NHS Blood and Transplant

Board Meeting in Public

Tuesday, 01 December 2026

Title of Paper	Board Patient Story - HLA Selected Red Blood Cells: how a new blood product can improve the outcome of organ transplantation	**Agenda No.**	2.1
Nature of Paper	☒ Official	☐ Official Sensitive	
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Lead Executive	Rommel Ravanan – Chief Medical Officer		
Non-Executive Director Sponsor	N/A		
Presenter(s) at Meeting	Prof David Roberts – Medical Director for Pathology		
Presented for	☐ Approval ☒ Information ☐ Assurance ☐ Update		
Is there a plan to communicate this to the organisation?	☐ Yes ☐ No ☒ Yet to be determined		

Executive Summary

We can now match our red blood cell units to the tissue type (that is the HLA type) of patients on the waiting list for an organ transplant or after a transplant if they need a blood transfusion. We are the first blood service in the world to roll out HLA selected red cells to all renal transplant patients and all patients waiting for a renal transplant.

Our panel of 100,000 typed blood donors allows new matching of HLA-typed red cell units which can increase the possibility of finding a matching organ for someone on the waiting list and reduce the chance of transplant rejection after transplantation. We are rolling out these HLA-selected red blood cells to all UK renal transplant centres and establishing the feasibility of providing these products for cardiothoracic transplants and stem cell transplants.

These new products may increase kidney graft survival by 5-10% and substantially improve the outcome of renal transplantation. This project represents an excellent example of collaboration and innovation across Blood Supply, Pathology and Transplantation in NHSBT to improve the care of patients across the UK. The programme is leading international efforts in using HLA matched red cells to improve transplant outcomes.

Previously Considered by

N/A

Recommendation

This is presented for information only

Risk(s) identified (Link to Board Assurance Framework Risks)

N/A

Strategic Objective(s) this paper relates to:

☐ Modernising One NHSBT ☒ Optimising Donor Experience and Meeting Demand
☐ Campaigning & Identity ☐ Data, AI and Interoperability ☒ New Treatments

Appendices:	Appendix 1



Introduction

Why tissue antigens or HLA antigens are important in transplantation

All of us have 12 tissue antigens, also known as human leucocyte antigens (HLA) or white cell antigens. They are very variable, with many tens of thousands of different types of antigens. They are present on all the cells in the body except red blood cells and help the body recognise foreign bacteria, viruses and other pathogens. They are so variable because pathogens are diverse and evolve rapidly. However, our immune cells can also use the same systems to recognise the tissue antigens of another person unless we match the organ or stems cells as closely as we can. Once present, these immune responses to HLA antigens can not only reduce the choice of an organ donor but also take part in rejection of a transplanted organ.

Why red blood cells from a transfusion can stimulate a response against HLA antigens

Unwanted immune response against tissue antigens (HLA antigens) can be stimulated during, not only pregnancy (from tissue antigens on the fetus), but also by a red blood cell transfusion. There are enough HLA antigens from the donor present in a unit of blood even though we remove 99.9% of white cells. These HLA antigens are probably free in the plasma, or present on small fragments of cells. The free HLA molecules can unfortunately stimulate an immune response against the respective HLA antigen.

What happens when red blood cells stimulate responses against HLA antigens

If a patient on the waiting list for an organ transplant is transfused with random red blood cell units, then many immune responses against tissue antigens can be stimulated and these responses can restrict the choice of a suitable match of a potential living or deceased kidney donor.

Patient story 1

Mrs. A, a 50yr old woman with end-stage renal failure after long standing diabetes was eligible for a live kidney transplant from her husband. However, Mrs. A underwent a coronary artery bypass graft and was transfused with 5 units of red blood cells and 2 units of platelets. After she recovered from the surgery, testing of her blood showed that she had developed a strong antibody response against the HLA-A24 antigen from one of her blood donors that would cross-react with her husband's kidney. She could not therefore receive a transplant from her husband.
Conclusion: HLA selected red cells at the time of her heart operation could have avoided sensitisation and allowed her to receive a kidney from her husband.

Patient story 2

Mr. B, a 74-year-old man, born in Kenya but who had lived in UK since he was 17 years old, was referred with advanced chronic kidney disease in 2024. Twenty years previously he had received many transfusions after a road traffic accident. In the work-up for transplant he was found to have anti-HLA antibodies that would cross-react with 53% of UK donors. Finding a potential UK deceased donor match was classed as difficult. He then had a total knee replacement and had a three-unit transfusion. Further testing of his blood showed he now reacted with >99.99% of potential UK donors and finding a potential UK deceased donor match was extremely unlikely.
Conclusion: HLA selected red cells at the time of his knee operation could have avoided extensive HLA sensitisation and allowed him to have a chance of receiving a kidney from a deceased donor.

