Evaluation of a New Kit for the Identification of Partial RhD Types by Haemagglutination

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Introduction/ Background

During routine D typing, the occasional sample may show discrepant results and sometimes anti-D may be present in the serum. Discrepant results, either due to weak reactions or to varying results with different reagents, may be due to partial D or weak D phenotypes. Laboratories have an increasing interest in analysing such samples in order to evaluate the clinical significance with respect to HDFN, transfusion or administration of immunoglobulin anti-D prophylaxis. However, due to the extreme complexity of the D antigen, it is often difficult to define these samples serologically.

There are currently kits available for partial D typing, but these are limited by the level of differentiation offered. Molecular typing of partial D samples is becoming more prevalent, yet the technology required to perform this testing is outwith the resources and remit of some testing laboratories, and samples are most often referred to reference labs. Molecular testing can be troublesome, while currently haemagglutination is still considered a simple and reliable test (Anstee, 2005).

Therefore, there was a requirement for a new haemagglutination based product for advanced partial D typing that would be available for use in all blood testing labs. Alba Bioscience has developed a new panel of anti-D's which it was envisaged would provide a product for enhanced differentiation of partial D types compared to the currently available partial D typing kits, including the original Partial RhD Typing Kit (product code Z291) available from Alba Bioscience.

The 7th Edition of the UKBTS Guidelines (UK Blood Transfusion Services, 2005) also recommend testing of weak and partial D's against an identification kit containing a panel of monoclonal antibodies directed against the different epitopes of the D antigen (section 14.7.7 of the Guidelines).

Study Design

The antibodies were carefully selected using data reported from the International Workshop on Monoclonal Antibodies Against Human Red Blood Cell and Related Antigens (Scott, 1996), to prepare a panel of complementary reaction profiles. Using these results an 'expected' reaction pattern was compiled. An extensive performance evaluation was performed to confirm and determine the full capabilities of the kit.

The kit consists of 12 monoclonal IgG anti-D antibodies. Cell lines and identification used were: Anti-D 'A' LHM76/58, Anti-D 'B' LHM76/59, Anti-D 'C' LHM174/102, Anti-D 'D' LHM50/2B, Anti-D 'E' LHM169/81, Anti-D 'F' ESD1, Anti-D 'G' LHM76/55, Anti-D 'H' LHM77/64, Anti-D 'I' LHM70/45, Anti-D 'J' LHM59/19, Anti-D 'K' LHM169/80 and Anti-D 'L' LHM57/17. The Partial RhD Typing Kit (Alba Bioscience, U.K. or DiaMed AG, Switzerland) was used as a reference where appropriate and consisted of cell lines and identification: Anti-D '1' LHM76/55, Anti-D '2' LHM77/64, Anti-D '3' LHM70/45, Anti-D '4' LHM59/19, Anti-D '5' LHM169/80, Anti-D '6' LDM1 (all were IgG except LDM1).

Integral to the development of this product, a number of international laboratories took part in a field trial, performing testing against partial D and weak D samples, some of which had been characterised at the molecular level. The input of all performance evaluation participants was vital to the development of this product and details of all who took part can be found in 'Acknowledgements'.

The type and number of most samples tested were chosen as known partial RhD samples (confirmed or not-confirmed by molecular testing). All test samples used in the evaluation had been collected for the purpose of routine blood grouping or stored as part of the SCARF system.

The evaluation and reference kits were tested using standard serological indirect haemagglutination assay (Coombs test) using cells suspended in phosphate buffered saline (PBS) or low ionic strength saline (LIS). Haemagglutination reactions were graded using the standard method in use at each test laboratory. Where anti-IgG was used, participants used their routine anti-human IgG or anti-human globulin (anti-IgG, anti-C3) reagent as recommended by the manufacturer. Some samples were tested for haemagglutination using a gel matrix test (LISS-Coombs 37ºC, DiaMed-ID Micro Typing System, DiaMed AG, or MTS Gel System, OCD). Red cell samples used were either EDTA or citrate anticoagulated blood samples collected from patients or frozen and recovered, and all were washed in PBS before use.

