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Clinical Delivery

Special Requirements

Working together To drive excellence in care for our patients and communities

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17/03/2024

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Session Outline

- Key Guidelines.
- Types of Special Requirements.
  - Irradiation
  - CMV status
  - HLA/HPA matched components
  - Antigen Negative
  - Special Patient Groups
  - Washed Components.
  - The 1996 Club.
- Indications and Risks.
- Practical ways to avoid incidences.

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Key Guidelines

Guidelines on the use of irradiated blood components

Theodora Foukaneli, Paul Kerr, Paula H.B. Bolton-Maggs, Rebecca Cardigan, Alasdair Coles, Andrew Gennery, David Jane, Dinakantha Kumararatne, Ania Manson, Helen V. New ... See all authors

First published: 18 August 2020 | https://doi.org/10.1111/bjh.17015 | Citations: 20

Irradiated Components

SaBTO

Advisory Committee on the Safety of Blood, Tissues and Organs

CMV Status.

CYTOMEGALOVIRUS TESTED BLOOD COMPONENTS

POSITION STATEMENT

Key Guidelines

Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories†

Correction(s) for this article

British Committee for Standards in Haematology, C. Milkins, J. Berryman, C. Cantwell, C. Elliott, R. Haggas, J. Jones, M. Rowley, M. Williams, N. Win

First published: 06 December 2012 | https://doi.org/10.1111/j.1365-3148.2012.01199.x | Citations: 95

Guidelines for the use of platelet transfusions

Correction(s) for this article

Lise J. Estcourt, Janet Birchall, Shubha Allard, Stephen J. Bassey, Peter Hersey, Jonathan Paul Kerr, Andrew D. Mumford, Simon J. Stanworth, Hazel Tinegateon behalf of ... See all authors

First published: 23 December 2016 | https://doi.org/10.1111/bjh.14423 | Citations: 213

Guideline on the investigation and management of acute transfusion reactions Prepared by the BCSH Blood Transfusion Task Force

Hazel Tinegate, Janet Birchall, Alexandra Gray, Richard Haggas, Edwin Massey, Derek Norfolk, Deborah Pinchon, Carrock Sewell, Angus Wells, Shubha Allard

First published: 29 August 2012 | https://doi.org/10.1111/bjh.12017 | Citations: 82

