

Genome Sequencing for Healthy People: Will it be Harmful?

Part two of a series. Read the previous entry here: [Genome Sequencing for Healthy People: Will it be Helpful?](#)



Imagine you are, as far as you know, a healthy person. You have no pressing health concerns and no family history of serious genetic conditions. Still, you'd like to know whether there's anything hiding in your genes that you ought to know about, anything that might cause a future illness. So you talk with your doctor about medical genome sequencing. No harm in looking, right?

This type of “predispositional” sequencing is becoming [increasingly available](#) to people without any known medical issues. It covers much of your genome and is many times larger and much more comprehensive than most of the mainstream consumer genetic tests available today.

For those with a clear medical line of questioning—like a health problem that doctors haven't been able to diagnose, or a family history of a genetically-linked condition—this sort of testing is well accepted. For apparently healthy people, the cost-benefit analysis is more complicated.

Despite the [potential benefits](#) of medical genome sequencing, it also carries potential harms. A multidisciplinary team of researchers looked into some of these potential harms and benefits in a [paper published this summer](#) in *Annals of Internal Medicine* as part of the [MedSeq Project](#), the first NIH-funded randomized clinical trial to study the integration of whole genome sequencing into the medical care of healthy individuals.

The paper focused on 100 generally healthy middle-aged people participating in the MedSeq Project. Half of the patients received a family history report on their genetic disease risks, while the other half received both a family history report *and* a personalized whole genome sequencing report.

One of our questions was whether sequencing would cause unnecessary anxiety for healthy participants. In our study, that did not seem to be the case. Both groups—those who received only a family history report and those who also received a whole genome sequencing report—showed almost no change in anxiety after receiving their results. (In fact, both groups averaged a very small decrease in anxiety levels.) Six months after receiving whole genome sequencing results, we found no evidence of increased levels of depression, and the participants, even the ones who learned they were carrying genetic risk factors for frightening diseases, still thought of themselves as being in good health.

We also wondered whether patients would follow up with unnecessary medical testing, or even procedures that could lead to harm. This could mean expensive tests or procedures, or perhaps self-medication or otherwise attempting to take matters into one's own hands. As far as the latter, we saw evidence that those who received whole genome sequencing were somewhat more likely to make positive health behavior changes afterward—mostly in the form of reporting improvements in diet and exercise. But we saw no evidence that participants or their doctors pursued costly diagnostic testing. In fact, in a follow-up [economic analysis published last week](#) in the journal *Genetics in Medicine*, we found no significant difference in follow-up spending between those who were sequenced and those who were not!

To learn more about potential follow-up responses, we looked at how participants' doctors handled the whole genome sequencing results. Out of the participants who learned of a new genetic variant in their results, we saw no problems related to unnecessary or harmful medical follow-up, the only issues being one miscommunication about the inheritance of a condition and one physician ordering insufficient follow-up screening at the time (though the screening was ordered later).

Our results paint a fairly optimistic picture of the safety of whole genome sequencing for healthy people—but we will be the first to tell you this isn't the full picture. For example, we don't know yet how the risks might be skewed depending on socioeconomic status, geography or ancestry. And ours was a pilot study of only 200 individuals; more research is needed, with larger and more diverse sample sizes.

Despite these early results, we don't know what actions participants or their doctors will take later on in life. And we don't know how their family members reacted, let alone how they would react if whole genome sequencing was readily available to them. If your sibling's genome report shows a rare and potentially pathogenic variation, would you rush to get your own genome sequenced? Or, if their report comes back with no problematic variants, would you assume that you have nothing to worry about? We are planning to follow this cohort for five years to see if we can gain any more information about how this information is used beyond the first six months after participants receive their results.

For now, more and more people are seeking predispositional sequencing and more and more laboratories are providing it. Collecting high quality data on outcomes is especially important before this type of testing becomes commonplace.

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