

# **National Kidney Registry**

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Facilitating Living Donor Transplants

## **Mt Sinai University Hospital Grand Rounds**

**June 2008**

*Version 2.2*

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# Long Term Outcomes of Transplants

*Disappointing*

“Despite recent advances in the field of transplantation, the long-term outcome of transplantation continues to be disappointing.... long-term kidney transplant survival rates have remained largely **unchanged** over the past 20 years.”

*Dr. Paul Terasaki - Clinical Transplants 2006*

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# A New Approach

Kidney transplants made possible through paired exchanges have facilitated over 300 transplants since the first recorded paired exchange was performed in 2000. Donor chains are a new approach to paired exchanges that have the potential to revolutionize living donor transplants, saving/improving thousands of lives, reducing health care costs by \$55 billion dollars over the next 10 years and extending long-term graft survival rates.

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# Background - National Kidney Registry

- Non-Profit 501(c)3 Corporation
- Formed May 2007
- Web Site Live September 2007
- BestMatch Completed December 2007
- Supported by \$350,000 in Donations
- First Triple Swap Completed February 2008

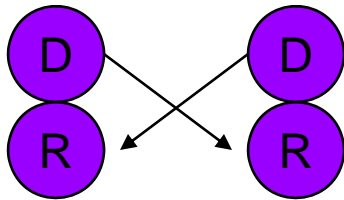
# Participating Transplant Centers

California	
UCLA Medical Center	Los Angeles
New Jersey	
Our Lady of Lourdes	Camden
Hackensack University Medical Center	Hackensack
St. Barnabas Medical Center	Livingston
Beth Israel Medical Center	Newark
New York	
Montifiore Medical Center	Bronx
N.Y. Presbyterian Hospital – Cornell	New York
Mount Sinai Medical Center	New York
N.Y. Presbyterian Hospital - Columbia	New York
Ohio	
Ohio State University Medical Center	Columbus