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Antigen Negative

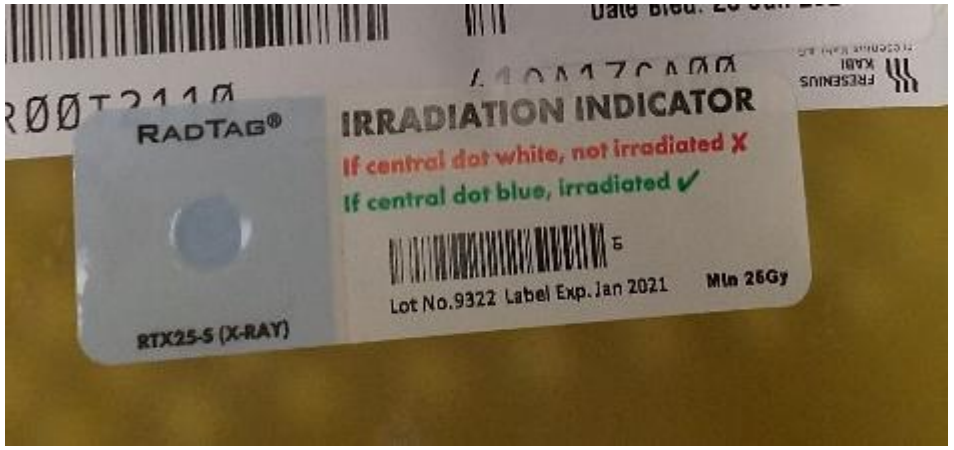
HLA/HPA Components

Washed Components

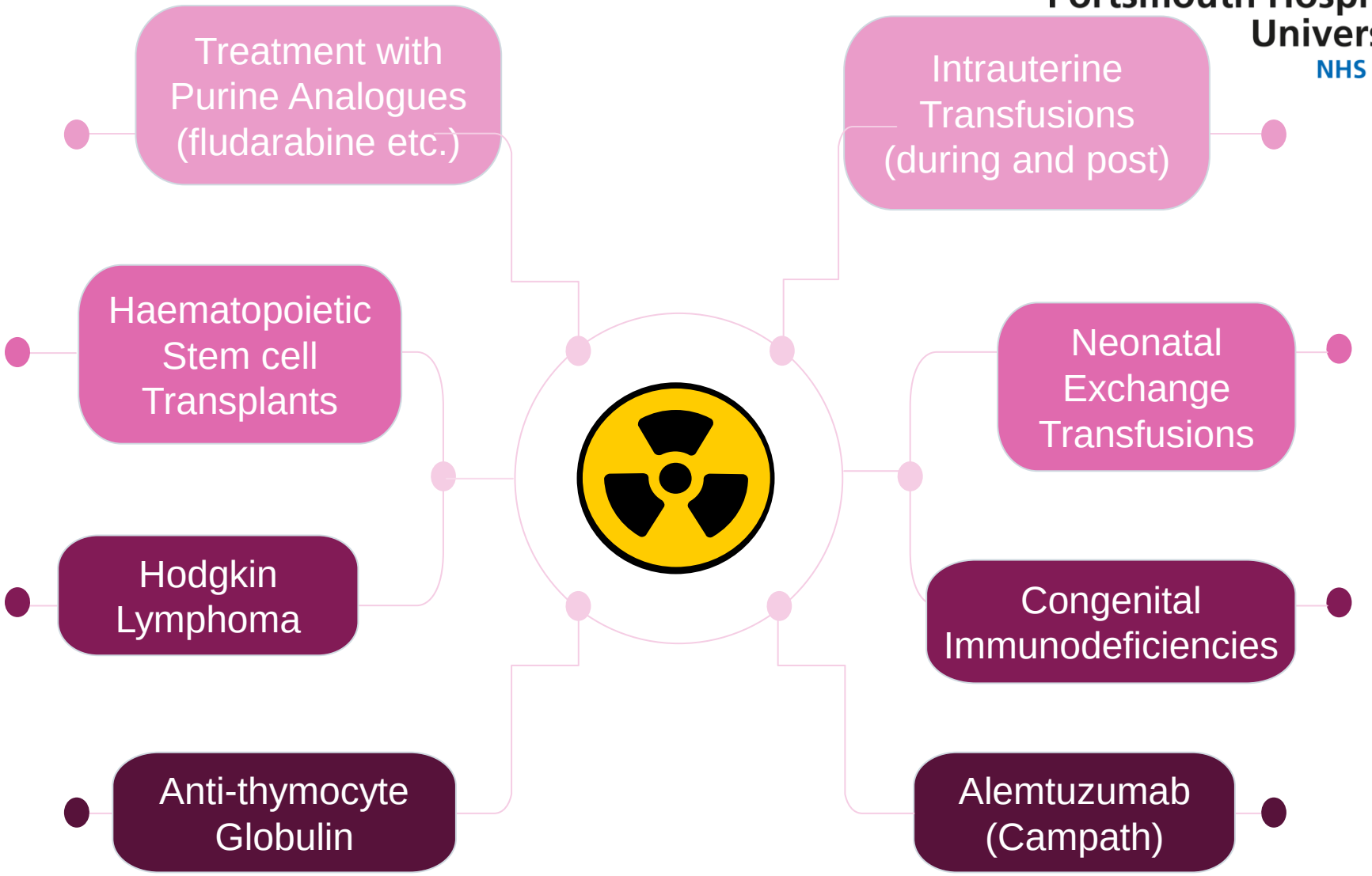
Irradiation

- X-ray or Gamma radiation at 25 grays.
  - **Any unit can be irradiated**
  - Irradiation shortens the lifespan of a unit
- Products which **ARE** irradiated:
  - Red cells
  - Platelets
- Products which **ARE NOT** irradiated:
  - Plasma
  - Cryoprecipitate

When do people need irradiated units?



Irradiation: Who needs it?



Irradiation: Why?