Results

The results were reported by each test centre using their standard grading systems. All results were compiled in one document, detailing the results against the evaluation and reference panels. Sample identifications have been removed for patient confidentiality. Results are displayed in Tables 1-15, and are shown according to partial D type, many prepositus samples were included in the evaluation.

Cells of the following types gave broad agreement in the evaluation. DII/DNU, DIII, DIV, DV, DVI, DVII, DOL, DMH, DAR, DHK/DAU-4, DBT and Ro^{Har}. Cells of types DII and DNU differ by only one amino acid, but serologically are the same and gave identical reactivity with the panel. DIII samples are known to react with all anti-D, and this was found in the evaluation. There were some anomalies in the testing. DAR samples were tested and after some investigation by IBGRL, Bristol, UK, it was found that homozygotes give additional positive reactions to heterozygotes, reacting also with kit components C,E and J. DHK/DAU-4 have an identical mutation in exon 5, yet it was found that these types may or may not react with kit component H (denoted on reaction profile as +/-).
Some DCS samples tested grouped as DFR using the new panel.
There are at least 41 types of weak D (Wagner *et al*., 2000). In the evaluation 53 weak D samples were evaluated, and reaction patterns were variable. While it was noticed kit component I gave the highest incidence of negative reactions, otherwise 75% of weak D were positive throughout. Weak D types 1 and 3 were positive throughout with type 2 looking most variable. Two type 15 tested reacted as DFR's.

Conclusions

A total of 269 partial D and weak D samples were tested. The analysis of results allowed many partial D's to be identified serologically; due to their unique reaction patterns with the panel of anti-D reagents. Given that the D antigen is very complex, there was generally a good consensus of results. The product, therefore, allows a number of partial D types to be identified by haemagglutination techniques, including DII/DNU, DIII, DIV, DV, DCS, DVI, DVII, DOL, DFR, DMH, DAR, DHK/DAU-4, DBT and Ro^{Har}. The range of partial D's differentiated by this kit is more comprehensive than any other D typing panel currently available. **The kit has the advantage of allowing rapid, reliable and low cost serological identification of a wide range of partial D types, some of which could previously only be characterised by molecular analysis.**
Weak D samples may react with all kit components to varying degrees due to a variation in the antigen site density. In future, the concentration of some of kit the components may be adjusted to improve the identification of weak D, which can give variable reactions.
There were insufficient numbers of cells of partial D types DAU-O, DNB, Crawford and DIM to confirm reaction profiles. If further samples of these types were available and evaluated, it is hoped that the reaction profile would be further extended. The new kit is now CE Marked but is available in the US as a 'Reference Use Only' product.

Table 1. DII/DNU results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
GAMMA	DII	?	4+	4+	4+	4+	4+	4+	4+	0	4+	4+	4+	4+
GAMMA	DII	?	4+	4+	4+	4+	4+	4+	4+	0	4+	4+	4+	4+
ORTHO	DII	N	3	3	3	3	3	3	3	0	1	3	3	3
IBGRL	DNU	Y	4+	C	4+	C	C	3+	C	w	1+	4+	4+	4+
NYBC	DNU		12	9	8	12	10	10	12	0	8	10	11	12
CONSENSUS	**DII/DNU**		+	+	+	+	+	+	+	0	+	+	+	+

