

# Organizing an Internal Living Donor Kidney Chain

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# Disclosures

I have no disclosures



# Objectives

- Understand the Need/Benefit Kidney Exchanges/Chains
- National Kidney Registry and their Role with Kidney Chains
- UNMC accomplishments with Kidney Chains
- Pitfall/pearls of Kidney Chains
- Role Special Patient Populations: Pediatrics



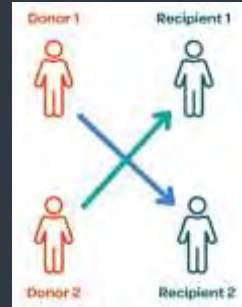
# The need

1/3 of patients are not compatible with their intended living kidney donor

Blood type, HLA sensitization, Donor specific antibodies

Kidney Paired Donation : addresses incompatibility  
Provides Reciprocal Matching

In the US  
14% of Living donors are performed with KPD



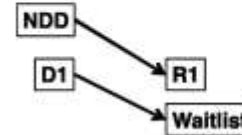
## Non-Directed Donation

**A** NDDs give to recipients on deceased donor waitlist

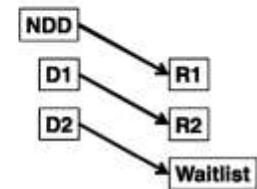


**B** NDDs participate in DPD

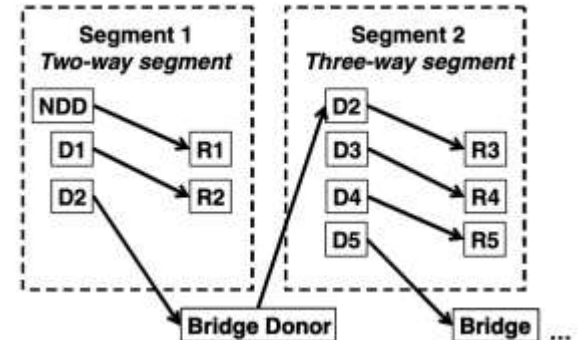
*Two-way domino*



*Three-way domino*



**C** NDDs participate in NEAD chains



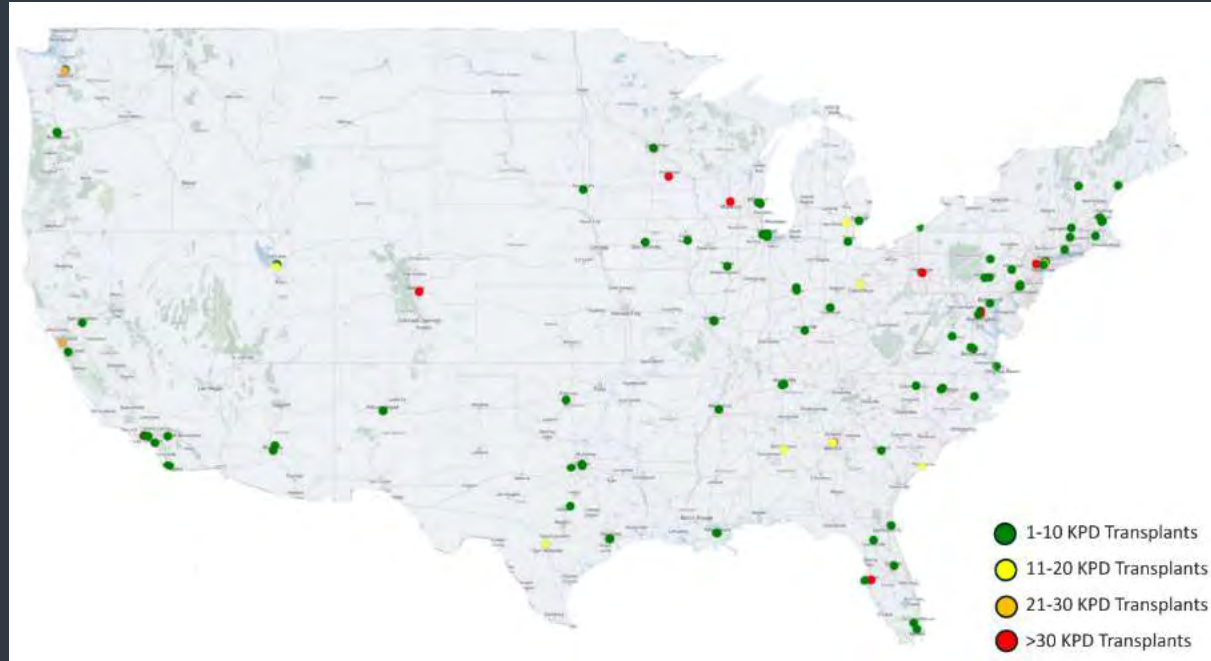
# Kidney Paired Donation programs

- OPTN/UNOS KPD Program
- Private Programs
  - Alliance for Paired Kidney Donation
  - National Kidney Registry

