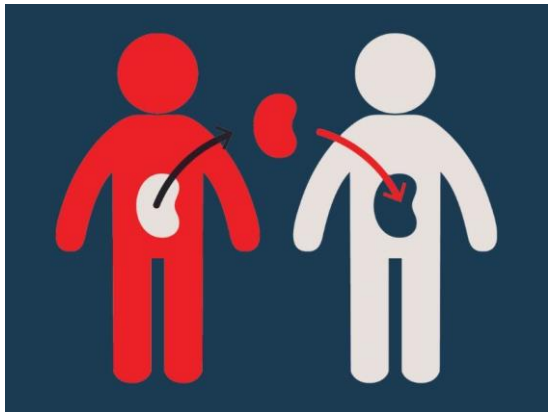
Public Pathology AUSTRALIA

National Forum 2026

Avoiding red cell transfusion-related HLA-alloimmunisation – to improve transplantation outcomes

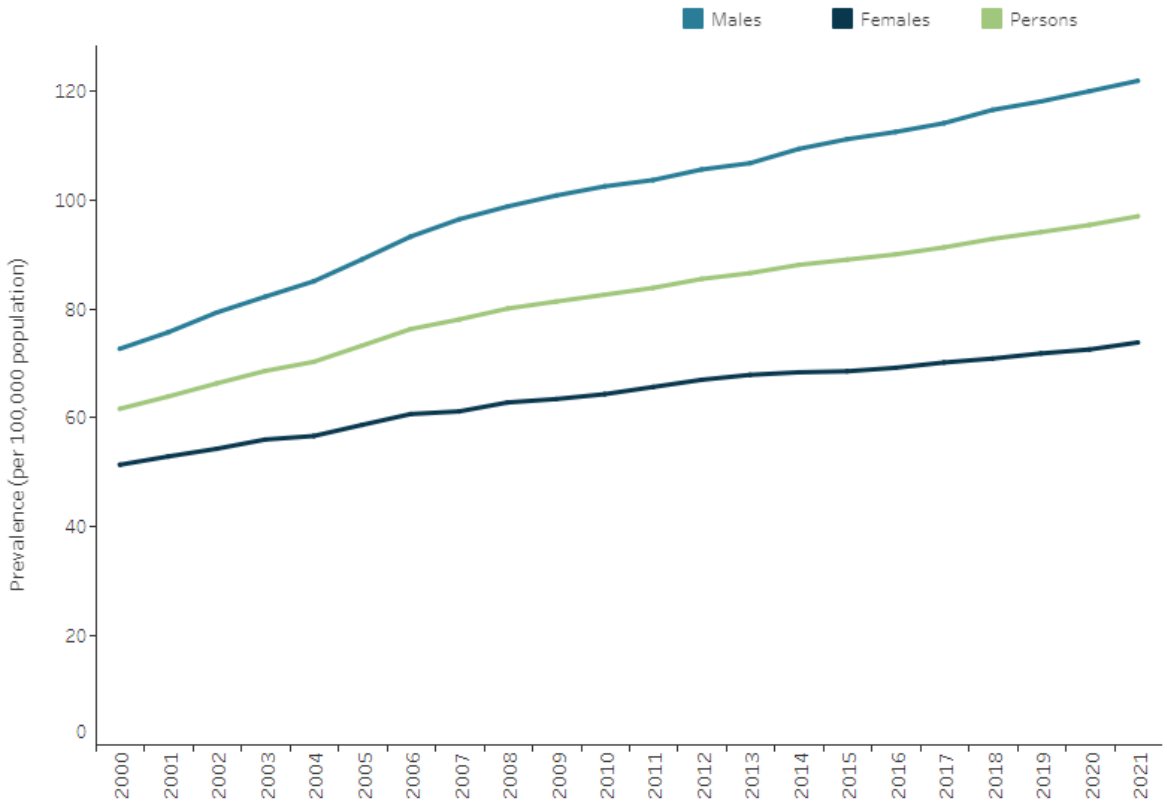


Dr Chris Hogan
Chief Pathologist

PUBLIC PATHOLOGY VICTORIA
Melbourne Health

The Royal Melbourne Hospital
the women's
The Royal Children's Hospital Foundation
PeterMac

Progressively rising burden of chronic kidney disease in Australia



for Kidney Transplants Needed:

