Precision medicine ideas for VCs and angel investors

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Companies from Apple to genetic testing company 23andMe regularly hit the headlines for their ability to enable aspects of the next wave in healthcare. And yet there is so much more going on underneath the surface that is creating investment opportunities.

Small privately held companies and ideas bubbling up from universities are also attracting attention and early investment. As well they should. Technologies that arm physicians with streams of data and analytics on individual patients are going to completely remake how healthcare is provided in the future.

Precision medicine means a big rethink in how we practice medicine. Instead of waiting for the patient to get sick, and then prescribing entire populations with the same treatment – aiming at the middle-of-the-curve outcomes from large research trials – precision medicine is about monitoring the biomarkers of individuals over time. Data on everything from body fat and hormones to cholesterol and blood pressure, as well as an individual's genome and family history, can help a wise physician spot trouble years –

even decades – before a disease emerges. Using this highly individualized approach and expert interpretation of the data, we can avoid trouble and reverse declines.

A shift to this kind of precision medicine approach, enabled by technologies and the increasing ability to read the genome, is still nascent. In fact, as a practice, it is not yet even broadly taught in medical schools.

But it feels to me like a shift as transformative as the one from broadcast media to Internet media – an "n of 1" instead of an "n of many" construct. Precision medicine, backed by President Obama earlier this year in the Precision Medicine Initiative he announced in his State of the Union address, has all of those markers of imminent disruption on a massive scale.

VCs who are not physicians themselves may have the feeling that healthcare is about to enter a new era but may not know where to look for precisely those technologies that will tip the balance.

As a physician practicing precision medicine, here are the areas I see where investment would move precision medicine forward in meaningful ways:

Making the body into a communication device: We already see with FitBit and other wearables that promise passive data collection that pairing these devices with your smartphone via Bluetooth lets you go a couple of days without charging a device. But even Bluetooth taps battery power, particularly when it has to transmit through barriers, such as the human body. And data collection is not truly passive if you have to tear the house apart to find the charger cable. At least one experiment has tried to use the body as an antenna instead. Imagine the implications if low power devices could be smaller and more efficient, not requiring a recharge for the lifetime of the device. I can imagine tiny gizmos traveling through a patient's bloodstream and digestive tract to report back wirelessly. Passive sensors for anything from blood sugar to metabolic rates enable this future.

Personalized data interpretation dashboards: With healthcare getting increasingly digital and data-oriented, things are accelerating faster than any medical journal can capture and deliver. Most physicians are not data scientists, and medical schools are not yet teaching precision medicine analyses or practice.

It sounds like a need for continuing education, and it probably is.

But imagine a database that could capture data on patient biomarkers over time – everything from metabolism, diet, and VO2 max to blood pressure and blood sugar — and use algorithms to interpret that data to provide flags to a physician, or even directly to the patient. The interpretation and personalization could, to a large degree, be built into the product. A physician cannot be expected to crunch every data point themselves. (Even offering options would then be possible, to weigh and predict how each might make a difference.)

Software that enables a physician-patient partnership: Under the Affordable Care Act, doctors and hospitals are clustering into referral networks to manage costs efficiently. Doctors are increasingly being judged by their referral partners on the data they present to demonstrate their cost and outcome performance. Imagine a rehabilitation center that needs to demonstrate to a referring hospital that it can handle knee replacements at lower cost with fewer return trips to the emergency room or operating table. This is how things work today in an Obamacare world.

This focus on outcomes, however, ignores one critically important piece of the healthcare picture: individuals' behavior in the real world. If your knee replacement patient isn't following through with therapeutic regimes or if they are not doing their daily exercises and stretching, it unfairly hits the doctor's numbers, and that doctor can be shut out of getting those critical partnerships. Most importantly, the patient isn't getting well.

Doctors already desperately need software that will capture their costs and outcomes and allow them to analyze and present this data. But software that can also capture and interpret patient behavior data, sending flags to the doctor, would be a blockbuster. And it's right in line with the data-monitoring aspects of precision medicine. Those flags can tell a doctor to check in and give closer counsel to better understand why a patient isn't complying.

Likewise, if that patient's exercise data can stream in from a FitBit, both patient and doctor can receive an automatic reminder if the patient hasn't followed through.

Patients could partner with their doctors to discuss what's going on in their lives outside of the examination room. Alerts could be automatically generated telling the patient how to get on track. Imagine a pre-diabetic having a conversation with their doctor about their triggers in a stressful month when their carb intake is higher than usual.

Prioritization of health issues: Wellness programs tend to be a bit scattershot. A smoking cessation program here, a weight loss program there. Then you add the risks of any individual due to their genetic makeup, and you have a soup of recommendations being passed along to patients. "Get a colonoscopy." "Watch your sugar." "Do weight-bearing exercise." "Meditate or do yoga to lower your stress." "Check your moles." "Get enough vitamin D." Imagine the single mother with a full-time job and three children: When is she going to meditate? At three in the morning when the baby is crying? You might as well tell the baby to meditate.

There should be a better way to provide recommendations in ways that are truly aware of the person's entire health and lifestyle picture. It seems to me that technology provides a basis for much of this. Plug in the foods you like and the foods you hate, your schedule, your allergies, your family history, your favorite activities – and let it collect your health data. Add genomic information, the interaction between your genetic blueprint and how your genes might be expressed, turned on or off. Imagine a product that then gave you personalized recommendations based on where you are today, and where you need to be, and your likes and dislikes. That could become a fantastic basis of discussion for a patient and doctor. The rather superficial patient history questionnaire would be a thing of the past.

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