Common Problems in Blood Transfusion

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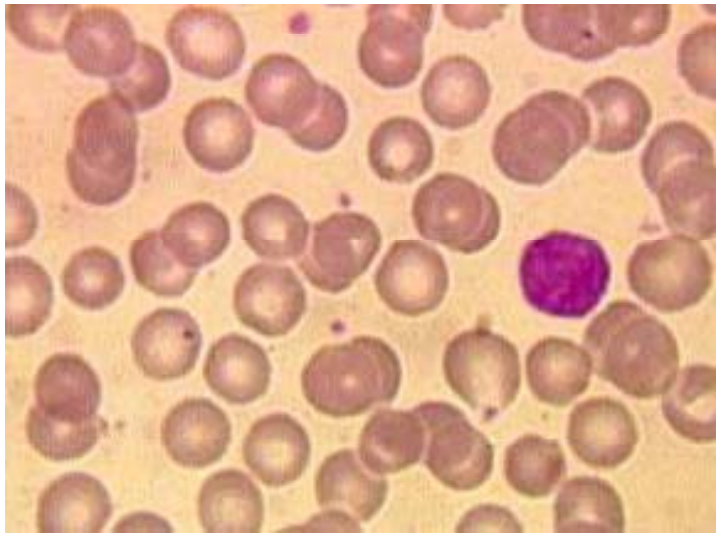
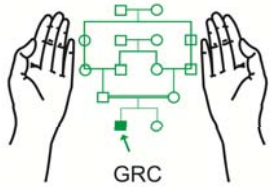
Genetics Resource Centre (GRC)

www.grcpk.com

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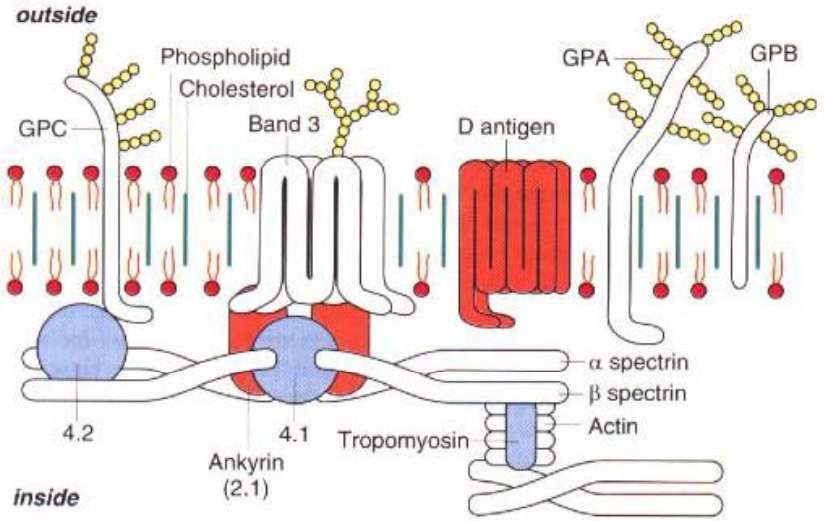
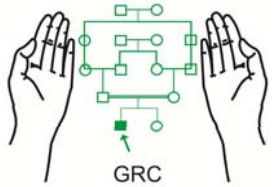

outside
Phospholipid
Cholesterol
GPC
Band 3
D antigen
GPA
GPB
α spectrin
β spectrin
Actin
4.2
4.1
Tropomyosin
Ankyrin
(2.1)
inside

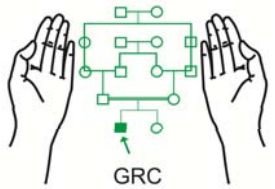
Table 10.1 Red cell antigens in humans (adapted from Daniels 1975)

