

Body's Blueprint for a second chance: Understanding HLA in Kidney Transplants

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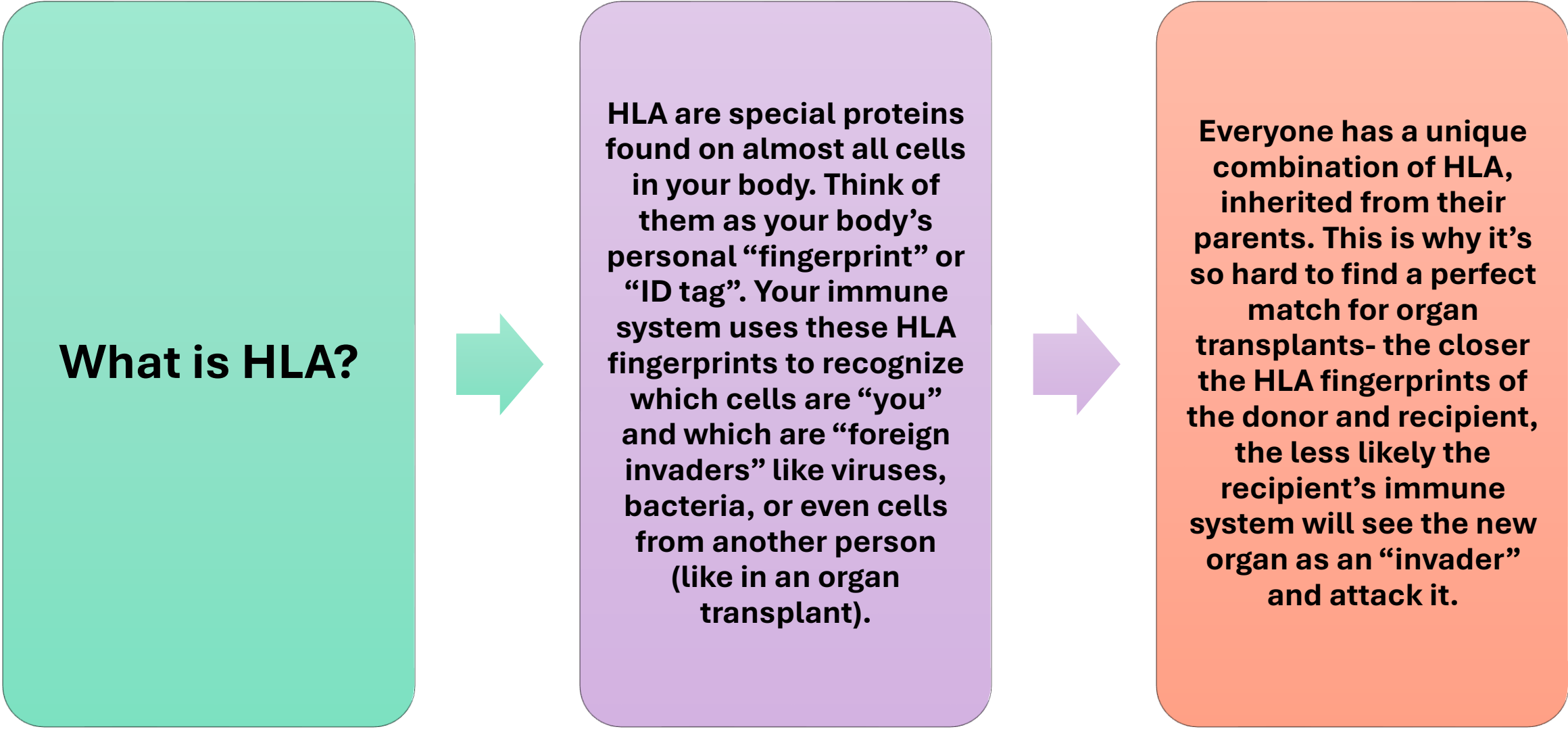


Imagine your body as highly secure building, and your immune system as the security team. Every cell in your body has a unique “ID Badge” on its surface, like a barcode, that tells the immune system, “I belong here!”



These ID badges are called Human Leukocyte Antigens, or HLA.

What is HLA?



HLA are special proteins found on almost all cells in your body. Think of them as your body's personal "fingerprint" or "ID tag". Your immune system uses these HLA fingerprints to recognize which cells are "you" and which are "foreign invaders" like viruses, bacteria, or even cells from another person (like in an organ transplant).

