

Blurred lines of surgical, cytology, and molecular pathology reporting

By Nancy Stoker

The laboratory's product is information and how that information is presented on the report. The report — your product — can set your laboratory apart from others. Today's technical advances provide sophisticated data that must be presented in a concise, easy-to-read, and attractive format. With the growth in molecular testing, the lines are blurring among surgical, cytology, and molecular pathology reporting. A current surgical or molecular pathology report bears little resemblance to a similar type of report produced even a few years ago and, today, might contain (in addition to the usual gross description, microscopic examination, and final diagnosis) relevant clinical-laboratory findings, molecular results, photomicrographs, annotated diagrams, graphs, scatter plots, and predictive-risk tables.

Premier Medical Laboratories	
700 Congressional Avenue Carmel, IN 46032 (800) 856-1948 CLIA ID # XXX-000-XXX Rob Bush, M.D.	
Patient name: Bowman, Mary Louise	Case number: B08-0006
Patient ID: 38331089	Collection date: 8/12/2008 08:40
Date of birth: 05/06/1978	Age: 30
Sex: F	Delivery date: 8/12/2008 08:40
	Approval date: 8/16/2008 09:02
Provider: Patricia Bolding, MD	
Bone Marrow Pathology Report	
FINAL DIAGNOSIS	
WHO Acute Myeloid Leukemia Not Otherwise Specified: FAB Acute Myelomonocytic Leukemia (M4)	
Bone Marrow Biopsy, Aspirate and Particle Preparation: 1. Acute Myeloid Leukemia with marked hypercellularity, numerous blasts (67%) and eosinophils (21%). 2. Reduced Trilineage Hematopoiesis.	
Peripheral Blood: 1. Acute Myeloid Leukemia with leukocyte toxics including numerous blasts (49%), monocytes (25%), and eosinophils (14%). 2. Anemia and thrombocytopenia.	
Flow Cytometry Interpretation	
Flow cytometric immunophenotyping studies performed on bone marrow demonstrated numerous CD34 positive/CD117 positive myeloid blasts (42.2% positive); these cells coexpressed the myeloid markers CD133. Many expressed HLA-DR and TdT, also markers of myeloid immaturity. Also, there was a distinct population of cells that expressed the monocytic marker, CD14.	
Clinical History: A 30-year-old female without any significant past medical history, developed symptoms of sinus pressure and headache for approximately three weeks. These were thought to be sinusitis and treated with oral antibiotics (Bactrim) and antihistamines. Subsequently she developed gingival hyperplasia and was found to have a white blood cell count of over 70x10 ⁹ /L.	
Microscopic Examination	
Bone Marrow Biopsy and aspirate were performed with the following remarkable and abnormal differential counts:	
Blasts	67.0% (normal 0.0 - 2.0)
Eos Myelo/Mon	15.0% (normal 1.0 - 4.0)
Eos Band	3.7% (normal 1.0 - 2.0)
Eos Seg	2.3% (normal 1.0 - 2.0)
The marrow was markedly hypercellular (approximately 100%). The predominant cells were blasts but eosinophils also appeared markedly increased. The blasts in the marrow were generally large with many having a moderate amount of cytoplasm.	
Case number: B08-0006-1	Reviewed by: _____
This report continues... (Preliminary)	

in a columnar profile format inserted into the narrative reports are the standard. This is relatively easy for most laboratory and pathology information systems to accomplish; however, this is just the beginning of change for today's surgical reporting.

Synoptic reporting mechanisms are being added to the report, and cancer protocols have standardized the content of the report, as well as the format. Digital photographs of gross and/or microscopic tissues not only make for informative reporting but also can verify tissue sampling. Immunohistochemistry, fluorescent *in situ* hybridization (FISH), and other molecular procedures can be captured in a digital file and incorporated into the report. Certain tissues (prostate and gastric are two prime examples) sampled with multiple biopsies or parts are summarized using annotated diagrams. Color-coded annotation and percentage of sample involved with tumor are displayed, often with corresponding color-coded diagnosis text. Even bar graphs are used to summarize findings.