System	*Most important antigens*	*Approx. no. antigens*
ABO	A_1, A_2, B	4
MNS	M, N, S, s, U	38
P	P_1	1
Rh	D, C, E, c, e, G	45[†]
Lutheran	Lu^a, Lu^b	18
Kell	K, k, Kp^a, Kp^b, Js^a, Js^b	21
Lewis	Le^a, Le^b	3
Duffy	Fy^a, Fy^b	6
Kidd	Jk^a, Jk^b	3
Diego	Di^a, Di^b, Wr^a, Wr^b	4
Cartwright	Yt^a, Yt^b	2
Xg	Xg^a	1
Scianna	Sc1, Sc2	3
Dombrock	Do^a, Do^b	5
Colton	Co^a, Co^b	3
Landsteiner–Wiener	LW^a	3
Chido/Rodgers	Ch, Rg	9
Hh	H[*]	1
Kx	Kx	1
Gerbich	Ge2, Ge3, Ge4, Wb, Ls^a	7
Cromer	Cr^a, Tc^a, WES^a, Es^a, UMC	10
Knops	Kn^a, Cs^a, Yk^a, McC^a	5
Indian	In^a, In^b	2
Very frequent, or 'public', antigens	Vel, Lan, JMH, etc	12
Very infrequent, or 'private' antigens	Bp^a, Rd, Sw^a, etc.	>20
Other antigens	P, P^k I, i Sd^a Bg (HLA on red cells)	

[*] H is genetically independent from the ABO system; its status as a blood group system has not yet been officially recognized.
[†] although 52 Rh antigens have been numbered, 7 have been deleted from the system.

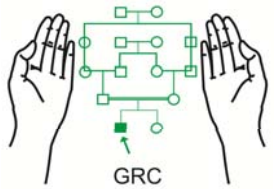


Antibodies of Blood Group Systems



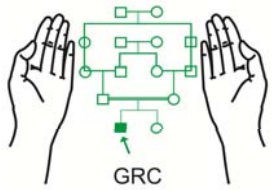
- **ABO System**
  - Naturally Occurring (Pre-formed)
  - Mostly IgM
- **Rh System**
  - Acquired (Take time to develop)
  - Mostly IgG

