AABB 2010: IVD innovation continues in transfusion medicine despite challenges

The unprecedented economic conditions and impending healthcare reform measures in the US cast a mood of uncertainty over this year’s American Association of Blood Banks (AABB) conference. However, this has not stemmed the flow of innovation among the IVD companies serving the transfusion medicine community. Here, Boston Biomedical Consultants’ CEO Kerri Weinert and senior analysts Ji Shi and Ed Fan highlight the latest technologies and key discussions from the meeting.

The global economic crisis and upcoming US healthcare reforms have posed many questions about funding and the impact it will have on blood management programmes. According to the American Red Cross, blood donations in the first 10 months of 2010 were down 3% compared with the same period in 2009, partly because the organisation actively scaled back collections to meet reduced demand.

Despite the many challenges it faces as a consequence of limits on healthcare funding, the IVD industry continues to offer innovation in blood management. Considering that the safety of the blood supply has never been higher, investigation of potential risks posed from emerging infections underscores the disciplined surveillance activity in the US.

The past year saw the release of several new automated blood grouping/typing (BGT) systems from Immucor and Bio-Rad, and the AABB 2010 meeting focused on new automation for BGT in the nucleic acid testing (NAT) area. The current systems and tests from the major companies in the US for NAT (Novartis and Roche) and immunoassay (Abbott, Bio-Rad, and Ortho Clinical Diagnostics) were well represented. Both Abbott and Novartis featured emerging pathogens as topics of their evening educational events, in particular...
Xenotropic Murine Leukaemia Virus-Related Virus (XMRV). Abbott highlighted its 25 years of HIV testing and scientific discovery and the availability of the only FDA-approved fourth-generation HIV test, the ARCHITECT HIV Ag/Ab test.

In addition, among other emerging pathogens, dengue and babesiosis also generated interest at this year’s meeting. According to Dr Darrell Triulzi, medical director at the Institute for Transfusion Medicine, these pathogens pose a unique challenge given that they are a problem only in selected regions of the US. “It has us pondering what new regional testing strategies, following the West Nile Virus and the Chagas testing experience, need to be considered here in the US.”

**Update on XMRV**

Among transfusion-transmitted infectious diseases, XMRV was a popular topic at this year’s meeting, appearing in several sessions and industry-sponsored symposia. In December 2009, the AABB convened an Interorganizational Task Force on XMRV, chaired by Dr Harvey Klein, chief of the Department of Transfusion Medicine, National Institutes of Health (NIH) Clinical Center.

To date, the AABB and the Task Force have supported the use of rational, science-based blood donor deferral policies and provided an interim measurement in June 2010. The next step to risk management of XMRV is to conduct additional research on its potential transfusion transmissibility, as many recent studies have conflicting data regarding the association of XMRV with chronic fatigue syndrome (CFS) and prostate cancer.

Roger Dodd, vice-president, research and development, American Red Cross Holland Laboratory, was actively involved in several sessions related to emerging infectious diseases. Regarding the current status of the research on XMRV, Dr Dodd stated, “It is still too early to tell where [XMRV] is going. There are conflicting data overall, and to date, there is currently no information as to whether or not XMRV plays a causative role in all, some, or any cases of CFS.”

Michael Busch of the Blood Systems Research Institute presented on the progress of the NHLBI’s Blood XMRV Scientific Research Working Group during multiple sessions, including a well-attended event sponsored by Novartis Diagnostics. The XMRV Working Group was established to design and co-ordinate research – a a four-phase study – to evaluate XMRV as a threat to blood safety. Dr Busch further explained that the aetiology of XMRV is not yet known or defined, which clouds the association of XMRV and CFS. When reviewing some of the research studies that he has been involved in, he commented on the use of the Abbott ARCHITECT assay that has been developed for XMRV: “We now have a serologic tool that could be quite important going forward.” Data generated using a NAT for XMRV in donor blood samples developed by Novartis and its development partner Gen-Probe was also reviewed.

**Molecular BGT products**

Molecular BGT (also referred to as molecular immunohaematology) generated interest at this year’s meeting with several companies promoting their new products. In the US, enthusiasm for the technology and its positive impact on patient care continued to build interest. Uses for molecular BGT are increasing, despite barriers to broader adoption which include cost, standardisation, assay consistency, bioinformatics, and walkaway automation. Addressing the issue of advanced automation, Immucor showcased its prototype, “New BioArray Automated Immunohaematology” for molecular BGT, which builds upon its proprietary BioArray BeadChip technology, for the first time. The product drew significant customer attention in the booth and will be renamed just prior to the launch of the system. Although the final product specifications have not been released, the following were highlights of some key features of the prototype:

- Integration of DNA amplification and hybridisation steps (considered the “midpoint” of the total work flow) on the BeadChip array;
- Instrument capable of processing one 96-well plate in one shift;
- Total testing procedure and work flow require separate instruments for DNA extraction and quantification, as well as final data analysis which is performed remotely at Immucor’s facility using BioArray Solutions Information System; and
- Test menu (not yet FDA-approved) similar to the current Human Erythrocyte Antigens panel, which covers DNA analysis of polymorphisms associated with 11 blood group systems, with the possibility of adding Cartwright typing.

Immucor plans to commence beta testing of the new product by mid-2011, with FDA approval expected in 2012.

Progenika and GTI Diagnostics also exhibited their molecular BGT products during the show. Progenika promoted both its BLOODChip and new BLOODChip ID molecular BGT products, the latter of which is based on the Lumineux xMAP technology. While the BLOODChip is capable of detecting 128 allelic variants in nine Red Blood Cell (RBC) groups and 12 Human Platelet Antigens (HPAs), its acceptance has been limited in the US donor screening field due to its relatively low throughput. However, the BLOODChip continues to be the most comprehensive tool in the market for molecular BGT in the case of patients.

