

DNA Today



Science that benefits humanity.



Genelex announces new suite of genetic testing options

Genelex has cemented its role as a leader in the world of pharmacogenetic testing with the unveiling of 17 new genetic tests, a number that nearly quadruples the number of tests previously available to prescribers.

The new genetic testing options augment Genelex's existing panel of five tests, which form the core of the YouScript® Personalized Prescribing System.

In conjunction with the YouScript Personalized Prescribing software, all are designed to improve the ability of prescribers to further personalize medication therapy for their patients.

The new genetic tests provide additional testing options for cardiology and psychiatry and expand coverage to include drugs used for ADHD, addiction, infectious diseases and oncology.

“The number of tests added speaks to the incredible advances made in personalized medicine in 2014, both at Genelex and in the medical community.”

Kristine Ashcraft, COO, Genelex

Some of the more notable additions include tests for CYP2B6 and CYP1A2, members of the CYP family of drug-metabolizing enzymes that process the

majority of medications on the market. These new genes join the CYP members already on YouScript's core polypharmacy

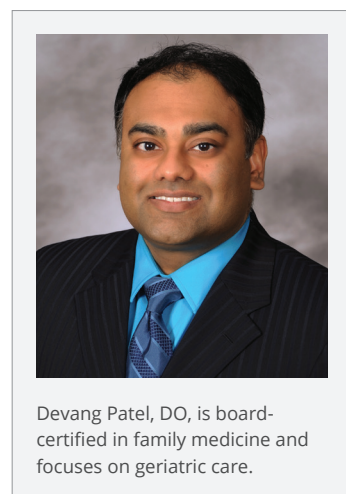
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Mixing old and new: house-call doctor uses cutting-edge technology in patient care

As a physician whose sole business is house calls, Devang Patel, DO, racks up quite a few miles seeing patients in the Plainfield area of Illinois.

Dr. Patel begins every morning with a paper printout of his patient roster for the day, and more than a little technology. With his laptop and medical supplies in his car and the morning's first patient address punched in to his GPS, Dr. Patel is ready to begin his day as a 21st century house-call doctor.

Dr. Patel's desire to stick to house calls developed during his residency, when the idea of working in a clinic began to



Devang Patel, DO, is board-certified in family medicine and focuses on geriatric care.

make him feel boxed in. After a stint at a practice that allowed him to do house calls, Dr. Patel

said he fell in love with this truly personalized method of patient care.

Main goal: preventing hospitalizations

Dr. Patel is board-certified in family medicine and focuses on geriatric care. His main goal is preventing hospitalizations in a patient population that he says is typically on four or more medications on a chronic basis—exactly the sort of population that would benefit from the YouScript Personalized Prescribing System.

“At first it felt unreal,” Dr. Patel said of the idea of YouScript drug-sensitivity testing.

“Genetic testing? I don't have time to sit there figuring out, going through basic pharmacology for every single medication out there.”

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The future: pharmacogenetics in primary care

Primary care physicians are in a prime position to advance the continued implementation of pharmacogenetic testing to improve patient care, according to a review article in the journal *Primary Care Reports*.

The article, which appeared in the October issue of *Primary Care Reports*, makes the case that primary care physicians are ideally positioned to advise patients in a manner that will make pharmacogenetic, or drug-sensitivity, testing more clinically useful. The authors write that not only are the vast majority of prescriptions written in the primary care setting, but that an estimated 60 percent of adverse drug events

(ADEs) take place in the primary care setting. ADEs, defined as any injury resulting from drug use, contributed to an estimated 13.5 million patient visits between 2005 and 2007.

Education an important first step

The review article's authors report that education for primary care physicians on pharmacogenetic testing is an important first step in expanding the use of this technology, citing two published surveys that found a marked lack of self-reported understanding of this testing among primary care physicians. Creating protocols to determine which patients would most benefit from pharmacog-

"...primary care physicians are ideally positioned to advise patients in a manner that will make pharmacogenetic, or drug-sensitivity, testing more clinically useful."

netic testing will also be a key consideration for primary care physicians.

"Despite significant barriers and pitfalls, creating solid protocols for implementation will yield optimal results for physicians and patients as genetic information takes a more prominent place in patient care," the review article authors conclude.

An online CME course through AHC Media focusing on this

Primary Care Reports article is available and costs \$33.75 for those who do not subscribe to the journal. Learn about what credits are offered through the course, read the article and take the test via the Genelex resources page at genelex.com/resources/cme.

The article was co-authored by Genelex regional pharmacist liaison Brian Hocum, PharmD, CGP.

Genelex announces new suite of testing options

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test panel: CYP2D6, CYP2C9, CYP2C19, CYP3A4 and CYP3A5.

"We constantly monitor the progress of genetic technology and clinical research so we can provide pharmacogenetic tests as soon as they become clinically actionable," Genelex Chief Operating Officer Kristine Ashcraft said.

Advances in personalized medicine in 2014

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CYP1A2 is of particular interest because of the unique CYP1A2

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hyperinducer phenotype. Individuals with this phenotype exhibit normal to slightly increased drug metabolism unless they ingest a substance that promotes CYP1A2 activity, called an inducer. Such inducers include smoking cigarettes and medications that include the anti-seizure drug phenytoin (Dilantin), the asthma medication montelukast (Singulair) and high-dose omeprazole (Prilosec), which treats acid reflux.

In the presence of one of these inducers, the amount of CYP1A2

induction has been shown to significantly increase relative to an individual without the hyperinducer phenotype, according to a 2012 study in the journal *Pharmacogenetics and Genomics*. Hyperinducers may have enhanced metabolism of drugs, and therefore may exhibit lower than expected blood levels of these drugs, which could lead to a reduced therapeutic effect.