- **Irradiation inactivates donor lymphocytes.**
- Residual T-lymphocytes can attack recipient cells.
  - Due to HLA mismatching.
  - Resulting in Transfusion Associated Graft vs. Host Disease (TA-GvHD)
- Most lymphocytes are removed by leucodepletion.
  - Never 100%
  - TA-GvHD possible in immunocompromised patients.
- Increased risk when recipient and donor share HLA Markers.
  - HLA-matched components are irradiated
  - Components from relatives are irradiated

Risks: TA-GvHD

- TA-GvHD is very dangerous
- But also very rare!
  - SHOT predicts the risk at 1 in 25,439,401 transfusions!

Bone Marrow
- Failure
- Pancytopenia
- Hypoplasia

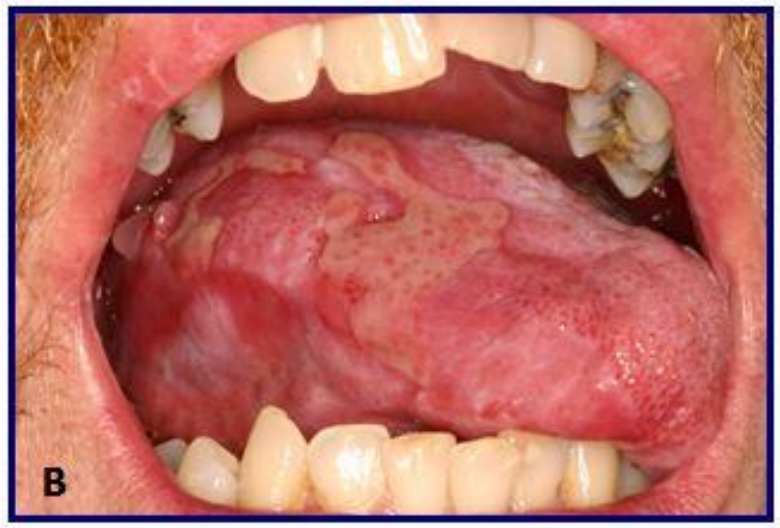
Gastrointestinal
- Diarrhoea
- Vomiting
- Hepatitis

