



# Single Center Programs Work Best

Adam Bingaman, MD, PhD  
Methodist Specialty and Transplant Hospital,  
San Antonio

---



CUTTING EDGE OF  
TRANSPLANTATION

AST | AMERICAN SOCIETY OF  
TRANSPLANTATION

**RESOLVING THE ORGAN SHORTAGE**



PRACTICE |



POLICY |



POLITICS

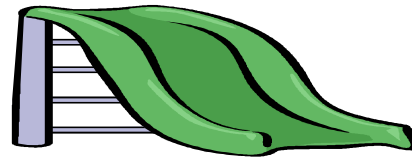
FEBRUARY 25-27, 2016 • PHOENIX, ARIZONA

# Conflict of Interest Disclosure

- **I have no relevant financial relationships to disclose.**
- **No off-label use discussion**

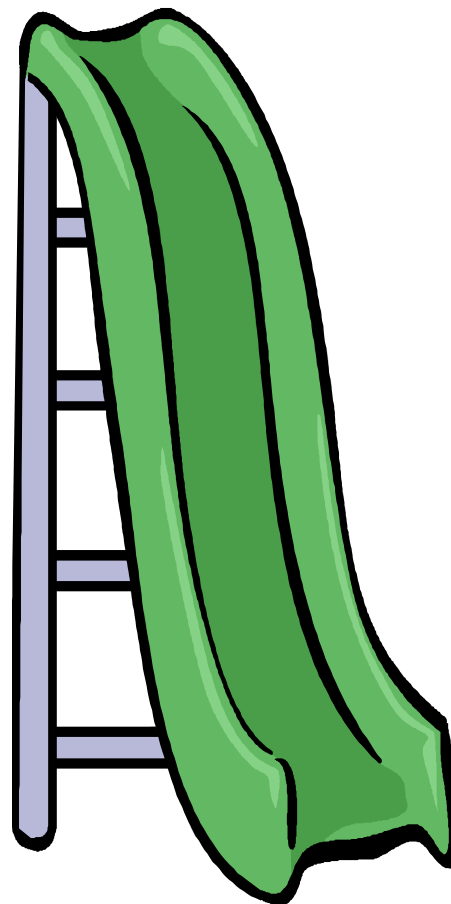
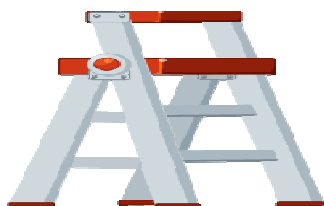
**All of the data presented is from  
Methodist Specialty and Transplant  
Hospital, San Antonio or is data  
from UNOS**

**What is the climb:slide ratio  
for kidney paired donation???**





**What is the climb:slide ratio  
for kidney paired donation???**



# **What are we DOING in KPD??**

**Need to move from analysis of ...**

**2008**

**Simulation Data**

**Opinions**

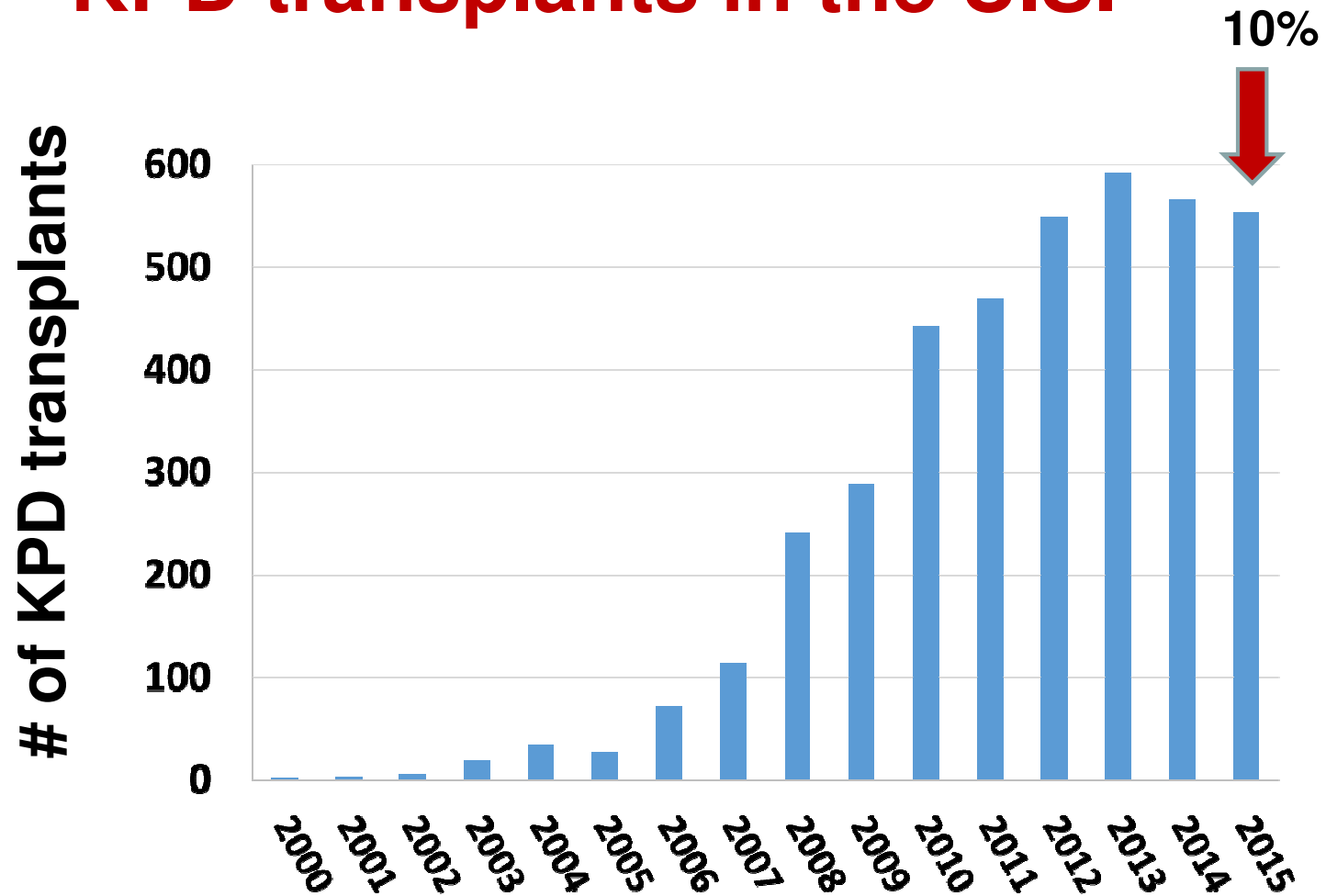
**2016**

**Real Data**

**Facts**



# KPD transplants in the U.S.



# KPD transplants in the United States

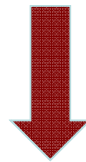
*KPD transplants are clustered*

## KPD transplants 2014

|       |             |
|-------|-------------|
| 0     | 140 centers |
| 1     | 29 centers  |
| 2     | 20 centers  |
| 3-5   | 26 centers  |
| 6-10  | 15 centers  |
| 11-20 | 10 centers  |
| 21-30 | 4 centers   |
| >40   | 1 center    |

## **Challenge ... shift in focus**

**Doing KPD transplants**



**Maximizing KPD transplants**

- **How does your program match up?**
- **Can you do more?**

**Need to identify and overcome the barriers!**

# **Barriers to kidney paired donation**

***Which does your center face?***

- **Logistical**
  - Financial
  - Staff
  - Education / Consent processes
  - Teamwork
  - Matching software
- **Immunologic**
  - Donor related
  - Recipient related

# How do you choose a KPD program?

*Establishment candidate?*

National Private (NKR)  
UNOS



*Outsider candidate?*

Single Center



# How do you choose?

*Outsider or Establishment candidate?*

Can you do it yourself?

~~– Small program~~

~~– Don't have the time or expertise~~

– Medium / Large program

– Great HLA support

– KPD support / time



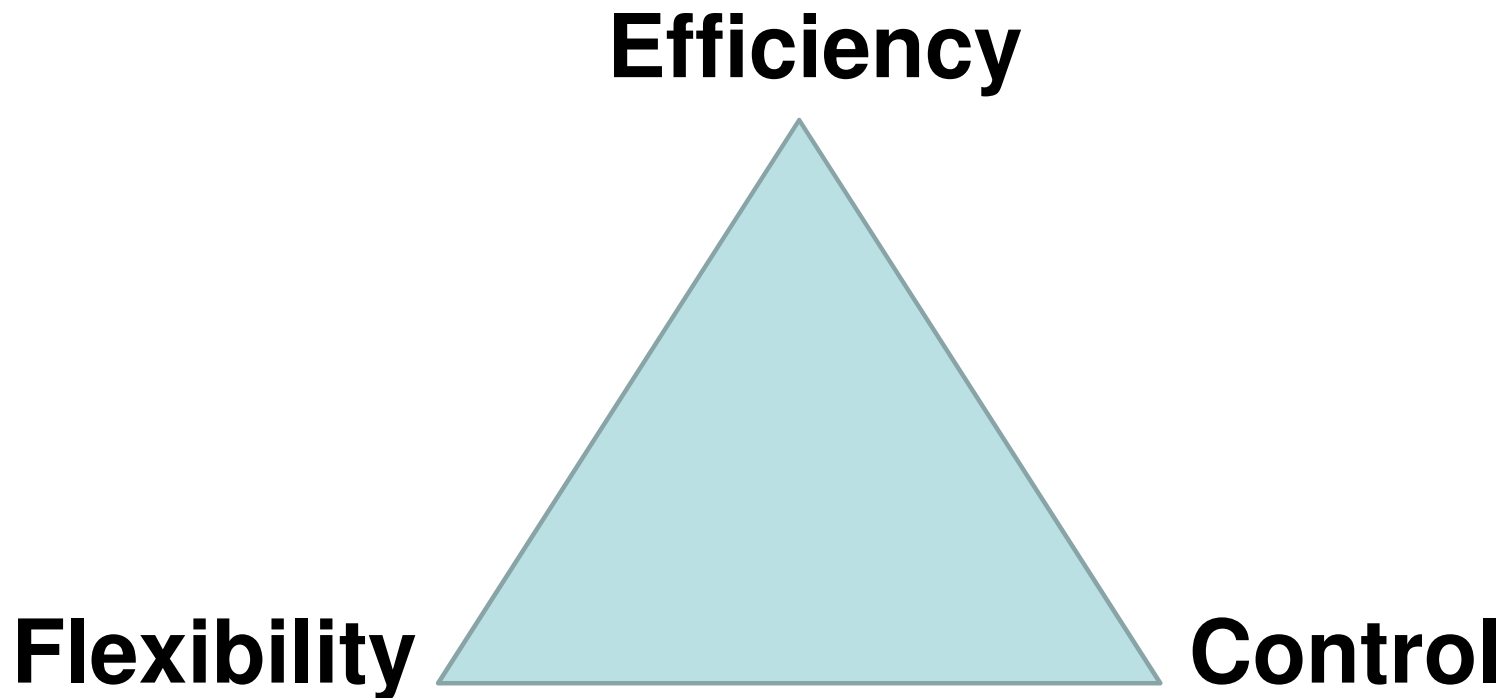
**Other  
program**





# Why run a single center KPD program?

*It's all about the triangle ...*



# Efficiency!

**Education and consent for evaluation / KPD**



**Incompatible crossmatch result**

**Entrance into single  
center KPD database**



**Crossmatches,  
Plan exchange**

**Evaluation process (4-12 weeks)**



**Transplant**

**Entrance into National KPD program database**



**Match offer / Crossmatches / Planning / Transplant**

**Control!**

***Positive “failed” crossmatches are the backbone of our program!***



**At a single center it is easy to have SUCCESSFUL FAILURES!**

## **Flexibility!**

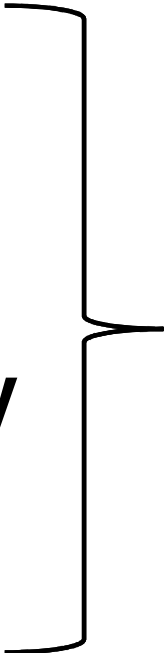
***What do the following have in common?***

**Pregnancy**

**Job loss**

**Sickness in the family**

**A wild boar**



**All have  
screwed up  
planned  
KPD  
transplants!**

# **Maximizing KPD transplants...**

## ***TIME IS AGAINST US!***

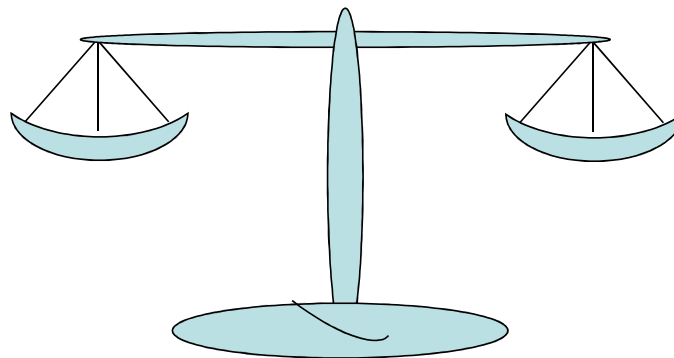
- **Donor issues**
  - Family circumstances
  - Job circumstances
- **Recipient issues**
  - Need a cardiac stent
  - Infected
  - Open wound
  - Death

**To maximize KPD transplants you must ...**

***Keep an effective pace!***

***No effective KPD program moves slowly!***

**Talking  
Analyzing  
Planning**

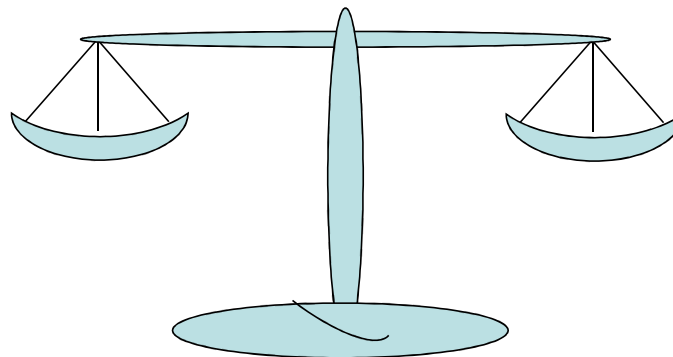


**DOING!**

**To maximize KPD transplants you must ...**

***Keep the conference call to transplant ratio favorable!!!***

**Conference  
calls**



**TRANSPLANTS!**

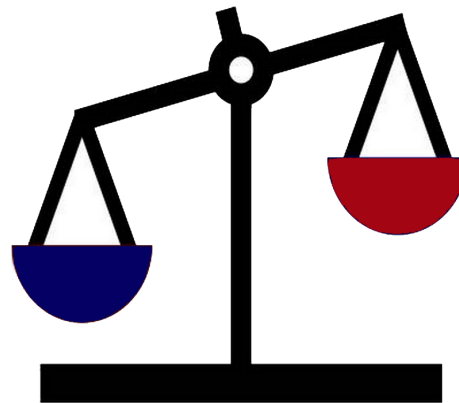


***Keep the conference call to  
transplant ratio favorable!!!***

**Establishment Candidate Ratio**



**Conference  
calls**



**TRANSPLANTS!**

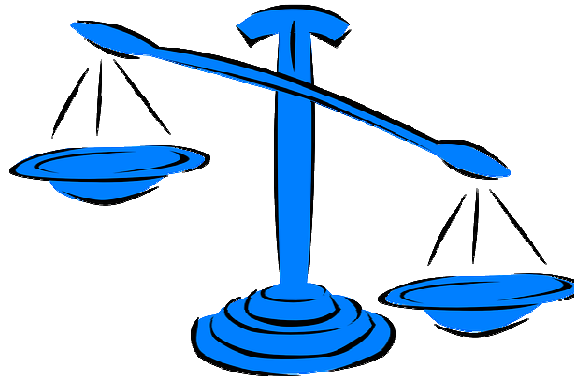


***Keep the conference call to  
transplant ratio favorable!!!***

**Single Center Ratio!**

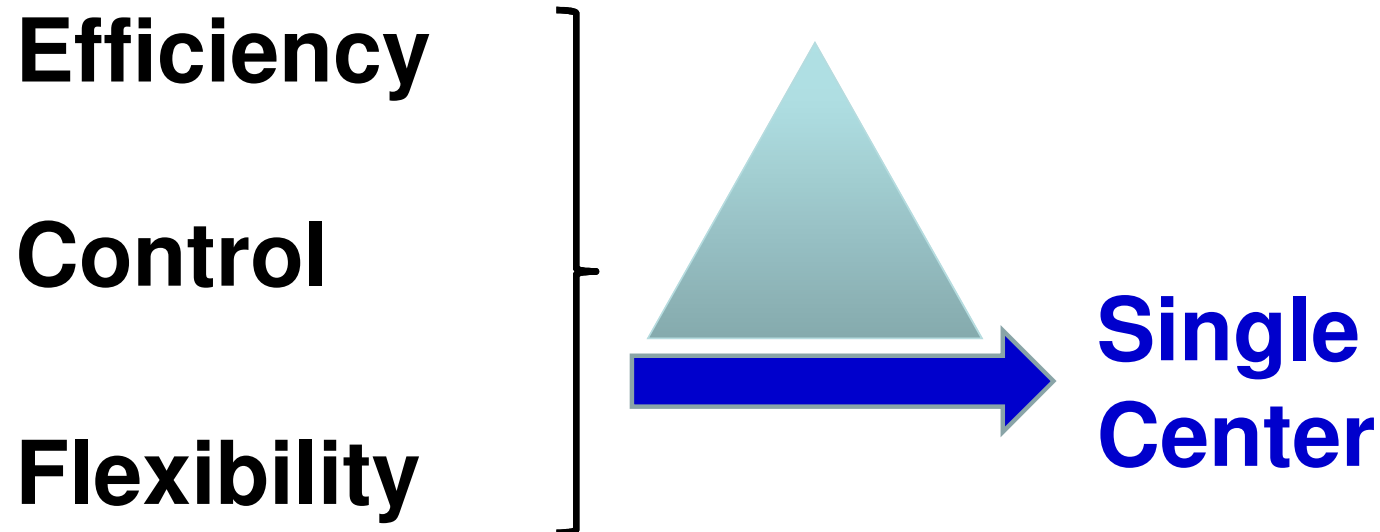


**Conference  
calls**



**TRANSPLANTS!**

**So we all agree ... Right?**



**... But what are we DOING?**

## **Methodist San Antonio KPD**

**Private practice hospital, 300 beds / 12 ORs  
... 2.2M metroplex - 28<sup>th</sup> largest market**

- **No** hospital financial support for KPD
- **No** fellows, **no** residents, **no** NPs, **no** PAs
- **No** in house HLA laboratory
- **Free KPD software** program obtained from Johns Hopkins and Dr. Ashlagi – Thank you!
- Collaboration with surgeon, HLA director and transplant coordinator

***Single center KPD requires nothing fancy***

# Single center KPD programs can DO a lot of transplants!

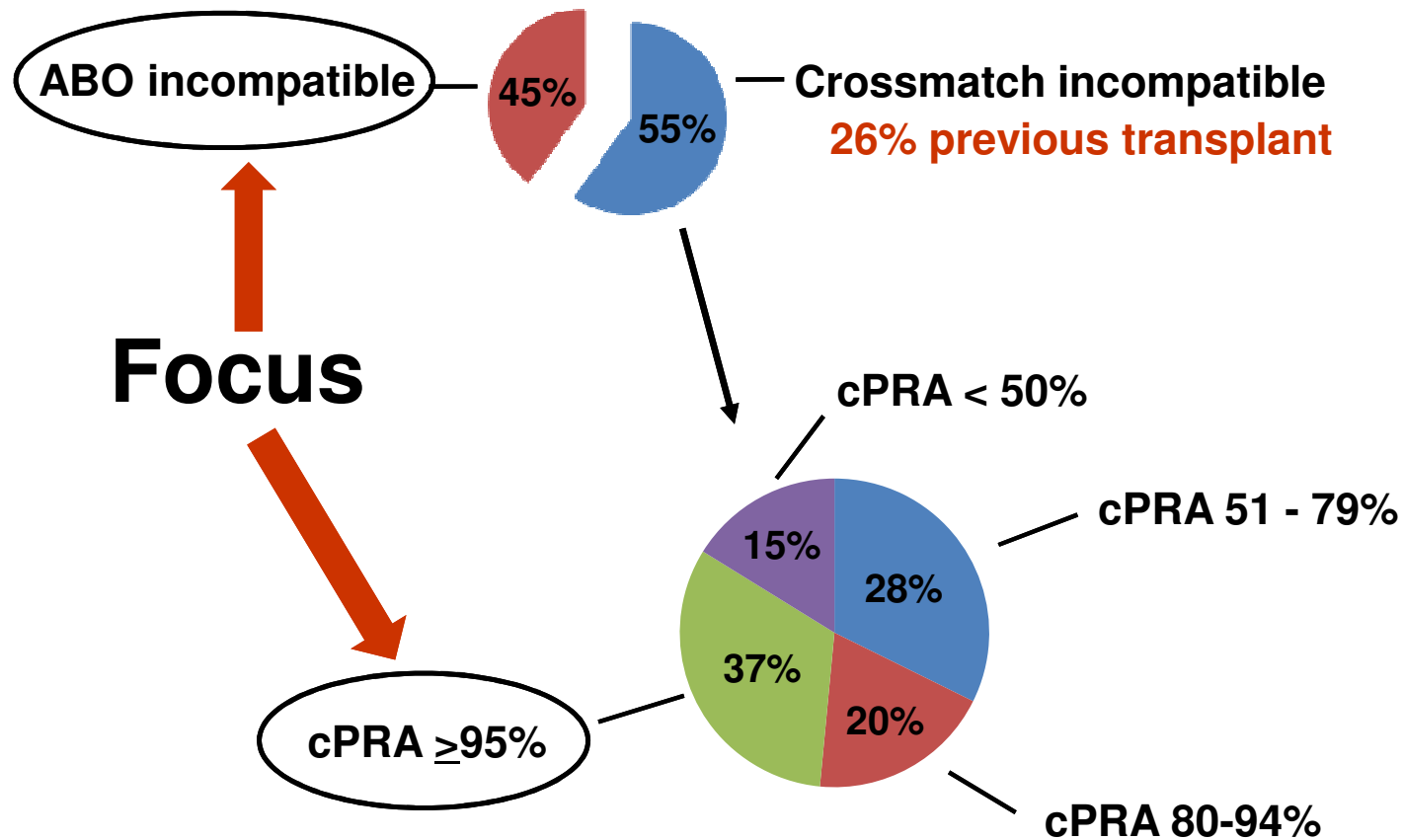
**319 KPD transplants ... 15 scheduled**

- Forty-seven 2-recipient exchanges
- Thirty-one 3-recipient exchanges
- Seven 4-recipient exchanges
- Five 5-recipient exchanges
- One 6-recipient exchange
- One 5-recipient chain
- One 6-recipient chain
- One 8-recipient chain
- One 9-recipient chain
- One 10-recipient chain
- One 12-recipient chain
- One 23-recipient chain

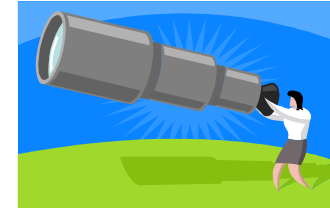


**73/319 = 23%**  
**transplanted with a**  
**non-directed donor**

# Who is Methodist San Antonio transplanting with KPD?



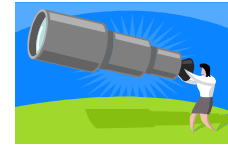
# **All effective KPD programs transplant the same pairs!**



- Recipient candidates with cPRA  $\leq 95\%$  with a blood type O donor all get transplanted with a negative crossmatch
- All A/B and B/A combinations get transplanted



# All KPD programs struggle to transplant the same pairs!



- Blood type O recipient candidates with non-O donors
- Highly sensitized recipient candidates (cPRA > 98%)

## Why?

- Blood group imbalance in the pool – not enough blood type O donors
- Competition for rare donor HLA types amongst highly sensitized recipient candidates

# **KPD in 2016 is all about transplanting difficult to match pairs!**

**Keys to success facilitated at a single  
center!**

- **Use of compatible pairs**
  - Enriched with O donors **WHICH WE NEED!**
- **Combination of KPD with desensitization**
  - Need to look for close matches for the most highly sensitized recipients!



**Why focus on compatible pairs?**

**Time is against you on dialysis**

**Does anyone have O recipient  
candidates with non-O donors  
waiting ... and waiting ... in a  
KPD database?**



**These pairs are NOT favorable!**

# What is your plan for these pairs?

- **Plan A**
  - Do you have another donor? ... Obvious ... but usually a failed plan
- **Plan B**
  - ABO incompatible transplant **BUT** must have acceptable antibody titer **AND** ABOi program!
- **Plan C**
  - Wait and hope ... I am not a fan of plan C!
- **Plan D ... A better plan!**
  - Compatible exchange!

# Use of compatible pairs in 2-way KPD for blood type incompatibility

## Recipient 1

63 year old male  
Blood type O



Incompatible

## Donor 1

32 year old male  
Blood type A1

## Recipient 2

30 year old female  
Blood type A



Compatible

## Donor 2

60 year old male  
Blood type O

***All centers, including small centers, should be using compatible pairs for O/A and O/B pairs!***

# Use of compatible pairs in KPD at Methodist San Antonio

**44 compatible pairs facilitated ...**

- 24 two-way exchanges**
- 10 three-way exchanges**
- 3 four-way exchanges**
- 2 five-way exchanges**
- 1 six-way exchange**
- 4 chains (length 10-23 recipients)**

**140 KPD  
transplants**

**All compatible recipients received  
kidneys from younger donors**

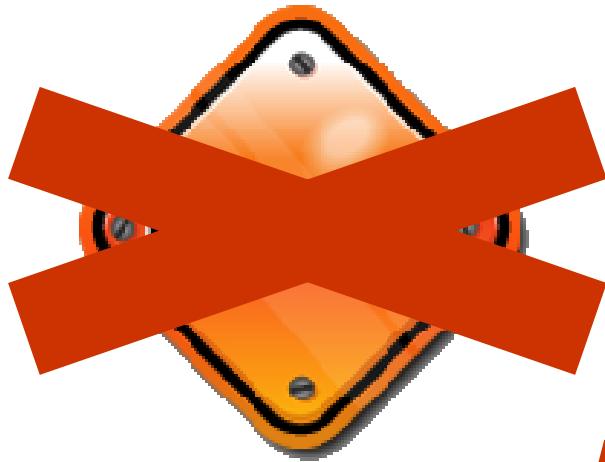
# Key concerns raised about utilization of compatible pairs in KPD!



**DO NOT WANT TO DELAY TRANSPLANTS  
FOR COMPATIBLE PAIRS!**

**DO NOT WANT TO IMPORT KIDNEYS FOR  
COMPATIBLE PAIRS!**

At a single center no delays, no imports ... **No worries!** ...



Great  
compatible  
pair we just  
used for a  
KPD  
transplant!

DO NOT WANT TO ~~USE~~ TRANSPLANTS  
FOR COMPATIBLE PAIRS!

DO NOT WANT TO ~~USE~~ KIDNEYS FOR  
COMPATIBLE PAIRS!

