Reflections and Future Directions HLA Testing in Transplantation

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Canadian Blood Services
it's in you to give

Disclosure

- Nothing significant to disclose

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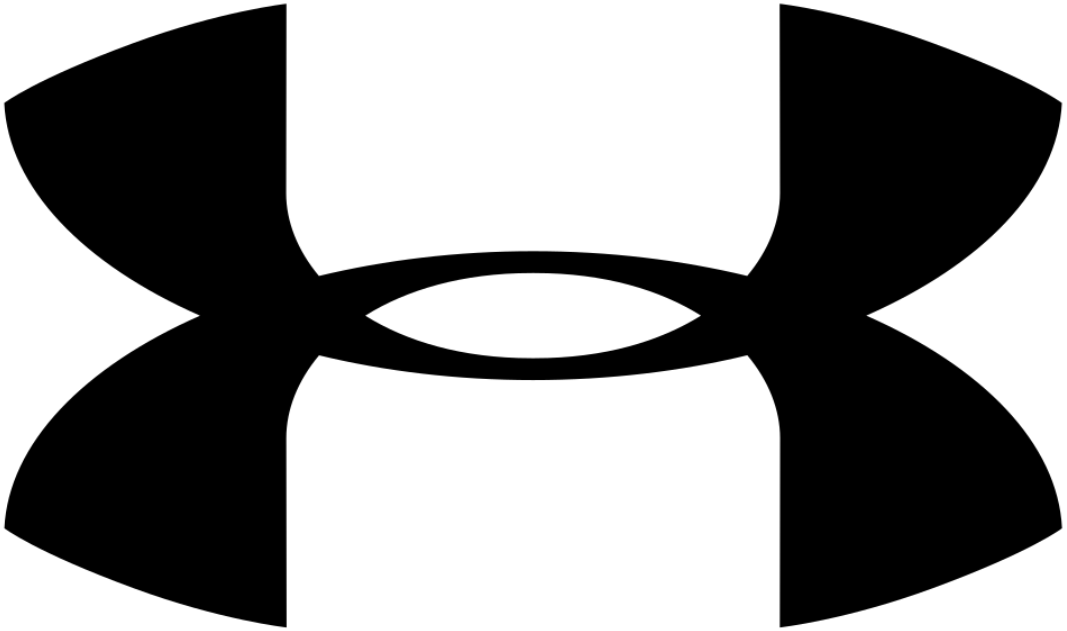
Disclosure

- Nothing significant to disclose



UNDER ARMOUR

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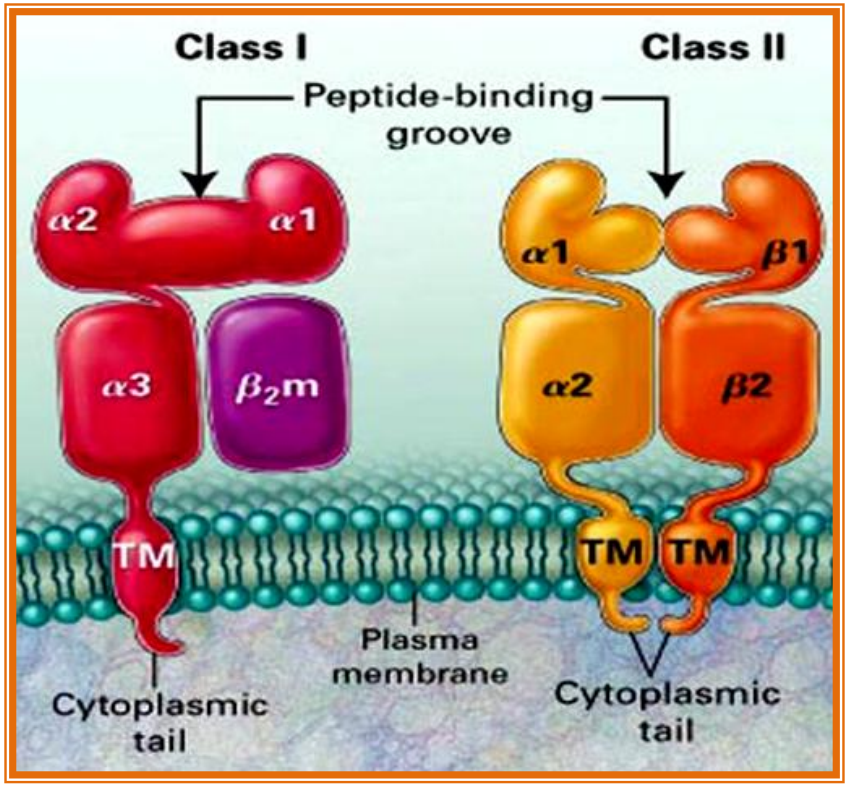
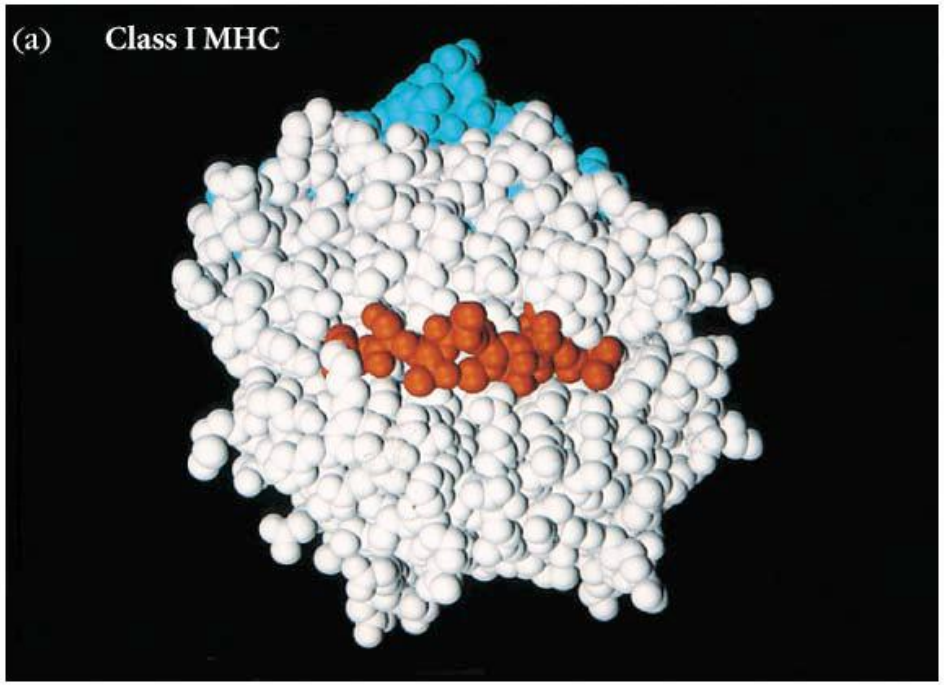
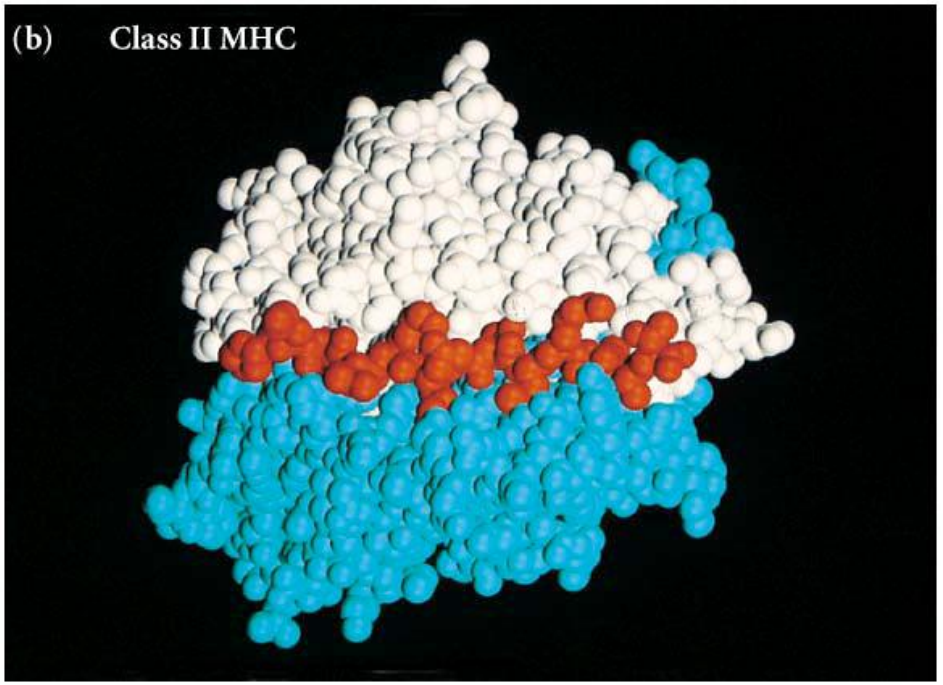
HLA class I and class II antigens

- Monomer with non-covalently associated subunit (β2m)
- Presents antigenic peptides to CD8+ T cells
- Expressed by all nucleated cells including endothelium



- Heterodimer
- Presents antigenic peptides to CD4+ T cells
- Restricted expression on antigen presenting cells (dendritic cells, B cells, macrophages)
- Inducible on other cells (endothelium and epithelium)





Kuby IMMUNOLOGY, Sixth Edition
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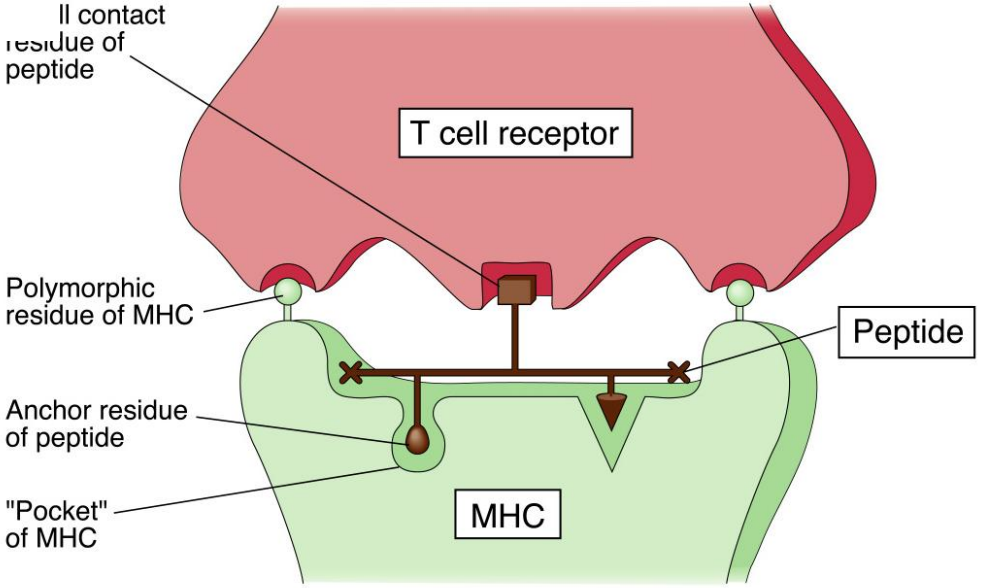

From Abbas, Lichtman, & Pober: Cellular and Molecular Immunology. W.B. Saunders, 1999,

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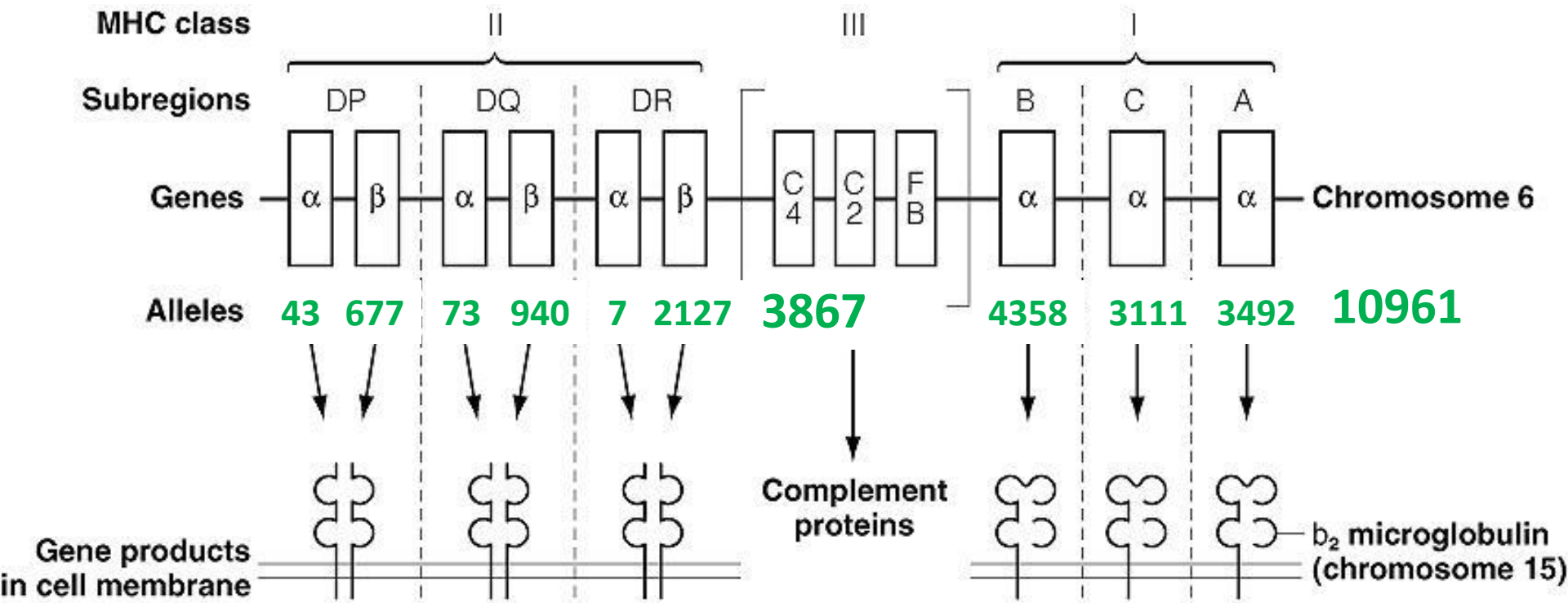
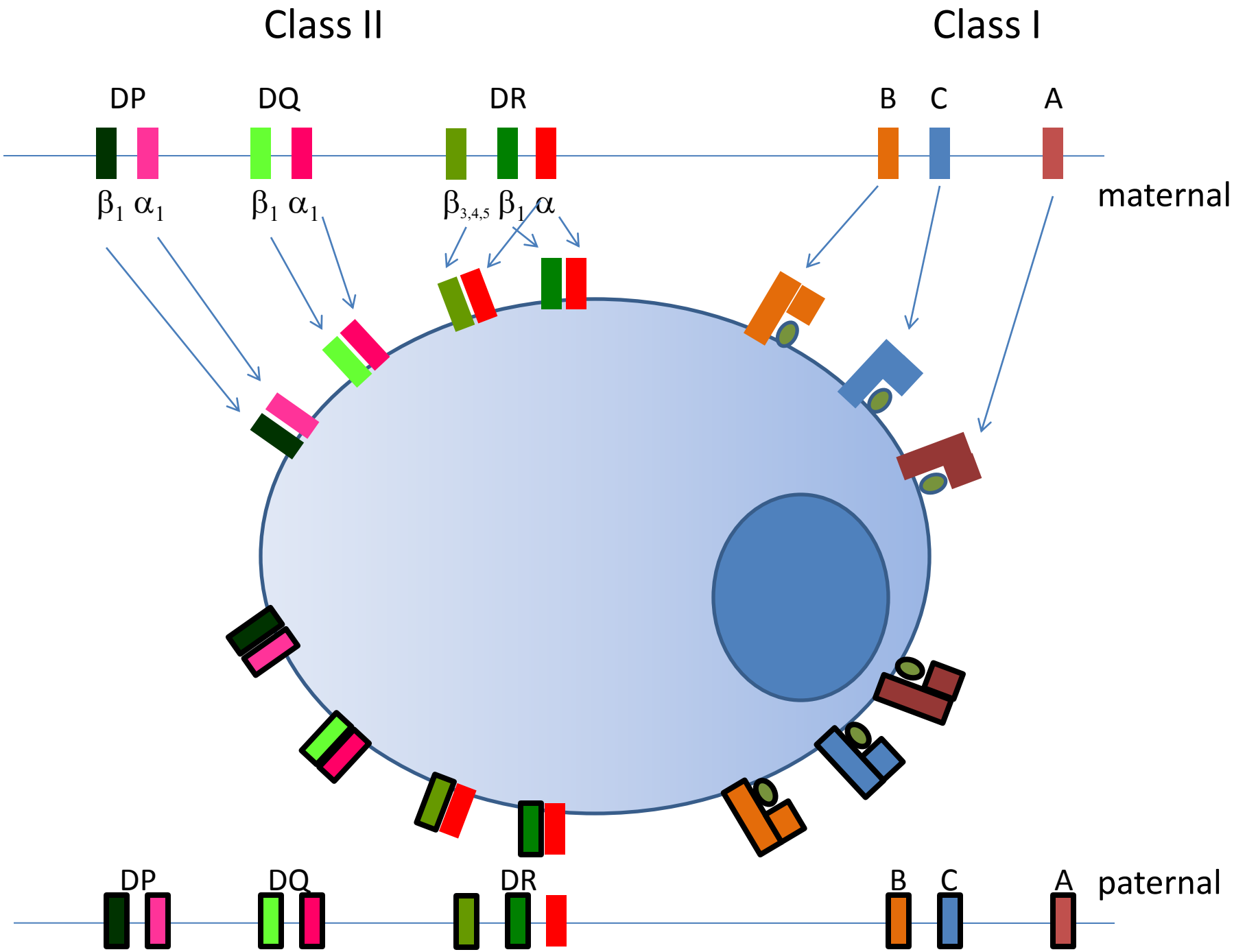
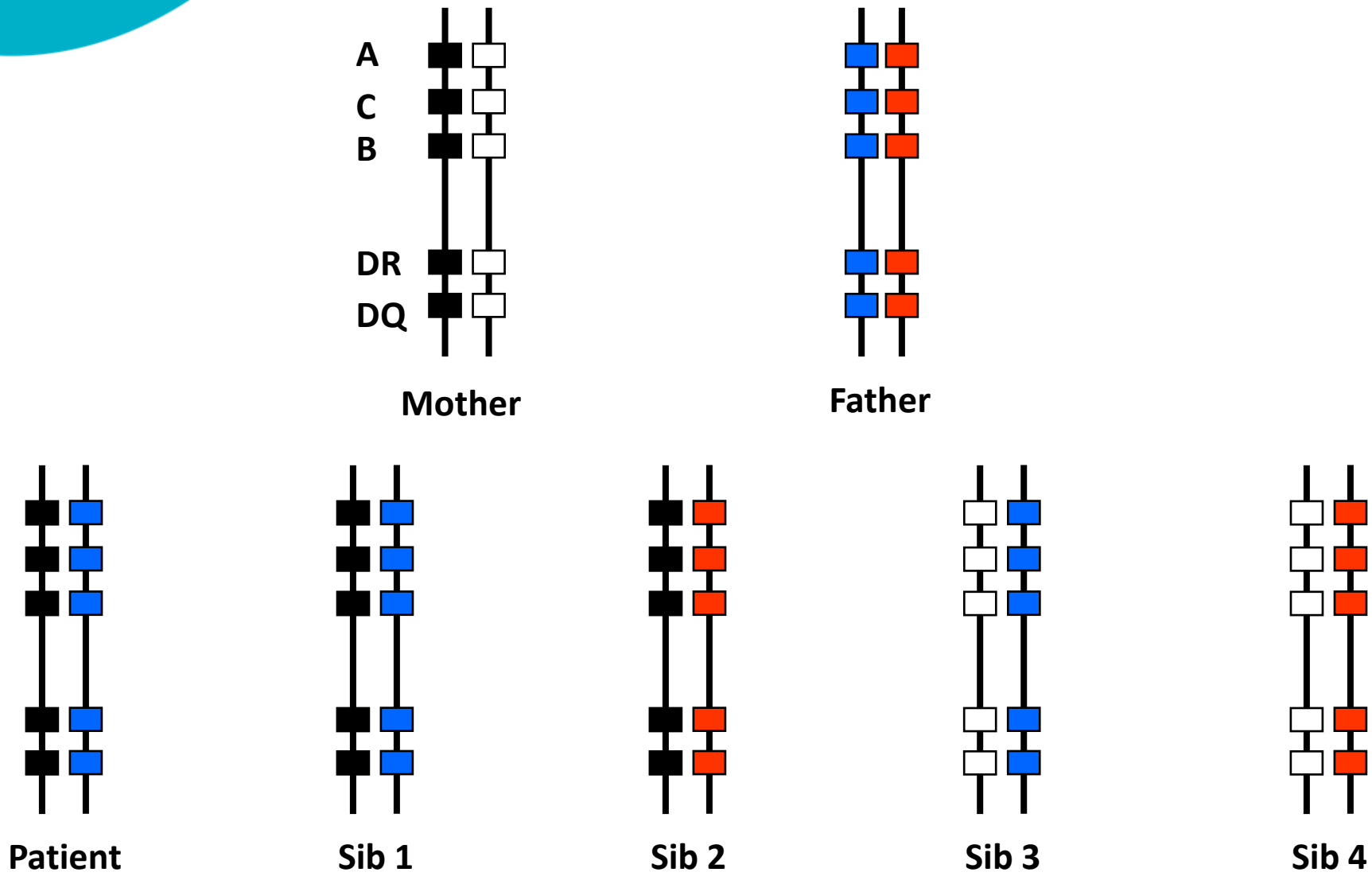
Polymorphism of the Major Histocompatibility Complex in humans - Human Leukocyte Antigen (HLA)




Class II
Class I
DP
DQ
DR
B
C
A
maternal
β_1 α_1
β_1 α_1
$\beta_{3,4,5}$ β_1 α
DP
DQ
DR
B
C
A
paternal

HLA inheritance



Approximately 25-30% chance of having an HLA matched sibling

Polymorphic residues on Class I HLA molecules

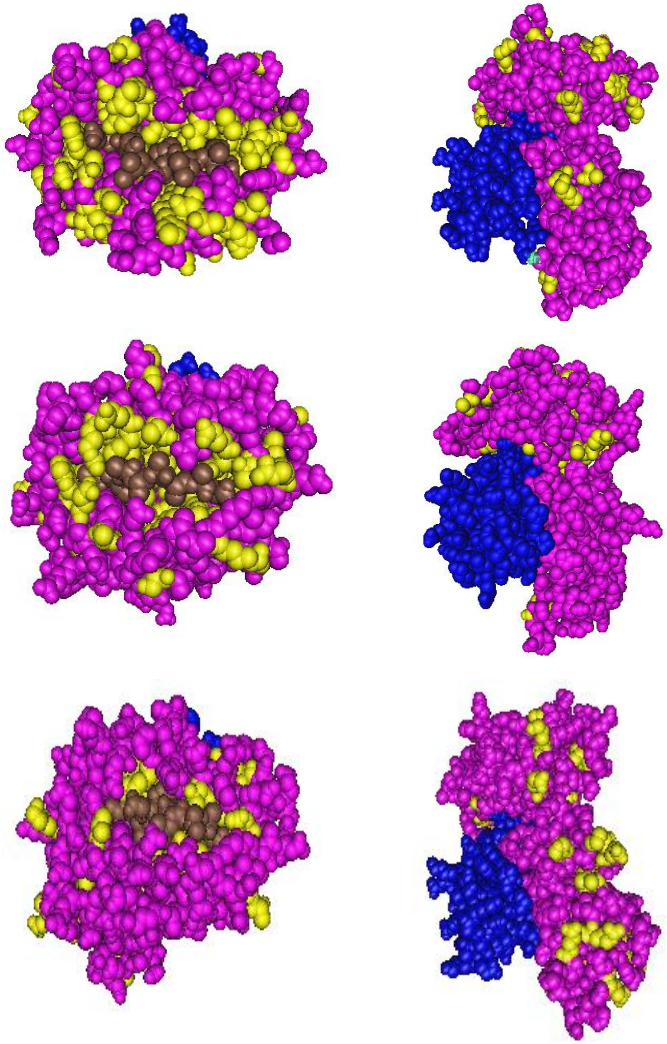
(polymorphisms are concentrated around peptide binding groove)

Top view | Side view

HLA-A

HLA-B

HLA-C



Alpha chain conserved aa

Alpha chain polymorphic aa

Peptide

β2 microglobulin

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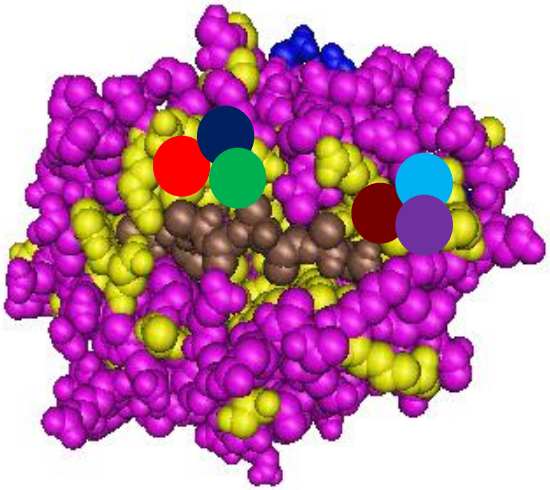
HLA antibody development

Your ("self") HLA



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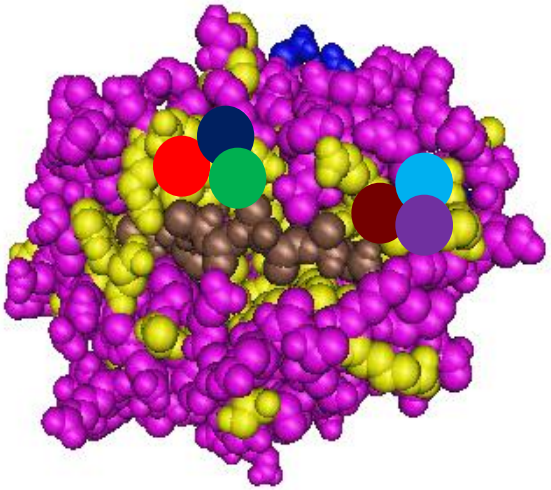
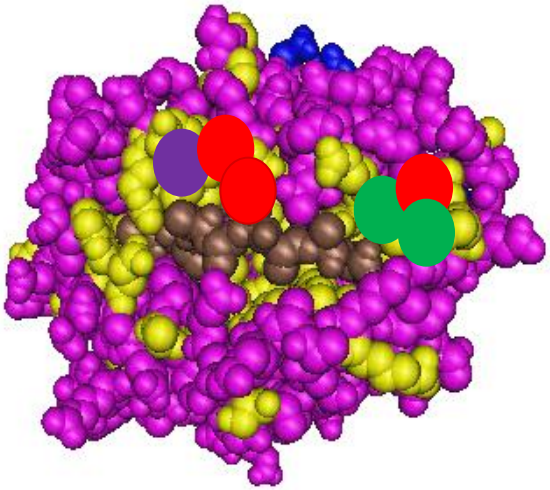
HLA antibody development

Your ("self") HLA



Donor ("allo") HLA



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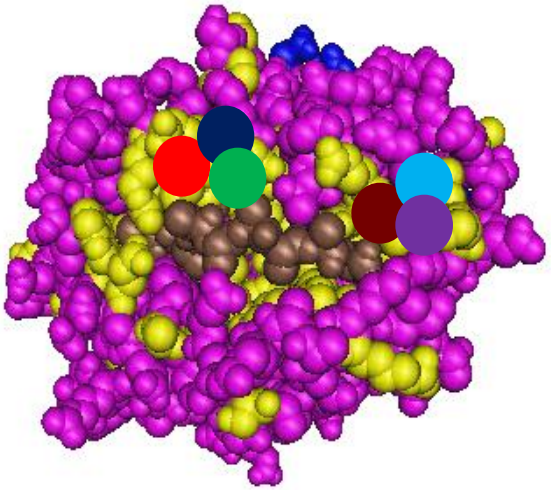
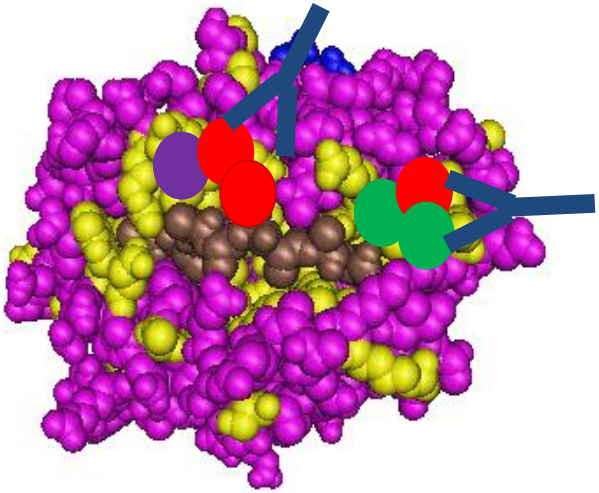
HLA antibody development

Your ("self") HLA



Donor ("allo") HLA



HLA antibody development

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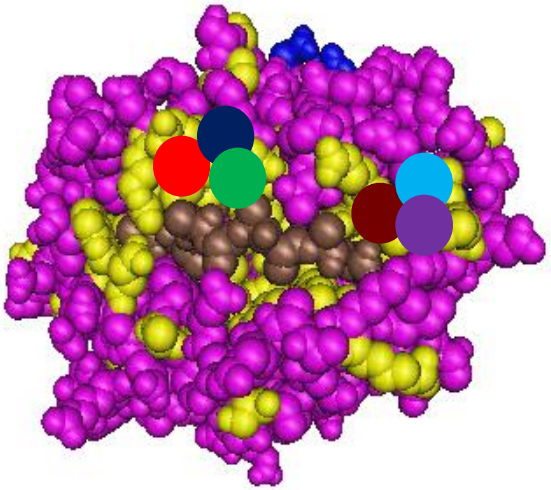

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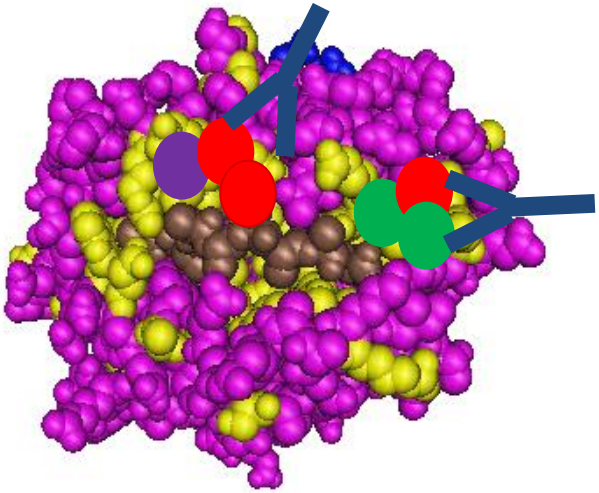

Sensitizing events:
Pregnancy
Transplantation
Transfusion

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Strategies used to avoid/minimize transplant rejection

- HLA typing and matching of recipient/donor pairs
- Detection of donor specific HLA antibodies.

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Evolution of HLA testing

Past (2010)

- HLA typing
  - Serology
    - CDC
- HLA antibody screening
  - Lymphocyte panel
    - CDC
- Lymphocyte crossmatching
  - CDC

Present

- HLA typing
  - Molecular methods
    - IR SSOP, allele level
- HLA antibody ID
  - Solid Phase Assay
    - Virtual crossmatch
- Lymphocyte crossmatching
  - Flow cytometry

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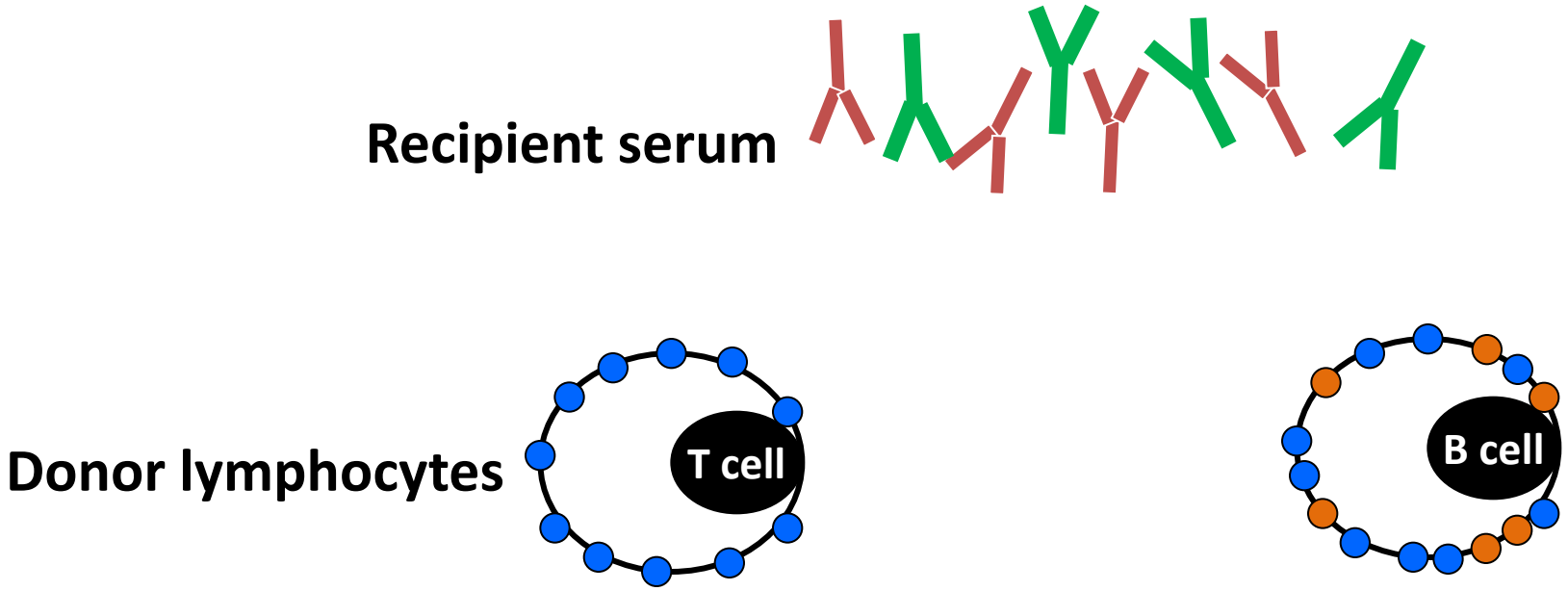
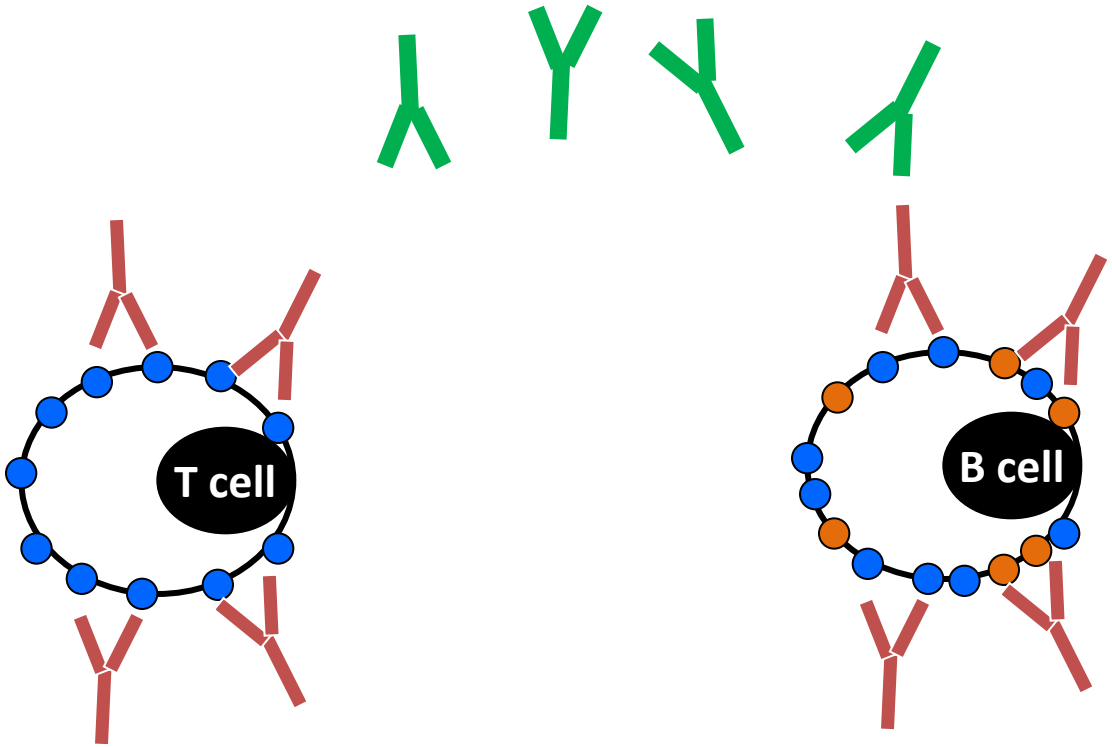
3-Color Flow Cytometric Crossmatch



Bray, Lebeck and Gebel. Transplantation 48:834-840, 1989.