Given the complexity of today's reporting, laboratories will turn to those lab information systems (LISs) with the capability to easily include these various types of formats to create a report that does not look like a total "data dump." Information systems which relied heavily on the IT department to compile a report are systems of the past. Most pathologists are open to using various tools to create their reports, but if the anatomic pathology (AP) system fails to provide easy solutions with minimal steps, pathologists will not use those systems. Their time is better spent reviewing samples and providing diagnoses, than spent worrying about the graphic design of the report.

Pap/molecular results, one report: easier said than done

Pap reports have evolved; liquid-based medium is now used to perform multiple procedures, and low- and high-risk HPV testing is widely performed. Gonorrhea and chlamydia swabs are requested on the same lab order and collected during the same exam. Providers desire that each of these test's results be compiled into a single report. This sounds like a simple request; but, surprisingly, many AP systems cannot accomplish this automatically. Pathologists are adding these results in a narrative format. Ordering physicians need a provisional Pap report followed by a final report consisting of the Pap interpretation and molecular results. Compiling these reports can be labor-intensive unless the LIS can directly interface the molecular analyzers to the AP system. In addition to this timesaver, the effective utilization of decision-support rules will unleash the AP system's potential.

The standardization of Pap and molecular results means that much of the Pap report is starting to resemble a quantitative panel.

Surgical pathology reporting: more complex than ever

Pathologists have always correlated clinical and anatomical findings. This has typically involved listing quantitative clinical results in a narrative fashion. This did not always make for easy reading; but, historically, it has sufficed. Today, clinical results

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Review of historical Pap interpretations is required, and this information (up to five years of Pap interpretations and any/all gynecological-surgery results) must also be reported. AP systems must be able to reflex the addition of correlations, historical results, and molecular tests based upon Pap interpretation.

For example, atypical squamous cells of undetermined significance, or ASCUS, added to the cytology worksheet should trigger HPV testing, as requested by the ordering physician. Decision support rules, as determined by the pathologist, should trigger the appropriate HPV procedures. If the AP system cannot do this, however, streamlining procedures may be difficult, as will be keeping staff productivity at a high level and increasing testing volume.

Molecular path tests: not just for esoteric labs anymore

Many molecular techniques are becoming more commonplace. Immunohistochemistry, flow cytometry, polymerase chain reaction, or PCR, and FISH are performed in most community hospitals, regional reference laboratories, and specialty clinics. The prevalence, cost-effectiveness, and availability of these types of tests have prompted many laboratories to take another look at their AP systems.

Homegrown molecular modules might work well but require dedicated IT staff to support them. For those labs that refer some or all molecular testing to a reference laboratory, compiling a single hybrid report will be difficult, if not impossible. If your reference laboratory incorporates images in its report, your HL7 reference-lab interface will not support the transmission of images. These are some of the problems faced in molecular reporting.

Pathology or molecular laboratories that can provide a narrative report with a portable document format, or PDF, overlay of images via Web delivery will have a definite advantage as hybrid-reporting expectations increase. Some clients may request both an HL7 transmission to their electronic-medical record (EMR) system and Web delivery of a report with images. The ability to consolidate all results will eventually overtake today's routine of two separate reports — the surgical pathology or cytology report, followed by a second

one containing molecular results at a later date.

The total integration of all results is the key to streamlining processes in the laboratory and providing the ordering physician a concise report. If your combined AP, LIS, and outreach systems cannot deliver, keeping up with the competition will be difficult, too.

Today's LIS/AP/outreach/integration systems: What can this combination deliver?

Many laboratories are facing the daunting task of replacing their AP systems, particularly as molecular procedures become more common. The proliferation of EMR systems in clinics is raising the bar for pathology reporting. Reference laboratories and hospitals must be willing to provide an interface to their clients' EMRs. If they provide pathology services to facilities that do not yet have an EMR, Web reporting is in increasing demand.

Web outreach tools not only provide a delivery mechanism for reports but also provide the testing facility with the opportunity to control the order-entry process. In today's market, turnaround times, quality assurance, EMR integration, and competitive pricing are being joined by the report-delivery "wars." The pathology or molecular laboratory that can deliver the easiest-to-read, best-looking, consolidated hybrid report in an electronic format will win. For those labs looking to replace their legacy LIS or AP systems, care must be taken to choose the system that will do the best job of integrating clinical, molecular, and pathology results. Seamless integration is the key to providing a bang-up report without getting all banged up.