For CYP2B6, a 2008 study by Hongbing Wang and Leslie M. Tompkins reported that this enzyme is involved in the

metabolism of about 10 percent of all drugs. These include medications in varied classes, such as the HIV drug efavirenz (Sustiva), the antidepressant bupropion (Wellbutrin) and the opioid methadone, used to treat pain and narcotics addiction. Testing can potentially allow prescribers to optimize efavirenz therapy, better predict bupropion effectiveness and identify methadone users at increased risk of developing QTc prolongation, which can lead to a heart arrhythmia.

Find out more about our new tests at genelex.com/pharmacogenetic-tests. You can also contact a member of the YouScript Personalized Prescribing team at youscript.com/contact or call 1-800-TEST-DNA.

Supplements, smoking could have effect on drug metabolism

Much has been written about the ability of both medications and individual genetics to affect how people metabolize drugs. But did you know things like herbal supplements, smoking cigarettes and even grapefruit juice could have the same effect?



The FDA has warned that certain dietary supplements can boost the effects of other medications as well as change how the human body processes medications.

The U.S. Food and Drug Administration has warned, for example, that certain dietary supplements can boost the effects of other medications as well as change how the human body processes medications. This could change drug blood levels, meaning a patient could be getting too much, or too little, of the medication they need.

Drugs designed to treat heart disease and depression are less effective when taken with St. John's wort. Altered efficacy of certain medications could result in potentially harmful adverse drug events or treatment failures.

The FDA also warns against combining supplements that thin the blood, such as ginkgo biloba and vitamin E, with warfarin (Coumadin), a common medication prescribed for cardiovascular disease or blood clots. Taking any of these products together may increase the risk for internal bleeding or stroke.

Cigarette smoking linked to increased enzyme activity

Research has also linked cigarette smoking with increased activity of the CYP1A2 enzyme, which processes many common medications, including

the antipsychotics olanzapine (Zyprexa) and clozapine. Stopping or starting smoking could result in increases or decreases of CYP1A2 substrates, necessitating a change in dose.

Also in the CYP enzyme family are CYP3A4 and CYP3A5. These are the most common drug-metabolizing enzymes in the body and process roughly half of the most commonly prescribed drugs on the market, including opioid pain medications, statins, chemotherapeutic drugs and combined oral contraceptives.

The American Medical Association reports common

grapefruit juice to be a CYP3A4 inhibitor, meaning it decreases the enzyme's ability to process drugs. This means that in people regularly drinking grapefruit juice, drugs that require the activity of CYP3A4 will not be metabolized at the same rate as in those who do not drink grapefruit juice regularly.

The YouScript Personalized Prescribing software database contains hundreds of substances, both prescription and not, and can detect potential interactions between them and many medications. Visit youscript.com to find out more.

2014 concludes with multiple accolades for Genelex

The year 2014 ended on a positive note for Genelex, with multiple publications bestowing the company with six awards or accolades for business growth and technological advancement.

In November, *Inc.* magazine included Genelex at the number 10 spot in its list of the top-10 fastest-growing private companies in Seattle. Genelex was the only healthcare software and genetic testing company included on the list.

Team dedication is rewarded

"I could not be prouder of our team at Genelex," said Genelex Chief Operating Officer Kristine Ashcraft. "It is gratifying to know that our dedication to our mission is being rewarded with such stellar growth."

In September, *Seattle Business* magazine recognized Genelex's progress toward eliminating adverse drug events with a silver award in the health category of the magazine's 2014 Tech Impact Awards.

"The company's effectiveness in tackling [adverse drug events] has made it one of the fastest growing private companies in the Puget Sound region—and perhaps one of the most beneficial," *Seattle Business* editors wrote in their October edition.

In October, the *Puget Sound Business Journal* ranked Genelex 47th in its 2014 list of the fastest growing Washington companies. It was Genelex's third inclusion on the prestigious

list since 1995, and second consecutive listing.

Earlier 2014 awards

Earlier in 2014, Genelex was also included on *Inc.* magazine's list of the 5,000 fastest growing private companies in the U.S. at number 1,104 and ranked at the 35th spot on *Seattle Business* magazine's 2014 list of the best midsize Washington companies to work for.

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Check us out at SXSW!

Genelex COO Kristine Ashcraft will discuss advances in personalized medicine at the 2015 South by Southwest Interactive Conference in March.

Learn more here:
sxsw.com



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Doctor uses cutting-edge technology in patient care

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But Dr. Patel said he soon learned the benefit of the technology, particularly the wallet-sized card his patients get and carry with them to show during a hospital stay or visit to a specialist. The card, included with the patient's test results, lists variations in that patient's enzyme-coding genes that will have an impact on drug metabolism.

"If they're normal metabolizers for everything, we're fine, and I don't have to say anything special," Dr. Patel said.

"But if they're ultra-rapid or slow metabolizers of any one

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Devang Patel, DO

of the [gene] systems, which are commonly used as metabolic pathways, I tell them, 'This is very important. Keep it next to your Medicare card. Make sure that wherever you go, if you're [seen] by another doctor, tell them to look at that.'"

For most of his patients, Dr. Patel said he uses the companion YouScript software to review medications they may have been on for a long time and see if their genetics might put them at risk for any potentially serious drug-gene or drug-drug-gene interactions.

Dr. Patel would then use YouScript's alternative medication feature to see if other similar drugs could reduce that risk.

It's this extra layer of protection, achieved through the use of technology, that allows Dr. Patel to optimize patient care while practicing the increasingly rare art of house-call medicine.

"Medication-related errors and adverse reactions [are] one of the most common reasons for hospitalization," Dr. Patel said.

"[That] goes into our core philosophy; we want to prevent [those]. So anything we can do in anticipation is good."