**Why focus on the most highly sensitized recipients?**



**Time is against you on dialysis**

**Does anyone have recipient  
candidates with a 99-100%  
cPRA waiting ... and waiting ...  
in a KPD database?**



**These pairs are NOT favorable!**

**What is your plan for these pairs?**

**The goal of a negative flow crossmatch with no DSA is not realistic for all recipients!**

**CAVEAT!**

**The era of HIGH immunologic RISK transplants is OVER!**

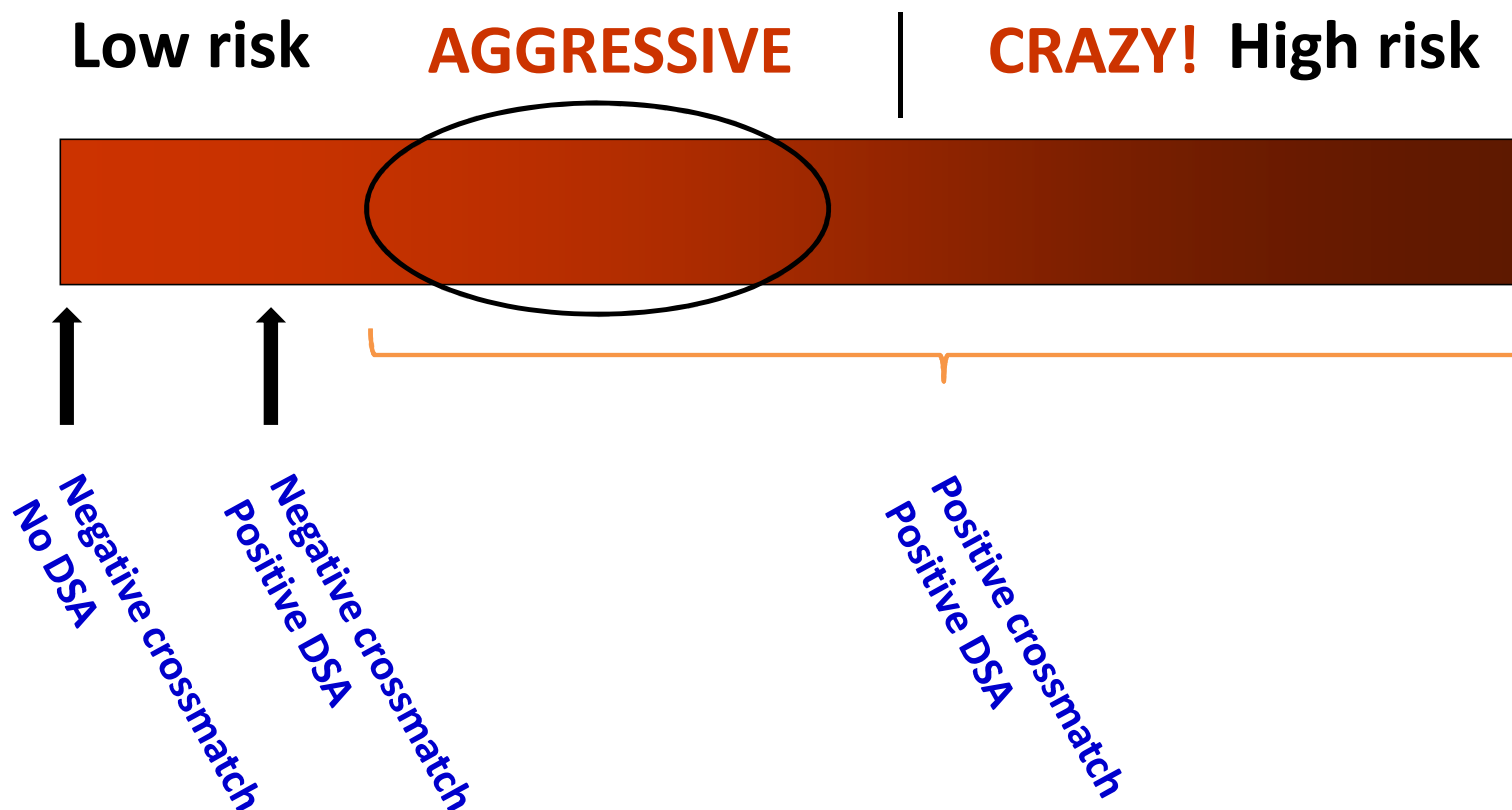
## Philosophy of risk ... look to Sun Tzu for wisdom



"Victorious warriors win first and then go to war, while defeated warriors go to war first and then seek to win." - Sun Tzu

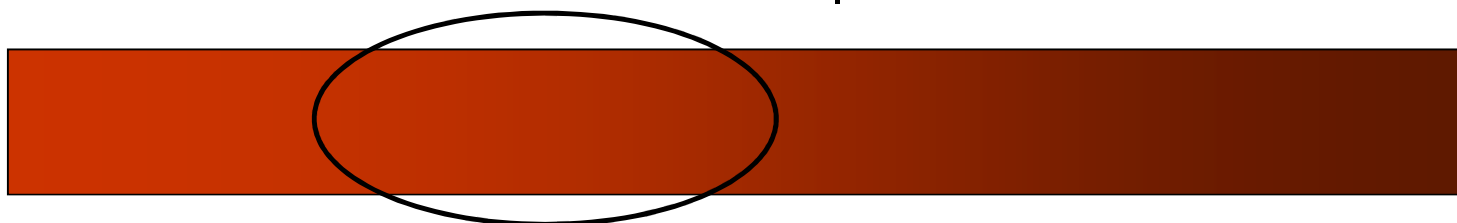
To transplant the most highly sensitized ...

... we need to move into the gray zone ...



# Choose your risk!

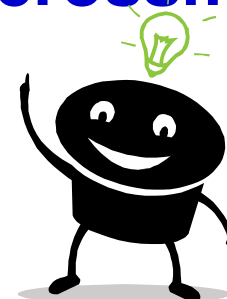
Low risk   **AGGRESSIVE**   |   **CRAZY!**   High risk



**Low risk DSA**

**Weak or moderately positive flow crossmatch**

**How do we do  
this?!**



# **Strategies to manage immunologic risk in the most highly sensitized**

***YOU MUST CHOOSE A LOW RISK DONOR!***

***STEP 1: UNDER-ASSIGN UNACCEPTABLES!***

- **Favorable DSA loci (C,DRw,DP,DQ)**
- **Low level DSA that titers down**

***STEP 2: EXPLORATORY CROSSMATCH!***

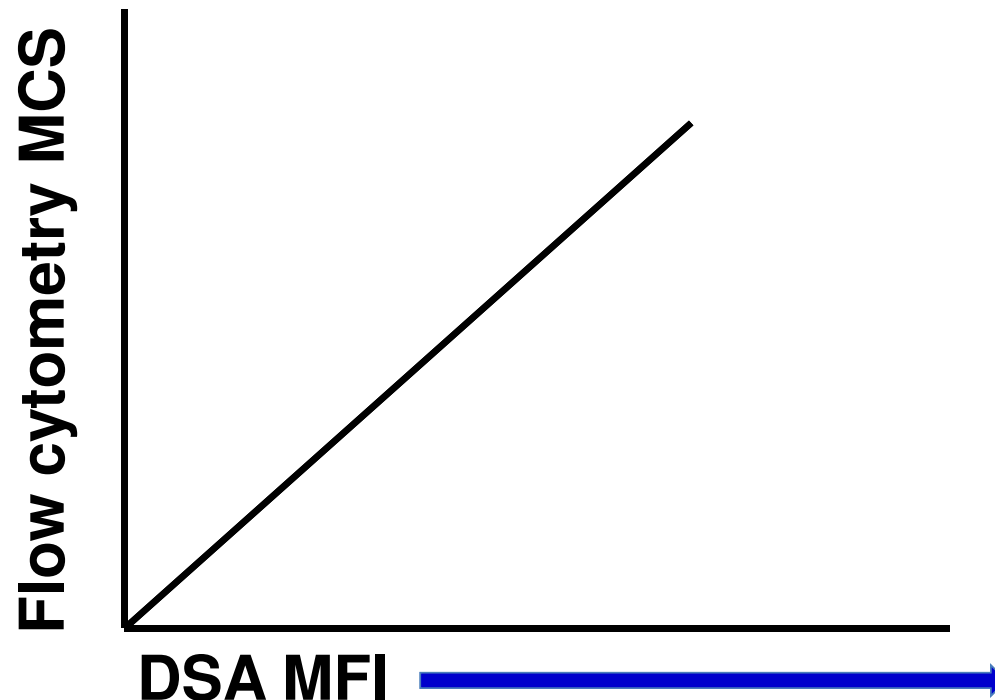
**Weak or moderately positive flow crossmatch that titers down**

***STEP 3: ASK YOURSELF ...***

***Is this as good as it gets?!***

The idea that DSA MFI *reliably* correlates with crossmatch results is **FALSE!**

*This relationship is not strictly linear... especially for the most highly sensitized patients!*



**The idea that DSA MFI *reliably* correlates with crossmatch results is FALSE!**

***Why?***

- There are not beads available for every allele
- Antigen bead density can vary
- Unreliable “cumulative effect” of multiple DSAs
- Prozone effect
- Lower antigen expression of C and DP on donor cells
- DSA against homozygous HLA ? Double dose
- Non-HLA antibody



If you have never had a failed positive crossmatch then you are not transplanting enough highly sensitized patients ...

... you can't be right all the time!

**“The key to success is to double your failure rate”**

**- Henry Ford**

**When your crossmatch fails with  
an establishment candidate ...**

**Conference call!**



**When you fail at a single center,  
SO WHAT???**

**Keys to FAILING SUCCESSFULLY!**

- You have learned from the failure!
- You failed quickly!
- No one else is hurt by the failure!

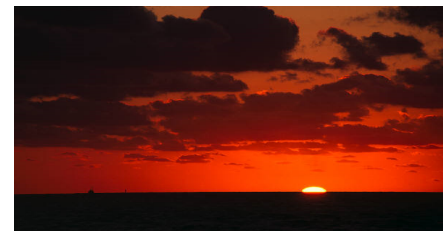
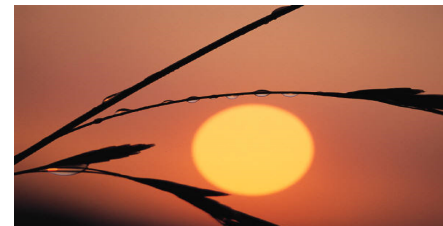


# Methodist San Antonio approach to the most highly sensitized

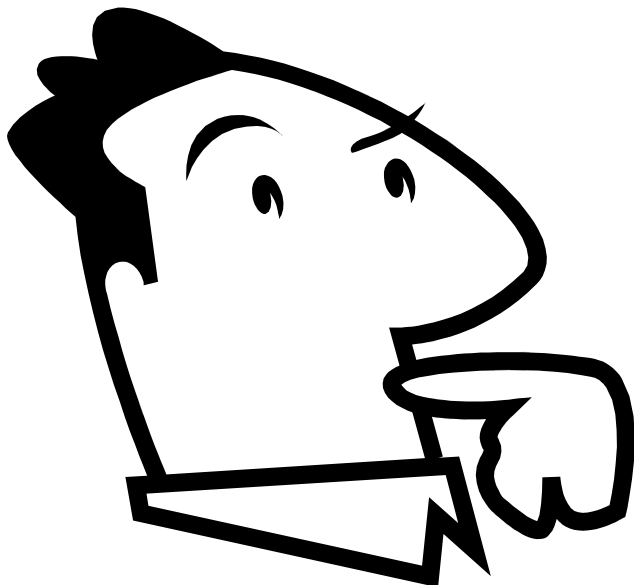
**Look for it ... Try it ... Do it!**

**“She loves me ... She loves me not ...”**

- **Look!** ... Aggressively drop off antibody in a KPD database looking for possibilities ...
- **Try!** Crossmatch promising pairs with **STORED FROZEN DONOR CELLS! ... NO DELAY!**
- **She loves me? ... TRANSPLANT!**
- **She loves me not? ... GO FISH!**

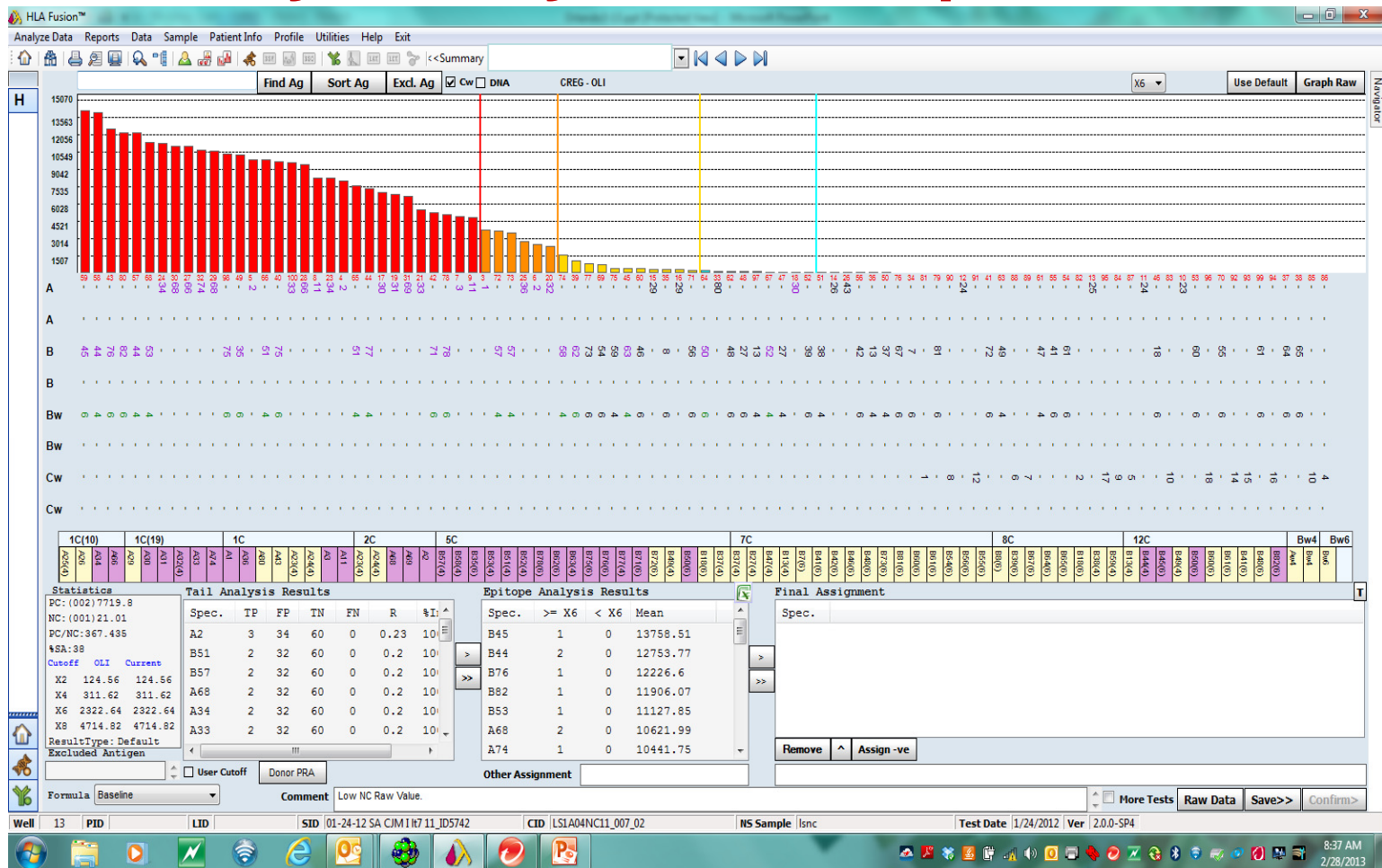


# A Game of Go Fish

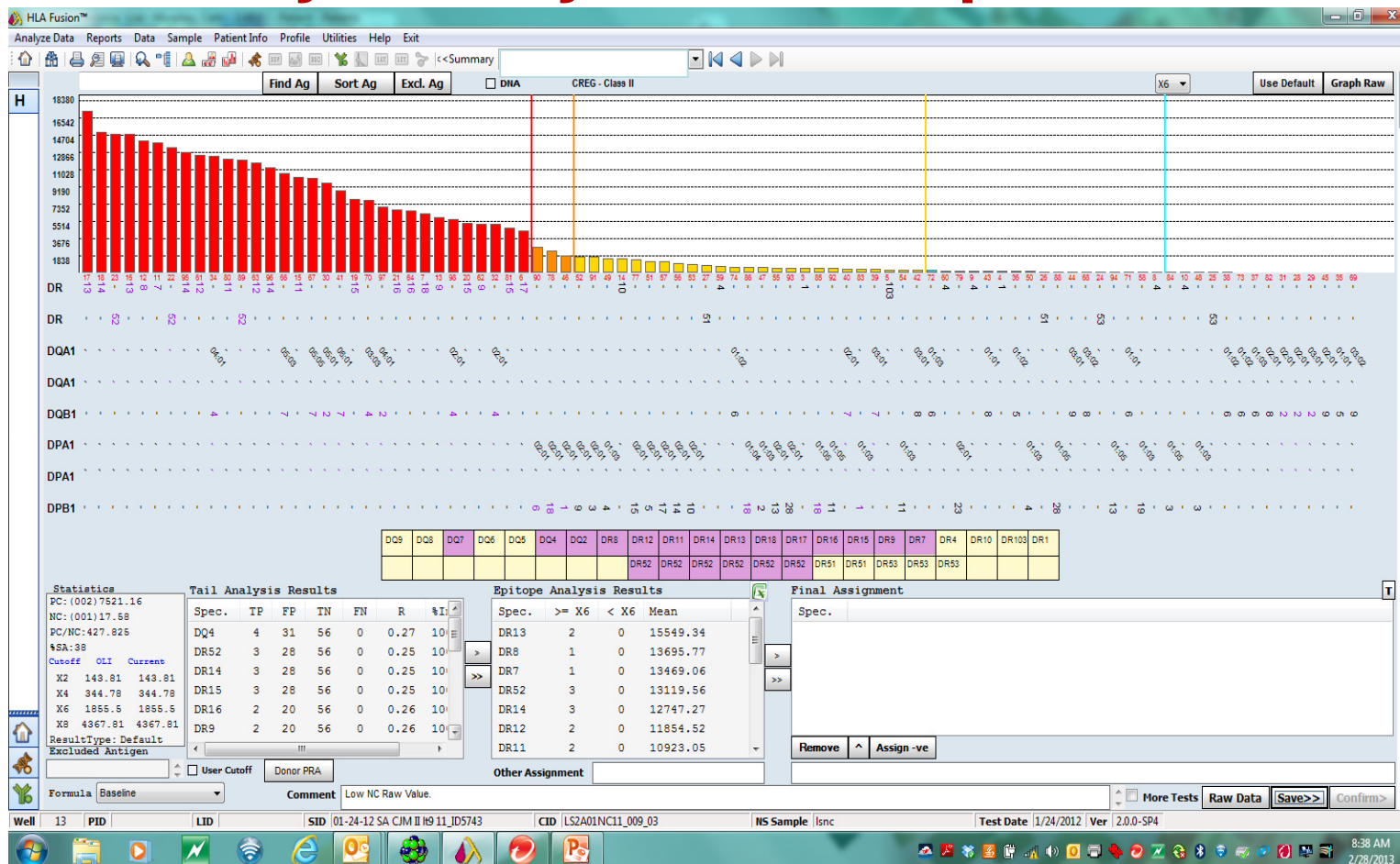


**What would  
you do?**

# 34 year old man, previous transplant, on dialysis 14 years, multiple lists



# 34 year old man, previous transplant on dialysis 14 years, multiple lists



# Need to under-assign antibody and search for a great class II match ...



HLA: A24,25 B18,4005 C10,12  
DR1,4 DRw53 DQ5,8

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,2,3,11,28,30,31,32,33,34,36,66,68,69,74

B12,17,35,44,45,51,53,57,58,71,75,76,77,78,82

DR 7,8,9,11,12,13,14,15,16,17,18 DRw52 DQ 2,4,7



KPD Donor: A2,29 B56,61 C1,8  
DR1,4 DRw53 DQ5,8  
Blood type O

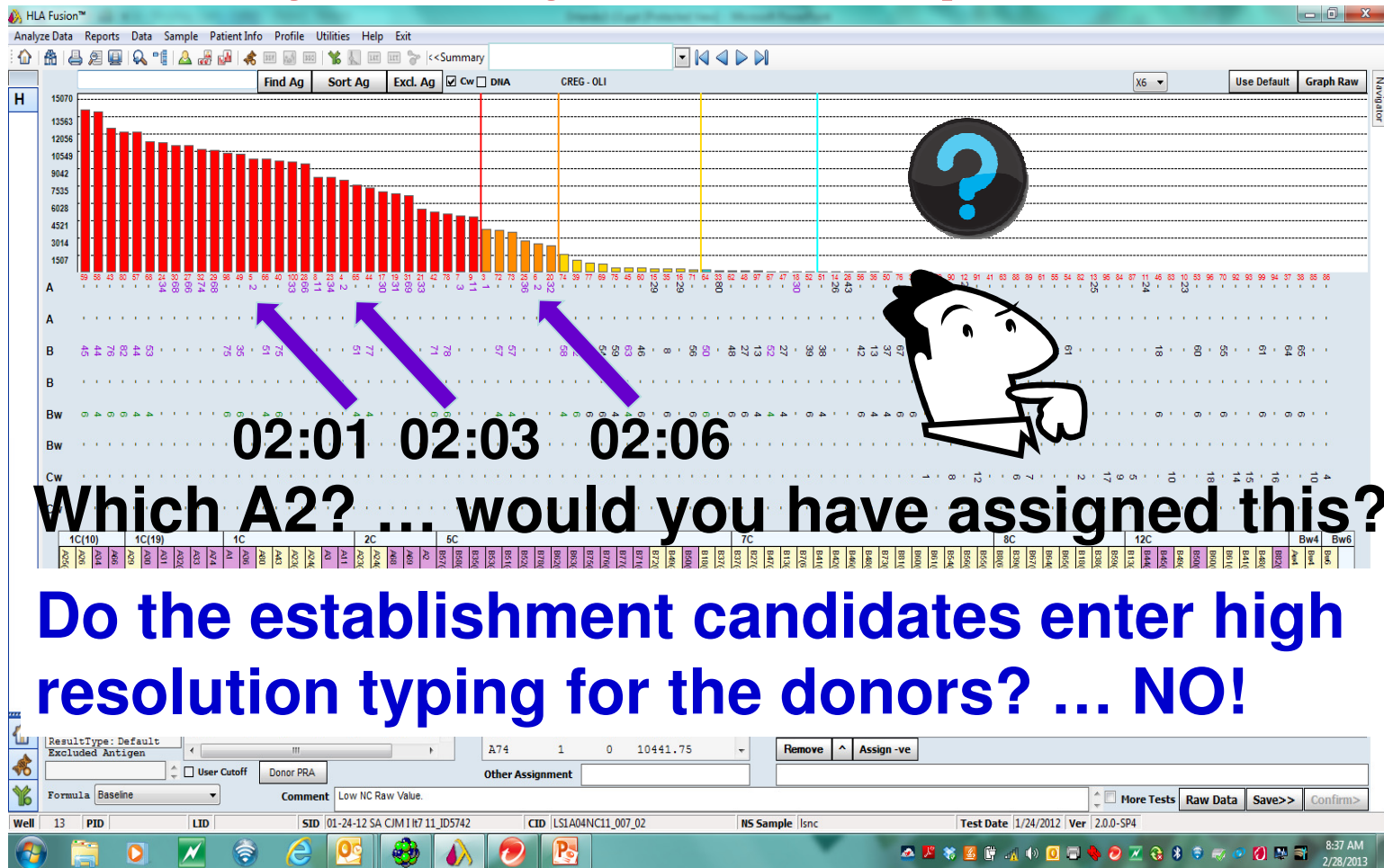


A2 MFI ?

Which A2?



**34 year old man, previous transplant,  
on dialysis 14 years, multiple lists**



# Need to under-assign antibody and search for a great class II match ...



HLA: A24,25 B18,4005 C10,12  
DR1,4 DRw53 DQ5,8

Blood type O

Calculated PRA – **100%**

HLA Antibodies –

A 1,2,3,11,28,30,31,32,33,34,36,66,68,69,74

B12,17,35,44,45,51,53,57,58,71,75,76,77,78,82

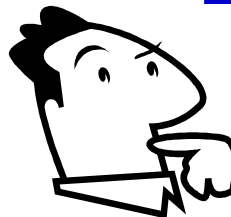
DR 7,8,9,11,12,13,14,15,16,17,18 DRw52 DQ 2,4,7



KPD Donor: A2,29 B56,61 C1,8  
DR1,4 DRw53 DQ5,8  
Blood type O



**High resolution typing!**  
**Exploratory crossmatch!**



**One day!**

# Need to under-assign antibody and search for a great class II match ...



HLA: A24,25 B18,4005 C10,12  
DR1,4 DRw53 DQ5,8

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,2,3,11,28,30,31,32,33,34,36,66,68,69,74

B12,17,35,44,45,51,53,57,58,71,75,76,77,78,82

DR 7,8,9,11,12,13,14,15,16,17,18 DRw52 DQ 2,4,7



KPD Donor: A2,29 B56,61 C1,8  
DR1,4 DRw53 DQ5,8  
Blood type O



A02:06 MFI 3449!

T MCS 80

B MCS 103

**Negative!**



If you overassign you will not find!