3-Color Flow Cytometric Crossmatch



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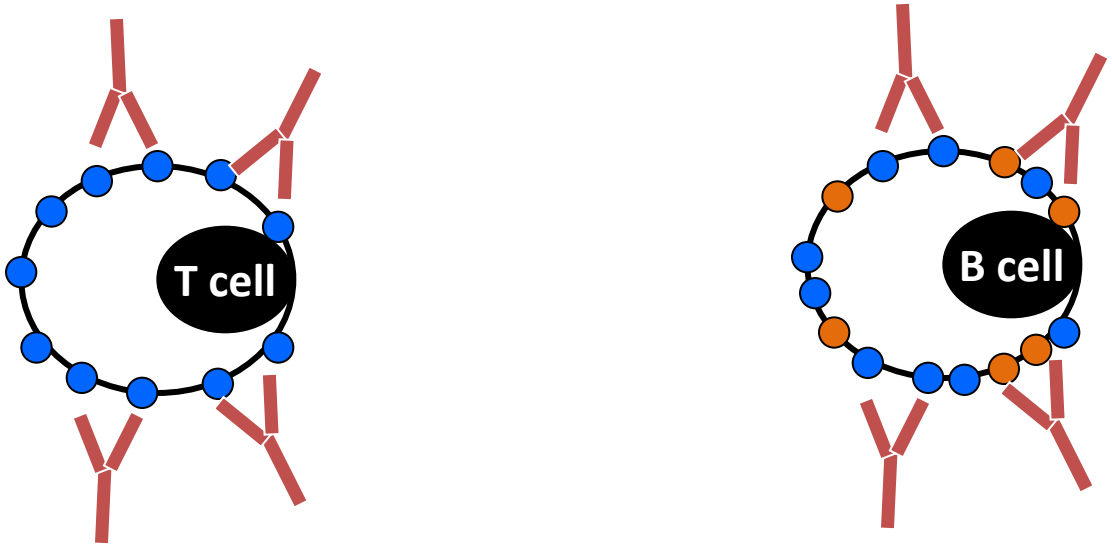

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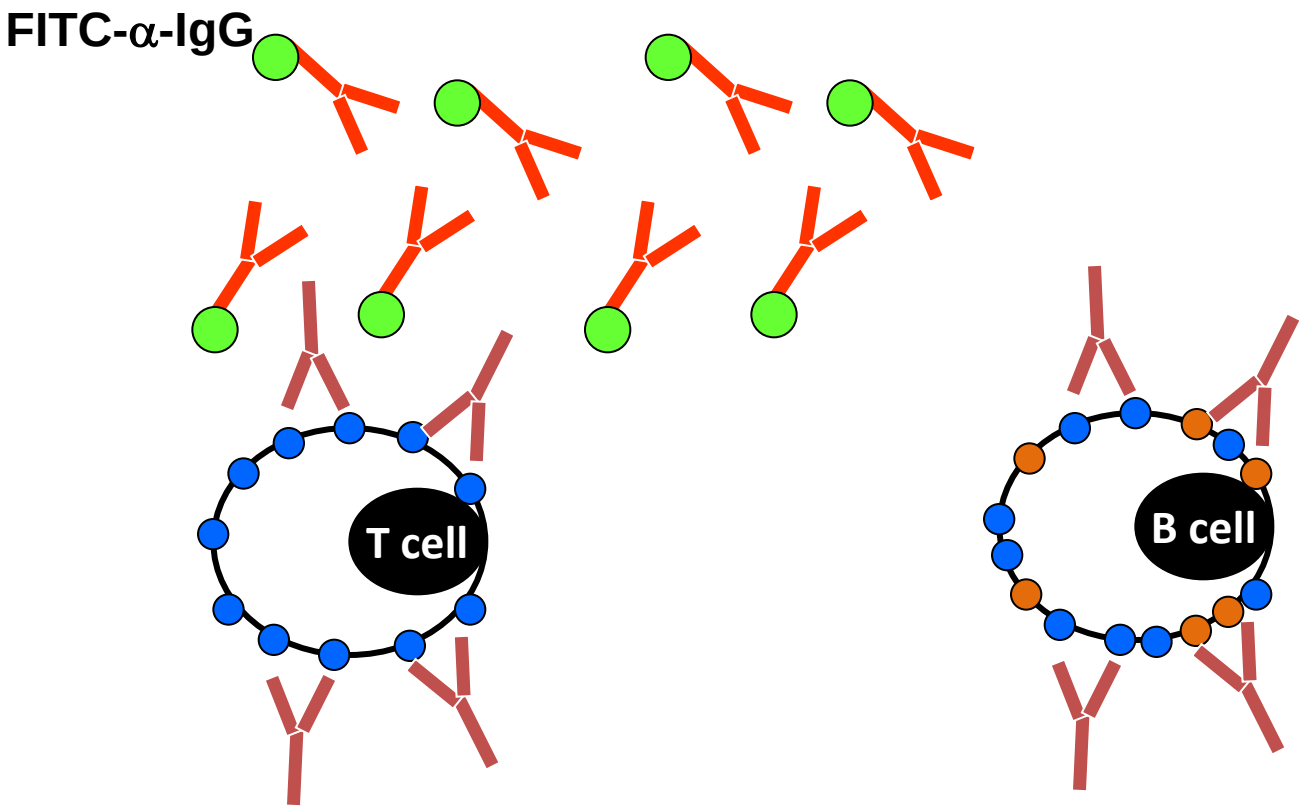

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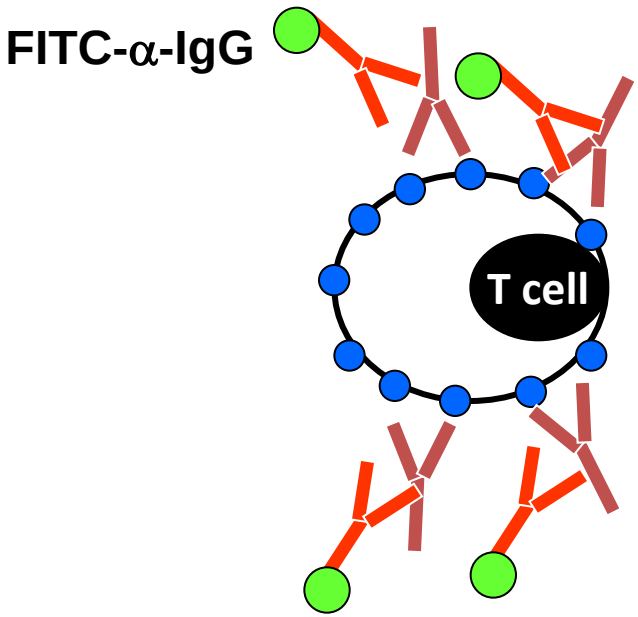

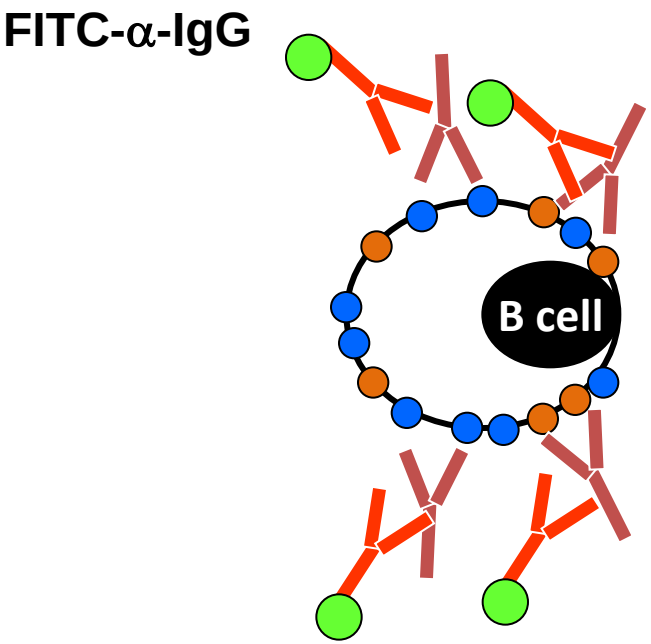

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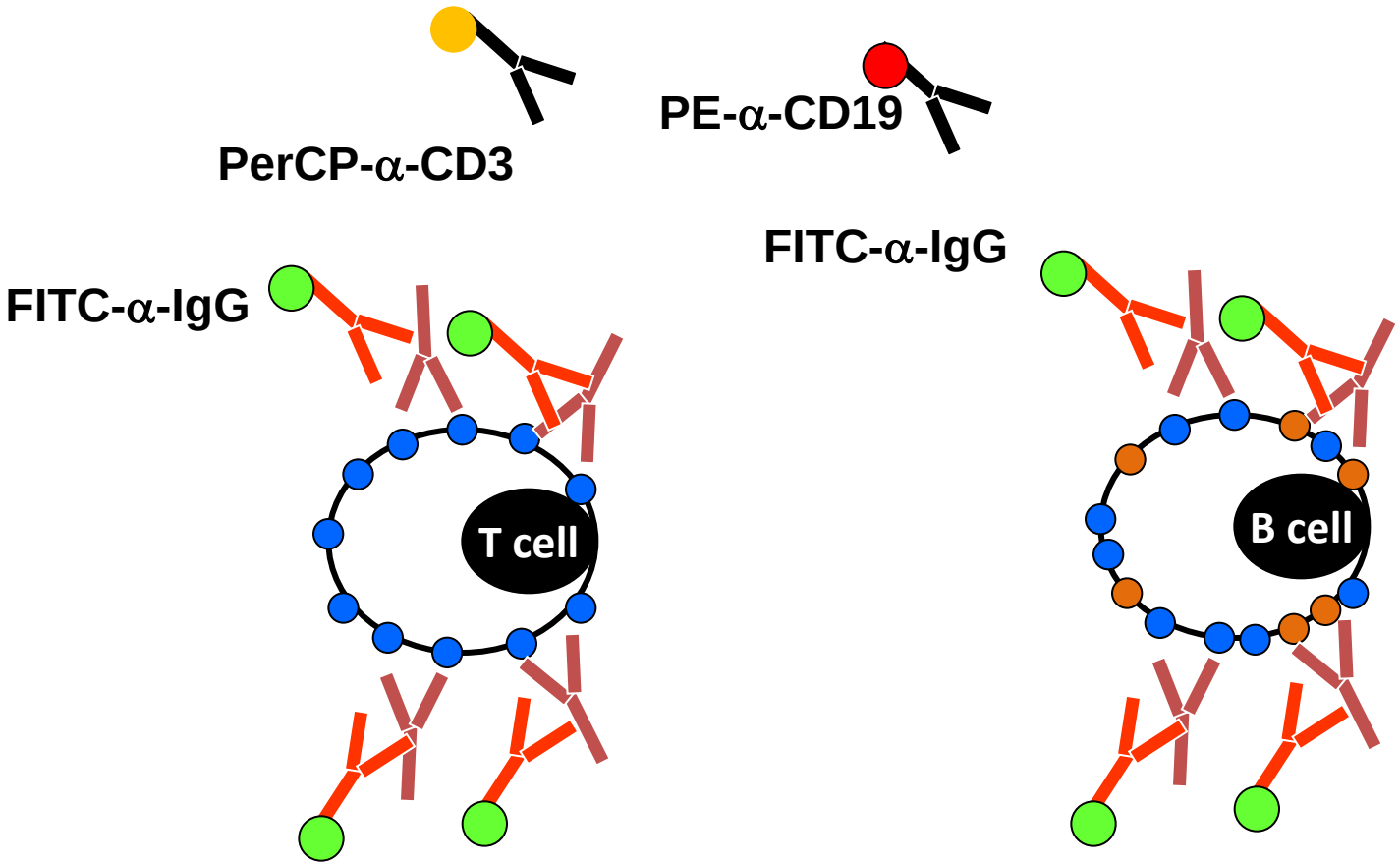

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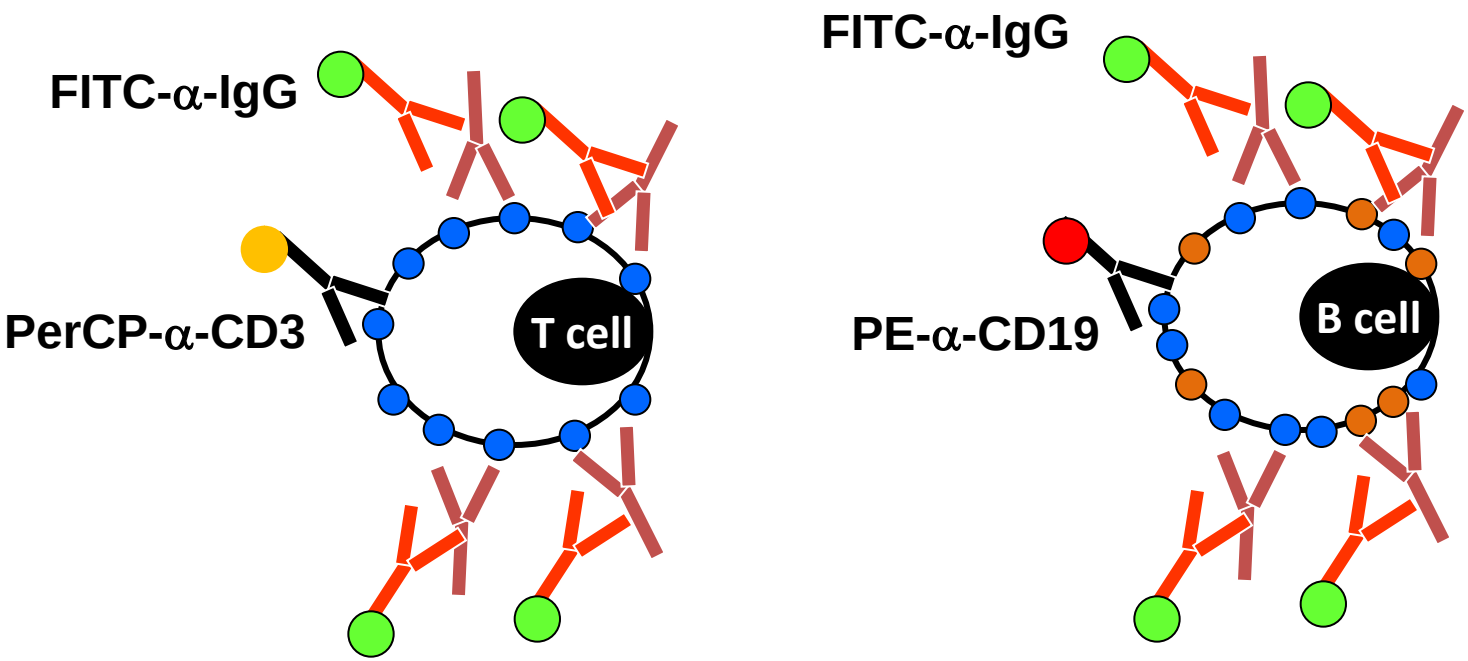
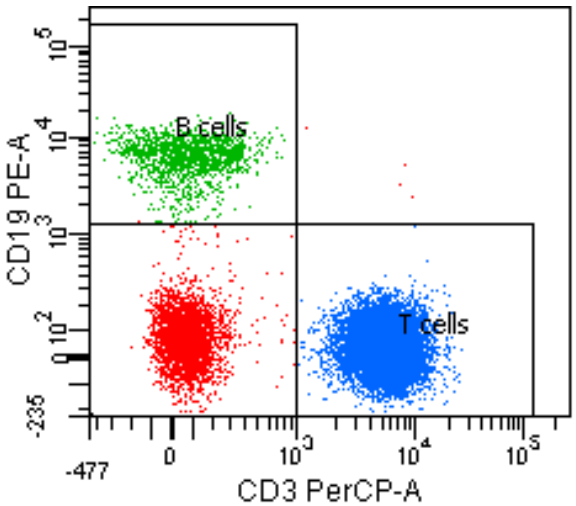


Detect fluorescent labels by flow cytometry

Bray, Lebeck and Gebel. Transplantation 48:834-840, 1989.

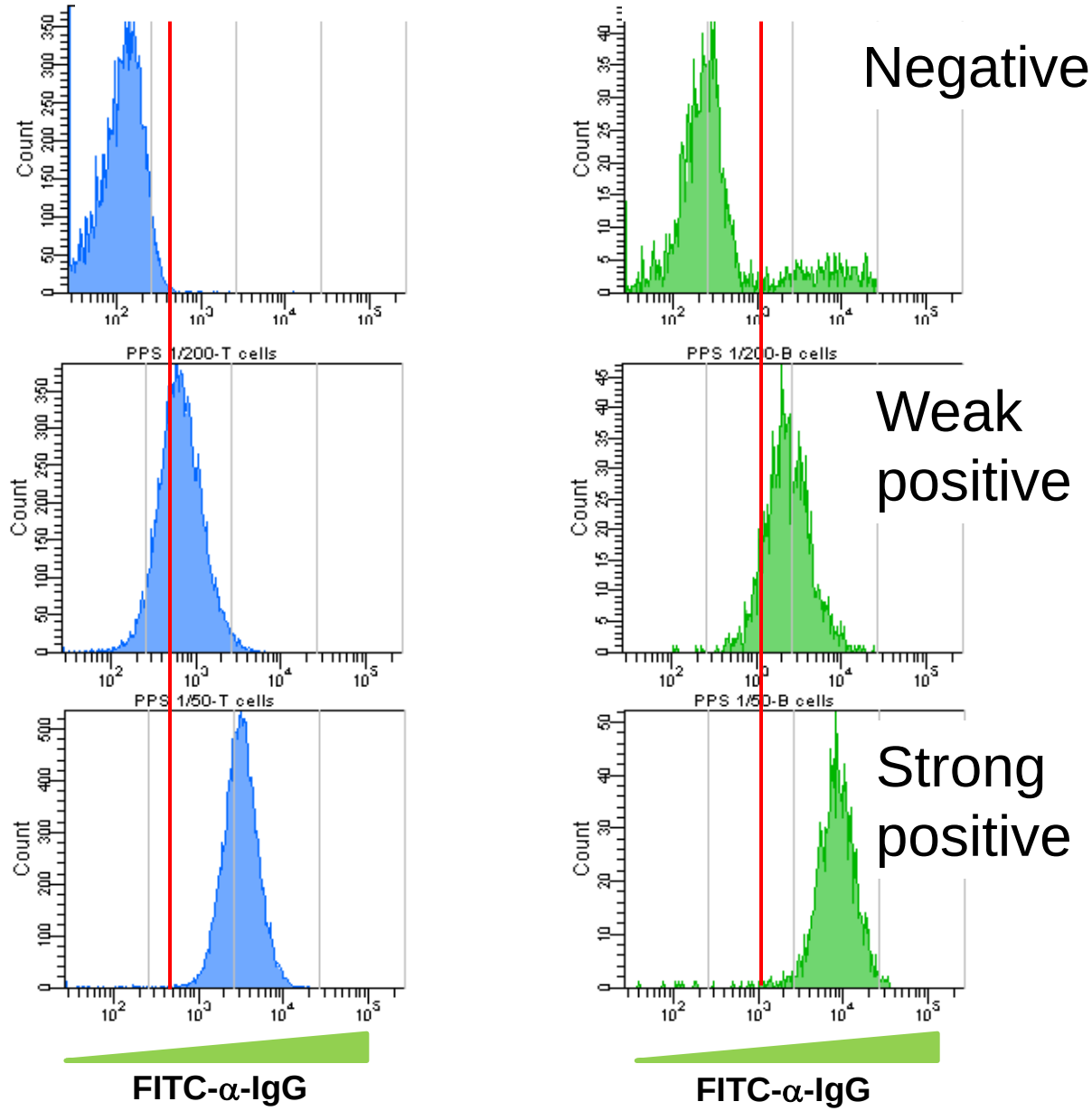
3-Color Flow Cytometric Crossmatch

Gating strategy



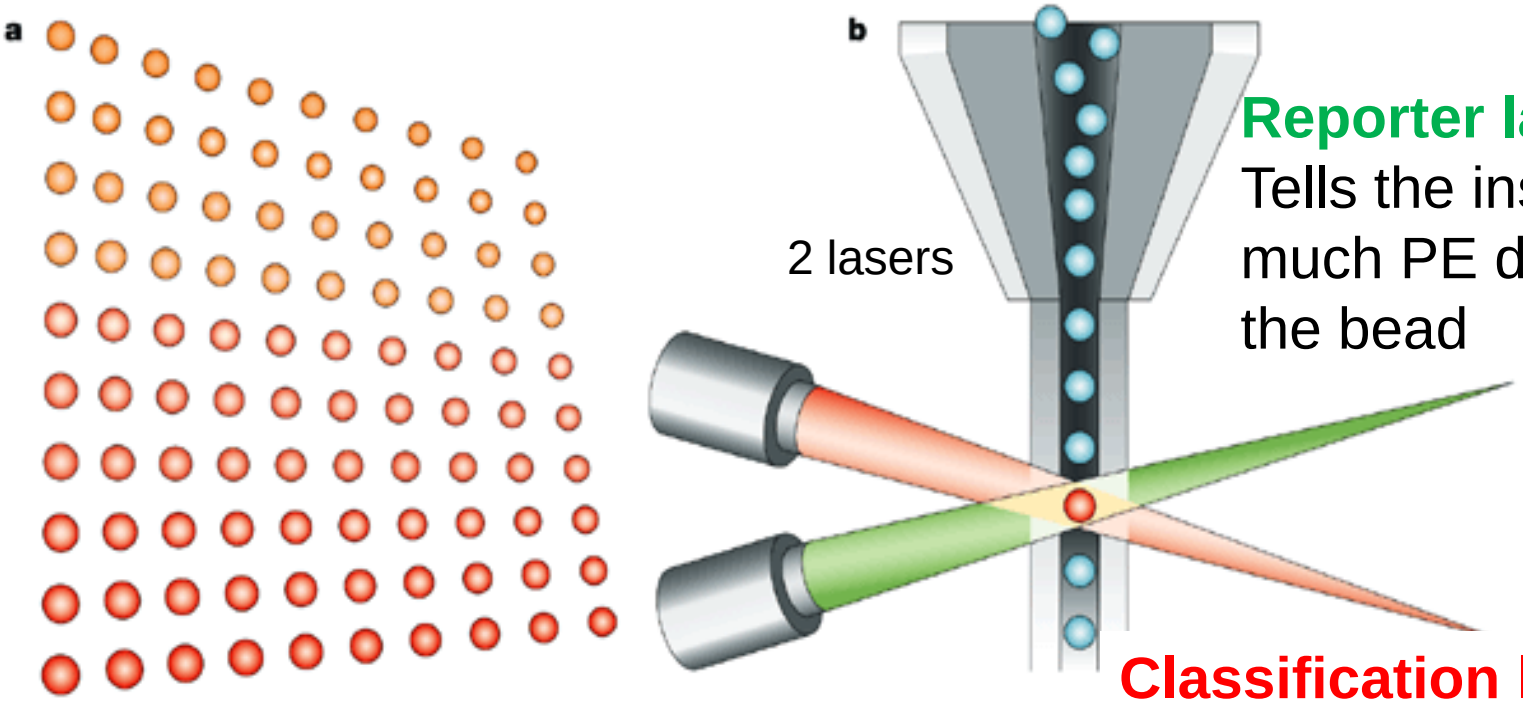
T cell X-match

B cell X-match



HLA antibody identification by LABScreen® Single Antigen Luminex Assay

100 different types of beads
Each bead type coded with different red/infrared dye combination
Each bead type is coated with different recombinant HLA antigen

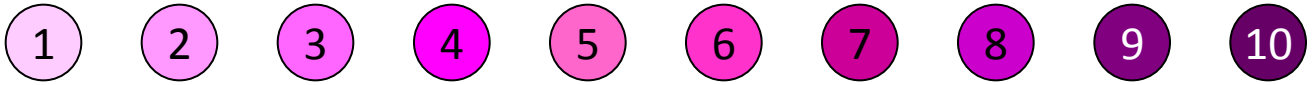


Reporter laser (532nm)
Tells the instrument how much PE dye is bound to the bead

Classification laser (635nm)
Tells the instrument which bead is being examined

Detection with anti-IgG-PE

HLA antibody identification by LABScreen® Single Antigen Luminex Assay



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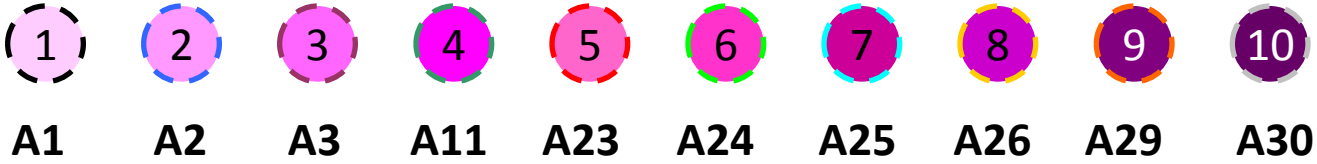

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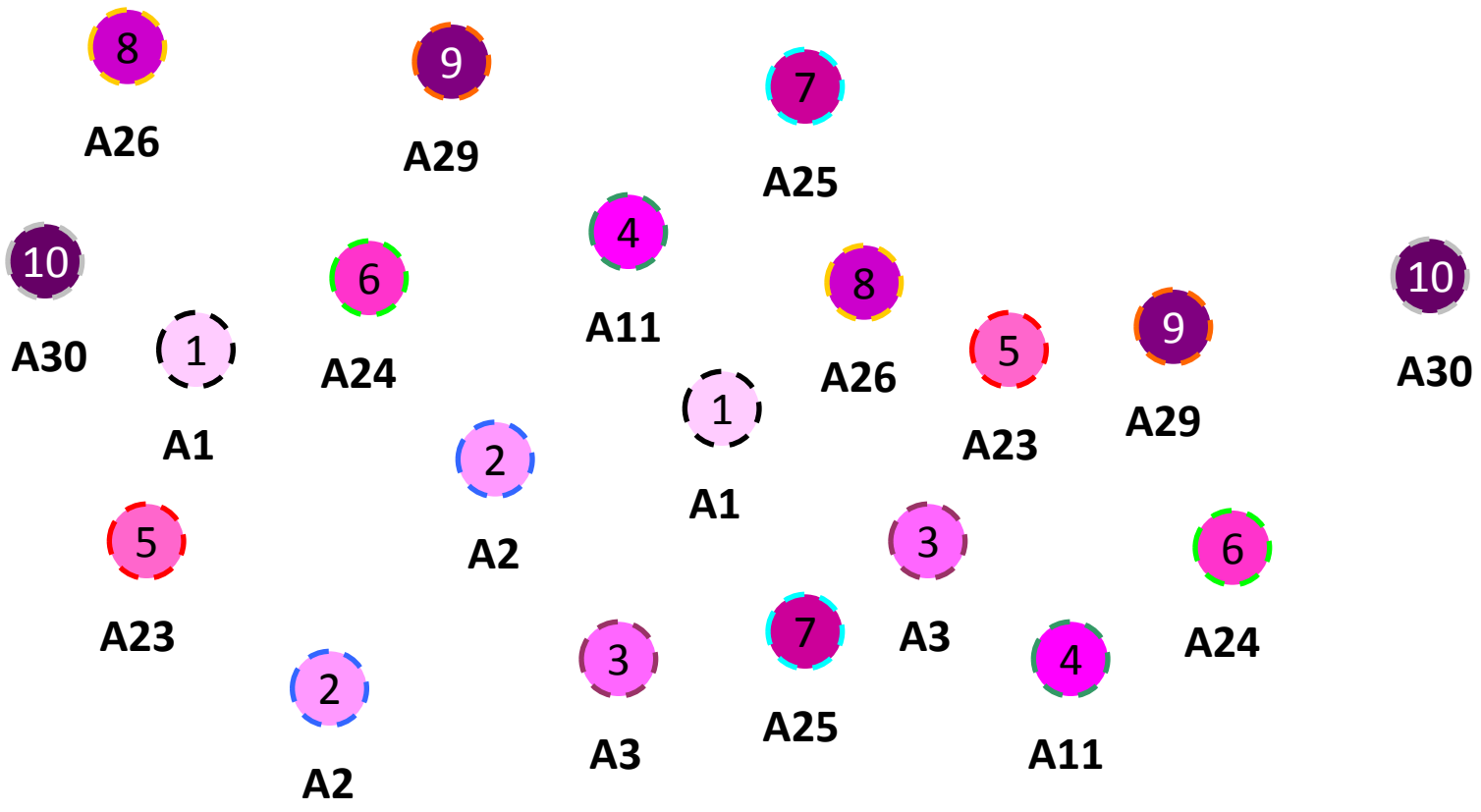

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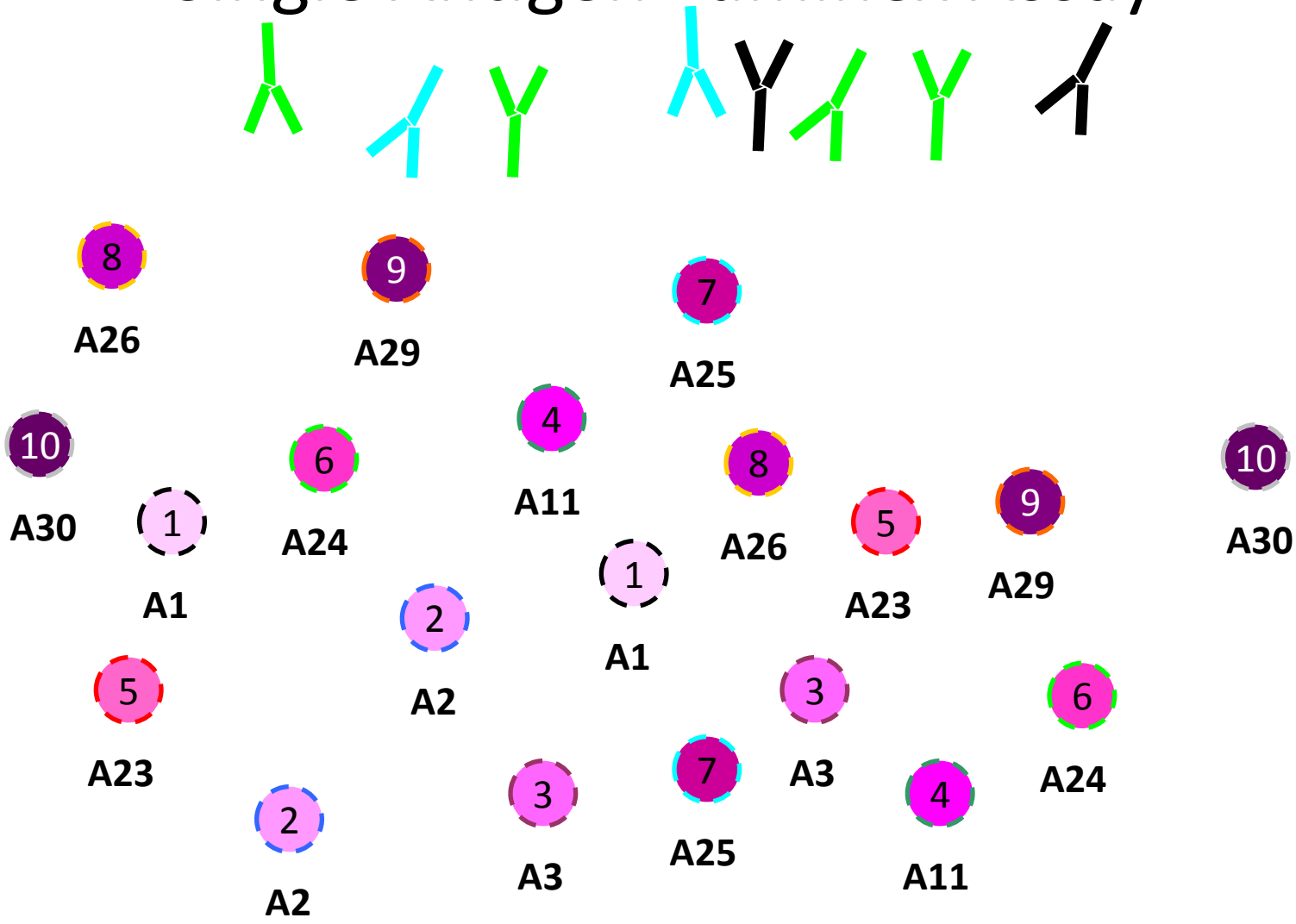

