G2 INTELLIGENCE

Diagnostic Testing & Technology Report

Competitive Intelligence & Analysis for an Expanding Global Market

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Genetic Testing Does Not Increase Health Service Utilization

As discoveries of biomarkers make their way into clinically available genetic tests, there has been some uncertainty regarding how knowledge of one's genes may alter the consumption of health care resources. But patients receiving multiplex genetic susceptibility testing do not increase utilization of health care services, according to a study published online May 17 in *Genetics in Medicine*.

Electronic medical records were used to compare health care utilization in the 12-month pre- and posttest periods for 217 healthy young adults, aged 25 to 40 years. Researchers from the Multiplex Initiative found that all of the individuals who underwent the multiplex testing carried at least one at-risk genetic marker, with the majority carrying an average of nine at-risk variants. But there was no evidence that having genetic information about predisposed risk for eight common conditions led to increased use of diagnostic testing to monitor for predicted illnesses.

"We need to understand the impact of genomic discoveries on the health care system," said Dan Kastner, M.D., Ph.D., scientific director of the National Human Genome Research Institute's division of intramural research, which collaborated on the study. "We are still learning how to integrate new genomic discoveries into clinical care effectively and efficiently."

To learn more about the penetration of molecular biomarkers into clinical practice, please see *Inside the Diagnostics Industry* on page 5.

Diagnostics M&A Focused on Strategic Fits; Gen-Probe Deal Pending, Illumina and Roche Unable to Reach Deal

With the takeover drama between Illumina (San Diego) and Roche (Basal, Switzerland) officially ended and a deal between Gen-Probe (San Diego) and Hologic (Bedford, Mass.) heading toward a close, experts say the prospect of additional mergers and acquisition (M&A) activity in the diagnostics industry looks promising, if there is a clear strategic fit between the companies.

Hologic agreed to purchase Gen-Probe for a total of $3.7 billion ($82.75 per share) in an all-cash deal announced at the end of April that will be financed through cash on hand, loans, and high-yield securities. The transaction is expected to close in the second half of the year. Industry watchers see the two companies as highly complementary and are pleased Gen-Probe's CEO Carl Hull is staying on board to oversee the company's combined diagnostics business.

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▲ **Diagnostics M&A Focused on Strategic Fits,** *from page 1*

The combined company is expected to have "a strong growth profile" with "strong free cash flows" and be accretive to Hologic's adjusted earnings per share in the first fiscal year after close. Gen-Probe's products will round out Hologic's women's health offerings with the combined company having "a global reach and significant growth opportunities," Hologic says.

"This transaction establishes Hologic as a premier company in STD diagnostics and advances our core focus on women's health. . . . [O]ur combined company will be well positioned globally to capitalize on the fast-growing molecular diagnostics market," says Hologic's CEO Rob Cascella. "With the combination of our capabilities, Hologic will operate a diagnostics franchise with the growth potential similar to our breast health franchise."

With Hologic's overseas marketing infrastructure, the growth trajectory of Gen-Probe's products is significantly enhanced.

"Hologic does bring some expertise, namely on direct-to-physician sales. Gen-Probe hadn't invested in that and called on their lab clients. It is a good synergy," says Brian Weinstein, a research analyst at William Blair & Co. "Gen-Probe has very strong market share domestically. They tried to get bigger overseas and build an international infrastructure but couldn't get an acquisition done. Hologic brings an established, mature infrastructure overseas."

So is there a takeaway lesson in this deal for the industry?

> ***"Hologic tells us that if there is something out there and folks are considering it and it makes sense, they can't sit back there on their heels."***
>
> ***—Jeff Frelick***
> ***Canaccord Genuity***

"We were surprised on the timing. We believed [Gen-Probe] was an M&A target next year given they will have launched a new product cycle with HPV and Panther. But with the approval and uptake on HPV and traction in women's health with chlamydia/gonorrhea and trichomonas assays, they thought why wait," says Jeff Frelick, a senior analyst in health care and life sciences at Canaccord Genuity. "If anything [the deal] keeps folks on their toes. There was $18 billion in M&A last year, the most since 2007. We expect the momentum to continue. A lot of companies in the space are embarking on new product cycles, not just extensions, so the incremental opportunity for new customers and revenue is attractive. Hologic tells us that if there is something out there and folks are considering it and it makes sense, they can't sit back there on their heels."