Donor Options and Protections	Single Center	UNOS	Private	
			APKD	NKR
Established		2010	2006	2007
Oversight	Transplant center	HRSA	Private	Private
Voucher program <sup>ii</sup>	No	No	No	Yes
Remote donation <sup>ii</sup>	No	Yes	Yes	Yes
Nondirected donor (allowed to list family/friend[s] as potential kidney recipient)	No	No	Yes	Yes
Prioritization of former living donors for LDKT	No <sup>c</sup>	No <sup>c</sup>	Yes	Yes
Prioritization for LDKT for orphan candidate <sup>d</sup>	Unknown	Yes	Yes	Yes
Donor mentors/coach <sup>e</sup>	Program-specific	No	No	Yes
Reimbursement program for lost wages, travel to transplant center, and dependent care	Only select donors: reimbursement based on recipient means (administered via NLDAC)		Universal	Universal
Legal support for unlawful employment termination or insurance discrimination	No	No	No	Yes
Cost to participate	Free	Free	Fixed	Variable based on program and level of participation
Publishes annual report	No	No	No	Yes
Number of LDKTs facilitated in 2023	Data not publicly available	15	Data not publicly available	1,430

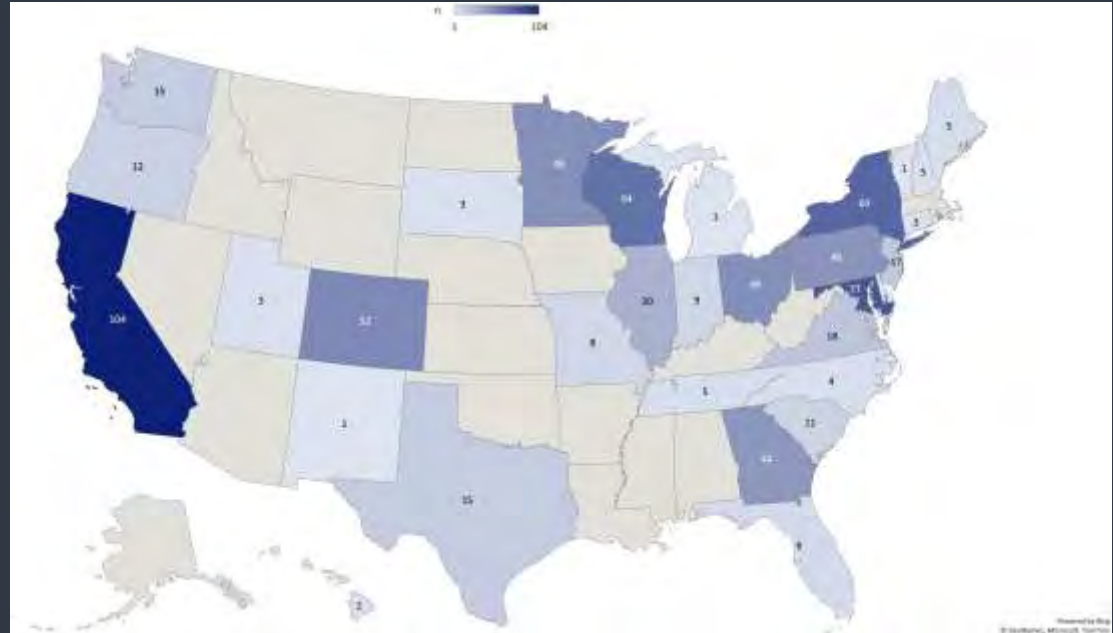


## Distribution of KPD (National and Private) transplants by center in 2021



# National Kidney Registry

- Nonprofit private organization that facilitates KPD
- 85-100 Transplant Centers
- 2008-2020 749 Chains  
(~7 chains per center)
- ~4100 Kidney Transplants



# Chain Ending

Beneficiaries of chain ending kidneys

Deceased Donors

N	749	135 847
Recipient characteristics		
Female, %	39.3	39.2
Black, %	31.6	33.6
Hispanic, %	10.5	17.9
Median (IQR) age, years	53.0 (41.0–60.0)	55.0 (43.0–63.0)
Preemptive transplant, %	16.0	10.6
Median (IQR) years on dialysis	3.0 (1.1–4.8)	3.6 (1.5–5.9)
Median (IQR) BMI, kg/m <sup>2</sup>	26.5 (23.5–31.0)	28.0 (24.3–32.1)
College educated, %	59.6	48.1
Public insurance, %	70.9	77.5
Diabetes, %	27.0	28.8
Hypertension, %	21.5	24.2
Hepatitis C, %	2.0	5.5
Previous transplant, %	11.3	14.0
PRA>80 at transplant, %	6.4	16.4
Median (IQR) eGFR Pre-transplant, ml/min per 1.73 m <sup>2</sup>	7.4 (5.2–10.6)	6.7 (4.9–9.5)
Antibody depleting induction, %	64.5	73.5
Delayed graft function, %	7.6	27.8



