CUSTOMER PROFILE

PharmacoScan Solution

The vision for preemptive pharmacogenomic screening for broad-based research

Thermo Fisher Scientific recently spoke with Dr. Ulrich Broeckel of Right Patient, Right Drug Diagnostics (USA) about his work in pharmacogenomics research.

Thermo Fisher: Can you tell us about your vision for pharmacogenomics?

Broeckel: We now know that a growing number of gene-drug pairs and other genetic variations can affect a patient's reaction to a drug. CPIC, which is a great resource for the community, publishes guidelines to help clinicians understand how the available genetic test results should be used to optimize drug therapy. CPIC has, to date, published specific genetic testing guidelines for over 30 drugs. The US FDA publishes a list of nearly 200 FDA-approved drugs with pharmacogenomic information in their labeling, and many of these drugs are listed with specific actions that should be taken based on patient-specific biomarker information. This includes seven drugs that have black-box warnings—the strongest guidance the FDA requires. These lists are growing all the time.

In the beginning, markers were discovered one-by-one, and tests were developed accordingly—one test for each target. Reimbursements followed this development pattern and covered individual, one-target tests. But a patient may need multiple tests, each of which may take several days, thus delaying treatment. On the positive side, this one-test/one-target process delivers a manageable amount of information to the physician.

Customer profile

Ulrich Broeckel, MD, a pharmacogenomics (PGx) specialist, recently launched a new company—RPRD (Right Patient Right Drug) Diagnostics, a spin-off from the lab he leads at Medical College of Wisconsin. Dr. Broeckel is on the faculty of Medical College of Wisconsin, and is active in the Pharmacogenomics Research Network (PGRN) and the Clinical Pharmacogenetics Implementation Consortium (CPIC). He is a leader in the movement to demonstrate the feasibility and value of preemptive pharmacogenomic screening research.

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We are now at an important crossroads. We have the tools available to perform research for all known PGx markers in a single assay. Results of this comprehensive screening research add important information to the sample profile and can become part of the patient's electronic health record (EHR), providing insight to physicians for decades. This is what we call preemptive pharmacogenetics screening research, and that is the vision.

There is a lot more attention today on the field of pharmacogenetics, particularly with the current focus on precision medicine research. I believe that in the next few years, there will be increasingly more information about the impact of PGx targets such as drug receptors or genes involved in drug metabolism, and that this knowledge can have a real clinical impact.

Thermo Fisher: For the past decade, you have been working with several clinical research hospitals on various pharmacogenomics screening projects for research. Can you tell us about this experience?

Broeckel: My lab at Medical College of Wisconsin has been working closely together with St. Jude Children's Hospital, where we have been preemptively genotyping the pediatric clinical research samples when they are collected at the hospital. This creates a scenario where the PGx information is all generated at once, ahead of time, eliminating the need to wait several days for results of subsequent genetic experiments. This PGx information then becomes part of the patient's medical record, readily available for any physician that sees the patient. This information also retains its value into the patient's adulthood. This is the longest-running research project in preemptive pharmacogenetics screening for pediatric clinical research samples. The idea is that when physicians prepare to prescribe a drug or a combination of drugs, they will have the genetic information readily available to support their clinical decisions. So far, we have seen that this information has been accessed in the majority of the patients. We are clearly seeing that preemptive pharmacogenetics screening can have an immediate and sustainable impact. The data our collaborators are collecting in this research project is unique and has spurred interest from other hospitals and health care organizations.

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For years, we have been using the Applied Biosystems™ DMET™ Plus Solution for pharmacogenomic screening research, and our lab at Medical College of Wisconsin was the first to offer this type of analysis to our clinical researchers. We are now planning to transition this research project to the Applied Biosystems™ PharmacoScan™ Solution, which provides more coverage and is more scalable and cost-effective.

Thermo Fisher: What do you see as the roadblocks to widespread adoption of PGx screening for research into understanding drug-gene and drug-drug-gene risk profiles?

