

Testimony of James P. Evans MD, Ph.D
Hearing of the House Energy and Commerce Committee's Subcommittee on Oversight and
Investigations, July 20, 2010

Thank you very much for inviting me to testify. I am a physician and scientist who specializes in medical genetics. My research involves the use of emerging technologies to analyze the human genome for genes involved in cancer predisposition and the ways in which people use genetic information. I am the Editor-in-Chief of *Genetics in Medicine*, the official journal of the American College of Medical Genetics. But first and foremost I am a physician. I am a board certified internist who has a general medical practice. I am also board certified in Clinical Medical Genetics and in Molecular Genetic Diagnostics in which capacity I see and test patients who have, or are at risk of having, genetic disorders such as predisposition to cancer.

The breathtaking pace of discovery in the field of genetics is providing new opportunities for rapidly and inexpensively analyzing the human genome. We are now able to routinely query an individual's genome at over 1 million sites and the "\$1,000 genome", in which access to one's entire genetic code will be feasible for many individuals, will soon be a reality.

Such advances in technology have great promise to revolutionize medicine and usher in a new era of genomic medicine. These advances will lead to great progress in our basic understanding of disease, improved diagnostic abilities, new therapies and personalized prescription of drugs.

But the rapid pace of technological progress has left us understandably impatient for immediate application to patient care. Like scientists and doctors, the public is curious and hopeful about genetics and has demonstrated an interest in analyzing and understanding their own genome. Indeed, we may be approaching an era in which much, if not most, genetic testing could be done outside the confines of the traditional doctor's office or medical setting.

In part to meet this burgeoning interest, a wide range of direct to consumer (DTC) genetic testing entities has arisen, a potentially positive development for both patients and the public. We should encourage individuals to be involved in, and be the primary directors of, their own healthcare. Truly participatory, individualized medicine is a worthy goal and one we should strive for. People should have access to the information contained in their own genome.

But it is also critical that they be assured that the information they receive is of high quality, that they have recourse to disinterested advice about the meaning of that information, that their privacy be protected and that claims made by the purveyors of such testing comport with reality.

Unfortunately this is not always the case at present. The most egregious problem – and the most remediable – is the distinct gap between claims made by the providers of such services and the value of the information actually imparted. Most of the purveyors of

DTC genetic testing appeal both implicitly and explicitly to the purported medical value of the genetic tests in question. We hear claims that scanning your genome for genetic variants provides a “road map to better health”, allows one to “take control of your health future” or that “knowledge is power” with regard to disease. Indeed, these are the central advertising logos of the three most prominent players in the genomic DTC arena. Yet on each page of every report provided to patients by these companies, some variant of the following disclaimer is made: “Information provided is not intended as, nor does it provide, medical advice, treatment, diagnosis, or treatment guidelines.” The explicit health claims and the accompanying disclaimer (in tiny font) cannot both be true. And indeed they are not. The disclaimer is correct. Such information, by and large, utterly lacks medical significance. This would be true even if we understood how to interpret such tests, which, as clearly demonstrated by scrutiny of the literature and the recent GAO investigation, we do not.

It is often submitted by boosters of such technology that mere knowledge of one’s risks will be of benefit to an individual. Yet, little evidence suggests that this is the case. Statistics about risk are tricky. I know, to a first approximation, what you, the reader of this document, will likely die of...cardiovascular disease or cancer. These maladies are not called “common diseases” for nothing. They are exceedingly common and one is at considerable risk for them regardless of whether one happens to be at a *relatively* increased or decreased risk when compared with the average individual in the population. Thus, even for those at decreased relative risk, the chances are that they too will die of one of these common diseases. Thus, finding out that you’re at double or half the “average” risk of a common disease is simply not medically meaningful.

Likewise, for rare diseases, what does defining your risk really mean? The risk of a US citizen developing Crohns disease, a disease of the GI tract, is about 1/1000. In what way is it useful to know that I’m instead at a 1/500 risk or a 1/2000 risk?

It is instructive to examine how we use risk information in pursuit of better health. Your doctor doesn’t measure your cholesterol and blood pressure because simple knowledge of that risk information is beneficial to your health. Rather, she measures it because we have ways of altering your blood pressure or cholesterol. As a physician, I simply don’t know what to do with the knowledge that I or my patient is at, say, a 40% increased risk for prostate cancer. We have no interventions that make that information useful.

Some claim that knowledge of an increased risk will motivate people to live more healthy life styles. Yet there is no good data thus far that genetic information has any special qualities that will motivate individuals any more effectively than do our current admonitions.