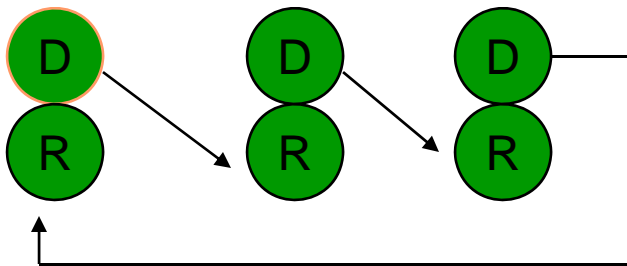
# The Evolution of Paired Exchange

## Traditional Paired Exchange

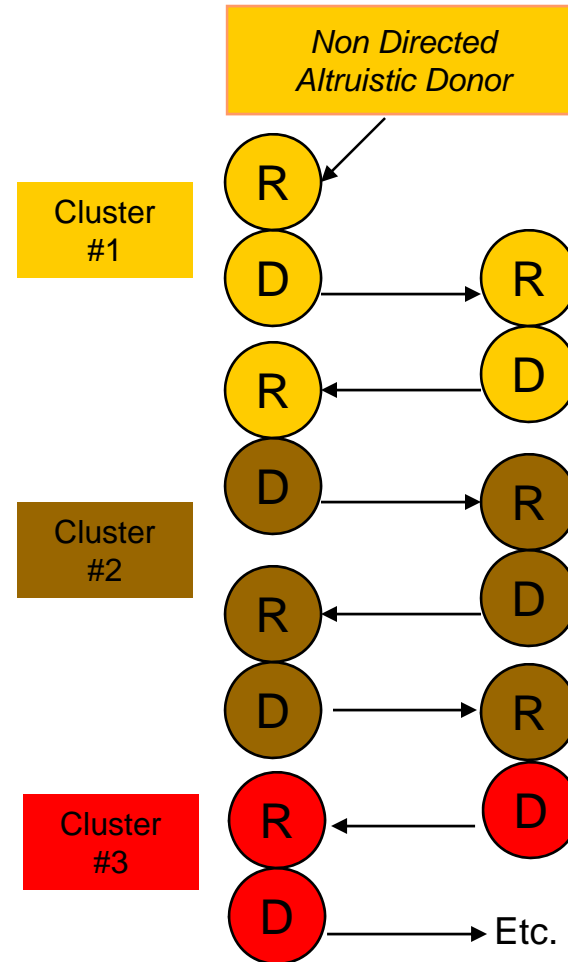
*Two Pair Exchange*



*Three Pair Exchange*



## Donor Chain



# Why Do Donor Chains Find More Matches?

*and why are they higher quality matches?*

## Traditional Paired Exchange

## Donor Chains

ABO PRA PROBABILITY  
 40% x 25% = 10%

Donor Chains Stop Here  
 At A 10% Probability



ABO PRA PROBABILITY  
 40% x 25% = 10%

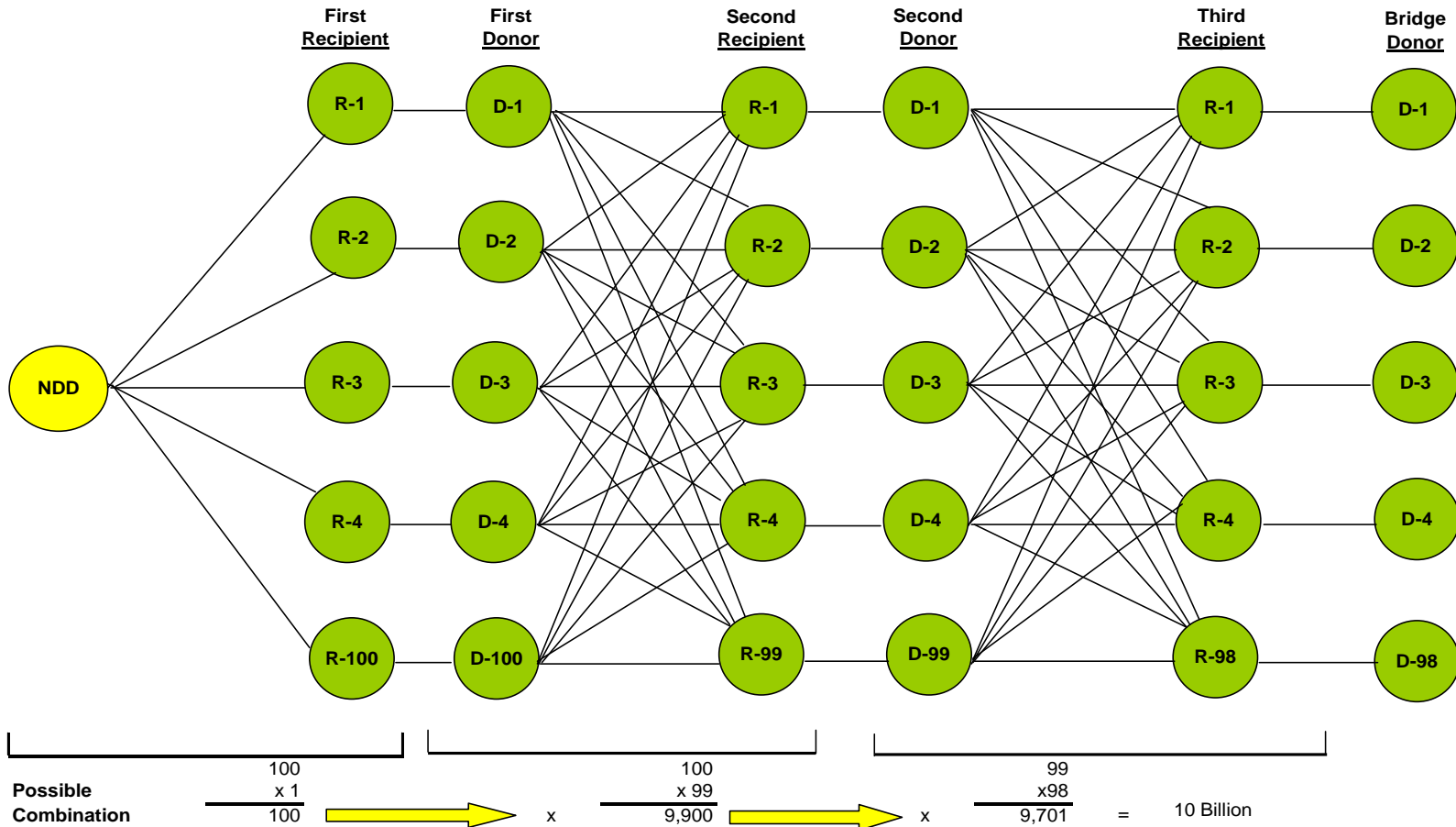
Donor Chains Have a 10x Better Chance  
 of Finding A Match And...