# Looking



Calculated PRA – **99%**

HLA Antibodies –

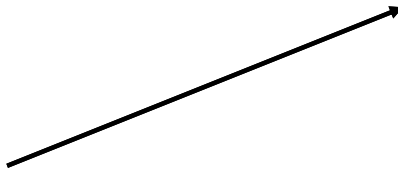
A 33,34,68,69

B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
62,63,64,65,67,70,71,75,76,78,80,81,82 C15

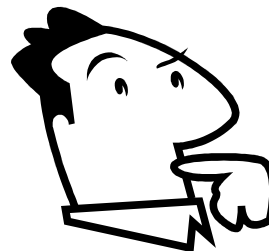
DR 1,7,9,10,103 DRw51 DP14,17,20,3,6,9



Donor: A2,24 B35 C4  
DR8,13 DRw52 DQ4,6  
Blood type O



**1:1** **1:8**  
**B35 MFI 6,484 1,267**



**Would you  
try this?**

# Looking



Calculated PRA – 99%

HLA Antibodies –

A 33,34,68,69

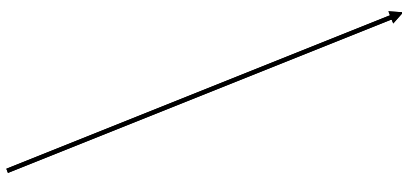
B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61

62,63,64,65,67,70,71,75,76,78,80,81,82 C15

DR 1,7,9,10,103 DRw51 DP14,17,20,3,6,9



Donor: A2,24 B35 C4  
DR8,13 DRw52 DQ4,6  
Blood type O



1:1 1:8  
B35 MFI 6,484 1,267

**Guess the  
crossmatch?**

# Trying



Calculated PRA – **100%**

HLA Antibodies –

A 33,34,68,69

B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
62,63,64,65,67,70,71,75,76,78,80,81,82

DR 1,7,9,10,103 DRw51

**1:1 T MCS 311 FAILED!**

1:4 T MCS 201

1:8 T MCS 149

1:16 T MCS 106 POSITIVE

**1:1 B MCS 179 GO FISH!**

1:4 B MCS 101

1:8 B MCS 65

**One day!**



Donor: A2,24 B35 C4  
DR8,13 DRw52 DQ4,6  
Blood type O

# 65 yo on dialysis for 4 years



HLA: A2,24 B48,61 C8,15  
DR4,11 DRw52,53 DQ7,8

Blood type A

Calculated PRA – **100%**

HLA Antibodies –

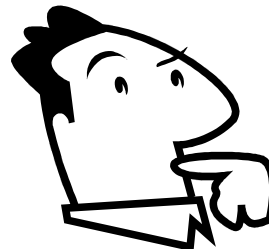
A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80  
B12,14,18,35,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10  
DR 1,3,9,10,17,18,103 DRw51 DQ 1,4,5,6



Donor: A2,24 B35 C1,4  
DR4,16 DRw51,53 DQ7,8  
Blood type A



DRw51 **MFI 17,000**  
B35 **MFI 1,096**



**Would you find this  
possible match?**

# 65 yo on dialysis for 4 years



HLA: A2,24 B48,61 C8,15  
DR4,11 DRw52,53 DQ7,8

Blood type A

Calculated PRA – 100%

HLA Antibodies –

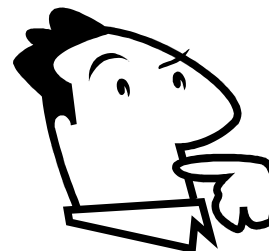
A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80  
B12,14,18,35,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10  
DR 1,3,9,10,17,18,103 DRw51 DQ 1,4,5,6



Donor: A2,24 B35 C1,4  
DR4,16 DRw51,53 DQ7,8  
Blood type A



DRw51 MFI 17,000  
B35 MFI 1,096



**Guess the  
crossmatch?**



# 65 yo on dialysis for 4 years



HLA: A2,24 B48,61 C8,15 DR4,11  
DRw52,53 DQ7,8

Blood type A

Calculated PRA – 100%

HLA Antibodies –

A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80

B12,14,18,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10

DR 1,3,9,10,17,18,103 DRw51 DQ 1,4,5,6



Donor: A2,24 B35 C1,4  
DR4,16 DRw51,53 DQ7,8  
Blood type A

B35 MFI 1096

DRw51 MFI 17,000

1:1 T MCS 167

1:2 T MCS 127

1:4 T MCS 92

1:8 T MCS 61 NEGATIVE

1:1 B MCS 216

1:2 B MCS 174

1:4 B MCS 129

1:8 B MCS 96 NEGATIVE

**SUCCESS!**



**All in a  
day's work!**

# 44 yo on dialysis for 17 years



HLA: A2,68 B8,13 C6,7  
DR7,17 DRw52,53 DQ2

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,3,11,23,24,25,26,29,30,31,32,33,34,36,43,66,74,80

B27,39,42,48,54,55,56,57,58,60,61,63,67,7,73,81,82

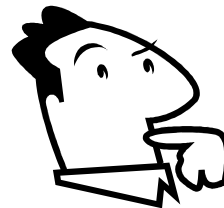
DR1,4,9,10,12,13,14,15 DRw51 DQ4,5,6,7,8,9

DP1,3,5,6,9,10,11,13,14,15,17,18,19

1:1 1:8



Donor: A2,3 B18,35 C4,5  
DR7,17 DRw52,53 DQ2  
DP3,18  
Blood type O



|      |     |        |       |
|------|-----|--------|-------|
| A3   | MFI | 7,944  | 1,674 |
| DP3  | MFI | 16,731 | 4,549 |
| DP18 | MFI | 4,964  | 677   |

**Would you find this  
possible match?**

# Looking



HLA: A2,68 B8,13 C6,7  
DR7,17 DRw52,53 DQ2

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,3,11,23,24,25,26,29,30,31,32,33,34,36,43,66,74,80

B27,39,42,48,54,55,56,57,58,60,61,63,67,7,73,81,82

DR1,4,9,10,12,13,14,15 DRw51 DQ4,5,6,7,8,9

DP1,3,5,6,9,10,11,13,14,15,17,18,19

1:1 1:8

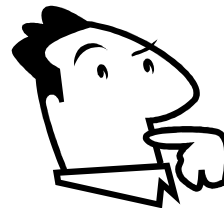


A3 MFI 7,944 1,674

DP3 MFI 16,731 4,549

DP18 MFI 4,964 677

Donor: A2,3 B18,35 C4,5  
DR7,17 DRw52,53 DQ2  
DP3,18  
Blood type O



**Guess the  
crossmatch?**

# Firing it up!



HLA: A2,68 B8,13 C6,7  
DR7,17 DRw52,53 DQ2

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,3,11,23,24,25,26,29,30,31,32,33,34,36,43,66,74,80

B27,39,42,48,54,55,56,57,58,60,61,63,67,7,73,81,82

DR1,4,9,10,12,13,14,15 DRw51 DQ4,5,6,7,8,9 DP1,3,5,6,9,10,11,13,14,15,17,18,19



Donor: A2,3 B18,35 C4,5

DR7,17 DRw52,53 DQ2

Blood type O

|      |     | 1:1    | 1:8   |
|------|-----|--------|-------|
| A3   | MFI | 7,944  | 1,674 |
| DP3  | MFI | 16,731 | 4,549 |
| DP18 | MFI | 4,964  | 677   |

1:1 T MCS 223

1:4 T MCS 134

1:8 T MCS 102

1:16 T MCS 78 NEGATIVE

1:1 B MCS 266

1:4 B MCS 183

1:8 B MCS 135

1:16 B MCS 98 NEGATIVE

**SUCCESS!**



**One day!**

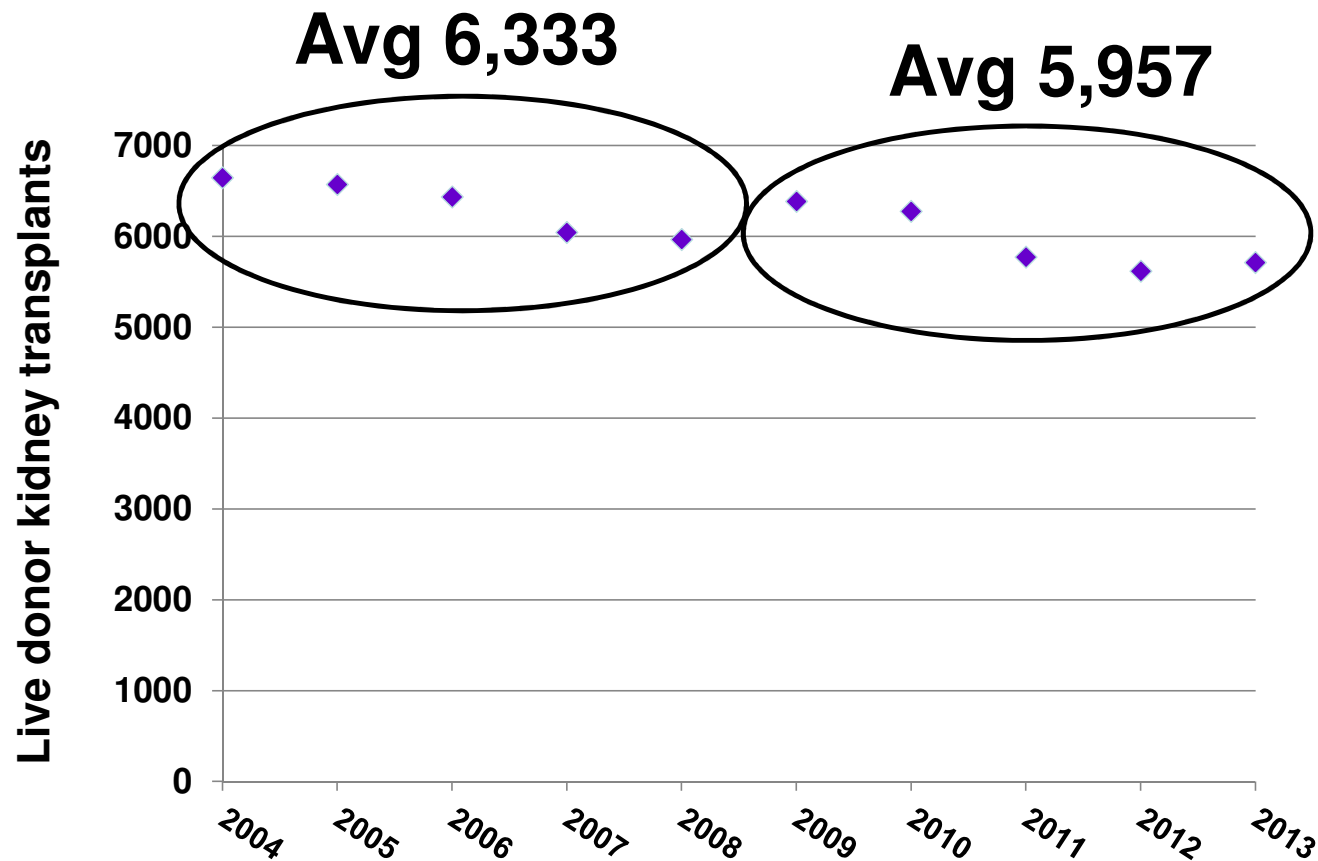
## **Methodist San Antonio incompatible kidney transplant program**

**8/09-present, 55 LD kidney transplants in patients with incompatible donors and cPRA  $\geq$  98%**

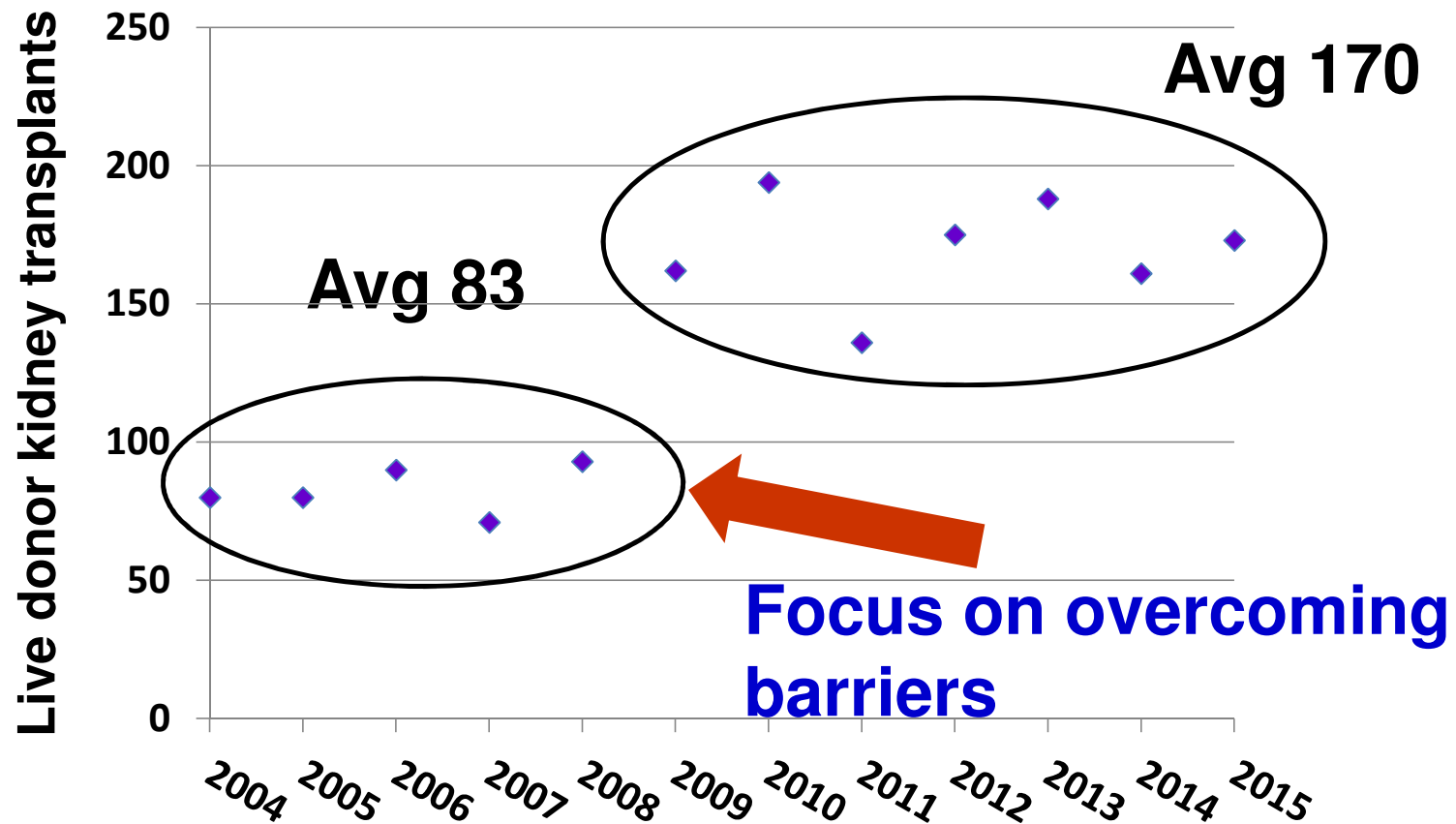
- **5 patients with cPRA 98%**
  - 3/5 had desensitization
- **16 patients with cPRA 99%**
  - 9/16 had desensitization
- **34 patients with cPRA 100%**
  - 22/34 had desensitization
- **51/55 transplanted with KPD**
- **33/55 re-transplant patients**

**Three cases of antibody mediated rejection**

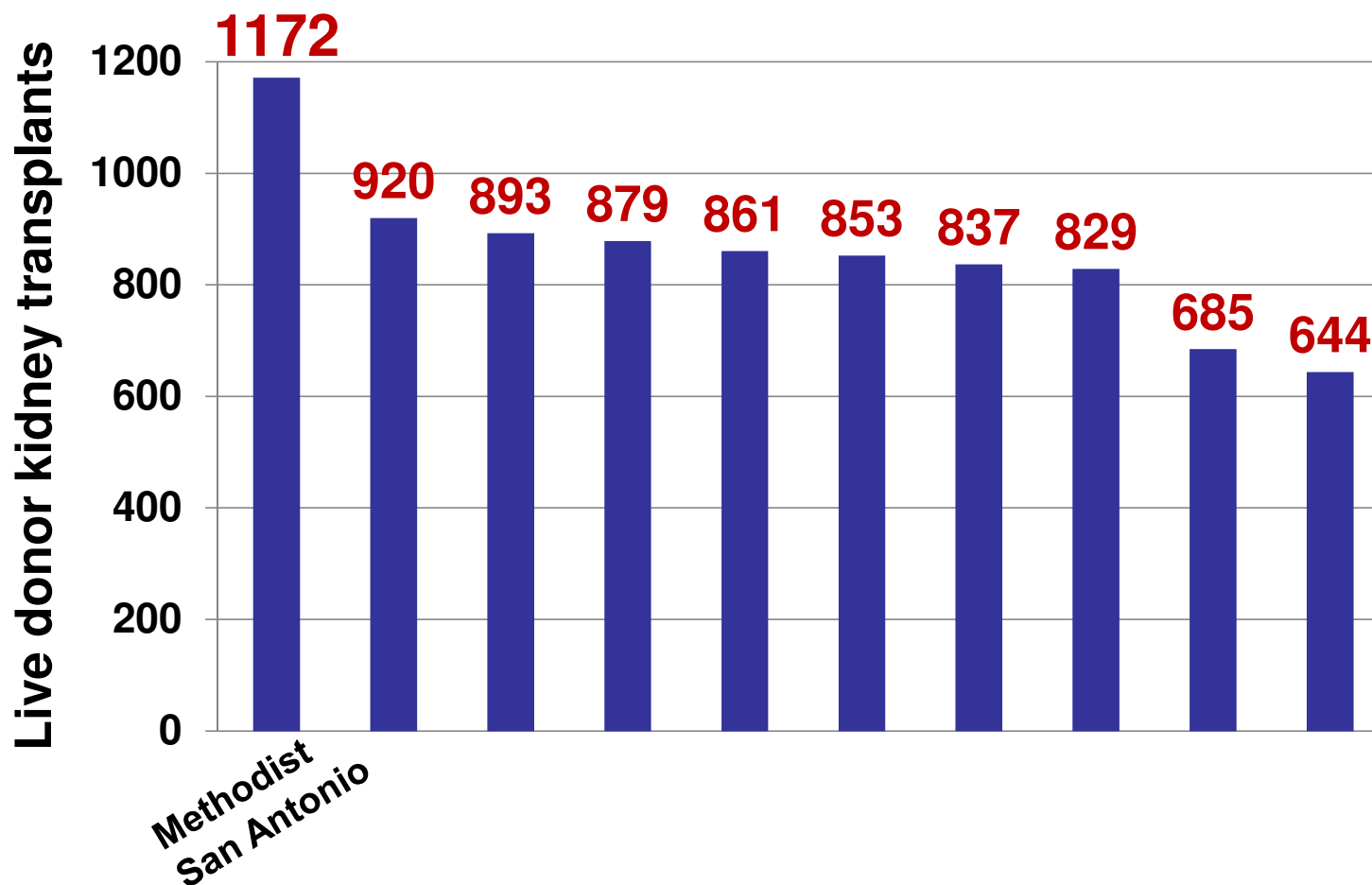
# Live donor kidney transplantation in the U.S. is decreasing



# Live donor kidney transplantation at Methodist San Antonio



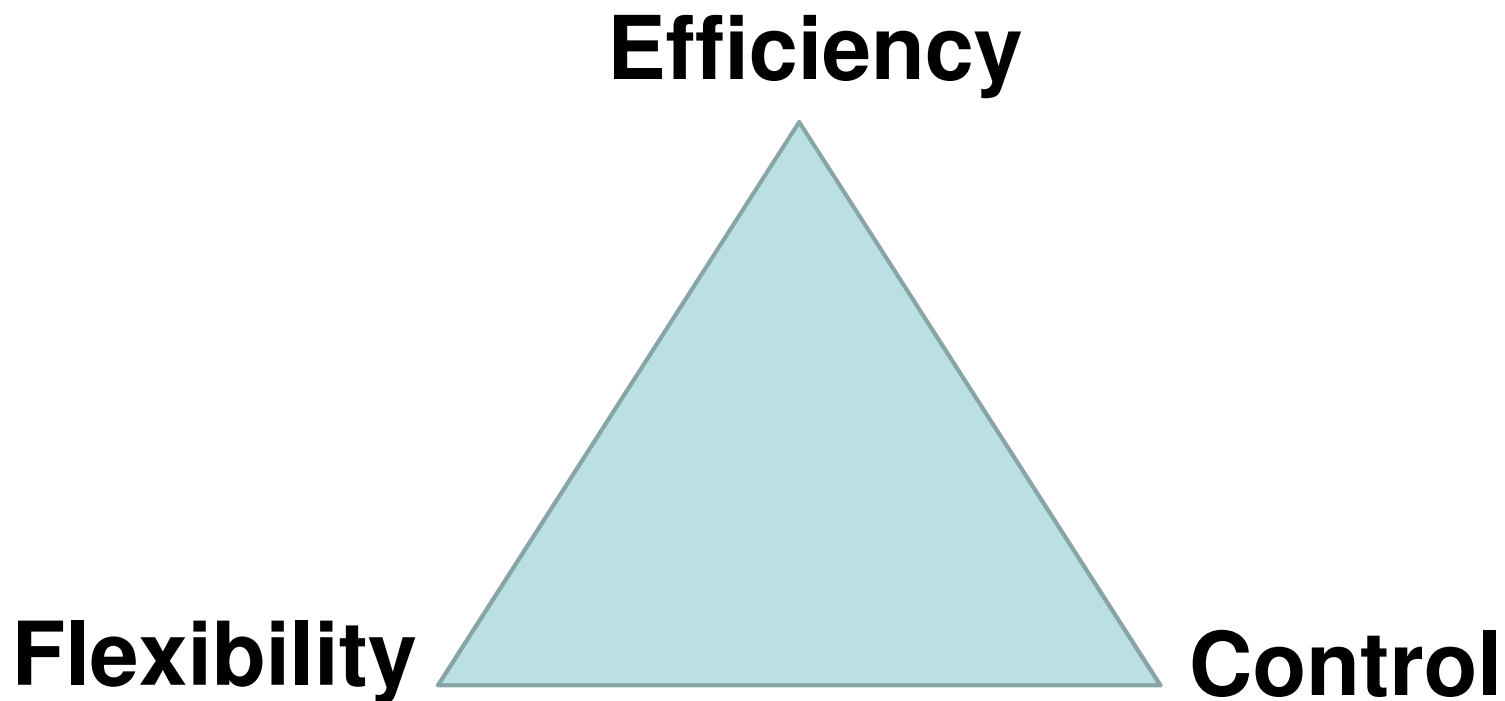
# Largest live donor kidney transplant programs in the U.S. 2009-present





# Why run a single center KPD program?

*It's all about the triangle ...  
... and DOING a lot of transplants!*



# Acknowledgements

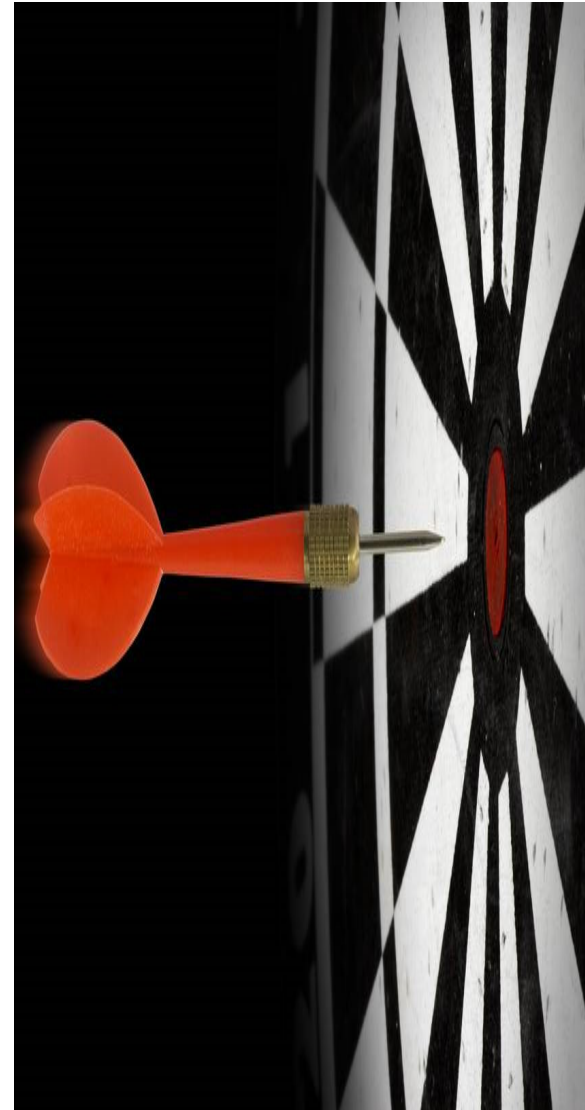
**Cathi Murphey, Ph.D.**

**Southwest  
Immunodiagnostics, Inc.**

**The staff at Methodist  
San Antonio**

**Thank you for the  
invitation**

**Adam.Bingaman@mhshealth.com**





# Regional / National Programs

## Strengths

**Larger pool**

**Sophisticated software**

**Heterogeneous HLA  
populations**

**Large pool of non-  
directed donors**

## Weaknesses

**Slower**

**Difficult to individualize**

**More rigid**

**Shipping kidneys**

**Cost**

# Time is against you on dialysis ...

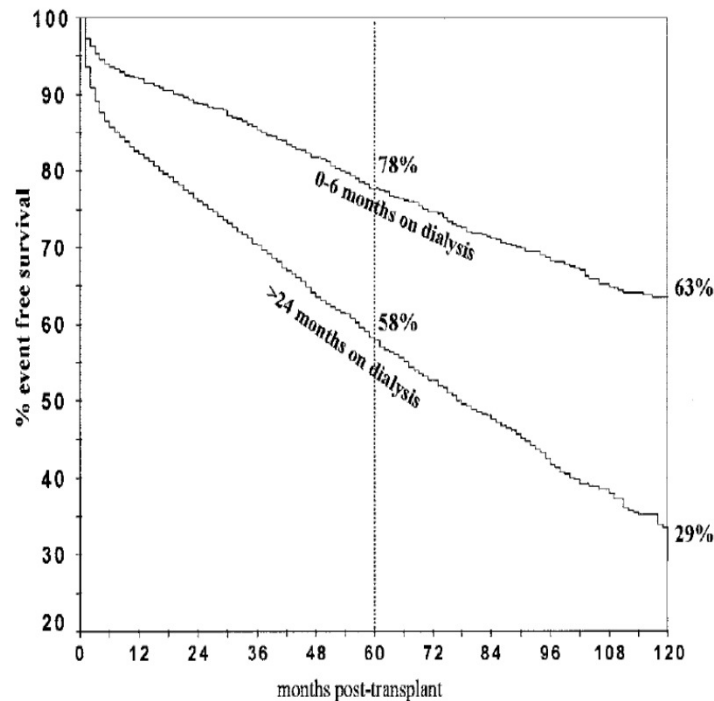


FIGURE 1. Unadjusted graft survival in 2,405 recipients of paired kidneys with short compared to long ESRD time.