Roche, though, is choosing to take a back seat, abandoning its $6.7 billion bid for Illumina after Illumina's shareholders rejected the proposals at the company's annual meeting. Analysts widely believe that Illumina must perform well this year to retain shareholder confidence and fend off any future takeover attempts from Roche. Illumina's first-quarter earnings rose 8.6 percent, more than analysts had expected, largely through decreases in expenses used to offset a 3 percent drop in revenue from the same period in 2011, although revenue was up over the prior quarter.

"Obviously Roche and Illumina captured everybody's attention over the first quarter. But now that that is behind us [Gen-Probe] is the big deal of the year so far," says Weinstein. "I have seen arguments on both sides, but I think it is tough to see this deal spur [further M&A activity]. More than anything else is the question of is it a strategic fit. If we see a flurry of deals they were probably already in the works."

Shifting Paradigm in Lung Cancer Screening: Predictive Blood Tests May Emerge in Conjunction With CT

National Jewish Health (Denver) kicked off a randomized screening trial in May to validate the autoantibody EarlyCDT-Lung (Oncimmune) test in conjunction with low-dose computerized tomography (CT) as a lung cancer screening tool in high-risk populations. The clinical value of the blood test, as well as emerging economic data demonstrating the cost-effectiveness of screening in high-risk, commercially insured populations, might indicate a shifting paradigm in lung cancer screening.

"The lung cancer community is constantly monitoring potential bio-markers in development and the few that have come to market. The EarlyCDT-Lung test has now been on the market for over two years," said principle investigator James Jett, M.D., from National Jewish Health, in a statement. "I believe the time is now right to explore extending the use of the test to population screening for high-risk patients."

The trial, which will determine if the two screening technologies have added value used together, compared to using each test alone, will enroll 1,600 patients over four years. The test was developed by Oncimmune (England) based on the immuno-biomarker technologies identified by John Robertson, M.D., from University of Nottingham (United Kingdom) and is run domestically in a Clinical Laboratory Improvement Amendments-certified lab located in Desoto, Kan. Positive test results are determined based on autoantibody levels above a disease-indicative threshold, which indicates an increased risk of lung cancer in high-risk patients (aged 40 to 75 years) including long-term current or former smokers and those with extensive secondhand smoke exposure or environmental exposures (radon, asbestos, coal products, or radioactive substances).

The EarlyCDT-Lung, while less sensitive than CT (40 percent versus 90 percent, respectively), can detect smaller, less advanced cancers and has greater specificity than CT (93 percent versus 50 percent), according to the company. The test, which lists for $475 and is reimbursed by Medicare Part B and private insurance, has a positive predictive value three times better than CT, the company says. Since findings show that 20 percent to 60 percent of screening CT scans of past or present smokers will show abnormalities, with most not cancer, many believe use of a prognostic test, like EarlyCDT-Lung, in conjunction with low-dose CT will further improve the benefit of screening.

Evidence is also mounting on the economic benefit of expanding lung cancer screenings. According to a study published in *Health Affair*s in April, researchers found using an actuarial model that offering lung cancer screening as an insurance benefit would save lives at cost comparable with screenings for cervical, breast, and colorectal cancers.

In the model if long-term smokers (age 50 or older) underwent CT screening and follow-up care, the cost per life-year saved would be below $19,000. Assuming there were 18 million people in the high-risk category and half would get the screening if it were a covered benefit, the researchers found that the screening would cost insurance companies about $247 per member tested annually. Overall, the study found that such

screening would keep alive an additional 130,000 people under age 65 over a 15-year period. Currently though, most private insurers do not cover this screening.

