

Personalized genomes go mainstream

Companies prepare to offer a very personal service.

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When scientists released a draft of the human genome sequence six years ago, they said the data belonged to all of us — but until now, they have been the only ones able to play with the data therein.

That's now starting to change. In the next few months, two Silicon Valley start-ups will start giving customers a peek at their genomes for a few thousand dollars a pop. A firm in Massachusetts is also offering people the opportunity to buy the whole sequence of their genome for an unspecified amount. And close behind these firms are corporations, such as Google, that are developing ways to store, analyse and profit from health information — including genetic data.

The first start-up, 23andMe of Mountain View, California, plans to launch before the end of this year, and the second, Navigenics of Redwood Shores, hopes to do so by spring 2008. Both companies say that they will genotype millions of regions in customers' genomes, called single nucleotide polymorphisms or SNPs, which have been linked to a handful of diseases and nonmedical traits, such as earwax consistency. They then sell that information back to the customer.

Navigenics will focus on medical conditions, says its chief scientific officer, Dietrich Stephan, a human geneticist at the Translational Genomics Research Institute in Phoenix, Arizona. It will use information from scientific studies to estimate composite risk factors for diseases based on each customer's SNPs, he says. It also plans to provide genetic counselling to help customers interpret these risk factors. The firm says that it will conduct long-term studies on how well those predictors work.

By contrast, 23andMe will analyse not just medical information, but also traits not necessarily linked to disease. The firm will introduce a social networking component to genomics by allowing customers to link their data with others', such as family members, say advisers. It is also considering providing researchers with access to the data, they say.

Advisers familiar with the firms say that there is a distinct difference between them. "Navigenics might be the white coat and stethoscopes approach, and 23andMe might be about family and ancestry and who you inherited something from," says genome scientist George Church from the Massachusetts Institute of Technology in Cambridge. Church is an adviser for 23andMe, has had discussions with Navigenics and is also advising Knome, the Cambridge-based personal genome company that offers to sequence the whole genome. "It's like the difference between IBM in the 1960s, which was about black ties and white shirts and shiny black shoes, and Google in the present time, which is a little more playful," he says.

Indeed, one of 23andMe's founders, Anne Wojcicki, is married to Google founder Sergey Brin, and Google has invested millions in her company. Google is developing its own suite of health tools to allow users to personalize and share health information, and many speculate that 23andMe will feed its data to Google.

The prospect of Google working with health data has raised concerns about privacy. Google typically targets advertisements to customers from information they enter into search engines and from the content of their e-mail messages, raising the issue of how it would handle personalized health records and genetic data. Few laws govern such use of health or genetic information — a sobering fact, given that any individual can be identified by 100 SNPs or fewer (Z. Lin, A.B. Owen and R. B. Altman *Science* **305**, 183; 2004).

But many customers might not be bothered by the privacy issue, says John Halamka, chief information officer for Beth Israel Deaconess Medical Center in Boston, Massachusetts, and a Google adviser. "Every one of us has a different threshold for privacy," he says.

Share and share alike

In fact, Halamka will be sharing some of his genetic data with the world next month as part of the Personal Genome Project led by Church. The project is releasing genetic and other types of data on ten volunteers as an experiment to test how such data are used, or misused, by participants and the public (see '[Genetic test claims AIDS insight](#)').

Church points out that hundreds of thousands of people have already paid for services that analyse the ancestral origins of their DNA. So companies such as 23andMe and Navigenics are likely to make money in the short term.

But whether the firms stick around will depend on whether they prove their worth, says Kathy Hudson, director of the Johns Hopkins Genetics and Public Policy Center in Washington DC. Hudson points out that the power of SNP-based tests is still very limited, so a whole-genome scan can't tell you much that you can't find out another, cheaper way.



Commercial personal genome services could help people to understand more about their family medical history. *Strauss/Curtis/Corbis*

"My real question is: why are you getting a genetic test to find out if you have sticky earwax?" Hudson asks. "I don't need a genetic test; I've got my Q-tips."

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