Clinical Study

More evidence for the value of HLA-selected red cells came from our clinical study (Spensley et al 2025). This study showed that if kidney transplant patients were transfused at the time of their transplant operation and the blood units stimulated an anti-HLA antibody that cross reacted with a new donor kidney, then the chance of the graft survival was very much reduced – see Appendix below Figure 1.
We concluded from this study that we could prevent 5-10% of rejected or failed kidneys by providing HLA-selected red cells that were compatible with the donor kidney. The health economics team at DHSC showed that this would be cost-effective across the NHS.

What we are doing to provide HLA-selected red cells

We have 100,000 HLA typed blood donors from donors who are also enrolled on the Stem Cell Transplant Register. So, we have about 2000 HLA-typed red cells units in stock at any one time. This is ample to allow us to provide red cell units that avoid the HLA antigens on any donor kidney**.** We can therefore provide HLA-selected red cells for almost all patients receiving a living donor or deceased donor kidney. We piloted the programme with Dr Michelle Willicombe, Head of the Renal Unit at the Hammersmith Hospital, to provide HLA-selected red cells to patients on the renal waiting list and to transplant patients. We supplied 137 units of HLA-selected blood to 73 patients and issued 98% of units in 48 hours.
We have now begun a national roll out and have on-boarded transplant centres at the Royal Free, Plymouth and Newcastle and will reach all UK primary renal transplant centres and satellite dialysis units by the end of 2027. The main constraint is the time taken for the renal transplant centres to complete on-boarding and their own ordering procedures and training.

Future Prospects

Cardiothoracic Transplant Patients

Anti-HLA antibodies directed at a transplanted heart can be fatal. There is a huge opportunity to avoid HLA sensitisation of heart transplant patients while they wait for a transplant and at the time of transplantation. We are moving quickly to assess the blood use and so feasibility of supplying HLA-selected units for patients on Left Ventricular Assist devices.

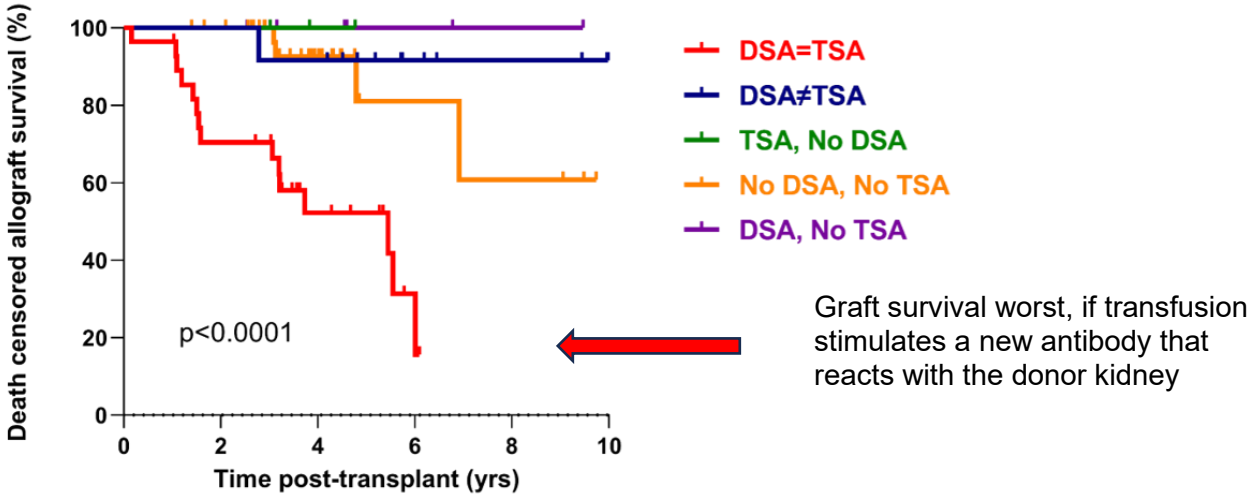
Haematopoietic Stem Cell Transplant Patients
HLA antibodies can cause graft rejection of a stem cell transplant, and this consideration is particularly relevant for the increasing number of patients with mismatched transplants. We are assessing blood use and so the feasibility of providing HLA-selected products, aiming for the most effective point along the patient journey from diagnosis to transplant for patients with Acute Myeloid Leukaemia who may be selected for mismatched transplants.

More HLA typed donors
HLA typed donors will be identified from the cohorts of genotyped donors. We will use the most valuable donors from the STRIDES study of 80,000 donors and later from the 100,000 blood donors enrolled in Our Future Health. In future years, we will be able to use the most valuable, genotyped donors from our proposed donor genotyping programme. We will need to have as high a proportion of donors from minority ethnic groups as possible.

Overall conclusion
These HLA selected red cells may increase kidney graft survival by 5-10% and so substantially improve the outcome of renal transplantation. We can extend the programme to support cardiothoracic and stem cell transplants. This project represents one of the first major applications of extended genotyping of donors. The scope of the programme is leading international efforts in using HLA-selected red cells to improve transplant outcomes.

Appendix 1

Figure 1 Graft survival after kidney transplant after red cell transfusion



Graft survival worst, if transfusion stimulates a new antibody that reacts with the donor kidney