

Smartphone app brings genetic analysis to the palm of your hand

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This is the GeneG logo. Credit: American Friends of Tel Aviv University (AFTAU)

Until now, understanding and using genetic information has depended on the scientists and doctors who do the testing. No longer.

Now, software developed by researchers at Tel Aviv University is putting the power of [genetic information](#) in the hands of the people. GeneG, a smartphone app and associated web site created by Dr. Noam Shomron at TAU's Faculty of Medicine allows individuals to access and analyze their [genome](#) at any time. After undergoing whole genome sequencing, users can upload their data to the GeneG website for analysis. The results are available via the GeneG app on [mobile devices](#).

"For the first time you can take your genome home and look at it whenever you want," says Shomron. "We are giving you eyes to peer into your genetics." And as new analytical tests are developed, you can apply them right away.

TAU graduate students Ofer Isakov and Gershon Celniker worked under Shomron to develop the software, which is to be released to physicians in October ahead of a public release. More information about the project can be found at <http://www.geneg.org/>.

Data-driven demand

The first map of the human genome, published in 2003, took eight years of work by thousands of researchers and cost \$1 billion. Today, people can get their entire genome sequenced within a few weeks for around \$1,000. Thousands have had it done, and the turnaround time and cost are fast decreasing as the technology advances. GeneG aims to meet the growing demand for ways to make sense of all this information.

At the moment, DNA sequencing focuses on specific areas, looking for quirks in sequences within individual genes, clusters of genes, or chromosomes. A downside of this targeted approach is that each genetic test requires donating new DNA and waiting for it to be processed. Shomron gives the example of a woman who wants to get tested before becoming pregnant. Currently, she has to take a day off work, travel to a

lab to have her blood drawn, then wait for several weeks while a selection of her genes is amplified and sequenced. If she later decides to conceive again and wants the newest genetic tests, she has to start the whole process over again.

With GeneG, on the other hand, new tests are just a software update away. Users who have uploaded their genomes to the website can "query" them using digital genetic tests based on research from organizations like the National Institutes of Health, Stanford University, and the European Bioinformatics Institute. The software provides all the functions of more limited [genetic testing](#), including diagnosing and predicting genetic diseases, checking potential parents for genetic traits that could cause disease in their future children, and screening unborn and newborn babies. And it can all be done without setting foot in a lab.

iGenome

But GeneG is not just a timesaver. By giving people instant access to their genomic information, Shomron hopes to help usher in an era of personalized medicine. He envisions people carrying their genomes with them on their mobile devices wherever they go, encouraging scientists to develop more tests and doctors to use the information in their treatment of patients.

"If we give this power to the general public, it will put pressure on the medical field to catch up with this information," said Shomron. But, he says, "It should be used with great caution and with sensible interpretation. Some people might not be ready to see all this [information](#) about themselves."

The software could be particularly effective, Shomron says, in advancing pharmacogenomics—the science of optimizing medications for each individual's unique genetic makeup. With the right tests, GeneG will tell

patients and their doctors which medicines are likely to be the safest and most effective in treating whatever ails them. Specific applications could range from finding the right antidepressant to maximizing the effectiveness of cancer treatments.

Within a few iterations of the [software](#), Shomron hopes the GeneG mobile app will be independent of the website. A bit further in the future, he says, you and your partner may be able to tap your smartphones together to see if you are as compatible genetically as you are personally.

Provided by Tel Aviv University

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