

DRUG DISCOVERY, PERSONALIZED MEDICINE AND THOMSON REUTERS

JOSEP PROUS & COLIN WILLIAMS

In recent years, the healthcare field has gone through a clear shift towards a new era of personalized medicine.

Personalized medicine aims to minimize the one-size-fits-all medicine approach by providing each patient a specific treatment based on his or her genetic profile. To a large degree this trend is driven by the current standard of care: if effective treatments already exist, the opportunity may be in improving a different parameter, e.g. replacing a drug delivery method of from syringe to ingestion. In this way the drug companies are being smart, understanding what the key outcomes are that drive reimbursement in certain disease areas, and where a stratification of patient populations can help them show a benefit over the current standard

of care using this. Almost every pharmaceutical organization is adapting its strategy to the new paradigm of personalized medicine, as it is an accepted fact in the

"...putting this two-dimensional information into the context of the myriad of other factors which contribute to the disease is going to be a huge challenge. Intelligent use of this information will really drive better therapy development."

industry that the era of blockbuster drugs is reaching an end.

The industry as a whole is always looking at ways to create more effective drugs, and more than ever these drugs have to create a step change in the standard of care to convince stakeholders, including the payers, that the therapy is worth reimbursing. A survey recently performed among some Thomson Reuters

pharmaceutical customers shows that the concept of personalized medicine is being adopted at different key decision points, especially at the proof of mechanism and proof

of concept stage gates. Almost every organization considers that this approach will be extensively used in every step of the drug R&D process in the very near future.

IS THIS A WAY OF THE FUTURE?

It's important to define what personalized medicine means. In a simplistic way there has always been a tailoring of

therapy to individuals, for example dosing changes for children. What we are seeing is really a progression to a more personalized approach to medicine and there are many hurdles in reaching individual medicine.

Those who use the Thomson Reuters information solutions to support their R&D decisions are more and more asking us to break down the silos of information. We see it already across biology and chemistry and support this through our Integrity® solution. The next challenge for drug development is how to integrate clinical information – both from the narrow reach of clinical trials through to looking at broad populations – and identifying trends and their alignment with the science of the disease which can be used to better treat given populations.

The predictive – preventive – personalized medicine triad will be shaping the future of healthcare as we know it. Information collection, integration and assessment from extremely broad populations is going to be critically important; the better we understand disease, the more effective the therapies we develop will be.



JOSEP PROUS
VP & Chief Scientific Officer



COLIN WILLIAMS
Director, Product Strategy



REUTERS/Muhammad Haed

People check their blood sugar level at a World Hypertension Day event in Amman. Dozens of doctors and people walk the streets to raise awareness on blood pressure and its impact on the livelihood of patients. May 17 is World Hypertension Day.



THOMSON REUTERS™

The NIH announced in 2009 they would spend over \$275 million to catalogue genetic changes driving more than 20 types of cancer, this kind of broad information is going to be critical, and the amount of data will be vast with potentially molecular information on every disease for every patient. Figuring out what this means is going to be a massive task, putting this two-dimensional information into the context of the myriad of other factors which contribute to the disease is going to be a huge challenge. Intelligent use of this information will really drive better therapy development.

WHAT DRUGS ARE CURRENTLY ON THE MARKET THAT COULD BE CLASSES AS PERSONALIZED MEDICINES?

It is worth considering that although a certain disease condition may be pathologically similar across patients, its cause can be significantly different at the molecular level. A good example of this is Breast Cancer. It is the molecular differences between individuals which can give an indication of

potential effectiveness of probably the most famous personalized drug, Herceptin.

Following the success of Herceptin for the treatment of HER2-positive breast cancer, a variety of

“However the FDA estimates that just a 10% improvement in the ability to predict drug failures before clinical trials could save US\$100 million in development costs per drug.”

molecules are being developed in different therapeutic areas with the personalized medicine view in mind. Not surprisingly, the field of oncology and neurological diseases are seeing major activity due to the unmet medical needs in these disciplines.