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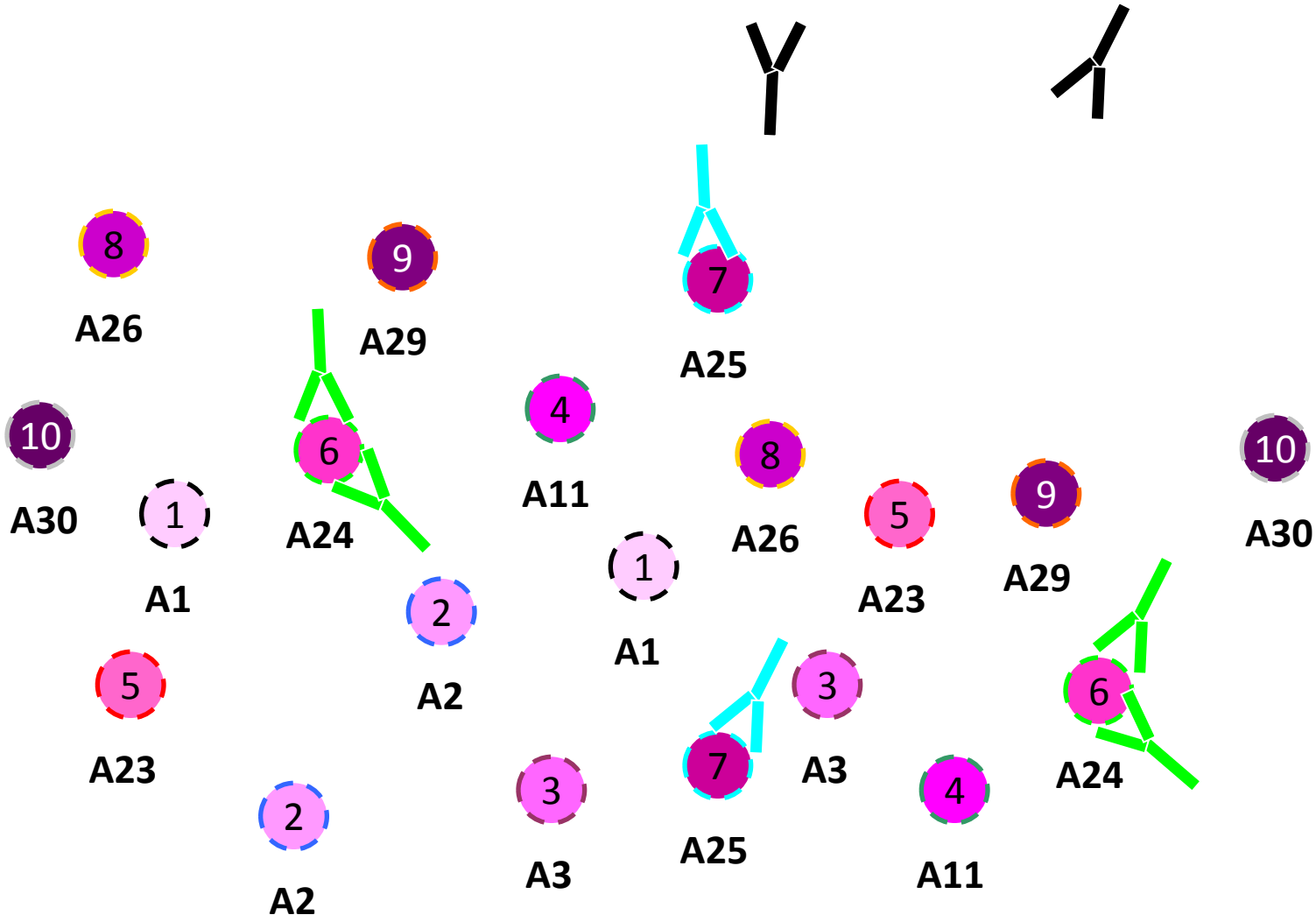
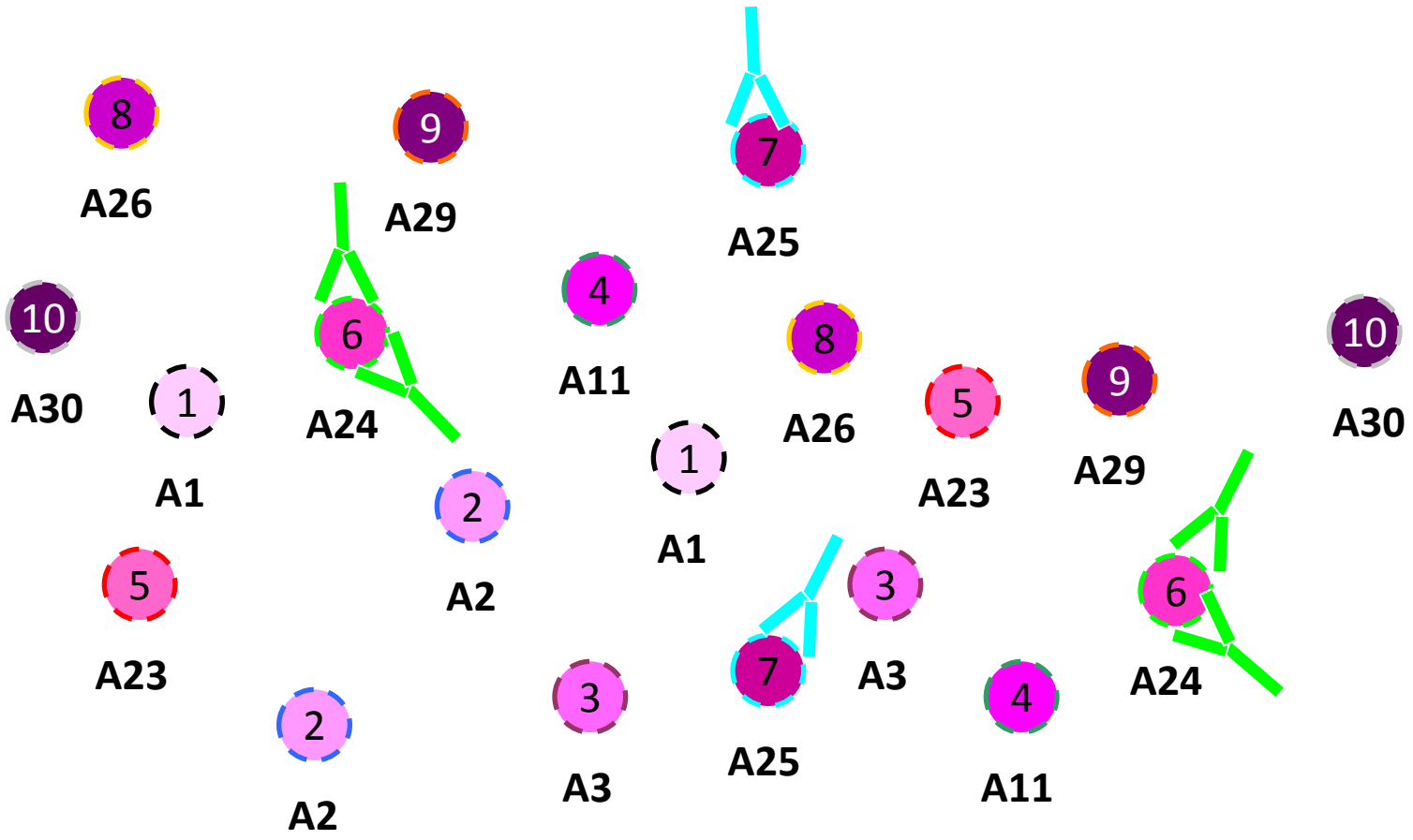
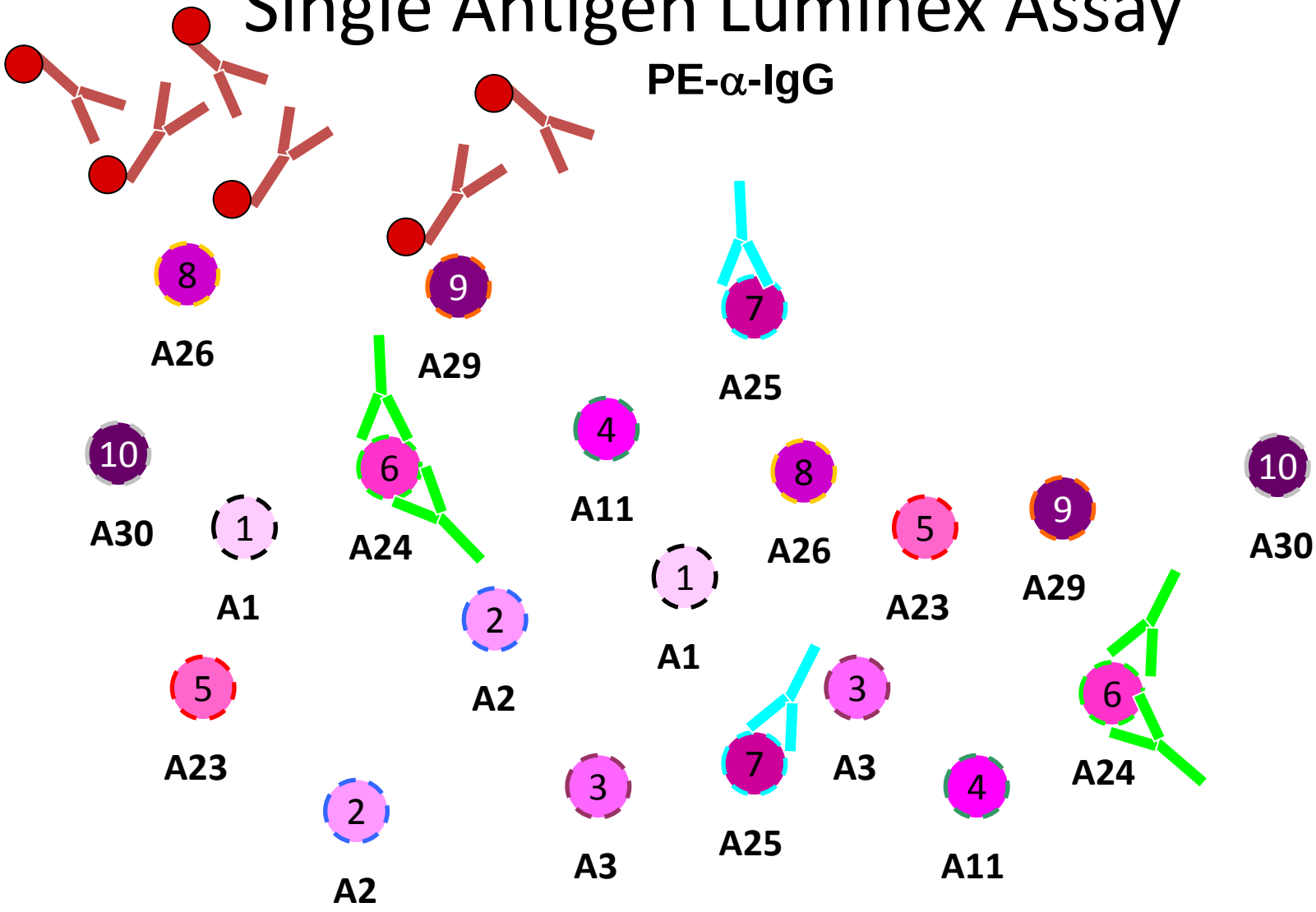


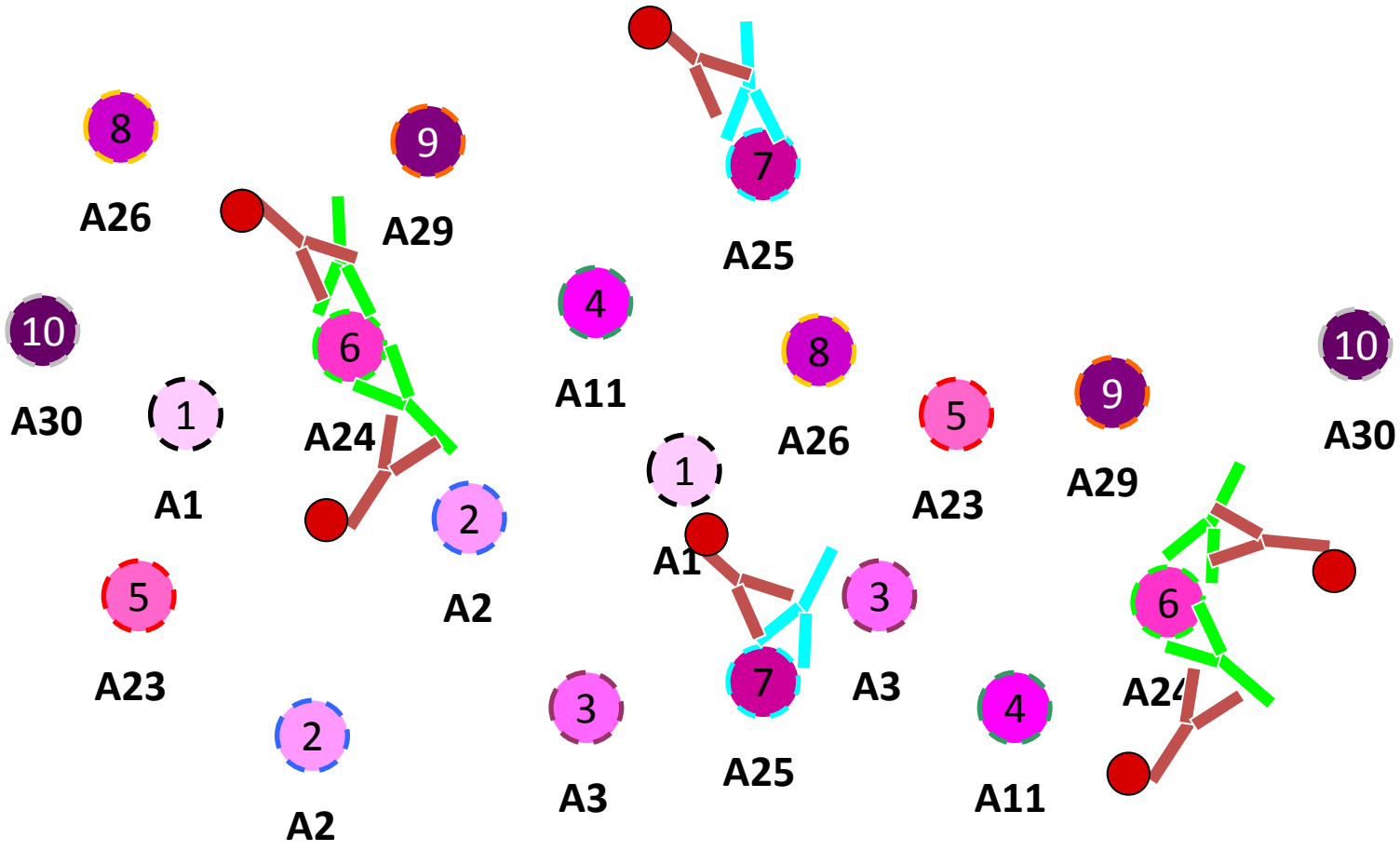
HLA antibody identification by LABScreen® Single Antigen Luminex Assay



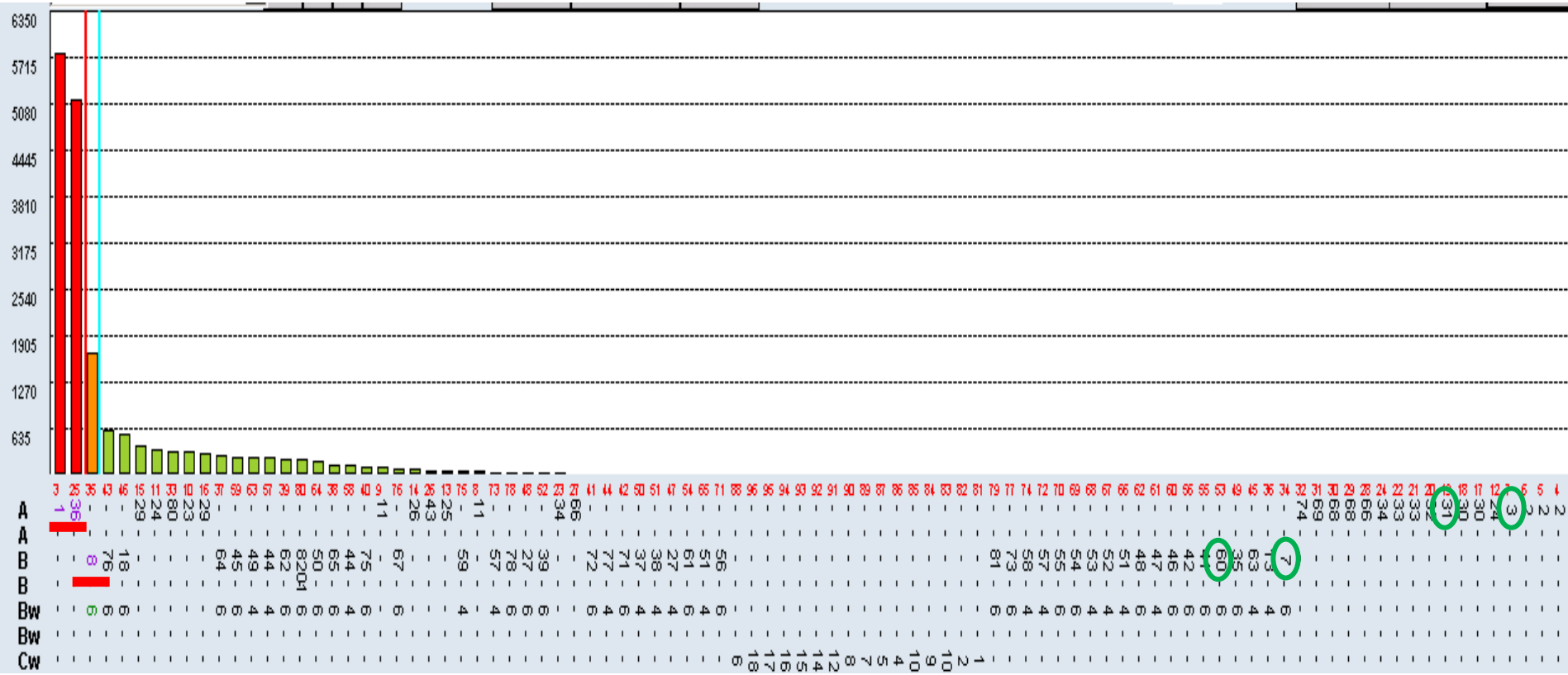
HLA antibody identification by LABScreen® Single Antigen Luminex Assay



HLA antibody identification by LABScreen® Single Antigen Luminex Assay



HLA Class I antibody analysis

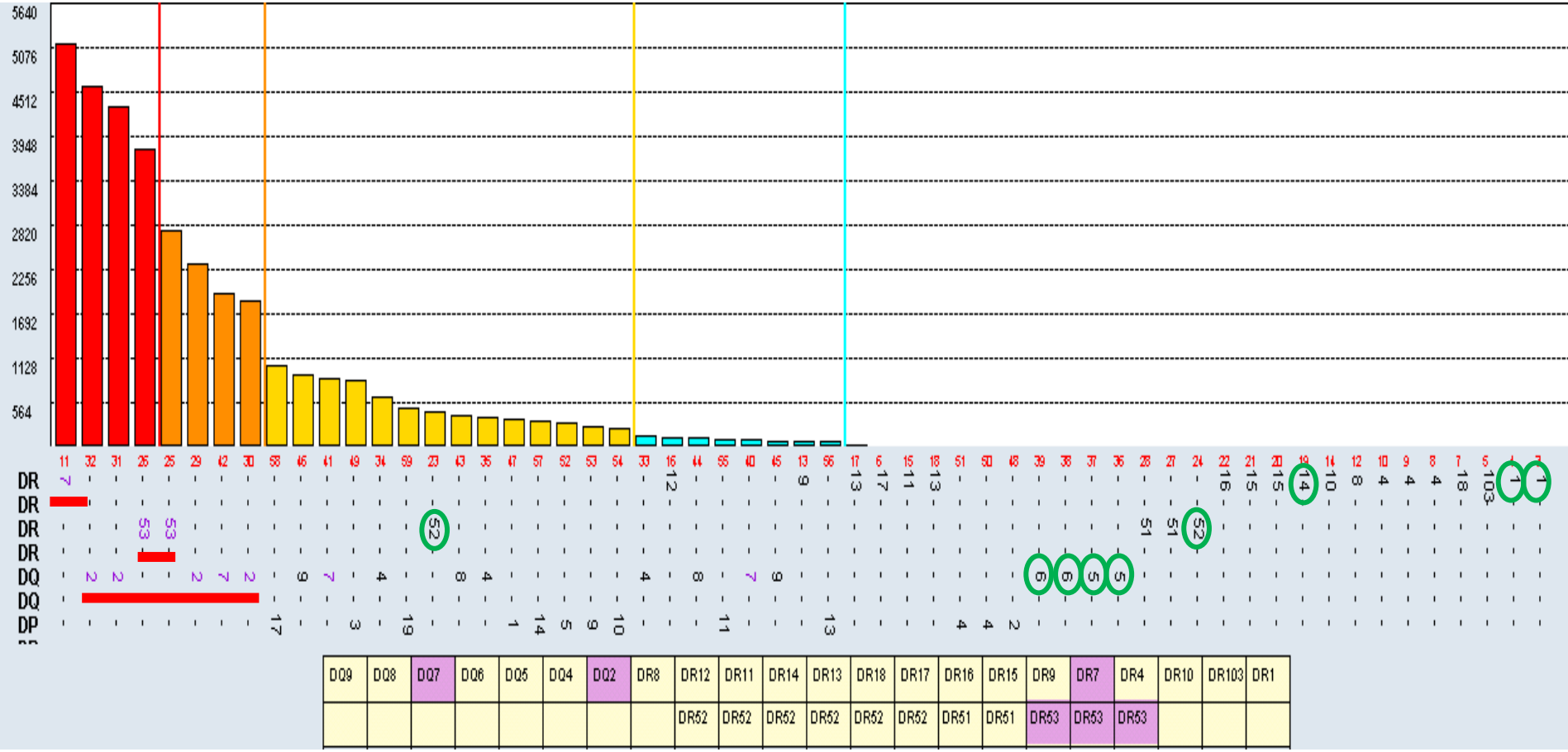


Patient A3,31 B7,60 DR1,14 (52) DQB5,6

Previous Donor **A1, B8** DR7,17 (53,52) DQB2

Unacceptable antigens: A1, A36, B8

HLA Class II antibody analysis



Patient A3,31 B7,60 DR1,14 (52) DQB5,6

Previous Donor **A1, B8** DR**7,17** (**53**,52) DQB**2**

Unacceptable antigens: DR7, DR53, DQ2

Canadian PRA calculator

Canadian PRA Calculator

Canadian Blood Services
Société canadienne du sang

Select Blood Group:

☐ O ☐ A ☐ B ☐ AB

Select Region:

☐ Alberta ☐ Atlantic-Canada ☐ British-Columbia ☐ Manitoba ☐ Ontario ☐ Saskatchewan ☐ Quebec

Check all A unacceptable antigens:

☑ 1 ☐ 2 ☐ 3 ☐ 11 ☐ 23 ☐ 24 ☐ 25 ☐ 26 ☐ 29 ☐ 30 ☐ 31 ☐ 32 ☐ 33 ☐ 34 ☑ 36 ☐ 43 ☐ 66 ☐ 68 ☐ 69 ☐ 74 ☐ 80

Check all B unacceptable antigens:

☐ 7 ☑ 8 ☐ 13 ☐ 18 ☐ 27 ☐ 35 ☐ 37 ☐ 38 ☐ 39 ☐ 41 ☐ 42 ☐ 44 ☐ 45 ☐ 46 ☐ 47 ☐ 48 ☐ 49 ☐ 50 ☐ 51 ☐ 52 ☐ 53
☐ 54 ☐ 55 ☐ 56 ☐ 57 ☐ 58 ☐ 59 ☐ 60 ☐ 61 ☐ 62 ☐ 63 ☐ 64 ☐ 65 ☐ 67 ☐ 71 ☐ 72 ☐ 73 ☐ 75 ☐ 76 ☐ 77 ☐ 78 ☐ 81
☐ 82 ☐ 83

Check all Bw unacceptable antigens:

○ 4 ○ 6 ○ N/A

Check all Cw unacceptable antigens:

☐ 1 ☐ 2 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 12 ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18

Check all DR unacceptable antigens:

☐ 1 ☐ 0103 ☐ 4 ☑ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18

Check all DR51/52/53 unacceptable antigens:

☐ 51 ☐ 52 ☑ 53

Check all DPA unacceptable antigens:

☐ 1 ☐ 2 ☐ 3 ☐ 4

Check all DPB unacceptable antigens:

☐ 1 ☐ 0201 ☐ 0202 ☐ 3 ☐ 0401 ☐ 0402 ☐ 5 ☐ 6 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 13 ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18 ☐ 19 ☐ 20 ☐ 21
☐ 22 ☐ 23 ☐ 24 ☐ 25 ☐ 26 ☐ 27 ☐ 28 ☐ 30 ☐ 40 ☐ 85

Check all DQA unacceptable antigens:

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

Check all DQB unacceptable antigens:

☑ 2 ☐ 4 ☐ 5 ☐ 6 ☑ 7 ☐ 8 ☐ 9

Calculate Reset

Canadian PRA calculator

Canadian PRA Calculator

Canadian Blood Services
Société canadienne du sang

Selected blood groups: ,
Selected regions:
Unacceptable antigens:
A: 1 ,36 ,
B: 8 ,
BW:
CW:
DR: 7 ,
DRW: 53 ,
DPA:
DPB:
DQA:
DQB: 2 ,7 ,

Calculated PRA:	**85%**
Calculated PRA (Class I):	**34%**
Calculated PRA (Class II):	**81%**
Total Number of Records Used for Calculation:	**1708**

Back

Tinckam, Liwski, Pochinco, Mousseau, Grattan, Nickerson and Campbell, *AJT 2015*

Virtual Crossmatching

Correlation between donor HLA typing and recipient HLA antibody testing.

Presence/Absence of Donor Specific Antibodies (DSA)

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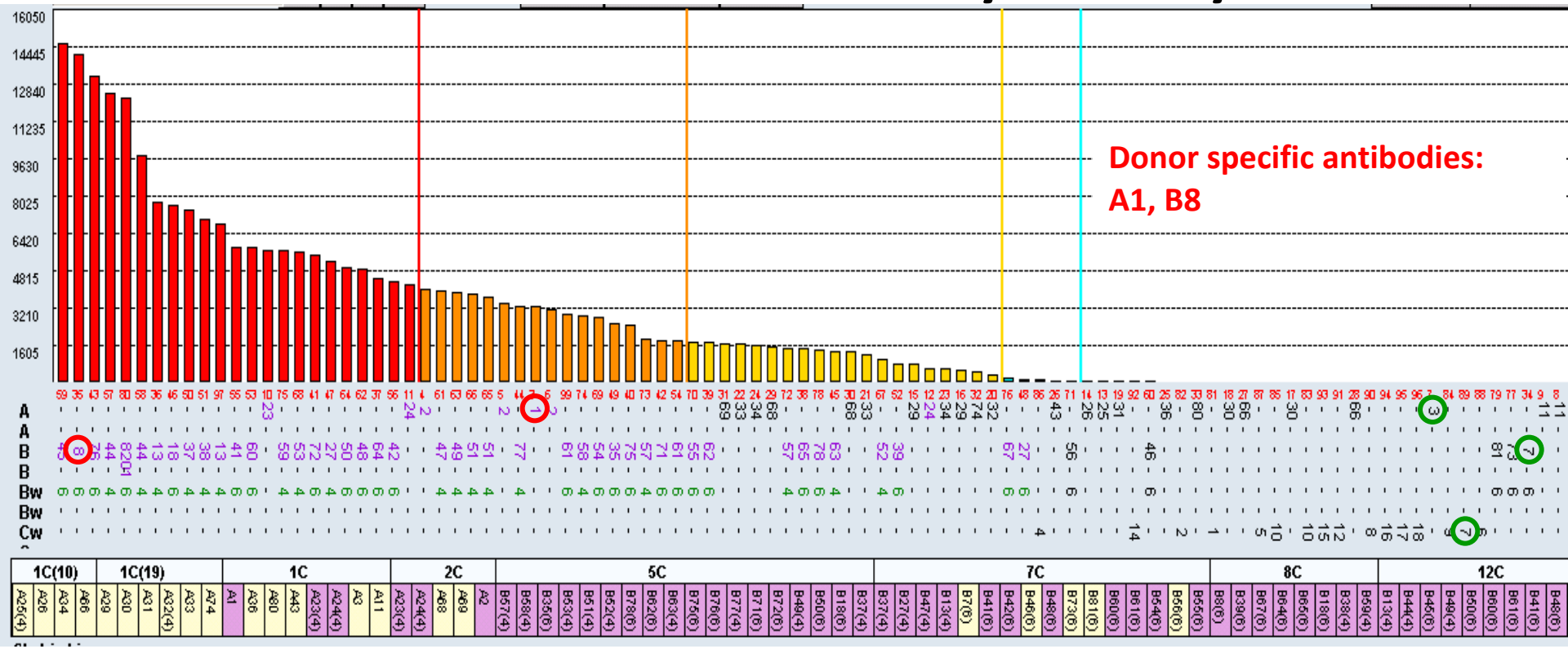
Class I HLA antibody analysis



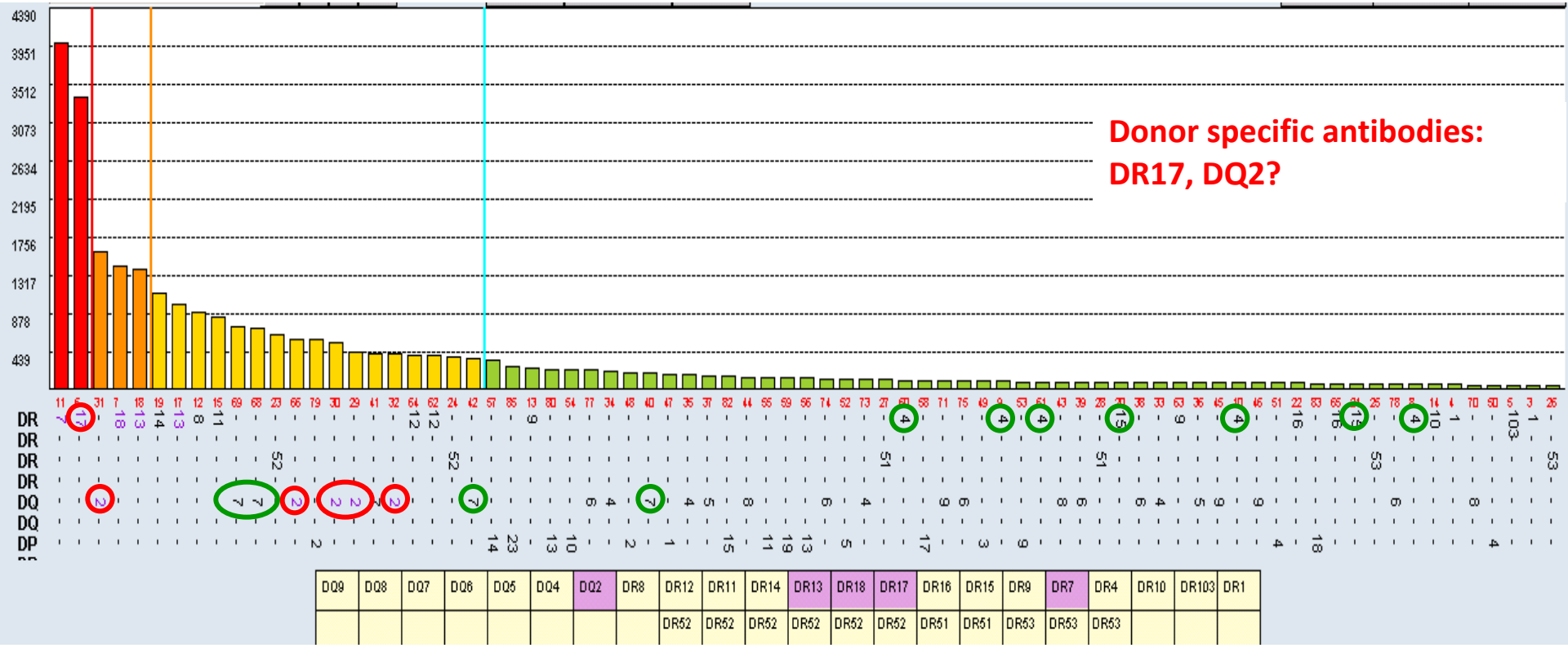
Recipient HLA typing (mother)

A3,3 B7,7 Cw7,7 DR4,15 DQ6,7

Donor HLA typing (son)

A1,3 B7,8 Cw7,7 DR4,17 DQ2,7

Class II HLA antibody analysis



Recipient HLA typing (mother)

A3,3 B7,7 Cw7,7 DR4,15 DQ6,7

Donor HLA typing (son)

A1,3 B7,8 Cw7,7 DR4,17 DQ2,7

Renal Transplant Patient Workup

- **HLA typing, SSO: HLA-A, B, C, DRB1/3/4/5, DQB1/A1 +/- DPB1/A1.**
- **Sera collected monthly and after sensitizing event.**
- **Antibody identification by Luminex every 3 months.**
- **Unacceptable antigens and HLA typing are entered into MOTP database.**

- **Donor HLA typing, HDSSO, entered into MOTP database.**
- **Virtual crossmatch excludes potential recipients with unacceptable mismatches.**
- **Top 5 potential recipients are selected for FCXM.**
- **Top 2 recipients with negative FCXM proceed to transplantation.**
- **Post Transplant Antibody Monitoring (Day of Tx, 3 wk, 3/6/12 mo)**

Renal Transplant Patient Workup

Cardiac and Liver Tx Patients

- **HLA typing, SSO: HLA-A, B, C, DRB1/3/4/5, DQB1/A1 +/- DPB1/A1.**
- **Sera collected monthly and after sensitizing event.**
- **Antibody identification by Luminex every 3 months.**
- **Unacceptable antigens and HLA typing are entered into MOTP database.**

- **Donor HLA typing, HDSSO, entered into MOTP database.**
- **Virtual crossmatch excludes potential recipients with unacceptable mismatches.**
- **Top 5 potential recipients are selected for FCXM.**
- **Top 2 recipients with negative FCXM proceed to transplantation.**
- **Post Transplant Antibody Monitoring (Day of Tx, 3 wk, 3/6/12 mo)**

Virtual Crossmatch

> 200 patients

	HLA typing			VXM	HLA antibodies identified
Patient 1	A1,3	B8,50	DR4,17		A11,A24,A25,B18,B44,DR17
Patient 2	A2,3	B44,62	DR7,8		A1,A26,A33,B52,DR15
Patient 3	A3,11	B8,18	DR4,15		A2,A31,A66,B7,B52
Patient 4	A1,24	B7,45	DR9,12		A3,A30,B60,B61,DR15,DR16
Patient 5	A23,24	B27,35	DR10,16		A1,B8,B44,DR7
Patient 6	A2,23	B51,55	DR9,17		A3,B60,B61,B62,B63,DR12,DR13
Patient 7	A1,30	B7,60	DR11,13		A2,DR1,DR7,DR8
Patient 8	A3,31	B27,61	DR4,7		A1,A23,A24,B18,B45,DR11,DR12
Patient 9	A2,24	B7,45	DR1,8		B27,B51,DR15,DR16
Patient 10	A2,2	B37,44	DR9,12		B8,B60,B61,DR10

Virtual Crossmatch

Donor	A1,2	B7,8	DR4,17

	HLA typing			VXM	HLA antibodies identified
Patient 1	A1,3	B8,50	DR4,17		A11,A24,A25,B18,B44,DR17
Patient 2	A2,3	B44,62	DR7,8		A1,A26,A33,B52,DR15
Patient 3	A3,11	B8,18	DR4,15		A2,A31,A66,B7,B52
Patient 4	A1,24	B7,45	DR9,12		A3,A30,B60,B61,DR15,DR16
Patient 5	A23,24	B27,35	DR10,16		A1,B8,B44,DR7
Patient 6	A2,23	B51,55	DR9,17		A3,B60,B61,B62,B63,DR12,DR13
Patient 7	A1,30	B7,60	DR11,13		A2,DR1,DR7,DR8
Patient 8	A3,31	B27,61	DR4,7		A1,A23,A24,B18,B45,DR11,DR12
Patient 9	A2,24	B7,45	DR1,8		B27,B51,DR15,DR16
Patient 10	A2,2	B37,44	DR9,12		B8,B60,B61,DR10