In 2022

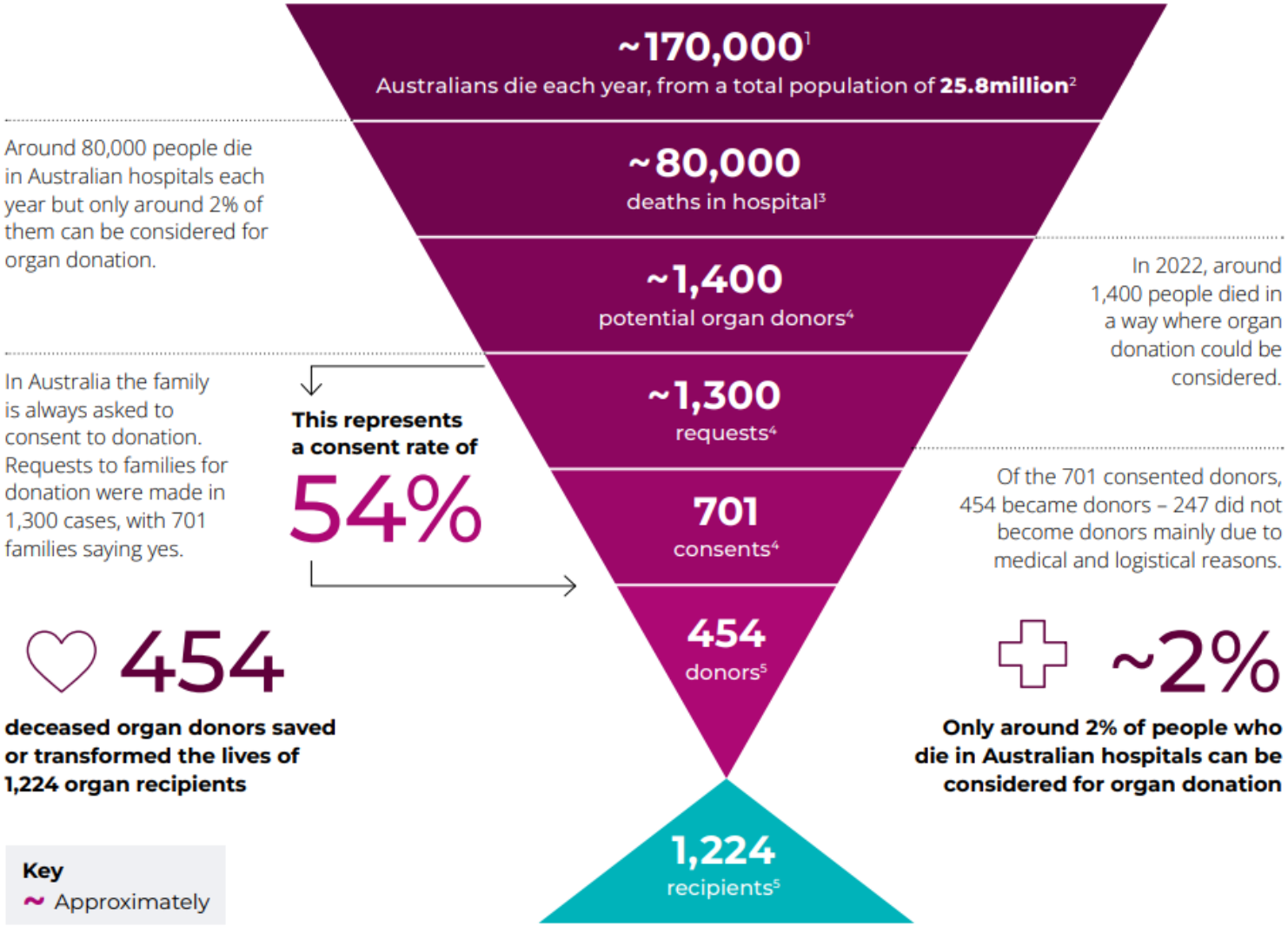
~1,800

people were on the waitlist for a transplant in Australia

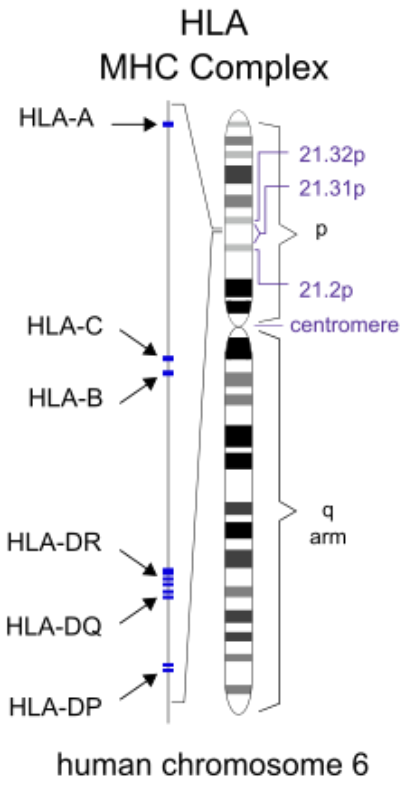
~14,000

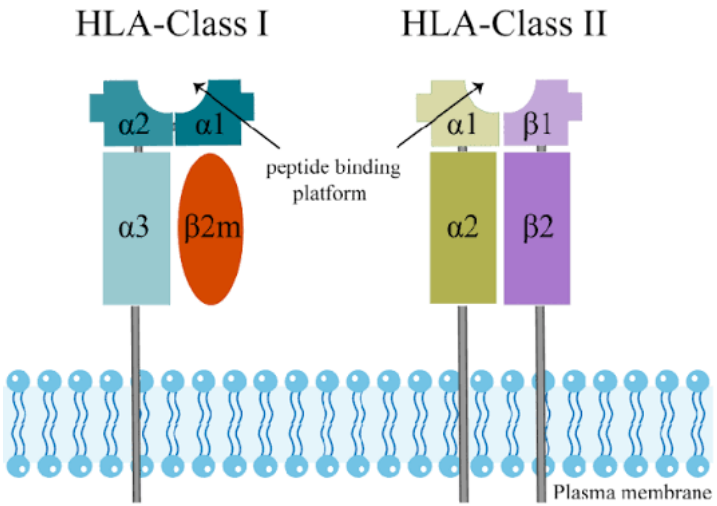
people on dialysis, many of whom could benefit from a kidney transplant