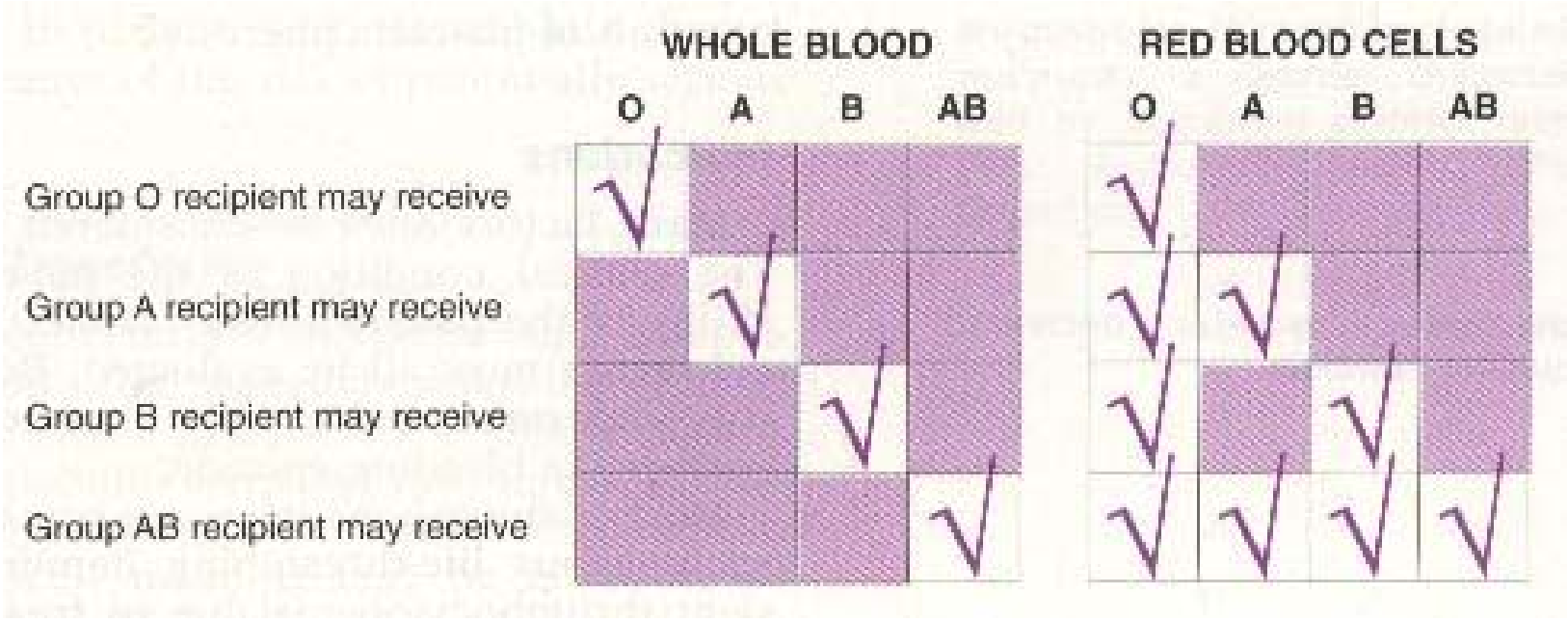
Compatibility Testing



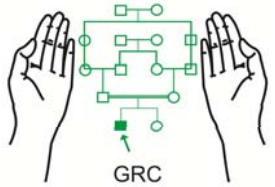
- **Donor**
  - **Red Cells**
  - Plasma
- **Recipient**
  - Red Cells (Antigens)
  - **Plasma (Antibodies)**