Virtual Crossmatch

Donor	A1,2	B7,8	DR4,17

	HLA typing			VXM	HLA antibodies identified
Patient 1	A1,3	B8,50	DR4,17		A11,A24,A25,B18,B44,DR1
Patient 2	A2,3	B44,62	DR7,8		A1,A26,A33,B52,DR15
Patient 3	A3,11	B8,18	DR4,15		A2,A31,A66,B7,B52,DR17,DR18
Patient 4	A1,24	B7,45	DR9,12		A3,A30,B60,B61,DR15,DR16
Patient 5	A23,24	B27,35	DR10,16		A1,B8,B44,DR4,DR7
Patient 6	A2,23	B51,55	DR9,17		A3,B60,B61,B62,B63,DR12,DR13
Patient 7	A1,30	B7,60	DR11,13		A2,DR1,DR7,DR8
Patient 8	A3,31	B27,61	DR4,7		A1,A23,A24,B18,B45,DR11,DR12
Patient 9	A2,24	B7,45	DR1,8		B27,B51,DR15,DR16
Patient 10	A2,2	B37,44	DR9,12		B8,B60,B61,DR10

Virtual Crossmatch

Donor	A1,2	B7,8	DR4,17

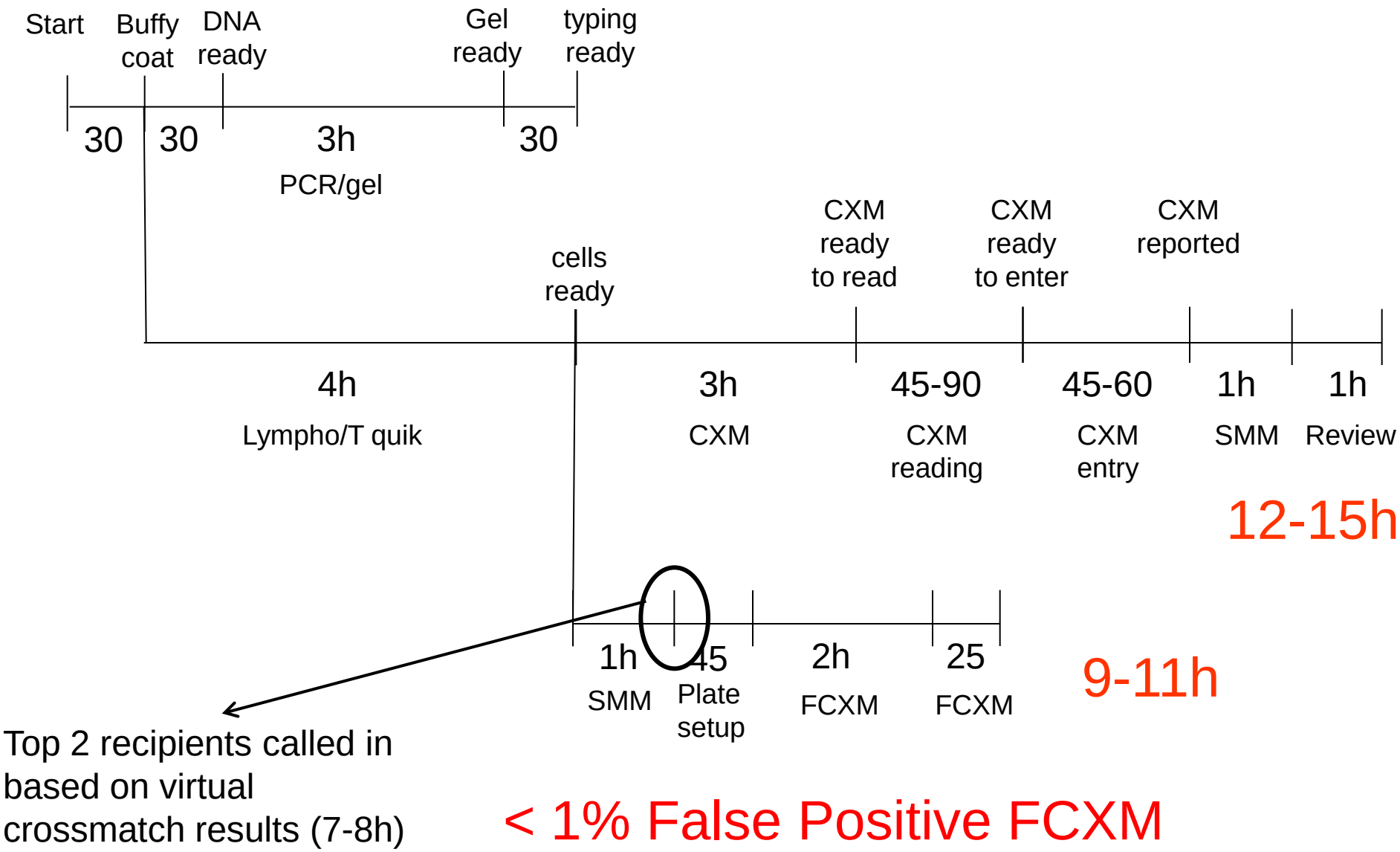
	HLA typing			VXM	HLA antibodies identified
Patient 1	**A1,3**	**B8,50**	**DR4,17**	**-ve**	**A11,A24,A25,B18,B44,DR1**
Patient 2	A2,3	B44,62	DR7,8	**+ve**	A1,A26,A33,B52,DR15
Patient 3	A3,11	B8,18	DR4,15	**+ve**	A2,A31,A66,B7,B52,DR17,DR18
Patient 4	**A1,24**	**B8,45**	**DR9,17**	**-ve**	**A3,A30,B60,B61,DR15,DR16**
Patient 5	A23,24	B27,35	DR10,16	**+ve**	A1,B8,B44,DR4,DR7
Patient 6	**A2,23**	**B51,55**	**DR9,17**	**-ve**	**A3,B60,B61,B62,B63,DR12,DR13**
Patient 7	A1,30	B7,60	DR11,13	**+ve**	A2,DR1,DR7,DR8
Patient 8	A3,31	B27,61	DR4,7	**+ve**	A1,A23,A24,B18,B45,DR11,DR12
Patient 9	**A2,24**	**B7,45**	**DR4,8**	**-ve**	**B27,B51,DR15,DR16**
Patient 10	A2,2	B37,44	DR9,12	**+ve**	B8,B60,B61,DR10

Virtual Crossmatch

Donor	A1,2	B7,8	DR4,17

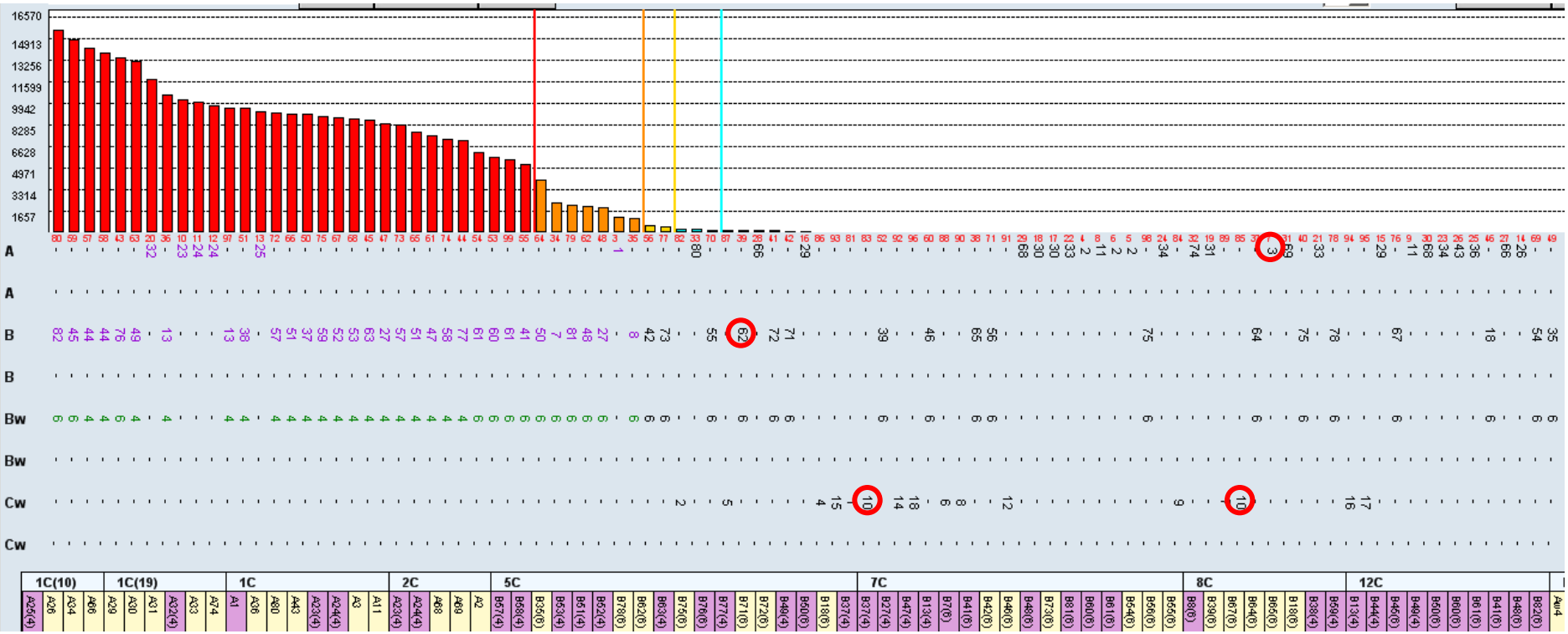
	HLA typing			VXM	HLA antibodies identified
Patient 1	A1,3	B8,50	DR4,17	-ve	A11,A24,A25,B18,B44,DR1
Patient 4	A1,24	B8,45	DR9,17	-ve	A3,A30,B60,B61,DR15,DR16
Patient 6	A2,23	B51,55	DR9,17	-ve	A3,B60,B61,B62,B63,DR12,DR13
Patient 9	A2,24	B7,45	DR4,8	-ve	B27,B51,DR15,DR16

Impact on crossmatch and recipient selection time



< 1% False Positive FCXM

Highly sensitized patient



Class I specificity

A1 A23 A24 A25 A32 B13 B27 B37 B38 B41 B44 B45 B47 B48 B49 B50 B51 B52 B53 B57 B58 B59 B60 B61 B63 B7 B76 B77 B8 B81 B82

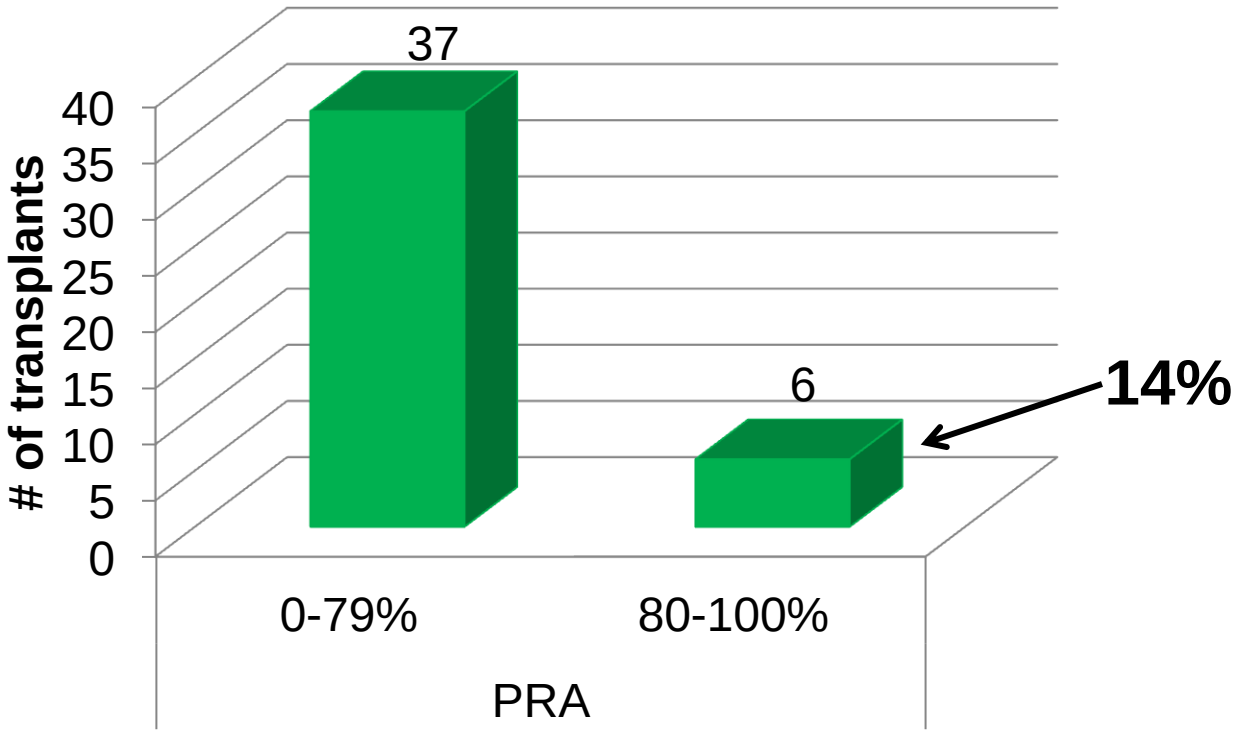
cPRA = 96%

Patient typing A*11,33 B*35,35 Cw*04,04 DRB1*04,13 DR52, 53 DQ*03(7),03(8)

Donor typing A*11,03 B*35,62 Cw*04,10 DRB1*04,11 DR52, 53 DQ*03(7),03(8)

Access to transplants for highly sensitized patients

Deceased donor transplants (April 2011-October 2011)



nova scotia health authority

Virtual Crossmatching National Impact

- Canadian Transplant Registry
  - Kidney Paired Exchange (KPD)
  - Highly Sensitized Patient Registry (HSP), cPRA ≥95%

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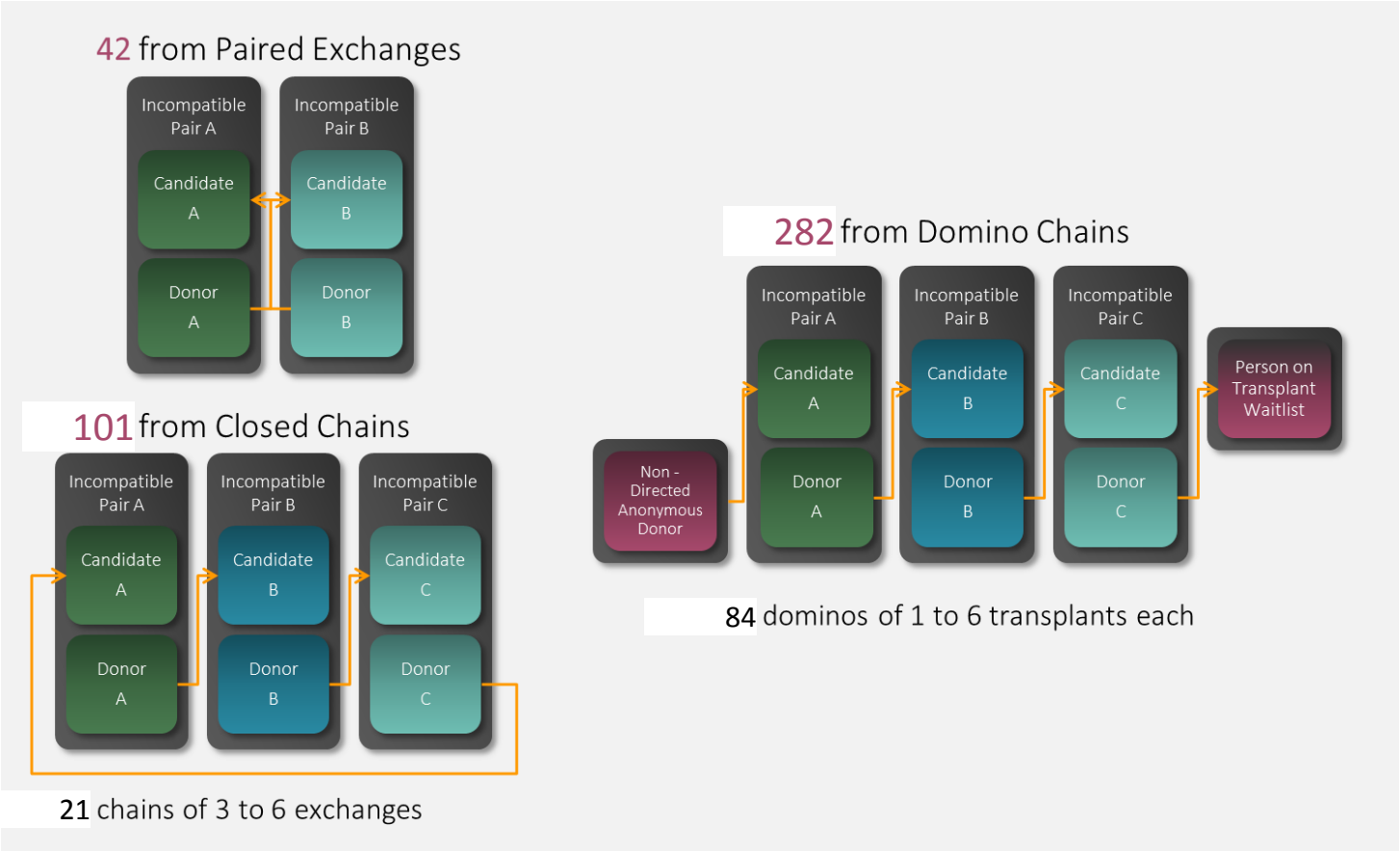
KPD Data Review

KPD Match Cycles

Of the 425 Transplants completed to date:



Canadian Blood Services
it's in you to give

Courtesy: Mr. Sean Delaney

Canadian Transplant Registry & Programs: KPD

Activity by Transplant Centre

	VGH	SPH	UAH	FMC	SPH	HSC	LHSC	SJH	TGH	SMH	HSC	TOH	HMR	HND	HRV	CHS	HDQ	QE2
	BC		AB		SK	MB	ON						QC					Atl.
Registered Transplant	41	72	19	18	10	15	6	8	45	33	5	19	4	11	5	2	5	20
Waitlist Transplant	13	9	2	3	5	4	3	5	18	3	0	4	0	4	1	1	0	2
Candidates Registered	76	116	46	50	21	41	15	34	114	68	8	50	7	22	24	4	20	50
Total Transplants in Province	135		42		15	19	149						33					22
% of National Total	33%		10%		4%	5%	36%						8%					5%

20 Tx

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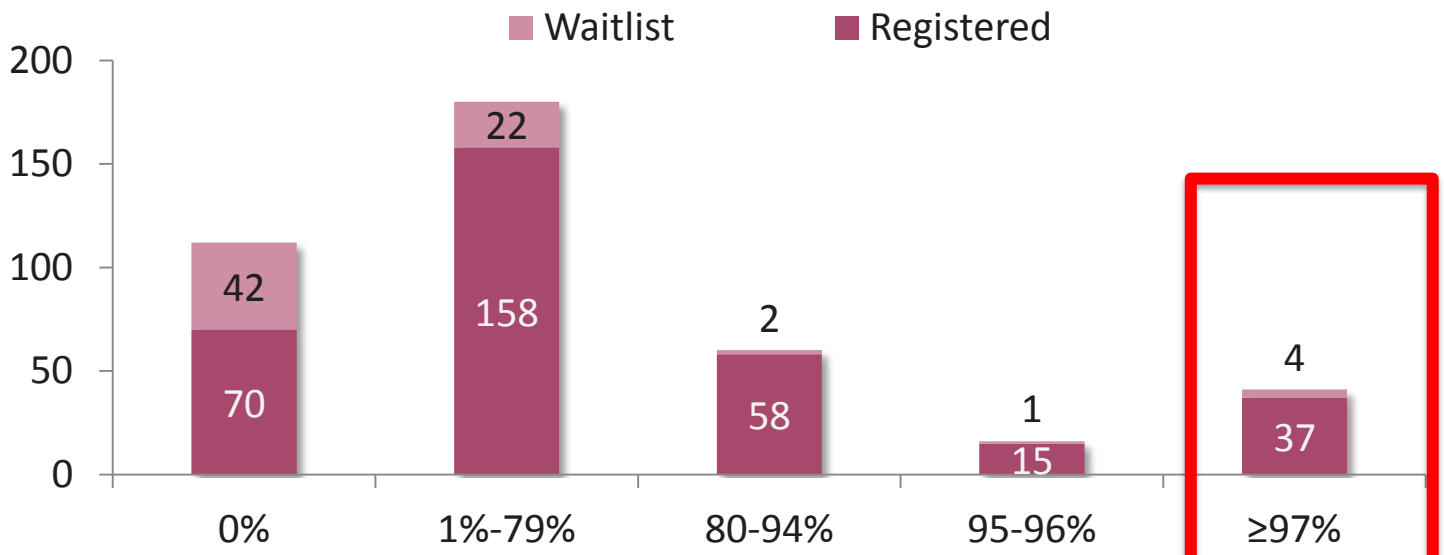
Canadian Transplant Registry & Programs: KPD

Transplant Recipients by cPRA



	0%	1%-79%	80-94%	95-96%	≥97%
% of Candidate Population	19%	36%	12%	3%	30%
% of Recipients (n=409*)	27%	43%	14%	4%	10%
% of Candidates in cPRA Group Transplanted	49%	57%	65%	58%	16%

*Includes both Registered and Waitlist Recipients. cPRA information for 6 Waitlist Recipients (1%) not available.

Canadian Blood Services
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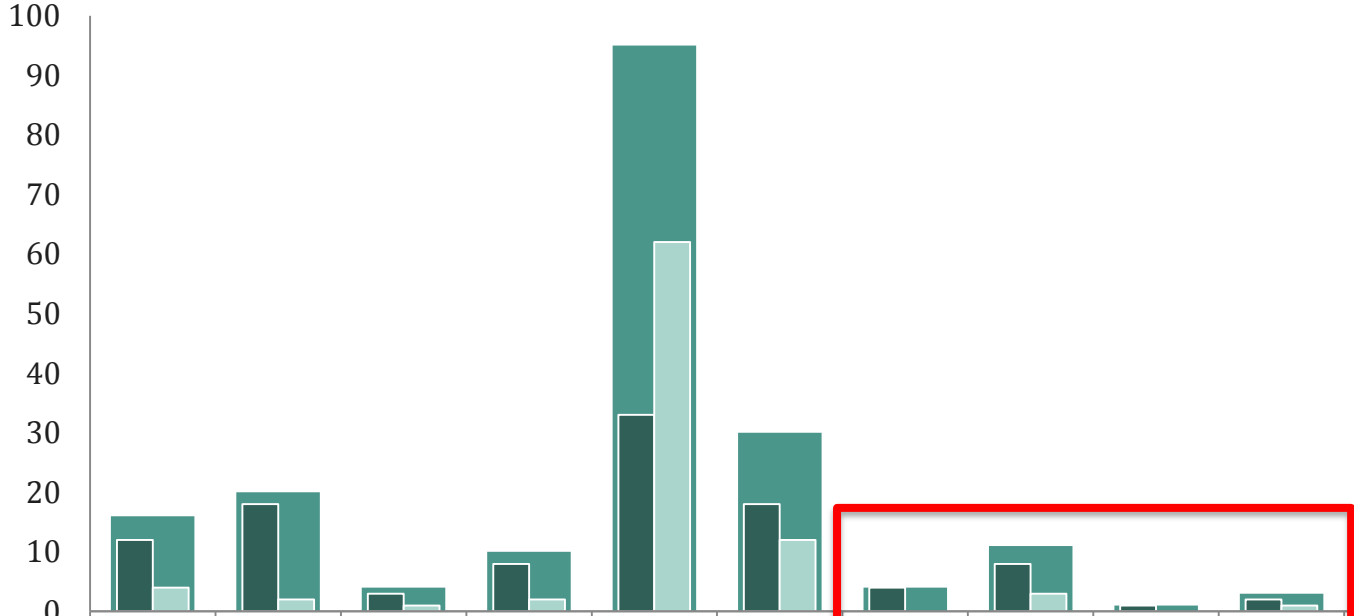
Courtesy: Mr. Sean Delaney

HSP Data Review

Tracking by Home Province



	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL	Total
HSP transplanted	16	20	4	10	95	30	4	11	1	3	194
Interprovincial transplants	12	18	3	8	33	18	4	8	1	2	107
Intraprovincial transplants	4	2	1	2	62	12		3		1	87

Based on Recipient PHN Province

19 Tx + 2

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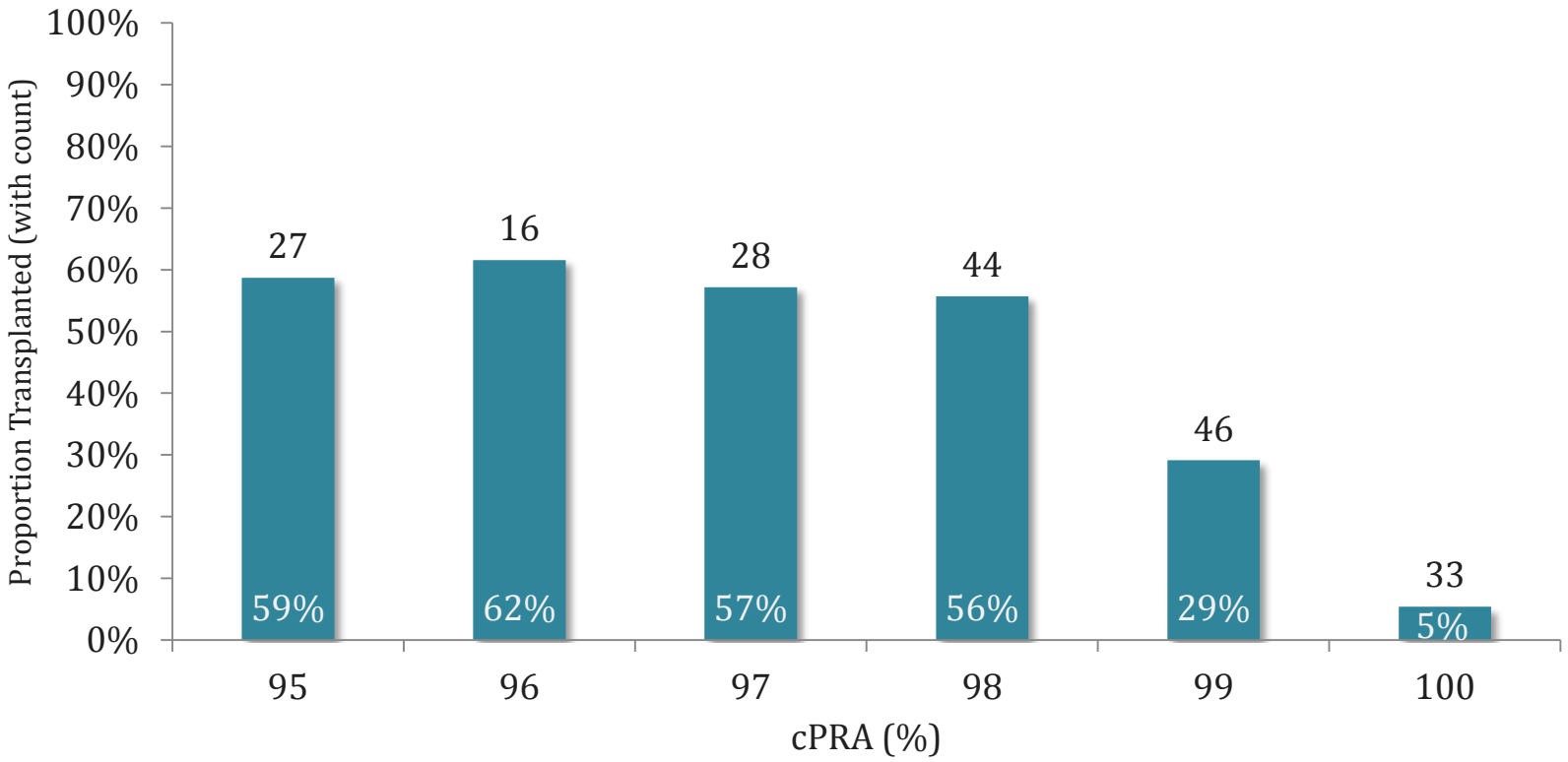
HSP Data Review

HSP Transplants by cPRA and Proportion Transplanted



Canadian Blood Services
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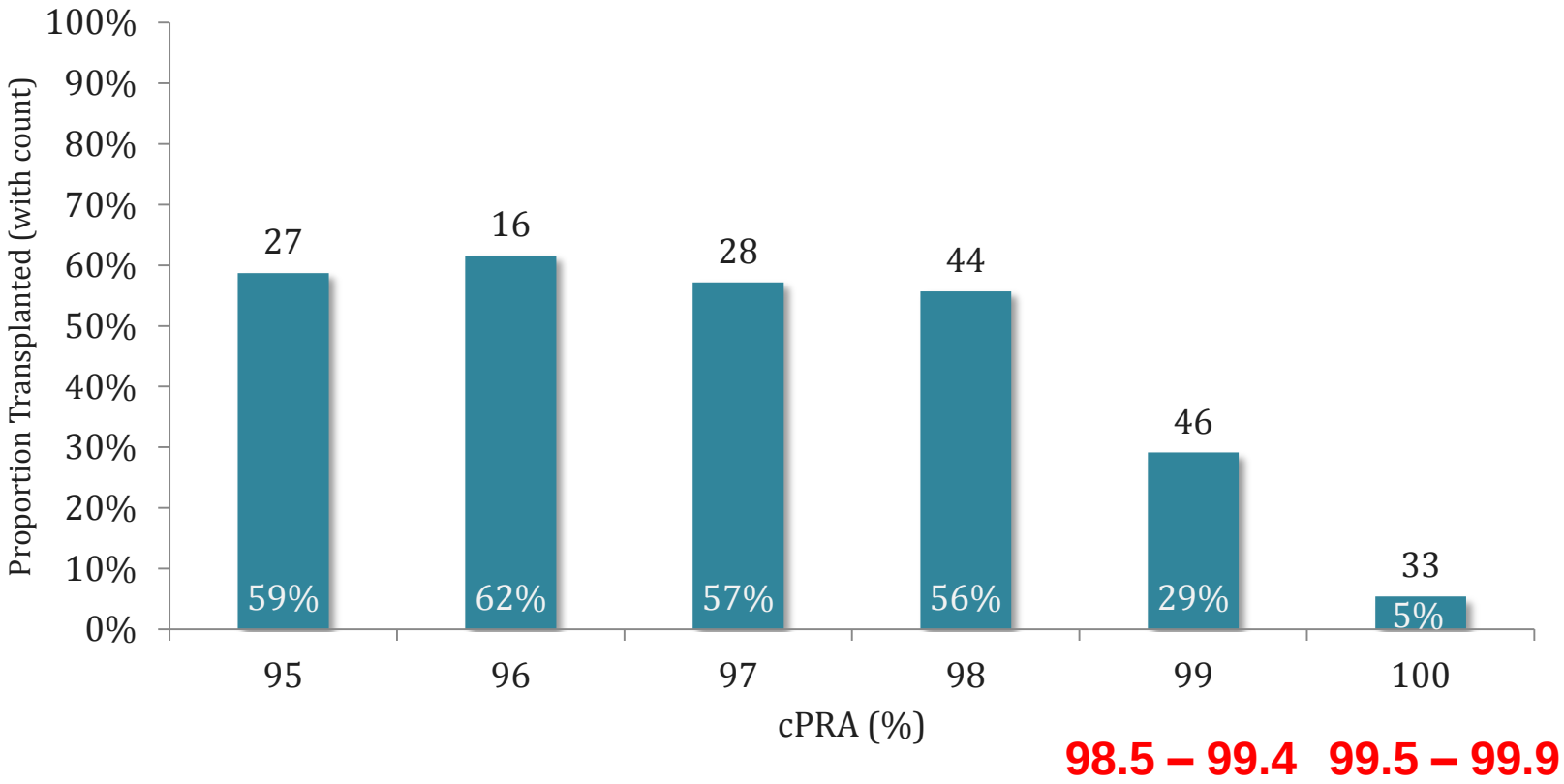
Courtesy: Mr. Sean Delaney

HSP Data Review

HSP Transplants by cPRA and Proportion Transplanted



Canadian Blood Services
it's in you to give

Courtesy: Mr. Sean Delaney

Canadian Experience with virtual crossmatching (as of March 2015)

- Live Donor Paired Exchange
  - 5 years
  - 249 transplants + 62
  - 276 negative virtual XM
  - 24 positive FCXM
    - 10 False pos (TX)
    - 14 True pos
      - 10, DQ/DP missing
      - 2, DSA not listed in error
      - 2, new DSA
- Highly Sensitized Patient Registry, cPRA ≥95%
  - 6 months
  - Transplanted 74/511 pt
    - 44 pt, cPRA > 97%
  - 3 FCXM pos

Halifax Lab (0 positive FCXM)

Flow Crossmatch Protocol

Incubate $5x10^5$ cells (30 µl) and serum 30 µl (4°C)	30 min
Wash x3 (5 min/spin)	15 min
Incubate with 100 µl anti-IgG-FITC/CD3/CD19 (4°C)	30 min
Wash x2 (5min/spin)	10 min
Total assay time **2 HOURS**	**1h 25 min**

Rapid Optimized Flow Crossmatch Protocol

Halifax/Halifaster Protocol

Incubate $5x10^5$ cells (30 µl) and serum 30 µl (4°C)		30 min
$1.5x10^5$ cells (15 µl)	30 µl (RT)	**20 min**
Wash x3 (5 min/spin)		15 min
(1 min/spin)		**3 min**
Incubate with 100 µl anti-IgG-FITC/CD3/CD19 (4°C)		30 min
	(RT)	**5 min**
Wash x2 (5min/spin)		10 min
(1 min/spin)		**2 min**
Total assay time	**2 HOURS**	**1h 25 min**