"The evidence of the value of advanced screening technology for lung cancer has accumulated to the point where we can show very strong cost-effectiveness for the commercial population," says lead author Bruce Pyenson, principal at the actuarial firm Milliman (New York City). "We can also jump the needle on cancer mortality for the first time in years, and do so in a cost-effective manner."

While this study only examined lung CT, future research may incorporate blood-based diagnostic tests in conjunction with CT.

Misuse of Prescription Drugs High, Including Pain Killers; Findings May Lead to Increased Drug Monitoring

Three in five Americans tested misused their prescription drugs, including potentially addictive pain medications, according to analysis by Quest Diagnostics (Madison, N.J.) of nearly 76,000 laboratory tests for monitoring prescription drug use. Inconsistencies in use, which could include not taking prescribed drugs or taking nonprescribed drugs, were seen across drug classes and across all populations.

While the analysis did have some limitations, including an inability to verify misuse with medical records and the possibility that clinicians tested patients due to suspicions of drug misuse, the Quest Diagnostics Health Trends Report, *Prescription Drug Misuse in America: Laboratory Insights into the New Drug Epidemic,* found widespread misuse across all ages, income levels, and in patients covered by both government and commercial health plans.

"The results were a bit startling. The data points [to the fact] that there is not any one group at risk," F. Leland McClure, Ph.D., Quest's director for national testing operations in pain management, tells *DTTR*. "We are facing a health epidemic [of prescription drug abuse], but it is also vital to remember that there are 116 million chronic pain sufferers and it would be inhumane to deprive them of pain relief because of fears of drug misuse."

While young people had the highest rates of misuse, half of patients tested over the age of 65 years had inconsistencies. Researchers found that the inconsistencies diminished on follow-up screens. Among the 6,858 patients who had repeat testing about a month later, inconsistency rates fell from 63 percent to 55 percent and dropped even more (17 percent) in those with inconsistent use of pain medications.

The researchers said their findings "support medical recommendations that physicians perform routine urine testing to monitor prescription drug misuse," although any increased urinalysis would benefit Quest. But there is a clear trend toward expanding prescription drug screening. In an April 18 earnings call, then Quest CEO Surya Mohapatra, Ph.D., acknowledged that Quest is seeing "continued strong growth in prescription drug monitoring." Group Health Cooperative (Seattle) has recommended regular urine screens for patients on chronic opioid therapy, and in 2009 guidelines on chronic opioid therapy put out by the American Pain Society and American Academy of Pain Medicine and 2011 guidelines from the American College of Occupational and Environmental Medicine there are recommendations for urine drug testing.

G2 INTELLIGENCE
Inside the Diagnostics Industry

The Real Penetration of Biomarkers in Clinical Practice Outside the Field of Oncology

A message heard repeatedly at G2 Intelligence's MDx Next conference (Boston; April 17-19) was that following the sequencing of the human genome, hope permeated the hallways of research facilities and clinics alike and the nuanced complexities of the molecular mechanisms behind disease remained underappreciated and oversimplified. Acknowledging the frustrating pace of meaningful adoption of genetic testing in clinical practice a decade after the Human Genome Project was completed, Jeremy Bridge-Cook, Ph.D., senior vice president of assay research and development at Luminex (Austin, Texas), examined the reality of biomarker use in clinical practice today.

"There is a great deal of hype about biomarkers," says Bridge-Cook. "But have biomarkers been clinically successful? Some people would say yes. But I would actually argue that outside of oncology biomarkers have not actually been very successful."

Structural Barriers to Adoption

In large part, significant structural barriers have slowed adoption of biomarkers. As an example, Bridge-Cook points out that there are 115 U.S. Food and Drug Administration (FDA)-approved drugs that somehow refer to biomarkers in the labeling, but test utilization has not followed suit.

"You would say, wow, 115 drugs, that's a lot of drugs, but not so fast," he cautions. "If you actually take a look at that, in 52 percent of the 115 drugs with biomarkers, the biomarkers are CYP450. And probably none of them are actually in widespread use."