The BLOODChip ID product offers a simplified, low labour-intensive solution to blood bank and hospital customers for donor screening, providing detection of 23 blood group antigens (RhCE, Kell, Duffy, Kidd, MNS, Dombrock) and the RBC R test detects 28 HPAs in its platelet panel (IDHPA). Progenika officially launched the product at the ISBT meeting in Berlin, Germany, in June 2010 and, in the same month, inked an exclusive partnership with Grifols for the worldwide distribution of its BLOODChip products.

GTI Diagnostics (GTI) promoted two of its new molecular BGT products, LIFECODES RBC/RBC-R and Red Cell EZ Type, through a learning lab session titled, “Making the Switch: Serology to Red Cell Genotyping.” The presentation centred on Michigan University Hospital’s experience with the products and covered topics such as reagent cost, assay validation, and discrepancy resolution. Gen-Probe (through its acquisition of Tepnel in early 2009) developed the LIFECODES RBC/RBC-R products based on the Lumineux xMAP technology. Designed primarily for use in donor/patient screening, the RBC test detects 51 common blood group genotypes (RhCE, Kell, Duffy, Kidd, MNS, Dombrock) and the BBC R test detects 28 less frequent blood group variants; both are currently available. In addition to the Gen-Probe product, GTI has also developed Red Cell EZ TYPE, a system intended for patient sample use that aids in resolving ambiguities and weak reactivities found in serological results. Red Cell EZ TYPE uses traditional PCR and a pre-cast gel system, and caters to lower-volume hospital transfusion laboratories.

Contrary to last year, there were no RAP sessions for molecular BGT at AABB 2010;
instead, a scientific session titled, “The Future of Molecular ‘Dry’ Matched Red Cell Transfusions” was hosted by Gregory Denomme, director of Immunohematology, BloodCenter of Wisconsin (BCW), and moderated by Willy Flegel, chief of Laboratory Services Section, Department of Transfusion Medicine, NIH Clinical Center. “Dry matching” refers to matching the donor and patient at their genotype level only (without using serology). Three speakers with significant molecular BGT experience presented during the well attended session, including Geoff Daniels of the International Blood Group Reference Laboratory at the University of Bristol; Ellen Klapper of Cedars-Sinai Medical Center; and Naomi Luban of the Children’s National Medical Center. Of note, BCW officially launched its OpenArray-based, red cell genotyping service to peer donor centres (in a two tier format) and has screened approximately 26,000 of its own donors in nine weeks.

With an increased number of red cell genotyping tests offered by different manufacturers, wider acceptance is expected over the next five years. In the US, a majority of the blood centres are currently evaluating the possibility of implementing molecular BGT testing, according to Dr Flegel. Meanwhile, timing of regulatory approval, cost, and availability of automation will all impact the future of the technology adoption.

Transfusion-Related Acute Lung Injury (TRALI)

IVD testing associated with TRALI was considered to be an emerging testing opportunity in the mid to late 2000s. However, new donor management strategies have helped to improve TRIALI incidence and the need for IVD testing appears to be no longer significant. There was discussion of TRALI during the meeting this year with the presentation of the results from two major studies, Leukocyte Antibody Prevalence Study-II (LAPS-II) and the TRALI incidence surveillance study which was a project conducted as part of the Specialized Centers of Clinically Oriented Research in Transfusion Medicine. Steven Kleinman, president of Kleinman Biomedical Research and one of the principal investigators on LAPS-II, commented on the findings:

“Multiple sources of data show the policy of transfusing predominantly male plasma has resulted in a decrease of TRALI incidence in plasma transfusion recipients. On the other hand, there has been no conclusive data presented evaluating whether HLA antibody screening of selected female platelet apheresis donors will reduce TRALI risk from transfusion.”

2010 US Biovigilance Network: a public/private collaborative

Several presentations at the conference reported on the implementation of the US Biovigilance Network, based on the user experience among ‘live’ hospital sites. The backbone of the biovigilance data collection programme is the CDC-developed National Healthcare Safety Network (NHSN). According to Barbee Whitaker, director of data and special programmes at AABB, there are 50 sites enrolled in the NHSN which are ‘live’, contributing data and participating, with a total of 90 that are listed on the website and are classified as committed, that means that they are in the pipeline.

The meeting also saw the official launch of a separate Donor Hemovigilance module. Kevin Land, president, CEO and medical director, of the South Texas Blood & Tissue Center, is chair of the AABB’s Donor Hemovigilance Working Group. As duly noted by Dr Land, the timeline for implementation by blood collection and services organisations differs markedly from hospitals for a number of reasons and will, therefore, lengthen the adoption time for this segment. Nonetheless, he clearly recognises the potential immediate benefits of donor centres: “People respect what you inspect.”

As more institutions implement the Transfusion Service Recipient Hemovigilance component of the programme, interest has continued to grow. In order to take advantage of the timing of the conference, the CDC supported up to 100 hospital-based personnel for a one-day training session on the haemovigilance software during the day prior to the opening of the annual meeting.

In March 2010, Beth Israel Deaconness Medical Center (BIDMC) started entering data (approximately 18,000 whole blood cell units are transfused per year) into the NHSN Hemovigilance Module. “We had some challenges initially, but we overcame them. We are keeping track of all of this information currently, so it’s not all that much of a burden, work-wise. We know all this information is valuable to the organisation. We are just not able to use it to its fullest yet as we are still under one year using the software,” stated Leslie Richardson-Weber, clinical manager at BIDMC.

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