# KPD

## Pearls

- Private KPD
  - Aid to maintain Financial Neutrality
  - Legal support for Unlawful employment termination
- National Kidney Registry
  - Activity Report Published
  - Chain- Ending Recipients

## Pitfalls

- Private KPD
  - Cost of program not public available
  - "Trust" in recovery surgeon
  - No public activity report
  - No performance metrics known
  - Primary Nonfunction
  - "Broken Chains"
    - NKR 2008-2016
      - 20 broken chains



# UNMC

Started Kidney Chains in 2017

43% of Living Donor Kidney  
Transplants

(compared to 14% national average)



# UNMC

2/2017-2/2025

8 Exchanges

2-way

3-way

4-way

18 Kidney Chains

Longest 12 donors/12 recipients



# UNMC 2/2017- 2/2025

26 Kidney Exchange/Chains

137 Patients Transplanted

18 Chain – ending recipients

16 Pediatric Recipients

Characteristics Recipients	
Male Recipients	63%
Blood Type O	65%
Preemptive (prior to initiation of dialysis)	47%
Mean wait list (months)	9.4

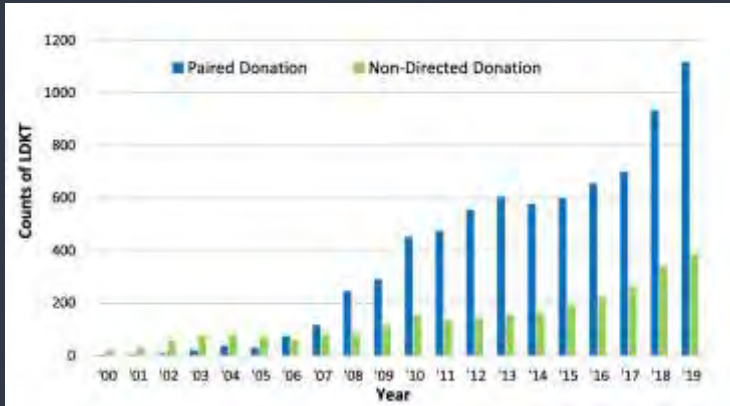


- Surgeons/Nephrologists
- Living donor coordinators
- Recipient coordinators
- Operating Room-supplies
- Preop/PACU
- Tissue Typing expertise
- Clinical space
- Inpatient rooms
- Financial teams
- Selection conference team
- Patient access/ Bed Management



# Nondirected Donors

- Traditional altruistic donors
- Conversion of "excess donors"



- Conversion of Directed to Nondirected following deceased donation



# Compatible Pairs (ABO/HLA)

Size/Weight

Age

CMV mismatch

Anatomy

Timing (uncoupling)

## CMV

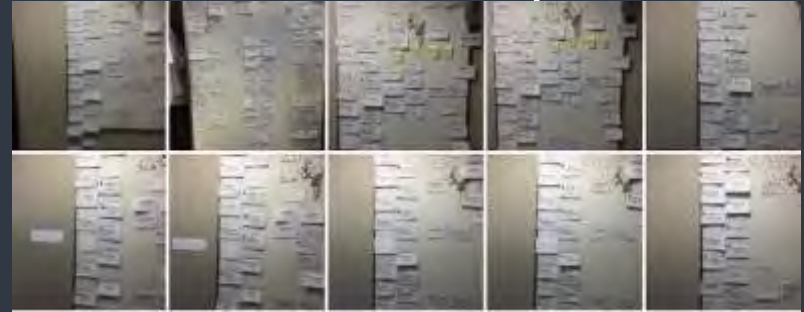
- CMV infections: morbidity/mortality
- Deceased donors D+/R- 17% higher risk graft failure D-/R-



# Incompatible Pairs ABO/HLA/DSA

- “Early detection”
- Donor evaluation prior to recipient
- Workup multiple donors at once

“Board of Hope”



# Internal Chain/Internal KPD

## Advantages

- All transplants performed at UNMC
- Close relationships formed with donors (donor first approach )
- Choose timelines for Donors and Recipients
- Short cold ischemic Time-no travel
- No broken chains
- Primary Nonfunction may be internally remediated

## Disadvantages

- Living Donor Assistant Program
- No confirmed financial neutrality
- May limit hard to match (high cPRA recipients)
- No donor protections without private KPD programs



# Pediatrics

- Public/ Private KPD

2008-2020

7% (258) of Pediatric Transplants were KPD

47% (120) were NKR

5 centers = 1/3 of all transplants

69 ( 50%) of Pediatric Centers did not perform a single pediatric KPD



# Pediatrics

UNMC

2/2017-2/2025

- 33% of all pediatric kidney through Internal KPD/chain
- 48% of all Living Donor Internal KPD/chain



# 2024: A Record-Breaking Year for Liver, Kidney and Lung Transplantation



**188**

adult or pediatric  
kidney transplants



**150**

adult or pediatric  
liver transplants

**17**

adult lung  
transplants



**13 multiorgan  
transplants**

involving kidneys  
and/or livers



Nebraska  
Medicine