However, it is not just drugs in development which are benefiting from a more personalized approach; previously marketed drugs are getting a new lease of life after broad clinical research in large populations.

The AstraZeneca drug Iressa is just such an example. In the mid 2000's the FDA limited its future use due to questions over its effectiveness. It was

clear it worked for many patients, and further clinical studies showed a molecular basis for identifying those responders. In 2009 Iressa was approved in Europe for those patients with that molecular profile.

Although we're making progress there's no guarantee of success because the decisions taken on selecting patients for treatment are still based on incomplete disease understanding; we are just improving the odds in a more rational way.

CAN PERSONALIZED MEDICINE BE PUSHED AND STILL REMAIN ECONOMICALLY FEASIBLE FOR BOTH DRUG DEVELOPMENT AND HEALTHCARE PROVISION, WHILE DELIVERING THE BEST QUALITY OF LIFE FOR THE PATIENT?

With more precise diagnostics, clear identification of risk factors, and accurate prediction of treatment efficacy patients are given the drug which gives them

the best chance of treating a disease and insurers and payers, although incurring higher costs in the short term, will decrease long term treatment and healthcare costs.

It's clear that the proposed investments in the US healthcare system – especially electronic health records – are seen as an investment in the personalized medicine direction. The working groups setting policy at the US Dept. Health and Human services are focused on creating the future standards to allow systems to talk together.

If patient data is collected at a molecular level (biomarkers), and response to treatments and disease outcomes can be measured in significant populations and correlated with this biomarker information, this could be a major shift for drug development in terms of helping us to develop more effective / targeted treatments, leading to personalized medicine.

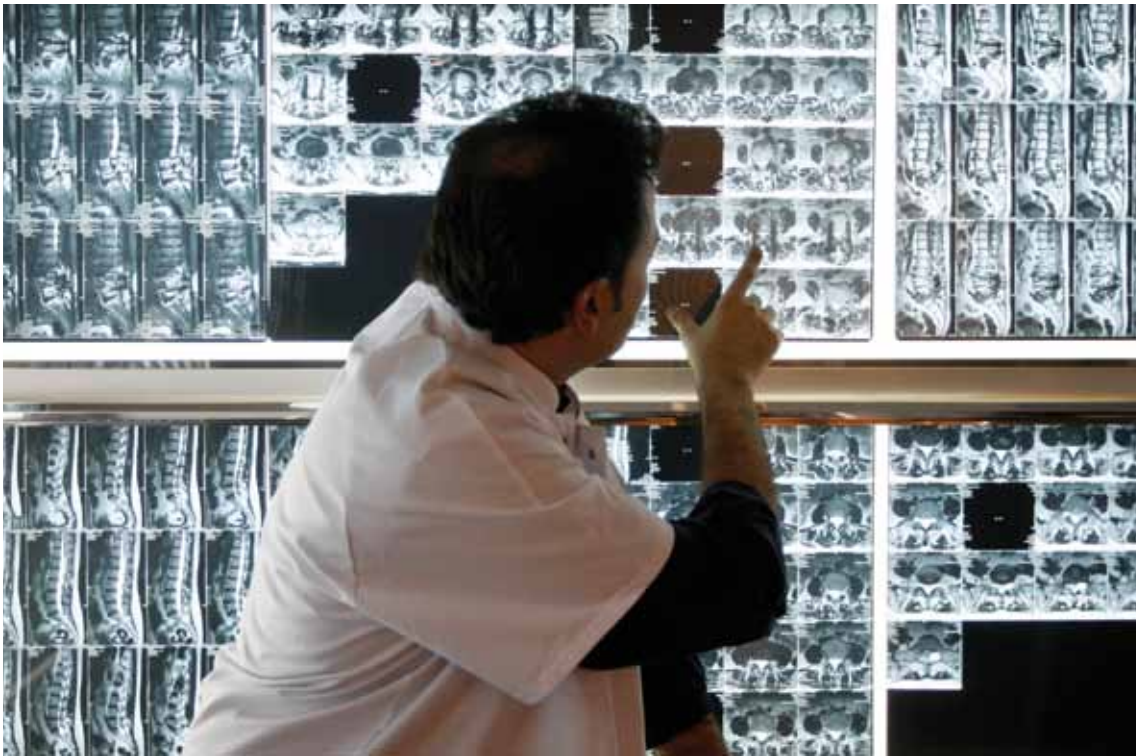
Thomson Reuters' work with diagnostic companies shows a complex dynamic in the diagnostic industry driven by lack of clinical validation of diagnostic tests as the longitudinal clinical data, with the right granularity, rarely exists to support this upside of using the test. In the current setting, few insurers reimburse, few physicians appreciate which tests to run, when and what the output means for the patient. The lack of reimbursement slows the molecular diagnostic industry and the lack of development in this area gives the FDA and others little real clinical data to generate new tests.