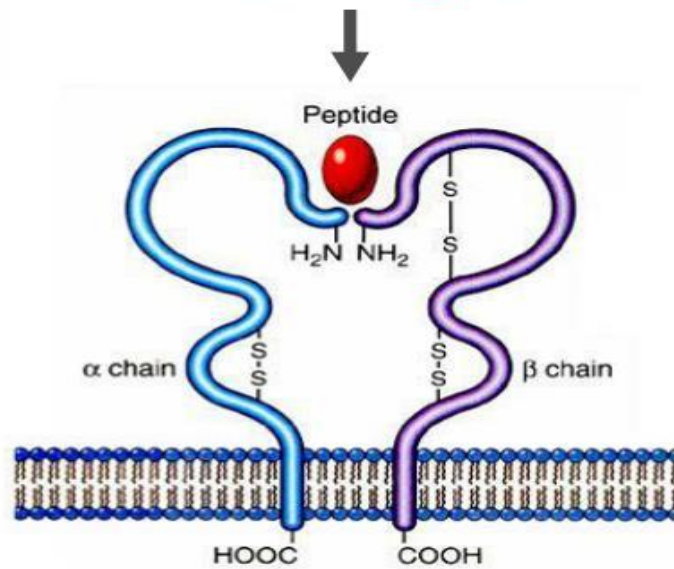
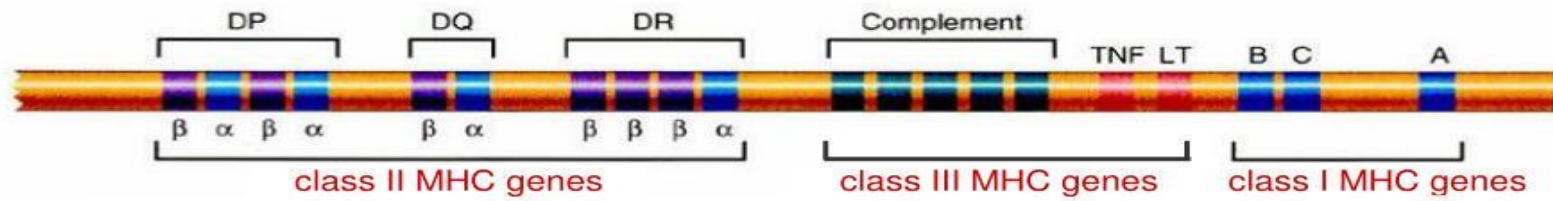
Everyone has a unique combination of HLA, inherited from their parents. This is why it's so hard to find a perfect match for organ transplants- the closer the HLA fingerprints of the donor and recipient, the less likely the recipient's immune system will see the new organ as an "invader" and attack it.

Major Histocompatibility Complex (MHC)

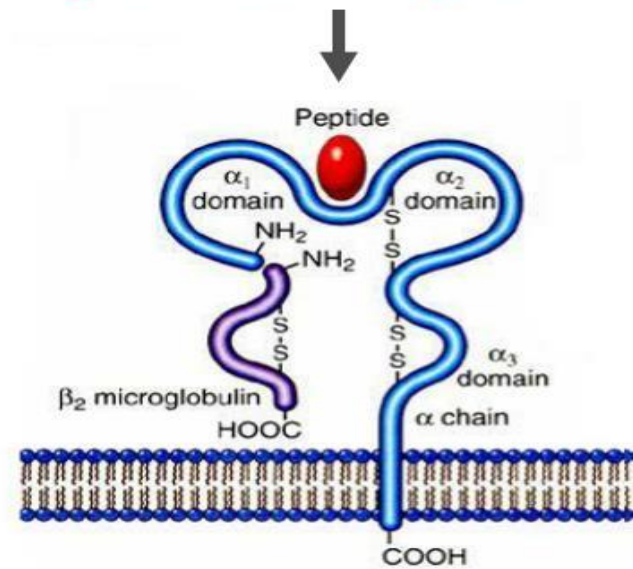
MHC acts as Antigen Presenting Structures