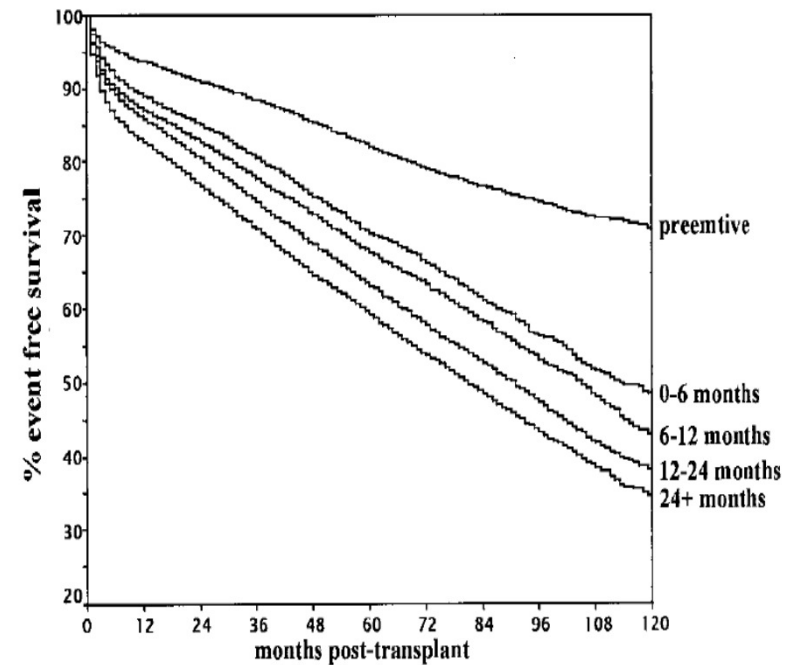
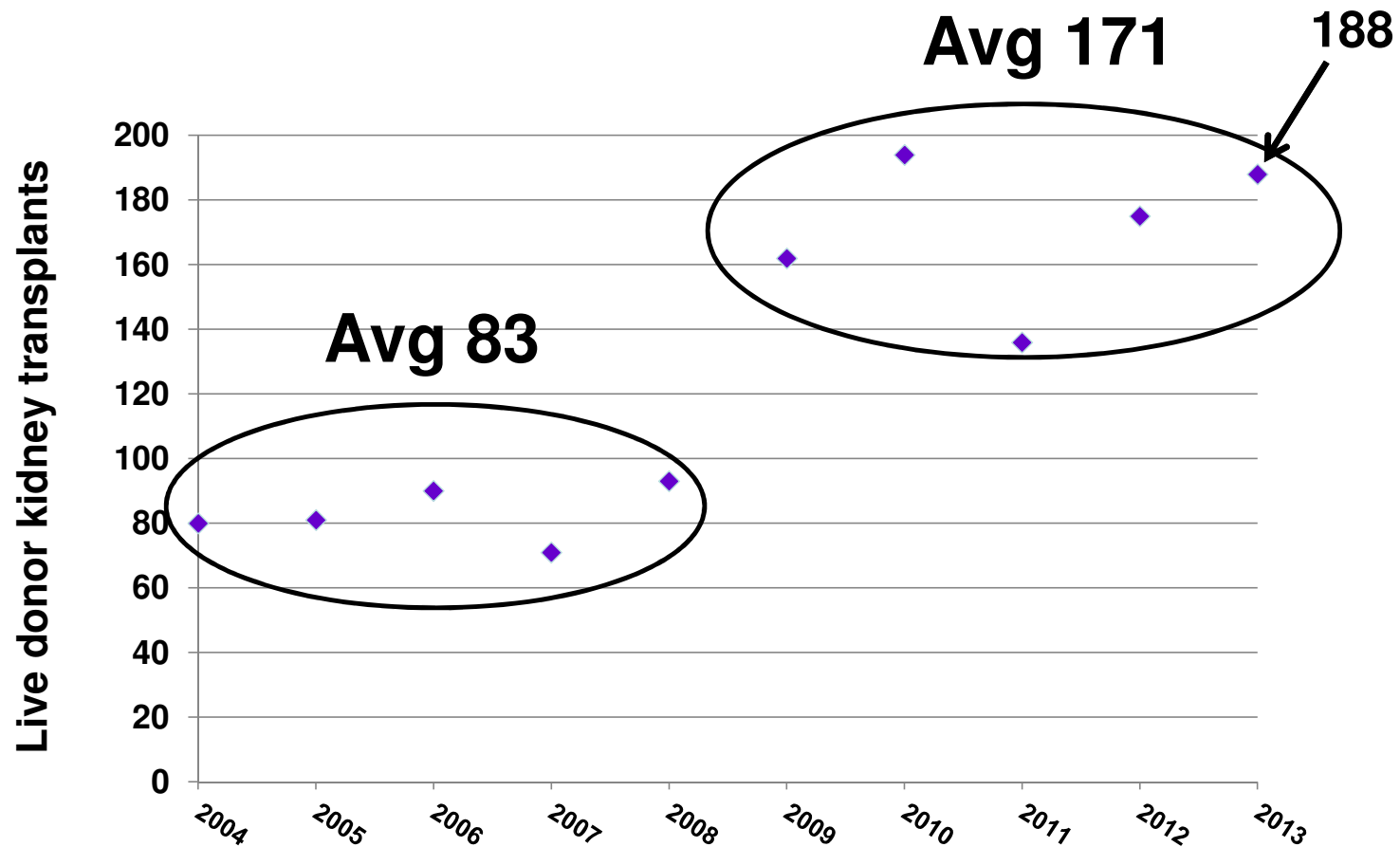


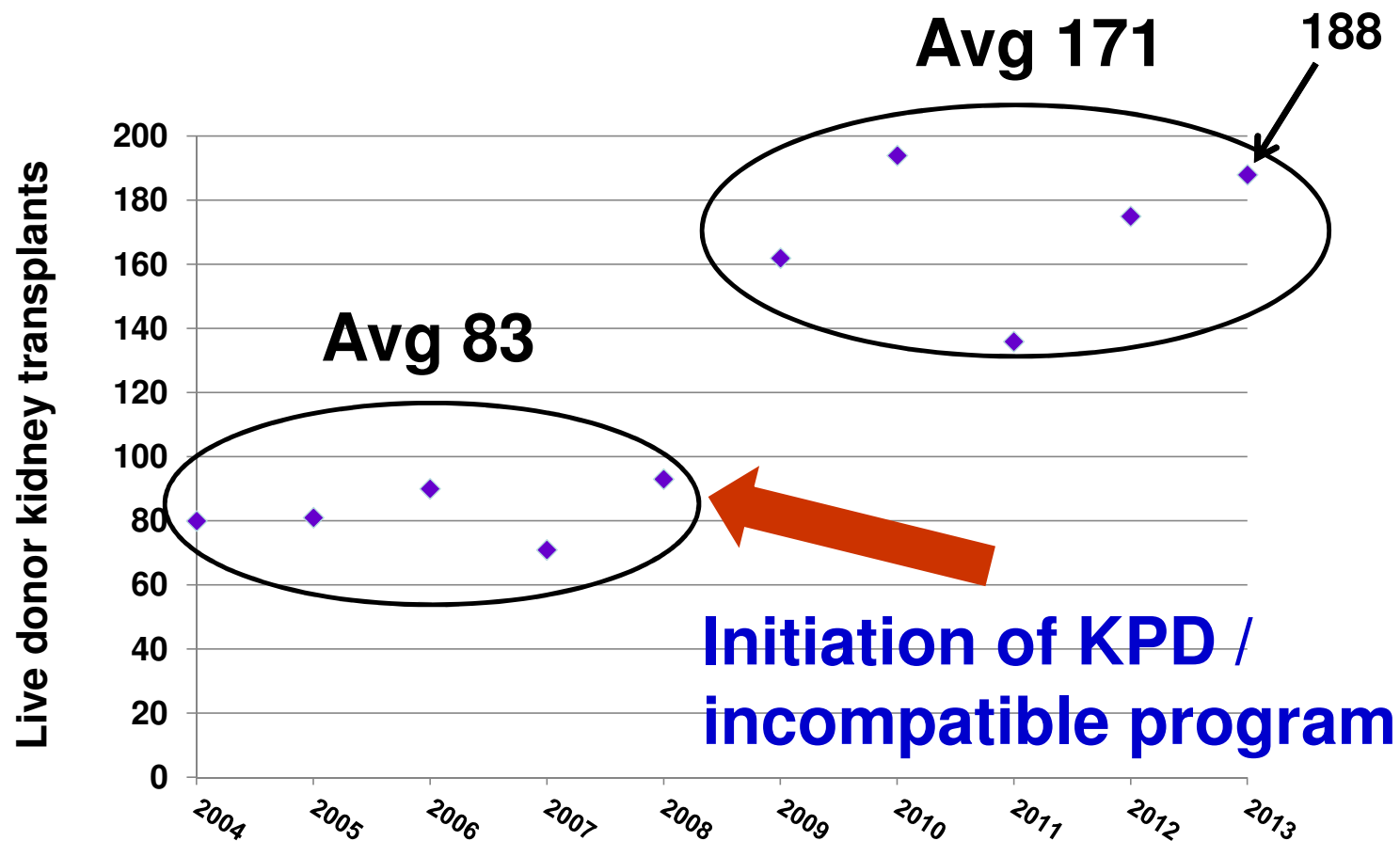
FIGURE 2. Unadjusted graft survival in 56,587 recipients of cadaveric transplants by length of dialysis treatment before transplant.

Meier-Kriesche and Kaplan: Transplantation. 2002;74:1377-81

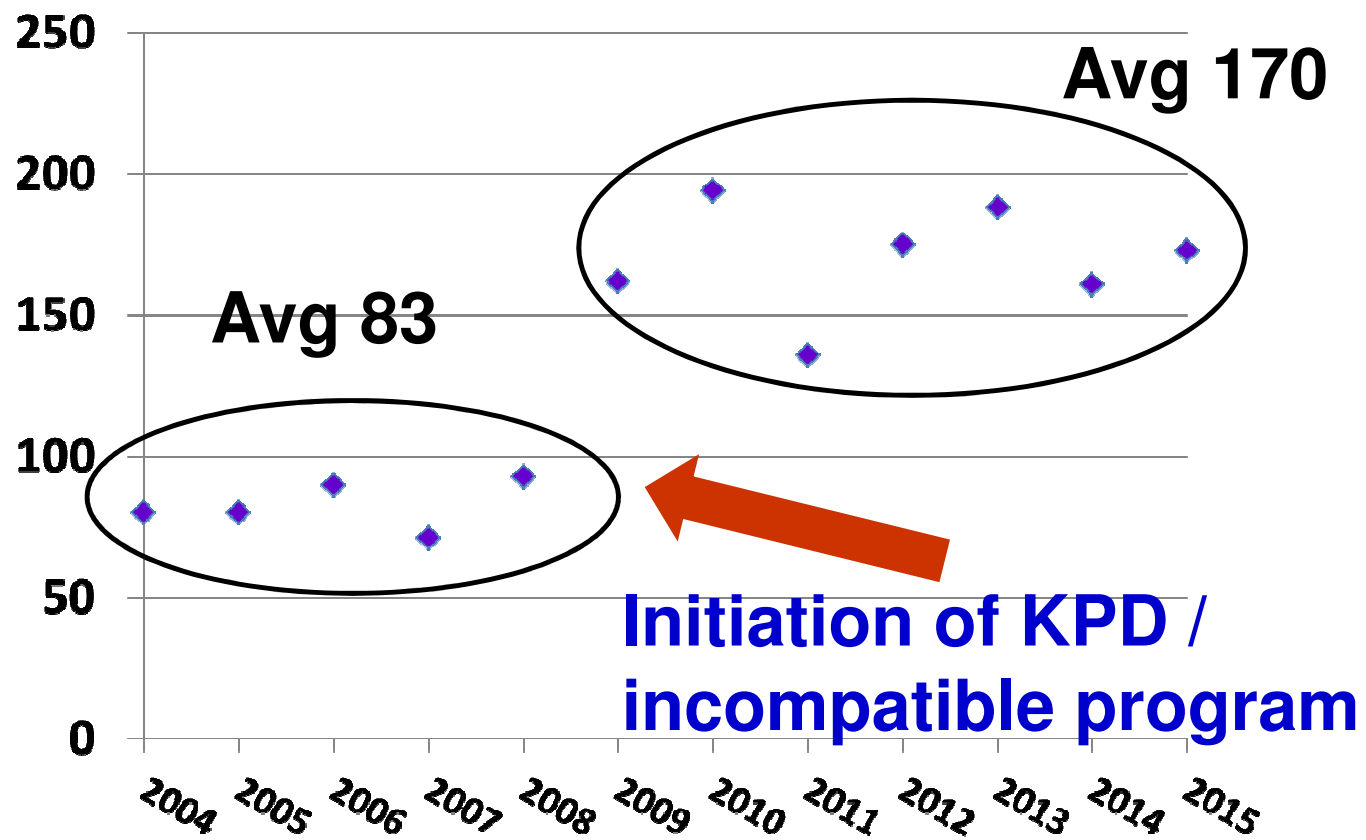
# Live donor kidney transplantation at Methodist San Antonio is increasing



# Live donor kidney transplantation at Methodist San Antonio is increasing



Live donor kidney transplants





**Modeling does not take into  
account HUMAN BEHAVIOUR!**

# Regional / National Programs

## Strengths

**Larger pool**

**Sophisticated software**

**Heterogeneous HLA  
populations**

**Large pool of non-  
directed donors**

## Weaknesses

**Slower**

**Difficult to individualize**

**More rigid**

**Shipping kidneys**

**Cost**

**What does it take?**

**Talent, Technology, Teamwork  
and Time are the keys to success!**

# Summary

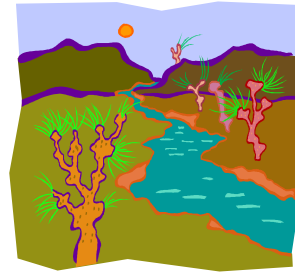
## *Advantages of single center KPD*

- **More control over your patients**
  - Fast time to transplant
  - Easier logistically (work at our own schedule/pace)
- **Use of compatible pairs to transplant blood type O recipients with younger non-O donors**
  - May be easier to consent within single center
- **Combination KPD plus desensitization to transplant the most highly sensitized**
  - More aggressive approach, easier logistically
  - Think of it ... Try it ... Do it! with frozen donor cells
  - Low risk, excellent results

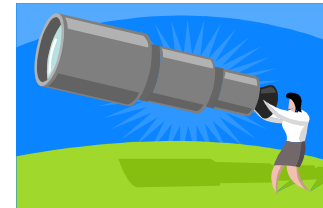
# Efficiency

## *Flow*

**Improved flow**



**Improved capacity to see the future**



## **KPD keys to success**

- **Great KPD staff / a champion / teamwork with the HLA staff**
- **Recipient / donor education, efficient entry of pairs into database**



# **Single center KPD relies on exchanges ... limited non-directed donors**

## **253 KPD transplants done ...**

- Forty-three 2-recipient exchanges
- Twenty-six 3-recipient exchanges
- One 4-recipient exchange
- Two 6-recipient exchanges
- One 5-recipient chain
- One 6-recipient chain
- One 8-recipient chain
- One 9-recipient chain
- One 10-recipient chain
- One 12-recipient chain
- One 23-recipient chain

**73/253 = 29%**  
**transplanted with a  
non-directed donor**

## Outsourcing KPD...

- **Matching** program and allocation principles
- **Planning** the logistics



# Example



**Calculated PRA – 100%**

**HLA Antibodies –**

**A 3,11,23,25,26,32,33,34,43,66,68,69,74,80**

**B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,  
58,59,60,61,62,63,64,65,67,70,71,72,75,76,77,78,81,82  
C7,12,15**

**DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9**

**DP 1,3,5,6,9,11,13,14,17,18,20,28**

## **Qualities of a successful KPD program**

- **Quick tempo to transplant**
- **Predictable outcome**
- **Flexible**
- **Can transplant hard to match pairs effectively**

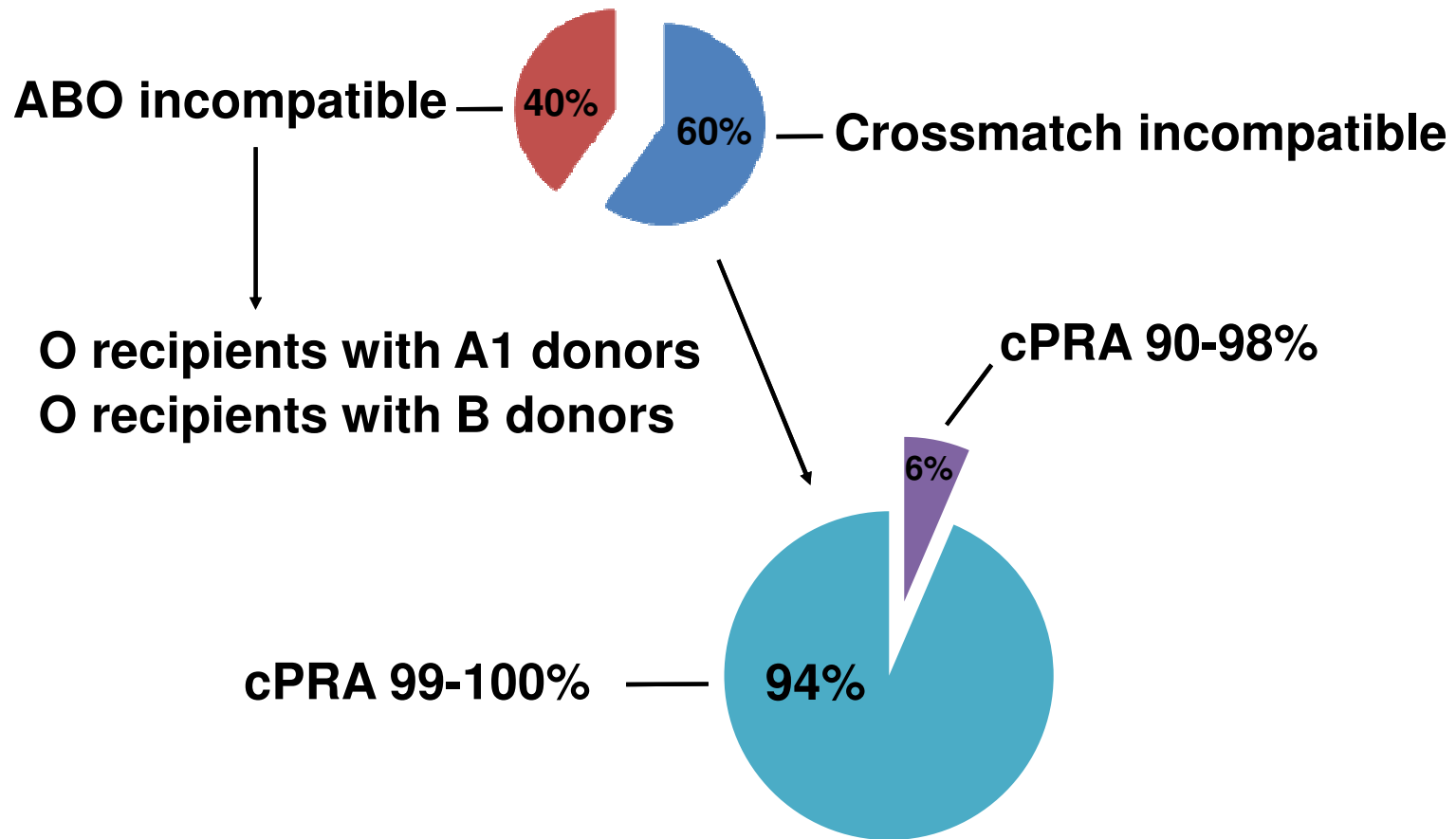
# **Signs of an Efficient Program**

**Transplant more pairs**

**All A/B and B/A combinations get transplanted**

# Who can't KPD program transplant effectively?

Methodist San Antonio KPD database  
waiting > 6 months

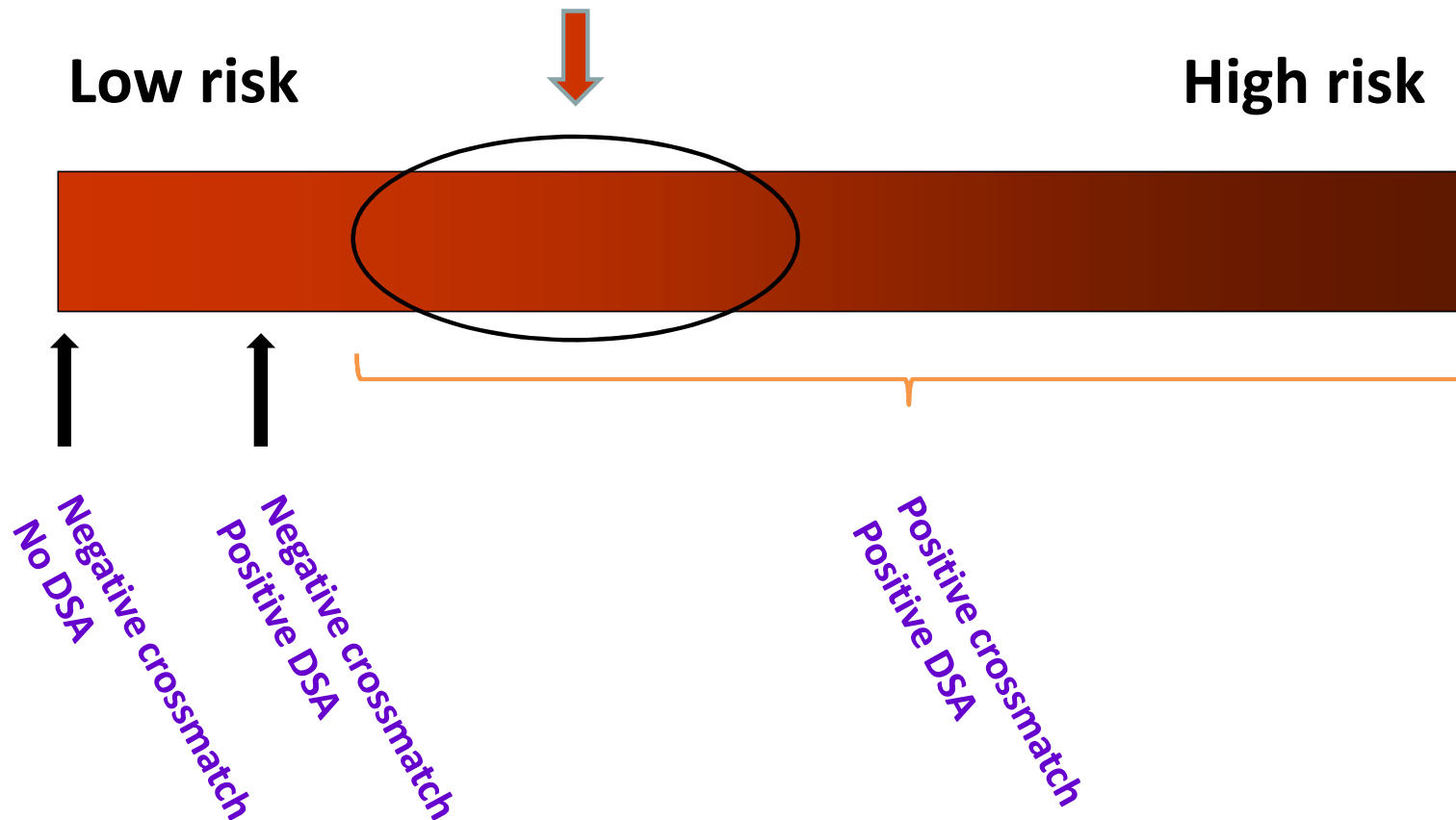


## KPD keys to success

*Calculated* risk for hard  
to match pairs

# Calculated risk

... we need to move into the gray zone ...

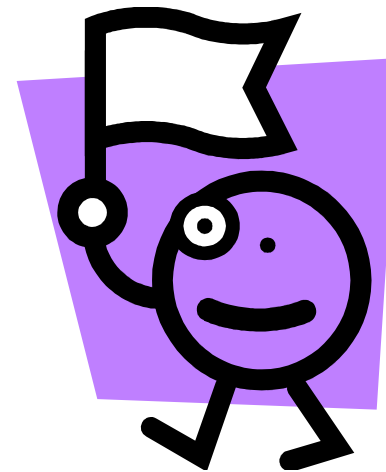


# KPD keys to maximum success

*Why outsource the matching and planning for transplant of your patients?*

**Matching = Control**

**Planning = Flexibility**



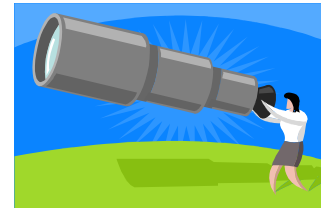
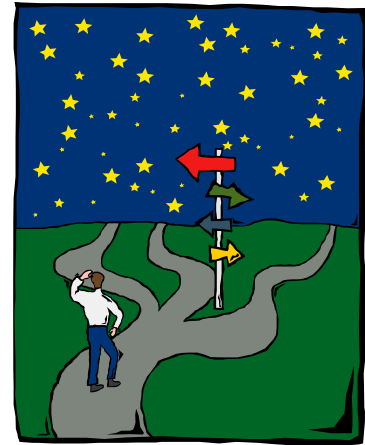
**Matching = Control**

*Control over what?*

**Control over early entry of  
pairs into the database**



# KPD keys to success



# **Incompatible transplant program**

## **Maximize opportunity**

**Paired donation**

**Crossmatch incompatible transplants**

**Blood type incompatible transplants**

## **Utilization of resources**

**Donor / Recipient evaluation process**

**Histocompatibility testing costs**

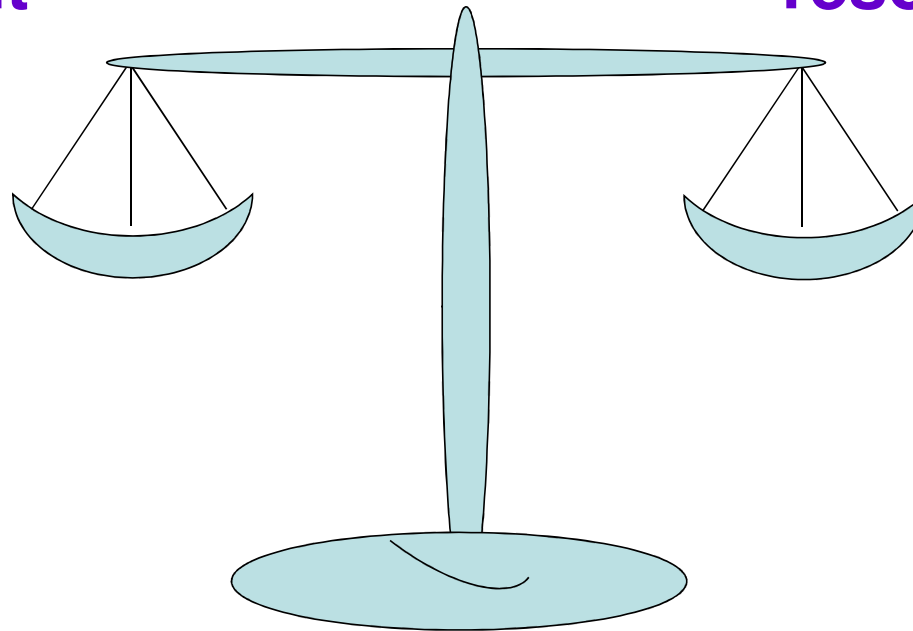
**Staffing**

**Increased risk**

# Incompatible transplant program

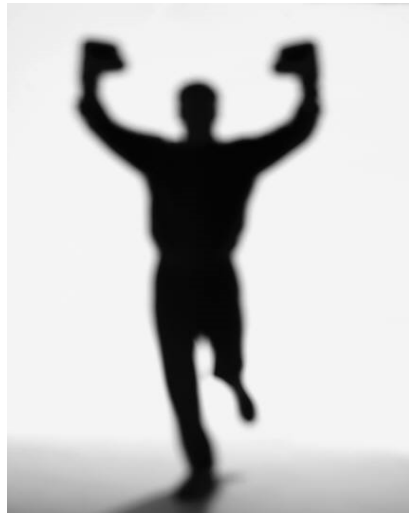
**Maximize  
opportunity for  
transplant**

**Maximize  
utilization of  
resources**



# Staff

An effective KPD program requires ...  
a champion!



... someone to *make it happen*

# Paired donation programs

## What are the options?

- **National**
  - U.S. pilot program initiated 2010
  - Updated/expanded in 2011
- **Regional**
  - National Kidney Registry
- **Single center**
  - Methodist San Antonio

*What is the most effective option for you?*

## Single Center KPD

*... things I have heard*

- Only the largest transplant programs can run a single center KPD program
- It is expensive to run a KPD program
- Need alot of staff to run a KPD program
- Need non-directed donors for most KPD transplants
- Single center KPD programs cannot transplant a lot of “difficult pairs”

*... all of the above are false*

## **Single Center KPD**

***Methodist San Antonio KPD started in 2008...***

- **Private practice, 380 bed hospital in San Antonio, 2.2M metroplex**
- **Live donor program 71 transplants in 2007**
- **No hospital financial support for KPD**
- **KPD software program obtained from Johns Hopkins – Thank you!**
- **Collaboration with surgeon, HLA director and transplant coordinator**

## Single Center KPD

*Where Methodist San Antonio is 2009-2013...*

- Live donor program 171 transplants per year
- 253 KPD transplants (55 last 12 months)
  - KPD is ~30% of our live donor volume
- No hospital financial support for KPD
- Using KPD software program obtained from Johns Hopkins – Thank you!
- Collaboration with surgeon, HLA director and transplant coordinator

*Centers with medium/large LD programs can run a successful KPD program without the need for many extra resources!*



## Expanding paired donation

- **Use of compatible pairs**
  - Enriched recipient candidates with O donors
- **Combination of KPD with desensitization often needed to transplant the most highly sensitized recipients**
  - Try to find a close match!

# Examples

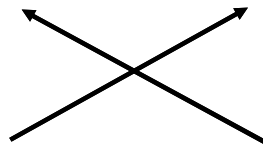
# Use of compatible pairs in 2-way KPD for blood type incompatibility

## Recipient 1

63 year old male  
Blood type O



Incompatible



## Recipient 2

30 year old female  
Blood type A



Compatible

## Donor 1

32 year old male  
Blood type A1

## Donor 2

60 year old male  
Blood type O

***All blood type O recipients with young A or B donors can be transplanted with compatible pairs***

# Use of compatible pairs in KPD to transplant highly sensitized recipients

## Recipient 1

63 year old male  
Blood type O  
High PRA!!!



