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Amanda Laterza

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Complying with the Unclear: The Need for FDA Regulation For the Direct-to-Consumer Genetic Testing Industry

Amanda Laterza¹

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¹ Seton Hall University School of Law, J.D. Candidate, 2015.

I. INTRODUCTION

We remain firmly committed to fulfilling our long-term mission to help people everywhere have access to their own genetic data and have the ability to use that information to improve their lives.²

This bold statement made by Anne Wojcicki, co-founder and CEO of 23andMe, a leading organization in the direct-to-consumer genetic testing industry, expresses the goals of the current genetic revolution. A market worth more than 8.6 billion dollars has been created based on the genetic make up of an individual. Due to advances in genetic science and the completion of the Human Genome Project, genetic tests are now being marketed directly to consumers. Private companies, such as 23andme, use print, television, and Internet advertising to reach consumers within their homes with the promise of identifying health related issues, including the individuals potential for disease and future health risks, as well as identifying their ancestral relationships.

The direct-to-consumer (“DTC”) genetic testing industry has been flourishing, which has caught the attention of federal regulatory agencies due to the rising public health concerns behind the validity, safety, and effectiveness of these genetic tests. The Food and Drug Administration (“FDA”) and the Centers for Medicare & Medicaid Services (“CMS”) have tried to regulate the growing field, but have fell behind. The industry is now at a standstill since the FDA has sent warning letters to numerous companies for violations of the Food, Drug, and Cosmetic Act, which prompted a halt to sales of DTC genetic tests. However, the enforcement by the FDA has not been clear or transparent, which has left must confusion within the industry. The FDA action thus far has caused companies to be left in the dark as to what steps they can take to comply with the FDA in order to place their products safely back on the market. The push by the FDA and other agencies to regulate DTC genetic tests as medical devices and the push by companies for a clear transparent compliance direction is now at the forefront for the industry.

² 23andMe, *Health*, <https://www.23andme.com/health> (last visited Dec. 7, 2014).

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Part I of this article will look at the history of genetic testing and the evolution of the DTC testing industry specifically. It will also analyze the advantages and disadvantages of marketing directly to the consumer. Part II examines the current regulatory framework laid out by both the FDA and CMS. CMS has the authority to regulate clinical laboratories, which includes laboratories that generate genetic tests. However, this does not cover the clinical validity of the tests. The FDA has the authority to regulate the validity of all medical devices and has strict procedures that must be followed to ensure accuracy and safety. DTC genetic tests come to the market for an array of reasons and are falling into the gaps of the unregulated based on how they are marketed. An in depth look at the medical device statute and the classification system currently used will give insight into how further regulation can be expanded to avoid any gaps. Part III of this article will look at FDA enforcement action, as well as comments from other agencies that push for regulation of the DTC industry in an effort promote public safety.

This article will ultimately conclude that in order for the industry to move forward, there must be a clear system in place to promote transparency and to ensure safety. Part IV of this article will offer the recommendation that the FDA issue clear regulations directed to the DTC genetic testing industry. Using a risk-based classification approach, similar to the one currently used in the regulation of other medical devices and laboratory developed tests, the FDA can protect patient safety while promoting the future of medicine in the United States. This article further recommends that the FDA and CMS must work together in order to ensure transparency throughout the process. The FDA issuing regulations and CMS creating a genetic testing specialty can do this. By filling in the gaps, the genetic testing companies will know the necessary steps and take action to act in compliance. Thus, consumers can continue to evolve with the science and reap the benefits of genetic testing.

II. UNDERSTANDING DIRECT-TO-CONSUMER GENETIC TESTING

A. History of Genetic Testing

The study of genetics began with who is now deemed the father of genetics, Gregory Mendel, in the late nineteenth century.³ His work with pea plants led to the fundamental laws of inheritance and presented the first conclusion that genes come in pairs and are inherited equally one from each parent, passed from generations.⁴ It was not until well after his death that the importance of his work was realized when Hugo de Vries, along with two other researchers, discovered Mendel's principles and published the results.⁵ Then, in 1869, Frederick Miescher identified deoxyribonucleic acid, or DNA, for the first time and in 1905, William Bateson denoted the name "genetics" to this evolving branch of scientific study.⁶

With a strong scientific foundation, genetic scientists Dr. James D. Watson and Francis Crick discovered the structure of DNA in 1953.⁷ The duo described the fundamental structure of DNA as a double helix.⁸ The work of Watson and Crick expanded upon those of Mendel in determining that the hereditary portions of humans were found within the double helix DNA.⁹ Thus, DNA is the molecule carrying our individual genetic codes. This expanded knowledge of the structure of the DNA molecule was the key to understanding how genetic information is copied and the start of the genetic testing revolution.¹⁰

³ M. Tevfik Dorak, *Landmarks in the History of Genetics*, Dorak.info, <http://www.dorak.info/genetics/notes01.html> (last updated July 14, 2013).

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ James D. Watson & Francis H.C. Crick, *Molecular Structure of Nucleic Acids*, 171 NATURE 737, 737 (1953).

⁸ *Id.* at 737-738.

⁹ James D. Watson & Francis H.C. Crick, *Genetical Implications of the Structure of Deoxyribonucleic Acid*, 171 NATURE 964, 965 (1953).

¹⁰ Leslie A. Pray, *Discovery of DNA Structure and Function: Watson and Crick*, 1 NATURE EDUC. (2008), available at <http://www.nature.com/scitable/topicpage/discovery-of-dna-structure-and-functionwatson-397>.

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Throughout the twentieth century, scientists developed genetic tests for genetic conditions such as Down syndrome, Cystic fibrosis, and Duchene muscular dystrophy.¹¹ In 1990, the United States Department of Energy and the National Institutes of Health coordinated the Human Genome Project.¹² The project was an international effort to determine the entire sequence of the human genome and identify the millions of genes that it contains.¹³ In 2003, after spending millions of dollars, the Human Genome Project was finished and released with the completed sequences of the human genome.¹⁴

As a result of the project, scientists have developed genetic tests for more than 2,500 diseases.¹⁵ Virtually all diseases stem in some part from our genetic make-up and genetic tests identify changes within genes to find the potential for specific diseases.¹⁶ The term "genetic test" has never been defined by FDA or by CMS, but the Federal Advisory Committee has defined it as "the analysis of human DNA, RNA, chromosomes, proteins, and certain metabolites in order to detect heritable disease-related genotypes, mutations, phenotypes, or karyotypes for clinical purposes."¹⁷ Genetic testing is now "a mainstream part of medical care" and is used to diagnosis, prediction, and detection of genetic diseases in newborns, children, and adults, as well as assesses risks to those individuals in the future.¹⁸

¹¹ National Inst. of Health, *Fact Sheet, Genetic Testing: How it is Used for Healthcare*, National Human Genome Research Institute, <http://www.report.nih.gov/NIHfactsheets/ViewFactSheet.aspx?csid=43&key=G> (Oct. 2010).

¹² Human Genome Project, *About the Human Genome Project*, http://web.ornl.gov/sci/techresources/Human_Genome/project/index.shtml (last visited Dec. 7, 2014).

¹³ *Id.*; F. Collins, *The Human Genome Project: Lessons from Large-Scale Biology*, 300 *SCIENCE* 286, 286 (2003).

¹⁴ Collins, *supra* note 13.

¹⁵ Ctrs. For Disease Control & Prevention, *Public Health Genomics: Genetic Testing*, <http://www.cdc.gov/genomics/gtesting/> (last updated June 28, 2013).

¹⁶ National Human Genome Research Institute, *A Brief Guide to Genomics*, <http://www.genome.gov/18016863> (last visited Dec. 7, 2014).

