Seven Nonsimultaneous Extended Altruistic Donor (NEAD) Chains*
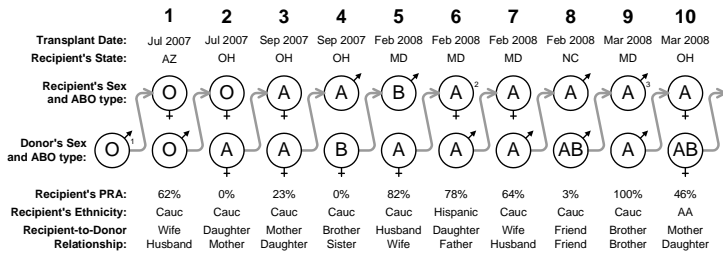
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NEAD Chain 1

	1	2	3	4	5	6	7	8	9	10
Transplant Date:	Jul 2007	Jul 2007	Sep 2007	Sep 2007	Feb 2008	Feb 2008	Feb 2008	Feb 2008	Mar 2008	Mar 2008
Recipient's State:	AZ	OH	OH	OH	MD	MD	MD	NC	MD	OH
Recipient's Sex and ABO type:	O	O	A	A	B	A	A	A	A	A
Donor's Sex and ABO type:	O	O	A	A	B	A	A	A	AB	A	AB
Recipient's PRA:	62%	0%	23%	0%	82%	78%	64%	3%	100%	46%
Recipient's Ethnicity:	Cauc	Cauc	Cauc	Cauc	Cauc	Hispanic	Cauc	Cauc	Cauc	AA
Recipient-to-Donor Relationship:	Wife Husband	Daughter Mother	Mother Daughter	Brother Sister	Husband Wife	Daughter Father	Wife Husband	Friend Friend	Brother Brother	Mother Daughter

[1] The initiating donor was an unpaired altruistic donor from Michigan.
[2] The recipient of Transplant 6 required desensitization to HLA DSA by T and B cell flow cytometry.
[3] The recipient of Transplant 9 required desensitization to blood group (AHG titer of 1:8).

NEAD Chain 2

	DEC 2007	DEC 2007	DEC 2007	OCT 2008	OCT 2008
	OHCO	OHOU	FLFH	OHCO	MDJH	OHCO
PRA		86%	69%	85%	100%	79%
Ethnicity		Cauc	Cauc	Cauc	Cauc	Cauc
Relationship		Mother Daughter	Mother Daughter	Father Daughter	Wife Husband	Wife Husband

NEAD Chain 3

	Donor From GA	OCT 2008
	OHCO	TXHH
PRA		79%
Ethnicity		Hisp
Relationship		Sister-in-Law Sister-in-Law

NEAD Chain 4

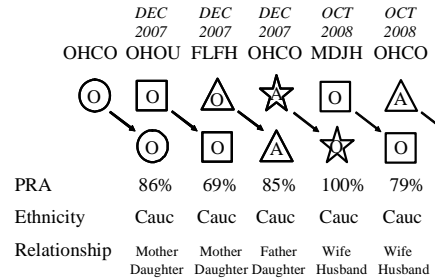|		JAN 2009
	OHCO	OHCO
PRA		27%
Ethnicity		Cauc
Relationship		Wife Husband

Abstract

INTRODUCTION: Kidney paired donation (KPD) is an evolving strategy for achieving living donor (LD) kidney transplants (KTx) for candidates with willing, but incompatible living donors. A new strategy combining altruistic donors (AD) and KPD to create non-simultaneous extended altruistic donor (NEAD) chains was recently introduced. We report our experience with six of these chains.

METHODS: Twelve transplant centers in ten states have transplanted patients as part of a larger network that shared ADs and arranged them into NEAD chains. ADs initiated NEAD chains that were extended by allowing recipients to receive kidneys before their incompatible donors, referred to as "bridge" donors (BD), donated.
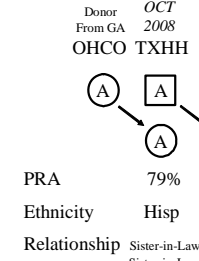
RESULTS: A total of six NEAD chains have been initiated resulting in 22 KTx. The first NEAD chain resulted in ten KTx and the BD (blood type AB) has now been waiting to donate for 20 months. A second NEAD chain has produced five KTx and the BD remains committed 13 months later. A third NEAD chain has produced four KTx, with the BD waiting for 3 months. Three additional NEAD chains have produced one transplant each. 15 of 22 (68%) recipients had a PRA >50%. 8 of 22 (36%) recipients had blood type O. No BDs have reneged, and the average waiting time for BDs is 6.4 months. 21 of 22 (95%) transplants are functioning.