Compatibility Testing

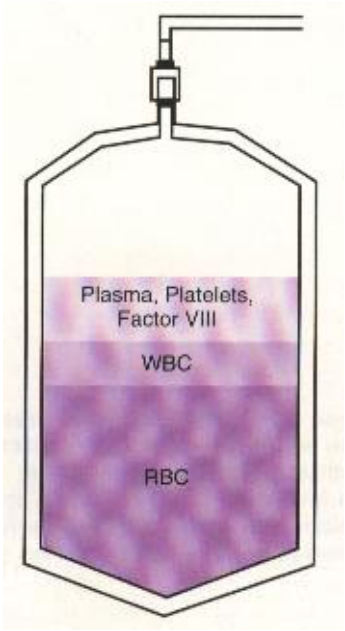


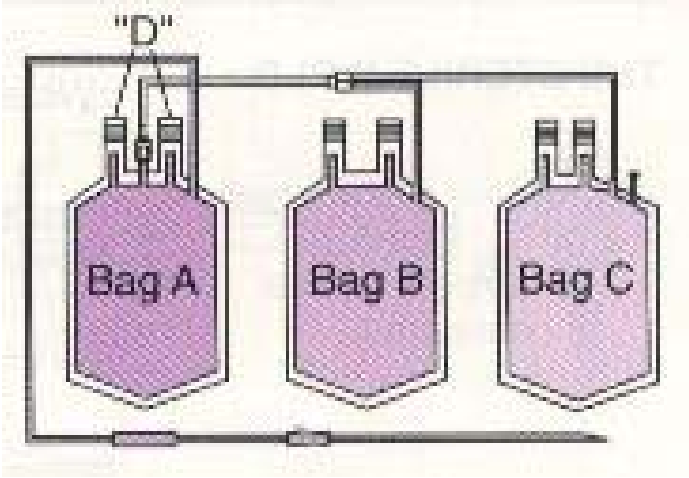


Blood Components

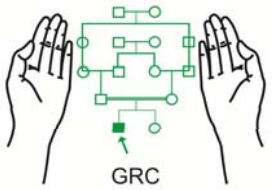


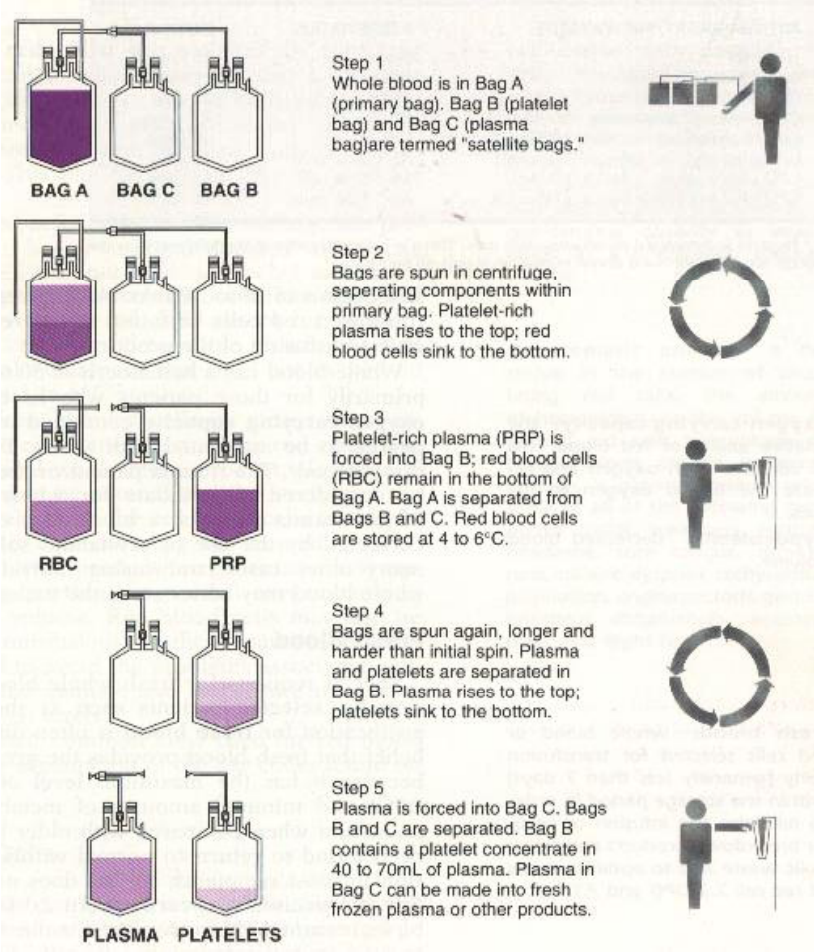
- Whole Blood
- Packed Cells
- Platelets
- FFP
- Cryoprecipitate
- Others



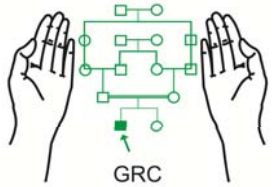


Blood Components

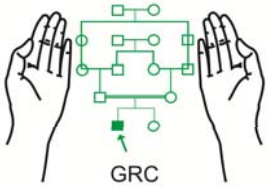




Case-1



- A patient developed chills and rigors after the start of blood transfusion. The likely cause is:
  - Rapid administration of cold blood
  - Non Haemolytic Febrile Transfusion Reaction
  - Allergic reactions
  - Mismatched blood transfusion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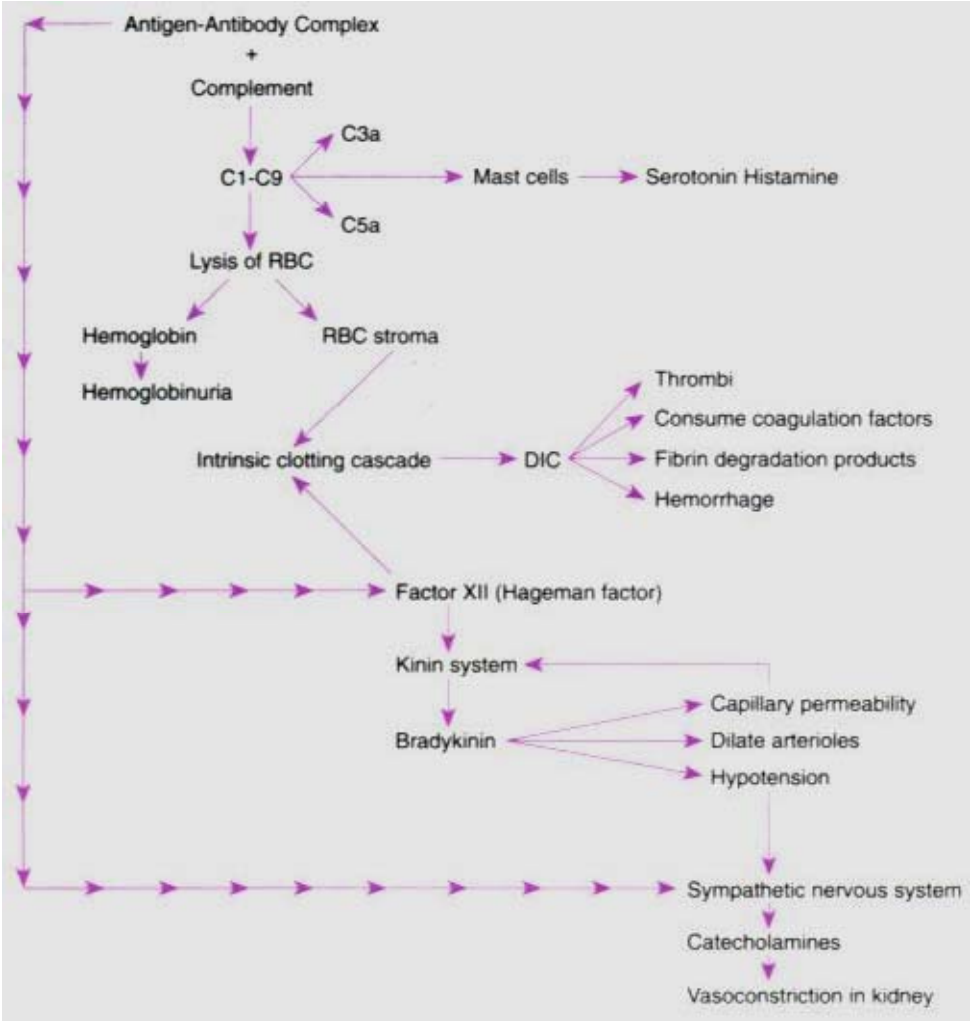
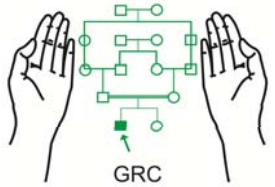
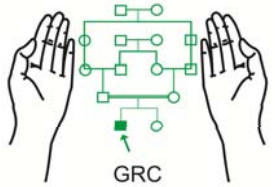