¹⁷ Neil A. Holtzman & Michael S. Watson, *Promoting Safe and Effective Genetic Testing in the United States: Final Report of the Task Force on Genetic Testing*, Nat'l Insts. of Health (1997), available at <http://www.genome.gov/10002405> (last visited Dec. 7, 2014); Wylie Burke, *Genomic Medicine: Genetic Testing*, 347 *NEW ENG. J. MED.* 1867, 1867 (2002)(quoting U.S. Task Force on Genetic Testing, *Promoting Safe and Effective Genetic Testing in the United States* (Neil A. Holtzman & Michael S. Watson eds., 1997)).

¹⁸ Gail H. Javitt, *In Search of a Coherent Framework: Options for FDA Oversight of Genetic Tests*, 62 *FOOD &*

B. Evolution of Direct-to-Consumer Genetic Testing

Direct-to-consumer (“DTC”) genetic testing rapidly expanded as the Human Genome Project came to an end.¹⁹ Traditionally, genetic tests were only available through healthcare providers such as physicians, nurse practitioners, and genetic counselors.²⁰ Healthcare providers would meet with the patient, order the appropriate test from a laboratory, collect and send the samples, and then interpret the test results with the patient. When the Human Genome Project concluded, the field of genetic testing grew and information on gene sequencing was more accessible. Then, in 2013, the Supreme Court confirmed that the human genome could not be patented in the landmark case of *Association for Molecular Pathology v. Myriad Genetics*.²¹ This decision further enabled competition in the field of genetic testing to expand to an unlimited amount of private companies. Thus, these companies began offering genetic tests directly to consumers.

A DTC genetic test is a genetic test that is marketed directly to the consumers through print, television, and even the Internet for the variety of health and non-health related reasons, without the use of a physician.²² Private companies, such as 23andMe, Navigenics, DeCode and Pathway Genomics, offer their genetic testing services at a reasonable price to an individual who orders the test via website, receives the test at home, takes a swab of their saliva, sends it back to

DRUG L. J. 617, 617 (2007).

¹⁹ Nat’s Human Genome Research Inst., *Direct to Consumer Marketing of Genetic Tests* (Mar. 23, 2004), <http://www.genome.gov/12010659>; Sarah F. Sunderman, *The Need for Regulation of Direct-to-Consumer Genetic Testing in the United States: Assessing and Applying the German Policy Model*, 12 WASH. U. GLOBAL STUD. L. REV. 357, 359 (2013).

²⁰ *Supra* note 19.

²¹ *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 186 L. Ed. 2d 124 (2013).

²² Sunderman, *supra* note 19.

the laboratory, and then the results are sent directly back to the consumer.²³ The consumer never has to leave their home and never has to meet with a healthcare provider.

The advertising of health-related products directly to consumers via television and print was formerly only used by pharmaceutical companies, and ultimately created a three billion dollar per year pharmaceutical industry.²⁴ By essentially removing the middleman and taking advantage of genetic science, the DTC genetic testing industry has used the same tactics and has grown to be worth over eight billion dollars.²⁵ For example, in 2002, Myriad Genetics, Inc. launched a DTC genetic marketing campaign, which included print and television advertisements for BRACAnalysis, a commercial genetic test for the BRCA1 and BRCA2 genes, which have been associated with breast and ovarian cancer.²⁶ This campaign resulted in an over three hundred percent increase in demand for the genetic test by woman.²⁷ This is only one example of success within in the DTC genetic industry and the demand for genetic tests by consumers.

The FDA, in 2010, estimated that several hundred laboratories offer between 2,500 and 5,000 different genetic tests directly to consumers.²⁸ Each privately owned company offers its own variety of genetic tests that they market to appeal to the average consumer. Some of the statements on the leading DTC genetic testing company websites include, “a new look at a healthier future,” posted on Navigenics, “take charge of your health and live well at any age,” posted on 23andMe, and “let your DNA help you plan for the important things in life,” by

²³ Sunderman, *supra* note 19; Jane Kaye, *The Regulation of Direct-to-Consumer Genetic Tests*, 17 HU. MOLECULAR GENETICS R180, R181 (2008).

²⁴ *Supra* note 19.

²⁵ A. Wesselius, et al., *Direct to consumer Genetic Testing*, OA Epidemiology (2013), available at <http://www.oapublishinglondon.com/images/article/pdf/1381968884.pdf>.

²⁶ Jan T. Lowery et al., *The Impact of Direct-to-consumer Marketing of Cancer Genetic Testing on Women According to Their Genetic Risk*, 10 GENET. MED. 888, 888 (2008).

²⁷ *Id.* at 890.

²⁸ Direct-to-Consumer Genetic Testing and the Consequences to the Public Health: Hearing Before the Subcomm. on Oversight and Investigations of the H. Comm. on Energy and Commerce, 111th Cong. 7 (2010).

Pathway Genomics.²⁹ This language, along with the price and the promise of life changing information, is attractive to any individual with curiosity and a reason the industry has been successful thus far.

C. Types of Genetic Testing Available

DTC genetic tests are marketed to consumers for both health and non-health related reasons. Some genetic tests meet the definition of a medical device and some will not based on how they are marketed and what they are offering to the consumer. Therefore, the classification of the type of the genetic information being offered to the consumer is key in future regulation.

The non-health related genetic tests offered by companies provide information about a person's ancestry, personality, and even acts as a paternity test.³⁰ Various companies offer genetic tests as a primary means of discovering you own genetic ancestry and other relationship based information. For example, 23andMe offers three ancestry options including the Relative Finder, which allows the consumer to locate other 23andMe users who match their familial DNA profile; the Global Origins test, which locates the historical homes of the consumer's ancestors; and, the Ancestral Lineages test, which promises to track the ancient migrations of the consumer's ancestors.³¹ This information uses the genetic technology in order to located similar DNA within the system. These tests are informational and educational for the consumer. This article will focus on genetic tests that are marketed and sold for health related purposes, and should be classified as medical devices due to the impact they can have on public health.

There are three categories of genetic testing available, which are for health related

²⁹ *Id.*

³⁰ Andrew S. Robertson, *Taking Responsibility: Regulations and Protections in Direct-to-Consumer Genetic Testing*, 24 BERKELEY TECH. L.J. 213, 217 (2009).

³¹ 23andMe, *Ancestry*, <https://www.23andme.com/ancestry> (last visited Dec. 7, 2014); Matthew Piehl, *Regulating Hype and Hope: A Business Ethics Model Approach to Potential Oversight of Direct-to-Consumer Genetic Tests*, 16 MICH. ST. U. J. MED. & L. 59, 63 (2011).

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purposes. They are pharmacogenetic, predictive, and nutrigenetic tests.³² Pharmacogenetic tests provide information about the suitability and effectiveness of a particular drug for the individual and predict that individual's response to particular drug treatments.³³ Predictive genetic tests are marketed as a means of "predicting" an individual potential for developing genetic diseases such as breast cancer, diabetes, or cystic fibrosis.³⁴ Finally, nutrigenetic tests provide individualized nutrition and lifestyle information based on a consumer's genetic profile in order to assist in future healthcare.³⁵ For example, if the genetic test determined an individual to be at increased risk for developing heart disease, the test results would return diet and lifestyle recommendations, such as exercise. All three of these genetic tests offer feedback based on the analysis of the genes that can lead to health related decisions on the part of the consumer. These decisions can have serious effects on the patient, and, therefore, there must be regulation of the companies to ensure the consumers are given accurate and complete information.

D. Advantages and Disadvantages of Marketing Directly to the Consumer

Policy makers, scientists, healthcare providers, and individuals have raised significant debate on the advantages and disadvantages of DTC testing on not only individuals, but on the economy and the genetic science industry. These issues are a direct indication for the need of stricter regulation because the threat to public safety is becoming imminent.