CONCLUSION: The number of KTx performed as a result of AD can be significantly enhanced by a program that allocates these kidneys to KTx candidates with willing, but incompatible living donors in NEAD chains. In addition, NEAD chains allow for greater numbers of highly sensitized and blood type O candidates to be transplanted than traditional KPD.
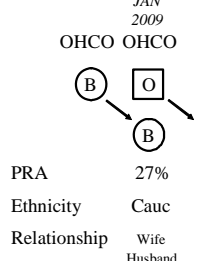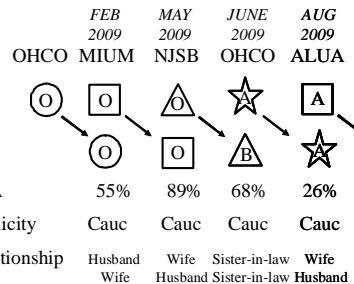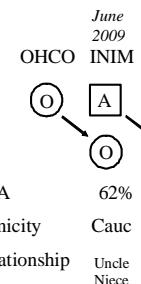
NEAD Chain 5

	FEB 2009	MAY 2009	JUNE 2009	AUG 2009
	OHCO	MIUM	NJSB	OHCO	ALUA
PRA		55%	89%	68%	26%
Ethnicity		Cauc	Cauc	Cauc	Cauc
Relationship		Husband Wife	Wife Husband	Sister-in-law Sister-in-law	Wife Husband

NEAD Chain 6

		June 2009
	OHCO	INIM
PRA		62%
Ethnicity		Cauc
Relationship		Uncle Niece

NEAD Chain 7

	FEB 2010	FEB 2010	JAN 2010	APR 2010	APR 2010
	OHCO	ALUA	ALUA	CASM	MISM	MISM
PRA		70%	8%	90%	0%	23%
Ethnicity		AA	Cauc	AA	Indian	Cauc
Relationship		Daughter Mother	Wife Husband	Husband Wife	Wife Husband	Wife Husband

Figure 1

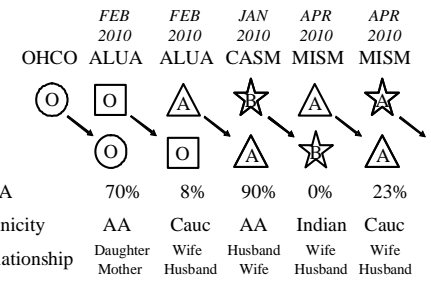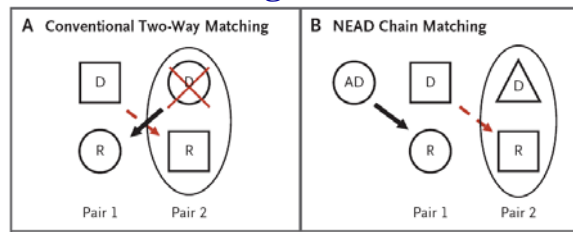A **Conventional Two-Way Matching**   B **NEAD Chain Matching**

Pair 1 / Pair 2

Figure 1. Consequences of a Donor's Reneging in a Conventional Paired Donation and in a Nonsimultaneous, Extended, Altruistic-Donor Chain. Reneging in a conventional two-way paired donation (Panel A) permanently harms Pair 2 because the recipient in that pair does not receive a kidney and has lost the opportunity to participate in a future paired donation. Reneging in a paired donation that is part of a nonsimultaneous, extended, altruistic donor (NEAD) chain (Panel B) does not permanently harm Pair 2, since the donor in that pair has not yet donated a kidney, and the pair can be matched again. In this example, squares are compatible with squares but not with circles, and circles are compatible with circles but not with squares. A black arrow represents a donation by a living donor, a broken red arrow represents reneging on a donation, and the red X represents a donor who has donated a kidney and is no longer able to help the recipient in their pair through paired donation. AD denotes altruistic donor, D donor, and R recipient.

Conclusions

1. NEAD Chains have allowed for 27 transplants from seven altruistic donors facilitated by the Alliance for Paired Donation.

2. Sixteen of twenty-seven (60%) have a PRA over 60%.

3. NEAD Chains increase the quantity AND quality of paired donation transplants compared with simultaneous exchanges.

4. The longest "bridge donor" donated after a 10 month wait.

5. No bridge donor has reneged.

Figure 2. Consequences of a Donor's Reneging in a Conventional Paired Donation and in a Nonsimultaneous, Extended, Altruistic-Donor Chain. Reneging in a conventional two-way paired donation (Panel A) permanently harms Pair 2 because the recipient in that pair does not receive a kidney and has lost the opportunity to participate in a future paired donation. Reneging in a paired donation that is part of a nonsimultaneous, extended, altruistic donor (NEAD) chain (Panel B) does not permanently harm Pair 2, since the donor in that pair has not yet donated a kidney, and the pair can be matched again. In this example, squares are compatible with squares but not with circles, and circles are compatible with circles but not with squares. A black arrow represents a donation by a living donor, a broken red arrow represents reneging on a donation, and the red X represents a donor who has donated a kidney and is no longer able to help the recipient in their pair through paired donation. AD denotes altruistic donor, D donor, and R recipient.

Figure 2. Feasible Matches in a Conventional Paired Donation and in a Nonsimultaneous, Extended, Altruistic-Donor Chain. Panel A shows feasible matches for the donor in incompatible pair 1 (solid arrows), which are ranked according to the quality of the match. Only the donor in incompatible pair 4 is able to donate a kidney to the recipient in incompatible pair 1 (broken arrow). Panel B shows all feasible matches for the donor in incompatible pair 4 (arrows), ranked according to the quality of the match. When potential transplantations are limited to conventional two-way paired donations, the only feasible match in this pool is between pairs 1 and 4, but this match is actually the least desirable match for their donors among the pool of potential recipients. Panel C shows how an altruistic donor can start a chain of transplantations in which every donor is matched to the recipient for whom that donor provides the maximum benefit. AD denotes altruistic donor, and BD bridge donor.