Donor Chains Have a 10x + Better Chance  
 Of Finding a Higher Quality Match

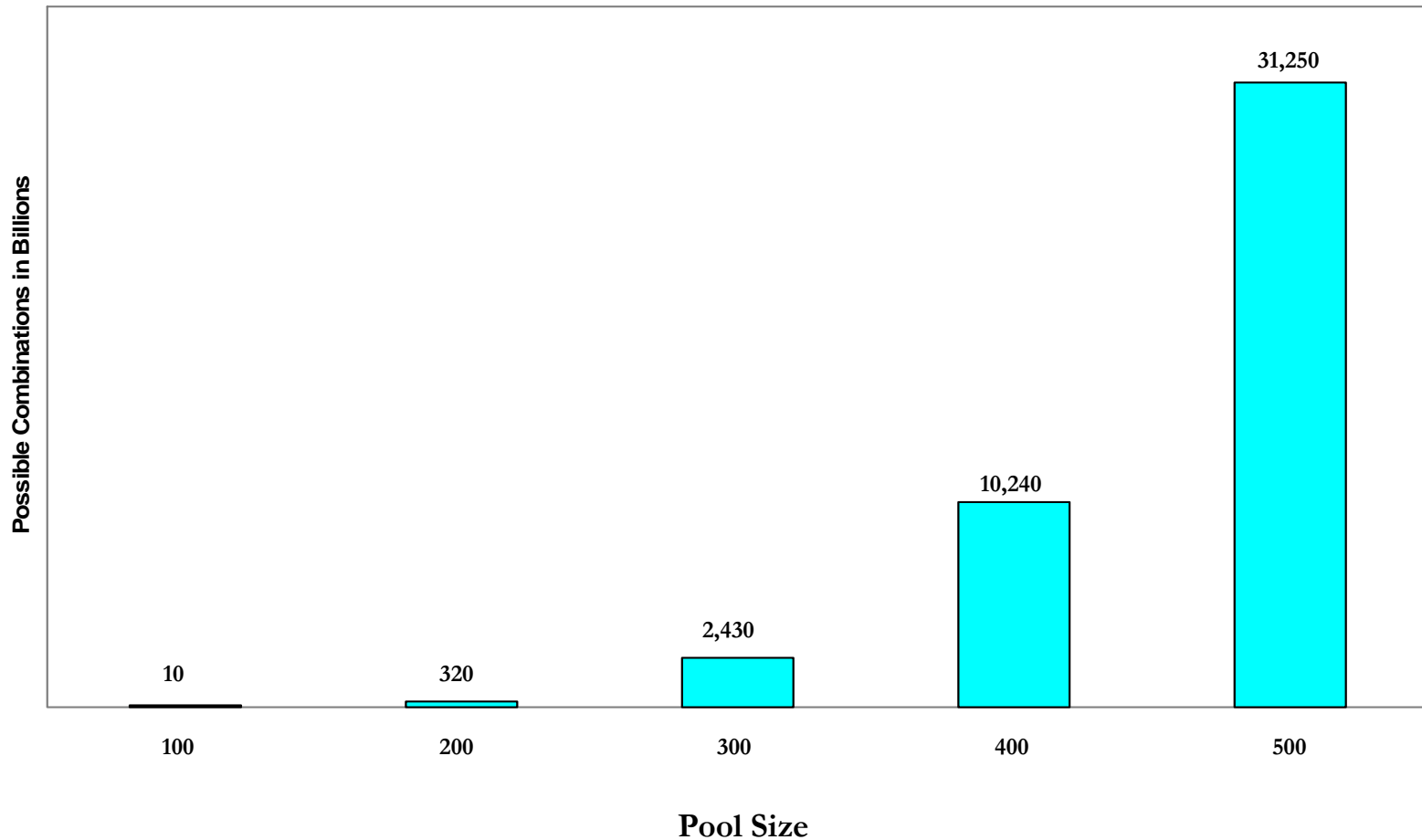
GIVE TO GET BACK MATCH PROBABILITY  
 10% x 10% = 1%