1. Advantages

1. Empowerment and Autonomy

In 2008, TIME magazine declared a DTC genetic testing company, 23andMe's, retail

³² Pascal Sue, *Direct-to-Consumer Genetic testing: A Comprehensive View*, 86 YALE J. BIOL MED. 357, 359-360 (2013).

³³ Rebecca Andar Novick, *One Step at a Time: Ethical Barriers to Home Genetic Testing and Why the U.S. Health Care System is Not Ready*, 11 N.Y.U. J. INT'L L. & POL. 621, 631 (2008).

³⁴ *Id.* at 633.

³⁵ *Id.*

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DNA test the “Invention of the Year.”³⁶ This invention received this title, in part, because advocates believe it has the potential to make a significant impact on the future of science as well as on the future of individuals who use the test. With the ability for a consumer to access their own genetic information from home, comes the ability of consumers to have autonomy over their own health decisions. Patient autonomy is usually defined as the ability of patients to make their own choices about their care, even if their physicians disagree.³⁷ Now, DTC genetic testing has moved all of decisions on the consumer without the involvement of a healthcare provider. As the company 23andMe put it, “we believe that your genetic information should be controlled by you.”³⁸ This autonomy advocates believe allows for consumers to make proactive, preventative, and informed lifestyle changes in response to the test results.³⁹

Some believe that individuals not only have the right to make their own health decisions, but, also, that they have the right to know and have access to their own genetic information.⁴⁰ The right to know is an essential right granted to a person and should not be taken away when it comes to genetic testing.⁴¹ 23andMe has argued in their public policy statement, that,

³⁶ Anita Hamilton, *Best Inventions of 2008: The Retail DNA Test*, TIME (Oct. 29, 2008), http://www.time.com/time/specials/packages/article/0,28804,1852747_1854493,00.html.

³⁷ Novick, *supra* note 33, at 641.

³⁸ 23andMe, *Core Values*, <http://www.23andme.com/about/values/> (last accessed Dec. 7, 2014).

³⁹ Karen Norrgard, *DTC Genetic Testing for Diabetes, Breast Cancer, Heart Disease and Paternity*, 1 NATURE EDUC. 1, 1 (2008), available at <http://www.nature.com/scitable/topicpage/dtc-genetic-testing-for-diabetes-breast-cancer-698> (last visiting December 7, 2014).

⁴⁰ Piehl, *supra* note 31 at 86.

⁴¹ *Id.*

Genetic information is a fundamental element of a person's body, identity and individuality. As such, the rights that people enjoy with regard to financial, medical and other forms of personal information should apply to genetic information as well.⁴²

With this enlarged patient autonomy comes a new found sense of empowerment for individuals to take control of their own future. According to a study done by the American Marketing Association in 2008, more than sixty percent of genetic testing companies use empowerment as an emotional appeal to their customers.⁴³ That same study showed that more than 80 percent of consumers derived some sort of satisfaction or empowerment from genetic tests.⁴⁴ It is the belief that individuals are empowered to use this information they have a right to make better health decisions. This, however, does not take into account the possibility that the information the consumer is given is accurate enough to lead to correct decisions.

b. Affordability and Accessibility

Another advantage of DTC genetic testing stems from the ability of companies to offer genetic testing in a more accessible and affordable manner across the nation, and even across the globe. Companies offer genetic tests for a reasonable price ranging from \$100 to more than \$2,000, depending on the type of test requested.⁴⁵ The reason this price can remain low is due, in part, to the expansion of science in the genetic field, the unpatentability of the human genome,

⁴² 23andMe, *23andMe Policy Forum: Direct to Consumer Genetic Testing*, <https://www.23andme.com/about/policy/> (last visited Dec. 7, 2014).

⁴³ Yuping Liu and Yvette Pearson, *Direct-to-Consumer Marketing of Predictive Medical Genetic Tests: Assessment of Current Practices and Policy Recommendations*, 27 JOURNAL OF PUBLIC POLICY & MARKETING 131,142 (2008).

⁴⁴ *Id.*

⁴⁵ NAT'L INSTS. OF HEALTH, Handbook: Help Me Understand Genetics, Genetics Home Reference (2014), available at <http://ghr.nlm.nih.gov/handbook.pdf>.

and the widespread utilization of genetic sequencing.⁴⁶

As genetic tests become more affordable, they become more accessible to larger amounts of people. No longer is an individual's geographic location or ability to meet with a physician relevant. Consumers now have a testing kit mailed to them by ordering online, no matter where they are geographically located.⁴⁷ And with a lower price, more consumers are able to afford the testing, thus, reaching more consumers geographically and economically. Consequently, putting more consumers health safety at risk.

c. Privacy

Another positive aspect raised by proponents of DTC genetic tests is the increase in privacy that comes from not having to need a prescription or involve a healthcare practitioner. During the Human Genome Project, concerns were raised that an individual's genetic test results may be used by insurance companies, employers, or the government against the individual.⁴⁸ In 1995, former President Bill Clinton issued an executive order prohibiting the federal government from using personal genetic information for employment purposes.⁴⁹ Following, in 2008, former President George W. Bush signed the Genetic Information Nondiscrimination Act, GINA, which provides for enhanced federal protection of genetic information and includes prohibitions on the use of genetic information by private employers in making employment decisions and health insurance companies in making decisions to raise individual premiums or deny benefits.⁵⁰ DTC genetic tests do not require the involvement of healthcare providers and therefore the results will

⁴⁶ Piehl, *supra* note 31, at 62.

⁴⁷ Norrgard, *supra* note 39.

⁴⁸ Novick, *supra* note 33.

⁴⁹ National Human Genome Research Institute, *Genetic Discrimination Fact Sheet*, <http://www.genome.gov/10002328> (last visited Dec. 7, 2014).

⁵⁰ National Human Genome Research Institute, *Genetic Information Nondiscrimination Act of 2008*, The Genetic Information Nondiscrimination Act of 2008 (GINA), PUB. L. NO. 110-233, 122 Stat. 881 (2008).

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never be documented in an individual's medical record, unless the consumers wanted to share the information. Without publicizing the results, the genetic information cannot effect employment or insurance and thus avoids the entire issue of GINA.⁵¹ The privacy advantage stems down to the fact that unless you want to share the results, the results will remain within your home where you ordered and received them. This makes the tests more appealing to consumers because they alone can know their genetic predispositions or health status, and take the necessary steps, without fear of discrimination of some kind.

2. Disadvantages

a. Lack of Genetic Counseling

The majority of the drawbacks associated with DTC genetic testing stem from the absence of a medical professional. When a patient physically visits a doctor to retrieve a genetic test, they are more likely, if not definitely, going to receive advice and counseling regarding the pretest expectations and the post test results. DTC genetic testing is offered in the absence of a prescription from a healthcare provider and absent counseling on possible courses of actions, both before and after the genetic test is administered, which can leave a consumer uneducated and at risk.

Some companies do offer counseling. According to a study conducted by the Genetic and Public Policy Center, as of August 2011, there were twenty DTC genetic testing companies in the United States and seven additional DTC genetic testing companies that required physicians to request the DNA tests.⁵² Of the twenty DTC genetic testing companies, eight offered some sort of genetic counseling to consumers, though only five did so without additional costs to the

⁵¹ Bridget M. Kuehn, *Risks and Benefits of Direct-to-Consumer Genetic Testing Remain Unclear*, 300 J. AM. MED. ASS'N 1503, 1504 (2008).

⁵² Sunderman, *supra* note 19, at 360.

consumer.⁵³ The counseling offered is also not mandatory and not pushed by the companies. Some companies also only offered counseling after the consumer already purchased the test.⁵⁴ This removes the ability for the consumer to be advised on expectations when beginning the test.