>70% Time Reduction **30 min**

Going with the Flow, Canadian Crossmatch Standardization

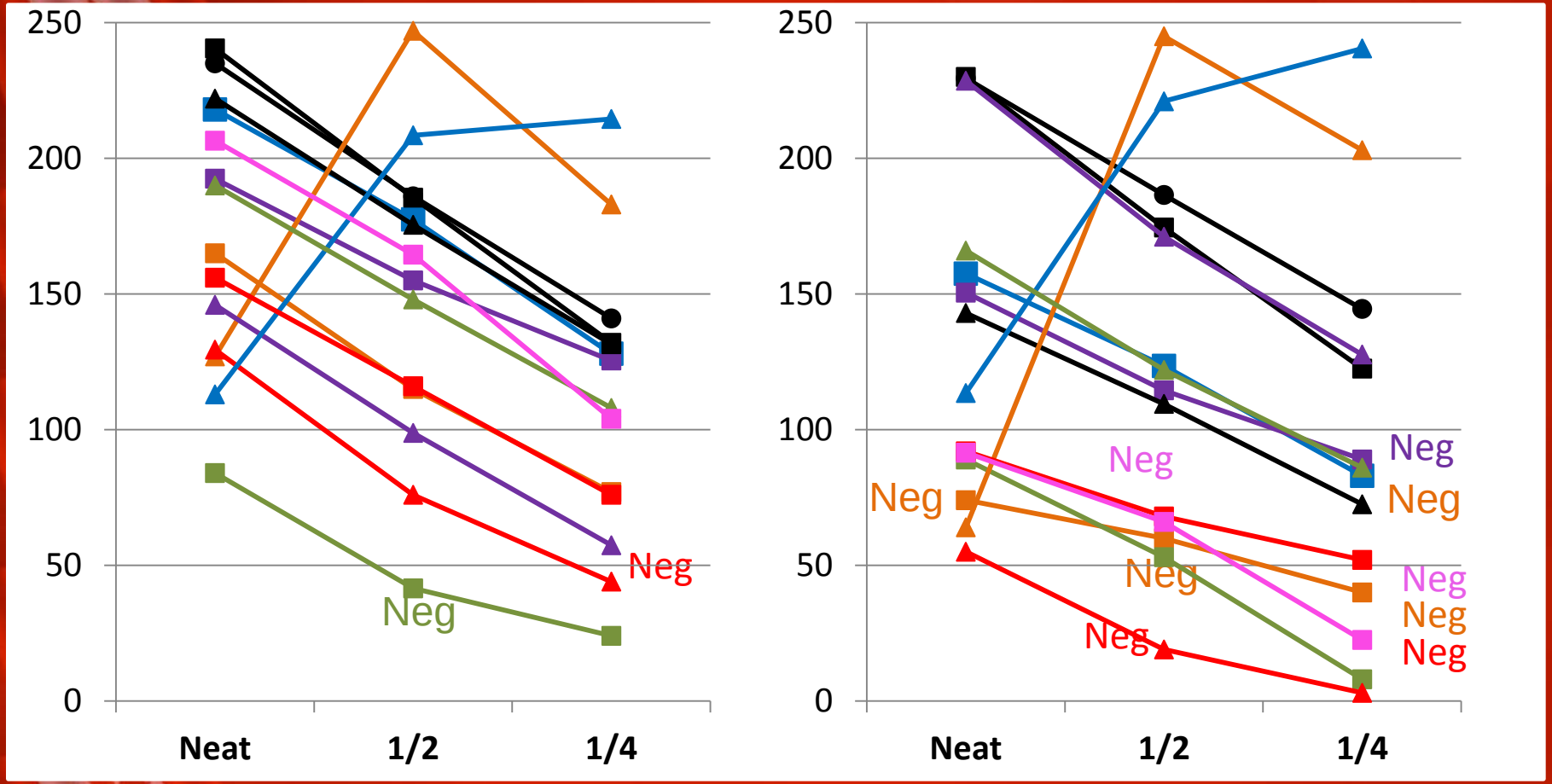
Robert Liwski, Denise Pochinco, Kathryn Tinckam, Howard Gebel, Patricia Campbell and Peter Nickerson

On behalf of the Nationwide Laboratory Oversight Committee & Canadian Blood Services

Liwski *et al* ASHI 2012

FXM Result Variability (Cell 1 vs Serum 1)

- T cell X-match
- B cell X-match



Class I DSA: A33 (2.5K), B13 (7K)

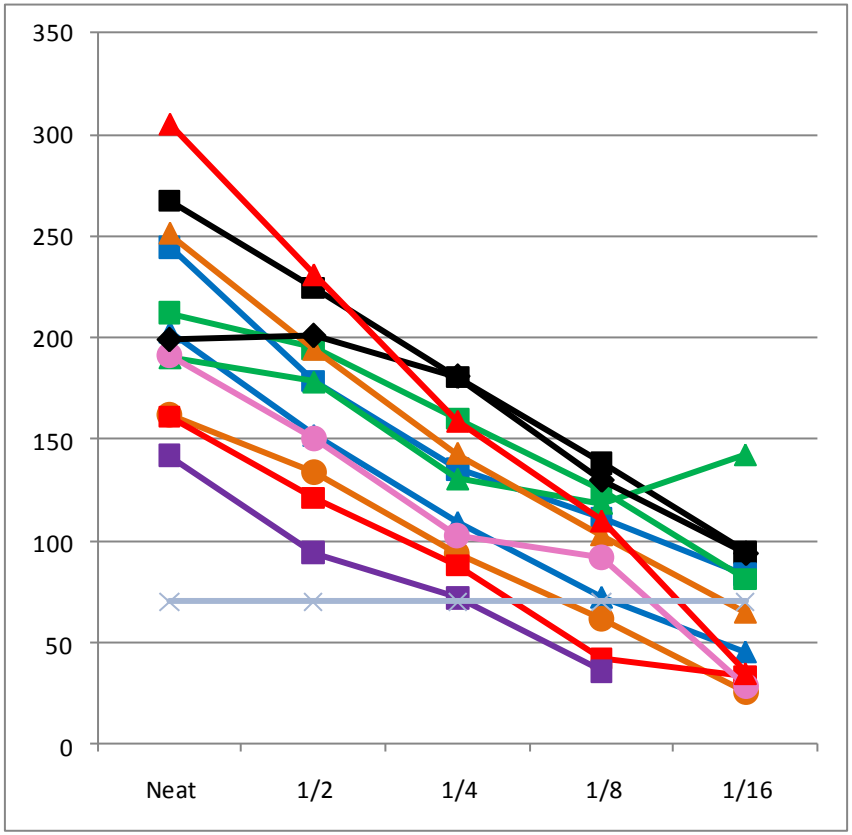
Class II DSA: DP17 (5K)

Liwski *et al* ASHI 2012

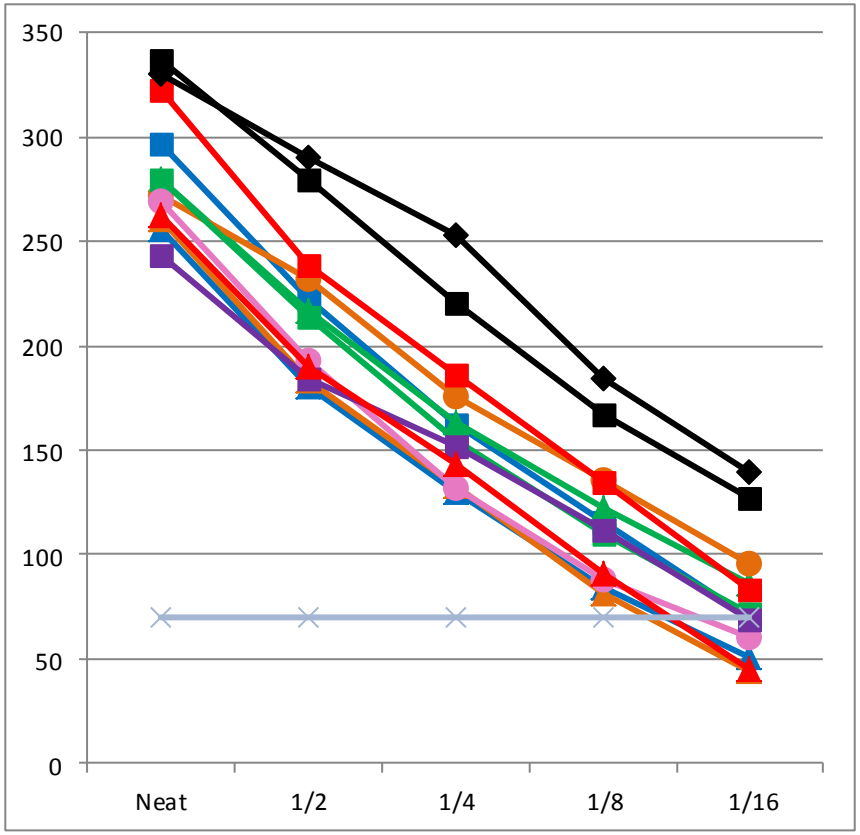
T cell FXM comparison

Delta MCF

Lab Method



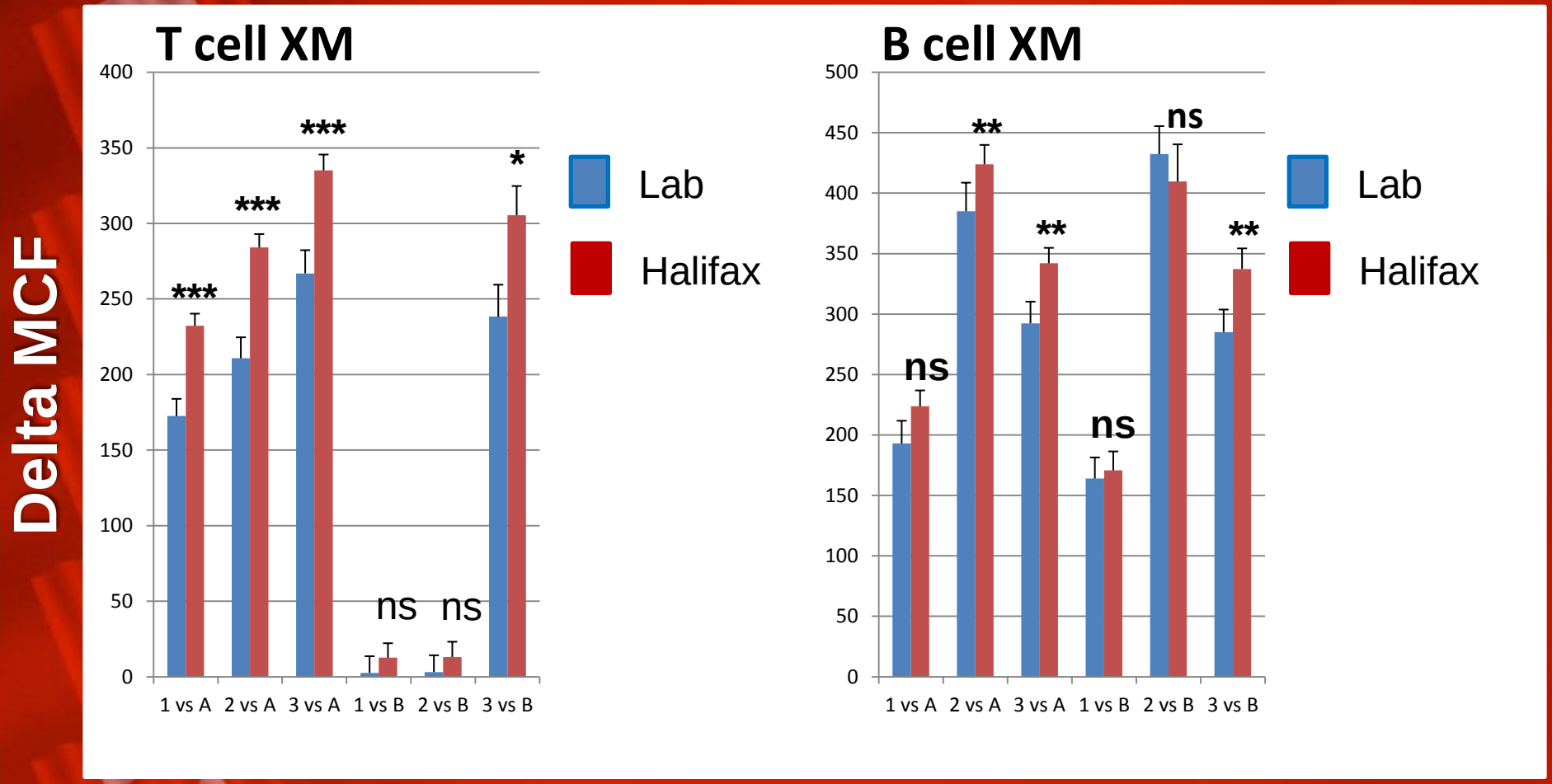
Halifax Protocol



Moderate class I HLA DSA

Liwski *et al* ASHI 2012

FXM signal/noise ratio
Lab vs Halifax Protocol



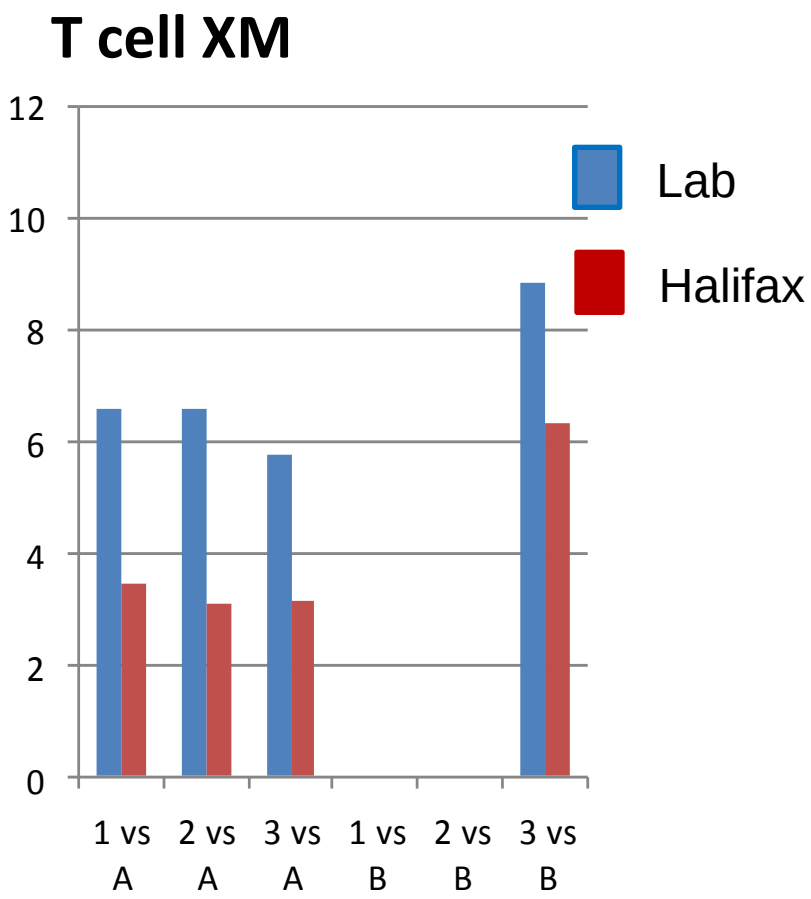
Paired Student's t-Test, 2 tail analysis

*p < 0.05. **p < 0.01, ***p < 0.001

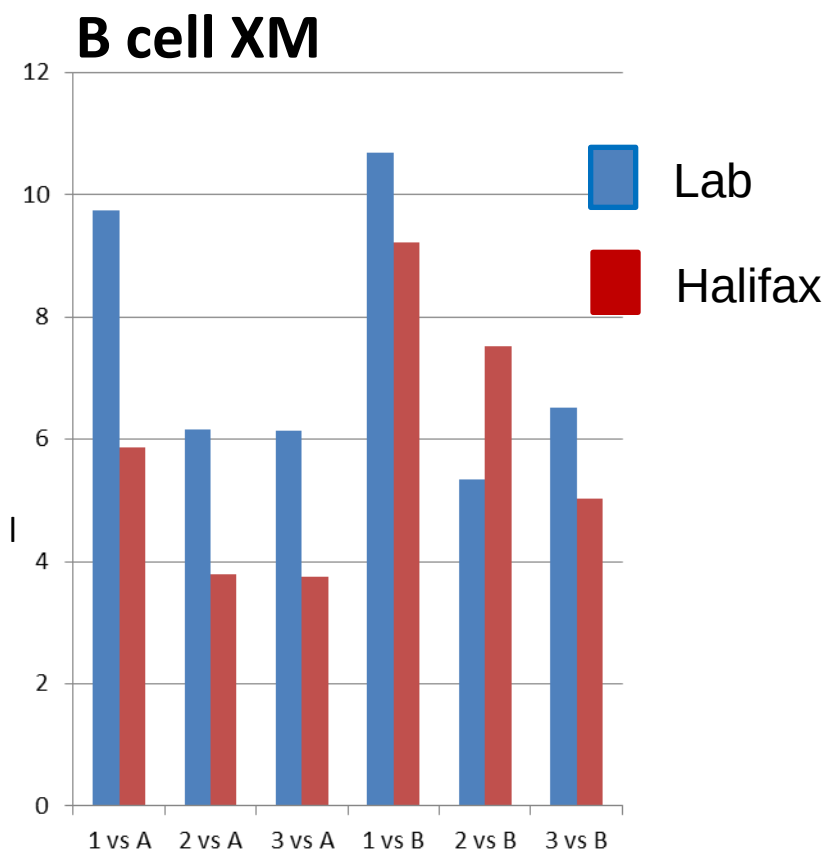
Liwski *et al* ASHI 2012

FXM Precision
Lab vs Halifax Protocol

Relative Standard Error (%)



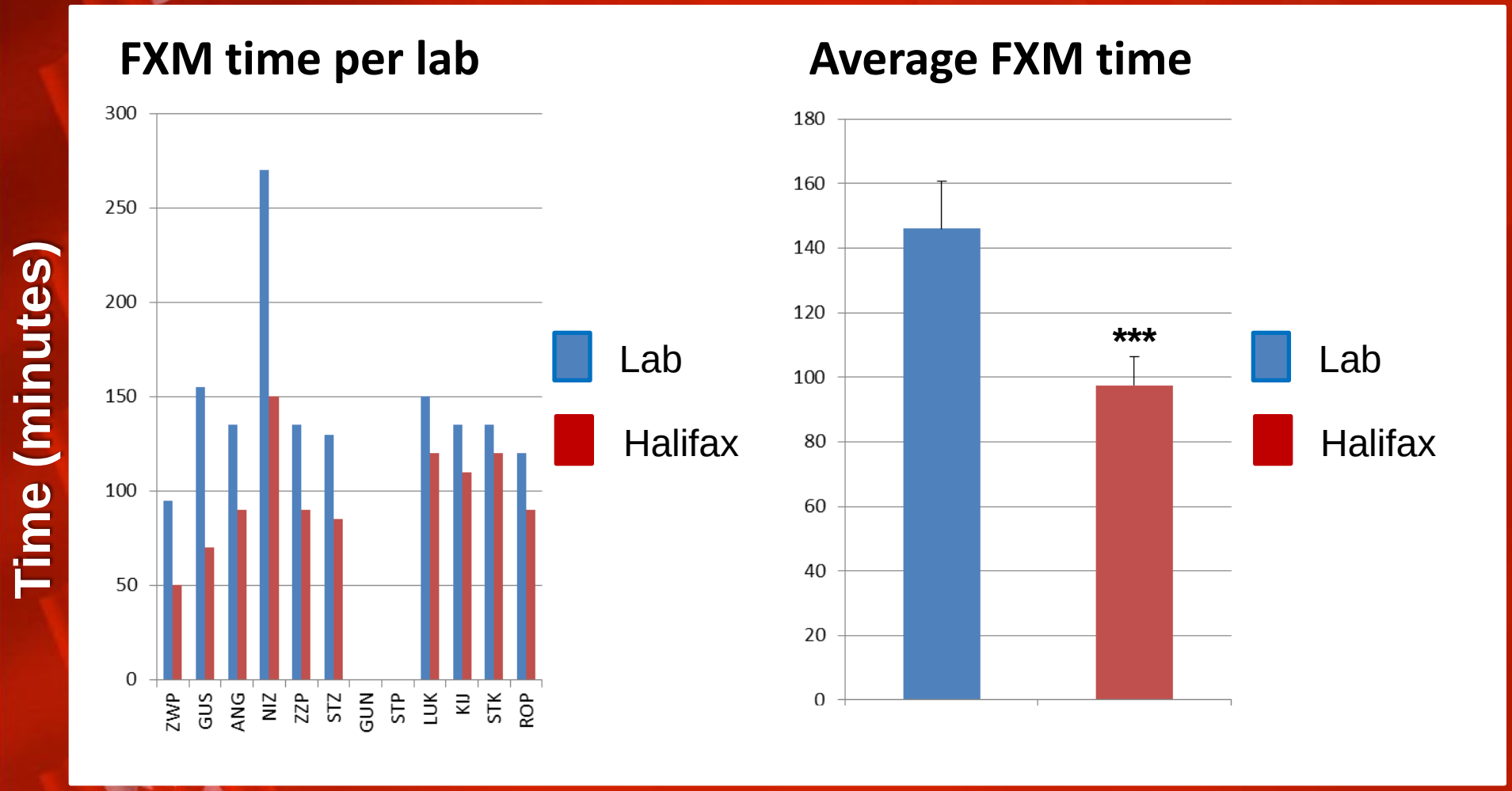
7.0+/-1.3 vs 4.0+/-1.5 p<0.001



7.4+/-2.2 vs 5.9+/-2.2 p=0.058

Liwski *et al* ASHI 2012

FXM time
Lab vs Halifax Protocol



Paired Student's t-Test, 2 tail analysis
***$p < 0.001$

Liwski *et al* ASHI 2012

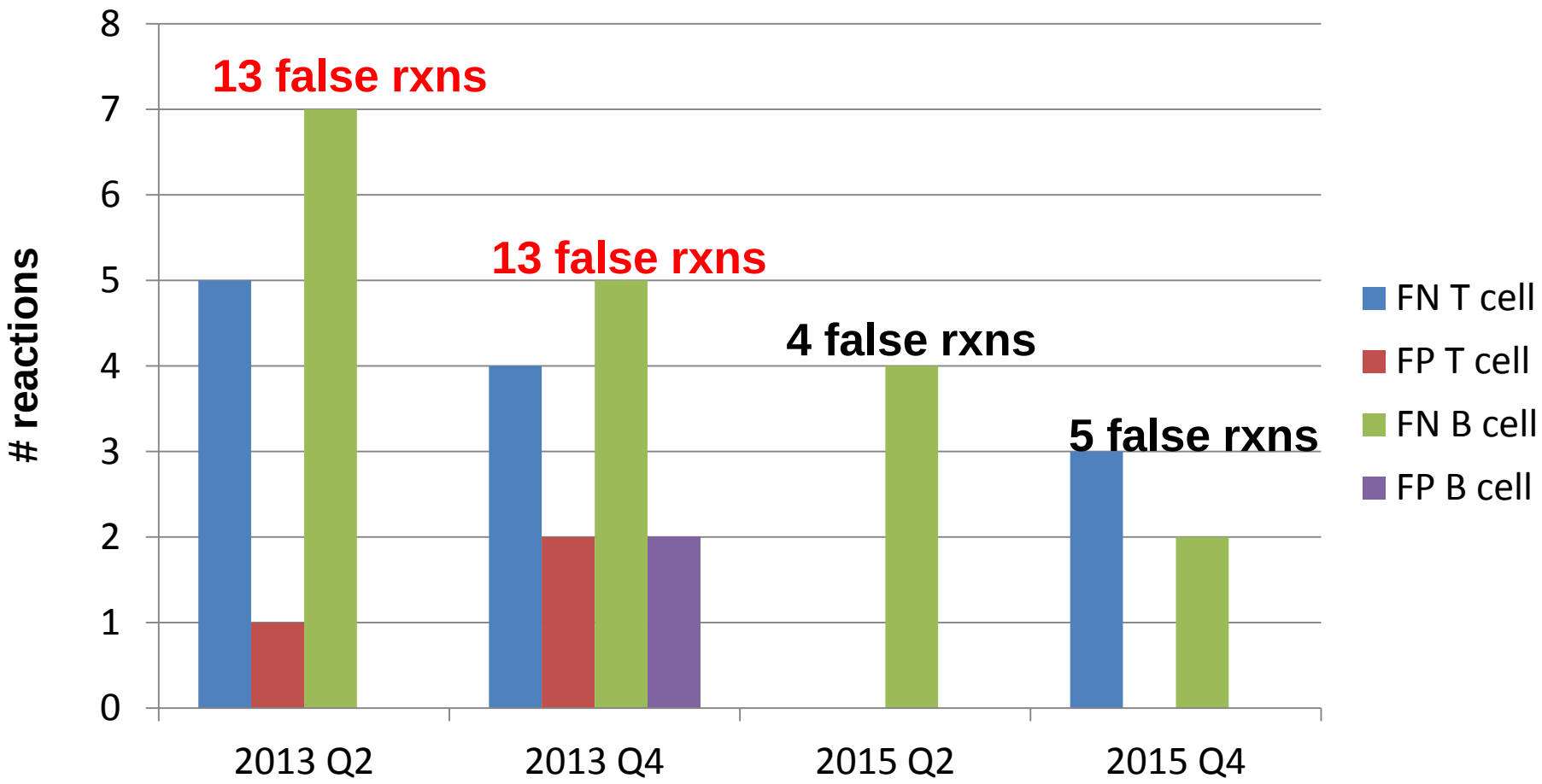
Brazilian FCXM PT Result correlation

Rob Liwski

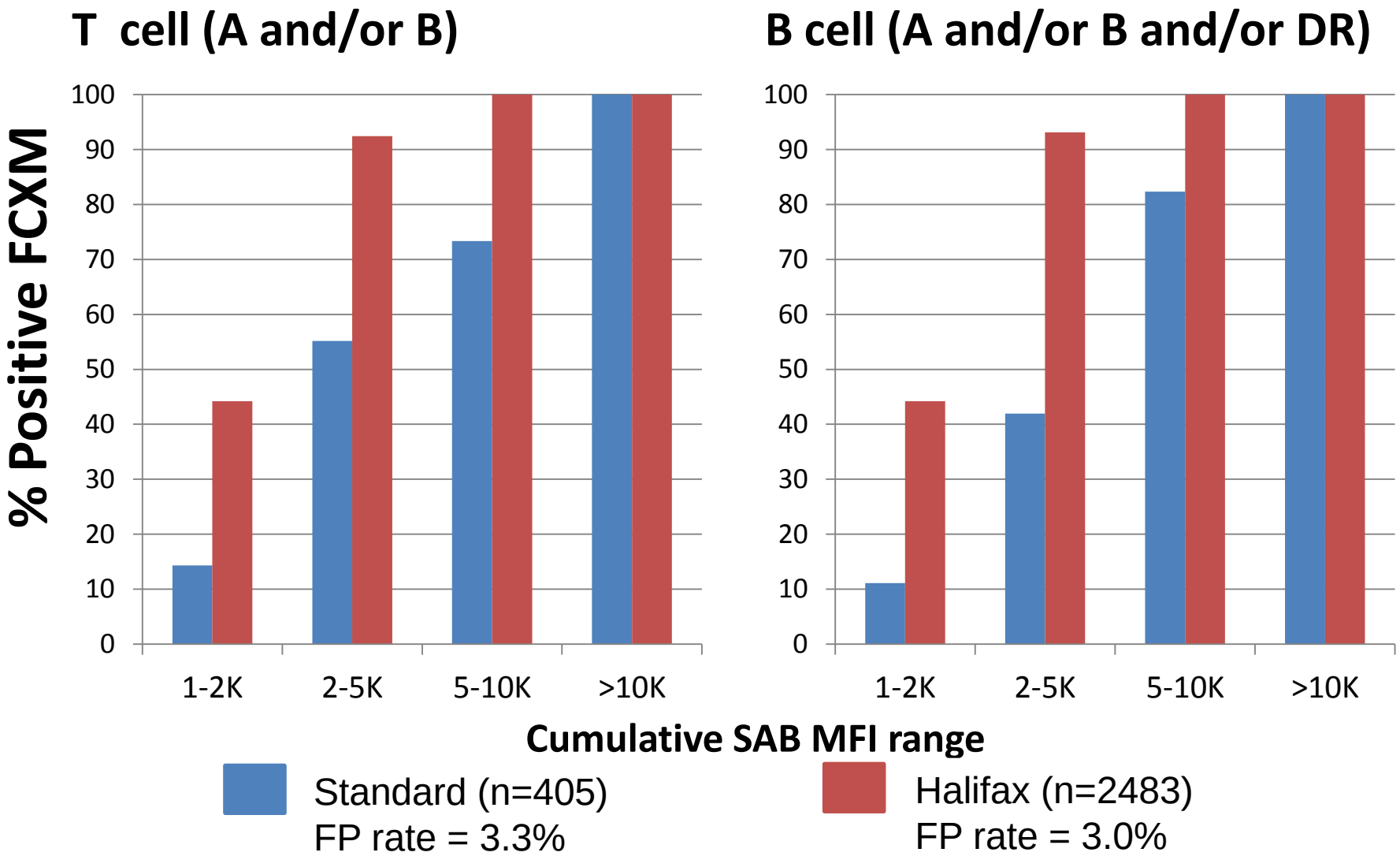
on behalf of ABH

www.fppt.info

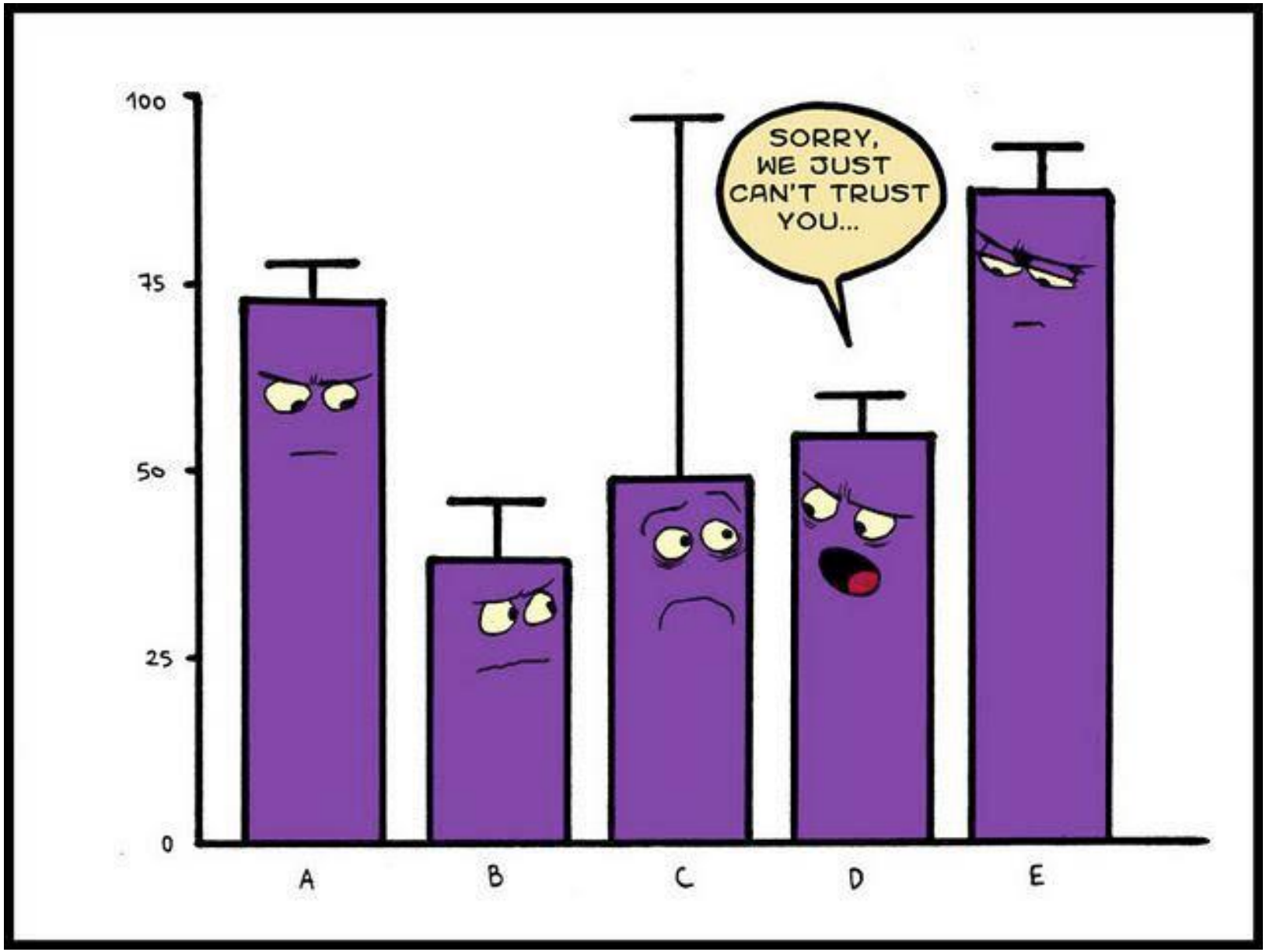
Significantly reduction in false pos/neg reactions. 2013 vs 2015



Santa Casa Lab, VXM vs FCXM Correlation Standard vs Halifax Protocol



Neumann and Liwski, manuscript in prep.