Another point for discussion is how payers will handle preventive medicine aspects, when an apparently healthy



REUTERS/Lucas Jackson

Medical equipment sits in labelled bins inside of the doctor's office of One Medical Group in New York.



REUTERS/Jean-Paul Pelissier

A radiologist examines X-rays of a patient at the Ambroise Pare hospital in Marseille, southern France.

individual might need a preventive treatment in order for him or her not to develop a disease.

However the FDA estimates that just a 10% improvement in the ability to predict drug failures before clinical trials could save US\$100 million in development costs per drug.

From a clinical development viewpoint, the application of a personalized medicine approach can shorten duration and lower the cost of clinical trials by selecting patients more likely to respond and less likely to suffer toxicity. Estimates on the reduction in the number of patients needed to be enrolled in Phase II and III clinical trials are 50% and 10% respectively along with a reduction in the length of Phase III clinical trials by 20%. Furthermore, new evidence continues to emerge showing how the early institution of biomarker-based assays can more reliably predict both efficacy and toxicity in the early phases of drug development.

Primary care givers are already stretched in terms of their time with patients, issuing and interpreting molecular diagnostic tests is going to be a challenge for them. There will have to be education and tools to allow these care givers to make the right decisions at the point of care. This is one of the biggest changes in medicine for years.

THE FUTURE FOR PERSONALIZED MEDICINES

The R&D paradigm is changing: the focus is on better understanding what the unmet medical needs are, and characterising the disease at a molecular level. Thomson Reuters research suggests the focus is on being more efficient earlier, and of course there is more competition than ever to license the most promising compounds early. As the molecular information of patients becomes more accessible we will better understand the molecular basis of disease. That understanding will help us to provide a more tailored approach

to disease treatment. However, it is only one part of a very complex multi dimensional network; human biology is just not that simple, and as we peel back the layers we will have new challenges to solve.

A more personalized approach could certainly mean that drugs get to market quicker. Knowing the profile of the patients most likely to respond as early as possible, means you can prove effectiveness in a population earlier and the raised standard of care for that population could impact reimbursement. The potential to knock down development times and costs and have longer patent life as a result is a very attractive upside for a drug development company. The challenge is picking the stratified populations in the market which will support the R&D investment to get there.

Add the complexity of science, with the dynamics of a complex healthcare system and commercial markets and you have a real challenge.

At the centre of all this lies the patient and

we should never lose sight of that. What will empower the better treatment of the patient is information. Intelligent use of information from all the stakeholders can align them towards the common goal, and Thomson Reuters will play a critical part in serving the information needs of all of these stakeholders as they strive to serve the patient better.

Healthcare & Science Regional Offices

North America

Philadelphia +1 800 336 4474
+1 215 386 0100
San Diego +1 858 273 8616

Latin America

+55 11 8370 9845

Europe, Middle East and Africa

Barcelona +34 93 459 2220
London +44 20 7433 4000

Asia Pacific

Singapore +65 6775 5088
Tokyo +81 3 5218 6500

For a complete office list visit:
science.thomsonreuters.com/contact

PH1006254

Copyright © 2010 Thomson Reuters