Absent counseling to review the results, consumers can easily misinterpret their results. This opens them up to make adverse medical decisions, thus eliminating the entire point of the test to help in health decisions.⁵⁵ For example, an individual may undergo unnecessary procedures such as a mastectomy in response to a genetic test evidencing an increased risk of breast cancer. The consumer might also cease using prescribed medications without speaking to their healthcare professional first. Without the proper counseling from a health care provider or counselor, consumers cannot use the results to their full potential, and the results may even leave the consumer in a worse health state.

b. Informed Consent

On top of the lack of genetic counseling, there is more than a possibility of a lack of informed consent that worries many medical professionals and policy makers. Informed consent is a fundamental principle in health law and allows for a doctor to discuss the risks and benefits with a patient, allows the patient to ask questions, disclose possible alternatives and ultimately allow the patient to come to the most informed and safe decision.⁵⁶ Due to a lack of genetic counseling, there is no way to ensure that the consumer is aware of all of these essential elements and even consents to them. The consumer is as informed as the company want them to be and does not have anyone to ask questions and discuss which route to take.

⁵³ *Id.*

⁵⁴ Jill Goldman et al., *Genetic Counseling and Testing for Alzheimer Disease: Joint Practice Guidelines of the American College of Medical Genetics and the National Society of Genetic Counselors*, 13 GENETICS IN MEDICINE 597, 602 (2011).

⁵⁵ Sivan Tamir, *Direct-to-Consumer Genetic Testing: Ethical- Legal Perspectives and Practical Considerations*, 18 MED. L. REV 213, 219 (2010).

⁵⁶ Zulfiqar A. Bhutta, *Beyond Informed Consent*, 82 BULL. WORLD HEALTH ORG. 771, 774 (2004), available at <http://www.who.int/bulletin/volumes/82/10/771.pdf>.

There is another informed consent issue relating to the use of the results in scientific research. There is a concern that “there is a release of the genetic test results or genetic materials to third parties to whom the individual never intended to impart the information or material.”⁵⁷ It is a fact that some genetic testing services that are marketing to consumers directly online, sell their customers information to research institutions, without the consent of the consumer.⁵⁸ Some companies inform consumers that their genetic information may be sold to third parties and used for research purposes.⁵⁹ They even give the consumers the option to consent to research by simply checking a box. This unapproved sharing or selling of information raises privacy and confidentiality issues for the consumer, as well as property right issues that could have serious implications.⁶⁰ If the consumer does consent, there is an issue as to whether the individual fully understand the ramifications of consenting to the sharing of their genetic information for research purposes.⁶¹

This next informed consent issue is raised because DTC genetic testing companies have no definitive way of knowing if the individual requesting the test is actually sending in their own DNA sample.⁶² For example, an individual could collect the genetic material of another person without that person’s consent and subsequently obtain and use the genetic information received from the DTC genetic testing company. Some companies even market to give the DNA test results as the “perfect gift.” This is a violation of informed consent, as well as privacy, that bypass the entire informed consent principle which is a major component of the everyday healthcare system, and for good reason.

⁵⁷ Gabrielle Kohlmeier, *The Risky Business of Lifestyle Genetic Testing: Protecting Against Harmful Disclosure of Genetic Information*, 2 UCLA J. L. & TECH. 11, 5 (2007).

⁵⁸ *Id.* at 27.

⁵⁹ Kohlmeier, *supra* note 57, at 26.

⁶⁰ *Id.*

⁶¹ *Id.* at 27.

⁶² Tamir, *supra* note 55.

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c. Accuracy

Scientific accuracy concerns are at the forefront of the negatives. As genetic science is still being developed and new genetic disorders are discovered every day, the complete accuracy of the results cannot be fully reached.⁶³ In fact, different companies have come to different results based on the varying information they use in calculating risks and due to the incompleteness of identifying every genetic disorder.⁶⁴ For example, one study comparing 23andMe and Navigenics test results found that only two-thirds of relative risk predictions between the two companies qualitatively matched.⁶⁵

In addition to undeveloped science, there are additional factors that contribute to the future of a person's health and those factors are not being calculated into the test results.⁶⁶ Factors such as the environment, your daily lifestyle, and even your personality can have an effect on your health.⁶⁷ For example, a smoker will clearly be more prone to lung cancer than a nonsmoker or different nationalities are more prone to specific diseases. The consumer receives the results based on their DNA alone, and does not take into account these other factors that will contribute to their future and present health. Thus, not only are the results not consistent, they are not considering outside factors, which can contribute to the accuracy of the test results and put patient safety at risk.

d. Emotional Harm

⁶³ *Supra* note 32, at 359.

⁶⁴ Pauline C. Ng et al., *An Agenda for Personalized Medicine*, 461 NATURE 724, 724 (2009), available at http://www.gis.a-star.edu.sg/internet/site/data/sup_data/2249/an_agenda_for_personalized_medicine.pdf.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ Muin J. Khoury et al., *Do We Need Genomic Research for the Prevention of Common Diseases with Environmental Causes?*, 161 AM. J. EPIDEMIOLOGY 799, 800 (2005).

Finally, there is physiological and emotional harm that consumers face after purchasing these genetic tests. Since consumers will not receive meaningful genetic counseling and, consequently, may misinterpret their results, there are psychological reactions based upon a flawed understanding of these test results.⁶⁸ Misinterpretation of results can lead to a false sense of security if results show a lower probability of disease than anticipated.⁶⁹ The opposite may also happen, and a consumer may interpret a test result as indicative of death, which could lead to "severe psychological trauma and possibly suicide."⁷⁰ Healthcare providers also fear that consumers, based on the results of these tests, will seek out additional unnecessary procedures or treatment, which will weigh heavily on the healthcare system as a whole.⁷¹ Clearly, DTC genetic tests are generating confusion, anxiety and even false reassurance.

Misleading advertising by DTC genetic testing companies minimizes the risks and overstates the possible benefits of genomic testing. The advertisements may "induce vulnerable consumers to purchase the tests, thereby diminishing their autonomy."⁷² Marketing and advertising tends to appeal to the consumer, while posing risks without them even knowing. Therefore, the potential for results to be misinterpreted or misused, and yet may not even be accurate, leads to serious health concerns that must be clearly regulated in the hope of compliance to protect public safety and well being.

III. THE CURRENT REGULATORY FRAMEWORK

⁶⁸ Stuart Hogarth et al., *The Current Landscape for Direct-to-Consumer Genetic Testing: Legal, Ethical, and Policy Issues*, 9 ANN. REV. OF HUMAN GENETICS 161, 168 (2008).

⁶⁹ *Id.*

⁷⁰ Kohlmeier, *supra* note 57, at 6.

⁷¹ Lauren B. Solberg, *Over the Counter but Under the Radar: Direct-to-Consumer Genetic Tests and FDA Regulation of Medical Devices*, 11 VAND. J. ENT. & TECH. L. 711, 721 (2009).

⁷² Deepthy Kishore, *Comment: Test at Your Own Risk: Your Genetic Report Card and the Direct-to-Consumer Duty To Secure Informed Consent*, 59 EMORY L.J. 1553, 1553-54 (2010); *Supra* note 19, at 360.

Given the serious health and safety concerns driven by DTC genetic tests, the current regulatory landscape for these tests is inadequate. Genetic testing “falls between several regulatory cracks within the federal government” because numerous government entities oversee genetic testing, but together no entity covers all genetic tests.⁷³ Figure 1 demonstrates the current regulatory framework of the FDA and CMS, which both have some authority over genetic tests. Together, they can create regulations to close the gaps and cover all genetic tests.