But what if I’m wrong? What if there really is something inherently special about genetic information that will induce behavioral change? I sincerely doubt that this will be the case but let’s grant that dubious proposition for a minute. If so, we have an even bigger problem. Because for everyone I find to be at increased risk of, say, heart disease, I am mathematically guaranteed to find another at decreased risk. If genetic information has

magical abilities to affect behavior then we run the inevitable risk that such information will induce adverse behavior in the other half of the population, to their ultimate detriment. The bottom line is that whether you are at increased risk or decreased risk of disease, a healthy lifestyle will benefit you and there is little to be gained from finely parsing that risk. The gap between claims and reality should be closed. And it doesn't even require new regulations, just enforcement of existing standards that are, at least in part, promulgated and promoted by the FTC.

Another important issue before us is what sources of information the public has about the meaning of their results. I would argue that the vast majority of test results provided by most DTC genetic companies are simply of entertainment, not medical value. As such I see little potential for harm and see no problem with the public having full access to such information - as long as it is not oversold in the way I've just been describing.

But mixed in with trivial and fun tests (that, for example, assay your likelihood of having thick earwax or liking Brussels sprouts) are a few tests offered by such companies that have very serious medical consequences. For example, one major purveyor's panel of DTC tests include, along with trivial matters, a test for specific mutations which result in an exceedingly high risk of breast and ovarian cancer. Thus, having signed up for innocuous information about one's ancestry and possible food preferences, women may also find out via the company's website that they should perhaps consider bilateral mastectomies and removal of their ovaries. Startlingly, the recipients of such information have no recourse to even talk with a qualified professional about their result and its implications. I think that people should be free to get medical tests on their own terms. But if one takes on the responsibility of informing someone that they have tested positive for a mutation that could well lead to very serious – indeed life changing - consequences, then one should ensure that the individual can at least pick up a phone and talk with someone knowledgeable about its implications for them and for their loved ones. I don't leave my patients in the lurch when I discover devastating information about their health and doing so should not become a new standard of the internet age.

Ensuring quality testing is also of paramount importance as we try to realize the potential of genomic information. Simply put, if such information has true medical value, then its quality should be ensured like any other medical test. This is not too much to ask. I applaud the recent move of the FDA to take a risk-calibrated approach to the regulation of such testing. Their action is especially timely given the recent mix up of 87 samples which occurred from a major purveyor of DTC genomics. In formulating appropriate regulations it is important to keep in mind that risk calibration is possible. There is no reason that each test must be regulated to the same degree. Rather, the seriousness of the implications of a given test can guide the degree to which it must be regulated.

Protecting the public's privacy is critical. A tiny sample of your DNA can serve to differentiate you from every other human who has ever lived. Thus, it seems reasonable that the public should be assured that their samples and their genomic information are protected. What do we do when a company goes bankrupt and ownership of your uniquely identifying genetic information suddenly may become the property of a venture

capital firm? We need clear and enforceable guidelines for how such information is handled by its (likely numerous) owners.

As we seek to employ genomic information in healthcare it's critical and sometimes difficult to remember that medicine and science are very different pursuits. Unfortunately good ideas are insufficient to guide the practice of medicine. We've learned that we must demand evidence of efficacy and safety before we translate what seem like good ideas into medical care. If we do not it is our patients who will inevitably pay the price.

No one is more excited about the future of genomics than I am, nor feels more strongly that it has the potential to usher in a new era of medicine that will benefit us all. I welcome the entry of quality-minded and responsible entrepreneurs into the field. Medicine is often validly criticized for being too slow to change and I think we have plenty to learn from innovative cutting edge companies, some of the representatives of which are also testifying today.

But as a physician who deals these issues daily I do not feel that it is paternalistic to ask that the public not be deceived by exaggerated claims, that their privacy be protected, that tests be of high quality and that they have recourse to unbiased information about the meaning of their results. Regulation does not mean proscription. We can embrace an exciting future in which the public has access to its genomic information but we should do so in a responsible manner and risk-calibrated regulation is part of the answer. Indeed, it seems obvious to me that the interests of companies and the public are actually fully aligned since both their long-term business interests and public's health will thrive only when tests and the claims made for those tests are trusted.

I believe that the public deserves access to the information contained in their own genomes. But they also deserve an honest accounting of what such information means and the assurance that it is derived in a manner that ensures quality, reliability and confidentiality.

Contact Information:

James P. Evans MD, Ph.D
Bryson Distinguished Professor of Genetics and Medicine
Editor-in-Chief of Genetics in Medicine
University of North Carolina at Chapel Hill
Campus Box 7264
Chapel Hill, NC 27599-7264

jpevans@med.unc.edu
919 966-2007