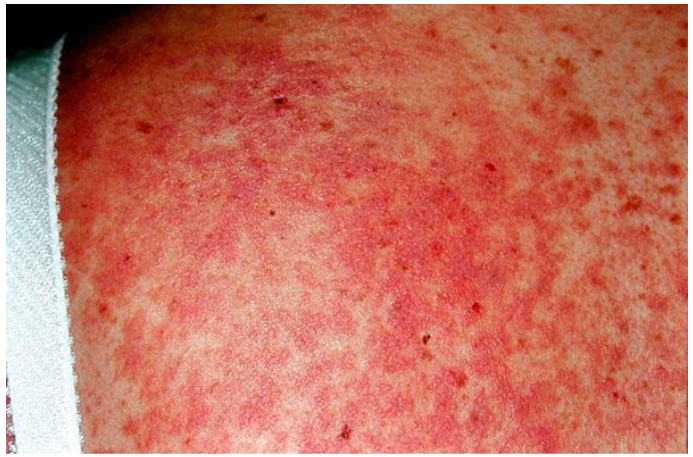
TA-GvHD Symptoms

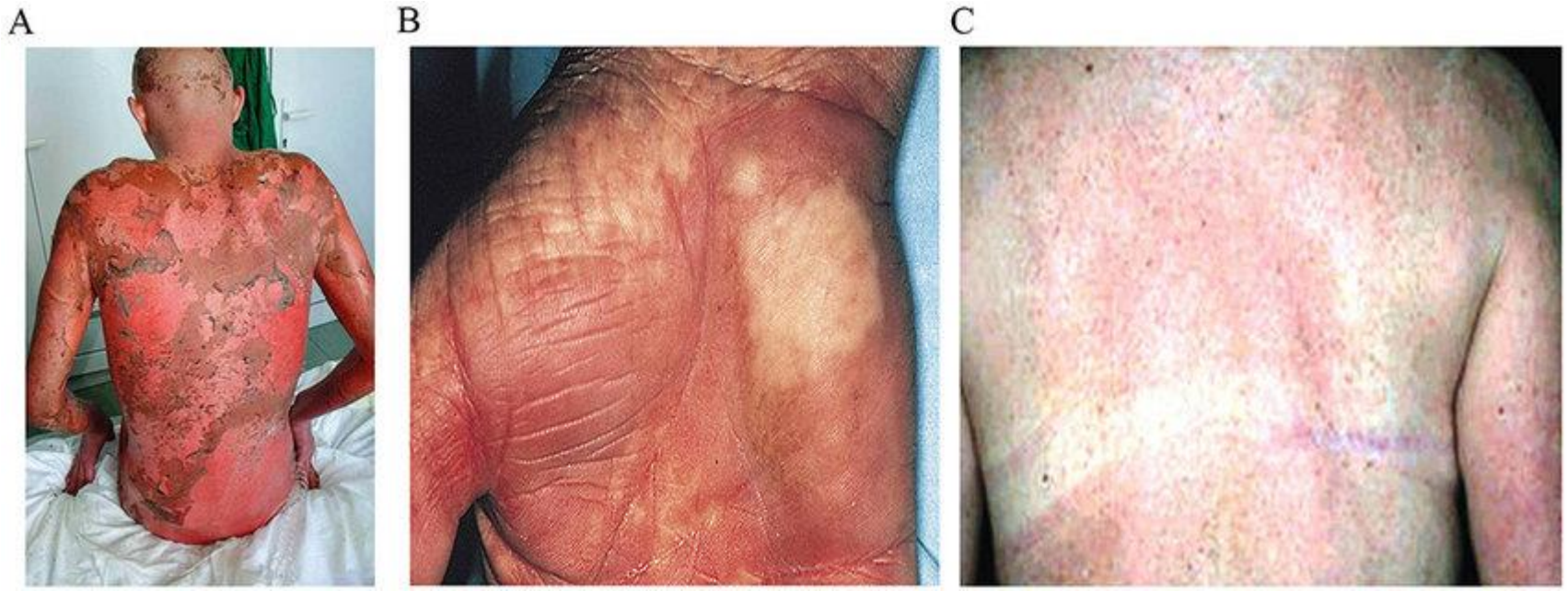
Systemic
- Fever

Skin Infiltration
- Desquamation
- Rashes/Erythroderma

GvHD: Avoid at all Costs!