# The Power of Many-To-Many Combinations



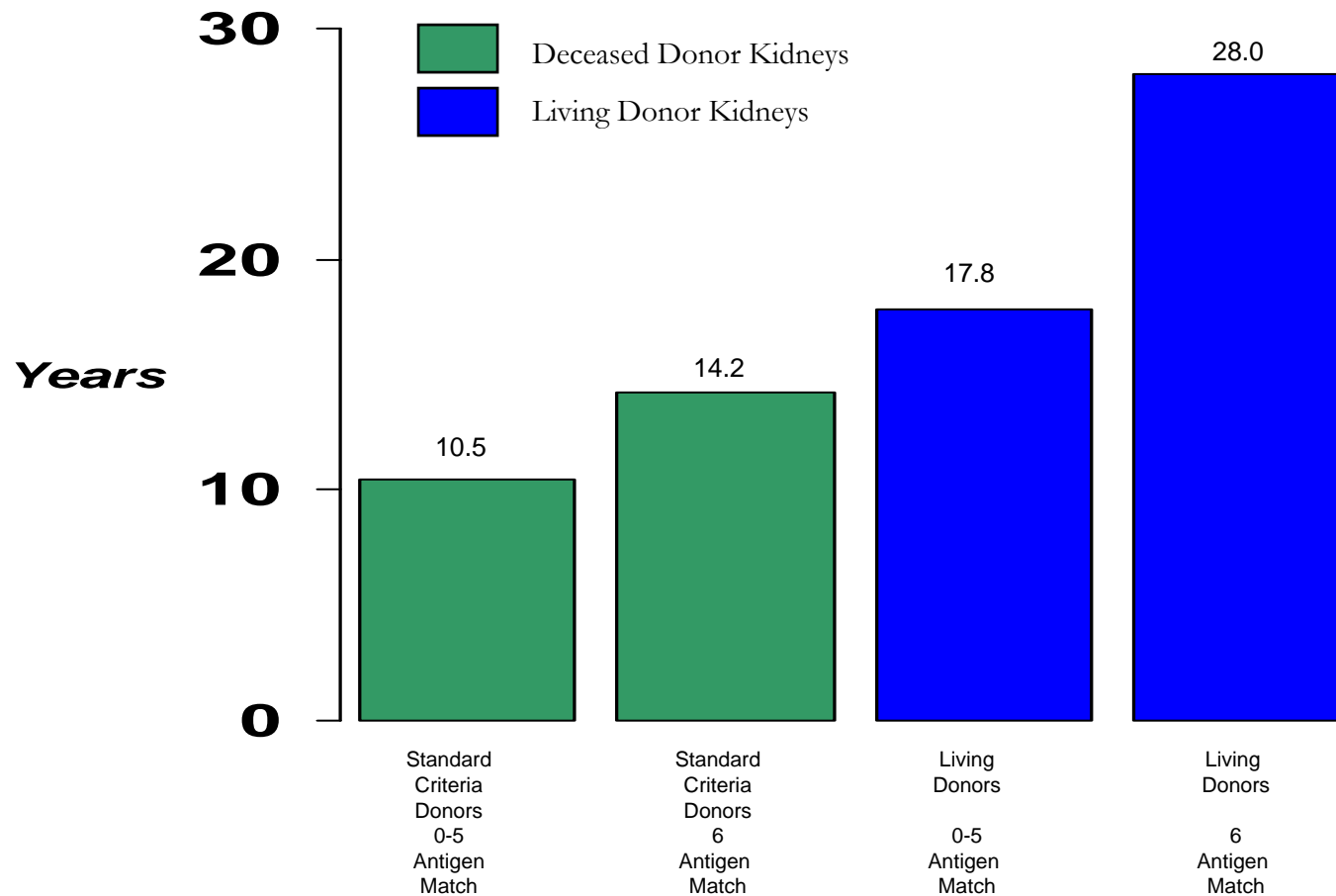
# Bigger Pool = More Combinations

*Combinations Increase Geometrically*



# Graft Half Life

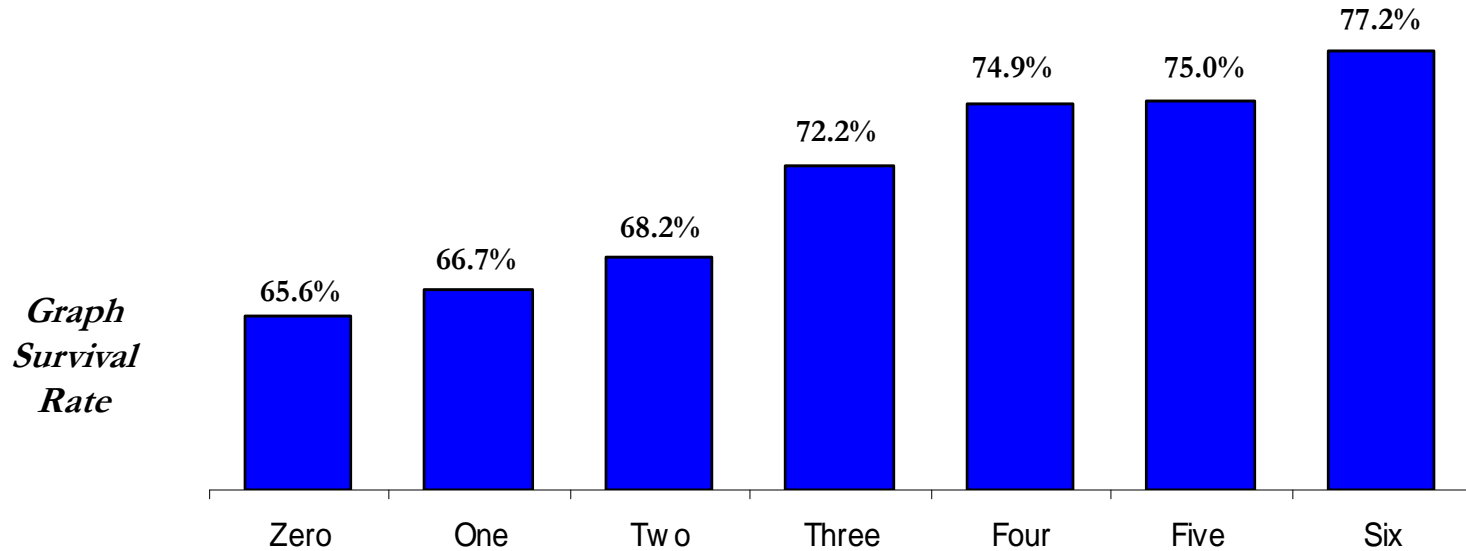
*The Point In Time When Exactly 50% Of The Kidneys Are Still Functioning*