In Humans MHC is found on chromosome 6, referred to as HLA complex

The MHC contains the human leukocyte antigen (HLA) and other genes



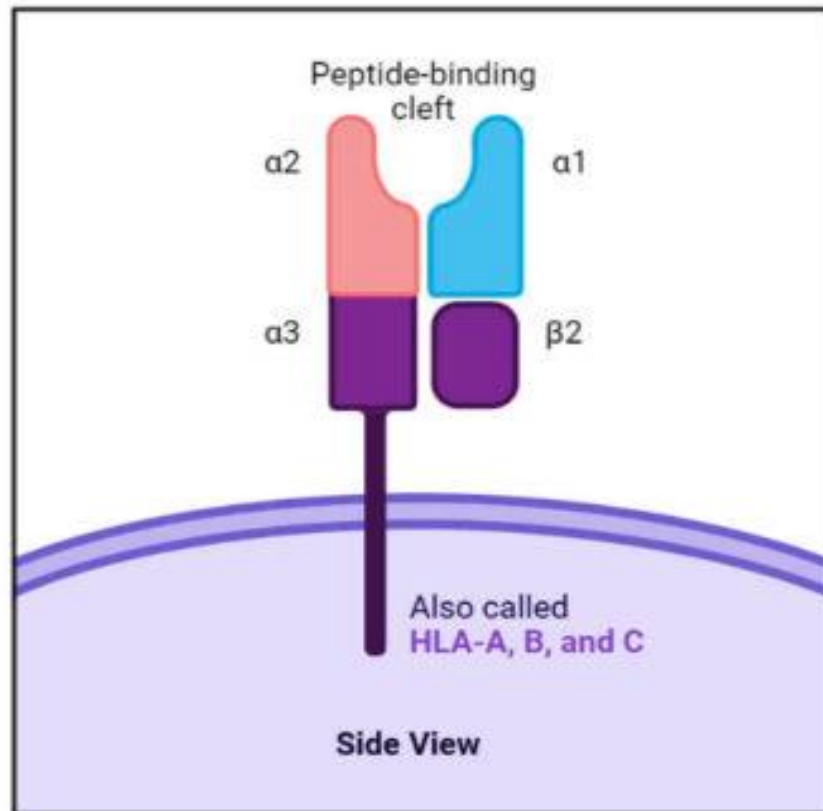
class II MHC molecule



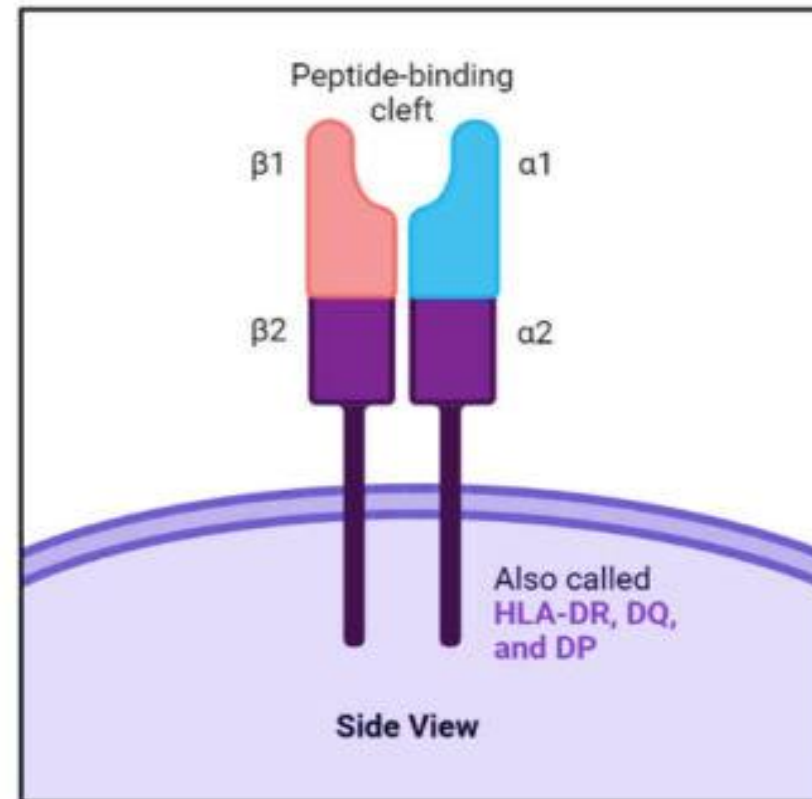
class I MHC molecule

Peptide binding cleft in MHC

MHC Class I



MHC Class II



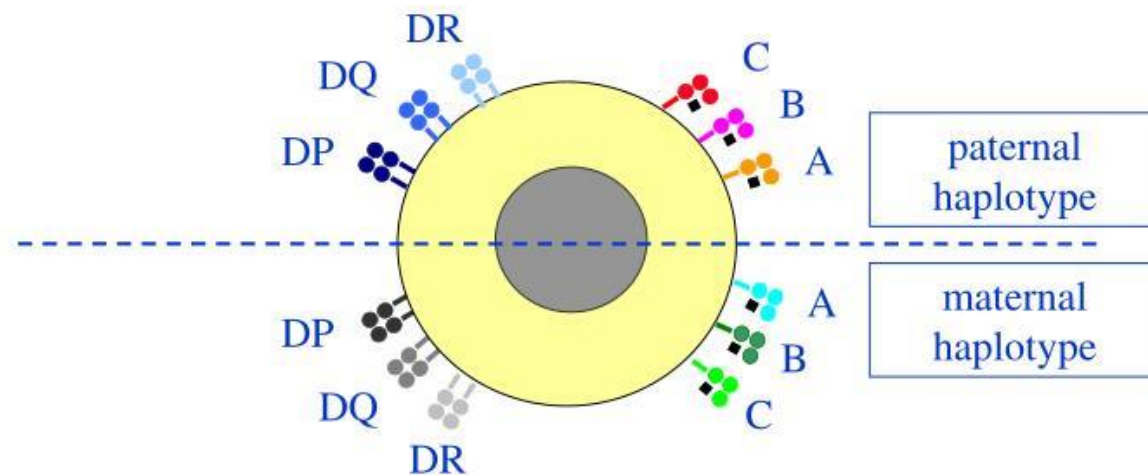
[MHC Molecules- Definition, Properties, Class, Types, Pathways](#)