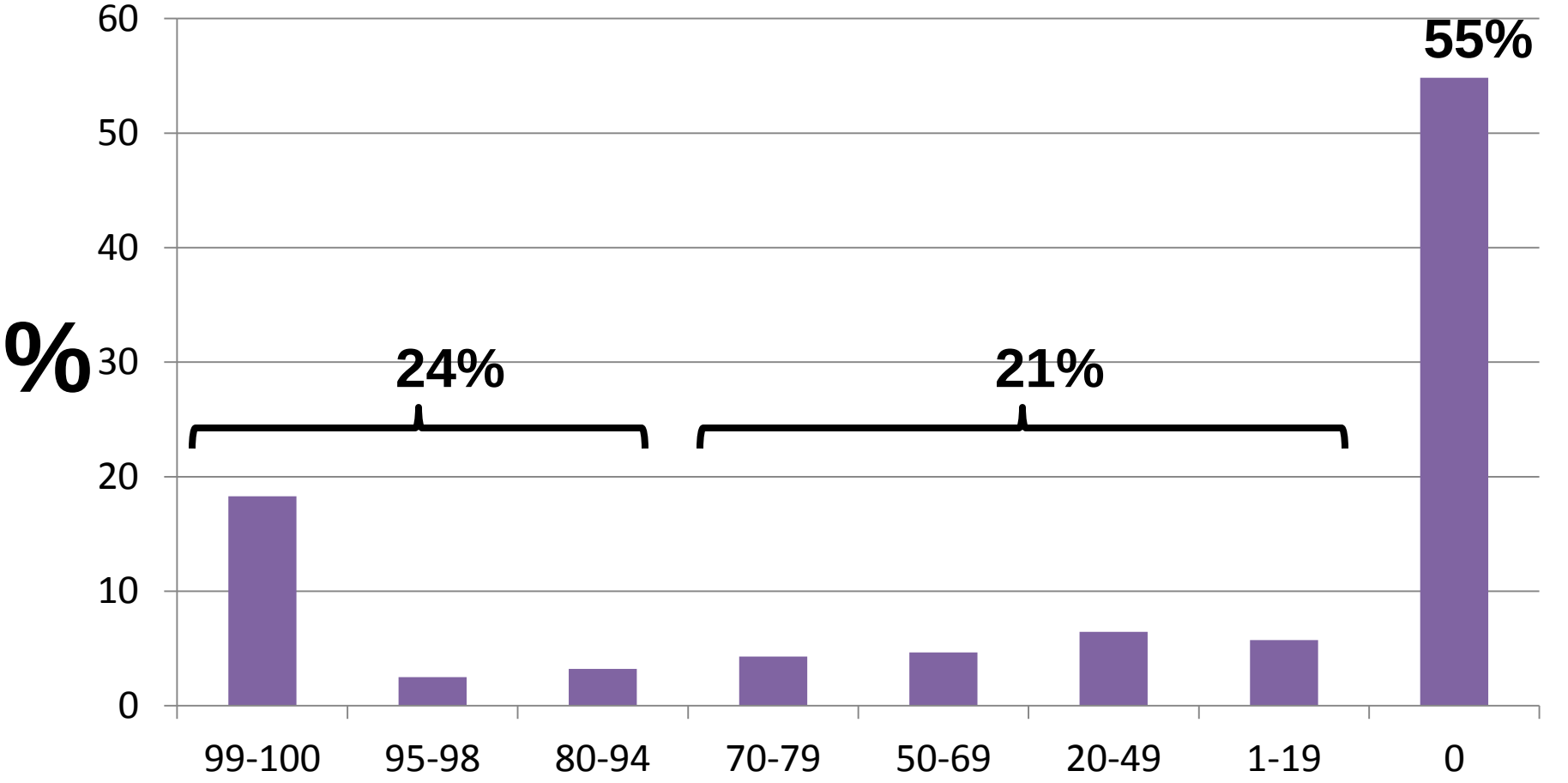
http://stats.stackexchange.com/questions/423/what-is-your-favorite-data-analysis-cartoon

Wait List 2016

- **Impact of:**
  - **virtual XM**
  - **Local priority for cPRA >80%**
  - **KPD**
  - **HSP**

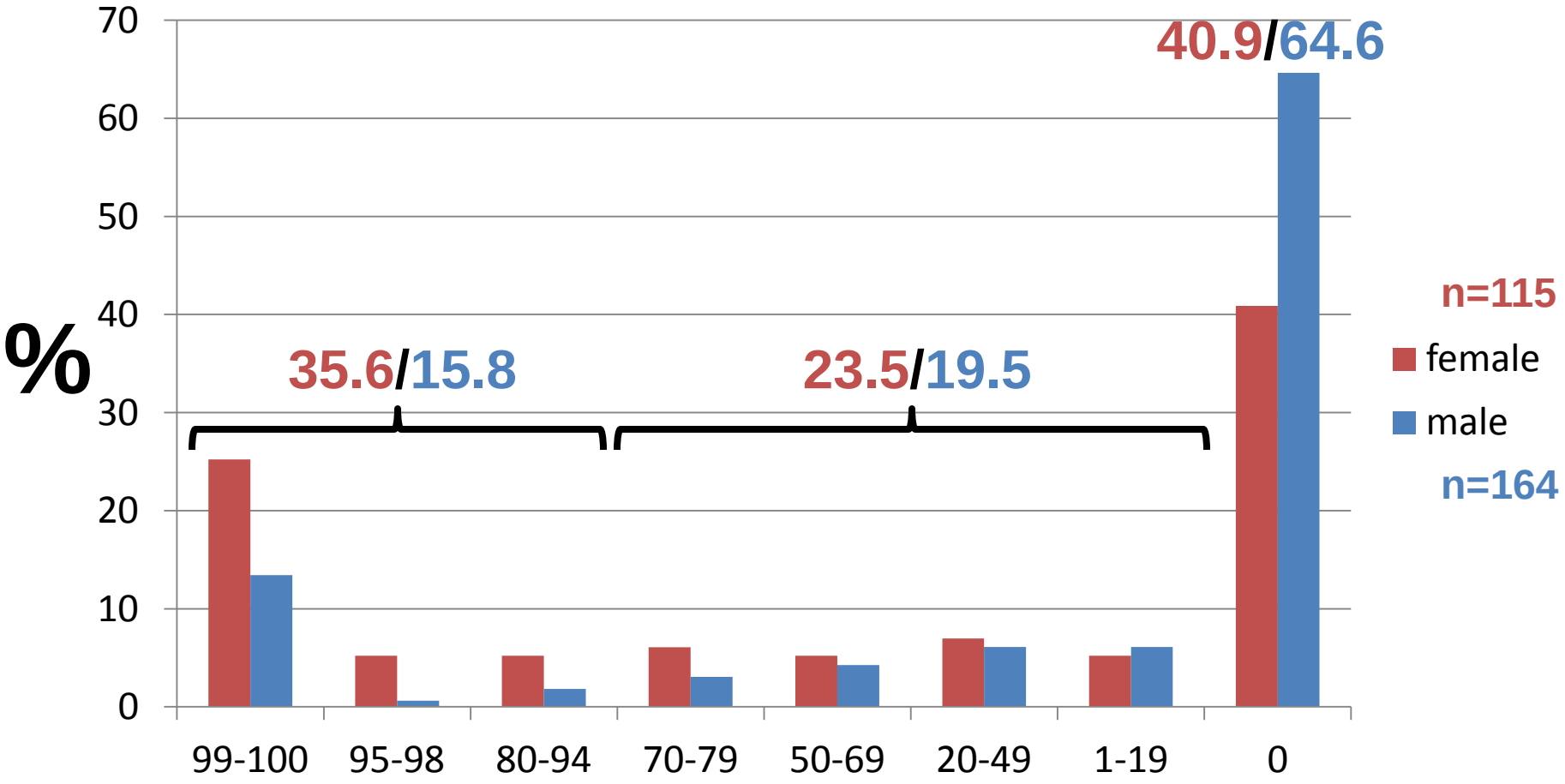
nova scotia health authority

Wait list patients by cPRA

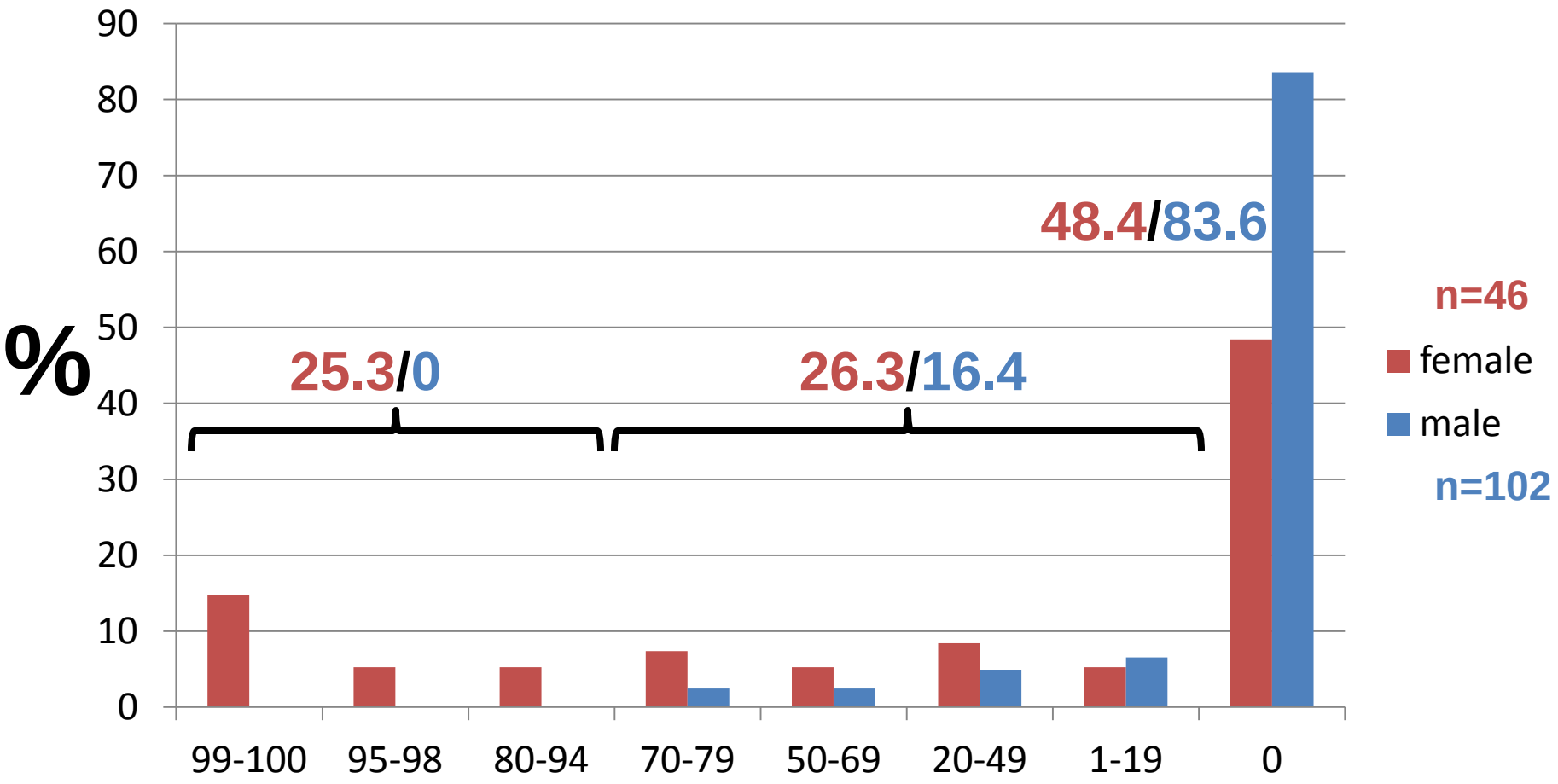


N=279

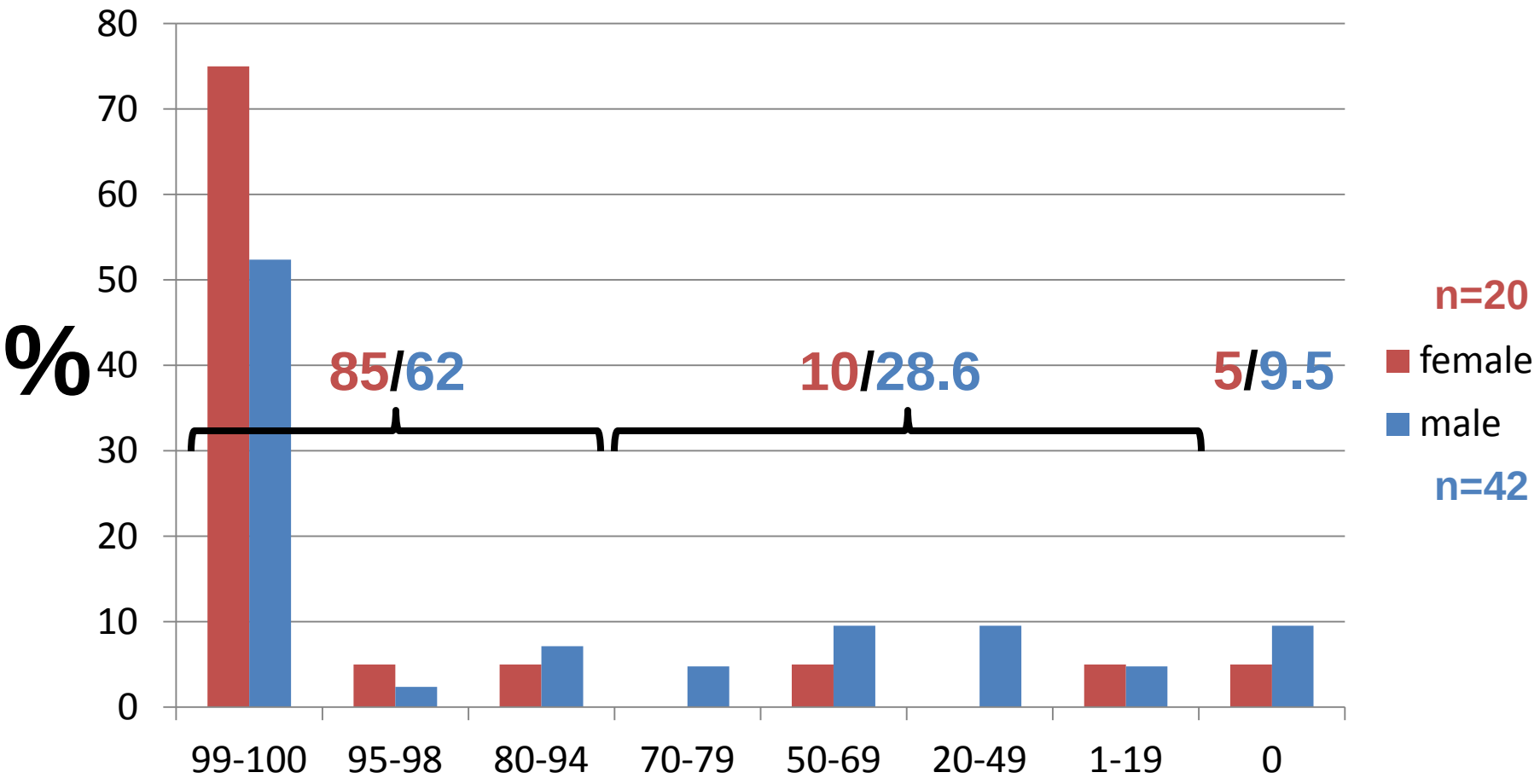
Wait list patients by cPRA, female vs male



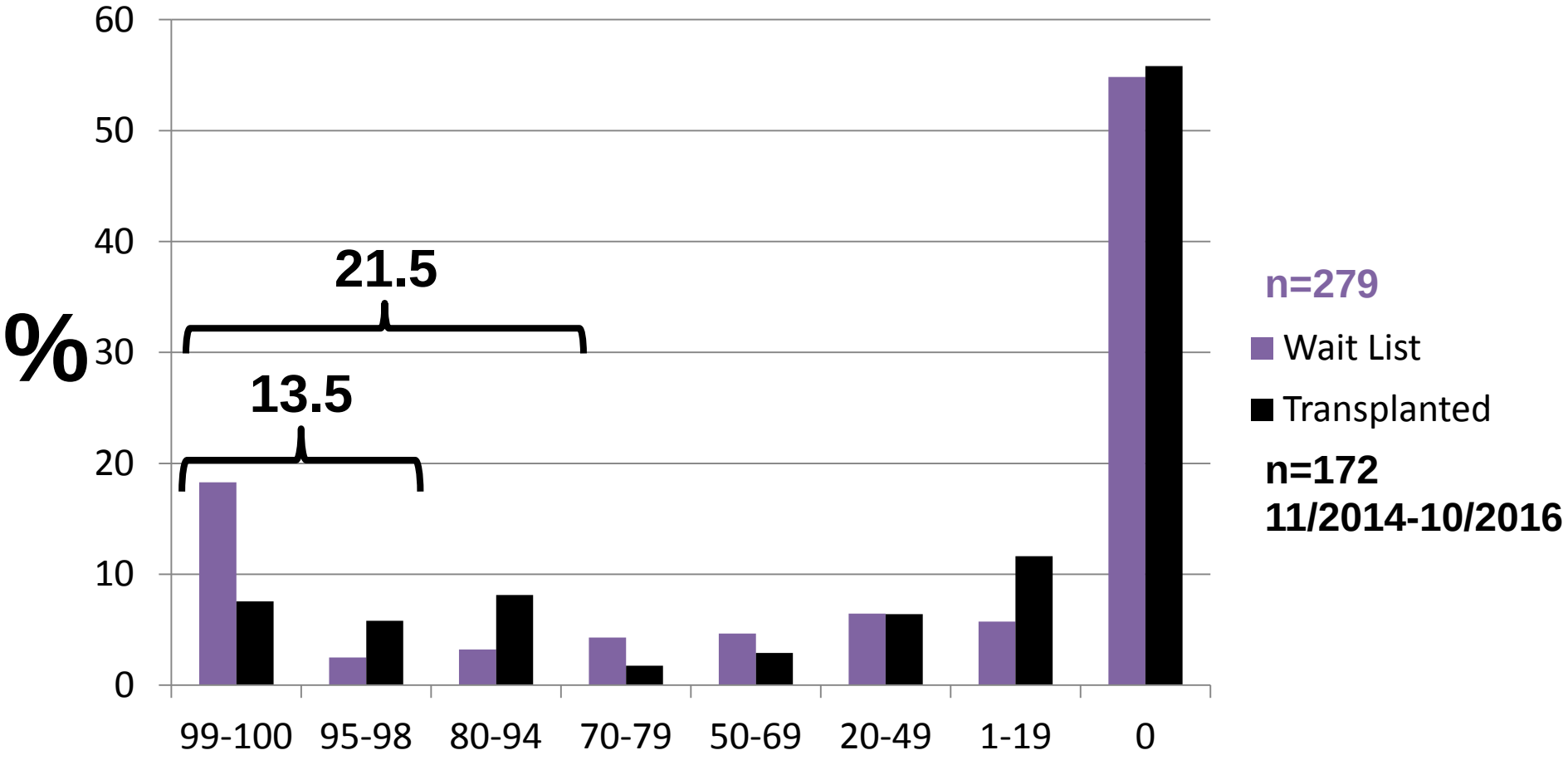
Wait list patients by cPRA
First Time Transplant Candidates



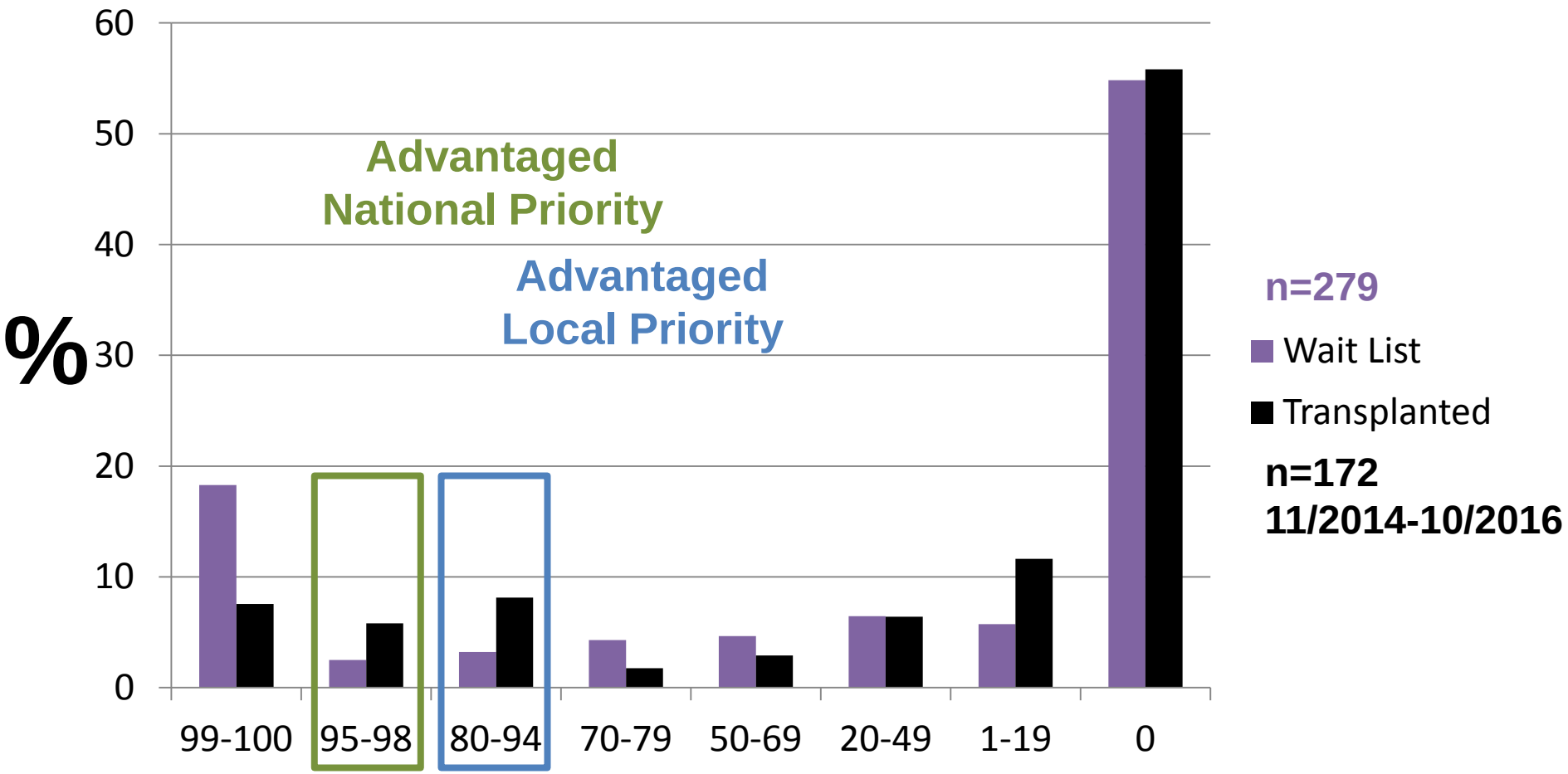
Wait list patients by cPRA, Previous Transplant Patients



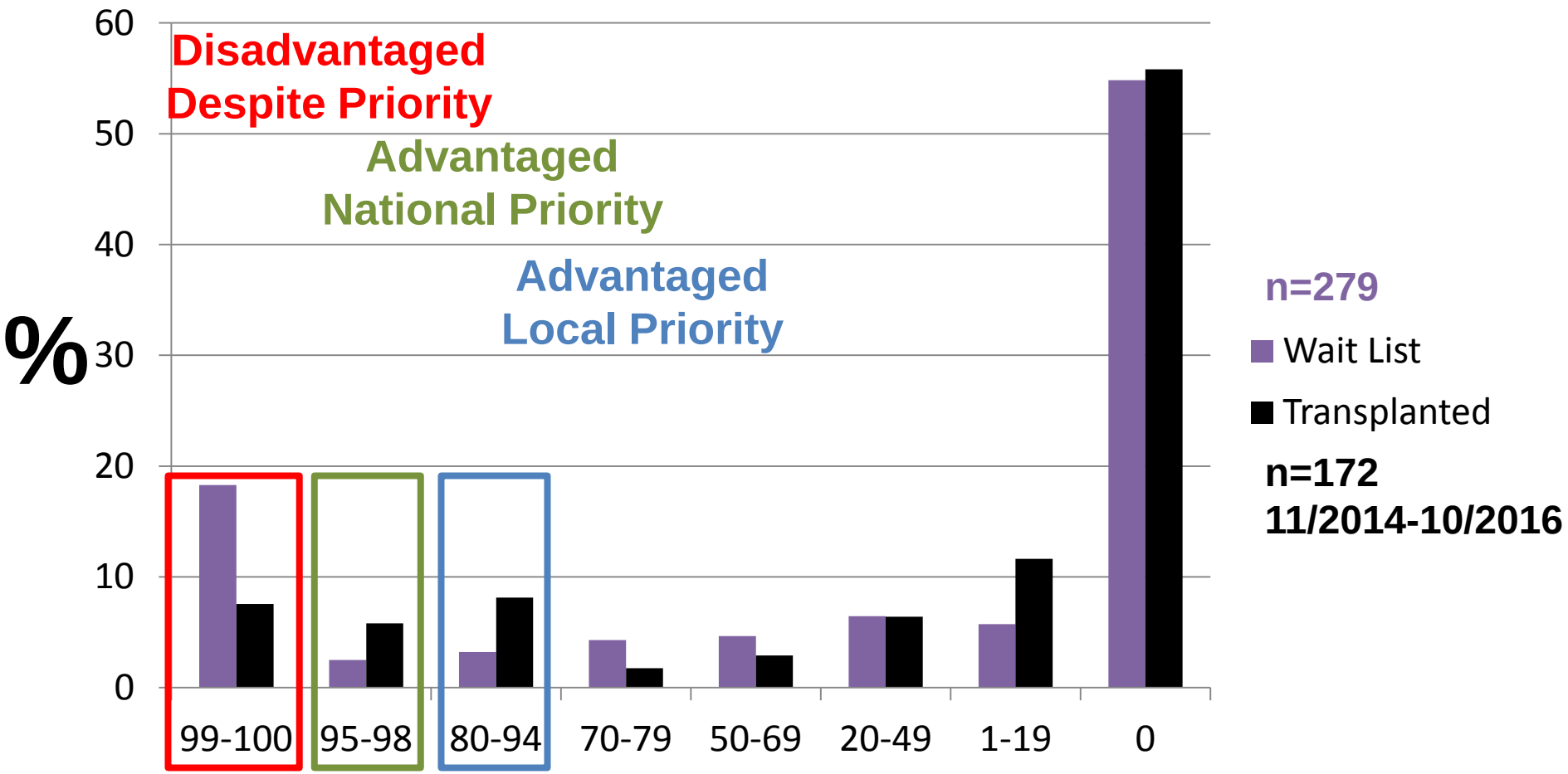
Wait list patients by cPRA
First Time Transplant Candidates



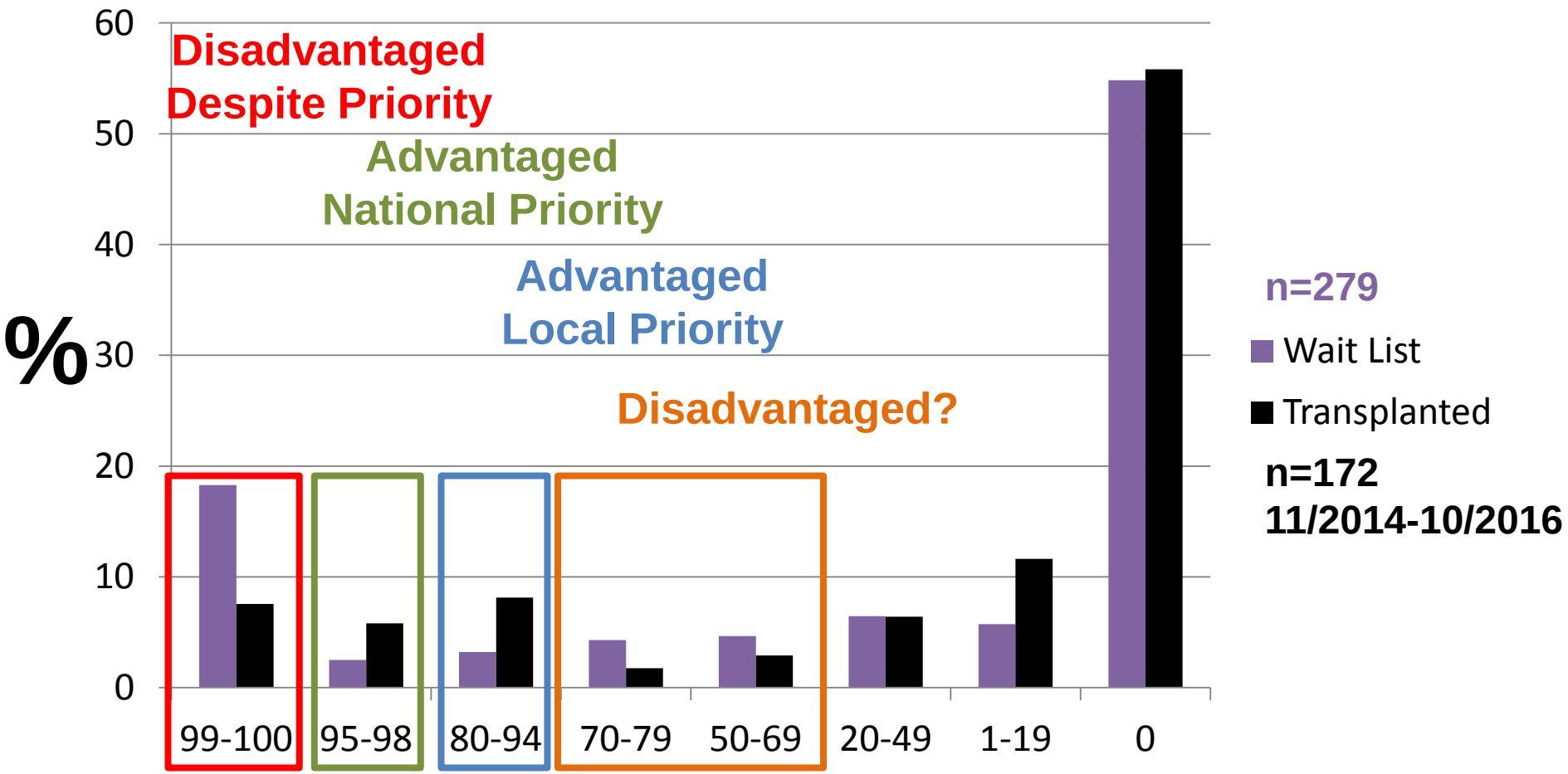
Wait list patients by cPRA
First Time Transplant Candidates



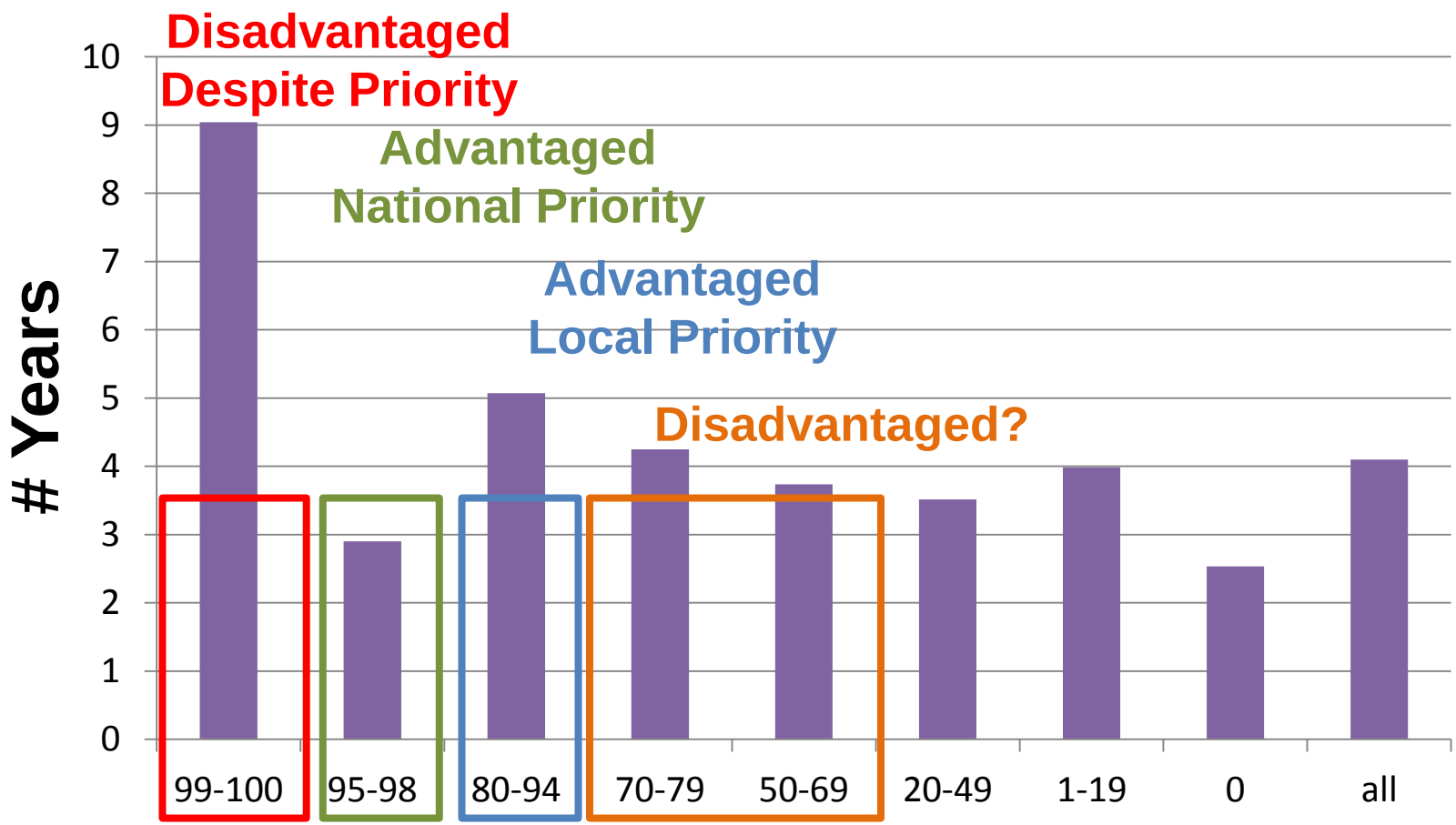
Wait list patients by cPRA
First Time Transplant Candidates



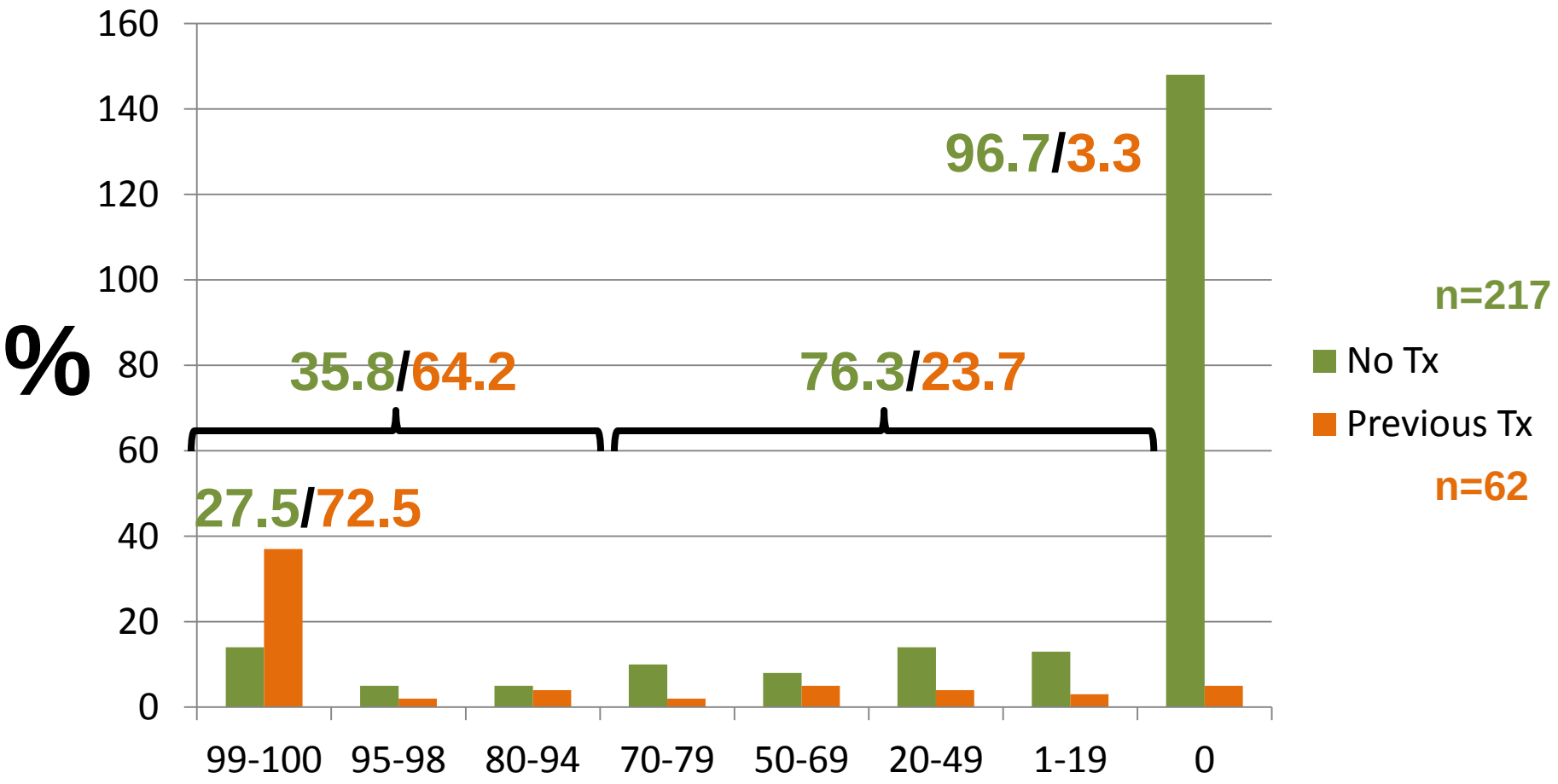
Wait list patients by cPRA
First Time Transplant Candidates