*Source: Clinical Transplants 2005*

# Antigen Match Benefit

## *5 Year Graft Survival Rates*

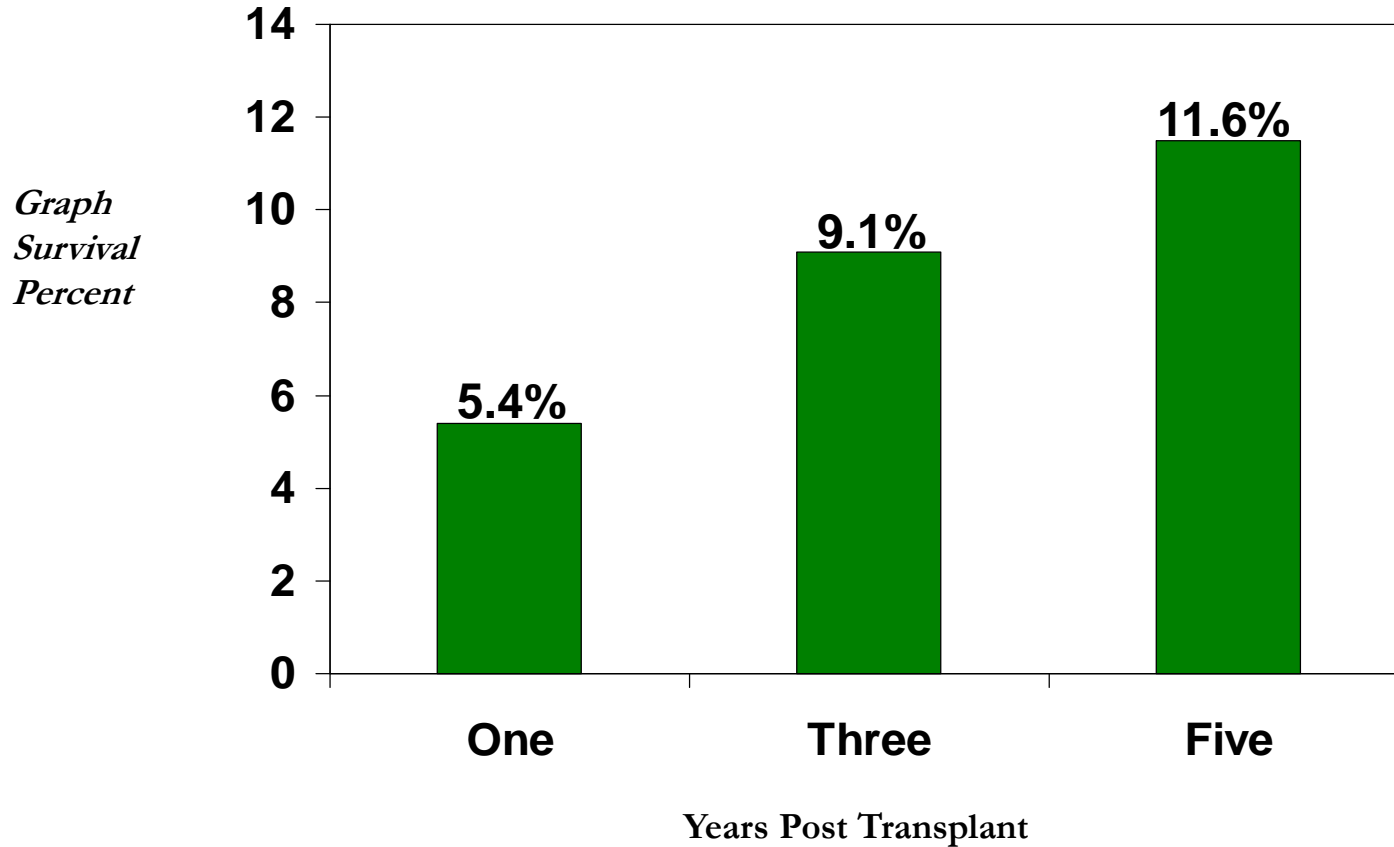


**Donor Recipient Antigen Match**

*Source: Based on OPTN data as of June 13, 2008*