Figure 1: Australia's potential deceased organ donor population and transplantation outcomes 2022



HLA system





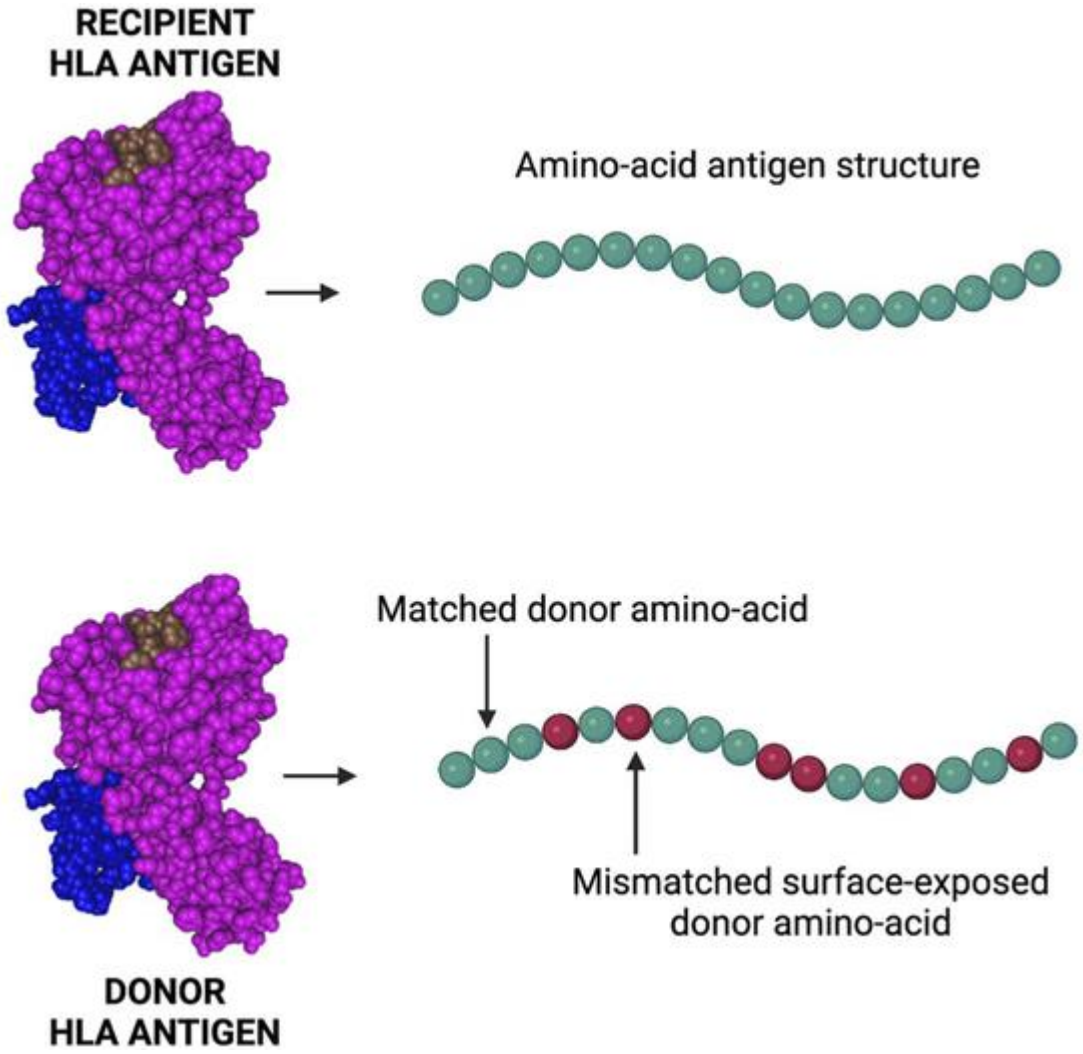
MHC class I	
locus	#[26][27]
Major Antigens	
HLA A	4,340
HLA B	5,212
HLA C	3,930
Minor Antigens	
HLA E	27
HLA F	31
HLA G	61