Average wait time by cPRA, wait list patients



Wait list patients by cPRA
Previous Tx vs First Time Tx Candidates



Disadvantaged patients

- **cPRA 99-100**
  - **27.5%: females, hx of pregnancy**
  - **72.5%: re-transplants**
    - **Prevention**
      - **better HLA matching at time of first Tx**
      - **withdrawal of immunosuppression?**
  - **Willing to cross DSA**
      - **Stratify 99-100% using decimal point cPRA**

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Better HLA matching at time of first transplant

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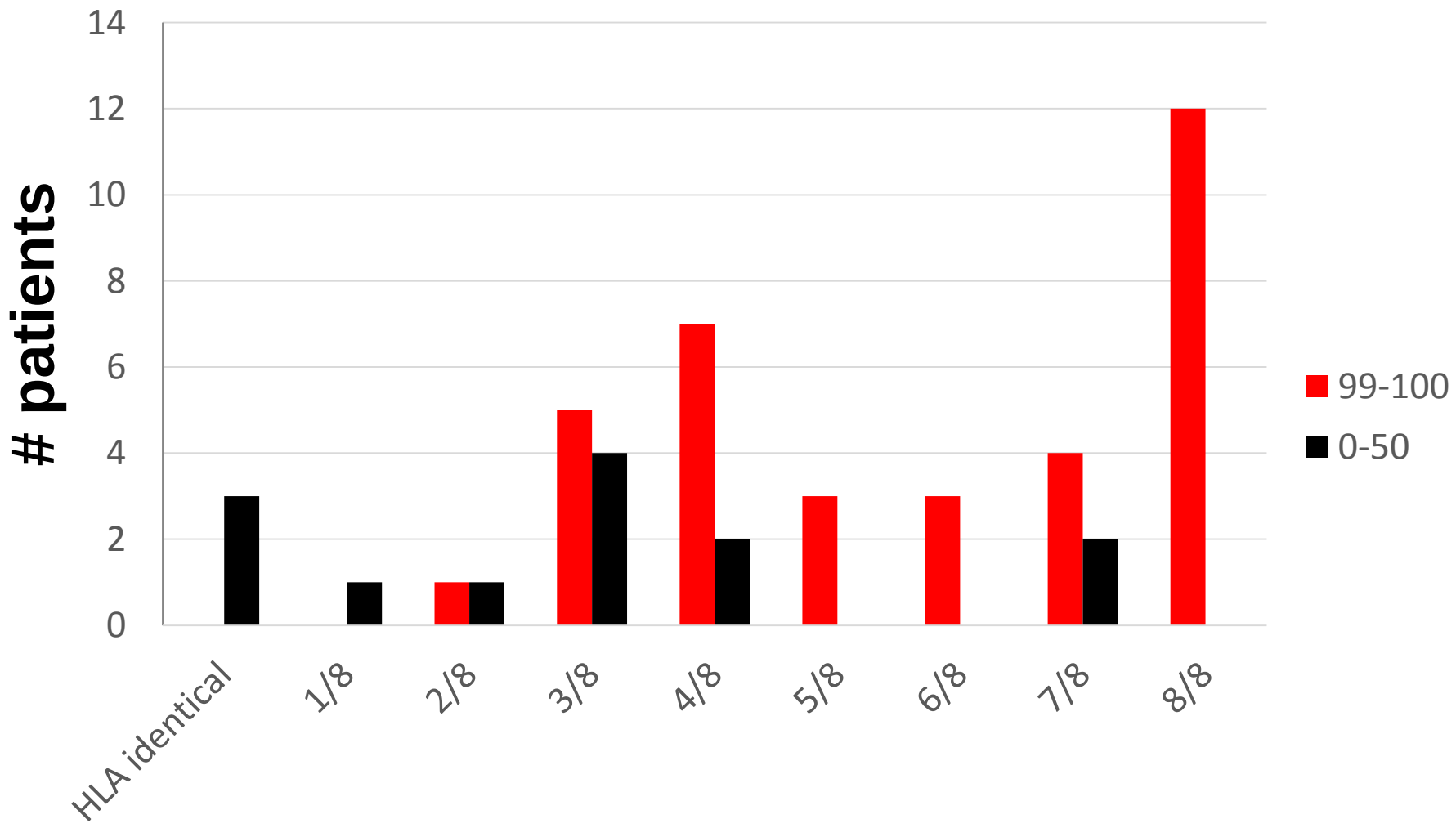
Patients with previous transplants cPRA vs degree of mismatch



Evolution and Clinical Pathologic Correlations of *De Novo* Donor-Specific HLA Antibody Post Kidney Transplant

C. Wiebe[a,†], I. W. Gibson[b,c,†],
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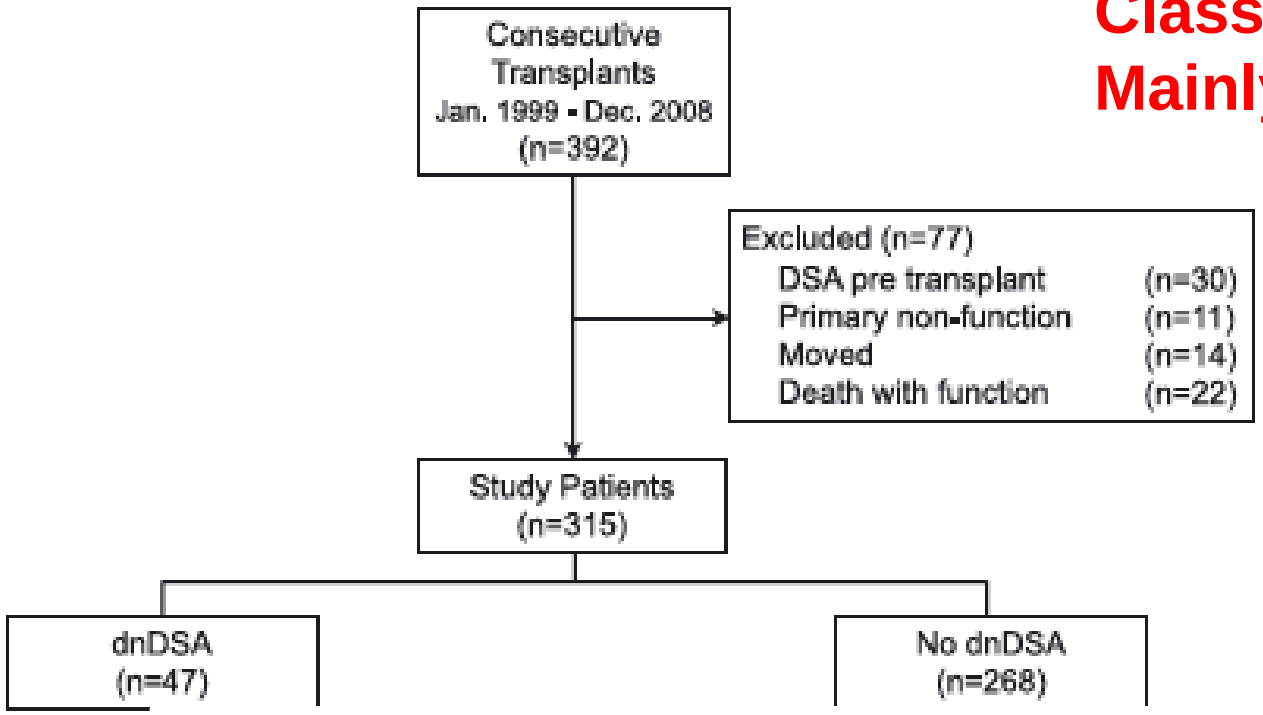
Class II DSA
Mainly DQ specific



Wiebe *et al.* AJT 12:1157, 2012

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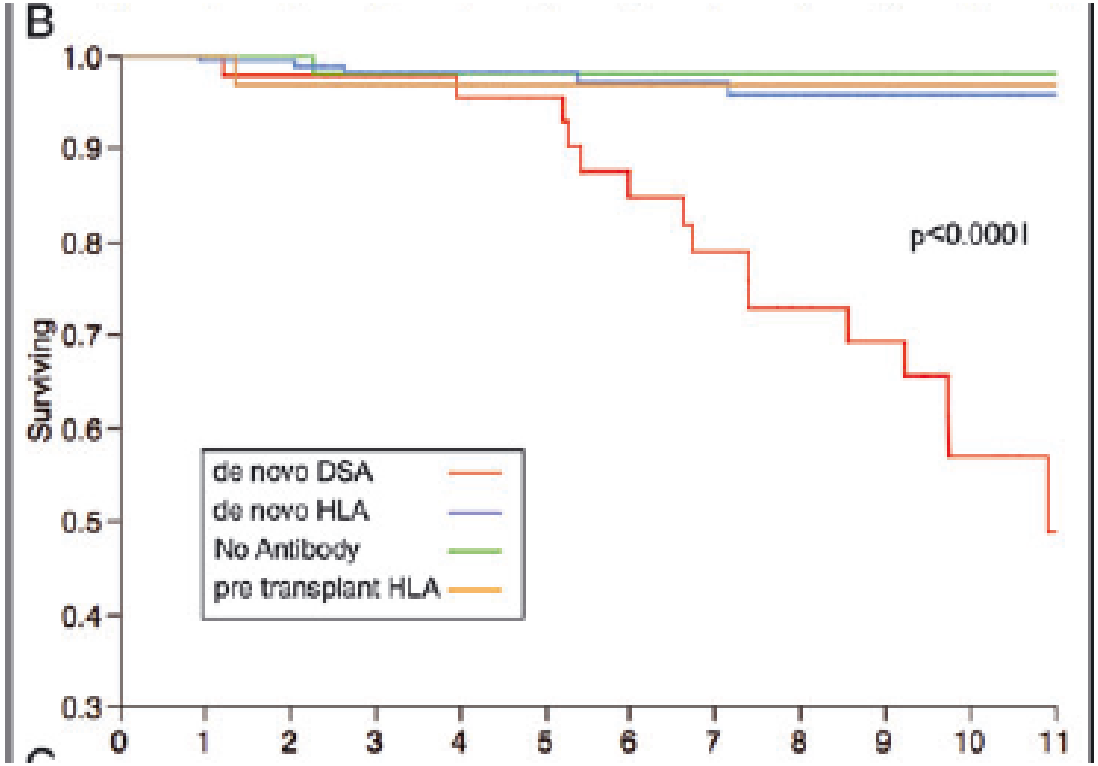

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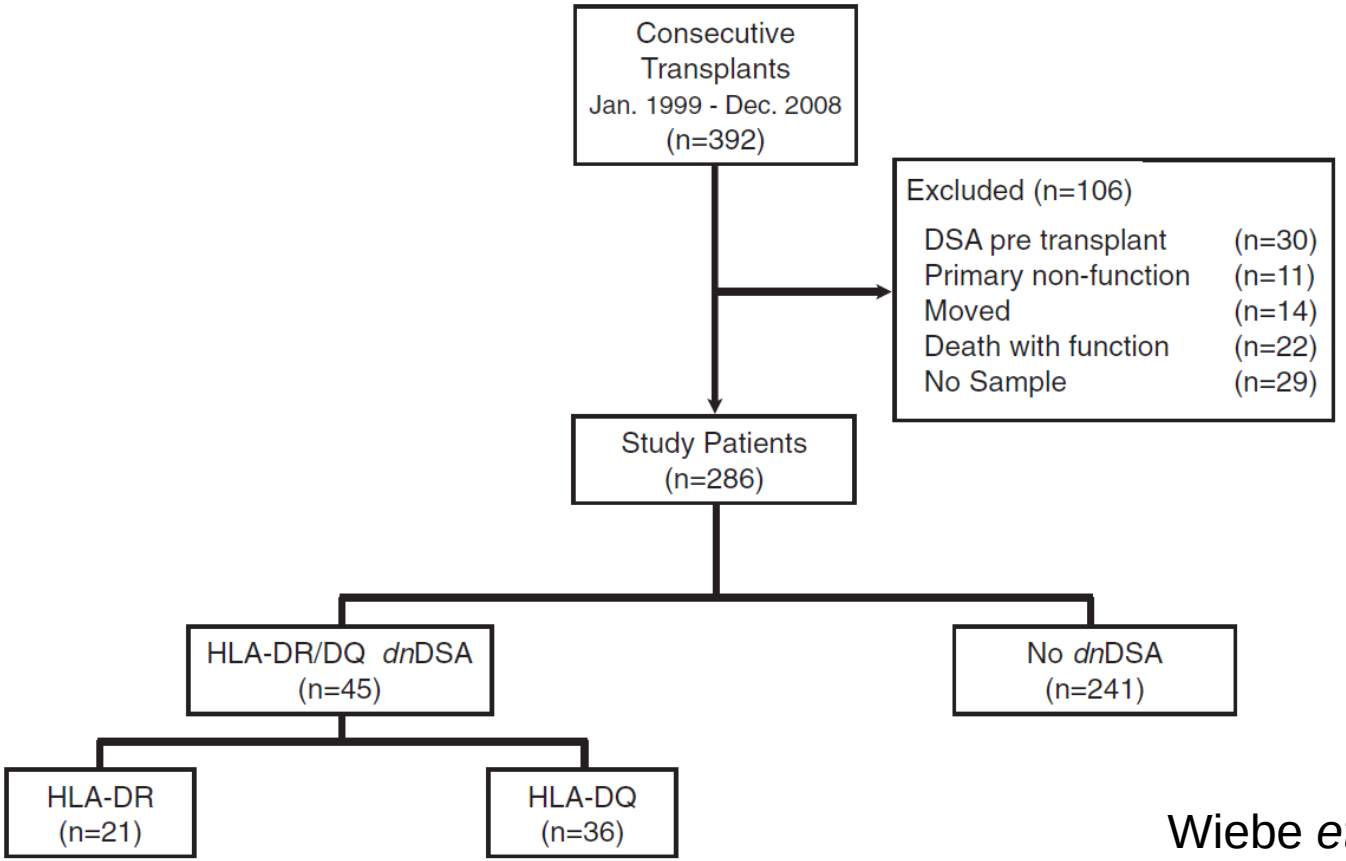

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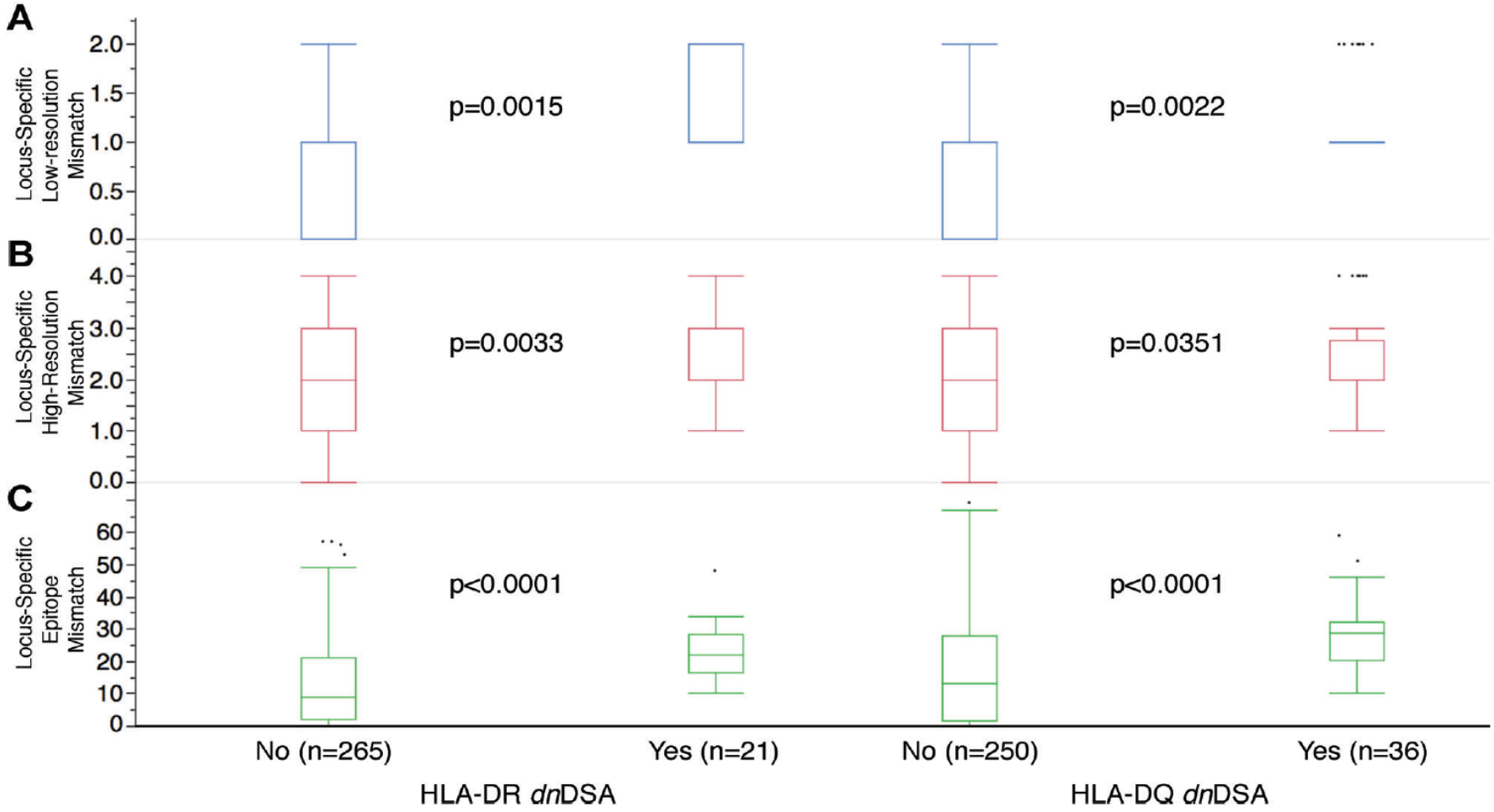

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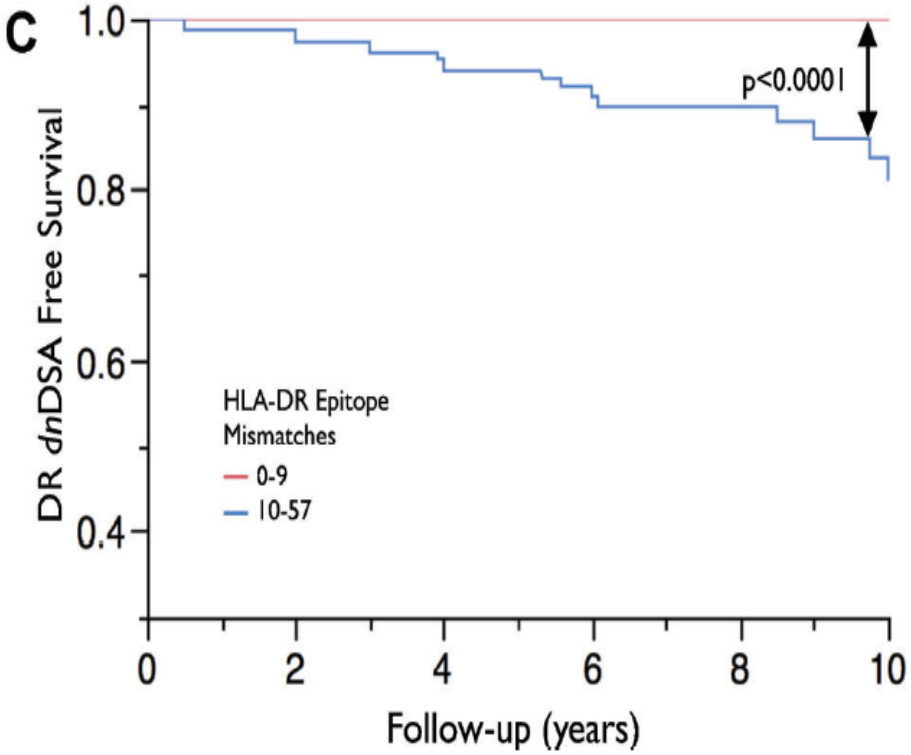

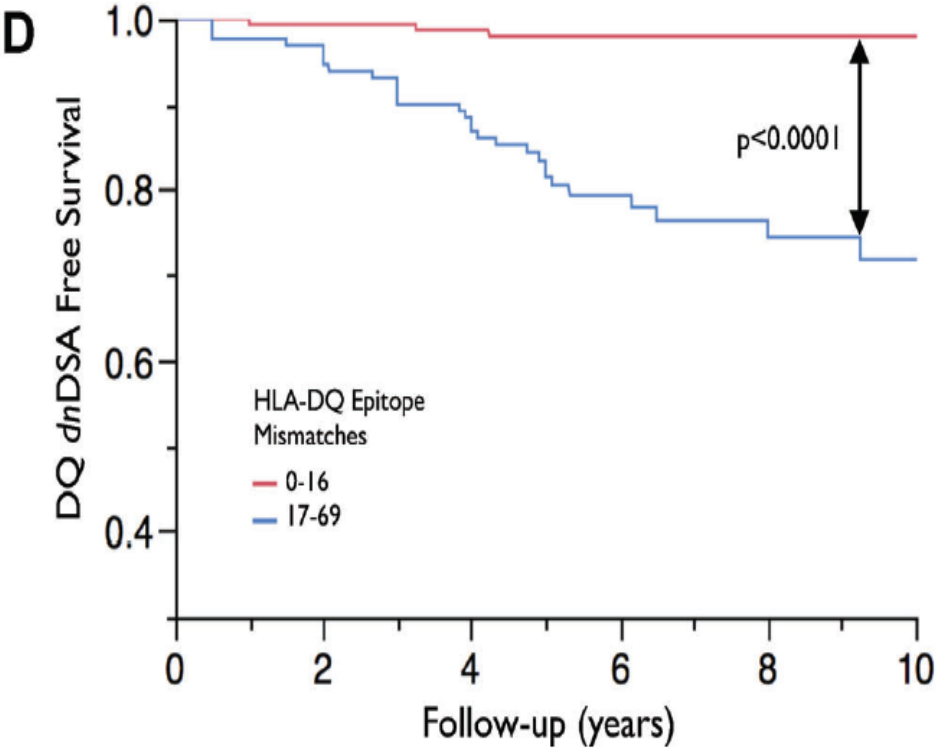

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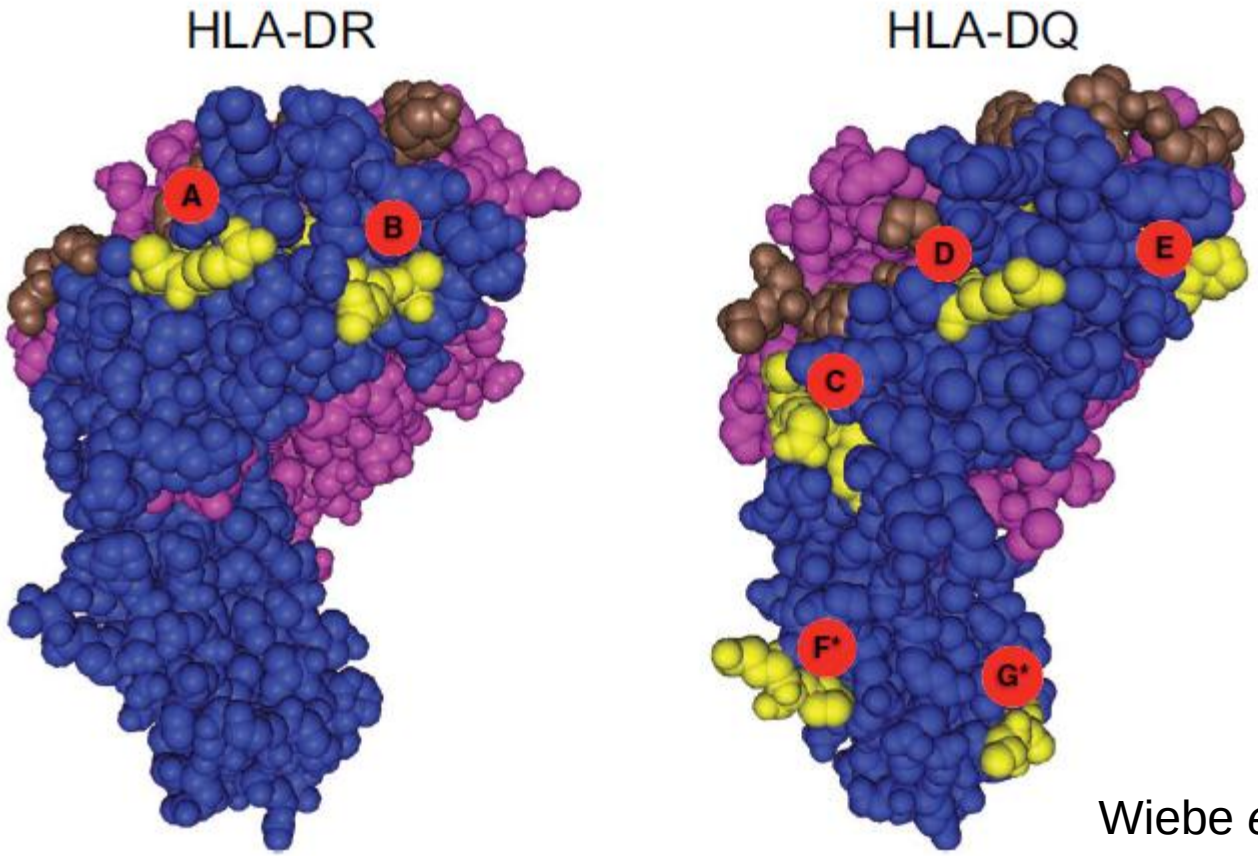

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Willing to Cross DSA

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American Journal of Transplantation 2016; XX: 1–10
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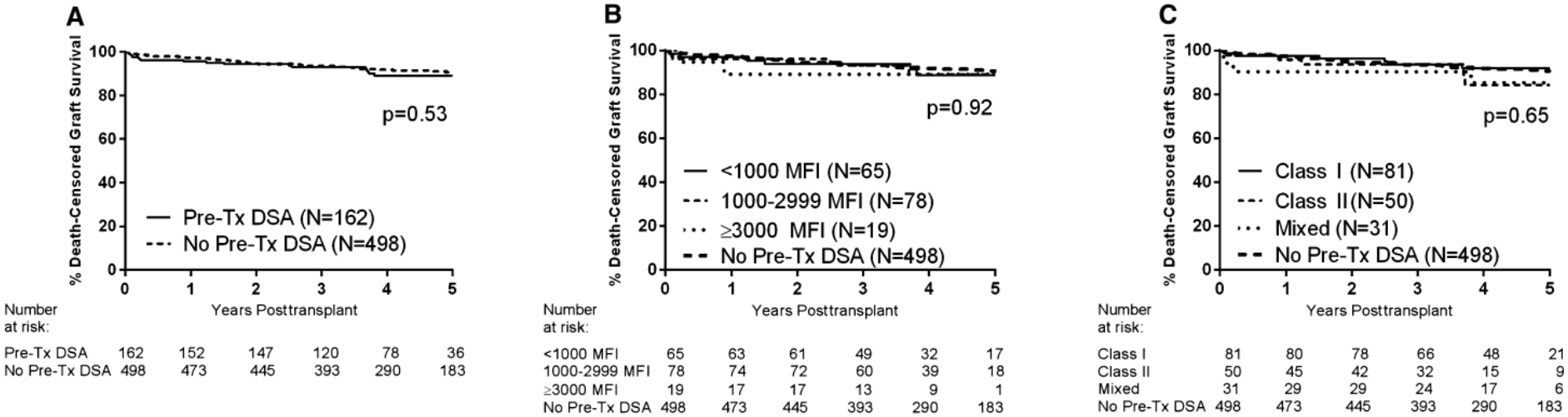
doi: 10.1111/ajt.13848

Clinical Significance of Pretransplant Donor-Specific Antibodies in the Setting of Negative Cell-Based Flow Cytometry Crossmatching in Kidney Transplant Recipients

O. O. Adebiyi[1], J. Gralla[2], P. Klem[3], B. Freed[4], S. Davis[1], A. C. Wiseman[1] and J. E. Cooper[1,*]

Retrospective single center study, 660 kidney Tx patients with negative pre-Tx FCXM.
162 patients with DSA by SAB.
Treated with standard immunosuppression: Tac/Myc/Ster (Basiliximab or ATG)
Impact on survival, AR and GFR



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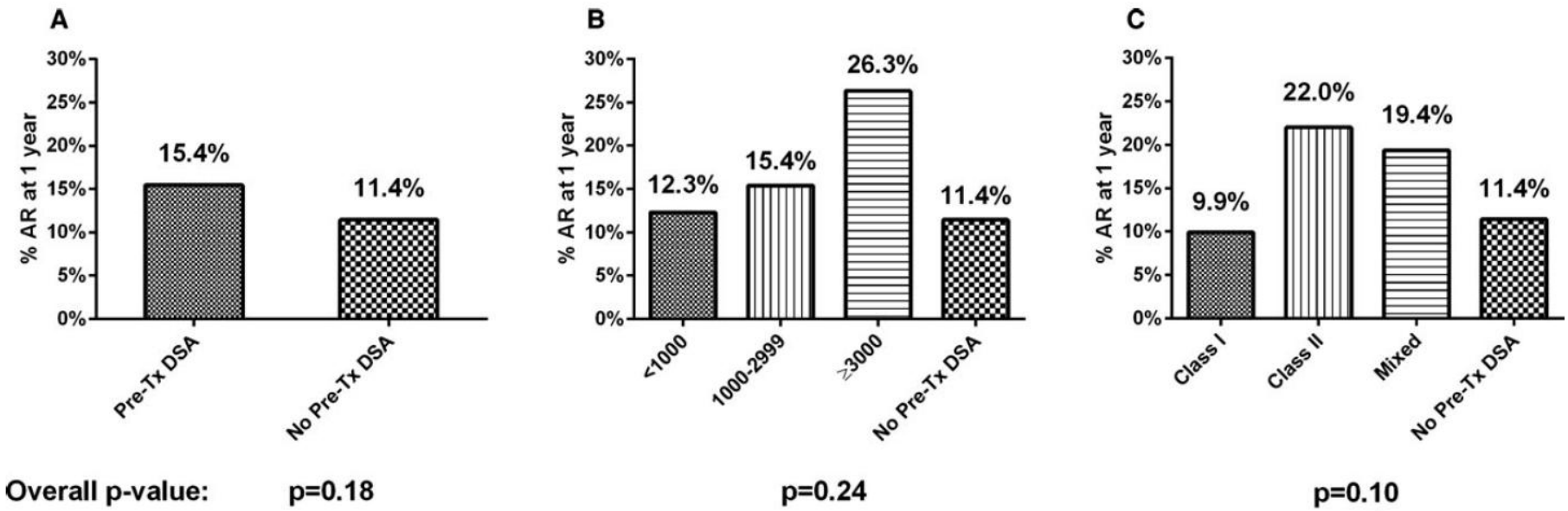

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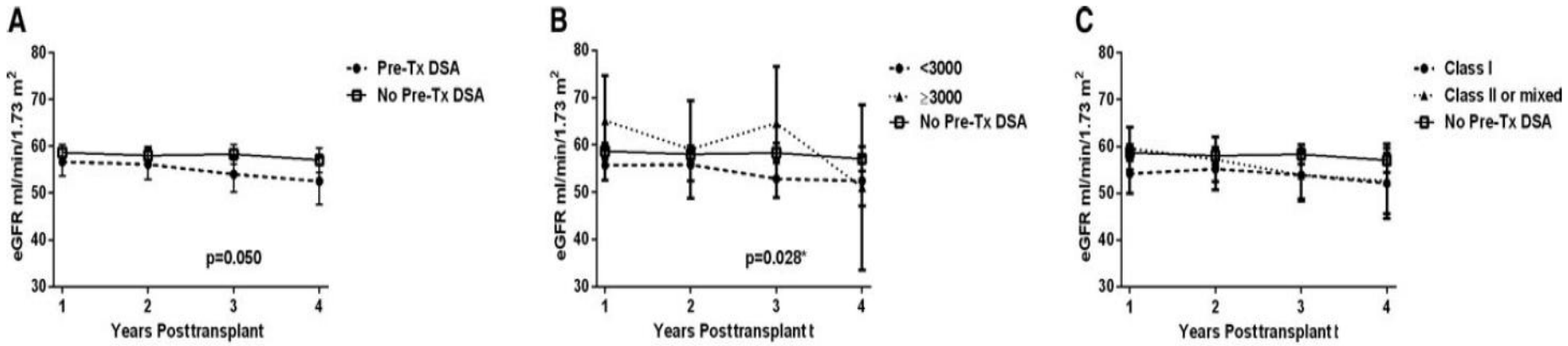

Background

- Groups have published acceptable outcomes with crossing “low level/selected antibody ”
- To increase access for the difficult to match group
- Suggest we consider identifying antibodies that we would be “willing to cross”
- Bead positive current Flow XM negative.

Canadian Blood Services
it's in you to give

Courtesy: Dr. Trish Campbell

Crossing Antibodies

- Clinicians will identify suitable candidates for 'Willing to Cross'
- HLA Labs will determine what antibodies to cross and reason why
- HLA Committee will review WTC outcome data over time to inform future strategies
- HLA Committee recommend piloting 'Willing to Cross' for patients with cPRA > 98% in the KPD program
- Crossing antibodies for a patient would be a clinical and HLA Lab decision

Canadian Blood Services
it's in you to give

Courtesy: Dr. Trish Campbell

Crossing Antibodies – Questions

- Which group of patients should be used for willing to cross?
  - KPD first then HSP
  - cPRA > 98%
  - Blood Group
  - Wait Times
- If a patient's cPRA drops below 95%, is the patient still eligible for KPD cPRA points and does ranking apply to "Willing To Cross cPRA " or original cPRA?
- Are programs open to proceeding with a Flow XM negative DSA positive result?
- Does the current and the historical crossmatch with the most sensitized sera need to be negative or just the current?
- Should we adopt uniform immunosuppressive protocols ?