Incompatible

## Donor 1

32 year old male  
Blood type O

## Recipient 2

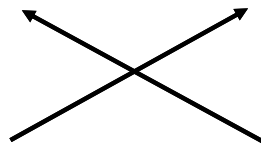
30 year old female  
Blood type O  
PRA 0



Compatible

## Donor 2

60 year old male  
Blood type O  
Rare HLA type!!!



# Use of compatible pairs in 2 way KPD for highly sensitized recipient



HLA – A2,24 B8,39 DR13,14 DRw52 DQ7

Calculated PRA – 99%

HLA Antibodies B7,27,40,60,61

DR4,7,9,10,15,16 DRw53 DQ1,2,4,5,6,8

Blood type O

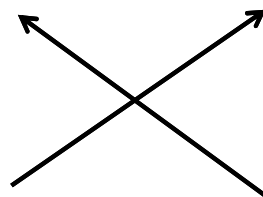


Donor: A24,29 B61

DR4,7 DRw53 DQ2,8

Blood type O

Age 22



Compatible pair



Calculated PRA – 0%

Blood type O



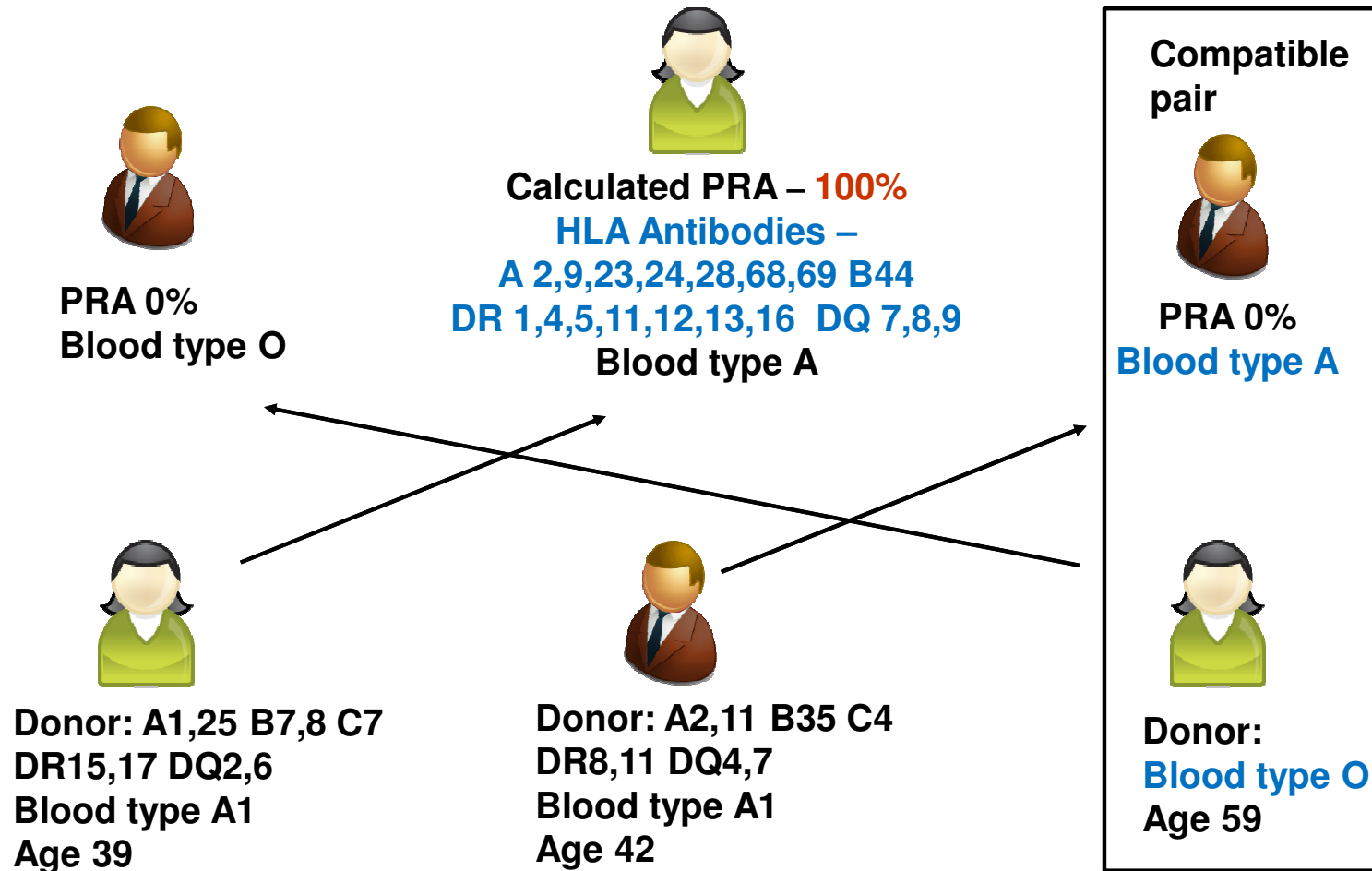
Donor: A2,31 B51,57

DR11 DRw52 DQ7

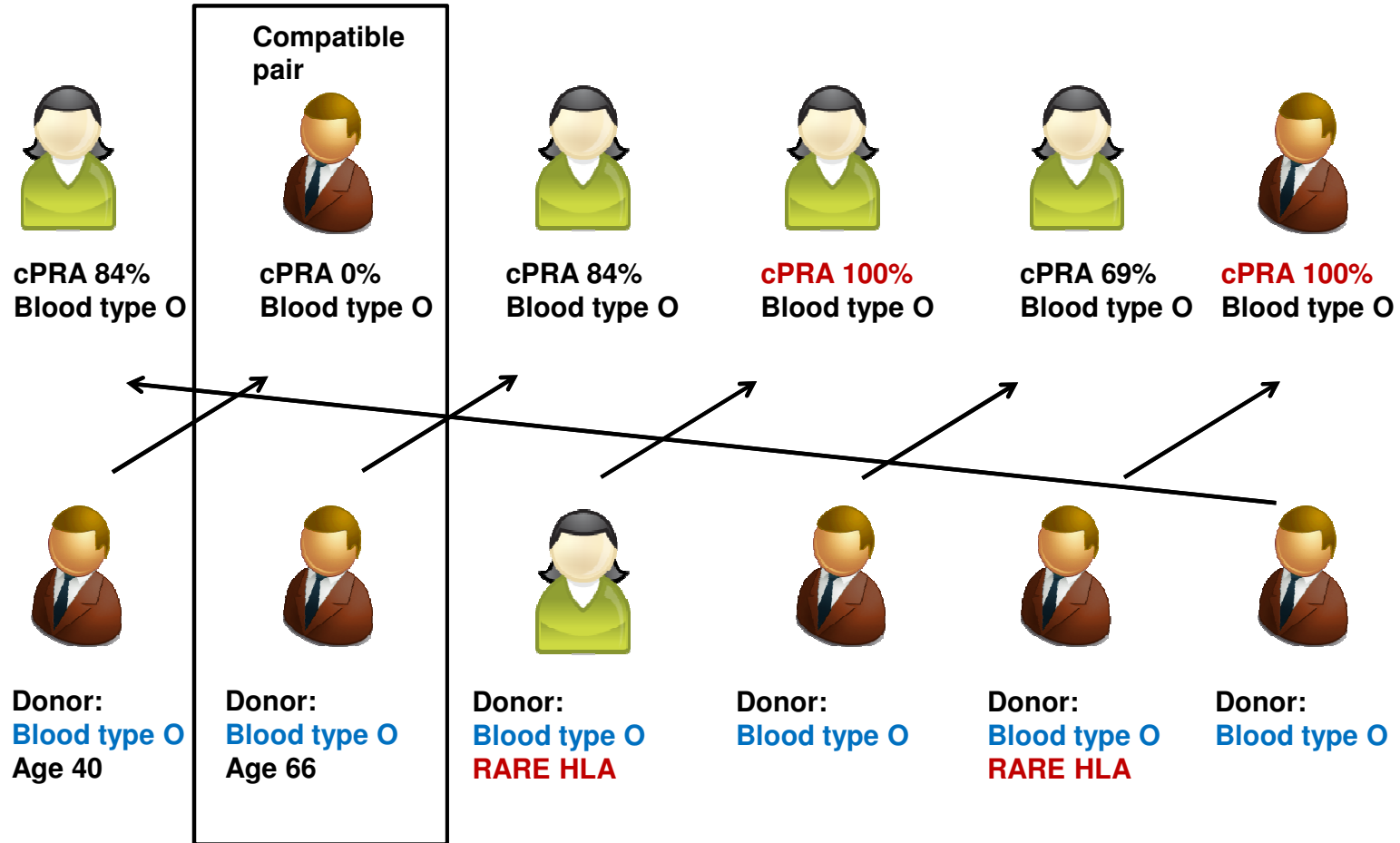
Blood type O

48 years old

# Use a compatible pair to *indirectly* transplant highly sensitized recipients

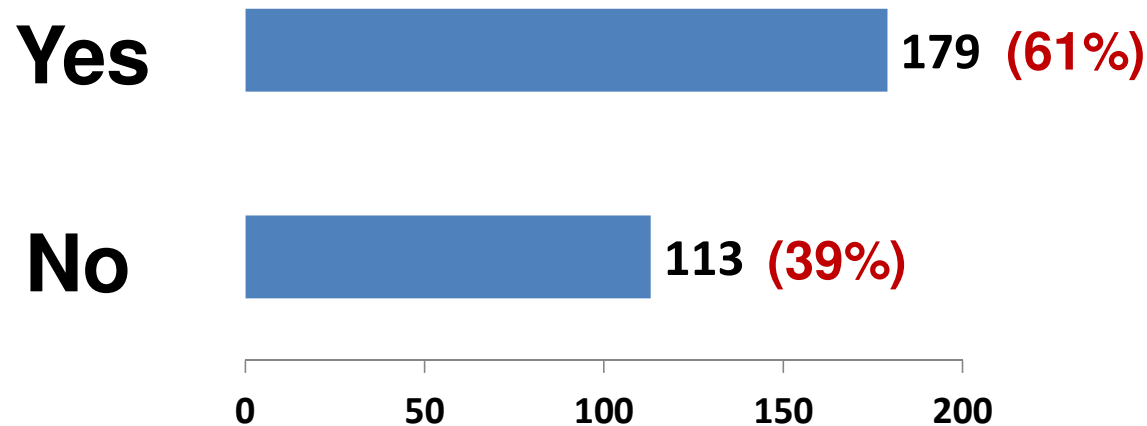


# Use a compatible pair to *indirectly* transplant highly sensitized recipients



# The majority of compatible pairs consent for exchange

**N=292**





## **Use of compatible pairs for KPD**

- **Utilization of compatible pairs in a large single center KPD program significantly expands KPD options for:**
  - **Highly sensitized recipients candidates**
  - **Blood type incompatible recipient candidates**
- **The majority of compatible pairs consented for exchange**

**Compatible pairs should be more broadly utilized in KPD programs**

# How can KPD transplant the most highly sensitized patients *effectively*?



Calculated PRA – **100%**

HLA Antibodies –

A 2,23,24,25,28,30,31,32,34,66,68,69

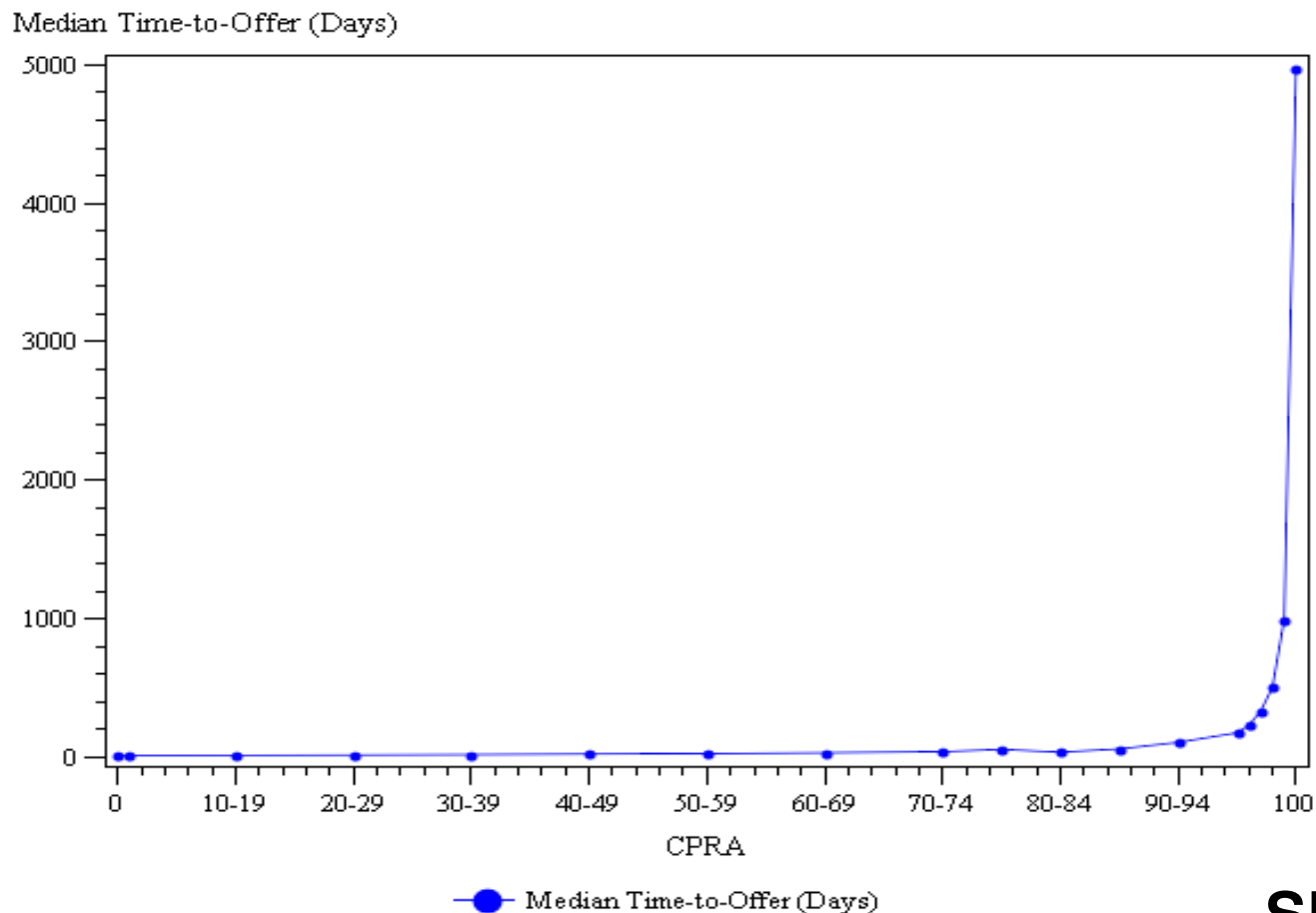
B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51,52,53,55,56,  
57,58,59,60,61,62,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

# Time to offer distribution estimates



**SRTR**

➤ A graphical view of median time-to-offer estimates emphasizes the extreme nonlinearity for very high cPRA

**The most highly sensitized  
(cPRA near 100%) are *truly*  
disadvantaged on the waiting list**

**... and this is a big problem**

**More than 7,250 candidates on the  
waiting list with cPRA 98-100%**

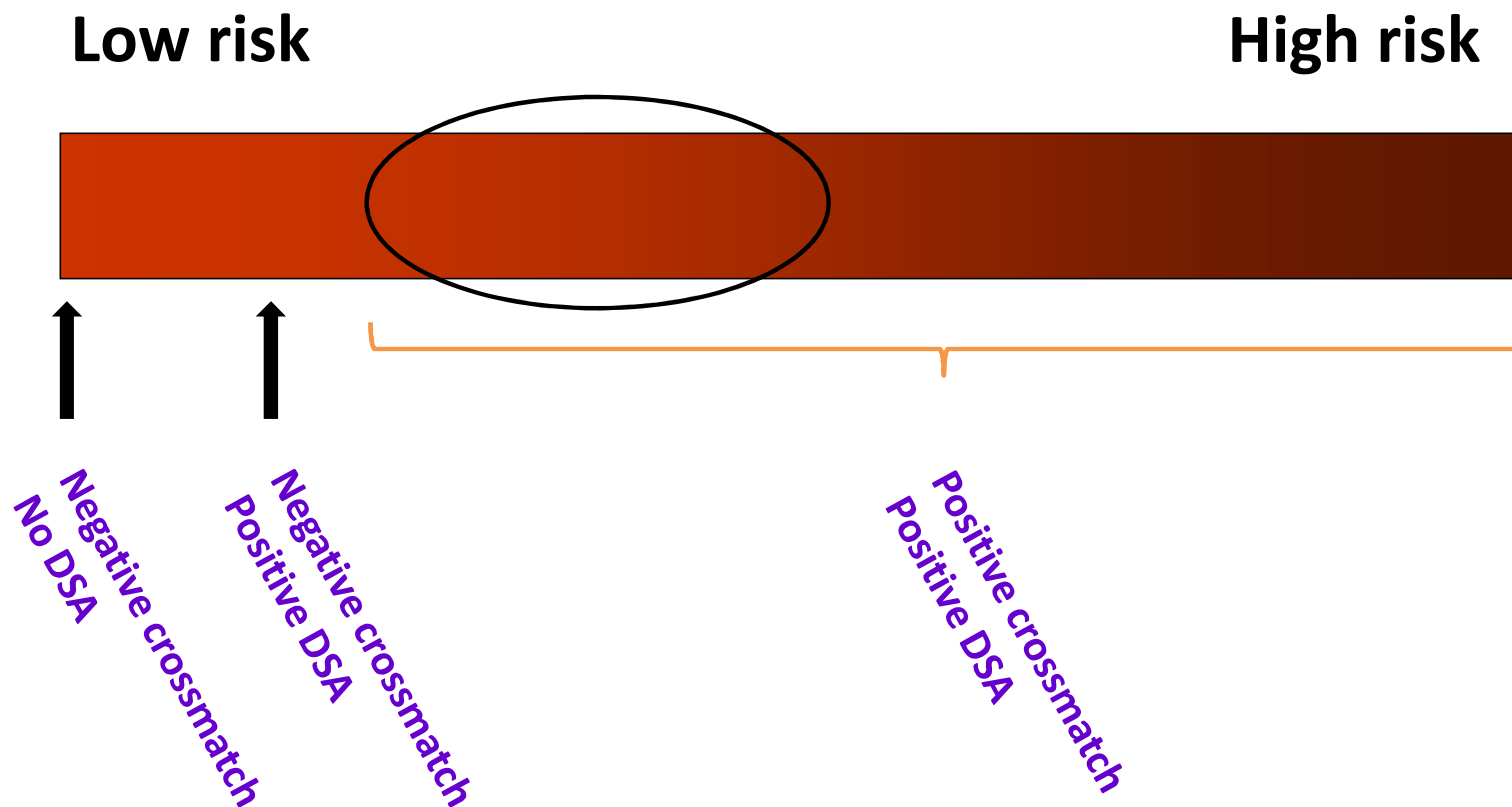
**19% of the waiting list has had a  
previous transplant**

**For cPRA 98-100%, chances of  
transplant off the list or by KPD are  
very low ...**



***Must take more risk to get many of these  
patients transplanted ... look for close  
matches***

**To transplant to most sensitized ...**  
**... we need to move into the gray zone ...**



## **Methodist San Antonio *low risk* desensitization program**

**Usually combined with KPD to find better matched donor**

- **Typically reserved for cPRA  $\geq 98\%$**
- **T and B flow crossmatch MCS  $< 300$  T and B**
- **Flow crossmatch titers down to negative by 1:16**
- **DSA titers down at 1:8**
- **Prefer class I DSA to class II DSA**
- **As good as it gets? ... could we find better?**

**Examples ...**

**Look for it ... Try it ... Do it!**



## Example ...



**Calculated PRA – 100%**

**HLA Antibodies –**

**A 2,23,24,25,28,30,31,32,34,66,68,69**

**B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82**

**C1,2,4,5,6,8,9,10,14,15,16,17,18**

**DR 4,7,9 DRw53 DQ 7,8,9**

**DP 1,2,4,5,10,11,13,14,15,19,20,23,28**

# Look for it ...



Calculated PRA – **100%**

HLA Antibodies –

A **2**,23,24,25,28,30,31,32,34,66,68,69  
B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,**62**,63,67,72,73,76,77,81,82  
C1,2,4,5,6,8,9,10,14,15,16,17,18  
DR 4,7,9 DRw53 DQ 7,8,9  
DP 1,2,4,5,10,11,13,14,15,19,20,23,28  
Blood type A

A2 **MFI 2300**

B62 **MFI 2700**



Donor: **A2 B8,62** C3,7  
DR13,17 DRw52 DQ2,6  
Blood type O

# Try it ...



Calculated PRA – **100%**

HLA Antibodies –

A **2**,23,24,25,28,30,31,32,34,66,68,69  
B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,**62**,63,67,72,73,76,77,81,82  
C1,2,4,5,6,8,9,10,14,15,16,17,18  
DR 4,7,9 DRw53 DQ 7,8,9  
DP 1,2,4,5,10,11,13,14,15,19,20,23,28  
Blood type A

A2 **MFI 2300**

B62 **MFI 2700**

**T MCS 369**

**B MCS 272**

**Too strong!!!**



Donor: **A2 B8,62** C3,7  
DR13,17 DRw52 DQ2,6  
Blood type O

# Look for it ... again



Calculated PRA – **100%**

HLA Antibodies –

A 2,23,24,25,28,**30**,31,32,34,66,68,69

B7,12,13,17,21,27,37,**38**,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

Blood type A

A30 **MFI 6166**

B38 **MFI 3669**



Donor: **A3,30 B18,38** C12  
DR13,14 DRw52 DQ2,5  
Blood type A1

# Try it ... again



Calculated PRA – **100%**

HLA Antibodies –

A **2**,23,24,25,28,30,31,32,34,66,68,69  
B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,**62**,63,67,72,73,76,77,81,82  
C1,2,4,5,6,8,9,10,14,15,16,17,18  
DR 4,7,9 DRw53 DQ 7,8,9  
DP 1,2,4,5,10,11,13,14,15,19,20,23,28  
Blood type A

A30 **MFI 6166**

B38 **MFI 3669**

**T MCS 160**

**B MCS 130**

**Looks good!**



Donor: **A3,30 B18,38** C12  
DR13,14 DRw52 DQ2,5  
Blood type A1

# Do it!



PRA 0%  
Blood type O



Calculated PRA – **100%**

HLA Antibodies –

A 2,23,24,25,28,30,31,32,34,66,68,69

B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

Blood type A



cPRA **71%**

HLA Antibodies –

A2,28,68,69

B13,62,75,76,77

DR7,9

Blood type O



Donor: A3,30 B18,38 C12  
DR13,14 DRw52 DQ2,5  
Blood type A1



Donor: A3,11 B35,57 C4,6  
DR13,14 DRw52 DQ5,6  
Blood type O



Donor: A3,30 B14,53  
C4,8 DR7,13 DRw52,53  
DQ2,6  
Blood type O

# Look for it ...



HLA: A24,25 B18,4005 C10,12  
DR1,4 DRw53 DQ5,8

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,2,3,11,28,30,31,32,33,34,36,66,68,69,74

B12,17,35,44,45,51,53,57,58,71,75,76,77,78,82

DR 2,3,5,6,7,8,9,11,12,13,14,15,16,17,18 DRw52 DQ 2,4,7



A2 MFI 3449

T MCS 80

B MCS 103

**Negative!**

KPD Donor: A2,29 B56,61 C1,8  
DR1,4 DRw53 DQ5,8  
Blood type O

If you don't look you won't find ...

## Last Example ... Look for it ...



HLA: A2,68 B8,13 C6,7  
DR7,17 DRw52,53 DQ2

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,3,11,23,24,25,26,29,30,31,32,33,34,36,43,66,74,80

B27,39,42,48,54,55,56,57,58,60,61,63,67,7,73,81,82

DR1,4,9,10,12,13,14,15 DRw51 DQ4,5,6,7,8,9

DP1,3,5,6,9,10,11,13,14,15,17,18,19



Donor: A2,3 B18,35 C4,5

DR7,17 DRw52,53 DQ2

DP3,18

Blood type O

|      |     | 1:1    | 1:8   |
|------|-----|--------|-------|
| A3   | MFI | 7,944  | 1,674 |
| DP3  | MFI | 16,731 | 4,549 |
| DP18 | MFI | 4,964  | 677   |

Worth a try?



# Try it! ...



HLA: A2,68 B8,13 C6,7  
DR7,17 DRw52,53 DQ2

Blood type O

Calculated PRA – 100%

HLA Antibodies –

A 1,3,11,23,24,25,26,29,30,31,32,33,34,36,43,66,74,80

B27,39,42,48,54,55,56,57,58,60,61,63,67,7,73,81,82

DR1,4,9,10,12,13,14,15 DRw51 DQ4,5,6,7,8,9 DP1,3,5,6,9,10,11,13,14,15,17,18,19



Donor: A2,3 B18,35 C4,5

DR7,17 DRw52,53 DQ2

Blood type O

|             |            |               |              |
|-------------|------------|---------------|--------------|
|             |            | 1:1           | 1:8          |
| <b>A3</b>   | <b>MFI</b> | <b>7,944</b>  | <b>1,674</b> |
| <b>DP3</b>  | <b>MFI</b> | <b>16,731</b> | <b>4,549</b> |
| <b>DP18</b> | <b>MFI</b> | <b>4,964</b>  | <b>677</b>   |

1:1 T MCS 223

1:4 T MCS 134 As good as it gets?

1:8 T MCS 102

1:16 T MCS 78 NEGATIVE

1:1 B MCS 266

1:4 B MCS 183

1:8 B MCS 135

1:16 B MCS 98 NEGATIVE

Transplanted,  
creat 0.9, no  
proteinuria

# **Methodist San Antonio incompatible kidney transplant program**

**8/09-present, 38 LD kidney transplants in patients with incompatible donors and cPRA  $\geq$  98%**

- **5 patients with cPRA 98%**
  - 3/5 had desensitization
- **9 patients with cPRA 99%**
  - 5/9 had desensitization
- **24 patients with cPRA 100%**
  - 15/24 had desensitization
- **34/38 transplanted with KPD**
- **24/38 re-transplant patients**

**One case of antibody mediated rejection**

# Regional / National Programs

## Strengths

**Larger pool**

**Sophisticated software**

**Heterogeneous HLA  
populations**

**Large pool of non-  
directed donors**

## Weaknesses

**Slower**

**Difficult to individualize**

**More rigid**

**Shipping kidneys**

**Cost**

# Summary

## *Advantages of single center KPD*

- **More control over your patients**
  - Fast time to transplant
  - Easier logistically (work at our own schedule/pace)
- **Use of compatible pairs to transplant blood type O recipients with younger non-O donors**
  - May be easier to consent within single center
- **Combination KPD plus desensitization to transplant the most highly sensitized**
  - More aggressive approach, easier logistically
  - Think of it ... Try it ... Do it! with frozen donor cells
  - Low risk, excellent results

# Regional / National Programs

## Strengths

**Larger pool**

**Sophisticated software**

**Heterogeneous HLA  
populations**

**Large pool of non-  
directed donors**

## Weaknesses

**Slower**

**Difficult to individualize**

**More rigid**

**Shipping kidneys**

**Cost**

# Time on dialysis is not good ...

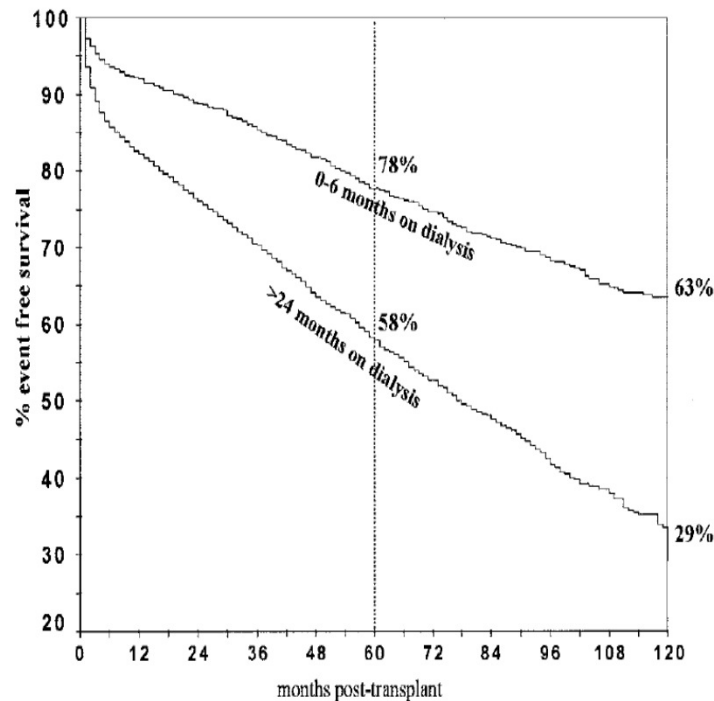


FIGURE 1. Unadjusted graft survival in 2,405 recipients of paired kidneys with short compared to long ESRD time.