MHC Class I and II

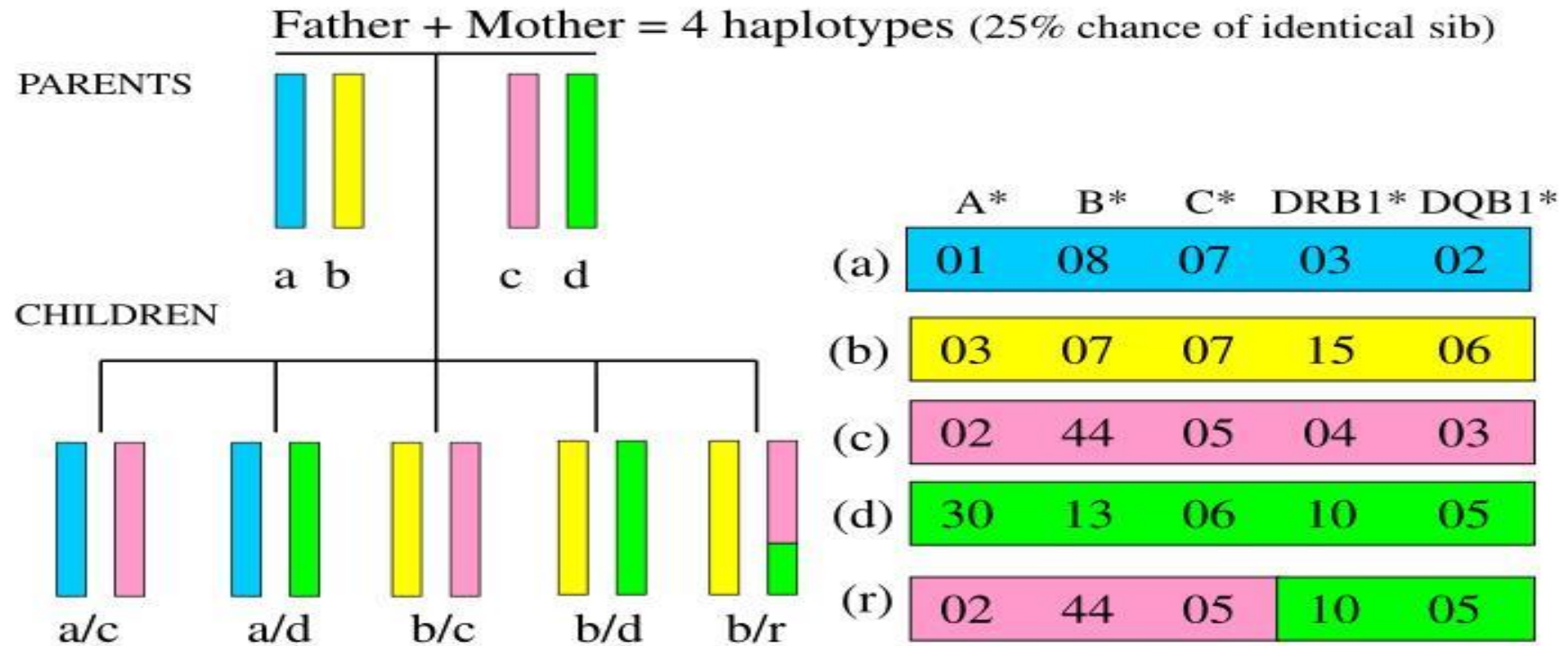
MHC region	Gene products	Tissue Location	Function
Class I	HLA-A, HLA-B, HLA-C	All Nucleated cells. Display antigens from within the cell to CD 8+ T cells	Identification and destruction of abnormal or infected cells by cytotoxic T cells
Class II	HLA-DR, HLA-DQ, HLA-DP	B lymphocytes, Monocytes, Macrophages, Dendritic cells, Activated T cells, Activated endothelial cells Display extracellular antigens to CD 4+ T cells	Identification of foreign antigen helper T cells

MHC alleles are co-dominantly expressed, both mother and father alleles are expressed

HLA ANTIGENS ON NUCLEATED CELLS



INHERITANCE OF HLA HAPLOTYPES



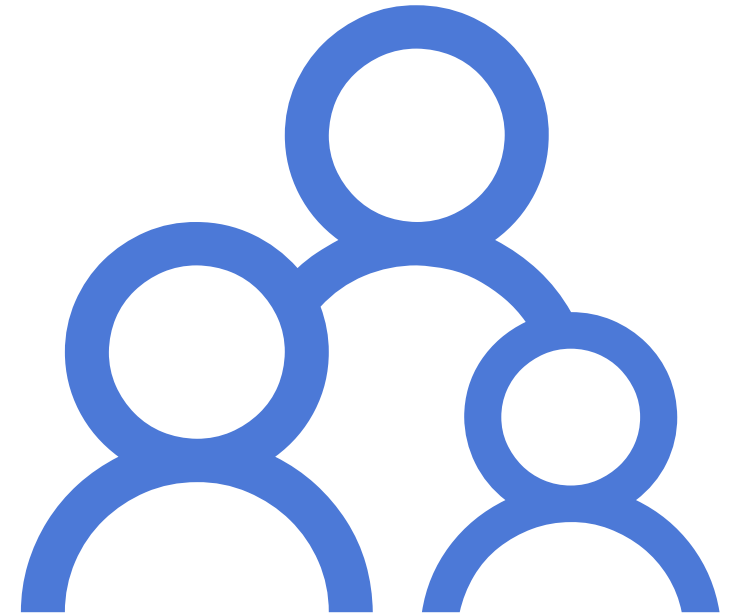
Understanding HLA Haplotypes: Your Inherited Immune Blueprint

The HLA genes are situated close to each other on chromosome 6, so they are inherited together as a linked block. This specific combination of HLA alleles from a single parent is called HLA haplotype.

Every person inherits two HLA haplotypes, one from their mother and one from their father, forming their complete HLA genotype.

This inheritance pattern means that within a family, siblings have a predictable chance of sharing haplotypes. There is a 25% chance that two siblings will inherit the same two haplotypes, making them a perfect HLA match.

There is a 50% chance they will share one haplotype, and a 25% chance they will inherit completely different haplotypes.



What is a Kidney Transplant?

A kidney transplant is a surgery that involves taking a healthy kidney from a donor and placing it into a person whose kidney(s) are no longer working properly.

Types of Kidney Transplant:

Living donor transplant

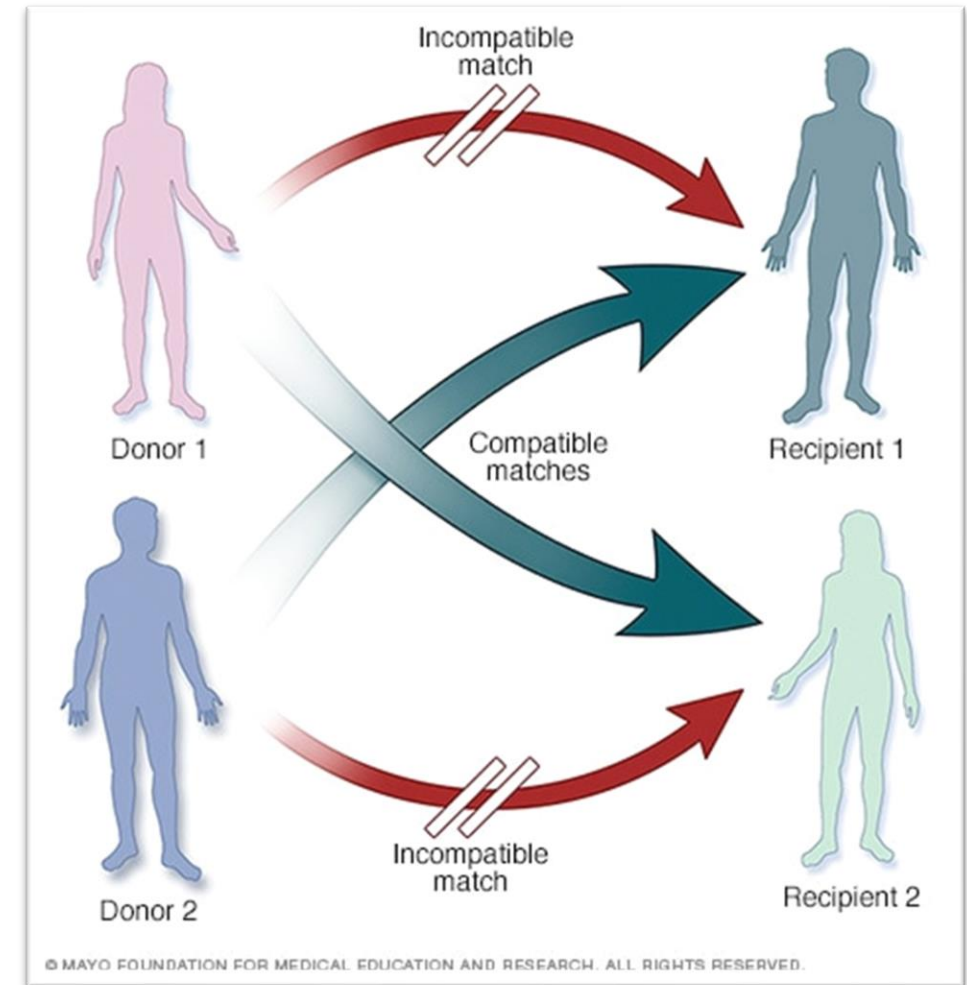
Common living donors are immediate family members, spouses, partners or friends, but living donors can be almost anyone.

Deceased donor transplant

People who want to be organ donors elect to do so while they're still alive.

Kidney Paired Donation (KPD)

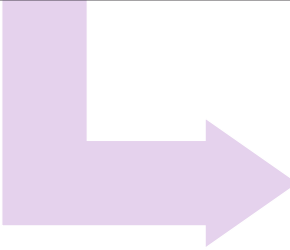
In KPD, a donor will donate their kidney to another recipient in exchange for a compatible kidney for their friend or family member.



How Kidney Paired Donation Works?



When a person (Recipient A) is in need of a kidney and has a willing donor (Donor A), but Donor A is either a poor match to Recipient A or not a match at all, the National Kidney Registry (NKR) can find a recipient who is in need of a kidney (Recipient B) and has a donor (Donor B) who is willing to donate, but is either a poor match or not a match at all to Recipient B, but is a match to Recipient A and, have them swap.



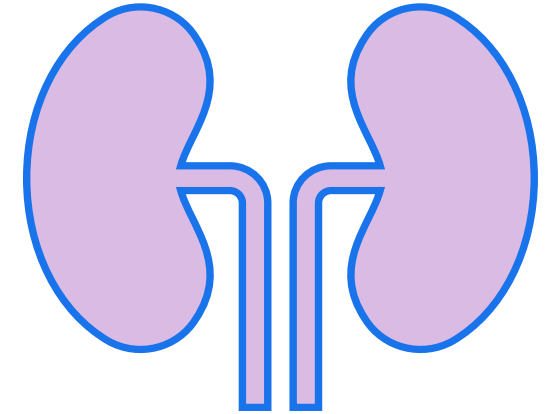
In traditional kidney paired donation, Donor A is a match and gives to Recipient B and Donor B is a match and gives to Recipient A. This is a “swap.”

What are the kidney transplant requirements?



Each hospital has its own criteria for accepting people as kidney transplant recipients. But in general, candidates for kidney transplant should have:

- **End-stage renal failure and be on dialysis**
- **Initiation of dialysis therapy or kidney function of 20% or less.**
- **A full understanding of postoperative instructions and care**
- **Be in good overall physical and mental health with strong social support**



What disqualifies you from getting a kidney transplant?

Kidney transplants are approved on a case-by-case basis. But there are some general factors that could make a person ineligible for a kidney transplant

A serious health condition like severe cardiac or pulmonary disease

Certain infections like Hepatitis B or C with cirrhosis on liver biopsy

Cancer or history of cancer within the past 2 years

Current psychiatric or psychological pathology

Evidence of current alcohol or substance abuse

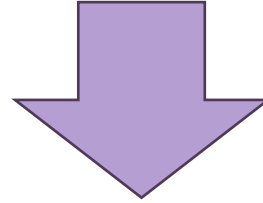
Morbid Obesity (BMI > 45)

History of noncompliance with medications and treatment

Why Blood type of donor and recipient matter?