Antigen-Antibody Complex
+
Complement
C3a
C1-C9
Mast cells
Serotonin Histamine
C5a
Lysis of RBC
Hemoglobin
RBC stroma
Hemoglobinuria
Thrombi
Consume coagulation factors
Intrinsic clotting cascade
DIC
Fibrin degradation products
Hemorrhage
Factor XII (Hageman factor)
Kinin system
Capillary permeability
Bradykinin
Dilate arterioles
Hypotension
Sympathetic nervous system
Catecholamines
Vasoconstriction in kidney

Case-2



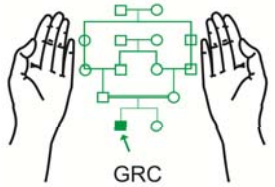
- A multiply transfused patient developed fever one hour after blood transfusion. The most likely cause is:
  - Mismatched blood transfusion
  - Transfusion of infected blood
  - Malaria
  - Anti-leukocyte antibodies

Case-3

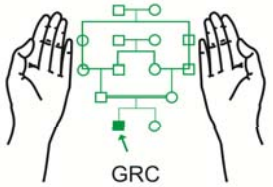


- A 62 years old patient developed dyspnoea half way during a blood transfusion. The likely cause is:
  - Allergic reactions
  - Mismatched blood transfusion
  - Transfusion associated Acute Lung Injury
  - Circulatory overload

