HLA TISSUE TYPING AND HISTOCOMPATIBILITY IN SUPPORTING THE AUSTRALIAN UTERUS TRANSPLANT PROGRAM

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Introduction

Women who experience uterine factor infertility (UFI) are unable to experience gestational parenthood, a condition which affects 3-5% of the population. Uterus transplantation provides fertility options for women to experience gestation, childbirth, and biological parenthood. The first uterus transplantation and live birth was reported in Sweden in 2014[1]. Australia has performed its first uterus transplant in January 2023 at Royal Hospital for Women, Sydney[2]. This has resulted in a live birth in December 2023. The second transplant was performed in March 2023, and resulted in a live birth in March 2024. We report the role of Australian Red Cross Lifeblood (ARCL), Transplantation and Immunogenetics laboratory in pre- and post-transplant assessment of donor-recipient pairs for these uterus transplants.

The first recipient in Australia to receive a uterus transplant was a 30-year-old female, who had a previous successful pregnancy and subsequent emergency hysterectomy due to complications. She has received multiple blood transfusions during this procedure. Her mother has served as a related donor. The second recipient, a 36-year-old female with Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome and her family friend, who served as the donor.

Donor/Recipient pair 1

Donor/Recipient pair 2

Baby Henry

Baby Rose

Methods

ARCL has conducted HLA typing, HLA antibody screening and flow crossmatching in both cases according to our living directed donation transplant work up protocol. HLA typing was performed on recipient and donor using AllType™ FASTPlex™ NGS (One Lambda™). HLA antibody testing was performed on the recipient's serum using LABScreen™ Single Antigen (One Lambda™) and flow cytometric crossmatches (Halifaster protocol) were performed using recipient's serum against donor's T and B lymphocytes[3].

Results

	DSA present	T cell flow crossmatch	B cell flow crossmatch
Recipient 1	No	Negative	Negative
Recipient 2	No	Negative	Negative

HLA mismatches between donor/recipient pairs

Donor 1 HLA typing profile

A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3	DRB4	DRB5
*02:01	*44:02	*05:01	*04:01	*02:02	*02:01	*04:01	*01:03		*01:01	
*29:02	*44:03	*16:01	*07:01	*03:01	*03:03	*11:01	*02:01		*01:03	

Recipient 1 HLA typing profile

A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3	DRB4
*02:01	*40:02	*03:04	*04:01	*03:01	*03:03	*04:01	*01:03	*01:01	*01:03
*03:01	*44:02	*05:01	*14:02	*03:01	*05:03	*04:01	*01:03		

Allelic assessment

Allelic Differences

A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3	DRB4	DRB5
-	-	-	-	*02:02	*02:01	-	-		*01:01	
*29:02	*44:03	*16:01	*07:01	-	-	*11:01	*02:01		-	

Eplet load

Class I	Class II	Total
-	-	-

Donor 2 HLA typing profile

A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3	DRB4	DRB5
*03:01	*27:05	*07:02	*03:01	*02:01	*01:03	*03:01	*01:03	*01:01		
*24:03	*38:01	*12:03	*13:01	*06:03	*05:01	*04:01	*01:03	*01:01		

Recipient 2 HLA typing profile

A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3
*02:01	*15:01	*03:03	*01:01	*05:01	*01:01	*04:01	*01:03	*02:02
*02:01	*52:01	*12:02	*14:04	*05:03	*01:04	*04:01	*01:03	

Allelic assessment

Allelic Differences

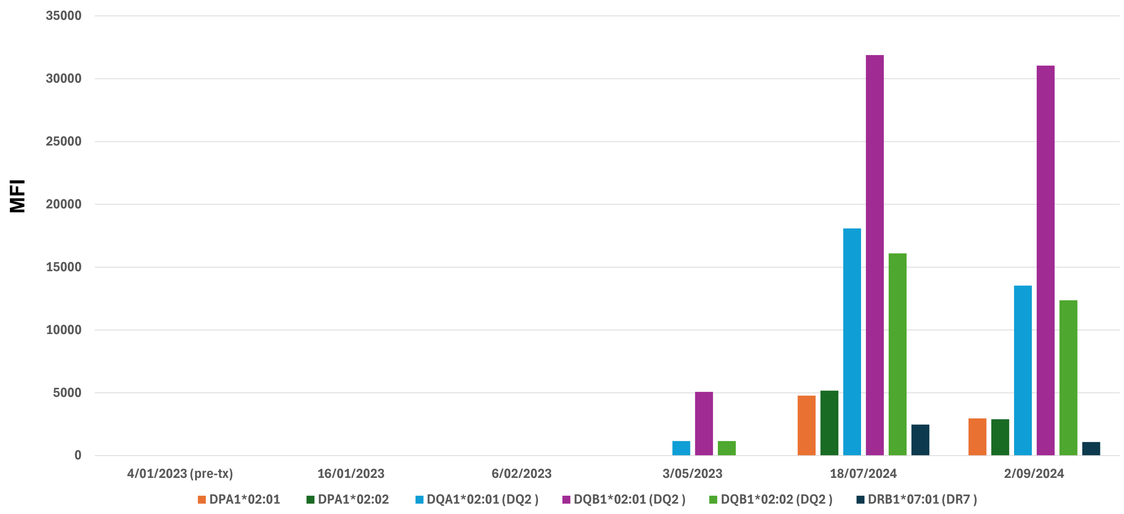
A	B	C	DRB1	DQB1	DQA1	DPB1	DPA1	DRB3	DRB4	DRB5
*03:01	*27:05	*07:02	*03:01	*02:01	*01:03	*03:01	-	*01:01		
*24:03	*38:01	*12:03	*13:01	*06:03	*05:01	-	-	*01:01		

Eplet load

Class I	Class II	Total
-	-	-

Post-transplant DSA monitoring

- **Recipient 1 DSA tracking**



DSA to DPA1*02, DQA1*02, DQB1*02 and DRB1*07 were detected from four months post-transplant and have peaked in July 2024. This antibody response could be the result of a memory response to prior HLA allo-sensitiation during her previous pregnancy.

- **Recipient 2 is DSA free in her two post-transplant samples, one month and two months post-transplant respectively, and we are yet to receive a sample in 2024 for DSA testing.**

Conclusions

HLA tissue typing and antibody screening is important in assessing transplant compatibility and monitoring for post-transplant DSA to prevent potential antibody mediated rejection in uterus transplant recipients. This is attributed to three successful uterus transplants and two live births in Australia since 2023. Further recipient-donor pairs have been assessed for histocompatibility in preparation for transplant. ARCL had played a crucial role in deciding compatible recipient-donor pairs for a successful transplant outcome. There are also plans to utilise non-directed donors through access to deceased donors via the national transplant waiting list (TWL) in the future[4]. ARCL will maintain these TWL recipients ready for matching and will perform virtual crossmatching and histocompatibility assessment against potential deceased donors for a successful transplant outcome.

References

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