Table 2. DIII results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DIII		C	C	C	C	C	C	C	C	4+	4+	4+	4+
IBGRL	DIII		4+	C	C	C	C	C	C	C	4+	4+	4+	4+
IBGRL	DIIIb		4+	C	C	C	C	C	C	C	4+	4+	4+	4+
ARC	DIIIa		4	4	3	4	3	4	3	4	3	4	4	3
GAMMA	DIIIa	?	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+
DUKE	DIIIa		2	2	2	3	2	3	2	3	2	3	3	3
DUKE	DIIIa		3	3	2	4	3	3	2	2	3	3	3	3
SE BTS	DIII		4	4	2	4	3	3	4	2	w	4	4	4
SE BTS	DIII		4	3	3	3	3	3	3	2	2	3	3	3
SE BTS	DIII		4	4	3	4	4	4	4	3	3	3	4	4
SE BTS	DIII		4	2	4	4	4	4	3	3	3	3	3	3
SE BTS	DIII		3	3	3	3	3	3	3	3	2	3	3	3
SE BTS	DIII		3	2	2	3	3	3	3	3	3	3	3	3
SE BTS	DIII		4	4	3	4	4	4	4	3	4	4	4	4
SE BTS	DIII		3	3	3	3	3	3	3	3	3	3	3	3
SE BTS	DIII		3	3	3	4	3	3	3	3	3	4	4	4
SE BTS	DIII		4	4	4	4	4	4	4	3	3	3	4	4
ORTHO	DIII		3	3	2	3	3	3	3	3	3	3	3	3
NYBC	DIIIa		12	12	11	12	10	12	12	12	12	12	11	12
NYBC	DIIIC		12	11	12	12	11	12	11	11	11	11	10	12
NYBC	DIIIa		12	10	10	12	10	10	12	12	10	10	10	10
NYBC	DIII		11	11	11	12	11	10	11	12	11	10	11	12
SRK Bern	DIIIc	Y	4	4	4	4	4	4	4	4	4	4	4	4
WISCONSIN	DIIIa	Y	4	4	4	4	4	4	3	4	3	3	4	4
WISCONSIN	DIIIa	N	4	4	4	4	4	4	4	4	4	4	4	4
WISCONSIN	DIIIa	N	4	4	4	4	4	4	4	4	4	4	4	4
WISCONSIN	DIIIa	N	4	4	4	4	4	4	4	3	3	4	3	4
WISCONSIN	DIIIb	N	4	4	4	4	4	4	4	4	4	2	3	4
WISCONSIN	DIIIc	N	4	4	4	4	4	4	4	4	4	4	4	4
CONSENSUS	**DIII**		+	+	+	+	+	+	+	+	+	+	+	+

Table 3. DIV results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DIV		4+	0	0	C	0	0	0	0	0	4+	4+	4+
IBGRL	DIV		4+	0	0	C	0	0	0	0	0	C	4+	4+
IBGRL	DIV		3+	0	0	C	0	0	0	0	0	C	4+	4+
IBGRL	DIV		2+	0	0	C	0	0	0	0	0	4+	4+	4+
GAMMA	DIV	N	2+	2+	0	4+	0	0	0	0	0	4+	4+	4+
ARC	DIV		4	0	0	4	0	0	0	0	0	4	4	4
LUND	DIV		4	0	0	4	0	0	0	1w	0	3	3	4
ORTHO	DIV		3	0	0	3	0	0	0	0	0	3	3	4
ORTHO	DIV		3	0	w	3	0	0	0	0	0	3	3	3
NYBC	DIV		9	0	0	10	0	0	0	0	0	10	10	10
NYBC	DIV		10	0	0	12	0	0	0	0	0	10	12	12
SRK Bern	DIVb		+/-	0	0	2	0	0	0	+/-	?	4	4	3
NYBC	DIV		0	0	0	7	0	0	0	0	0	11	10	10
SRK Bern	DIVa	Y	4	1	2	4	?	?	0	+/-	?	4	4	4
WISCONSIN	DIV		4	0	2	4	0	0	0	0	0	4	4	4
AUSTRIA	DIV	Y	/	0	1	3	0	0	0	0	0	4	4	3
NYBC	DIVb	Y	0	0	0	0	0	0	0	0	0	10	10	10
ORTHO	DIV		0	0	0	0	0	0	0	0	0	3	3	3
GAMMA	DIV	Y	0	0	0	0	0	0	0	0	0	4+	4+	4+
CONSENSUS	**DIV**		+	0	0	+	0	0	0	0	0	+	+	+