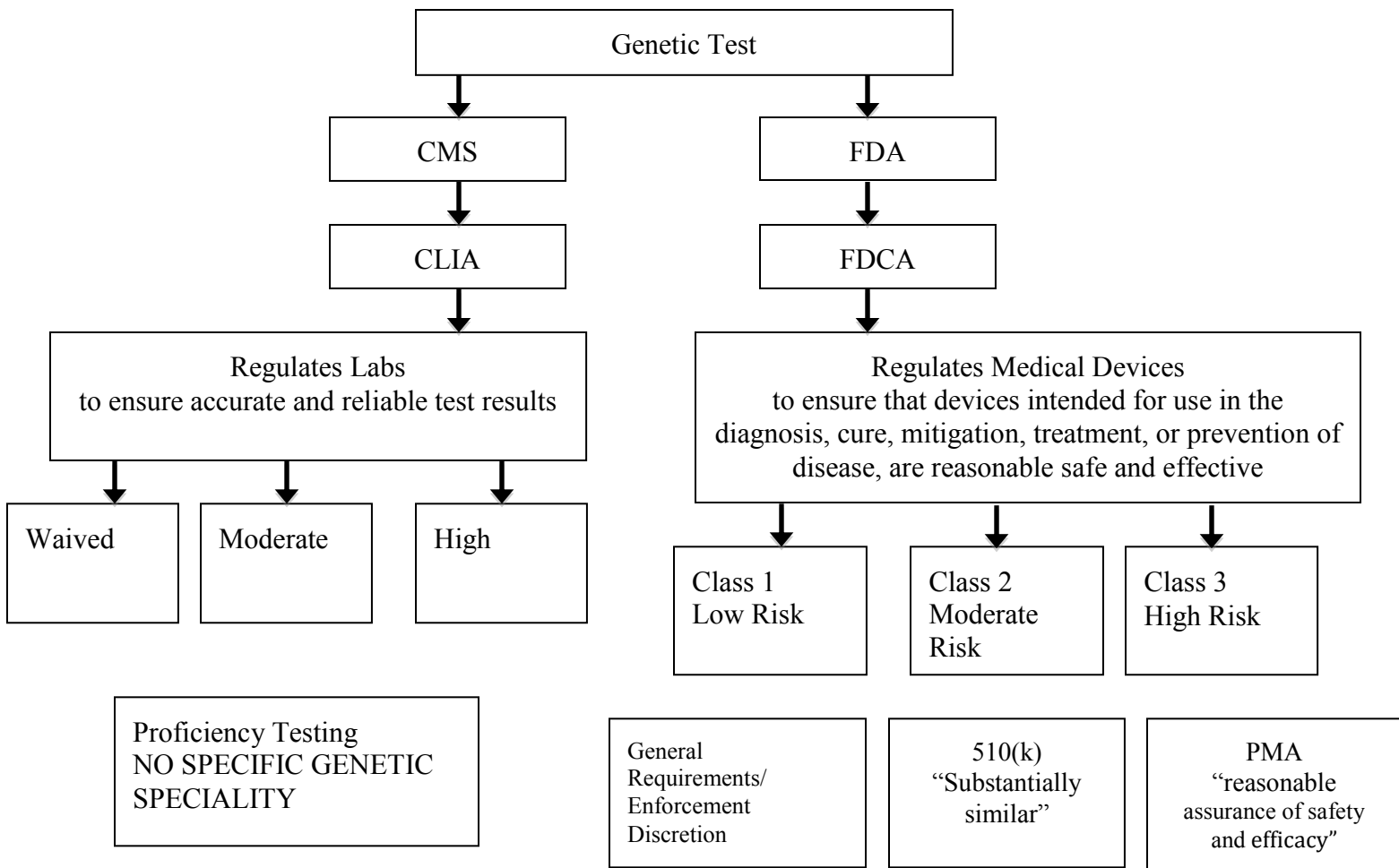


Figure 1: Current Regulatory Framework of CMS and FDA

⁷³Gail H. Javitt, et al., *Direct-to-Consumer Genetic Tests, Government Oversight, and the First Amendment: What the Government Can (and Can't) Do to Protect the Public's Health*, 57 OKLA. L. REV. 251, 258 (2004).

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A. Clinical Laboratory Regulation by CMS

The Centers for Medicare and Medicaid Services has primary authority for regulating laboratory testing under the Clinical Laboratory Improvement Amendments of 1988, or CLIA.⁷⁴ CLIA regulations are designed to ensure the analytical validity of genetic testing by covering how the tests are performed and the quality of the procedures and laboratory personnel.⁷⁵ CLIA does not address clinical validity, utility, or review laboratory marketing communications.⁷⁶

A laboratory is defined under CLIA as,

a facility for the biological, microbiological, serological, chemical, immune-hematological, hematological, biophysical, cytological, pathological, or other examination of materials derived from the human body for the purpose of providing information for the diagnosis, prevention, or treatment of any disease or impairment of, or the assessment of the health of, human beings.⁷⁷

In short, CLIA covers all laboratories that conduct testing on human specimens to “diagnose, prevent, or treat any disease.”⁷⁸ The amendments prohibit laboratories from performing clinical laboratory tests without being issued a federal certificate.⁷⁹ CMS currently regulates laboratory-testing activities of over more than 200,000 laboratory entities within the United States.⁸⁰ DTC genetic testing companies use laboratories that collect “materials derived from the human body” of its consumers “for the purpose of providing information for the diagnosis, prevention, or treatment,” and therefore fall into the purview of CLIA regulated laboratories.

⁷⁴ 42 U.S.C. § 263a-q.

⁷⁵ 42 C.F.R. § 493.1253(b).

⁷⁶ Neil A. Holtzman, *FDA and the Regulation of Genetic Tests*, 41 JURIMETRICS 53, 57 (2000).

⁷⁷ 42 C.F.R. § 493.2.

⁷⁸ 42 U.S.C. § 263a; U.S. Dep't of Health and Human Servs., Ctrs. for Medicare & Medicaid Servs., *Clinical Laboratory Improvement Amendments (CLIA): Overview*, <http://www.cms.hhs.gov/clia/> (last visited Dec. 7, 2014).

⁷⁹ 42 U.S.C. § 263a.

⁸⁰ 42 U.S.C. § 263a(a).

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Once a lab is covered by CLIA, it is then categorized as waived, moderate complexity, or high complexity.⁸¹ This classification determines the level of control by CMS. Waived tests are those “so simple and accurate as to render the likelihood of erroneous results negligible” or those which “pose no reasonable risk of harm to the patient if the test is performed incorrectly.”⁸² The remaining are placed as moderate or high based on a set of criteria, including the difficulty of the scientific and technical knowledge necessary to conduct the test, the stability and reliability of the materials used, and the level of judgment required by those administering the tests. Genetic tests qualify as “high complexity,” due to the high level of skill needed according to the factors.

Although classified as a high complexity test, genetic testing is not subject to all of the requirements required of other moderate and high complexity tests. Moderate and high complexity tests must follow quality assurance programs and undergo proficiency testing.⁸³ The proficiency testing assures the accuracy of the test and imposes requirements specific to that specialty.⁸⁴ However, under CLIA, “there are no specified quality control, personnel, or proficiency testing requirements mandated ... for most genetic tests.”⁸⁵ As there are no specific proficiency standards to which a genetic testing lab must adhere, there is no requirement for genetic tests to meet specific standards for accuracy, reliability, or clinical validity. Instead the lab is only required to “establish and maintain the accuracy of its testing procedures.”⁸⁶

In 2000, the Clinical Laboratory Improvement Advisory Committee (“CLIAC”) published a Notice of Intent, proposing amendments to CLIA that would create a specific genetic

⁸¹ 42 C.F.R. § 493.15.