Broeckel: We touched on reimbursement earlier and the need to facilitate a shift to the broader test mindset. Projects like the one at St. Jude show results and clinical utility that may potentially be used to inform the payer side of the equation that it is possible to shift the standard practice from conducting one reactive test at a time to one proactive, preemptive complete screen. Data presents another roadblock. These PGx screens generate a large amount of data, which family physicians may not be able to interpret right at the time when a decision needs to be made. We need to improve how to interpret this large amount of information generated by PGx screening research and deliver it in a timely manner to physicians in a concise form that they can use. The physician asks, "Should I use drug A or drug B," or "should I avoid this class of drugs altogether and use something else?" Then the genetic data needs to be evaluated with other clinical parameters. In addition, we need to educate physicians, who have been introduced to pharmacogenetics screening as one test at a time, on the value of preemptive genotyping.

Thermo Fisher: Tell us about the new pharmacogenomics company you have launched.

Broeckel: RPRD Diagnostics is an outgrowth of the pharmacogenomics work we were doing at Medical College of Wisconsin, and our goal is to advance that work. Our mission at RPRD Diagnostics is to enable health care organizations, contract research organizations (CROs), and pharmaceutical companies with a comprehensive PGx analysis at a price point comparable with single-gene tests. Many hospitals and health organizations have been mulling over the idea of gathering PGx information for use in decision support; but unfortunately, due to the limited scope and high cost of current PGx tests, this is not yet part of the routine practice. RPRD Diagnostics will focus initially on serving pediatric centers, where we have significant experience and where it is paramount to avoid adverse drug reactions. Additionally, the investment in pharmacogenetics testing can be amortized over a longer period of time with pediatric patients, further justifying the investment. Pharmaceutical companies are also increasingly interested in the use of PGx during drug development, and stratify clinical research cohorts. This requires extensive genotyping experience, which the RPRD Diagnostics team offers. We expect to serve pharmaceutical companies and CROs who are involved in clinical research, and we will serve as a reference lab for clinical trials.

Thermo Fisher: What kind of services does RPRD Diagnostics offer?

Broeckel: Having just launched the company, we are offering both comprehensive and tailored PGx research panels and associated services, including data analysis, consultation, and EHR integration. Our current offering includes broad-based, preemptive screening research using the PharmacoScan Solution, along with tools to address complex cases with in-depth analyses on the Ion Torrent™ next-generation sequencing platform. Sometimes you will have a sample for which genotyping results don't match the phenotype or may be unclear because the sample is from a different ethnic group. The idea is to have a full pipeline, from broad PGx genotyping to highy targeted sequencing, and it's great that Thermo Fisher Scientific offers the continuum of technologies. Additionally, although I think preemptive pharmacogenetics is the way to go in the future, we will also meet specific clinical needs to analyze one gene for one drug.

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Thermo Fisher: You mentioned the PharmacoScan Solution. Can you tell us about your experience with it thus far?

Broeckel: We are very excited to work with Thermo Fisher Scientific on this array platform, and we have been involved since the early access phase of the product. Right now, we are finishing over 600 samples and are happy with the collaboration on the content and also with the data analysis software. We have been able to work on some interesting and challenging samples that produce unusual genotypes to evaluate the array. Included in our analysis are samples that are part of a Centers for Disease Control (CDC) project we participated in. They established a reference set of DNA samples that have now been genotyped with a number of different PGx platforms. As a service to the pharmacogenetics community, we will make this data available as a reference set for other PharmacoScan Solution users. We have other collaborators who are sending us interesting samples as well, which we are currently genotyping. RPRD Diagnostics will be the first company to take advantage of the PharmacoScan Solution. I think this array really stands out in terms of content and the number of genes that are analyzed, along with its competitive pricing. We will start to put together a case for a clinical utility study taking into account the content the array generates and the pricing. Additional markers can be added to these arrays fairly easily without adding to the cost, so it makes sense to use a technology that can grow with the research findings.

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Thermo Fisher: In your opinion, what differentiates the PharmacoScan Solution from other tools that might be used in this type of work?

Broeckel: The primary factor is the number of genes that are on the array and that can be analyzed in one round. The assay results are very consistent and the call rate is high. This is particularly important when you are looking at *CYP* genes where you often need a combination of different markers, which we call star alleles. You need to call a number of variants at the same time, and dropout can negatively affect the results. We are also looking at copy number variations, which are very important in studying *CYP2D6*, and this can be done on the PharmacoScan Solution platform, in addition to analyzing some very rare gene variances. The second feature is the price point, which adds to the overall value.

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Find out more about the PharmacoScan Solution at
thermofisher.com/pharmacoscan

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