While labels may "very vaguely" refer to the fact that a biomarker test is available, they do not inform the clinician how to use the information generated from biomarker testing, exacerbating the challenge of physician adoption.

"There is no question that treatment with a large number of drugs that are on the market today could be improved through P450 testing, but there are a few things that are holding it back," says Bridge-Cook. "First, and by far the most important, is the lack of pivotal trials. In order to actually prove [the benefit], you need a randomized, controlled pivotal trial with greater than 1,000 patients, and that just doesn't happen."

But nobody is stepping up to pay for the trials, which can run $10 million, perpetuating a catch-22 scenario.

"As a society, as a whole, we would easily benefit from that $10 million, but no one group really does. So those trials just don't get done," explains Bridge-Cook. "What happens is you get, for instance, P450

Clinically Successful Biomarkers

Abacavir and HLA B5701
Cetuximab and EGFR/KRAS
Cisplatin and TPMT
Crizotinib and ALK
Erlotinib and EGFR
Irinotecan and UGT1A1
Trastuzumab and Her2/neu
Vermurifenib and FRAF

Source: Jeremy Bridge-Cook, Ph.D.

markers for SSRIs anti-depressants, with which you know that you could get much better treatment of patients on SSRIs if you actually did this kind of testing. But nobody has actually conducted these large-scale studies that will unequivocally prove it."

Even in drugs where there may be small studies having proved some benefit to testing, physicians often do not know how to clinically apply the information, slowing adoption. For example, the FDA has put a black box on warfarin-related drugs and cleared some related 2C9 and VKORC1 tests.

"But there is nothing that says in the test how to use the results to titrate the dose of warfarin. So, basically physicians are no better off," says Bridge-Cook. "Manufacturers have been very reluctant to take on the additional regulatory and clinical trials burden required to receive approval for pharmacogenomic assays with specific drug dosing recommendations."

Pharmacogenomic tests can be cleared through the 510(k) process, but if they make specific dosing recommendations, that requires premarket approval, a more expensive and time-consuming process that most manufacturers are not willing to take on.

Bridge-Cook says that his company, Luminex, is investing "fairly heavily" in the assay segment and currently has tests for cystic fibrosis, CYP2D6, a P450 gene, 2C19, several infectious disease products, respiratory pathogens, gastrointestinal pathogens, and also a newborn screening product, all making use of Luminex's xMAP multiplexing technology.

> ***"Manufacturers have been very reluctant to take on the additional regulatory and clinical trials burden required to receive approval for pharmacogenomic assays with specific drug dosing recommendations."***
> ***—Jeremy Bridge-Cook, Ph.D.***
> ***Luminex***

"It's interesting. It's actually in some ways encouraging," says Bridge-Cook, regarding the uptake in utilization of these products. "I mean, the growth and volume for instance of sales of number of tests of our 2D6 product, for example, is growing somewhere in the neighborhood of 80 percent to 100 percent compound annual growth rate. So it's actually growing really quickly, but it's going from such a small base that it's still minor."

Why Is Oncology So Different?

Some point to the routine clinical application of biomarkers in oncology and wonder why other medical fields have not had equal success. Bridge-Cook says that while there is a greater molecular understanding of cancer than of other diseases, pharmaceutical companies have a role to play in oncology's early adoption of biomarker utilization.

"Historically, the marketing department has been the most powerful in the pharmaceutical companies, and they don't generally want to cut their market in half with a biomarker," says Bridge-Cook. "But in oncology, basically, there is so much

pricing flexibility, clinical trials are so expensive, and patients are relatively hard to come by, that you do anything that you can do to decrease your trial time and cost and increase its success rate. So biomarkers are something that they are much more open to."

Additionally, on the reimbursement front, oncology reimbursement is based on Diagnosis Related Groups, or flat fees, rather than current procedural terminology (CPT) coding, and the cost of a test is a "drop in the bucket" compared to the overall scope of care of oncology patients.

