SPECIAL REQUIREMENTS – WHAT DO WE NEED TO KNOW FOR SURGERY?

PATIENT BLOOD MANAGEMENT IN SURGERY
STUDY DAY
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WHAT ARE SPECIAL REQUIREMENTS?

- The need for any blood component which has a special quality i.e. not a standard unit
- Selected for particular groups of patients where a standard unit might put them at risk
- Can have a financial premium
- Can be selected on basis of age and other factors
- Some selected during period of immunosuppressive treatment

SPECIAL COMPONENTS YOU MIGHT COME ACROSS…

1. Irradiated cellular components
2. HEV negative components
3. CMV negative cellular components
4. Methylene blue & solvent detergent treated plasma

1. IRRADIATED BLOOD

- Required by some patients who are immunocompromised
- May present for surgery and require a blood transfusion
- Transfusion with irradiated blood prevents transfusion-associated graft versus host disease (TA-GVHD)

NHS Blood and Transplant

I am at risk of transfusion-associated graft-versus-host disease

If I need to have a blood transfusion, cellular blood components (Red Cells, Platelets and Granulocytes)

MUST BE IRRADIATED

Please inform the blood transfusion laboratory

Please detach the above card, complete the details on the reverse and hand to th
This card must be shown to the patient's medical team before each transfusion.

NHS Blood and Transplant

This patient is at risk of transfusion-associated graft-versus-host disease

If this patient needs to have a blood transfusion, cellular blood components (Red Cells, Platelets and Granulocytes)

MUST BE IRRADIATED

Please inform the blood transfusion laboratory

Anaesthesia
Volume 66, Issue 7, Version of Record online: 20 JUN 2011
Abstract | Article | References

Table 1 Indications for irradiated blood products.

Category/disease	Rationale	Special considerations
Neonates	Immaturity or primary immune deficiency leading to inability to reject donor T cells	All IUT irradiated. Non-irradiated blood may be given for ET if time limited and no prior history of IUT
Congenital immuno-deficiency states e.g. SCID, Di-George's syndrome	Defect of T-cell function	High index of suspicion required in newborns where presenting feature may be unrelated to immune defect e.g. cardiac disease
Allogeneic BMT recipients	Immune suppression from conditioning e.g. TBI	Duration unclear, at least until immunosuppression withdrawn or lymphocytes > $1.0 \times 10^9.l^{-1}$. Continue in the presence of chronic graft versus host disease
Allogeneic BMT donors	Two reports of TA-GVHD associated with graft rejection mediated by third party lymphocytes	Irradiate all products given to donors up to 7 days before or during harvest
Autologous BMT	Prevent harvesting of allogeneic T-lymphocytes	Continue until immune re-constitution; at least 3 or 6 months if TBI given
Hodgkin's lymphoma	Defect of T-cell function	Give irradiated red cells and platelets to all patients for life
Purine analogue therapy including new agents; clofarabine and bendamustine	T-cell suppression	Continue irradiated products for life
Anti-thymocyte globulin therapy	T-cell suppression	No recommended duration
Alemtuzimab (anti-CD52) therapy	T-cell suppression	No recommended duration

IUT, intra-uterine transfusion; ET, exchange transfusion; SCID, severe combined immune-deficiency; BMT, bone marrow transplant; TA-GVHD, transfusion-associated graft versus host disease; TBI, total body irradiation.

TA-GVHD

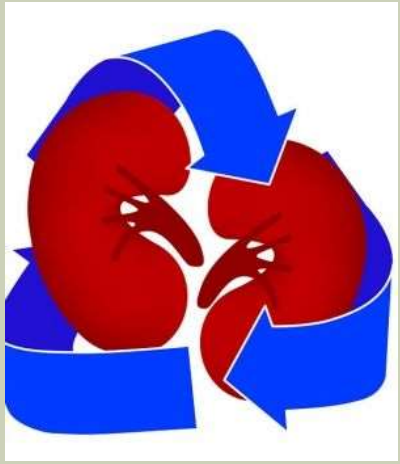
- Tissue damage due to action of donor T-lymphocytes
  - Fever, macropapular rash, diarrhoea, hepatitis, jaundice
- Can proliferate in a host with impaired immune system
- Only method of prevention is transfusion of irradiated cellular blood components
- Condition rare, but usually fatal

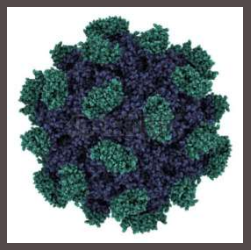
IRRADIATED BLOOD COMPONENTS

- Irradiated blood components = cellular blood components treated to inactivate lymphocytes
- These blood components can be irradiated by Gamma irradiation or X-ray irradiation

2. HEV NEGATIVE BLOOD

- Who needs it?
  - Patients awaiting **solid organ transplant (SOT)** – from 3 months before date of planned elective SOT / date of listing
  - Patients who have had **SOT** – while patient is on immunosuppressants
  - Patients with **acute leukaemia** – from diagnosis (unless decision is made not to proceed with SCT)
  - Patients awaiting **allogeneic stem cell transplant**
    - 3 months prior to planned transplant up to 6 months following transplant or
    - while patient is immunosuppressed
  - Extra corporeal procedures – such as **dialysis or extra-corporeal circulatory support** for SOT patients
  - **Neonates**





HEPATITIS E VIRUS (HEV)