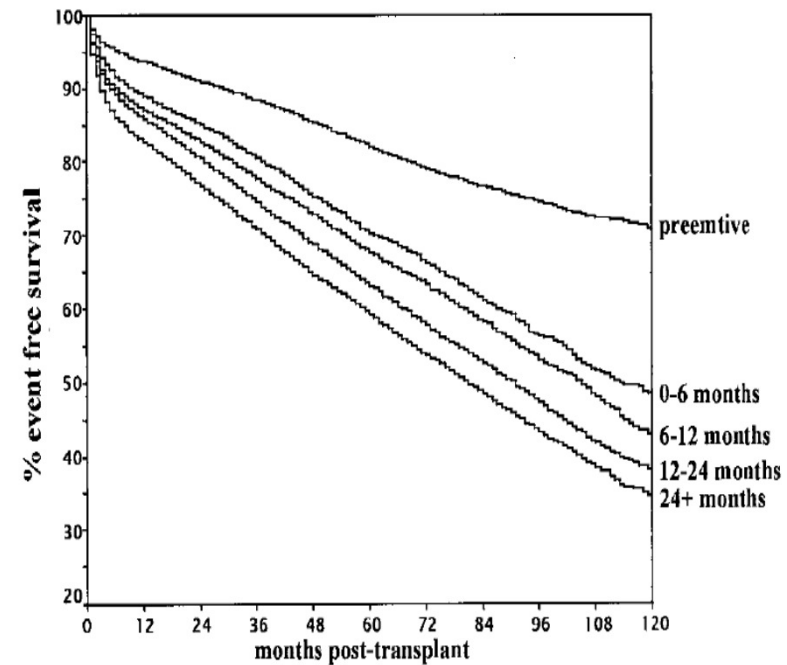


FIGURE 2. Unadjusted graft survival in 56,587 recipients of cadaveric transplants by length of dialysis treatment before transplant.

Meier-Kriesche and Kaplan: Transplantation. 2002;74:1377-81

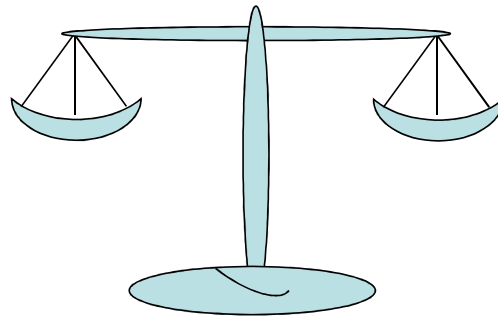
# Summary

## *Advantages of single center KPD*

- **More control over your patients**
  - Fast time to transplant
  - Easier logistically (work at our own schedule/pace)
- **Use of compatible pairs to transplant blood type O recipients with younger non-O donors**
  - May be easier to consent within single center
- **Combination KPD plus desensitization to transplant the most highly sensitized**
  - More aggressive approach, easier logistically
  - Think of it ... Try it ... Do it! with frozen donor cells
  - Low risk, excellent results

# What is the future of KPD?

- More single center programs?
- Multi-center programs?
- Multiple national programs?
- International programs?



**Different programs have different needs**



## **Challenge ...**

- **How does your program match up?**
- **Can you do more?**

**Assistance is available to help you  
break through the barriers!**

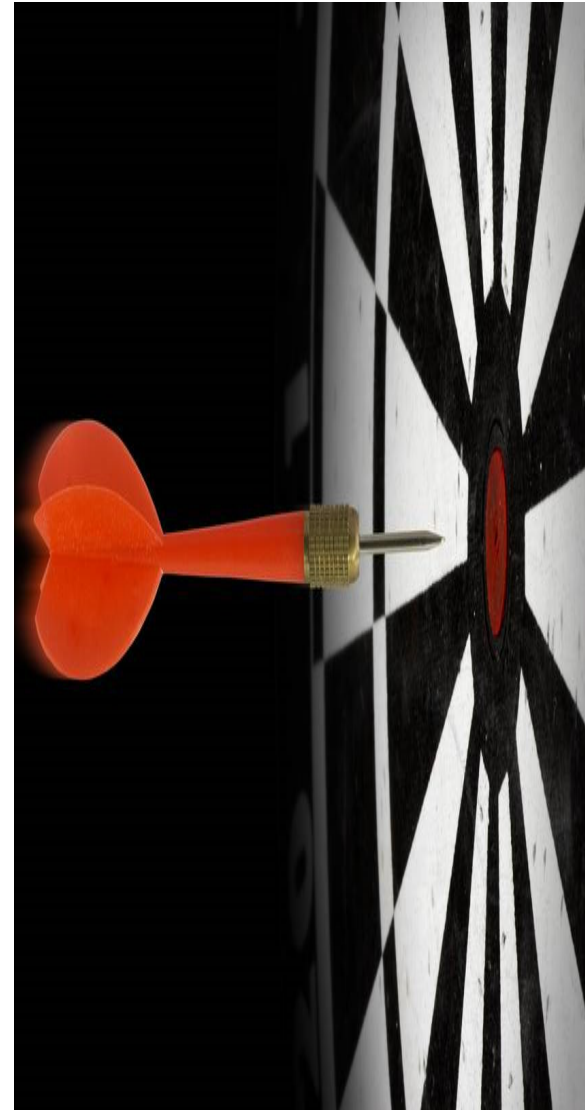
# Acknowledgements

**Cathi Murphey, Ph.D.**

**Southwest  
Immunodiagnostics, Inc.**

**The staff at Methodist  
San Antonio**

**Thank you for the  
invitation**



# Summary

**Talent, Technology, Teamwork  
and Time are the keys to success!**

# Who benefits from KPD?



**Donors are heroes in transplantation!**



## KPD flow ...

**Education and consent for evaluation / KPD**



**Incompatible crossmatch result**

**Entrance into single  
center KPD database**



**Plan exchange**

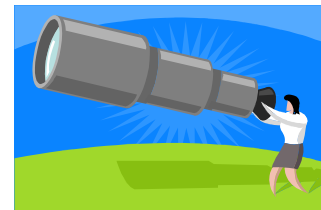
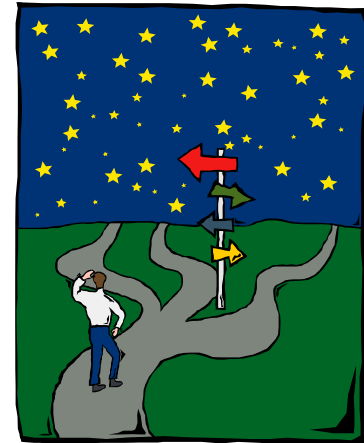
**Evaluation process (4-12 weeks)**



**Transplant**

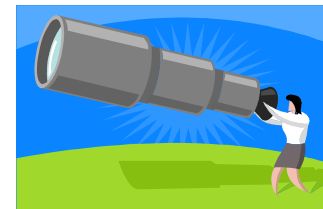
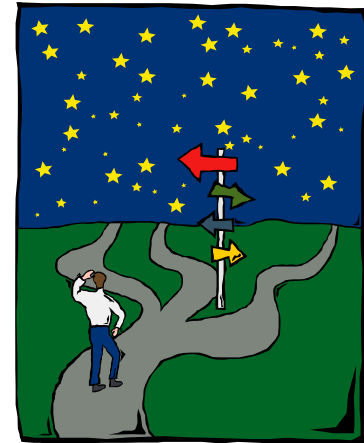
**Entrance into National KPD program database**

# KPD keys to success





# KPD keys to success





## KPD keys to success

- Great KPD staff / a champion / teamwork with the HLA staff
- Recipient / donor education, efficient entry of pairs into database



- Matching program and allocation principles
  - Planning the logistics
- } ?  
Outsource

# How do you choose?

## *Single center or National Program?*

- **Can you do it yourself?**

- Size of the program

- Do you have the time and expertise

**National  
program**

- **Will you do more or fewer transplants?**

- **More or less efficient?**

- **Faster or slower pace?**

# Need to under-assign antibody and search for a great class I match ...



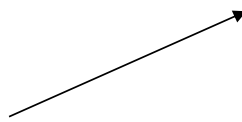
HLA: A2,24 B48,61 C8,15  
DR4,11 DRw52,53 DQ7,8

Blood type A

Calculated PRA – 100%

HLA Antibodies –

A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80  
B12,14,18,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10  
DR 1,3,9,10,17,18,103 DRw51 DQ 2,4,5,6



KPD Donor: A2 B51 C8,15  
DR8,14 DRw52 DQ4,7  
Blood type A

|     |     | 1:1   | 1:8   |
|-----|-----|-------|-------|
| B51 | MFI | 5,200 | 2,800 |
| DQ4 | MFI | 7,400 | 2,400 |

## What should we do?

# Need to under-assign antibody and search for a great class I match ...



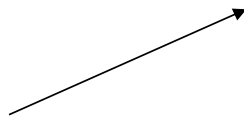
HLA: A2,24 B48,61 C8,15  
DR4,11 DRw52,53 DQ7,8

Blood type A

Calculated PRA – 100%

HLA Antibodies –

A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80  
B12,14,18,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10  
DR 1,3,9,10,17,18,103 DRw51 DQ 1,4,5,6



Donor: A2 B51 C8,15  
DR8,14 DRw52 DQ4,7  
Blood type A

|     |     | 1:1   | 1:8   |
|-----|-----|-------|-------|
| B51 | MFI | 5,200 | 2,800 |
| DQ4 | MFI | 7,400 | 2,400 |

T MCS 322  
B MCS 281

**Too strong!**

# Need to under-assign antibody and search for a great class I match ...



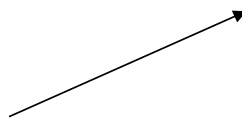
HLA: A2,24 B48,61 C8,15  
DR4,11 DRw52,53 DQ7,8

Blood type A

Calculated PRA – 100%

HLA Antibodies –

A 1,3,10,11,19,25,26,28,29,30,31,32,33,34,36,43,66,68,69,74,80  
B12,14,18,39,41,44,45,51,54,59,60,64,65,75,76,77,78 C3,9,10  
DR 1,3,9,10,17,18,103 DRw51 DQ 1,4,5,6



1:1 1:8

B51 MFI 5200 2800

DQ4 MFI 7400 2400

Donor: A2 B51 C8,15  
DR8,14 DRw52 DQ4,7  
Blood type A

T MCS 322  
B MCS 281

... We can do better

# How do you choose?

## *Single center or National Program?*

- Can you do it yourself?

~~– Small program~~

~~– Don't have the time or expertise~~



**National  
program**

- Efficiency
- Control
- Flexibility



**Single  
center**

# Example



**Calculated PRA – 100%**

**HLA Antibodies –**

**A 2,23,24,25,28,30,31,32,34,66,68,69**

**B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82**

**C1,2,4,5,6,8,9,10,14,15,16,17,18**

**DR 4,7,9 DRw53 DQ 7,8,9**

**DP 1,2,4,5,10,11,13,14,15,19,20,23,28**

# Example ... guess the crossmatch result?



Calculated PRA – **100%**

HLA Antibodies –

A **2**,23,24,25,28,30,31,32,34,66,68,69

B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51

52,53,55,56,57,58,59,60,61,**62**,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

Blood type A

A2 **MFI 2300**

B62 **MFI 2700**

**T MCS 369**

**B MCS 272**

**Why so strong?????**

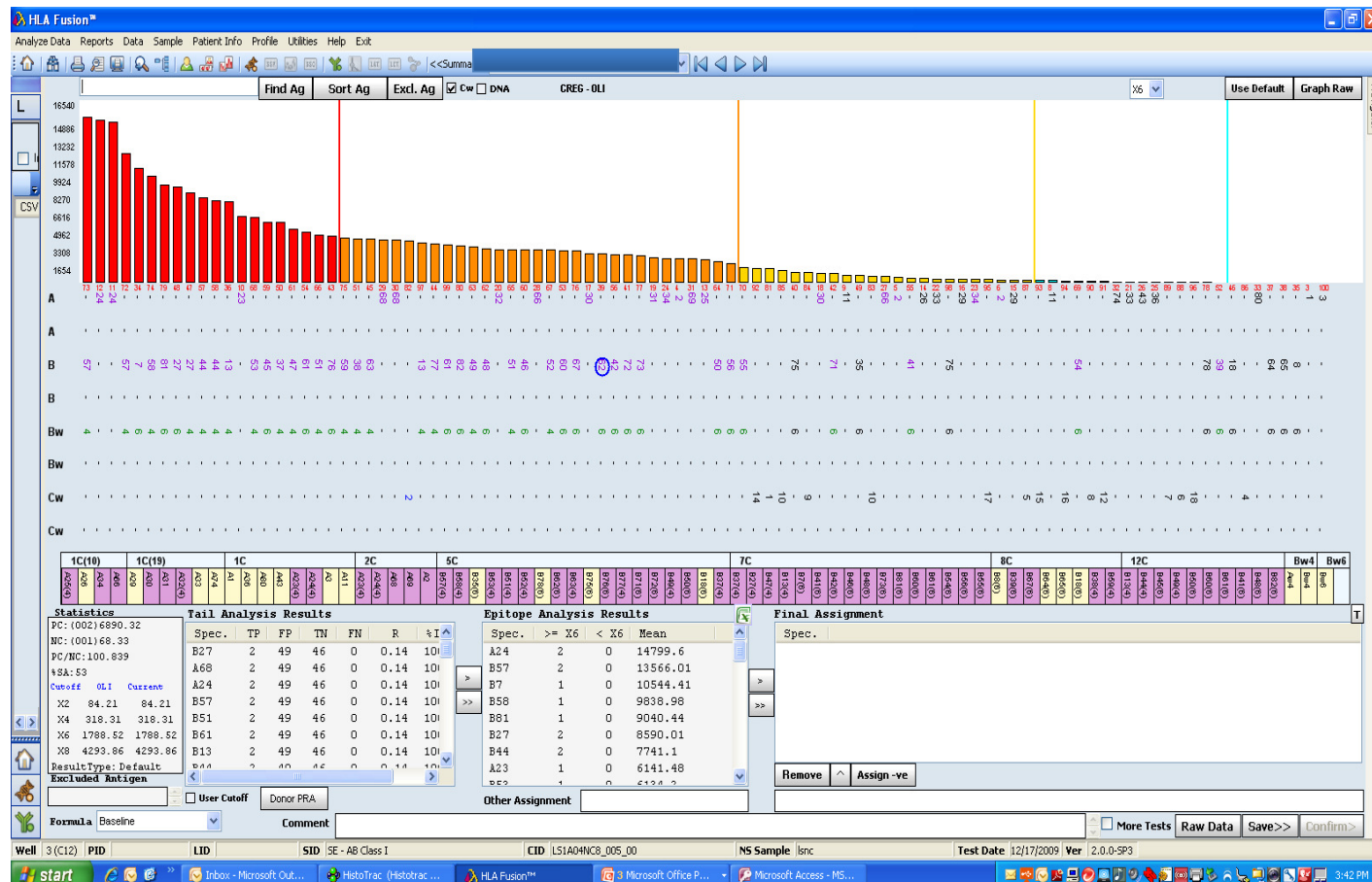


Donor: **A2 B8,62** C3,7  
DR13,17 DRw52 DQ2,6  
Blood type O



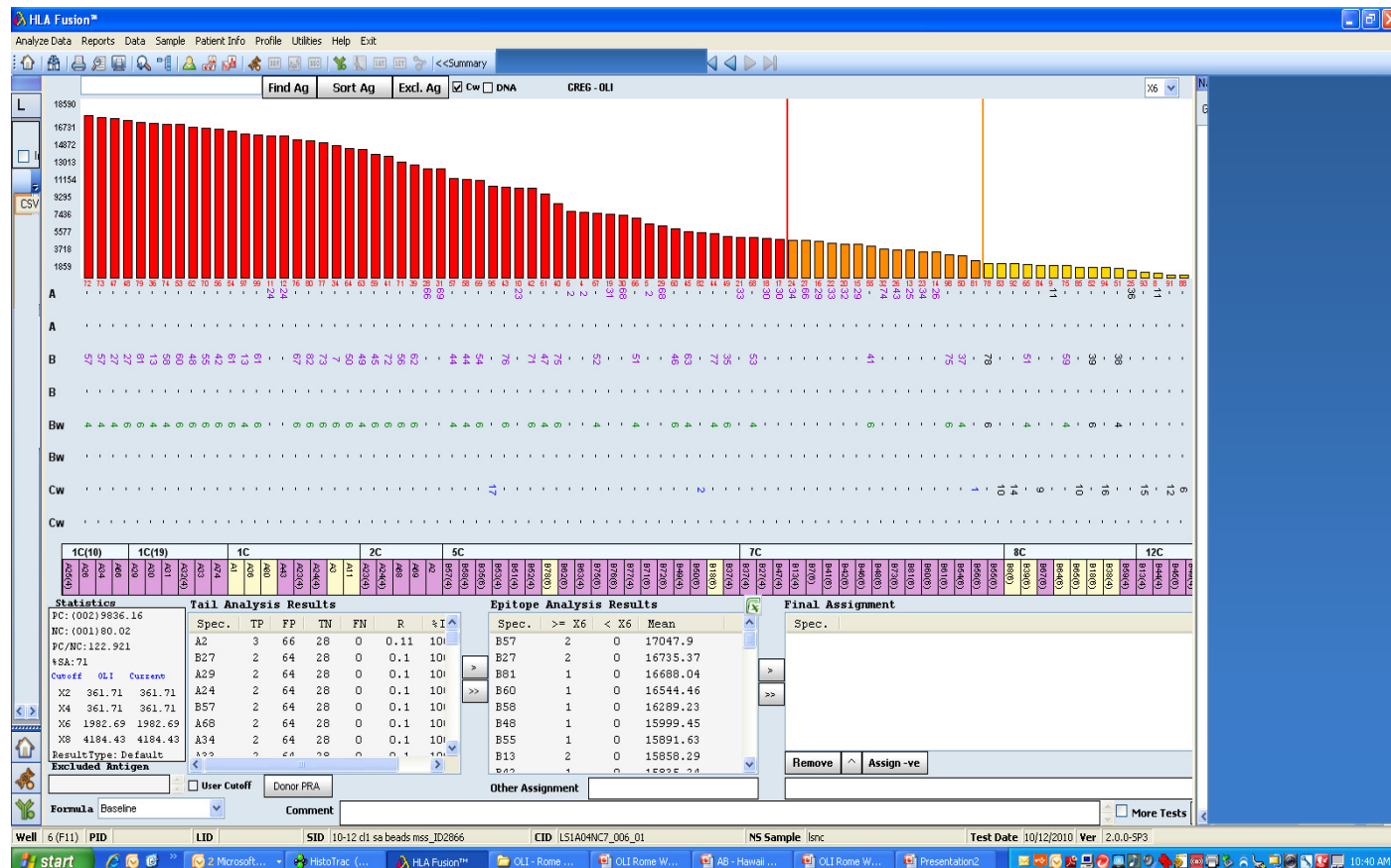


# Class I antibodies undiluted





# Class I at 1:8 dilution!



## The prozone effect ...

**A2 1:1 MFI 2300**

**1:8 MFI 6940!**

**B62 1:1 MFI 2700**

**1:8 MFI 11,800!**

## **Be careful of the prozone effect ...**

- **Reassign based on 1:8 dilutions ...**
- **Donor pops up!**
  - **HLA A3,30;B18,38 C12 DR13,14 DQ2,5 DRw52**
- **Donor specific antibodies**
  - **A30 1:1 MFI 6166**      **B38 1:1 MFI 3669**
  - **A 30 1:8 MFI 4144**      **B38 1:8 MFI 1185**



Calculated PRA – **100%**

HLA Antibodies –

A 2,23,24,25,28,30,31,32,34,66,68,69

B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51

52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw 53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