The Future of Biomarkers in Clinical Practice

So despite the persistence of structural barriers, will other medical disciplines catch up with oncology in the utilization of clinical biomarkers?

"I think there are some reasons for optimism that there are actually some fairly pivotal changes that are occurring today that might actually accelerate [the pace] and you might finally get to see adoption of biomarkers in clinical practice outside of oncology in a bigger way," predicts Bridge-Cook.

"Timelines being what they are, it is likely that I think it's going to take about five years before that actually is felt in terms of many more new drugs reaching the market that require a biomarker to be used for the drug, again, outside of oncology."
—Jeremy Bridge-Cook, Ph.D.
Luminex

The National Institutes of Health is moving toward "bridging the gap" and providing funding for large-scale, pivotal trials looking at comparative effectiveness that are imperative for positive reimbursement coverage. Bridge-Cook also is seeing some shifts in pharmaceutical companies' attitude toward and utilization of biomarkers.

"I would argue that pharma seems to have recently gotten religion on personalized medicine," says Bridge-Cook of his observations at a recent investment conference. "What they are saying is that biomarkers were being mandated as a corporate priority, so from the top down, basically not just that biomarkers had to be part of the overall program, but actually whenever possible biomarkers had to be part of the trial design and that's different from what we were seeing five years ago. I think that's actually a sea change in pharma's attitude."

Bridge-Cook says, though, that the motivation for this change may be driven economically by drugs coming off patent.

"They have really come on some very rocky shores recently and I think in order to try to show that they are implementing new paradigms and new ways to increase research and development productivity, they have really latched onto biomarkers as the way to accomplish this," he says. "However, the timelines being what they are, it is likely that I think it's going to take about five years before that actually is felt in terms of many more new drugs reaching the market that require a biomarker to be used for the drug, again, outside of oncology."

Competition in Noninvasive Prenatal Testing Market Heats Up Amid Product Launches, IP Battles Reach Court

The noninvasive prenatal testing market is evolving frantically as three firms are rapidly deploying competing commercialization strategies and unleashing legal action in an effort to stake their claim to their share of the estimated $1 billion U.S. market.

On the positive side, in May Sequenom (San Diego) announced that it had performed 4,900 MaterniT21 tests in the first quarter and upped its full-year guidance to 40,000 tests. The MaterniT21 PLUS test, which was the first noninvasive prenatal DNA test to market, analyzes fetal DNA circulating in the maternal bloodstream to identify trisomies 21, 18, and 13. But on May 17 the company had to do an abrupt about-face saying that its previously announced (May 9) payer contract with Coventry Health for coverage for Sequenom's MaterniT21 PLUS had been terminated without cause. Insiders say the deal unraveled in part because of Sequenom's press release announcing the deal.

"In our conversations with both Coventry and Sequenom, it is clear to us that competitive dynamics and pricing did not have anything to do with Coventry's decision to terminate the Sequenom contract," says Junaid Husain, senior research analyst for medical technology at investment bank Dougherty & Co. "Having a payer contract is meaningful to getting paid. It feeds the coffers and helps them get to profitability. My projections have [Sequenom] getting to profitability in the fourth quarter of 2013."

Husain also estimates that Sequenom's revised volume guidance is still low and based on his own calculations "with conservative assumptions" projects Sequenom's 2012 volume to be near 65,000 tests.

Ariosa Diagnostics (San Jose, Calif.; formerly Aria Diagnostics) shocked industry watchers with its May announcement that its Harmony Prenatal Test will be nationally launched in June through a partnership with LabCorp (Burlington, N.C.) and LabCorp's specialty testing unit Integrated Genetics at more than 1,000 patient-service centers.

"Ariosa is being very aggressive. Their test is priced at a massive dis-

A Frenzy of Legal Filings

There has been a mounting battle of filings of suits and countersuits, with the first court hearing over the contested intellectual property at the heart of these prenatal tests approaching. A June 15 date is set for District Judge Susan Illston to hear Sequenom's motion for preliminary injunction against Aria (now Ariosa Diagnostics), asking the U.S. District Court for the Northern District of California to have Aria stop making, using, or selling its test until the case is resolved.