Table 4. DV results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DVa		w	C	0	C	(w)	C	C	C	0	4+	4+	4+
IBGRL	DVa		1+	C	0	C	(w)	C	C	C	0	4+	4+	4+
ARC	DVa		4	4	0	4	0	4	3	3	0	4	4	2
GAMMA	DVa	N	3+	4+	0	4+	0	4+	4+	4+	0	4+	4+	4+
DUKE	DVa		1	3	1	3	1	3	3	4	0	3	3	3
DUKE	DV		0	4	0	4	0	4	3	3	0	3	3	3
ORTHO	DV		0	3	0	3	0	3	3	3	0	3	3	2
NYBC	DVa		5	11	3	12	0	12	10	11	0	11	10	12
NYBC	DVa		4	10	0	12	0	11	10	10	0	10	10	9
NYBC	DV type7		0	10	0	10	0	10	10	10	0	4	10	3
SRK Bern	DV type7		0	4	0	3	?	4	3	4	0	1	4	+/-
SRK Bern	DVa	Y	1	4	2	4	1	4	4	4	0	4	4	4
MICHIGAN	DV	DV?	10	10	10	10	0	10	10	10	0	10	10	10
MICHIGAN	DV	DV?	10	10	9	10	0	10	10	10	0	10	10	10
IBTS	DVa		0	3+	0	C	0	C	C	3+	0	3+	3+	2+
CONSENSUS	**DV**		0/+	+	0	+	0	+	+	+	0	+	+	+

Table 5. DCS results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
DUKE	DCS	Y	2	2	0	2	2	3	2	2	0	0	2	0
CZECH	DCS	Y	4	4	4	4	4	4	4	4	0	2/3	4	0
SRK Bern	DCS		4	4	1	4	4	4	3	4	0	0	4	0
SRK Bern	DCS		5	5	4	5	5	5	4	5	0	2/3	5	1/2
IBTS	DCS	N	3+	5	0	5	3+	5	5	5	0	0	3+	0
CONSENSUS	**DCS**		+	+	+	+	+	+	+	+	0	+	+	0

Table 6. DVI reaction pattern consensus. 41 were tested, results not shown.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
CONSENSUS	**DVI**		0	+	0	0	0	+	+	+	0	0	0	0

Table 7. DVII results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DVII		4+	C	C	C	4+	C	C	C	4+	w	4+	4+
IBGRL	DVII		C	C	C	C	4+	C	C	C	4+	w	C	4+
IBGRL	DVII		4+	C	3+	C	4+	C	C	C	4+	(w)	4+	4+
ARC	DVII		4	3	4	4	3	4	4	4	2	0	3	4
GAMMA	DVII	Y	3+	3+	3+	3+	3+	3+	3+	3+	3+	0	3+	3+
DUKE	DVII		3	3	3	4	3	4	3	3	2	0	3	3
ORTHO	DVII		3	3	1	3	3	3	2	2	2	0	3	3
ORTHO	DVII		3	3	3	4	3	3	3	3	3	0	3	3
NYBC	DVII		11	11	10	12	10	10	12	11	10	0	10	10
NYBC	DVII		11	10	9	12	10	10	10	10	9	0	10	10
SRK Bern	DVII		4	4	4	4	4	4	4	4	4	0	4	4
AUSTRIA	DVII	Y	4	4	4	4	4	4	3	4	3	1	4	3
CONSENSUS	**DVII**		+	+	+	+	+	+	+	+	+	0	+	+

Table 8. DOL results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DOL		4+	C	0	C	C	C	C	4+	0	0	4+	4+
IBGRL	DOL	Y	4+	C	0	C	C	C	C	C	0	0	4+	4+
DUKE	?		3	3	0	4	3	3	3	3	0	0	3	3
CONSENSUS	**DOL**		+	+	0	+	+	+	+	+	0	0	+	+