⁸² 42 C.F.R. § 493.5.

⁸³ 42 C.F.R. § 493.17.

⁸⁴ *Id.*

⁸⁵ Am. Soc’y of Human Genetics Bd. of Dirs., *ASHG Statement on Direct-to-Consumer Genetic Testing in the United States*, 81 AM. J. HUMAN GENETICS 635, 636 (2007), available at http://www.dnapolicy.org/resources/ASHGDTC_statement.pdf.

⁸⁶ 42 C.F.R. §493.801(a)(2)(ii).

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testing section in the regulations.⁸⁷ However, CLIA was never amended according to this suggestion. Therefore, it remains that CLIA is only governing the conduct of the laboratory, not the accuracy of the result obtained by the genetic tests created in CLIA certified laboratories.

B. Medical Device Regulation by the Food and Drug Administration

The FDA, under the Federal Food Drug & Cosmetic Act (“FDCA”) has the authority to regulate medical devices, and plays the largest role in the oversight of genetic tests.⁸⁸ The FDA is tasked with protecting the public’s health by assuring the “safety, effectiveness, and security” of medical inventions.⁸⁹ According to the Supreme Court, “viewing the FDCA as a whole, it is evident that one of the Act’s core objectives is to ensure that any product regulated by the FDA is safe and effective for its intended use.”⁹⁰ Consequently, whether the FDA regulates a device is determined by how it comes to the market and what its intended use is.

1. Classification of Medical Devices

A medical device is defined in the FDCA as “an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article, including any component, part, or accessory, which is . . . intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease...”⁹¹ This broad definition, simply put includes equipment, reagents, and other components used by laboratories to analyze human specimens for the “cure, mitigation, treatment, or prevention of disease.”⁹² Thus, genetic tests would be included because their intended use is in the cure, treatment, or prevention of disease.

⁸⁷ U.S. Dep’t of Health and Human Servs., *Notice of Intent; Genetic Testing Under the Clinical Laboratory Improvement Amendments*, 65 FR 25928-02 (2000).

⁸⁸ 21 U.S.C § 321(h).

⁸⁹ 21 C.F.R. §808.1; FDA, *FDA Fundamentals*, <http://www.fda.gov/AboutFDA/Transparency/Basics/ucm192695.htm> (last visited Dec. 7, 2014).

⁹⁰ *Food & Drug Admin. v. Brown & Williamson Tobacco Corp.*, 120 S. Ct. 1291, 146 L. Ed. 2d 121 (2000).

⁹¹ 21 U.S.C.A. § 321(h).

⁹² 21 U.S.C.A. § 321(h)(2).

The FDA then classifies medical devices into three categories based on the level of risk posed to the consumer.⁹³ The FDA, like CMS, uses these categories to determine how much control is needed to ensure the safety and effectiveness of each device. Class I devices are subject to the least FDA regulation and may be introduced directly into United States commerce. This is because they do not present an “unreasonable risk of illness or injury.”⁹⁴ As Class I devices pose minimal potential for harm, they are only subject to FDA “General Controls” including registration, labeling, and good manufacturing.⁹⁵ Class II devices have an increased safety risk and are subject to greater FDA controls to ensure safety and effectiveness.⁹⁶ Class II devices are subject to the “General Controls”, as well as “Special Controls,” which include stricter labeling requirements, performance standards, and post market surveillance.⁹⁷ Most importantly, Class II devices must submit a premarket notification, or 510(k), before being marketed.⁹⁸ Finally, Class III devices are defined as those, which are “supporting, sustaining, or preventing impairment of human health,” or those that present a potential “unreasonable risk of illness or injury.”⁹⁹ The FDA believes that general controls and special control would not provide adequate reasonable assurance of the safety and effectiveness, and instead requires a stricter pre market approval, PMA, before being marketed.¹⁰⁰ Most genetic tests, if found to be a medical device, will be found to be Class II or Class III.

2. Premarket Processes

⁹³ 21 U.S.C.A. § 360c(a)(1).

⁹⁴ 21 U.S.C.A. § 360c(a)(1)(A).

⁹⁵ 21 C.F.R § 801 (2013).

⁹⁶ 21 U.S.C.A. § 360c(a)(1)(B).

⁹⁷ 21 U.S.C.A. § 360c(a)(1)(B).

⁹⁸ 21 U.S.C.A. § 360(a)(B)(ii).

⁹⁹ 21 U.S.C.A. § 360c(a)(1)(C).

¹⁰⁰ 21 C.F.R. §814.1; U.S. Food and Drug Administration, *Premarket Approval (Medical Devices)*, <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/HowtoMarketYourDevice/PremarketSubmissions/PremarketApprovalPMA/default.htm> (last visited Dec. 7, 2014).

Medical device classification will dictate the level of control by the FDA and the level of engagement necessary by companies to be able to comply with the regulations and legally be able to market and sell their devices. Most Class II and some Class III devices must submit a premarket notification, or 510(k), to the FDA before marketing.¹⁰¹ This notification requires manufactures to demonstrate that their medical device is “substantially equivalent” to a medical device currently on the market.¹⁰² A device is “substantially similar” if it has the same intended use and uses the same technology as another legally marketed device.¹⁰³ A successful 501(k) submission will result in the FDA clearing the device for sale.

Most Class III devices must go through the rigorous PMA process. In this process, companies must demonstrate that their device is safe and clinically valid through “adequate and well-controlled” clinical trials involving human subjects.¹⁰⁴ Once the company shows adequate scientific evidence proving the device is safe and effective for its intended use, the FDA will approve the new device to be distributed.

3. Classification of Genetic Tests

The definition of a medical device suggests that any type of genetic test, whether it is marketed directly to the consumer or not, is a medical device because it is used “to diagnose or prevent a disease.”¹⁰⁵ However, the FDA has further classified genetic tests and used varying regulations for each classification.

The FDA expanded the definition of medical device in 1976 to include in vitro diagnostic devices. In vitro diagnostic devices (“IVDs”) are those “reagents, instruments, and systems intended for use in the diagnosis of disease or other conditions, including a determination of the

¹⁰¹ 21 C.F.R. § 807.

¹⁰² 21 C.F.R. § 807.92.

¹⁰³ 21 C.F.R. § 807.92(a)(3).

¹⁰⁴ 21 C.F.R. § 314.126.

¹⁰⁵ 21 U.S.C. § 321(h)(2).

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state of health, in order to cure, mitigate, treat, or prevent disease or conditions arising from a disease.”¹⁰⁶ The FDA only regulates genetic tests as IVDs “if the components of the test are bundled together, labeled for a particular use, and sold to an outside laboratory as a unit”, or “test kit.”¹⁰⁷ The FDA classifies tests that fit this definition as Class II or Class III devices, subjecting them to 510(k) or PMA approval processes. Of the hundreds of genetic tests currently available only a handful are sold as test kits. In fact, IVDs subject to FDA review make up only about one percent of the commercially available genetic tests.¹⁰⁸

The majority of genetic tests available today are classified as laboratory-developed tests, also called “home brews.” The FDA defines laboratory-developed tests (“LDTs”) as “in vitro diagnostic devices intended for clinical use and designed, manufactured and used within a single laboratory.”¹⁰⁹ They are developed in house by laboratories and do not become part of the test kit, but instead are marketed as proprietary tests. Historically, the FDA has not enforced regulatory provisions with respect to LDTs, but only exercised “enforcement discretion.” This was because the FDA believed that LDTs were generally “relatively simple, well-understood, low risk tests that diagnosed rare diseases and conditions, and that were intended to be used by physicians and pathologists in a single institution where they were actively involved in patient

¹⁰⁶ 21 C.F.R. § 809.3(a).