Recipients Blood Type	% In population	Donor Blood Type
O	50% (Universal Donor)	O only
A	30%	A or O
B	>10%	B or O
AB	>5% (Universal Recipient)	A, B, AB or O

Common cause of sensitizing events for HLA antibody:



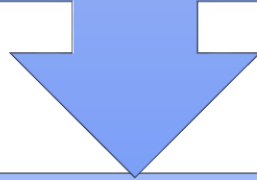
Previous Transplant

Blood Transfusions

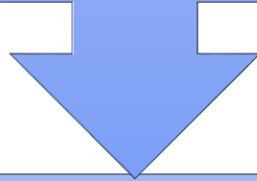
Pregnancy

Patients who get listed for kidney transplant gets Antibody Screen Test every other month.

United Network for Organ Sharing (UNOS)



UNOS is a non-profit scientific and educational organization that administers the only Organ Procurement and Transplantation Network (OPTN) in the U.S.

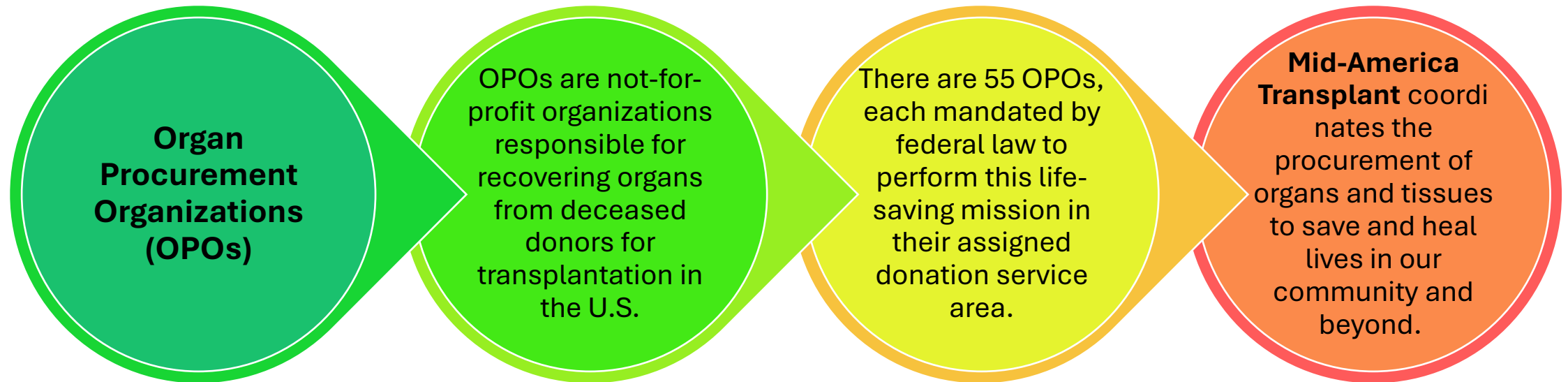


United Network for Organ Sharing is involved in many aspects of the organ transplant and donation process

Managing the national transplant waiting list, matching donors to recipients.

Maintaining the database that contains all organ transplant data for every transplant event that occurs in the U.S.

BARNES JEWISH HOSPITAL, ST. LOUIS, MO



Mid- America Transplant

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AMERICA
TRANSPLANT



WE SERVE

4.7
MILLION
PEOPLE

124
HOSPITAL
PARTNERS

84
COUNTIES
throughout Illinois,
Missouri & Arkansas

Mid-America
TRANSPLANT
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Virtual Crossmatch:

Abdominal Transplant Coordinator calls the HLA Lab for a Virtual Crossmatch with the doner and potential two recipients. IT is a screening process done before calling in a transplant recipient to get admitted.

HLA laboratory creates the electronic report using the patient's antibody screen reports from past 12 months and releases for the Transplant surgeons to review and decide if this donor is compatible with potential recipients.

If suitable, transplant surgeon calls in the patient to get admitted for potential kidney transplant.



Patient Name:
Med. Rec. Number:
Date of Birth:
Sex
Age: Male
64



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Phone (314) 362-5323
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HLA Virtual Crossmatch Recipient Report

Donor Name:
MRN:
DOB:
Relationship: Deceased Donor
Ordering Physician:

	Sample Date	Increased Risk DSA (MFI >= 5000)	Moderate Risk DSA (MFI 2000-4999)	Low Risk DSA (MFI 1000-1999)
Most Recent Antibody Screen	06/20/2025	None	None	None
Historic SA screens within last year		None	A24 (2/20/2025)	None
Comments				

Molecular Typing Results

Recipient:	A*/A	B*/B	Bw	C*/Cw	DRB1*/DR	DRB3*/4*/5* / DR51/52/53	DQB1*/DQ	DQA1*	DPB1*/DP	DPA1*
Molecular Typing:	11 26	14 15		03 08	04 07	DRB4*01	02 03	02 03	02:01:02G 04:01:01G	
Serologic Equivalent:	11 26	64 62	6 6	9 8	4 7	53	2 7			

Donor: MRN: DOB: Rel: Deceased Donor Typing Source: OPO Typing

Molecular Typing:										
Serologic Equivalent:	1 24	35 55	6	9 4	1 11	52	7 5	01 05	01:01 04:02	01 02

Transplant History

Transplant Date Donor ID Donor Name DOB Organ Type Donor HLA Typing
No Record

PRA Screen Results

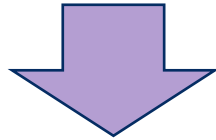
Sample Date	Tested Date	Treatment	Class I PRA	Class II PRA	Comments
02/20/2025	02/25/2025	Untreated	0	0	

Donor HLA tying is done in OPO and accessed through UNOS.

Current and Historic Antibody screen report comes from HLA Laboratory.