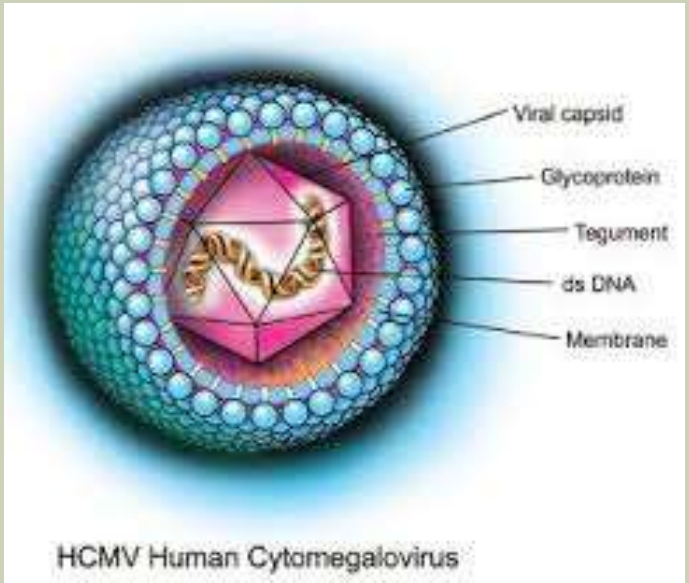
- Found throughout the world in both humans and animals, esp. pigs.
- RNA virus with 4 genotypes: genotype 3 found in UK
- Common route of infection - raw/undercooked meat (esp. pork products) and shellfish
- HEV also transmitted via blood transfusion and solid organ transplantation
- ~100,000 persons may suffer acute infections each year
- Most people asymptomatic and infection clears
- Immunocompromised patients may be unable to clear the infection → chronic inflammation of the liver and cirrhosis.

GETTING THE WORD OUT…

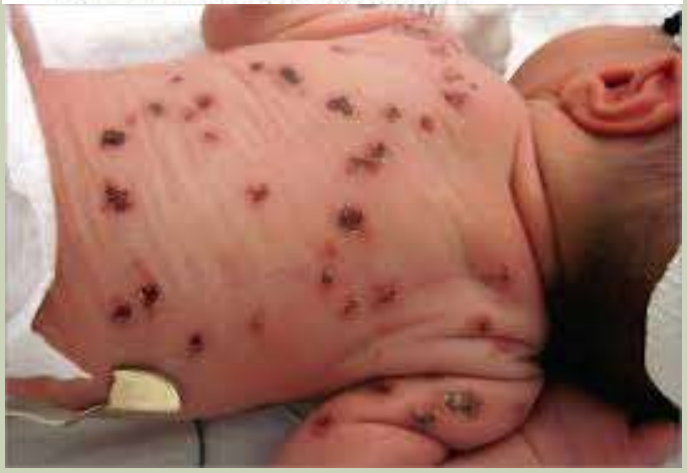
- **All blood components screened**
  - Only HEV negative used
  - No need to ‘flag’ at-risk patients in laboratory
- Patient information
  - affected patients counselled & informed re: diet by medics

3. CYTOMEGALOVIRUS (CMV) NEGATIVE

- CMV - herpes virus that gives rise to chronic, persistent (mostly asymptomatic) infection in a majority of adults worldwide.
- More severe disease may occur in e.g. foetuses, neonates and immunocompromised adults.
- **Transfusion transmitted**
- Universal leucodepletion implemented in 1999 for vCJD risk reduction - can reduce CMV to ≤0.1 viral copies per mL in leucodepleted blood.



HCMV Human Cytomegalovirus



WHO IS AT RISK?

- Planned transfusions during pregnancy e.g. for haemoglobinopathy (NOT for emergency, labour, delivery)
- Neonates (i.e. up to 28 days post expected date of delivery)
- Intrauterine transfusion

- *Not required for BM/PBSCT*
- *Monitor levels with CMV PCR*

4. TREATED PLASMA COMPONENTS FOR POST 1996

- All plasma components transfused to patients born after 1st January 1996 must be virally inactivated
- DoB alert on lab systems – automatic issue 
- Must be sourced from countries free from BSE or low CJD incidence
- **Methylene Blue** treatment used by NHSBT
- **Solvent Detergent** treatment applied to pools – used by e.g. Octapharma

METHYLENE BLUE TREATMENT – HOW DOES IT WORK?

- Phenothiazine dye added to plasma pack system and mixed with plasma
- Exposed to white light - MB generates reactive oxygen free radicals which damage nucleic acids, preventing viral replication
- Applied to single donor units of plasma.
- MB then removed with adsorption filter
- *NB: Can reduce activity levels of FVIII and fibrinogen*

SOLVENT DETERGENT (SD)

- Treatment dissolves lipid envelope of HIV, HBV, HCV
- Ineffective against non-lipid coated viruses (parvo B19, HAV)
- Applied to several hundred pools of ABO-identical plasma
- Titre of viruses reduced by downstream processing

TIPS FOR SURGERY?

- **Preop assessment & anaesthetics:**
  - Good history-taking essential – some patients carry a card
  - Look for alerts on systems, patient notes
  - Ask haematologist for advice if haematology history, or any mention of transplantation
  - Caution when patients are from out of area/treated at another hospital

WHAT IF NO ADVICE CAN BE OBTAINED?

- Avoid transfusion initially until advice received
- If transfusion essential and the required blood not available:
  - Crossmatched blood
  - Emergency O blood

Transfusion should never be withheld if required as part of a life-saving regimen