Number of variant alleles at class II loci (DM, DO, DP, DQ, and DR):

MHC class II				
HLA locus	-A1 #[27]	-B1 #[27]	-B3 to -B5[1] #[27]	Theor. possible combinations
DM-	7	13		91
DO-	12	13		156
DP-	67	1,014		16,036
DQ-	95	1,257		34,528
DR-	7	2,593	312	11,431

[1]DRB3, DRB4, DRB5 have variable presence in humans

HLA Eplets
& HLA compatibility



Dialysis patients, awaiting renal transplantation

Up to 20% of these patients will still **require regular red cell transfusion**, despite erythropoiesis stimulating agents

- Iron
- Erythropoietin
- Prolyl hydroxylase inhibitors

Development of anti-HLA antibodies in dialysis patients who require red cell transfusion

J McComish et al.
Nephrology 2026

18% of red cell transfused dialysis patients developed Class I anti-HLA antibodies

1% developed Class II anti-HLA antibodies

0% in the non transfused cohorts

Red Cell Transfusions & HLA alloimmunisation – How does this occur?

Residual leukocytes in the bag presenting HLA antigens to the red cell recipient

Soluble HLA molecules in the red cell concentrate

Small numbers of HLA antigens on the red cells

Median waiting time for renal transplantation

Median waiting time by anti-HLA antibody status

HLA alloimmunisation increases renal transplantation waiting time in **Australia**

Non-sensitised
Typical wait: **2–3 years** (varies by ABO group)

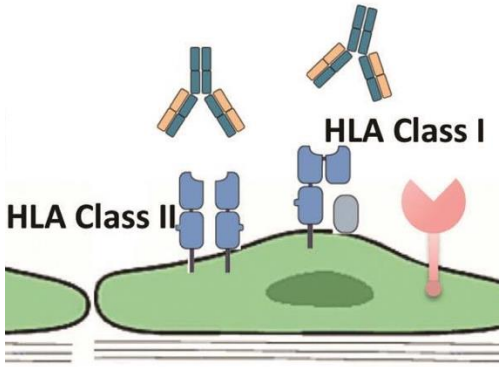
Moderately sensitised
Typical wait: **3–5 years**

- Increasing frequency of positive crossmatches
- More offers declined due to donor-specific antibodies

Highly sensitised

- Typical wait: **5–7+ years**

Pre-existing HLA alloimmunisation and renal transplant outcomes



S Mehrotra et al
Frontiers Nephology 2026

Class I antibodies

- **Higher risk of early antibody-mediated rejection (AMR)**

Class II antibodies:

- **Chronic microvascular inflammation and transplant glomerulopathy**

- **Diminshed long-term graft survival**

Potential strategies to avoid HLA sensitisation induced by red cell transfusion

Treat the red cell units

- Wash
- Leucodeplete
- Irradiate

Transfuse HLA compatible red cell units

- Autologous
- Directed donation
- **Selected units from typed red cell donors**

HLA compatible red cells – for whom & when & for how long?

Focus on live kidney donation transplant recipients

When to commence the support ?

- As soon as the patient is on a renal transplant waiting list?
- As soon as the patient commences long-term dialysis?
- Near to the time of the actual transplant?

Our Innovation

- Now ongoingly providing HLA compatible red cell units for dialysis patients, once listed for transplantation
- No de novo anti-HLA antibodies have developed (6 months / 10 patients)

Further scientific questions

What is the relevance of alloimmunisation to low expression HLA molecules (C, DP)?

Does dialysis and/or aetiology of the End Stage Kidney Disease itself affect the propensity to form anti-HLA antibodies?

How are particular leukocyte HLA mismatches more (or less) likely to result in anti-HLA antibody formation?

Does transfusion itself, irrespective of HLA type, stimulate anti-HLA antibodies?

Acknowledgements

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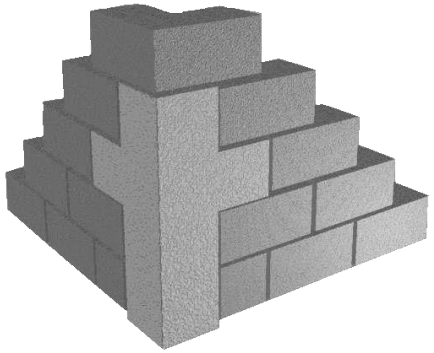
Dr Daniela Zantomio – Haematologist – Austin Hospital

Thank You

Pathology is the cornerstone in transplantation