¹⁰⁷ Audrey Huang, *FDA Regulation of Genetic Tests*, GENETICS & PUB. POLICY CTR., http://www.dnapolicy.org/images/issuebriefpdfs/FDA_Regulation_of_Genetic_Test_Issue_Brief.pdf (last updated May 30, 2008).

¹⁰⁸ Jennifer A. Gniady, *Regulating Direct-to-Consumer Genetic Testing: Protecting the Consumer Without Quashing A Medical Revolution*, 76 FORDHAM L. REV. 2429, 2438 (2008).

¹⁰⁹ FDA, *Draft Guidance for Industry, Food and Drug Administration Staff and Clinical Laboratories: FDA Notification and Medical Device Reporting for Laboratory Developed Tests (LDTs)*(Oct. 3, 2014), available at <http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM416685.pdf>. (hereinafter FDA Guidance)

care.”¹¹⁰ Thus a majority of genetic tests that are classified as LDTs were able to enter the market without undergoing any FDA premarket evaluation for safety, effectiveness, or accuracy.

However, due to technological and scientific advances, LDTs has become more complex. The FDA has determined that heightened review of LDTs is necessary to mitigate risks to patients because of high risk they pose to consumers. In 2010, the FDA stated that it had reconsidered its position regarding non-enforcement of LDTs, reasoning that the industry was shifting toward using component parts that were not individually regulated and were being used to assess high-risk diseases and direct treatments.¹¹¹ In September of 2014, the FDA issued two Draft Guidance documents, which set out a regulatory framework, similar to that of other medical devices, for regulating LDTs going forward.

As seen in *Figure 2*, the classifications of genetic tests all intersect. DTC genetic tests can be both test kits and LDTs. The issue arises because DTC genetic testing companies outsource to third parties, and therefore, the genetic tests are falling into the regulatory gaps. In the end, they are all genetic tests, but where they are manufactured, the intended use of each test, and what they are marked for plays a role in the level of regulation by the FDA.

¹¹⁰ Oversight of Laboratory Developed Tests; Public Meeting; Request for Comments, 75 FED. REG. 34, 464 (June 17, 2010).

¹¹¹ *Id.*

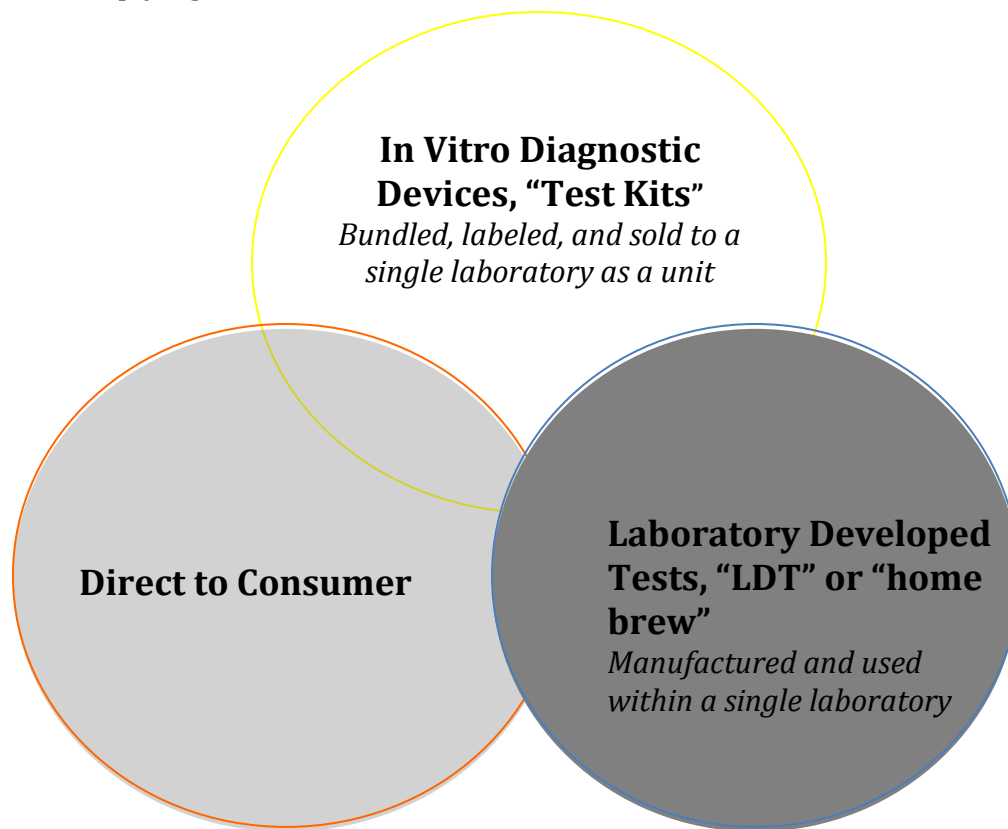


Figure 2: Types of Genetic Tests

IV. FDA ENFORCEMENT ACTION

A. Warning Letters

Marketing and distributing a medical device not cleared or approved by the FDA is a violation of the FDCA.¹¹² Warning Letters are issued in reaction by the FDA to put the company on notice of the violation that may lead to further enforcement action if not promptly and adequately corrected.¹¹³ The DTC genetic testing industry caught the attention of the FDA in 2010, when Pathway Genomics announced that it was going to partner with Walgreens and sell its genetic test in drug stores across the country.¹¹⁴ The FDA responded by sending Warning Letters to twenty three genetic testing companies for violations of the medical device regulation

¹¹² 21 U.S.C § 331(a).

¹¹³ Howard Dorfman, *Pharmaceutical Compliance & Enforcement Answer Book 2014*, 69-70 (Practising Law Institute).

¹¹⁴ Robert Stein, *Company Plans to Sell Genetic Testing Kit at Drugstores*, WASH. POST (May 11, 2010), <http://www.washingtonpost.com/wp-dyn/content/article/2010/05/10/AR2010051004904.html>.

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under FDCA. This resulted in a majority of the companies dropping out of the DTC genetic testing market and discontinuing the sale of their health related genetic tests.

One company, 23andme has caught the attention of the media because they tried to comply with the FDA regulations. More than 800,000 Americans have used their at home genetic tests, which, when used for a health related report, can provide information on over 254 diseases and conditions.¹¹⁵ 23andMe received one of the Warning Letters from the FDA accusing them of marketing medical devices without clearance.

The FDA in its Warning letter to 23andMe demanded them to stop marketing its “Saliva Collection Kit and Personal Genome Service (“PGS”).”¹¹⁶ The FDA was clear that they believed their product was an unapproved and uncleared device under the FDCA because of the intended uses cited on the website. 23andme marketed on its website health reports that provided for “a first step in prevention” and enabling users to “take steps toward mitigating serious diseases.”¹¹⁷ The FDA in its letter wrote, “some of the uses for which PGS is intended are particularly concerning, such as assessments for BRCA-related genetic risk and drug responses because of the potential health consequences that could result from false positive or false negative assessments for high-risk indications such as these.”¹¹⁸ The FDA reasoned that most of the intended uses were health related and had not been classified, and, thus, require premarket approval before being distributed.¹¹⁹ This means they deemed their product a Class III medical device due to the high risk they posed to consumers.

¹¹⁵ 23andMe, *Fact Sheet*, <http://mediacenter.23andme.com/fact-sheet/> (last visited Dec. 7, 2014).

¹¹⁶ Letter from Alberto Gutierrez, Dir., Office of In Vitro Diagnostics and Radiological Health, Ctr. for Devices & Radiological Health, Food & Drug Admin., U.S. Dep't of Health & Human Services, to Anne Wojcicki, C.E.O., 23andMe, Inc. (Nov. 22, 2013), *available at* <http://www.fda.gov/iceci/enforcementactions/warningletters/2013/ucm376296.htm> (hereinafter Letter from Alberto Gutierrez).