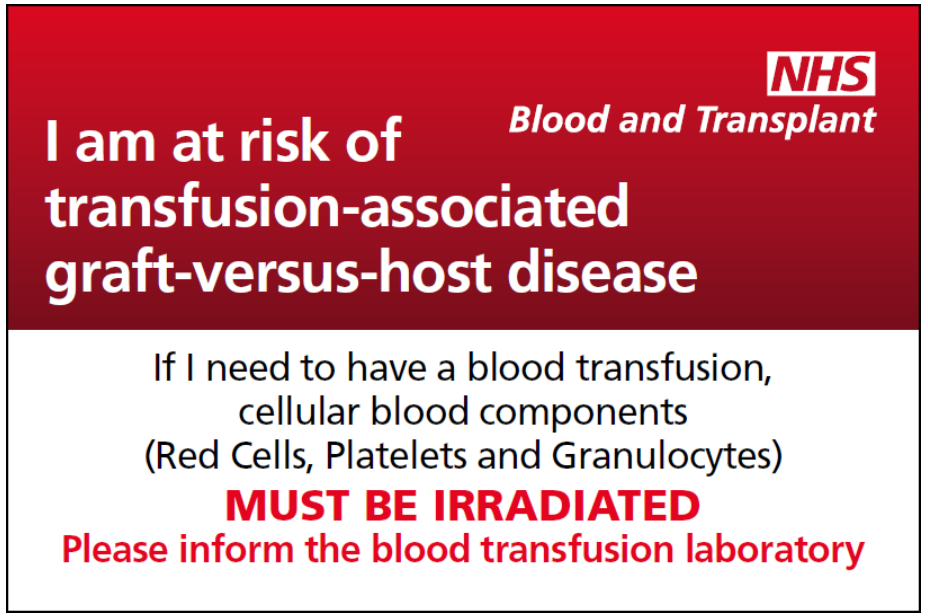




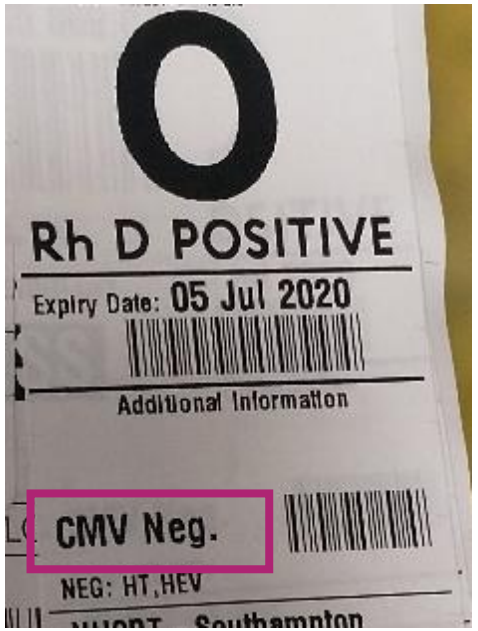


Avoiding TA-GvHD

- Communication!
  - Ensure the laboratory is informed of new Irradiation requirements.
    - By phone and EPRO letter.
- Always Check!
  - If you think the patient needs irradiated units, but you haven't received them- call the lab!
- Ask the patient!



Cytomegalovirus (CMV)



- CMV is a virus in the *Herpesviridae* family.
- The virus is spread through all fluid contact types.
- CMV infects various cell types, and infection may be asymptomatic, or flu-like.
- Once infected, the virus persists in a dormant state.
  - CMV persists in white cells, likely monocytes.

60-90% of adults will be infected within their lifetime.

Who needs CMV Negative?

Antenatal Transfusions

Historically Transplant recipients and the Immunosuppressed

Neonates up 28 days post delivery date

Intrauterine Transfusions (during and post)

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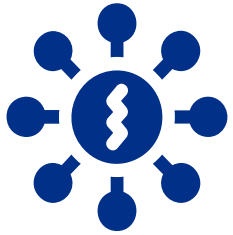
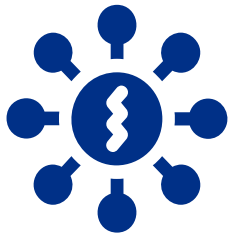
Risk of CMV Infection.



- Reactivation/Infection of immunosuppressed patients **could** result in severe disease.
  - **Leucodepletion** has mitigated this risk.
  - This includes transplant recipients, who should have pre-emptive CMV management.
- CMV infection in neonates/foetuses is **very dangerous**.
  - 10-30% of infected neonates die from CMV.
  - Antenatal infections have a 40% transmission rate.
  - Non-fatal symptoms:
    - Sensorial hearing loss
    - Bile duct destruction
    - Microcephaly
    - Blindness

Avoiding CMV Infection



- **Always** let the laboratory know if your patient is pregnant!
  - CMV- units MUST be given if the patient will be pregnant at the **end** of the transfusion.
- Neonates need CMV- units up to 28 days post EDD.
  - Paediatric units are always CMV-.

HLA/HPA Matching

- Human Leucocyte and Platelet Antigens (HLA/HPA)
  - How the immune system identifies “self” cells.
- Multiply/Chronically transfused patients can develop antibodies to non-self-Antigens.
  - This can result in a failure to increment.
  - These patients are described as “platelet refractory”
- Platelets are the only components which can be HLA/HPA matched.
  - Red cells have very low expression of HLAs.
  - Other products are plasma based.

Who needs HLA/HPA products?

Platelet refractoriness occurs when a patient fails to increment, even with ABO matched, HT negative units.

Reference laboratories can test for HLA antibodies.

Antibody Positive.

HLA matched platelets provided for the patient are negative for the antigen.

Platelets are matched closely to patient HLA type if poor response continues

Antibody Negative

There are many alternative causes for platelet refractoriness e.g., immune causes e.g., drugs and non-immune e.g., DIC. These must be excluded as part of investigations.

HPA antibodies are less common but should be considered if patient fails to increment with no explanation. .

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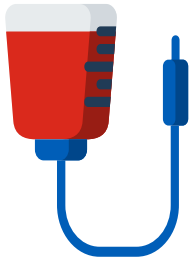
Ensuring matching happens.