Table 9. DFR results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DFR		4+	4+	0	C	4+	C	C	4+	0	(w)	4+	0
IBGRL	DFR		C	C	0	C	4+	C	C	C	0	(w)	4+	0
IBGRL	DFR		4+	4+	0	C	4+	C	4+	4+	0	0	4+	0
ARC	DFR		4	3	0	4	3	2	2	3	0	0	3	0
DUKE	DFR		w/o	3	0	w/o	0	3	2	2	0	0	w/o	0
NYBC	DFR		10	10	0	10	10	10	10	10	0	0	9	5
NYBC	DFR		11	10	0	10	11	11	10	10	0	0	11	0
SRK Bern	DFR	Y	4	4	0	4	4	4	4	4	0	0	4	0
CZECH	DFR	Y	3	4	0	4	4	4	4	4	0	0	4	0
CZECH	DFR	Y	3	3	0	3	3	4	3	3	0	0	4	0
GAMMA	DFR	?	4+	4+	2+	4+	4+	4+	4+	4+	0	0	4+	0
SRK Bern	DFR	N	1	4	?	?	?	4	3	4	?	?	?	?
SRK Bern	DFR	N	(+)	4	?	?	+/-	4	4	4	?	?	?	+/-
WISCONSIN	DFR		1	1	0	3	4	1	2	0	0	2	4	0
AUSTRIA	DFR	Y	4	4	4	4	4	4	3	4	3	3	4	1
CONSENSUS	**DFR**		+	+	0	+	+	+	+	+	0	0	+	0

Table 8. DMH results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DMH	Y	4+	C	4+	C	4+	C	C	C	0	w	4+	4+
IBGRL	DMH	Y	4+	C	4+	C	C	C	C	C	0	1+	4+	4+
MICHIGAN	??	?	10	10	10	10	9	10	10	10	0	6	10	10
MICHIGAN	D2??	Y - D2	10	10	10	10	10	10	10	10	0	9	10	10
MICHIGAN	D2??	Y - D2	10	10	10	10	10	10	10	10	0	10	10	10
GAMMA	Unknown	Y	3+	3+	1+	3+	2+	2+	2+	2+	0	2+	3+	3+
IBGRL	New Dvar?		4+	C	2+	2+	4+	4+	4+	3+	0	4+	4+	4+
CONSENSUS	**DMH**		+	+	+	+	+	+	+	+	0	(+)	+	+

Table 11. DAR results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DAR	Yes	4+	4+	(w)	C	0	4+	3+	3+	0	0	4+	2+
IBGRL	DAR		4+	4+	0	C	0	4+	4+	3+	0	0	4+	2+
NYBC	DAR		9	9	0	9	0	10	9	9	0	0	9	9
NYBC	DOL?		10	10	7	10	0	10	10	10	0	0	9	9
NYBC	DAR		9	9	8	10	0	9	9	9	0	0	9	4
IBGRL	DAR	Yes	4+	C	3+	C	4+	4+	4+	4+	0	2+	4+	4+
DiaMed	DAR		4-	4-	3+	4-	3	4-	3	3+	1-	2	3+	3
CONSENSUS	**DAR**		+	+	0*	+	0*	+	+	+	0	0*	+	+

Table 12.DHK/DAU-4 results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
DiaMed	DHK	Y	0	4	0	4	0	4	4	2	0	4	0	0
IBGRL	DAU-4		0	C	0	C	0	C	C	3+	0	4+	0	0
IBGRL	DNP	Y	0	C	0	C	0	C	C	0	0	4+	0	0
IBGRL	DNP	Y	0	4+	0	C	0	C	C	0	0	4+	0	0
IBGRL	DNP	Y	0	C	0	C	0	C	C	0	0	4+	0	0
IBGRL	DNP		0	C	0	C	0	C	C	0	0	C	0	0
IBGRL	DNP		0	C	0	C	0	C	C	0	0	C	0	0
GAMMA	Unknown	Y	0	3+	0	3+	0	3+	3+	0	0	3+	0	0
CONSENSUS	**DHK/DAU-4**		0	+	0	+	0	+	+	+/-	0	+	0	0