# Advantages of a Perfect Match

*Advantages Increase Over Time (Perfect Match vs. Zero Match)*



*Source: Based on OPTN data as of June 13, 2008*

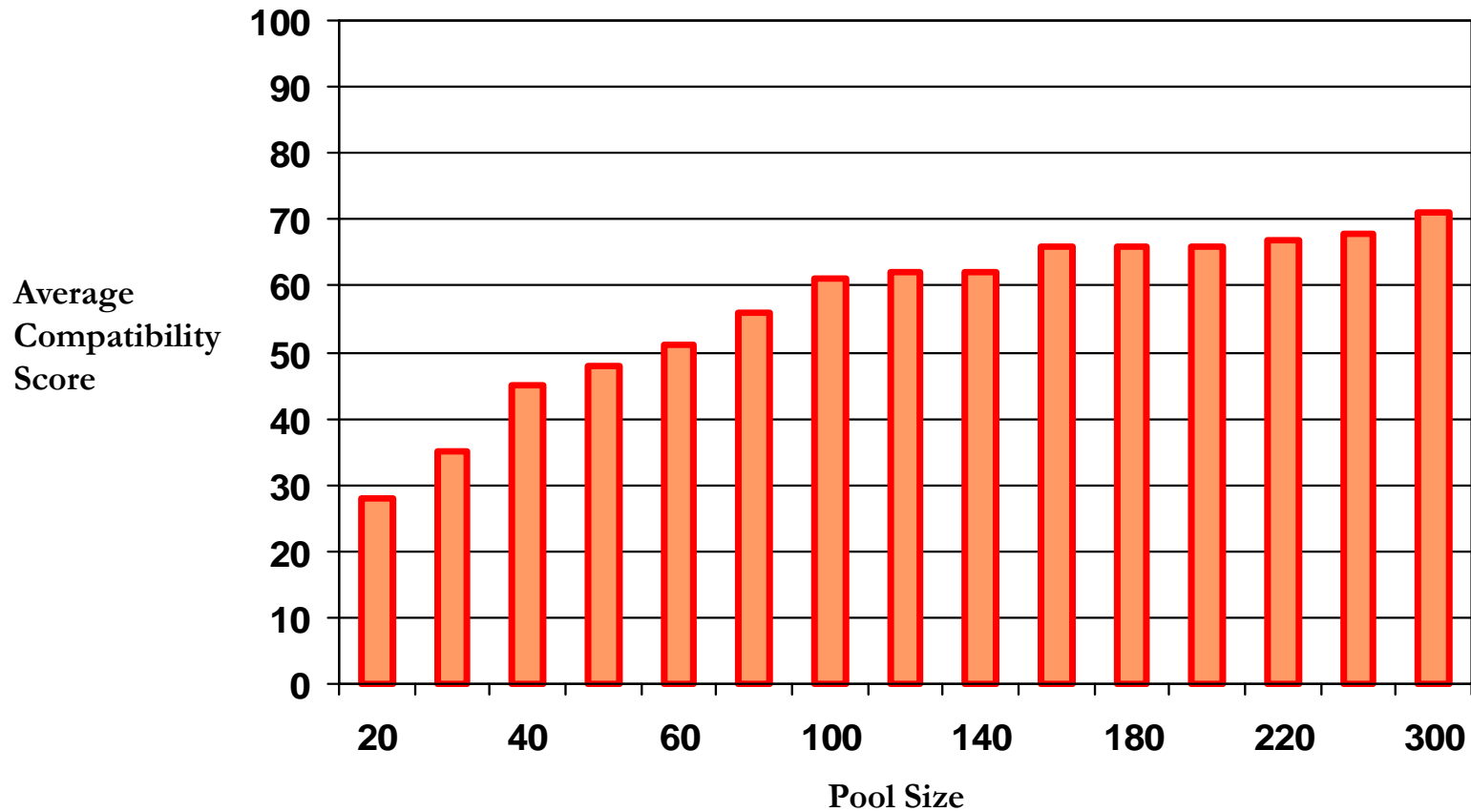
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# Large Scale Simulations