Canadian Blood Services
it's in you to give

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Willing to Cross DSA patient cases

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Patient Case 1

- 47 yo female
- 100% cPRA (CI/II: 98/98)
- 3 pregnancies, 11 transfusions
- Wait listed since June 2011
- On HSP registry

Patient Case 1

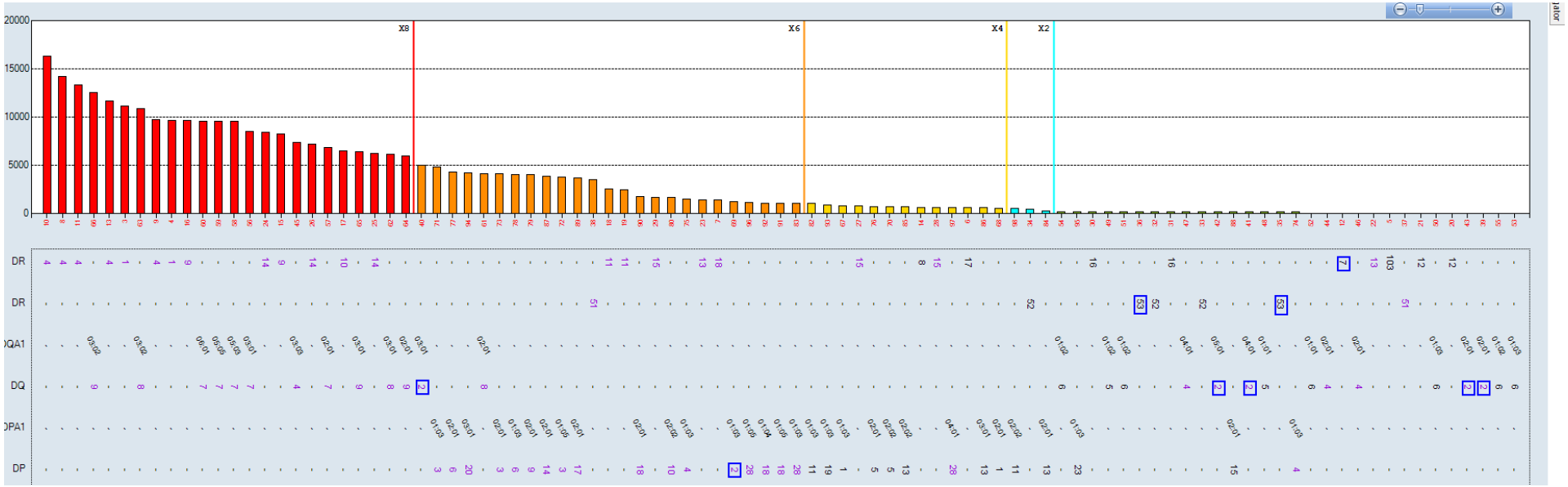
	Patient		Donor
A	**02**	**30**	**30**
B	**13**	**44**	**13**
C	**02**	**06**	**06**
DRB1	**07**	**13**	**07**
DRB3/4/5	**03(52)**	**04(53)**	**03(52)**
DQB1	**02**	**06**	**02**
DQA1	**01**	**02**	**02**
DPB1*	**04**		**02**

0/10MM

Weak DSA against HLA-DP2, 2000-3000

Husband was DP2 positive

Class II pre-Tx



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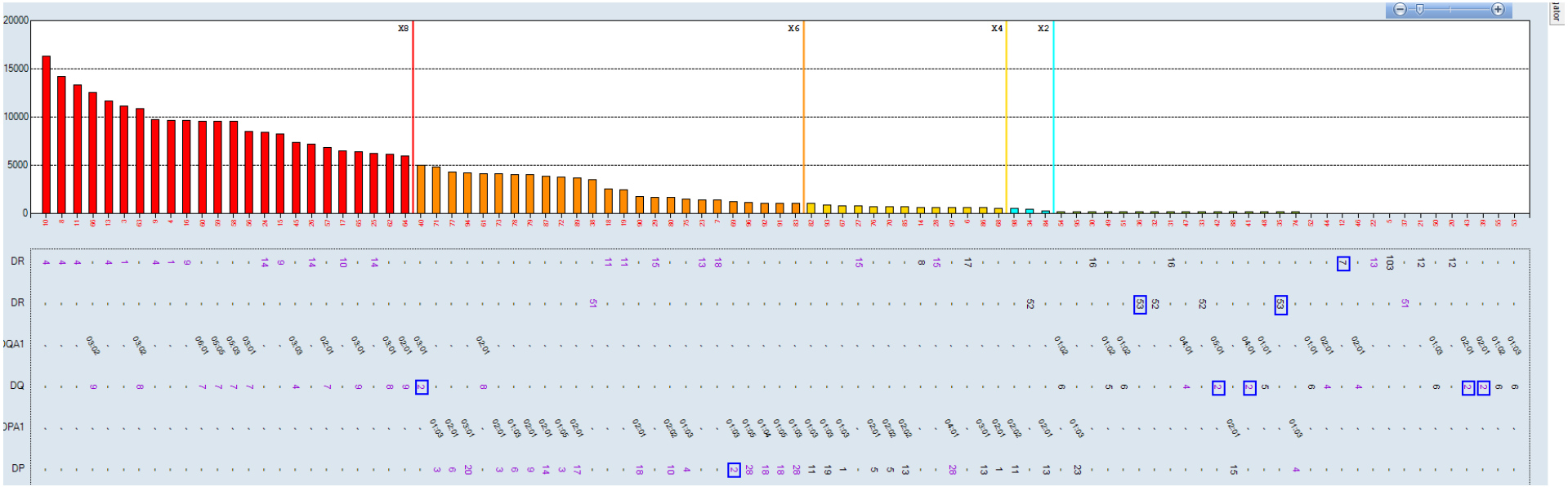
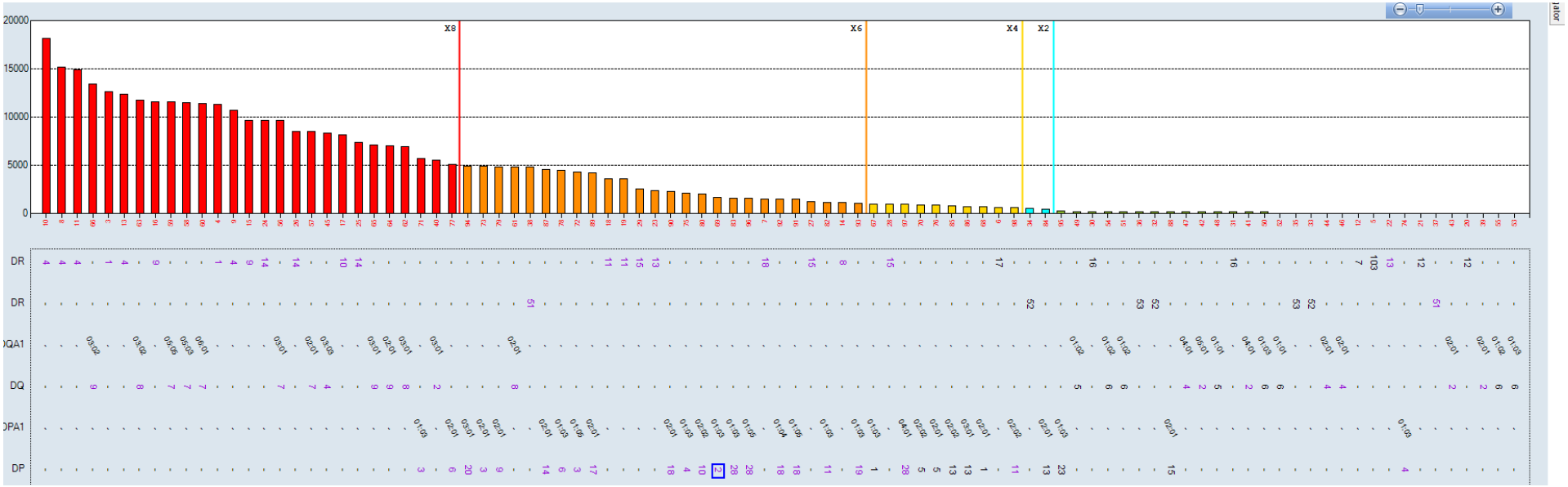
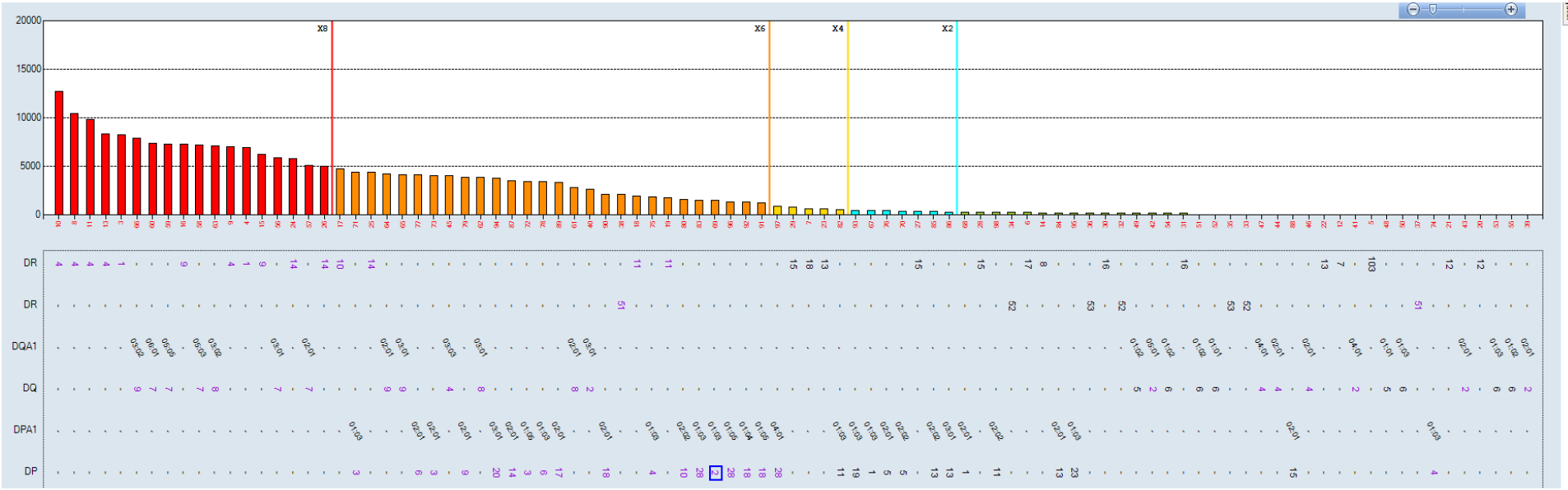


Negative FCXM

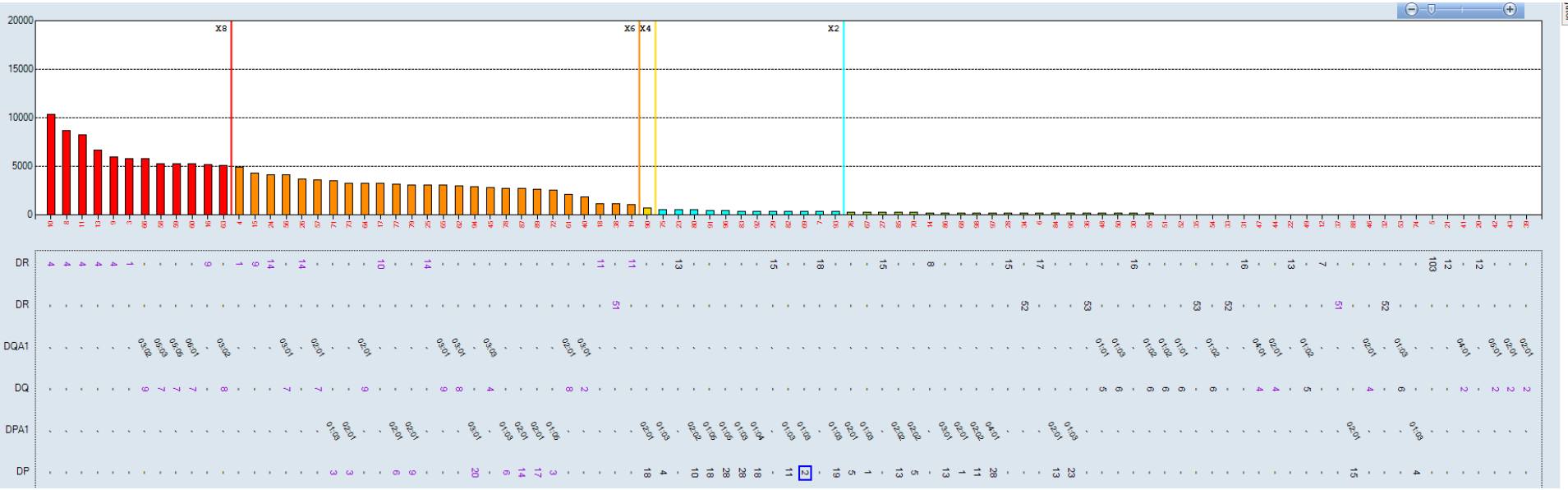
Class II 7 days post



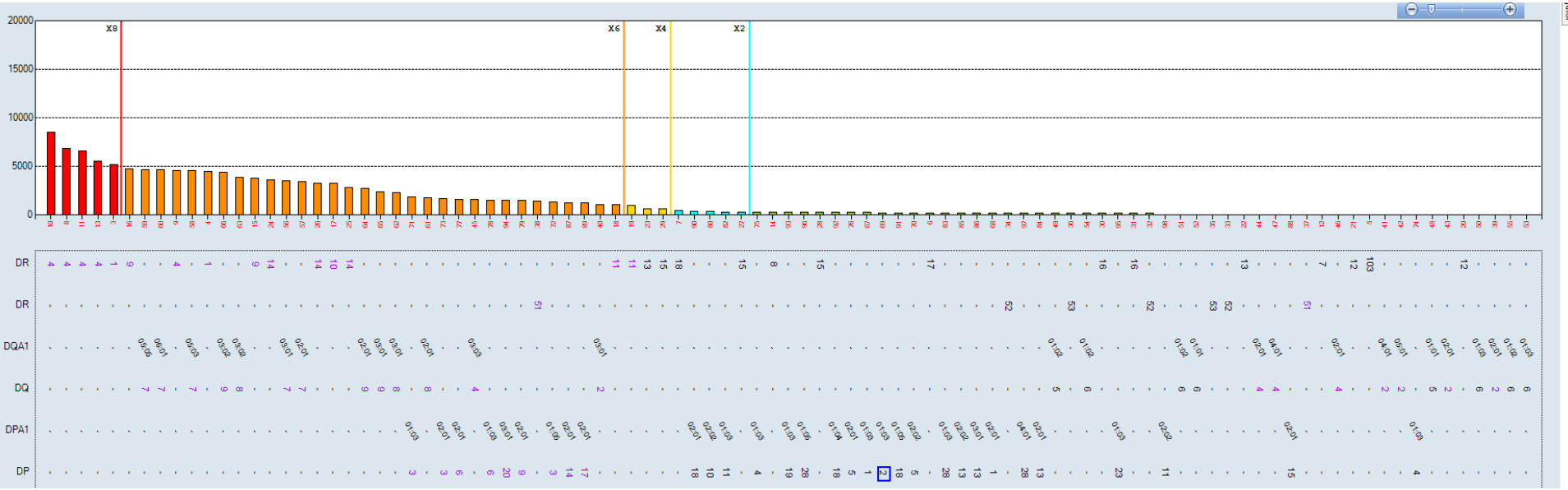
Class II 12 days post



Class II 6 weeks post



Class II 5 months post



Patient Case 2

- 39 yo female
- Dilated Cardiomyopathy
- 100% cPRA (CI/II: 100/29)
- pregnancies, transfusions
- Wait listed since August 2014

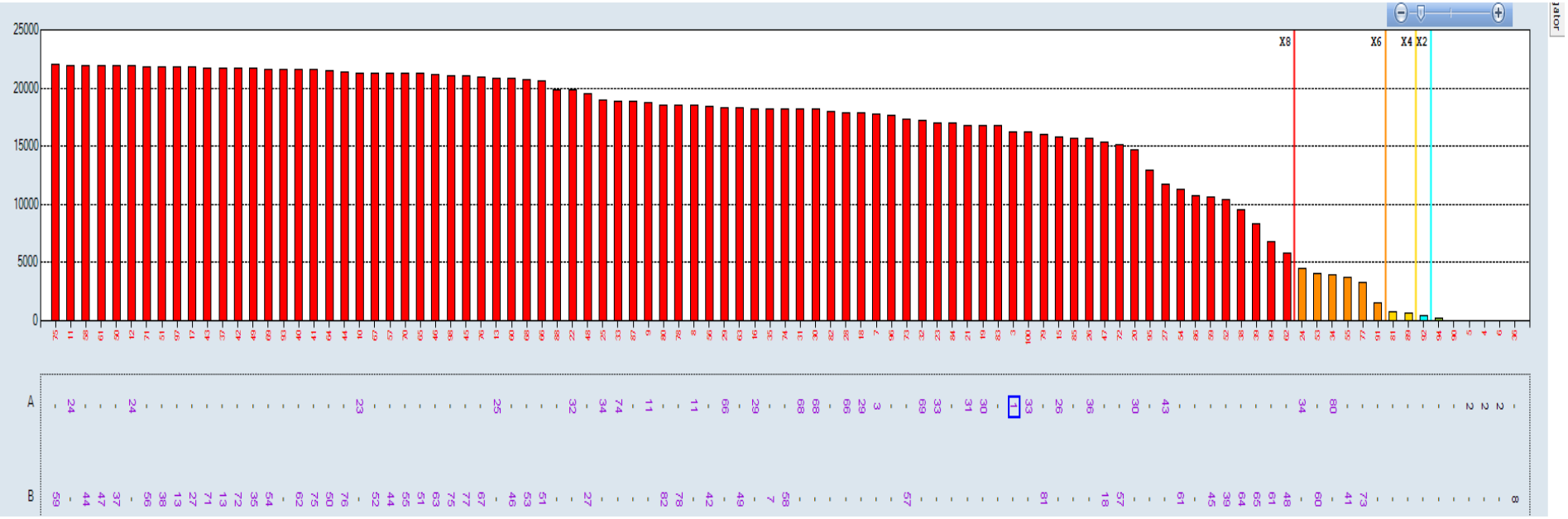
Patient Case 2

	Patient	Donor	
A	**02**	**01**	**02**
B	**08**	**08**	
C	**07**	**07**	
DRB1	**01**	**03(17)**	**09**
DRB3/4/5		**03(52)**	**4(53)**
DQB1	**05**	**02**	**03(9)**
DQA1	**01**	**03**	**05**
DPB1*	**11**	**04**	

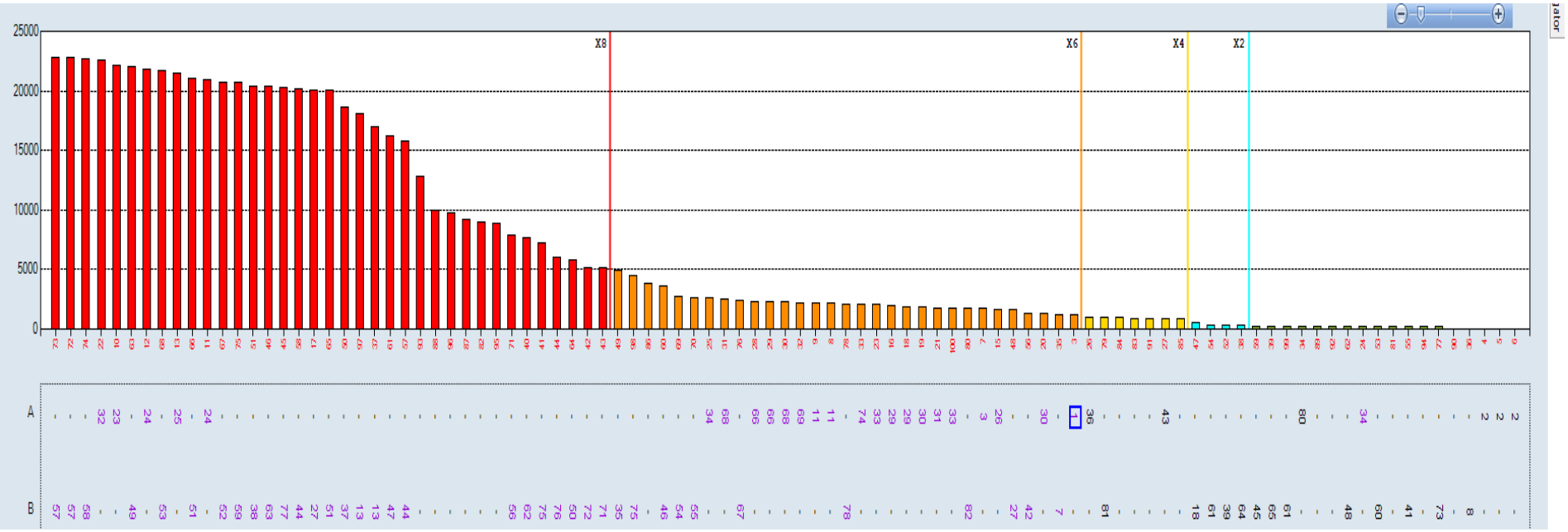
Weak DSA against HLA-A1, 1500 MFI

Strong A1 DSA in historical sera, 20,000 MFI

Class I, 1 year pre-Tx



Class I, Pre Tx



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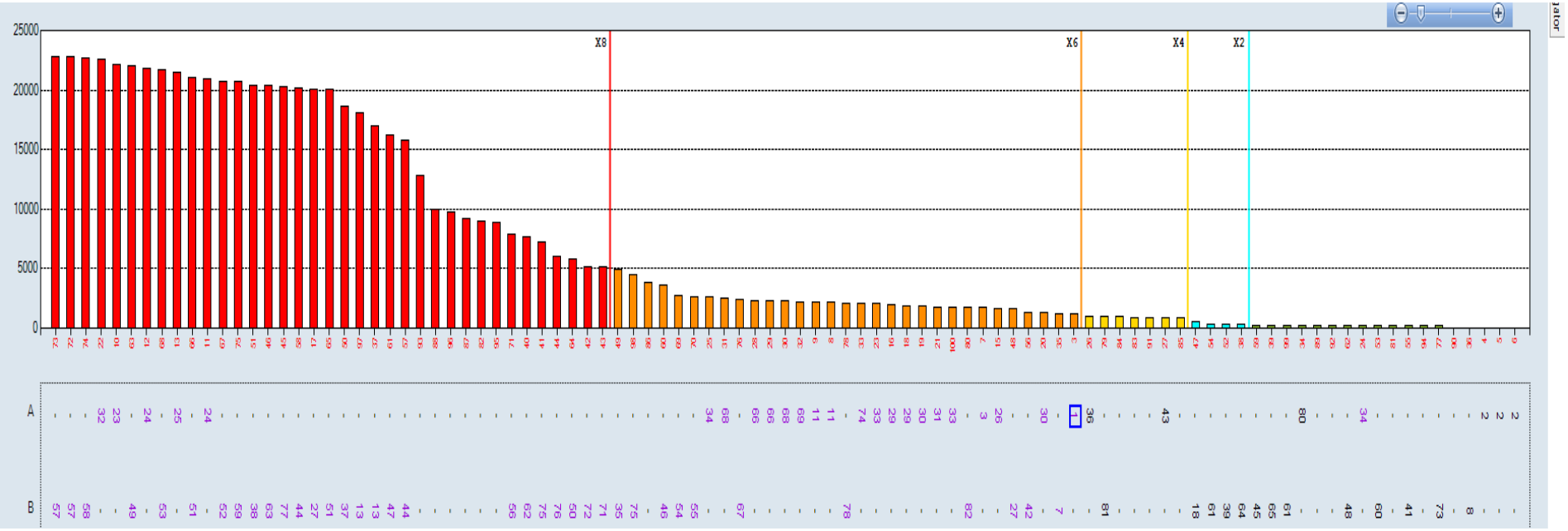
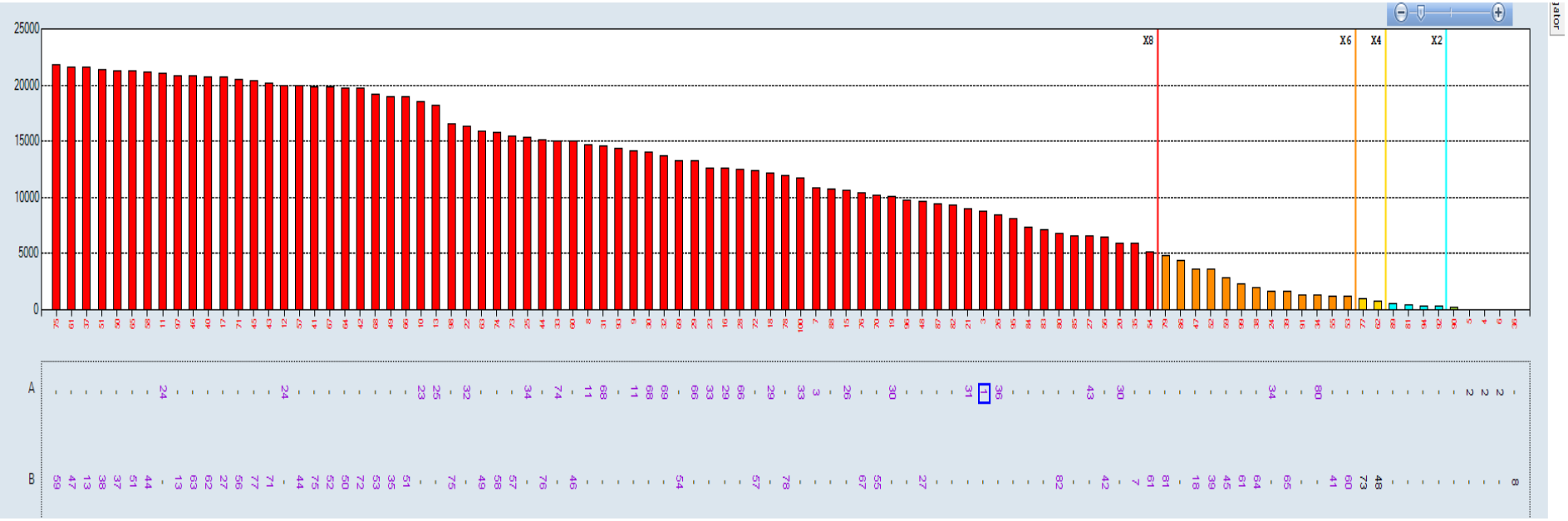
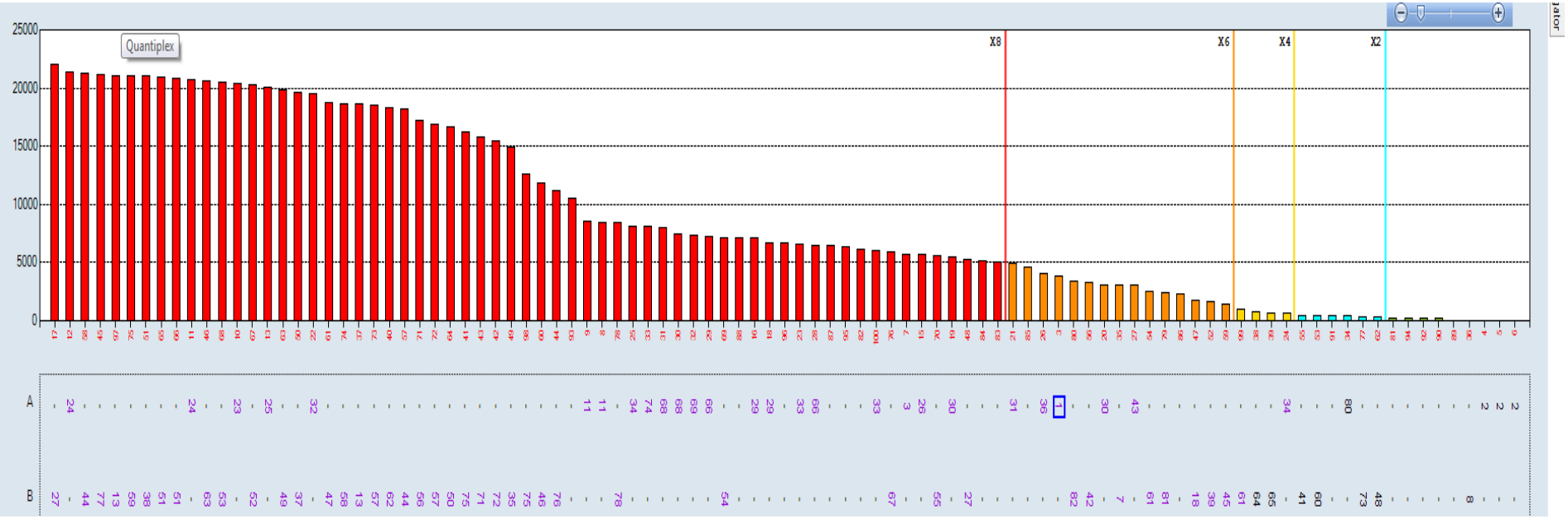


Negative FCXM, current sera
Strong Positive FCXM, historical sera

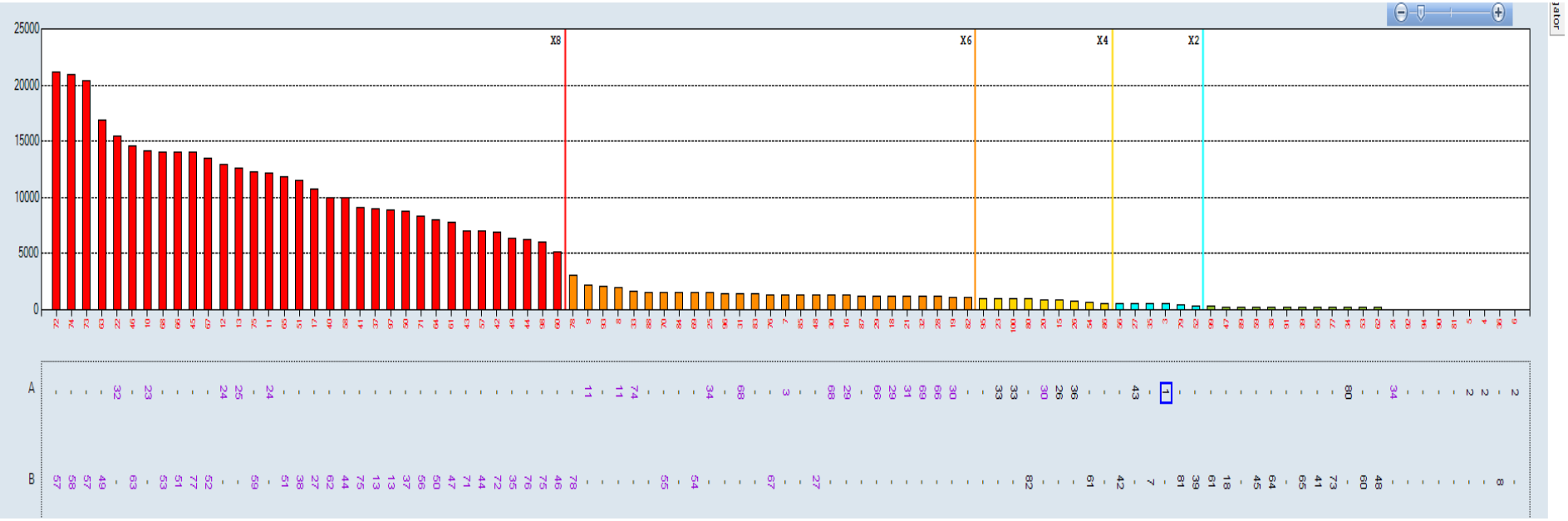
Class I, 1 week post



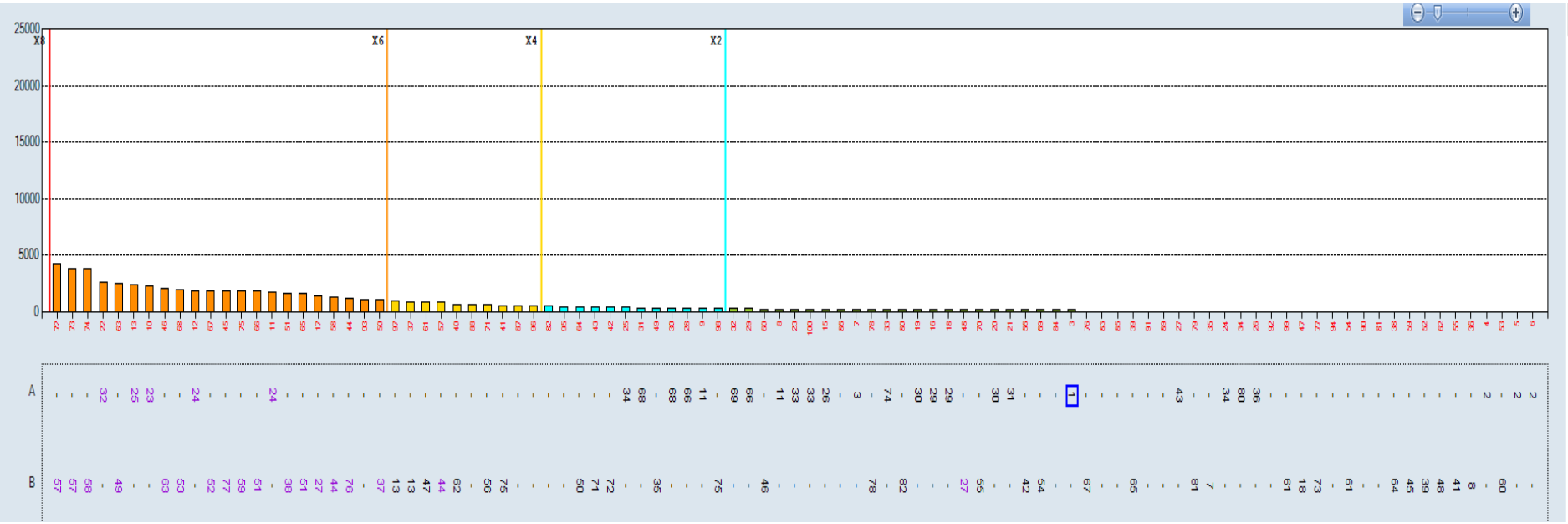
Class I, 2 weeks post



Class I, 2 months post



Class I, 13 months post



Conclusions

- **Continued improvement in HLA testing over the last few years**
  - **Implemented state of the art methodology**
  - **Allows more complete assessment of immunologic risk**
  - **Decreased TAT**
  - **Decreased cost**
  - **Allowed for our participation in LDPE and HSP program**
  - **Increased transplantation of Highly Sensitized patients**

- **Future Directions**
  - **Refinement of allocation strategy**
  - **Improve matching**
    - **epitope**
  - **Consider Willing to Cross DSA approach to improve transplantation of highly sensitized (99-100) patients.**

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Acknowledgements

- **Halifax Lab Technologists**
  - Geoff Adams
  - Geoff Peladeau
  - Kelly Heinstein
- **National Collaborators**
  - Kathryn Tinckam
  - Patricia Campbell
  - Peter Nickerson
- **National PT Testing Committee**
- **Canadian Blood Services**
- **Labs (west to east)**
  - Vancouver
  - Edmonton
  - Calgary
  - Saskatoon
  - Winnipeg
  - Toronto
  - Ottawa
  - Hamilton
  - London
  - Montreal
  - Laval
  - Quebec City
  - Halifax

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Welcome to Dr. Anna Greenshields
ASHI Director-in-Training

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ASHI
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CERTIFIES THAT

Queen Elizabeth II Health Science Center
The Capital District Health Authority HLA Laboratory

ASHI # 09-9-NS-01-1

UNDER THE DIRECTION OF

Robert Liwski, MD

HAVING MET ALL APPLICABLE STANDARDS
AND THE REQUIREMENTS OF THE SOCIETY,
IS GRANTED ACCREDITATION

From: **9/1/2014** To: **8/31/2016**

Assuming all interim requirements are met,
In the following areas:

HSC/BM Transplantation: Related Donor
Solid Organ Transplantation: Deceased Donor

HSC/BM Transplantation: Unrelated Donor
Solid Organ Transplantation: Live Donor

PRESIDENT

ACCREDITATION PROGRAM DIRECTOR

Accreditation does not automatically transfer when a change in ownership, director or location has occurred.