Evaluating the Predictive Power of Offer Evaluation for Physical Crossmatch Outcomes

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Introduction: Offer evaluation (OE), defined by our lab as a prediction of a flow cytometry-based physical crossmatch (PXM), is important to organ allocation. OE can catch incompatibilities not detectable by UNet. If OE is formalized as a virtual crossmatch (VXM) and used as the final pre-transplant XM, cold time is dramatically reduced. This study aims to quantify our confidence in OE as the programs we support become increasingly interested in leveraging VXM.

Methods: We reviewed the corresponding OEs of 159 PXMs, noting if the OE was compatible, incompatible, or indeterminant. Organ offers for which the OE is incompatible are always refused, so PXM is not performed for those cases. A compatible OE is T cell and B cell negative. OE and PXM results were compared to determine the percentage of OEs associated with an incompatible PXM.

Results: Of 159 cases reviewed, 98% of al PXM performed were compatible. PXM-incompatible cases were noted to have low-level DSA on further analysis of the recipient's antibody history. The kidneys for these three cases were reallocated and successfully transplanted into backup candidates.

VXM \ PXM	PXM Compatible	PXM Incompatible
VXM Compatible	146 (92%)	3 (2%)
VXM Indeterminant	10 (6%)	0

Table: 159 OE-PXM pairs were reviewed. Of the 149 OEs predicted to be compatible, 3 (2%) had an incompatible PXM. Of the 10 OEs reported as indeterminant, none had an incompatible PXM. Of the 3 PXM-incompatible cases, all had potential low-level DSA on further analysis

Case	Description
1	DSA to DRB1*15:03 (with MFI 800 on OLI SAB), supported by OLI PHE assay. PXM was weakly Bc positive; autologous XM was not performed due to lacking fresh samples. This adult candidate was transplanted one month later, is now 14 months post-transplant, and has developed no DSA.
2	DSA to Bw6 (MFI 486 to 2251 on OLI SAB – in which there are 31 beads for Bw6; graph below). PXM was weakly positive. The candidate did not meet VXM criteria, as there had been only two screens in the prior year (and only three in total for the two years the candidate was known). This adult candidate was subsequently removed from the waitlist due to transportation difficulties.
3	DSA to B44 (MFI=853 on WER SAB). This assay had not been run on prior sera and demonstrates antibody to B*44:02,B*44:03,B45,B82 (eplet 162GLS covers all four of these beads, possibly leading to underrepresentation of MFI if this represents a single antibody). While B44,45 had not been called positive in the past, they were noted as suspicious in prior sera when tested using both OLI SAB and PHE assays. This pediatric candidate was transplanted nine months later.

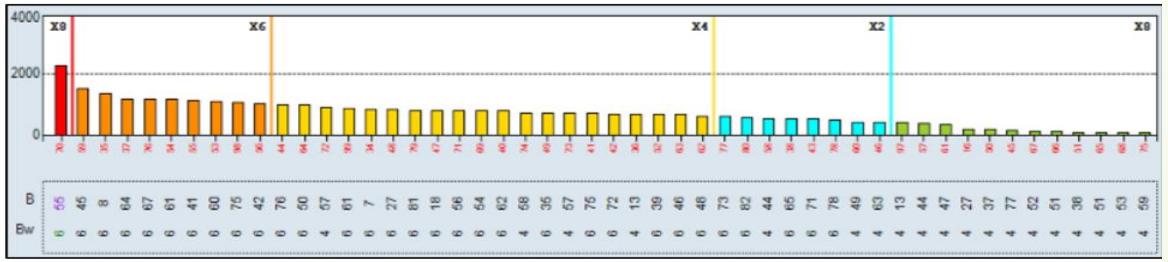

Figure: Analysis of the three PXM-incompatible cases (top), and histogram of the Bw6 pattern seen in case 2 (bottom).

Conclusion: The use of VXM in kidney transplantation is increasing due to its associated substantial reduction in cold time, reduced demands on after-hours technologist time, and lower expense. The three unexpected positive PXM cases in our study remind us of the complexity of antibody analysis and how we might improve the accuracy of our OEs.