Blood type A



Donor: **A3,30 B18,38 C12**

DR13,14 DRw52 DQ2,5

Blood type A1

**T MCS 160**

**B MCS 130**

**Looks good!**

# Success!



PRA 0%  
Blood type O



Calculated PRA – **100%**

HLA Antibodies –

A 2,23,24,25,28,30,31,32,34,66,68,69

B7,12,13,17,21,27,37,38,40,42,44,45,46,47,48,49,50,51  
52,53,55,56,57,58,59,60,61,62,63,67,72,73,76,77,81,82

C1,2,4,5,6,8,9,10,14,15,16,17,18

DR 4,7,9 DRw53 DQ 7,8,9

DP 1,2,4,5,10,11,13,14,15,19,20,23,28

Blood type A



cPRA **71%**

HLA Antibodies –

A2,28,68,69

B13,62,75,76,77

DR7,9

Blood type O



Donor: A3,30 B18,38 C12  
DR13,14 DRw52 DQ2,5  
Blood type A1

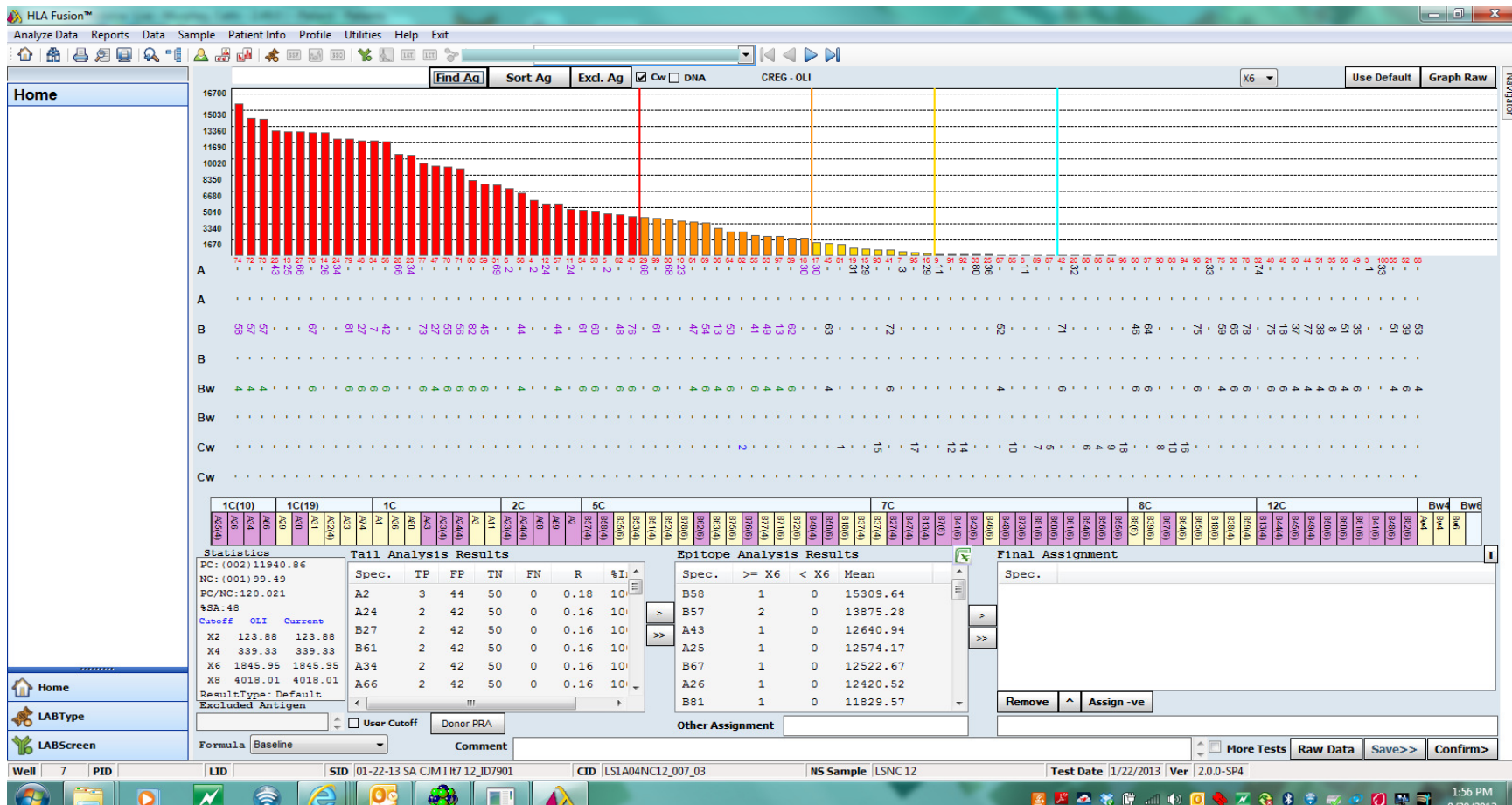


Donor: A3,11 B35,57 C4,6  
DR13,14 DRw52 DQ5,6  
Blood type O

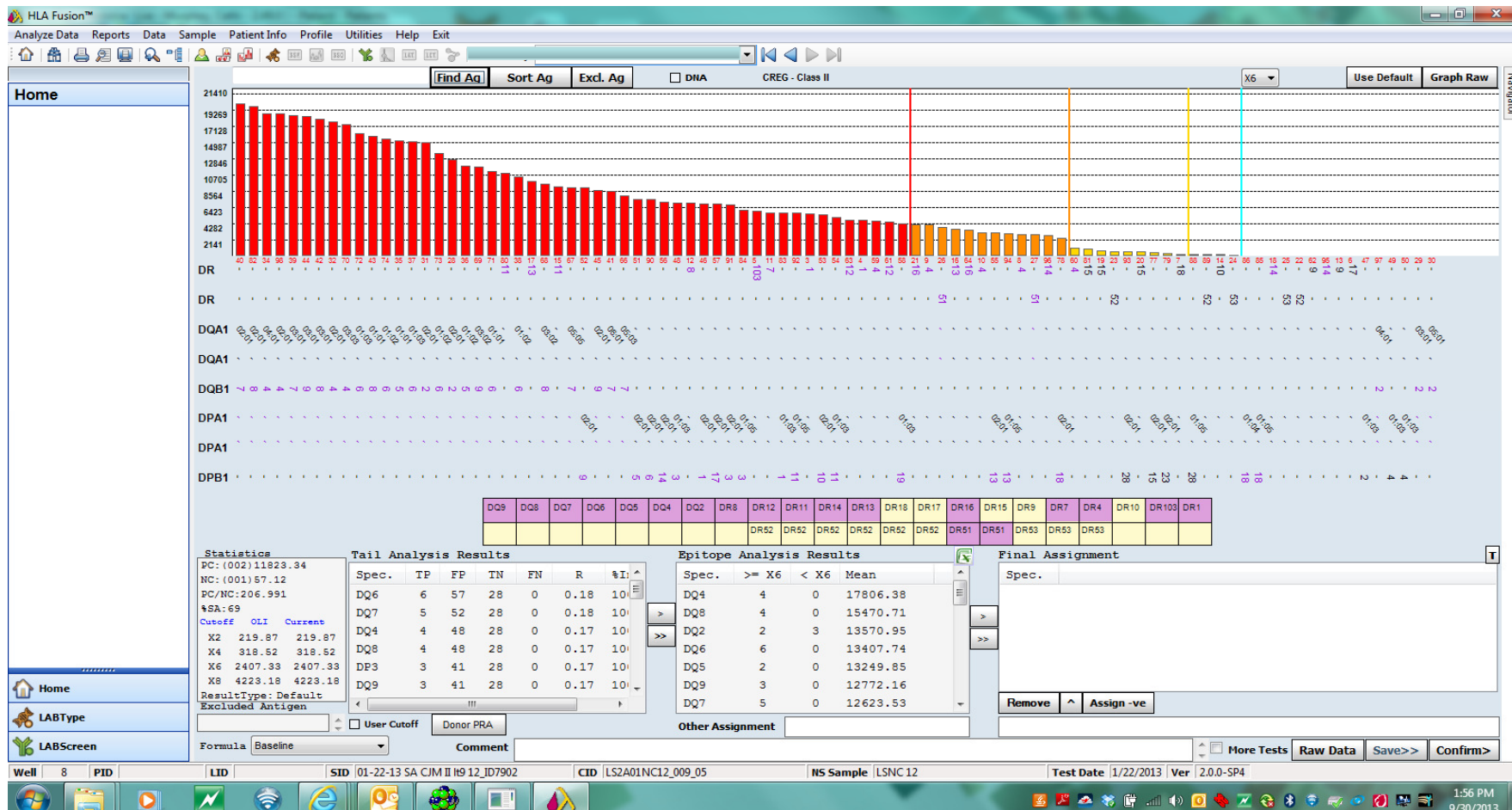


Donor: A3,30 B14,53  
C4,8 DR7,13 DRw52,53  
DQ2,6  
Blood type O

# 47 year old woman, previous transplant, on dialysis 17 years, multiple lists

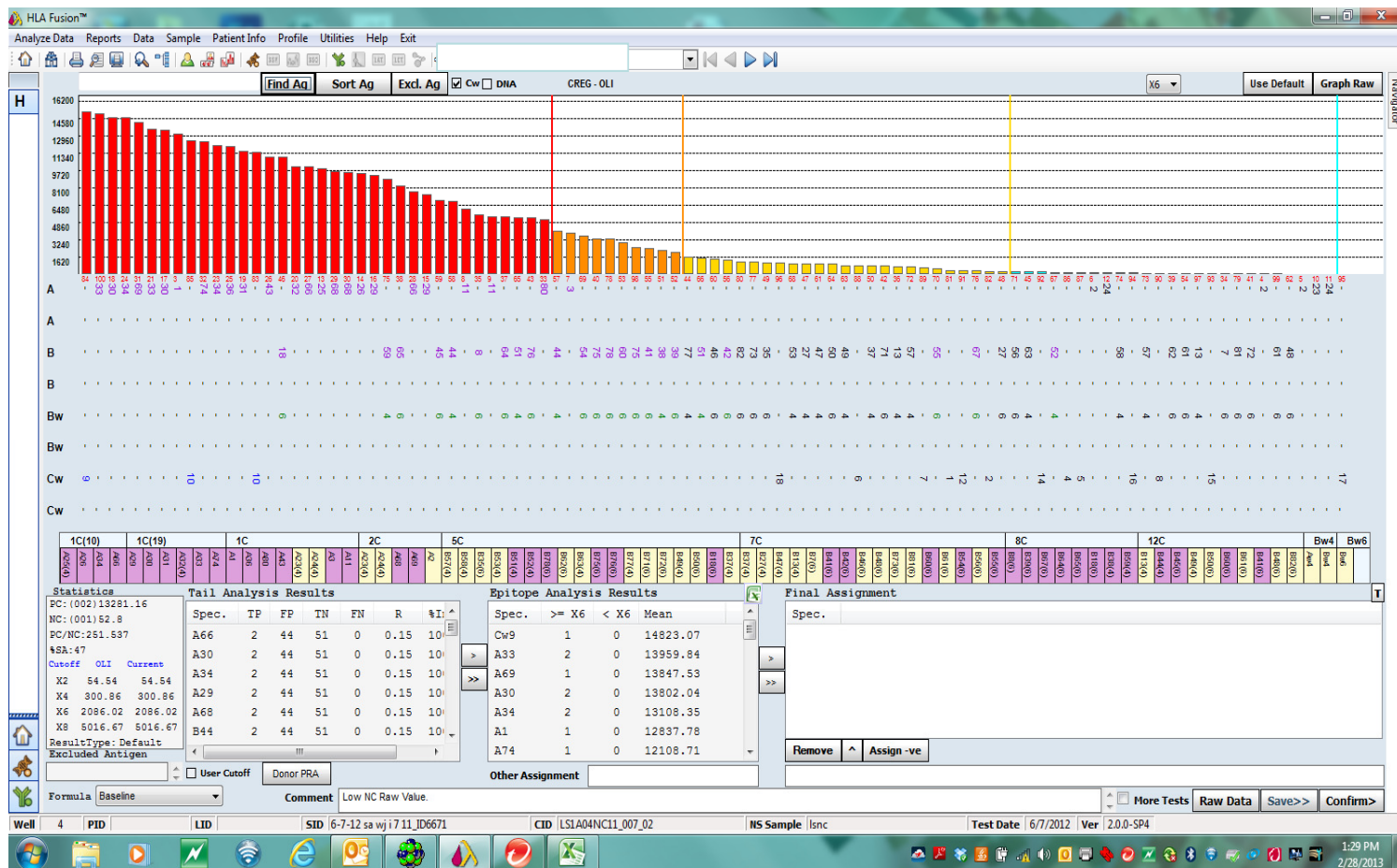


# 47 year old woman, previous transplant, on dialysis 17 years, multiple lists

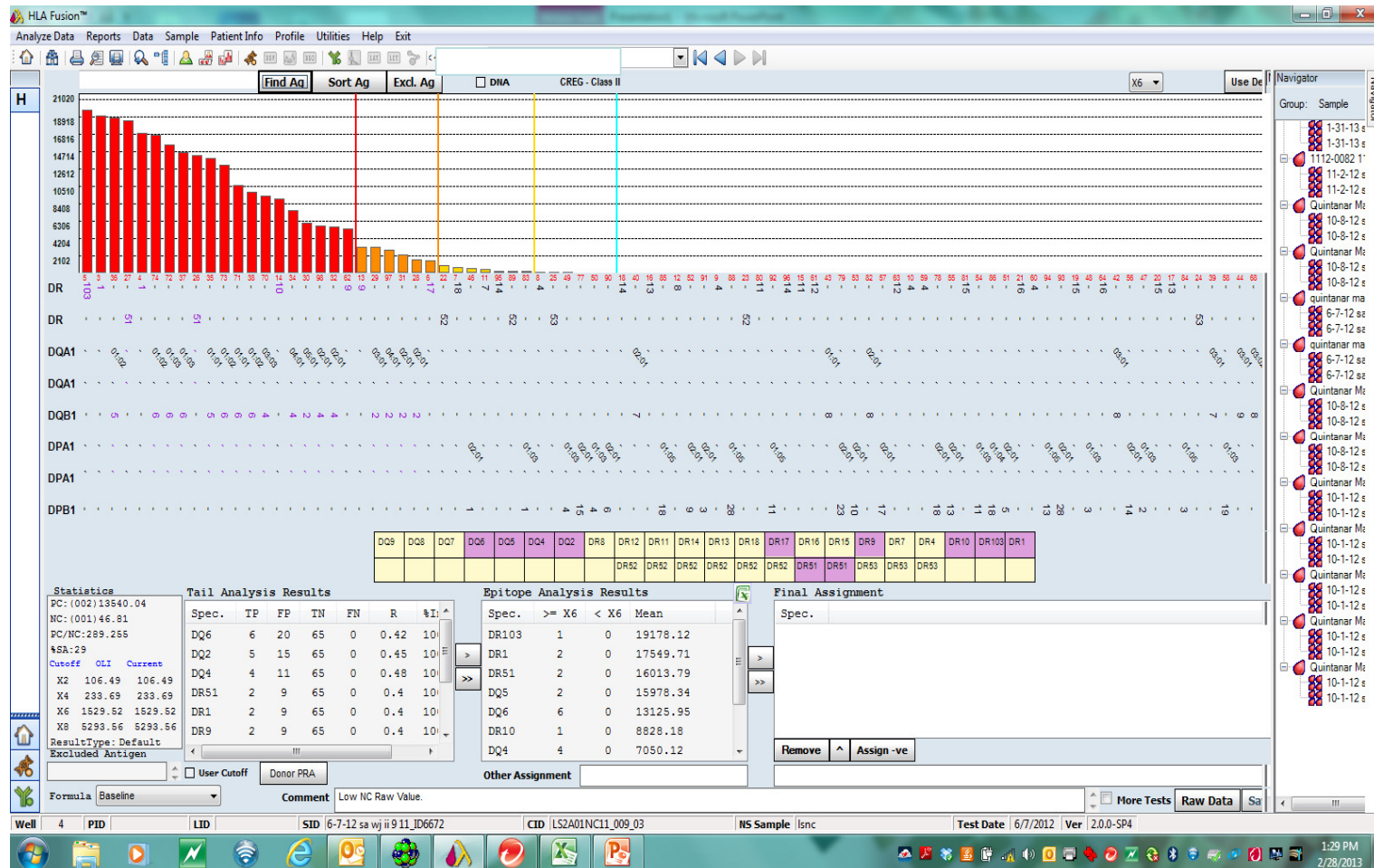




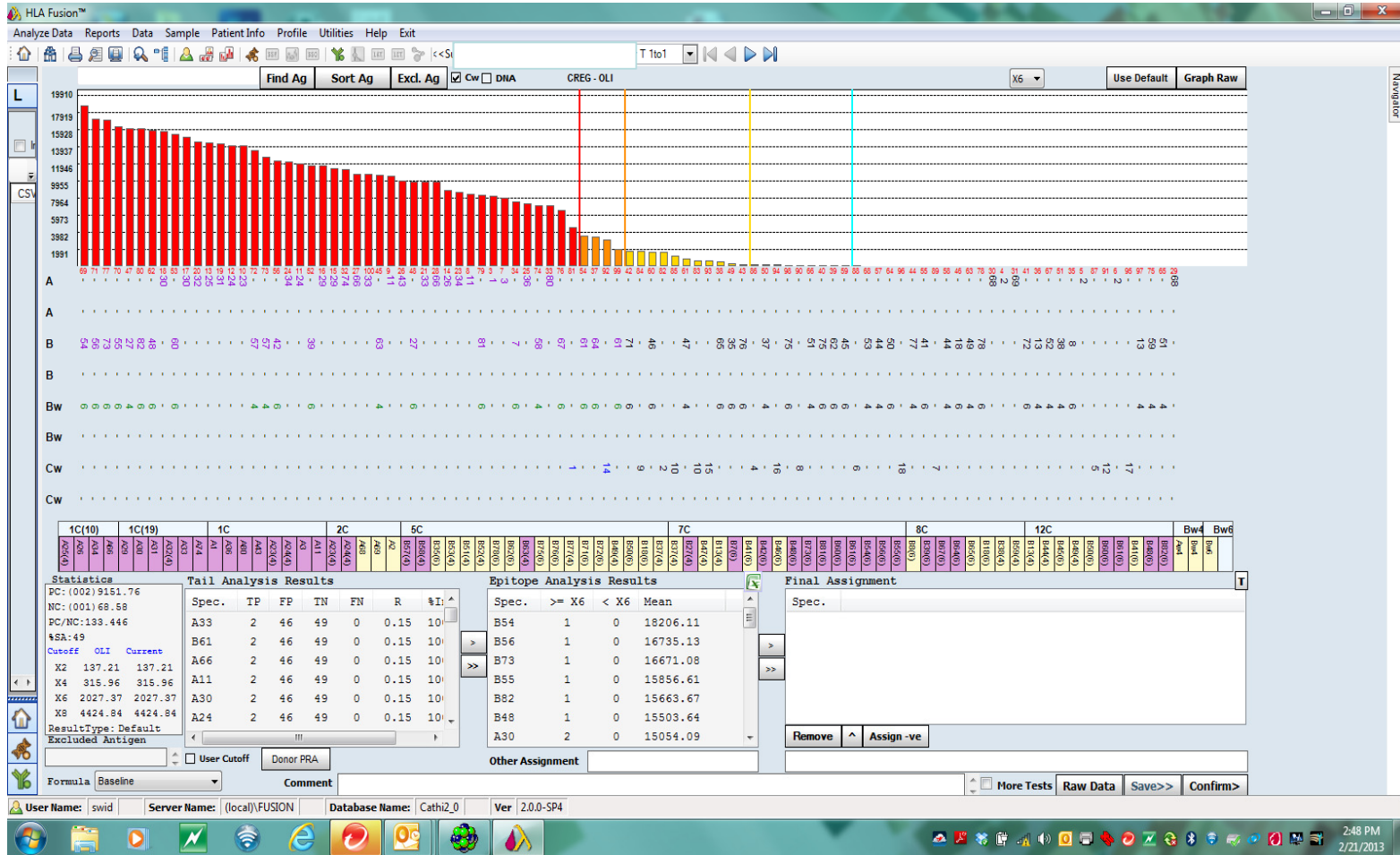
65 year old woman, previous transplant never worked, > 7 years waiting time ...



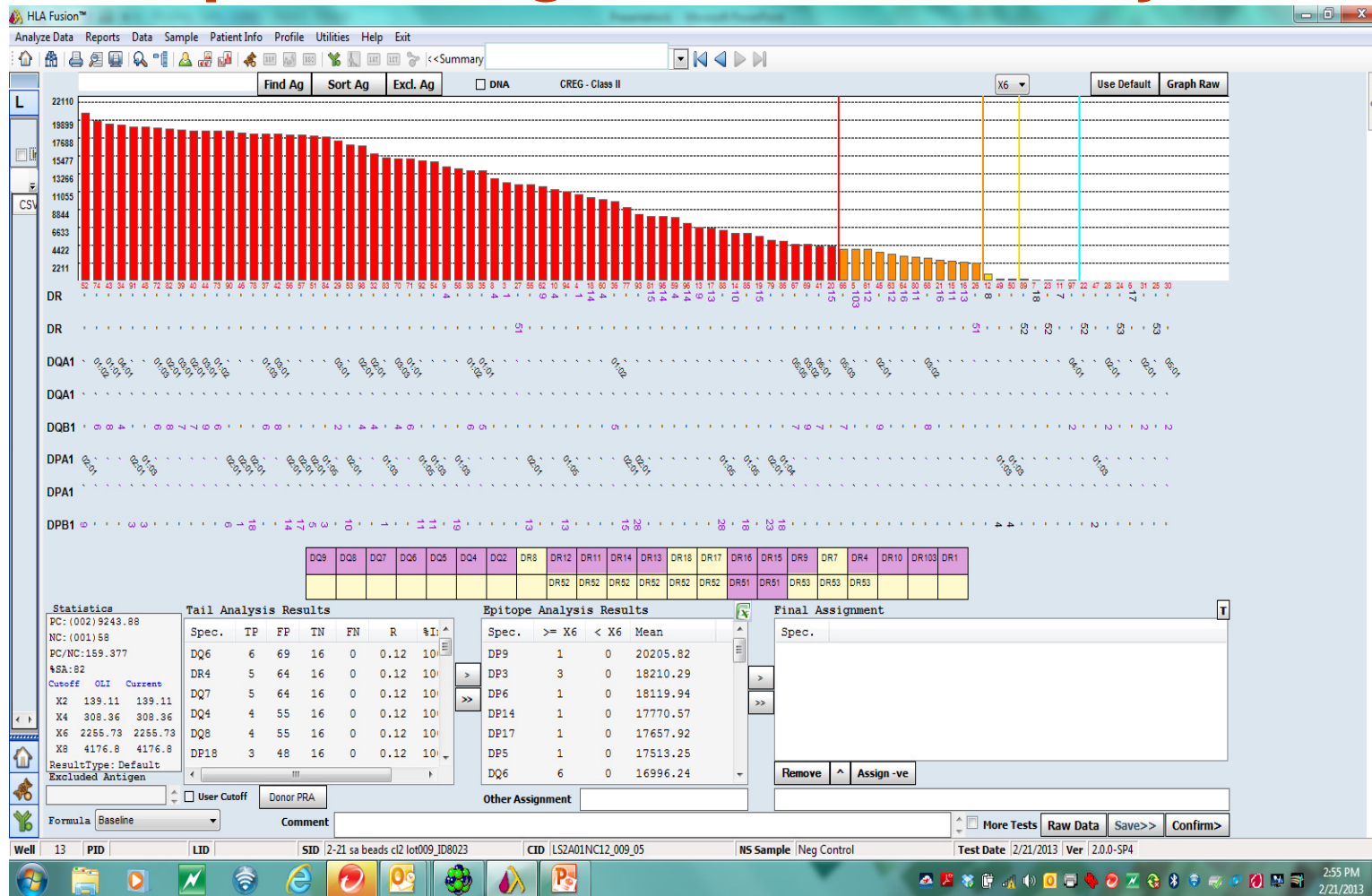
## 65 year old woman, previous transplant never worked ...



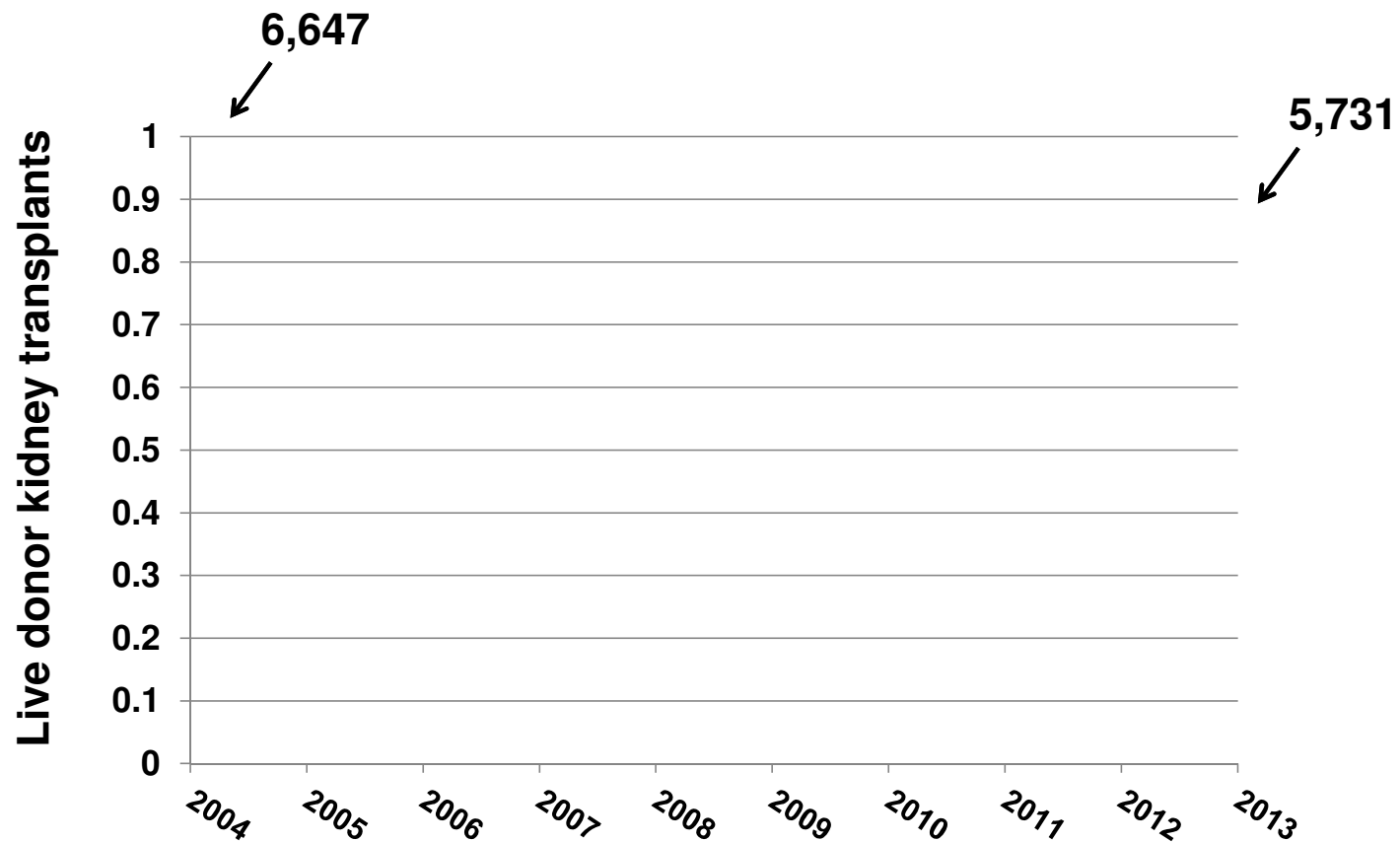
## 37 year old woman, previous transplant, multiple waiting lists for over 10 years



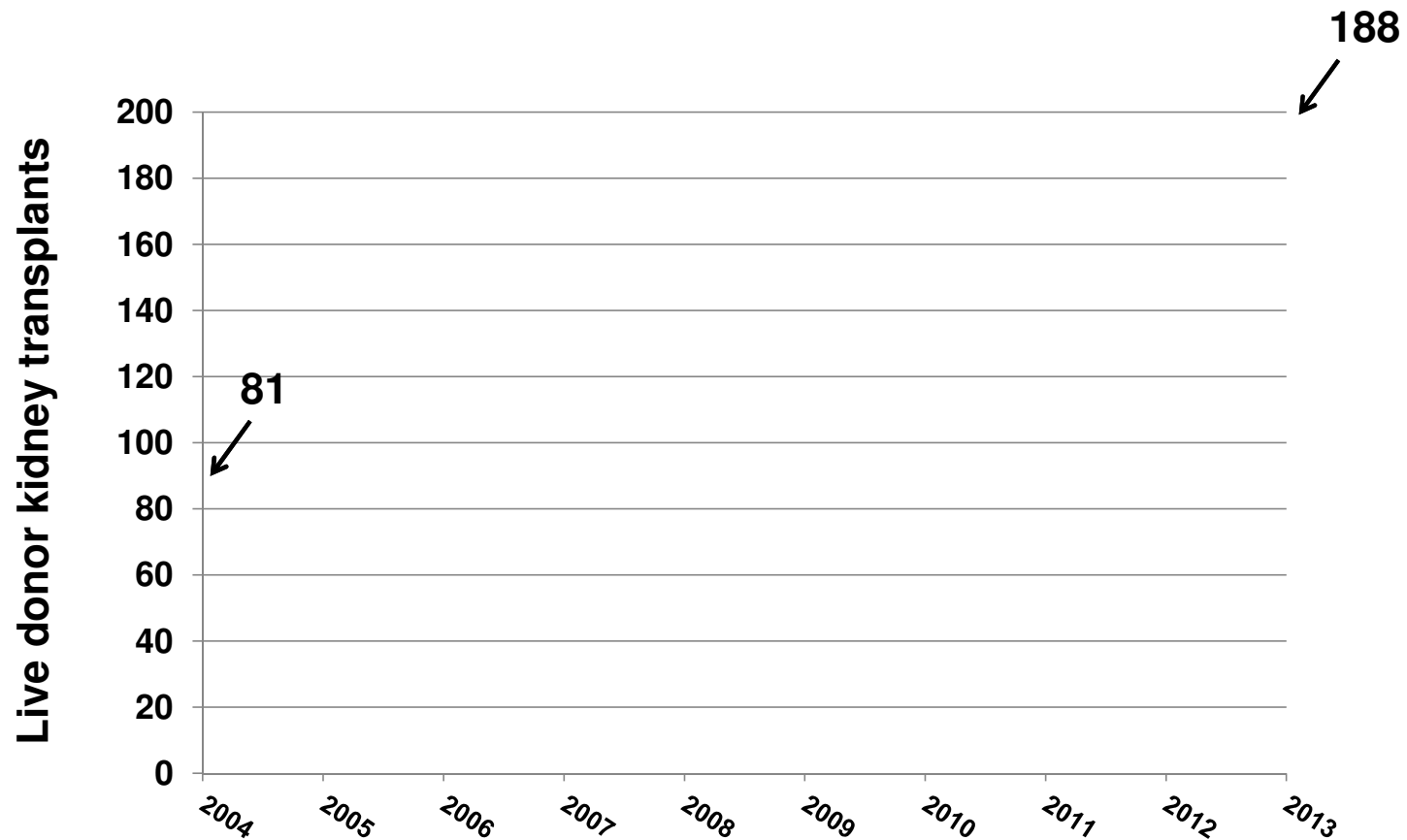
# 37 year old woman, previous transplant, multiple waiting lists for over 10 years



# Live donor kidney transplantation in the U.S. is decreasing



# Live donor kidney transplantation at Methodist San Antonio is increasing



# Example



**Calculated PRA – 100%**

**HLA Antibodies –**

**A 3,11,23,25,26,32,33,34,43,66,68,69,74,80**

**B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,  
58,59,60,61,62,63,64,65,67,70,71,72,75,76,77,78,81,82**

**C7,12,15**

**DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9**

**DP 1,3,5,6,9,11,13,14,17,18,20,28**

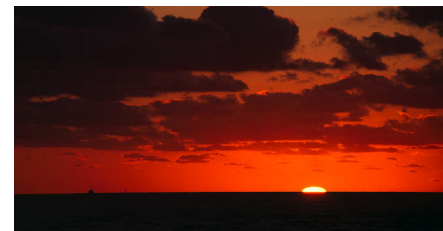
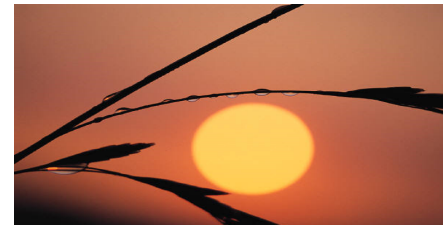


# Methodist San Antonio approach to the most highly sensitized

Look for it ... Try it ... Do it!

“She loves me ... She loves me not ...”