Sample Size	1,923
Data Elements	HLA & Blood Type
Provided By	Rogosin Lab/Cornell University Hospital
Time Period	1999 - 2007

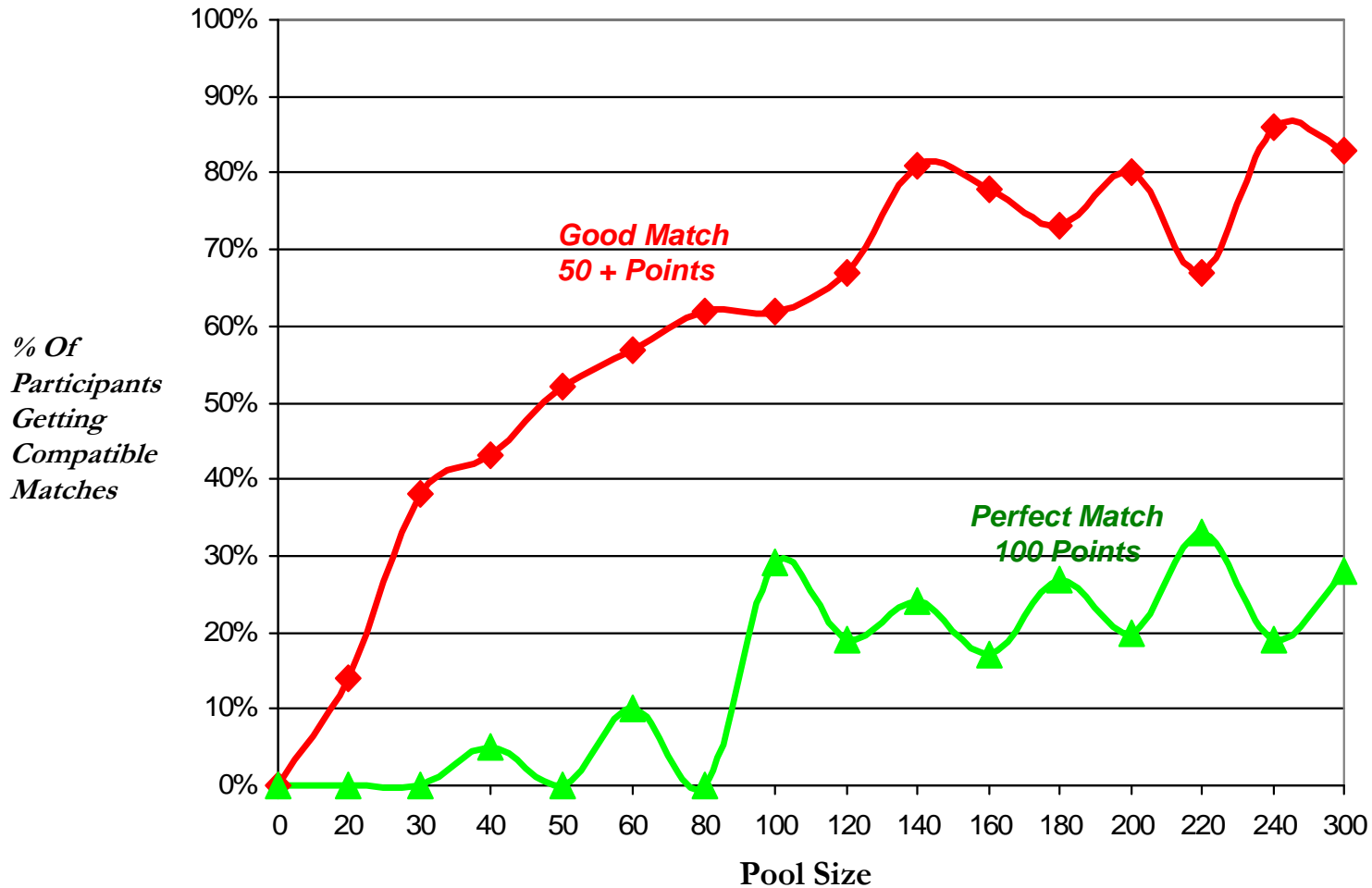
# Antigen Match Quality

*Match quality improves with pool size*



# Pool Size vs Quality

*The larger the pool the better the HLA match*



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# Results From All-In Match Runs

*Finding Perfect Matches between Strangers*

## Inputs

- 190 Recipients
- 326 Paired Donors
- 1 Non-Directed Donor
- 7 Transplant Centers

## Outputs

- 5 Match Runs
- 73% HLA Score > 50 Points
- 70 Average HLA Match Points
- **33% Perfect Matches**

# Profile of Transplants Identified

Cluster	Transplant	Donor Blood	Recipient Blood	HLA Match Score	Matching Antigens
1	1	O	A	40	1A,2B
	2	A	A	75	1A 1B 2DR
	3	A	A	100	2A,2B,2DR
2	1	O	A	35	1A,1DR
	2	A	A	75	1A,1B,2DR
	3	O	O	100	2A,2B,2DR
3	1	O	O	50	2DR
	2	O	O	60	2A,1B,1DR
	3	O	A	100	2A,2B,2DR
4	1	O	O	45	2A,1DR
	2	O	A	60	1A,2DR
	3	O	O	100	2A,2B,2DR
5	1	O	B	65	1B,2DR
	2	O	O	45	2A,1DR
	3	B	B	100	2A,2B,2DR
<b>Avg HLA Match Score</b>				<b>70</b>	

# Current State Living Donor Transplants

Antigen Match	2005 Transplants SRTR	Percent of Total	5-year Graft Survival OPTN	Graft Survival Delta	Adjusted Delta	Graft Half Life Terasaki + estimate	Extension
