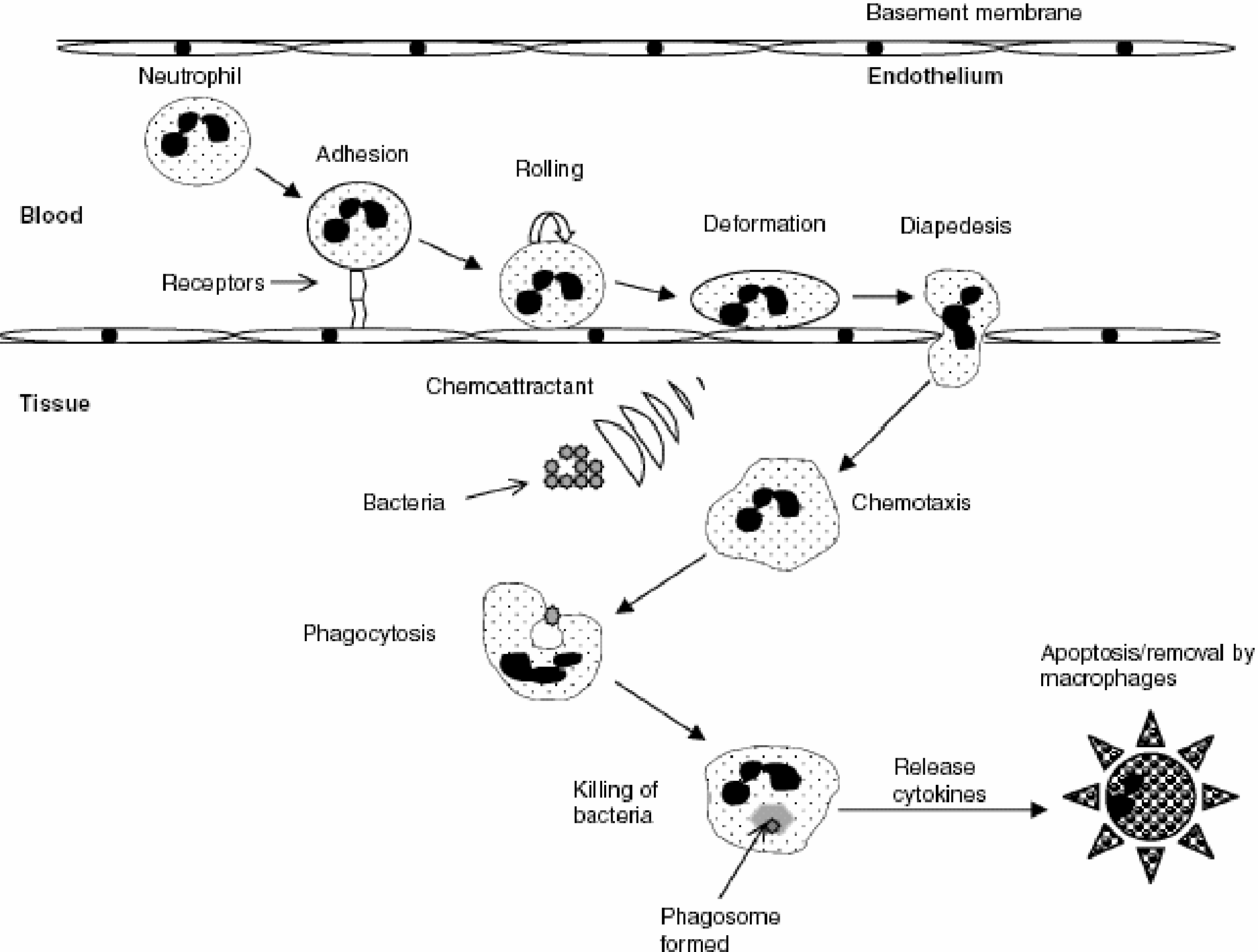


Pseudomonas & Citrobacter infection following total 7 GTX and 3 weeks of antibiotic treatment. Blood and wound culture negative. Tissue regeneration and healing

Neutrophils

- Production: $40-60 \times 10^9$ cells per day
- $2 - 7 \times 10^9/L$ (2,000 – 7,000 cells / mm^3 or / μL)
- $\pm 50\%$ circulate free in blood flow
- Life span 9-10 days
 - 5-7 day in bone marrow
 - Peripheral circulation hrs
 - Tissues 2-3 day





WBC (250 donors)