How can you meet the expectations of the ordering physician and his facility's EMR requirements and keep your pathologist(s) happy? Creating a report that contains the myriad of different reporting features without burdening the pathologist is the ultimate challenge — and a delicate balancing act — but, believe it or not, it can be done. How much information is too much? How many of the graphs and diagrams are truly necessary? Are these reporting mechanisms helpful to the ordering physician? To the patient reading his report? It depends on who you ask.

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Patients appreciate the visual aids that graphs and annotated diagrams provide. Ordering physicians use those same tools to translate the results to their patients. As more results and images hit the pathology or molecular report, the varied reporting styles make it easier for everyone who reads it to digest the material. Pathologists once might have used terms like “bells and whistles” or “marketing fluff” to describe these features (and some still do), but they accept the fact that certain specialties are already demanding the hybrid report.

How will your LIS handle the compilation of different result types? What type of report is it? Is it a pathology report with clinical and molecular results, or a clinical report with molecular results and pathology interpretive text? The answer is: “It depends.” The best LIS solution will give you the flexibility to create a workflow that starts from either side, incorporates results from all areas of the lab, and provides a single report. As molecular testing has broken down some of the walls that traditionally divided histology, cytology, microbiology, and core clinical-department workflow, molecular reporting bridges anatomic pathology, cytology, and clinical systems.

Hybrid reports' future: Advancing technology saves the day

What is next on the reporting horizon? Jacqueline Seabrook, vice president of marketing for Molecular Pathology Laboratory Network in Maryville, TN, believes that EMRs and legacy hospital information systems will eventually have to accept a report with a PDF overlay or attached JPEG images. “Our laboratory’s primary focus is a wide range of molecular technologies. Integration of these results has not happened easily,” she says. “Our facility has made a commitment to a customized Web portal to allow physician clients to access full-featured, hybrid reports. Many of our physicians also require HL7 transmission of strictly text results to their EMRs.”

Seabrook continues, “Our laboratory has developed the custom portal over six years, with a large IT staff that is totally involved in deploying the system to our clients.” She believes that AP and/or molecular systems will need to accept results generated at different times, create a provisional report at each step, and then

compile the results in a patient-centric manner allowing the pathologist to make a true summary statement.

“The cutting and pasting of results will not suffice for future reporting,” she says, “because it is labor-intensive and not eligible for reimbursement. Pathologists must have all these tools to make progress in comparing all clinical, molecular, and pathology results.”

Seabrook’s wish for an EMR with the ability to accept the type of report her facility provides resonates through the laboratory industry. For all the effort that goes into creating the perfectly formatted report, the EMR industry has some catching up to do.

Got the prescription for a clear-cut reporting mechanism?

Pathologists usually agree on clinical-laboratory information systems’ functionality but may have strong and differing opinions on how to maneuver through even the most basic elements of any AP system. When it comes to deciding how best to compile a hybrid surgical pathology report with molecular results and images, they can break off into divergent schools of thought.

The hybrid report does give the pathologist the opportunity to create the report as his “product.” This product stamps him professionally. If we start with the pathologist’s vision for his report and work back through the process, many systems in the market still require the pathologist to hand select items for inclusion in the final report. But if he has access to a system that allows the addition of items using rules-based technology *and* allows for the seamless integration of clinical, molecular, and pathology results, the pathologist can put his vision in effect. Setting up a fully integrated system requires time, effort, and a commitment to the process; but, like all good things, the outcome is worth the venture in the end. After all, it is all about the report. □

Application specialist Nancy Stoker worked closely with the development of Orchard Software’s comprehensive diagnostic-information system, Orchard Pathology. Since joining the company in 2003, Stoker has demonstrated products for prospective clients and provided applications support for existing clients. She was once director of Ancillary Services for a large, multispecialty group practice, and consulted with laboratories. Stoker, a certified medical technologist, has more than 20 years of clinical experience with 15 of those spent in laboratory and radiology management. Reach her at nstoker@orchardsoft.com or call 800-856-1948.

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