Sequenom sued both Aria and Natera in January, saying that the companies' noninvasive prenatal test and paternity tests infringe on a patent exclusively licensed to Sequenom (U.S. Patent No. 6,258,540). The "'540" patent, as the company refers to it, involves researcher Dennis Lo's discovery of fetal DNA in maternal blood. In a preemptive complaint filed earlier in January both Ariosa and Natera (which has not yet commercially launched its test) said their respective tests do not infringe Sequenom's patent and allege that Sequenom has "misrepresented" the scope of its patent.

Also in late February Verinata filed suit claiming that Sequenom willfully infringes on Verinata's exclusive patent rights. Stanford University owns and exclusively licenses to Verinata the "the '017 patent" (U.S. patent No. 7,888,017, "Non-invasive Fetal Genetic Screening by Digital Analysis") and the "'018 patent" (U.S. Patent No. 8,008,018; "Determination of Fetal Aneuploidies by Massively Parallel DNA Sequencing"). Verinata and Stanford are seeking an injunction to halt Sequenom's infringement of the patents, in addition to damages and other relief. In the complaint Verinata's asserts that the '540 patent is invalid because "the claims are old and obvious" and Sequenom interprets the patent in an "overbroad" manner and that Verinata's activities do not infringe the '540 patent.

count, compared to what we see with other players. Sequenom lists for $2,762. Their list is about $900. Nobody pays list. Usually the average selling price is 65 percent. How can Ariosa do this?—very low margins," says Husain. "The cost of goods for Ariosa's test is $300 to $500, we think. If the test is priced at $585 and they are giving a bit of that away to LabCorp, that is a narrow margin. They will get squeezed harder to cover costs and grow their business."

Husain is also skeptical of any real benefit that will come from the LabCorp partnership.

"I have heard people say they will own the market because they have partnered with a large clinical service provider. But the devil is in the details," explains Husain. "LabCorp has hundreds of relationships with vendors. Sales and marketing support is probably not part of the deal. Ariosa will have to do all of the heavy lifting to convince ob/gyns. For LabCorp it is the perfect deal. They add it to their service offerings and collect a check with every test. They are no guarantee for reimbursement."

Verinata Health (Redwood City, Calif.), which has been quiet on its commercialization plans, published the results of a study demonstrating the clinical and economic value of its verifi test in the April issue of the *Journal of Managed Care Medicine*. The published model shows that incorporating the verifi test as a secondary prenatal screening test for high-risk pregnancies does not increase the overall cost of care and demonstrates clinical benefit through a significant reduction in false positive results. Using the verifi test to diagnose one aneuploidy would decrease the cost of invasive diagnostic procedures by 71 percent and would reduce miscarriages resulting from invasive testing by 66 percent. verifi, which tests for all three trisomies, reportedly lists for $1,200.

So, how will it play out as the three companies battle for testing volumes among the 750,000 annual high-risk pregnancies in the United States?

"The market is evolving in a positive, constructive manner," says Husain. "Sequenom has the first mover advantage and [may have] the first payer advantage. People think that Ariosa has a slam dunk with the LabCorp deal, but it is not a slam dunk. They are still chasing Sequenom." G2

AssureRx Health Launches Personalized Medicine Test for ADHD

AssureRx Health Inc. (Mason, Ohio) has launched its GeneSightRx ADHD pharmacogenomic test to aid psychiatrists in personalizing treatment for children and adults diagnosed with attention deficit hyperactivity disorder (ADHD). The test represents an expansion of the company's neuropsychiatric personalized medicine offerings and offers another opportunity for pharmacogenomics to penetrate clinical practice of a common disorder, outside the field of oncology.