Case-4



- A patient developed fever, anaemia, and mild jaundice three days after a blood transfusion. She had also received a blood transfusion three months earlier. The most likely cause for her symptoms is:
  - Acute haemolytic blood transfusion reaction
  - Transfusion of haemolysed blood
  - Transfusion of infected blood
  - Post transfusion hepatitis
  - Delayed haemolytic transfusion reaction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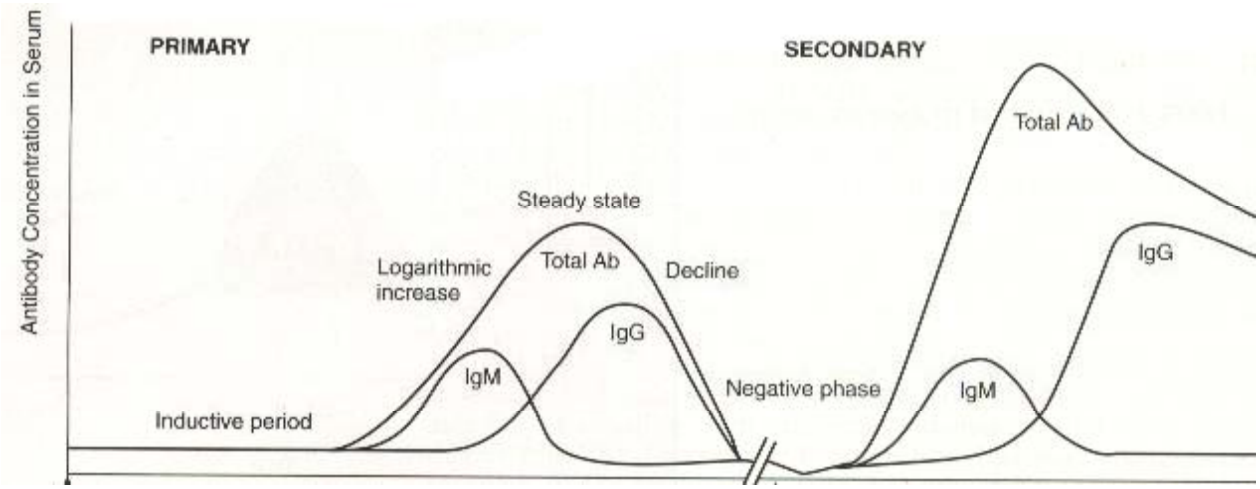
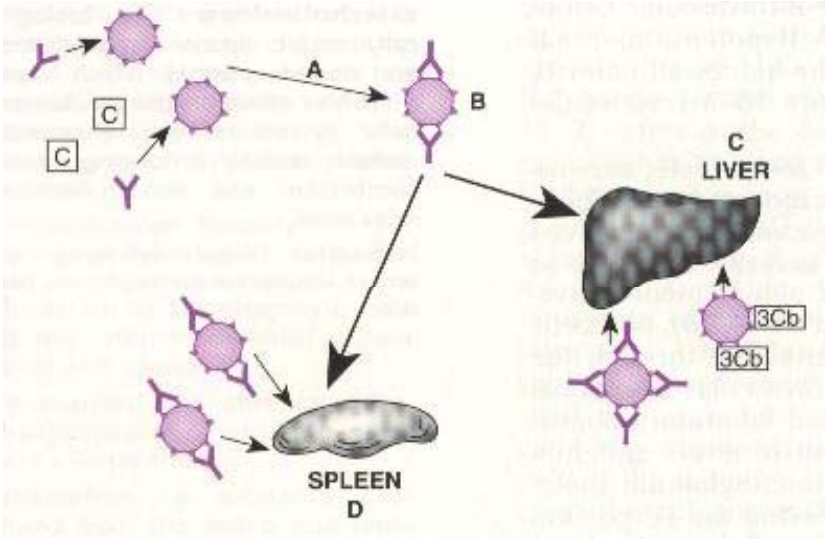
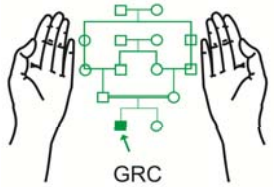

PRIMARY
SECONDARY
Antibody Concentration in Serum
Steady state
Logarithmic increase
Total Ab
Decline
IgG
IgM
Inductive period
Negative phase
Total Ab
IgG
IgM