Standard Platelets: £240.90
HLA/HPA Platelets: £562.44

- **Timing is everything.**
  - Matched platelets are hard to source- labs need 24-48 hours' notice when possible.
- **Repeat.**
  - If poor responses persist, reference labs can recheck for new antibodies.
- **Take pre- and post-samples.**
  - Record pre and post platelet levels (10mins-1hour post infusion start)
  - Reference labs use this to identify better matches.

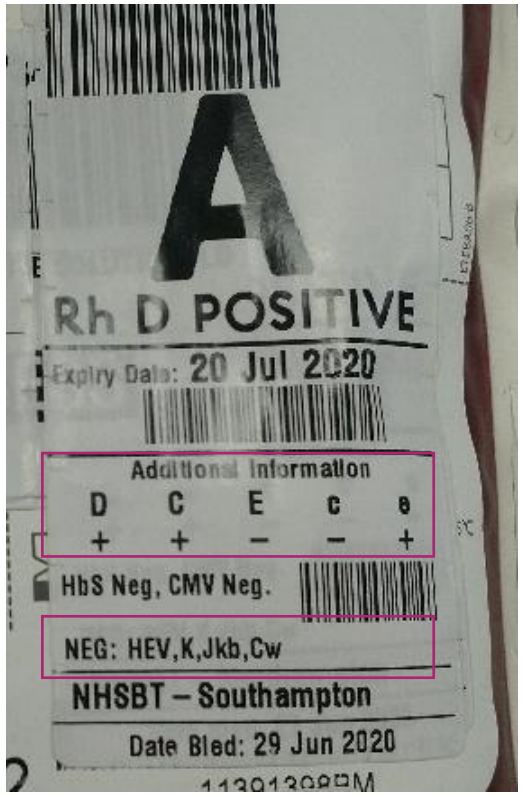
Don’t make us waste platelets- if they aren’t needed tell the Lab!

Antigen Negative and Special Groups



- **Patients with alloantibodies will react to units positive for those antigens.**
  - These patients need antigen negative units.
- Special patient groups need to **avoid** developing antibodies, as this can put them at risk of:
  - Limited blood access in emergencies
  - Haemolytic Disease of the Foetus and New-born
  - Transfusion reactions (morbidity risks)
- Some special patient groups have **additional** requirements.
  - These increase the lifespan of the unit in the patients.
  - Aims to reduce their transfusion requirements.

Who needs Antigen Negative units?



Not all patients with alloantibodies need antigen negative blood!

Table A3. Likely clinical significance of red cell alloantibodies, and recommendations for the selection of blood for patients with their presence

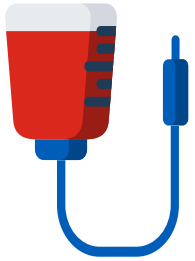
P	Anti-P_1	No	IAT crossmatch compatible at 37 °C
Lewis	Anti-Le^a, -Le^b, -Le^{a+b}	No	IAT crossmatch compatible at 37 °C
Lu	Anti-Lu^a	No	IAT crossmatch compatible at 37 °C
Diego	Anti-Wr^a (anti-Di3)	Yes	IAT crossmatch compatible[2]
H	Anti-HI (in A_1 and A_1B patients)	No	IAT crossmatch compatible at 37 °C
All	Others active by IAT at 37 °C	Yes	Seek advice from Blood Centre

[1]Where antigen negative red cells are recommended these should also be compatible in an IAT crossmatch.

[2]These recommendations apply when the antibody is present as a sole specificity. If present in combination, antigen negative blood may be provided by the blood centre, to prevent wastage of phenotyped units. This guidance is also suitable for patients undergoing hypothermia during surgery (Klein and Anstee, 2005b).

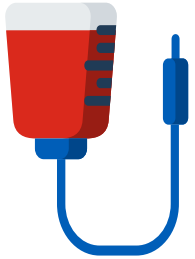
Don’t worry too much about this. The most important thing is : Your patient will ALWAYS need a full crossmatch!!