- **Look!** ... Aggressively drop off antibody in a KPD database looking for possibilities ...
- **Try!** Crossmatch promising pairs with **STORED FROZEN DONOR CELLS! ... NO DELAY!**
- **She loves me? ... TRANSPLANT!**
- **She loves me not? ... GO FISH!**





# Looking



A2,29 B44 C5,16  
DR7,13 DRw52,53 DQ2,6

Calculated PRA – 100%

HLA Antibodies –

A 3,11,23,25,26,32,33,34,43,66,68,69,74,80

B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
62,63,64,65,67,70,71,72,75,76,77,78,81,82 C7,12,15

DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9

DP 1,3,5,6,9,11,13,14,17,18,20,28



Donor: A1,29 B8,44 C7,16  
DR7,17 DRw52,53 DQ2 DP4



C7 MFI 3615

**Guess the  
crossmatch?**

# Trying



A2,29 B44 C5,16  
DR7,13 DRw52,53 DQ2,6

Calculated PRA – 100%

HLA Antibodies –

A 3,11,23,25,26,32,33,34,43,66,68,69,74,80

B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
,62,63,64,65,67,70,71,72,75,76,77,78,81,82 C7,12,15

DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9

DP 1,3,5,6,9,11,13,14,17,18,20,28



Donor: A1,29 B8,44 C7,16  
DR7,17 DRw52,53 DQ2 DP4

1:1 T MCS 642

1:4 T MCS 618

1:8 T MCS 605

1:1 B MCS 477

1:4 B MCS 453

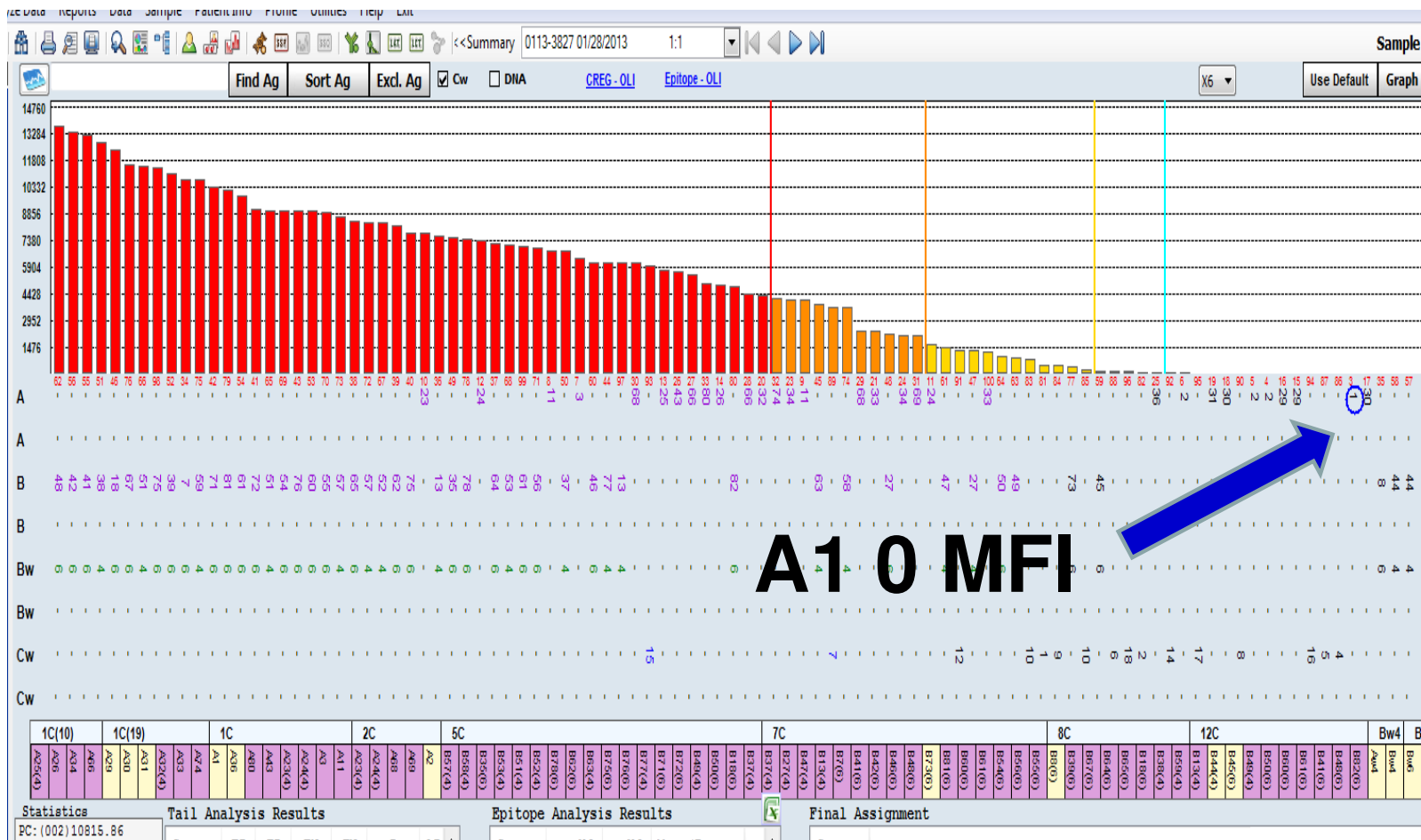
1:8 B MCS 446

**FAILED!**

**What ??**

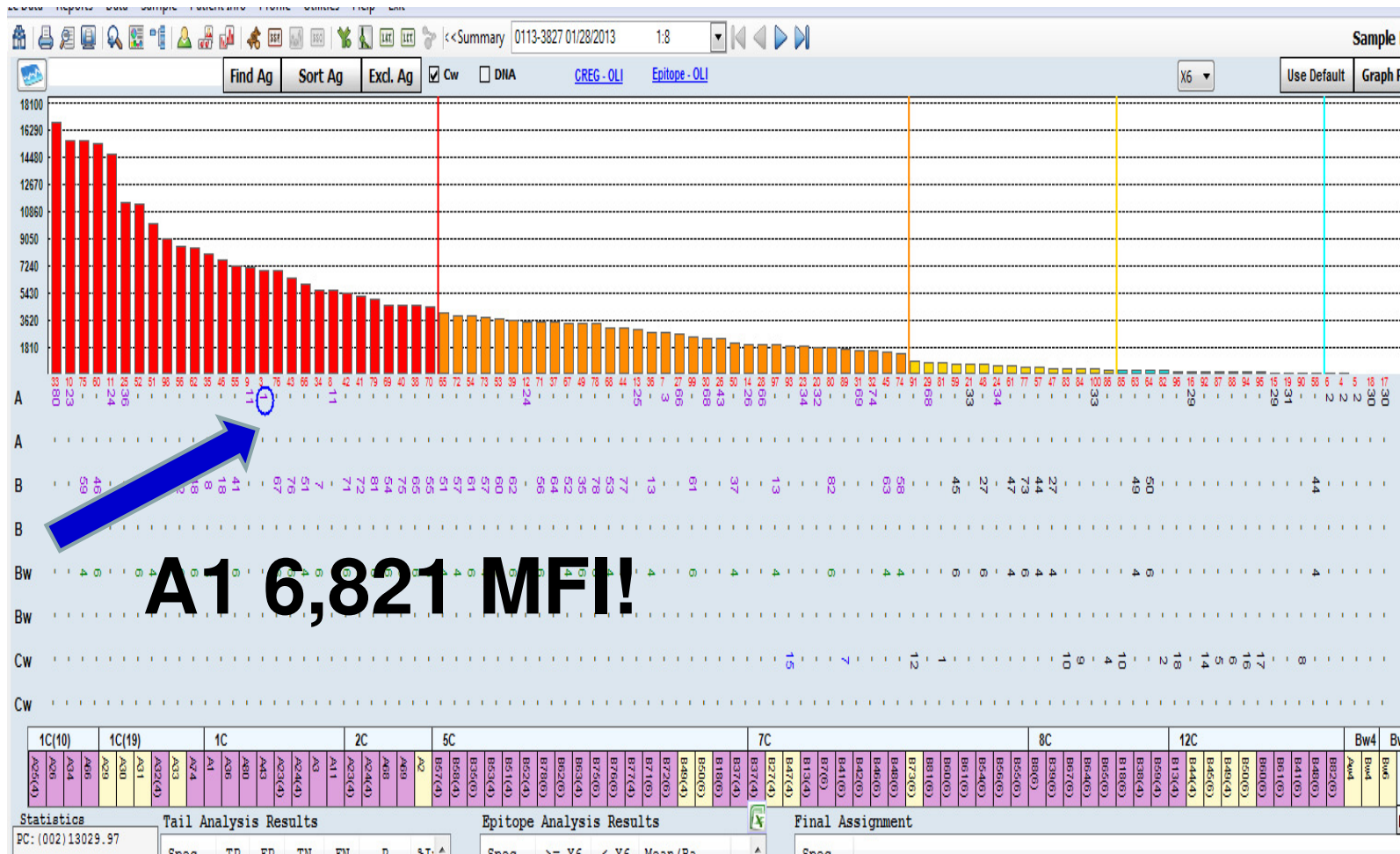
# What ??...

## Undiluted



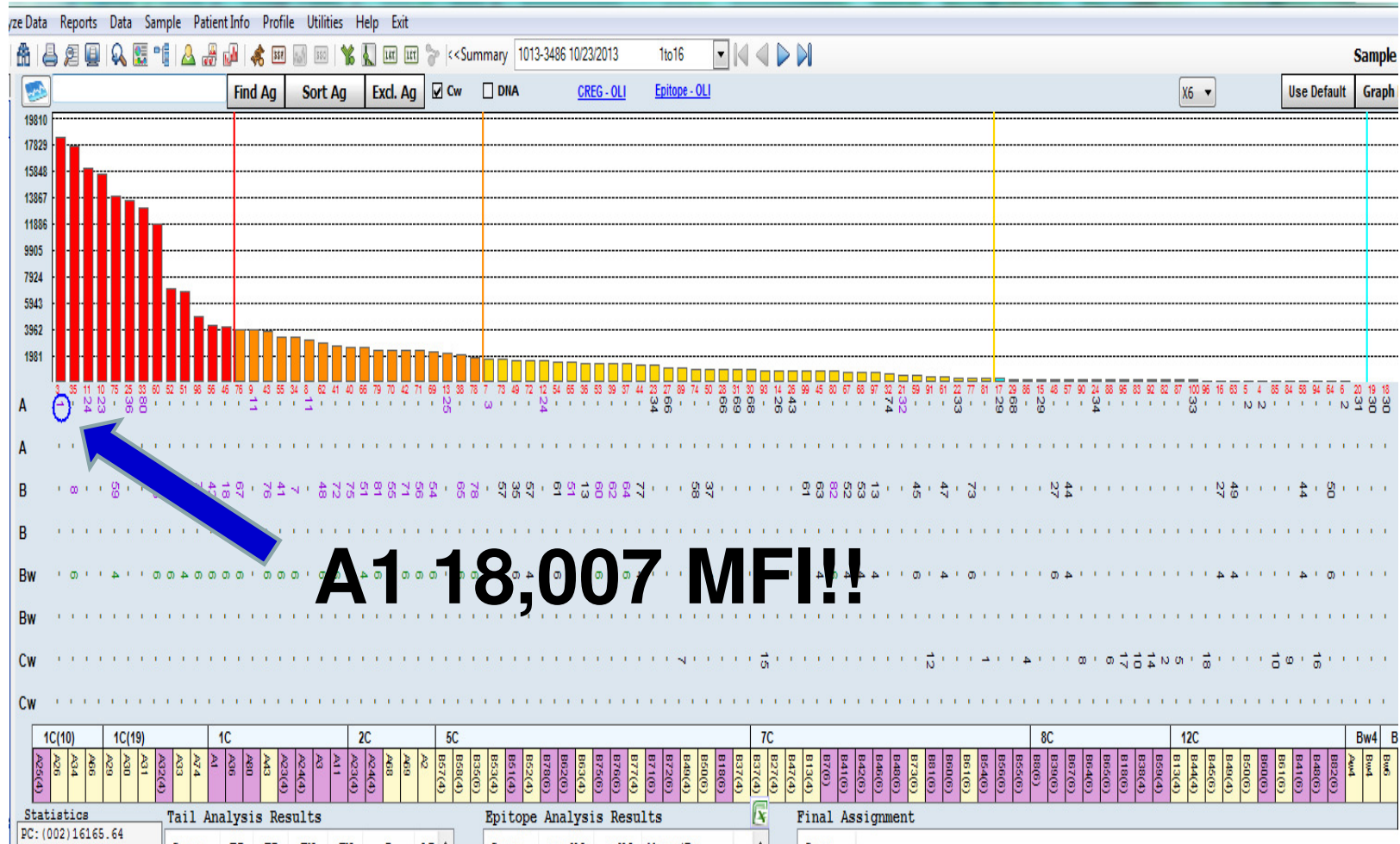
# What ??

# 1:8 dilution



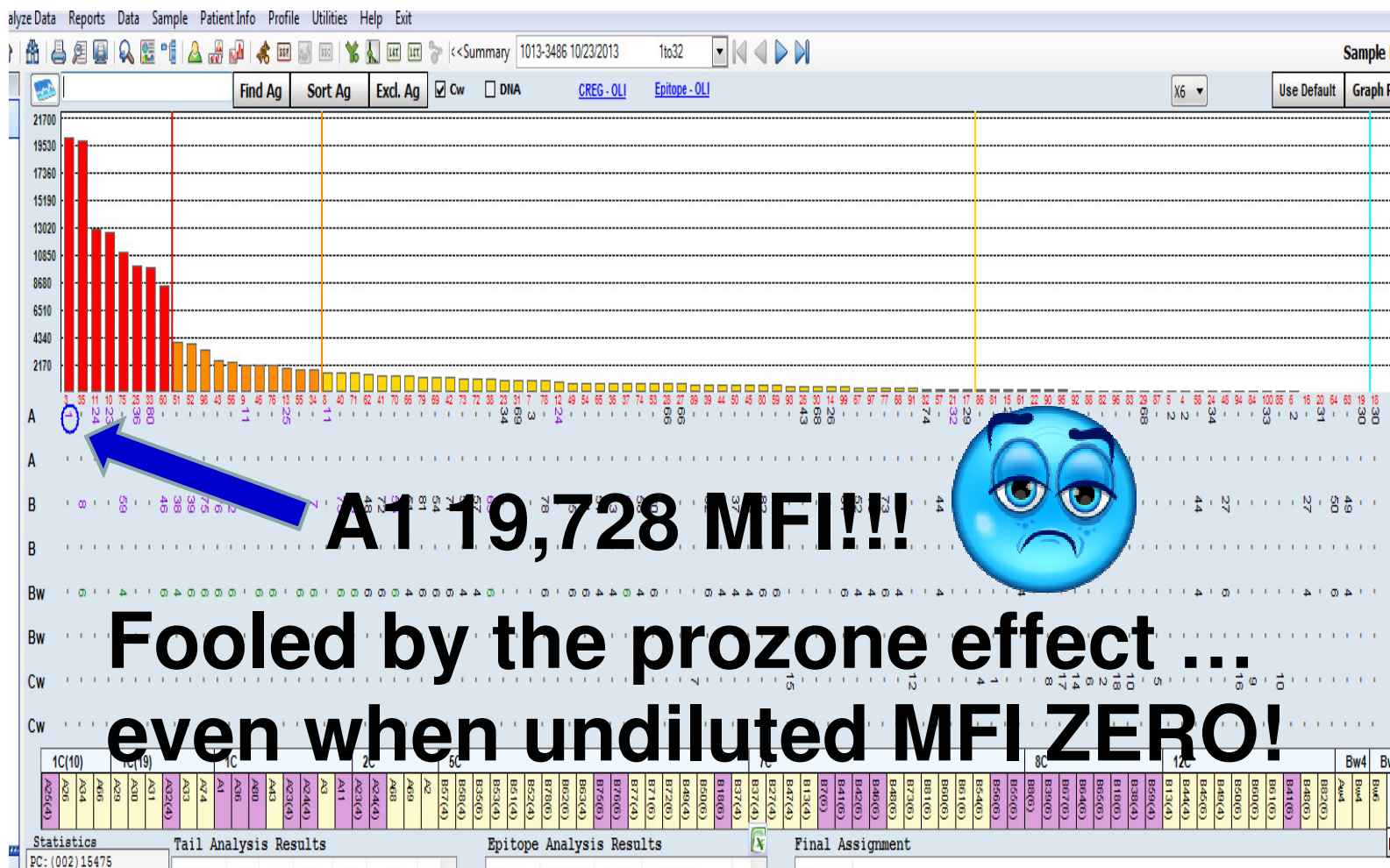
# What ??

# 1:16 dilution



# What ??

# 1:32 dilution





# Looking



A2,29 B44 C5,16  
DR7,13 DRw52,53 DQ2,6

Calculated PRA – **100%**

HLA Antibodies –

A 3,11,23,25,26,32,33,34,43,66,68,69,74,80

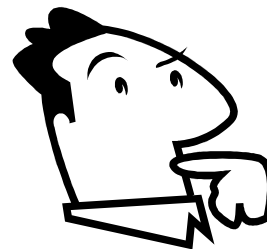
B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
,62,63,64,65,67,70,71,72,75,76,77,78,81,82 C7,12,15

DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9

DP 1,3,5,6,9,11,13,14,17,18,20,28



Donor: A2,68 B13,44 C6,16  
DR7 DRw53 DQ2 DP4



|     |           |       |
|-----|-----------|-------|
|     | 1:1       | 1:16  |
| B13 | MFI 9,653 | 2,259 |
| A68 | MFI 2,779 | 455   |

**Guess the  
crossmatch?**

# Trying



A2,29 B44 C5,16  
DR7,13 DRw52,53 DQ2,6

Calculated PRA – **100%**

HLA Antibodies –

A 3,11,23,25,26,32,33,34,43,66,68,69,74,80

B13,18,27,35,37,38,39,41,42,46,48,51,52,53,54,55,56,57,58,59,60,61  
62,63,64,65,67,70,71,72,75,76,77,78,81,82 C7,12,15

DR 1,4,9,10,14,15,16,103 DRw51 DQ 4,5,7,8,9

DP 1,3,5,6,9,11,13,14,17,18,20,28



Donor: A2,68 B13,44 C6,16  
DR7 DRw53 DQ2 DP4

1:1 T MCS 259

1:4 T MCS 138

1:16 T MCS 62

1:1 B MCS 226

1:4 B MCS 177

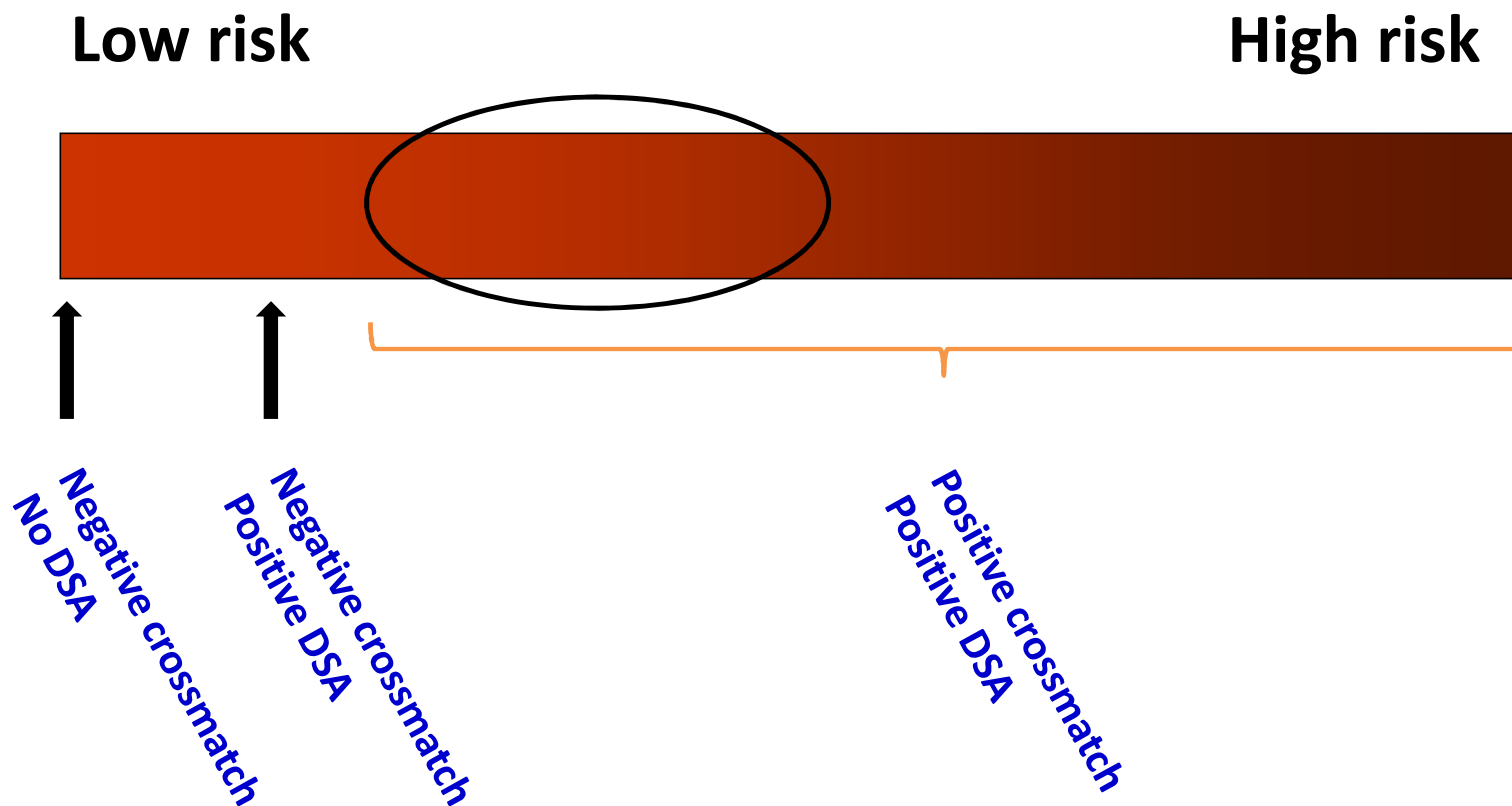
1:8 B MCS 84

**SUCCESS!**



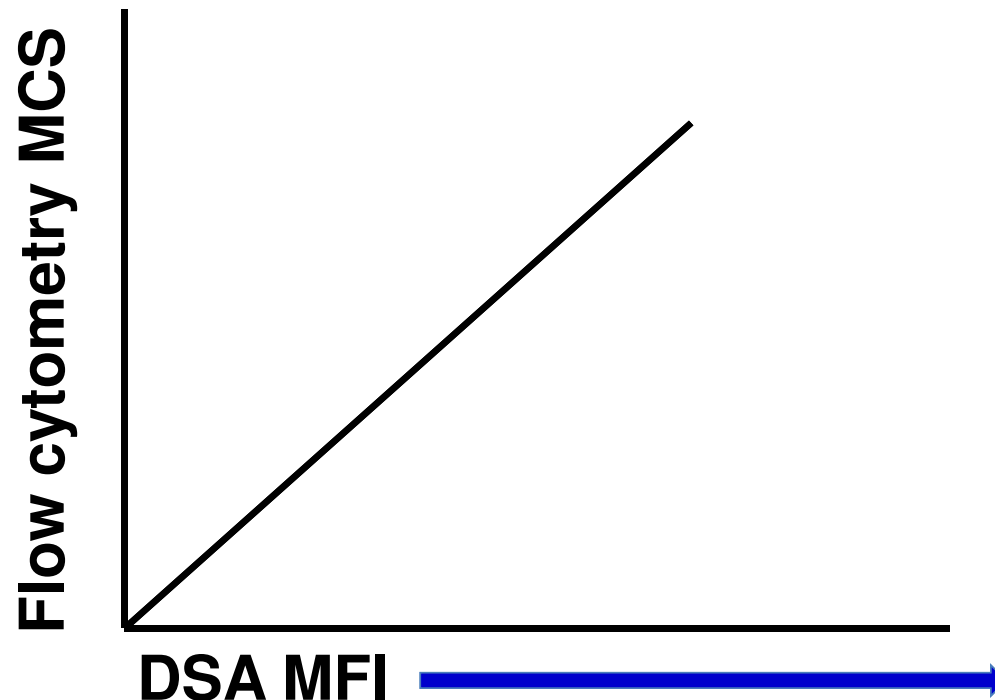
**To transplant the most highly sensitized ...**

**... we need to move into the gray zone ...**



The idea that DSA MFI *reliably* correlates with crossmatch results is **FALSE!**

*This relationship is not strictly linear... especially for the most highly sensitized patients!*



**The idea that DSA MFI *reliably* correlates with crossmatch results is FALSE!**

***Why?***

- There are not beads available for every allele
- Antigen bead density can vary
- Unreliable “cumulative effect” of multiple DSAs
- Prozone effect
- Lower antigen expression of C and DP on donor cells
- DSA against homozygous HLA ? Double dose
- Non-HLA antibody

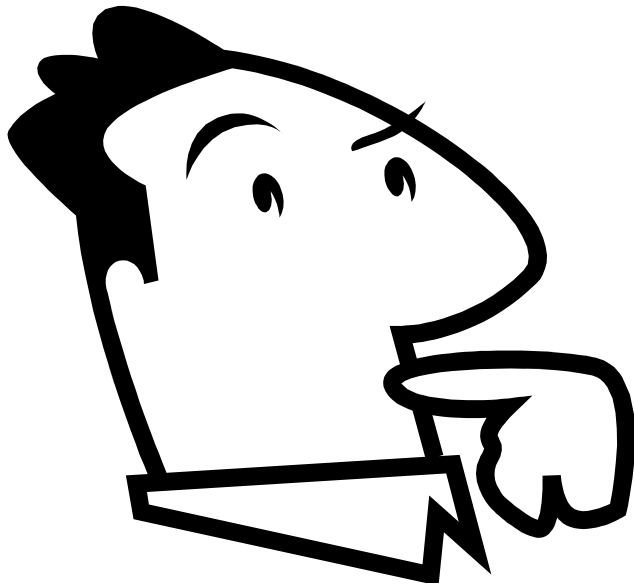
**If you have never had a failed positive crossmatch then you are not transplanting enough highly sensitized patients ...**

**... you can't be right all the time!**

**“The key to success is to double your failure rate”**

**- Henry Ford**

## Examples ...



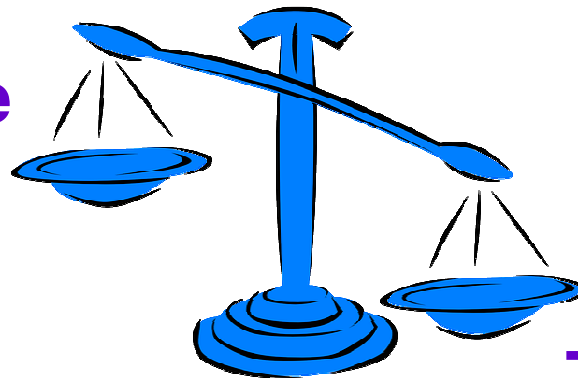
**What would  
you do?**

**To maximize KPD transplants you must ...**

***Keep the conference call to transplant ratio favorable!!!***

**Single Center Ratio!**

**Conference  
calls**

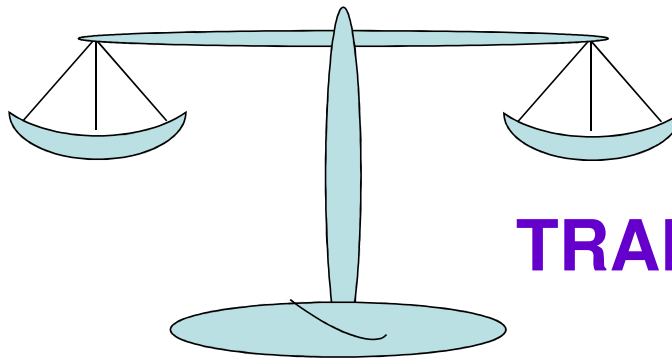


**TRANSPLANTS!**

**To maximize KPD transplants you must ...**

***Keep the conference call to transplant ratio favorable!!!***

**Conference  
calls**



**TRANSPLANTS!**

**When you fail with an  
establishment candidate ...**

**Conference call!**





**When you fail at a single center,  
SO WHAT???**

**Keys to FAILING SUCCESSFULLY!**

- You have learned from the failure!
- You failed quickly!
- No one else is hurt by the failure!

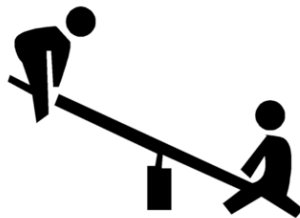


**Need to manipulate antibody  
assignments ...**

***How do we know what to assign as  
unacceptable?***

# Examples

**Good judgement comes from  
experience ... and experience  
comes from bad judgement!**



**... old saying**