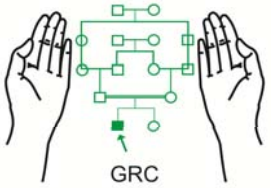

A
B
C
C
C
LIVER
3Cb
3Cb
SPLEEN
D

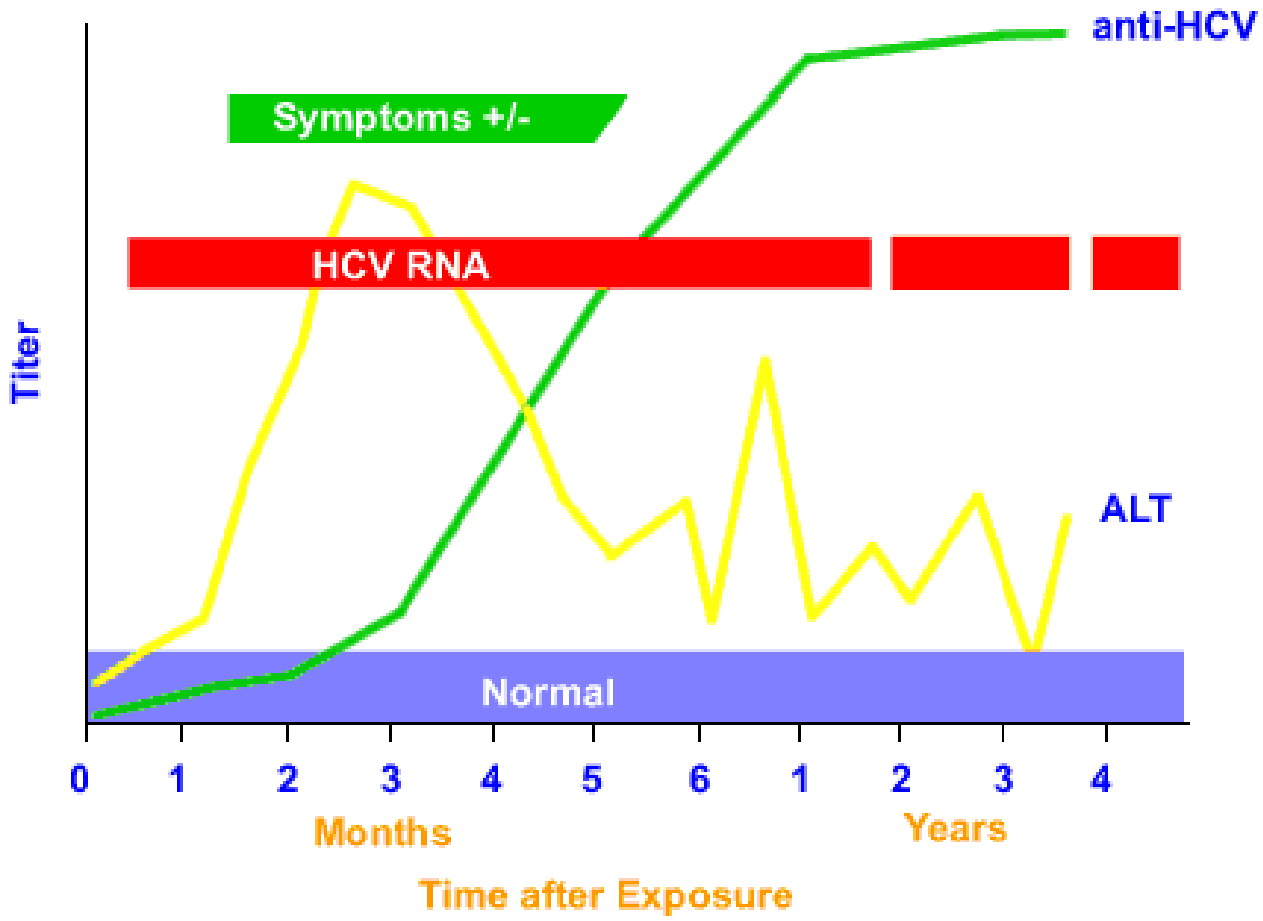
Case-5



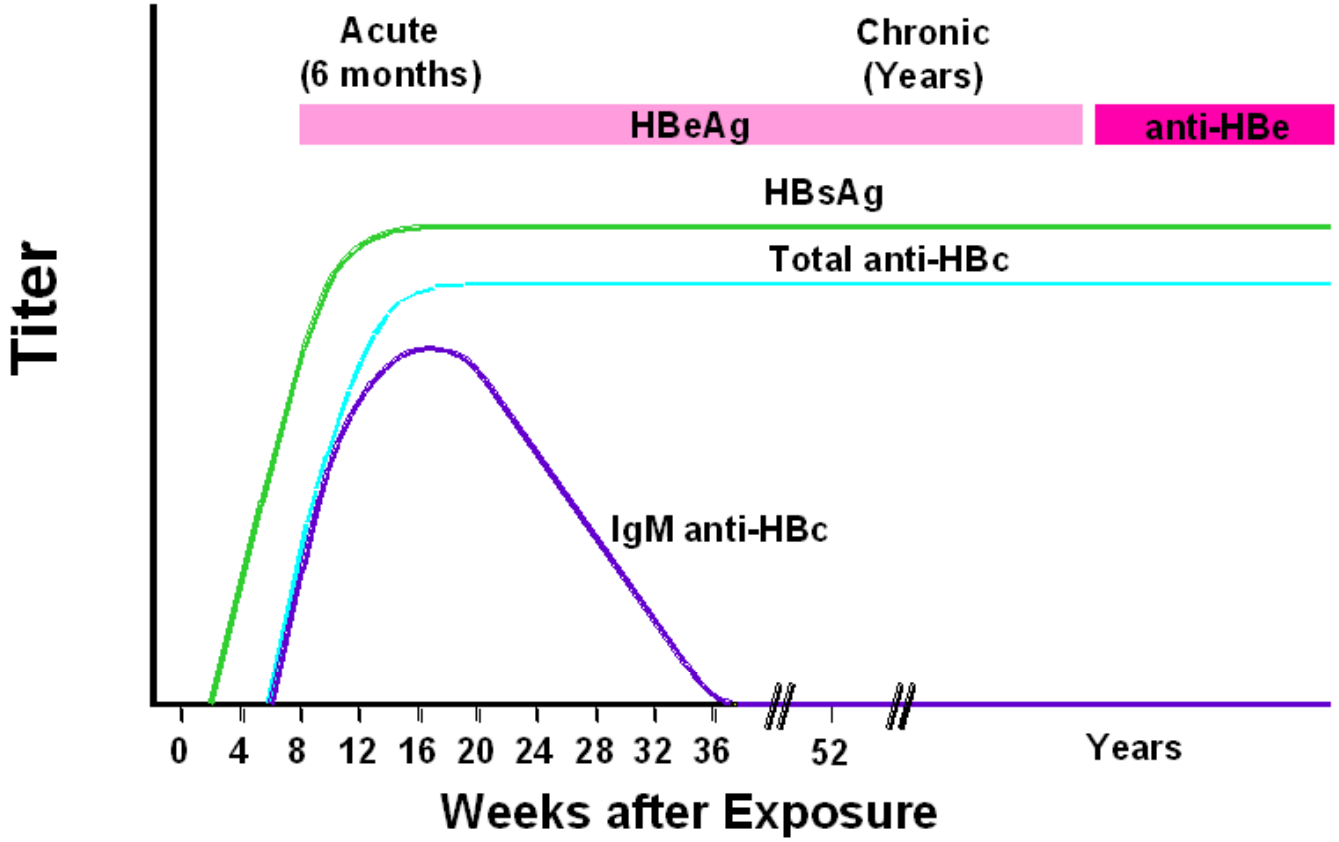
- A patient developed mild jaundice and abnormal liver function tests two months after a blood transfusion. The most likely cause for the symptoms is:
  - Delayed haemolytic transfusion reaction
  - Post transfusion hepatitis

Serologic Pattern of Acute HCV Infection with Progression to Chronic Infection

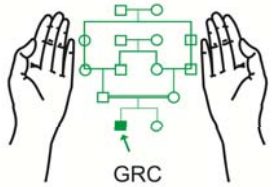




Progression to Chronic Hepatitis B Virus Infection
Typical Serologic Course

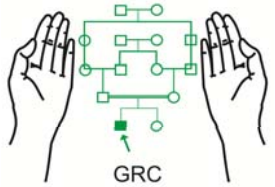


Case-6



- A known case of ITP failed to achieve a rise in platelet count following repeated platelet transfusions. The most likely cause is:
  - Anti-platelet antibodies

Case-7