6	438	6.9%	77.2%	0		28.00	12,264
5	403	6.4%	75.0%	2.2%	4.42	20.62	8,310
4	1,185	18.7%	74.9%	2.3%	4.42	20.62	24,435
3	1,866	29.4%	72.2%	5.0%	2.60	18.80	35,081
2	873	13.8%	68.2%	9.0%	-	16.20	14,143
1	1,045	16.5%	66.7%	10.5%	(0.91)	15.29	15,978
0	534	8.4%	65.6%	11.6%	(1.63)	14.58	7,783
<b>Total</b>	<b>6,344</b>						<b>117,993</b>

# Future State Living Donor Transplants

*Creating 100,000 + Kidney Life-Years*

Antigen Match	Legacy Transplants	Upgrade Transplants	Net New Transplants	Total Transplants	Percent of Total	Graft Half Life	Extension
6	438	1,407	1,200	3,045	29.4%	28.00	85,266
5	403	1,407	1,200	3,010	29.1%	20.62	62,070
4	1,185	704	800	2,689	26.0%	20.62	55,439
3	200	-	200	400	3.9%	18.80	7,520
2	200	-	200	400	3.9%	16.20	6,480
1	200	-	200	400	3.9%	15.29	6,116
0	200	-	200	400	3.9%	14.58	5,830
<b>Total</b>	<b>2,826</b>	<b>3,518</b>	<b>4,000</b>	<b>10,344</b>			<b>228,721</b>

# Creating One Million Kidney Life Years

*and Saving 55 Billion Dollars and Thousands of Lives*

Future Profile Kidney Life Years	228,721
Current Profile	- 117,993
Additional Kidney Life Years	110,728
Measurement Period	x 10 Years
Additional Kidney Life Years	<b>1,107,280</b>
Savings Per Life Year	x \$50,000
Total Savings	<b>\$55 Billion</b>