Table 13. DBT results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	DBT		0	0	0	0	0	0	0	0	0	C	0	2+
IBGRL	DBT		0	0	0	0	0	0	0	0	0	4+	0	1+
GAMMA	DBT	?	0	0	0	0	0	0	0	0	0	4+	0	3+
SRK Bern	DBT	Y	0	0	0	0	?	?	?	?	0	4	0	1
CONSENSUS	**DBT**		0	0	0	0	0	0	0	0	0	+	0	+

Table 14. Ro^{Har} results summary and reaction pattern consensus.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
IBGRL	RoHar		(w)	0	0	0	0	0	0	0	0	0	0	0
IBGRL	RoHar		w	0	0	0	0	0	0	0	0	0	0	0
IBGRL	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
ARC	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
GAMMA	RoHar	Y	1+	0	0	0	0	0	0	0	0	0	0	0
DUKE	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
DUKE	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
ORTHO	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
ORTHO	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
NYBC	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
NYBC	RoHar		0	0	0	0	0	0	0	0	0	0	0	0
SRK Bern	RoHar	N	0	0	0	0	0	?	0	0	0	0	0	0
CZECH	RoHar	Y	0	0	0	0	0	0	0	0	0	0	0	0
CZECH	RoHar	Y	0	0	0	0	0	0	0	0	0	0	0	0
AUSTRIA	RoHar	Y	0	0	0	0	0	0	0	0	0	0	0	0
NYBC	RoHar		0	0	0	0	0	0	0	3	0	0	0	0
CONSENSUS	**RoHar**		(+)	0	0	0	0	0	0	0	0	0	0	0

Table 15. Undefined results summary.

TEST CENTRE	D variant	Molec?	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL
NYBC	DAU-O	Y	10	10	12	12	10	12	11	11	10	10	11	11
MICHIGAN	DAU		11	11	11	11	11	11	11	11	11	11	11	11
SRK Bern	DNB	Y	4	4	4	4	4	4	2	4	4	4	4	4
IBGRL	DV type 7??		0	C	0	C	0	4+	4+	4+	0	C	4+	0
IBGRL	New Dvar?		0	C	0	4+	0	4+	4+	3+	0	2+	4+	0
GAMMA	??		0	4	0	4	0	4	4	4	0	4	4	0
LUND	??		0	4	0	4	0	3	3	3	0	3	4	1
LUND	??		0	4	1	4	0	4	4	4	1	2	3	1
WISCONSIN	weak D	N	0	4	0	4	0	4	4	4	0	4	4	3
WISCONSIN	D Wiel/DV??	N	0	4	0	4	0	4	4	4	0	3	4	3
SE BTS	??		0	4	0	4	0	4	4	4	0	4	4	4
IBGRL	New Dvar?		2+	3+	w	3+	w	1+	2+	w	0	w	3+	2+
DiaMed	??	N	3+	x	3+	4	3+	3+	3+	3+	1-	3	4-	3
GAMMA	Crawford	N	1+	0	0	0	0	0	0	0	0	0	0	0
NYBC	Crawford		0	0	0	0	3	4	3	4	0	0	0	0
NYBC	DIM		9	8	0	0	0	9	11	5	0	0	0	0
LUND	??		0	0	w	1	0	0	0	0	0	0	w	0
NYBC	weak D		3	3	0	4	0	0	3	5	0	0	0	0
NYBC	weak D		0	9	0	9	0	0	9	3	0	0	4	0
LUND	weak D		0	4	0	4	0	3	4	1	0	3	0	0
ARC	Dweak		2	3	0	3	0	3	3	4	0	3	2	2
NYBC	DVI type1		8	8	0	10	0	7	5	9	0	6	8	0

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