• Leukocytes	5.8 x 10 ⁹ /L	
• Lymphocytes	1.6 x 10 ⁹ /L	(28%)
• Monocytes	0.5 x 10 ⁹ /L	(9%)
• Granulocytes	3.7 x 10 ⁹ /L	(64%)
• Basophils	0.05 x 10 ⁹ /L	(1%)
• Eosinophils	0.18 x 10 ⁹ /L	(5%)
• Neutrophils	3.47 x 10 ⁹ /L	(94%)

Granulocyte blood component

- Whole blood
- Apheresis

Granulocyte blood component

European guideline

- Less than 500 mL
- More than 1×10^{10} neutrophils/unit
- Adult dose: $1.5 - 3.0 \times 10^8/\text{kg}$
- Must be irradiated



Granulocytes from whole blood

- Buffycoat
- Buffycoat pool

Results

	Buffycoat derived		Apheresis derived	
	Mean	± SD	Mean	± SD
Product volume	201	± 15	297	± 89
Granulocytes / unit (x 10 ⁹)	11	± 1.3	47	± 23
Erythrocytes / L (x 10 ¹²)	2.25	± 0.23	2.05	± 0.63
Platelets / unit (x 10 ⁹)	327	± 75.7	108	± 44
Haematocrit (L/L)	0.21	± 0.02	0.18	± 0.06
Leukocytes / unit (x 10 ⁹)	21.9	± 2.1	59	± 26

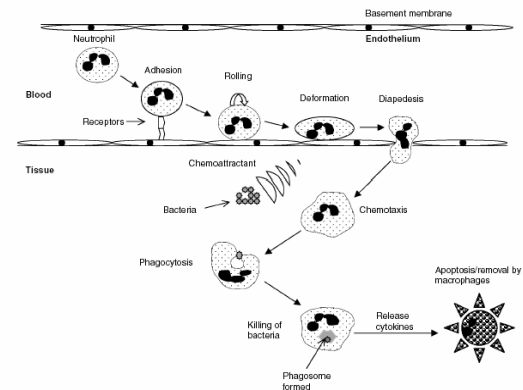
Production Granulocyte-concentrate

From 10 buffycoats

1. To study storage conditions
2. Alternative granulocyte transfusion product

Note

- Product at least 24 hrs after donation
- Not always available
- Function?



Granulocytes from whole blood

Neutrophil function is preserved in a pooled granulocyte component prepared from whole blood donations

Saber Bashir,¹ Simon Stanworth,² Edwin Massey,³ Fred Goddard³ and Rebecca Cardigan¹

¹NHS Blood and Transplant, Brentwood, ²NHS Blood and Transplant, Oxford, and ³NHS Blood and Transplant, Bristol, UK

British Journal of Haematology, 140, 701–711

The Granulocytes in Neutropenia 1 (GIN 1) Study: A safety study of granulocytes collected from whole blood and stored in additive solution and plasma.

E. Massey, et al, *Transfusion Medicine* 2012

Granulocytes derived by apheresis

- Sufficient neutrophils in donor

Collection of granulocytes → donors

- Not stimulated $3.5 \pm 1.3 \times 10^9/L$ (2.1 – 6.9)
- G-CSF $20.8 \pm 2.3 \times 10^9/L$ (14.8 – 36.9)
- G-CSF + dexamethason $42.5 \pm 12.7 \times 10^9/L$ (19.7 – 82.0)

‘G-CSF mobilized neutrophils have normal function when tested in assays of respiratory burstchemiluminescence, phagocytosis, chemotaxis, and superoxide anion production.’