- A 41 years old male presented with weakness and fatigability for 2½ months. Examination showed pallor and no other abnormality.
  - Blood CP showed:
    - Hb: 6.8 g/dl
    - TLC: 4.5 X 10^9/L
    - MCV: 125 fl
    - Platelets: 89 X 10^9/L
    - RBC Morphology: Macrocytosis ++
    - Reticulocytes: 0.5%

Monthly Consumption of Blood at PNS Shifa

	Surgical	Gynae	Medical	Paeds
Total (270)	54 (20%)	81 (30%)	58(21%)	77 (29%)
Routine 67/270 (25%)	4/54 (7%)	9/81 (11%)	8/58 (14%)	46/77 (60%)
Urgent 203/270 (75%)	50/54 (93%)	72/81 (89%)	50/58 (86%)	31/77 (40%)
Packed Cells 163/270 (60%)	11/54 (20%)	35/81 (43%)	42/58 (72%)	75/77 (97%)
Whole Blood 107/270 (40%)	43/54 (80%)	46/81 (57%)	16/58 (28%)	2/77 (3%)
Hb (Mean) (Range)	9.3 g/dl (4.9-12.2)	8.3 g/dl (4.4-11.1)	7.0 g/dl (4.1-10.6)	7.3 g/dl (2.6-9.6)
P value	← 0.66 → ← 0.02 →			

Monthly Consumption of Blood at PNS Shifa