In this Virtual crossmatch most recent antibody screen is negative but Historic antibody report suggests A24 (Moderate risk).

Cross match

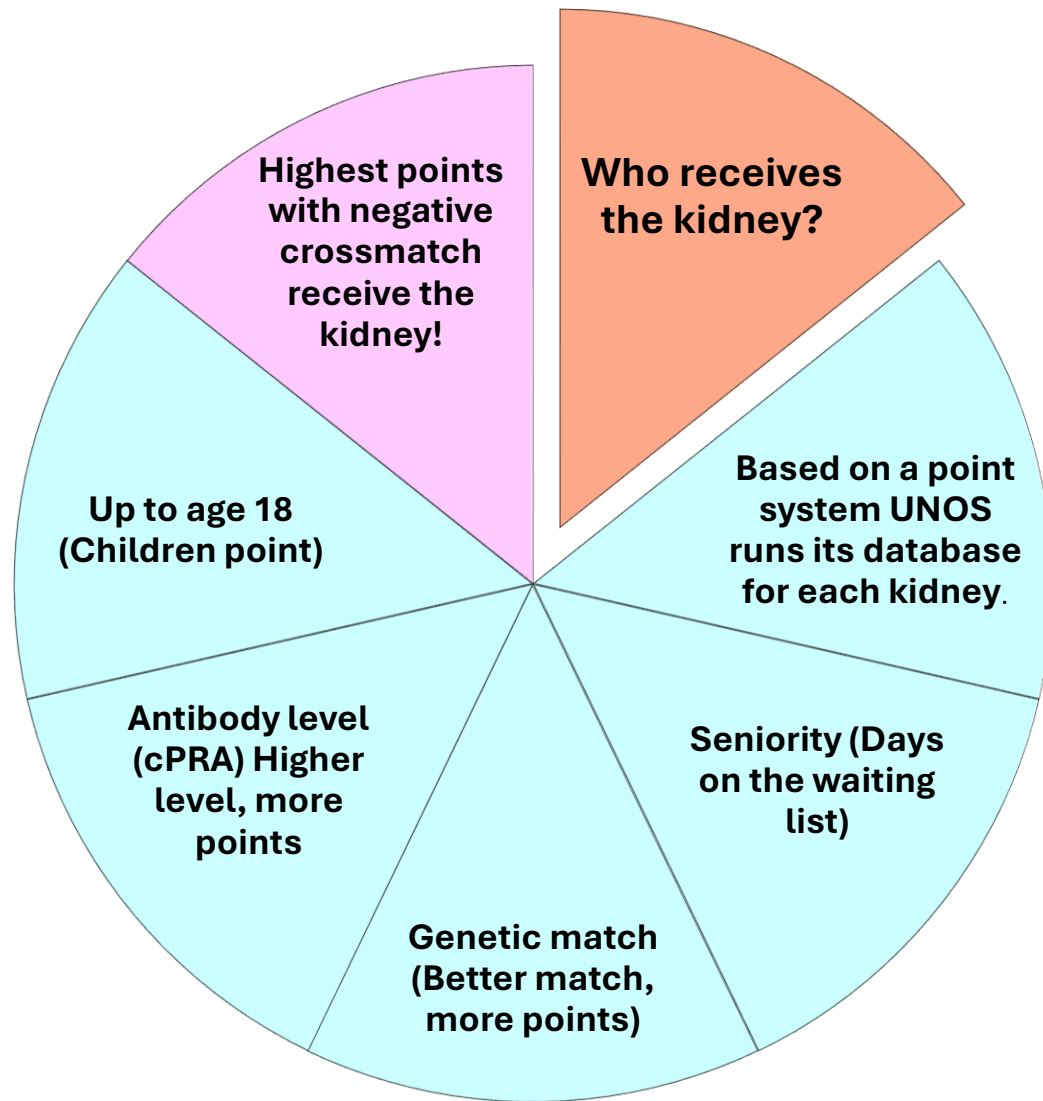


Test done by using donor lymphocyte and patient serum.

Can be performed during living donor evaluation.

Cross match will be the final test performed by HLA laboratory prior to transplant.





What happens during a kidney transplant procedure?