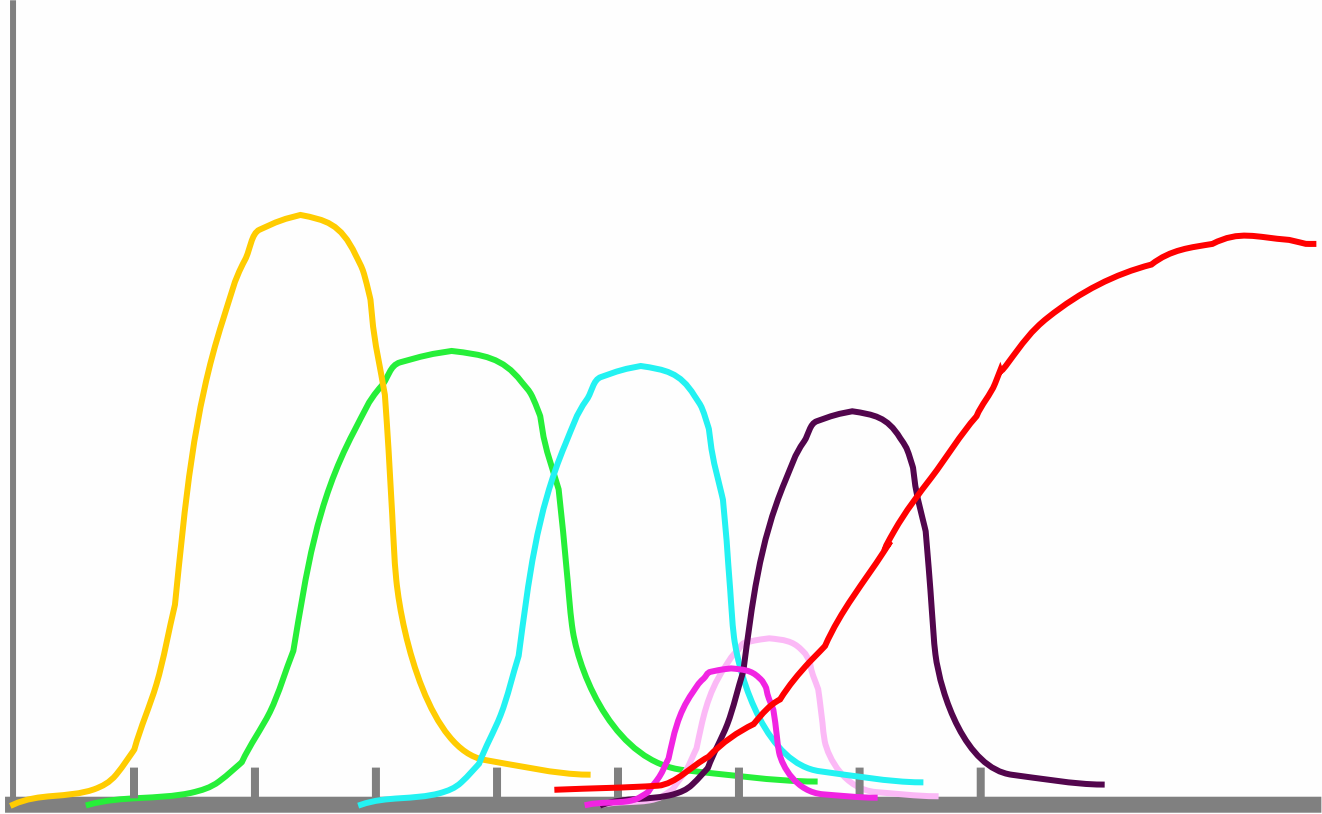
Granulocyte concentrates: prolonged functional capacity during storage in the presence of phenotypic changes. Drewniak A., et al. Haematologica 2008.

Granulocyte apheresis

- Donors
- G-CSF & dexamethasone stimulation
- Anticoagulant
 - 46.7% sodium citrate (30 mL)
 - 6% hydroxyethylstarch (500 mL)



Separation



Indication for granulocyte transfusion



Courtesy: dr Lynne M. Ball, UMC Leiden

- Severly neutropenic patient with life-threatening bacterial and/or fungal infection unresponsive to conventional therapy.
- Preemptive

Granulocyte apheresis

- Donors

Granulocyte apheresis

- Family donors
 - Questionnaire for blood donors
 - Medical examination
 - Informed consent
 - AB0 Rh D
 - Virology tests
 - Compatibility tests

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Granulocyte apheresis

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 - Compatibility tests
- G-CSF & dexamethasone stimulation
 - 5 µg / kg G-CSF
 - 8 mg oraal

G-CSF & dexamethasone stimulation

- Botpijn
- Moeheid
- Spierpijn / gewrichtsklachten
- Hoofdpijn
- Misselijkheid / braken
- Nachtzweeten
- Koorts / rillingen
- Slapeloosheid
- Splenomegalie

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Granulocytferese

- Afnamelocatie
- Begin ochtend
- Keuring voor donors
- Bloedbeeld voorafgaand aan procedure
- ABO Rh(D)
- Spoedtests bloedoverdraagbare ziekten
 - Serologie (Lab Amsterdam: duur $\pm 1,5$)
- Procedure (2-3 uur)
- Bloedbeeld na de procedure
- “Bloedbeeld” product
- Product bestralen
- Uitgifte aan en transport naar transfusielab ziekenhuis