The GeneSightRx ADHD test analyzes variations in three genes that influence metabolism of medications used to treat ADHD to improve treatment selection and lessen common side effects associated with the medications. As with the company's GeneSightRx Psychotropic, which was launched in 2010, the GeneSightRx ADHD utilizes a sample from a cheek swab for analysis of genetic variants in combination with an algorithm that examines current Food and Drug Administration-approved manufacturer's drug labels, peer-reviewed scientific and clinical publications, and

pharmacology. The test is performed at the company's Cincinnati-area Clinical Laboratory Improvement Amendments-certified laboratory.

In the first quarter the company announced that it has secured an $8 million term and revolving credit line from Silicon Valley Bank to provide additional capital to support increasing clinical adoption of GeneSightRx and to finance multiple new products scheduled for launch in 2012. While not verified by the company, it has been reported future pharmacogenomic tests may include ones for neurodegenerative disease including Parkinson's and Alzheimer's disease.

Bio-Reference Labs Invests in InCellDx

Clinical testing laboratory Bio-Reference Laboratories (Elmwood Park, N.J.) closed on an equity investment of up to $6 million in molecular diagnostics firm InCellDx (Menlo Park, Calif.) on May 15 and simultaneously launched a new test they developed called GenCerv, which is based on InCellDx's patented human papillomavirus (HPV) mRNA quantification technology.

The test, developed by Bio-Reference's GenPath Women's Health business unit, quantifies the overexpression of oncogenes E6 and E7 in HPV and relies upon InCellDx's technology to quantify molecular biomarkers inside intact cells using cell-based instruments and in situ hybridization.

"Our assay based on InCellDx technology seeks to track the neoplastic process; therefore, it is not about the infection, it's about the disease," said Marc Grodman, M.D., CEO of Bio-Reference, in a statement. "We anticipate that this technology, which has been well reviewed in academic publications, should not only improve the specificity that accompanies HPV testing, but also should be cost effective in identifying those HPV cases that do not progress to cervical cancer."

The company says that since 95 percent of women who test positive for high-risk HPV do not develop cervical cancer, the GenCerv test should be able to limit the colposcopies and cervical biopsies performed to cases where clinical progression is most likely.

As part of the deal Bio-Reference is making a $4 million cash investment and $2 million of as-needed promissory notes in exchange for preferred stock and warrants worth between 20 percent and 25 percent of the value of InCellDx. InCellDx's total 2011 revenue was $1.1 million. Additionally Grodman will become chairman of the InCellDx board of directors and Bio-Reference's Charles Todd will also become a board member.

Will Bedside Testing Increase Pharmacogenetic Utilization?

Bedside genetic testing of cardiology stent patients rapidly identified carriers of the CYP2C19 variant at increased risk for stroke because of poor response to clopidogrel and allowed for personalization of anti-platelet therapy, according to a proof-of-concept study published May 5 in *Lancet*. While clinical adoption of pharmacogenetic testing has been slow because of the time lag for results and uncertainty about the true impact on patient outcomes, but the point-of-care (POC) Spartan Rx system by Spartan Biosciences (Ottawa, Canada) may cause clinicians to re-evaluate the utility of pharmacogenetic testing.

"Looking at the big picture this is the first study to truly show that bedside testing is a reliable method of obtaining genetic information," says co-author Derek So, M.D., a cardiologist at the University of Ottawa Heart Institute. "It will open the door in multiple areas of medicine as a tool we can use. We are not limited to conventional genetic testing and that is the key message."

Cardiac stent patients with the CYP2C19*2 variant who receive standard clopidogrel therapy following the procedure have a 42 percent higher risk of death, stroke, or heart attack in the first year compared to noncarriers, the authors say. Typically if genetic testing is ordered results can take up to seven days, but complications in CYP2C19 carriers can occur in the first 48 hours after therapy initiation.

The RAPID GENE study demonstrated that patients randomized to receive rapid POC genotyping and tailored drug therapy were protected from poor response to treatment as measured by platelet reactivity (PR), a marker of patients at risk for complications. Of the 200 patients studied, none of the 23 carriers identified in the rapid genotyping group had a PR unit value of more than 234 at day 7, compared with seven carriers (30 percent) given standard treatment. The Spartan RX test had 100 percent sensitivity and 99.4 percent specificity compared with DNA sequencing.