Special Requirements



Patient Group	Special Requirements
All special patient groups must be ABO and RhD matched at a minimum and negative for any clinically significant antigens the patient has antibodies for.	
Sickle Cell	• HbS- • <10 days old. • Kell Negative. • Rh Matched: D, C/c, E/e
Thalassemia	
Pregnant Patients	• Kell Negative. • Rh Matched: D, C/c, E/e • CMV-
Patients of Child bearing age.	• Kell Negative. • Rh Matched: D, C/c, E/e
Chronically Transfused Patients	

Risks

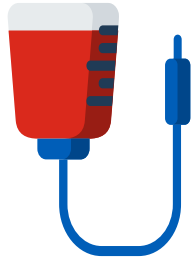


Acute Transfusion Reactions.

- Preformed antibodies can cause immediate haemolysis in a patient.
- This can result in renal injury, cardiac strain, hepatitis etc.

HDFN

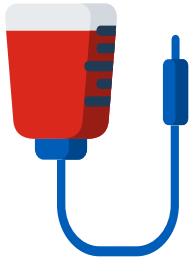
- Antibodies to D, K and c can cause severe foetal haemolysis.
- This can result in non-viable pregnancies, or significant antenatal interventions.

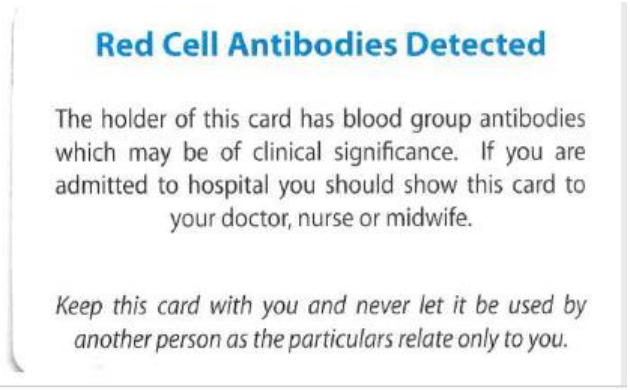


Delayed Transfusion Reactions.

- Patients can develop antibodies from a transfusion, resulting in haemolysis.
- These reasons occurs at >24 hours and may not be present until >72 hours.
- Symptoms are typically mild to moderate, with the main feature being refractory anaemia.

Avoiding Complications.





- Communication!
  - Tell the lab if a patient fulfils any Special Patient Requirements.
- Give the lab some warning.
  - Patients with multiple or high frequency antibodies may be difficult to access blood for.
  - The lab will always accept crossmatches for these patients in advance – so err on the side of caution!
- Ask the patient.
  - The patient may have history in other hospitals.
  - Previous antibodies may no longer be detectable.
  - The lab has limited access to national information.

Washed Products

- Plasma is very complex! It contains:
  - Immunoglobulins
  - Cytokines/Inflammatory mediators
  - Proteins with a wide array of functions
- **Washing**: Removal of most of the plasma from a component.
  - Replaced with additive solution.
- Cellular components can be washed.
  - Additive solution is used to support the cells.
- Plasma products cannot be washed.
  - Plasma products are detergent treated.

Who needs washed products?

Washed products are used to treat Acute Non-Haemolytic Transfusion Reactions.

Anaphylactic Reactions.	Selective IgA deficiency. (SIgAD)
• 200-300 ATR's are reported to SHOT annually.	• SIgAD is one of the most common primary immunodeficiency diseases in Caucasians.
• Anaphylaxis is likely caused by sensitisation of circulating foreign proteins	• These patients are at risk of developing Anti-IgA which can cause anaphylaxis.

• Symptoms can vary from moderate to severe but include:
  • Angioedema
  • Hypotension
  • Shock
  • Dyspnoea.	

The 1996 Club.

- **Historical Requirement ONLY.**
- All patients born after 1996 required:
  - Methylene blue treated cryoprecipitate.
  - Detergent treated/virally inactivated plasma.
  - Apheresis platelets (low plasma level)
- Why?
  - vCJD was eliminated from the food chain in 1996.
  - Treated products used to avoid infection.
- In 2019 this was phased out.
  - Reduced risk due to increased unaffected donor population and leucodepletion.
  - Only exception is patients <1 year old (local decision).

The End!

Thank you for listening.

Any Questions?

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