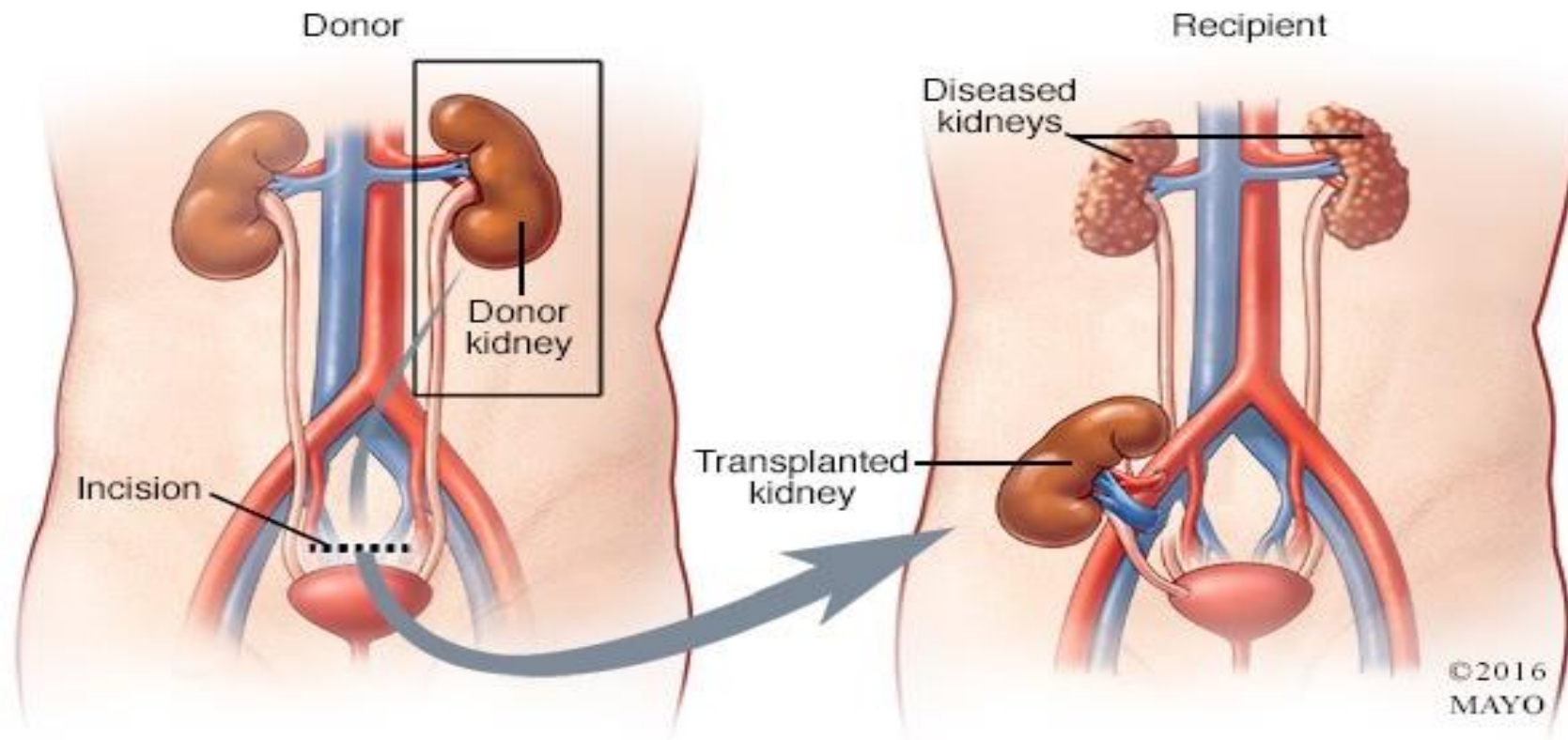
Kidney transplantation involves placing a healthy kidney into your body, where it can perform all of the functions that a failing kidney can't.



Your new kidney is placed on the lower right or left side of your abdomen where it's surgically connected to nearby blood vessels. Placing the kidney in this position allows it to be easily connected to blood vessels and your bladder.

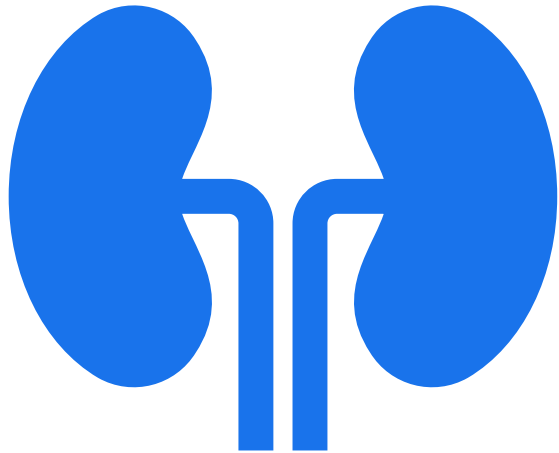


The vein and artery of your new kidney are attached to your vein and artery. The new kidney's ureter is attached to your bladder to allow urine to pass out of your body.



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Kidney Transplantation:

Recipients:

Surgery time: 4-6 Hours

Time in hospital stay:

Discharge teaching will begin from time of admission for transplant: Have support system available.

5-6 days hospital stay for uneventful cases.

Discharged when medically stable.

Living Donors:

All living donor surgery done by Laparoscopic robotic assisted.

3-4 days hospital stay.



So, what happens when the
kidney transplant recipient
is an employee of the
HLA Laboratory?

*They will see their results and
transplant status?!?*

*They might be
testing their own
sample?*

How do we manage this?

Special Thanks to

Lauren Wetter

Supervisor

HLA Laboratory

Barnes Jewish Hospital

Jenna Boxell

Pre-Kidney Transplant Coordinator,

Barnes Jewish Hospital

Trisha Kaplan, RN, CCTC

Kidney Pancreas Transplant Coordinator

Barnes-Jewish Transplant Center

References and Credits:

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- [Kidney Transplant: Surgery, Purpose, Procedure & Recovery](#)
- [MHC Molecules- Definition, Properties, Class, Types, Pathways](#)
- [PPT - PRINCIPLES OF HLA TYPING; HLA MATCHING IN HSCT David Smillie H & I, NHSBT, Sheffield PowerPoint Presentation - ID:3415398](#)
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- [Kidney Paired Donation Program | National Kidney Registry](#)
- [What Are HLA Haplotypes and Why Do They Matter? - Biology Insights](#)
- [PPT - Pre Transplant Kidney PowerPoint Presentation, free download - ID:959412](#)
- [What is UNOS? | About United Network for Organ Sharing](#)
- [The HLA System: Genetics, Immunology, Clinical Testing, and Clinical Implications – PMC](#)
- [Organ procurement organizations | Increasing organ donations | UNOS](#)
- [Service Area | Mid-America Transplant](#)