The Spartan RX CYP2C19 is CE marked in Europe and the company says it is "working towards" U.S. Food and Drug Administration clearance. The test can be performed by a nurse with results in one hour.

New Zealand-based Company to Enter U.S. Market With Bladder Cancer Test

Pacific Edge Diagnostics (Dunedin, New Zealand) plans to enter the U.S. diagnostics market with its Cxbladder bladder cancer detection test. In preparation for the launch the company is hiring and building out an 11,000-plus square foot laboratory in Hershey, Pa., its headquarters for its U.S.-based subsidiary Pacific Edge Diagnostics USA (PEDUSA).

The Cxbladder test is based on mRNA levels for five biomarkers that can be detected from a small urine sample. All U.S. samples will be tested in the company's laboratory, which is expected to be Clinical Laboratory Improvement Amendments-certified before the March 2013 launch. The company says the noninvasive test, which is currently available New Zealand, Australia, Spain, and Portugal, is expected to replace cytology for patients presenting to clinicians with blood in the urine and can be used to complement cystoscopy in monitoring patients for a recurrence of the disease. The test has an overall sensitivity of 84 percent compared to 46 percent using cytology and a specificity of 85 percent and 96 percent, respectively. Additionally, clinical trials suggest the Cxbladder test has 80 percent accuracy for triaging patients from high to low grade of disease.

PEDUSA will hire 100 people over the next three years, including the May appointment of Jackie Walker as its CEO. Construction of the facility is expected to be completed in 2012 and it will have a capacity to run 260,000 tests annually.

EDITOR'S NOTE:
Diagnostics Testing and Technology Report *will no longer track stocks on a monthly basis. Instead, we will publish biannual updates on publicly traded diagnostics companies and their stock prices.*

G2 Insider

New Role for Genetic Counselors in Laboratories . . . Given the expanding role that genetic testing is playing in health care, many laboratories are beginning to hire genetic counselors to help stakeholders navigate through the process of molecular testing, from ordering through interpretation. With the practice of genetics evolving so rapidly, primary care physicians may not have the training or knowledge to adequately interpret results of complex genetic tests, says Brenda Finucane, executive director of Elwyn Genetics (Elwyn, Pa.) and president of the National Society of Genetic Counselors (NSGC). While consumers are becoming increasingly savvy about genetic testing, many primary care doctors may not even know what test to order.

The incorrect ordering of genetic tests is a common occurrence, with research finding that on average one-third of molecular tests are ordered incorrectly. Laboratory genetic counselors are screening test requests for appropriateness, assisting in the interpretation and communication of test results, and serving as an educational resource internally in the lab and with ordering physician. This is representative of a shift in the field of genetic counseling with an increasing number of counselors holding nonclinical positions, including in laboratories. According to results from the NSGC 2010 Professional Status Survey experts estimate that there are 85 practicing laboratory genetic counselors.

Based on a small survey conducted from the NSGC listserv, the vast majority of respondents reported that their two greatest tasks are customer liaison (95 percent) including interacting with ordering physicians and calling out results (88 percent), which account for an average of 18 percent and 13 percent of their time, respectively. Additionally roughly two-thirds say they teach or supervise students and coordinate or review requests for send-outs, whereas genetic counseling of clinical patients was reported by 42 percent of respondents and accounts for a mean of 8 percent of their time. The study is the first to try to define the role of the laboratory genetic counselor and was published in the November 2011 issue of the *Journal of Genetic Counseling*.

Company References

Ariosa Diagnostics 408-229-7500
AssureRx 866-260-2394
Bio-Reference Laboratories 201-791-0382
Coventry 301-581-0600
Gen-Probe 858-410-8000
Hologic 781-999-7300
Illumina 800-809-4566
InCellDx 650-777-7630
LabCorp 336-584-9525
Luminex 512-219-8020
Milliman 646-473-3000
Natera 650-249-9090
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