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ *Id.*

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In a press statement, 23andMe stated that “we recognize that we have not met the FDA’s expectations.... our relationship with the FDA is extremely important to us and we are committed to fully engaging with them to address their concerns.”¹²⁰ Promptly after, 23andme began the 501(k) clearance process on a few of its nearly two hundred genetic tests. But they never began the PMA process. Ultimately, 23andme failed to satisfy the FDA requirements as to the validity of their genetic tests under the 501(k) process. The FDA shut them down in November 2013 with regards to their health related genetic tests in order to protect patient safety. The company is still permitted to sell the DNA analysis kit in the United States, but it can no longer provide health reports based on a persons individualized genetics. The 23andme current website now states at the top of the page, “23andMe provides ancestry-related genetic reports and uninterrupted raw genetic data. We no longer offer out health-related genetic reports.”¹²¹ Current 23andMe customers who received health-related results prior to November 2013 will continue to have access to health related information. However, no new health-related updates will be provided. The FDA has stated that even after many interactions with 23andMe, “we still do not have any assurance that the firm has analytically or clinically validated the PGS for its intended uses, which have expanded from the uses that the firm identified in its submissions.”¹²² The 501(k) submission was the start of the 23meandMe attempting to get its health related genetic tests back on the market.

B. Enforcement Discretion Revised

Historically, the FDA was exercising enforcement discretion on whether or not to enforce FDCA regulations when it came to LDTs. Enforcement discretion means that the agency retains

¹²⁰ 23andMe, *Statement Regarding FDA Warning Letter*, <http://blog.23andme.com/news/23andme-statement-regarding-fda-warning-letter/> (last visited Dec. 7, 2014).

¹²¹ 23andMe, *Welcome*, <https://www.23andme.com> (last visited Dec. 7, 2014).

¹²² Letter from Alberto Gutierrez, *supra* note 116.

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the option to take enforcement action if safety concerns are identified, on a case-by-case basis. In *Heckler v Chaney*, the court noted “refusals of administrative agencies to exercise enforcement authority involve a complicated balancing of factors, which are not suitable for judicial review.”

¹²³ Thus, they are presumptively "committed to agency discretion by law," which means the FDA does not have to actively enforce its regulatory requirements, but reserves the right to do so in the future or in particular instances.¹²⁴ Today, as mentioned early, due enhanced public safety concerns regarding LDT testing, the FDA has issued two draft guidance documents in regards to regulation going forward. Although these long awaited guidance documents are nonbinding, courts generally give deference to them and they lay out what the FDA is concerned with.

In the Framework Guidance, the FDA explains its intention to regulate LDTs not by enforcement discretion, but using a risk based approach. Over the course of the next ten years or so, the FDA will phase in regulation based on the level of risk posed.¹²⁵ The new regulation will utilize the current three-class system used for medical device regulation.¹²⁶

For moderate and high risk LDT's, the FDA intends to enforce applicable regulatory requirements, including registration and listing, adverse event reporting, premarket review, and quality system requirements.¹²⁷ High-risk LDTs will be required to begin making PMA submissions within a year after the guidance is finalized, and moderate-risk LDTs will be required to begin making 501(k) submissions beginning the fifth year after the guidance is finalized.¹²⁸ The FDA also makes it clear that it plans to continue enforcement discretion for

¹²³ *Heckler v. Chaney*, 470 U.S. 821, 105 S.Ct. 1649 (1985).

¹²⁴ *Id.* at 833.

¹²⁵ FDA Guidance, *supra* note 109.

¹²⁶ *Id.*; Ben Berg et al., *Regulatory Overview of Proposed LDT Framework*, NSF Health Sciences (2014), available at http://www.nsf.org/newsroom_pdf/md_reg_overview_proposed_ldt_framework.pdf.

¹²⁷ FDA Guidance, *supra* note 109.

¹²⁸ *Id.*

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LDTs used solely for forensic purposes and LDTs used in CLIA-certified high-complexity histocompatibility laboratories for transplantation, as well as low risk LDTs.¹²⁹

The guidance documents provide insight into what the FDA is thinking in regards to the industry. The guidance is intended to prove an oversight framework that will assure that devices within the definition of LDTs will comply with the appropriate levels of regulatory controls to assure that they are safe and effective. Footnote 4 of the LDT Guidance states, “FDA generally does not exercise enforcement discretion for DTC genetic tests regardless of whether they meet the definition of an LDT. Therefore, the enforcement policies in this guidance do not apply to DTC genetic tests, and FDA’s usual enforcement policies apply to DTC genetic tests.”¹³⁰ The addition of this sentence is another validation that the FDA plans to provide direct guidance for the industry, and potentially knows they have to.

C. Government Accountability Office Report

The Government Accountability Office (“GOA”) is a federal agency tasked with improving the performance and to ensure the accountability of the federal government for the benefit of the American people.¹³¹ The GAO first investigates the legitimacy of DTC genetic tests in 2006.¹³² The GAO purchased nutrigenetic tests from four unnamed DTC genetic test companies and posed as twelve individual consumers by sending in DNA samples.¹³³ The results proved to be generic and ambiguous, according to the report, which states that, “these results were so ambiguous as to be meaningless and could apply to any human who submitted

¹²⁹ *Id.*

¹³⁰ FDA Guidance, *supra* note 109.

¹³¹ U.S. Government Accountability Office, About GAO, <http://www.gao.gov/about/index.html> (last visited Dec. 7, 2014).

¹³² U.S. Gov’t Accountability Office, GAO-06-977T, *Nutrigenic Testing: Tests Purchased from Four Web Sites Misled Consumers*, Testimony Before the S. Special Comm. on Aging (July 27, 2006), available at <http://www.gao.gov/new.items/d06977t.pdf> [hereinafter GAO - 2006].

¹³³ *Id.*

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DNA.”¹³⁴ It concluded that the companies provided results that were so vague as to be virtually useless.¹³⁵

Then again in 2010, the GAO issued another report demonstrating the issues with DTC genetic tests at a House Committee Hearing on the regulation of genetic tests.¹³⁶ This time, the GAO purchased ten tests from four different companies and then selected five donors and sent two DNA samples from each donor to each company, with one using factual information about the donor and one using fictitious information, such as incorrect age and race or ethnicity.¹³⁷ The goal was to investigate the marketing practice, testing data, and customer support.¹³⁸ Throughout the investigation, the GAO made undercover calls seeking health advice and inquiring on privacy and test reliability.

The GAO received similar results to the to the 2006 study. In its report, the GOA concluded that the services were misleading, deceptive, fraudulent, and nearly useless.¹³⁹ For example, GAO’s donors often received risk predictions that varied across the four companies and received DNA based predictions that conflicted with their actual medical conditions.¹⁴⁰ Further, the companies failed to provide any expert advice as was promised.¹⁴¹ Gregory Kutz, the Managing Director of Forensic Audits and Special Investigations for the GAO, testified before the Senate Special Committee on Aging that the sampled genetic tests at best provided little or no value to consumers, and at worst “could frighten a consumer into thinking that they will

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ U.S. Gov’t Accountability Office, GAO-10-847T, Direct-to-Consumer Genetic Tests: Misleading Test Results are Further Complicated by Deceptive Marketing and Other Questionable Practices 1-2 (2010), available at <http://www.gao.gov/new.items/d10847t.pdf>.

¹³⁷ *Id.*

¹³⁸ *Id.*

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

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develop cancer, osteoporosis, heart disease, or brain aging.”¹⁴² After informing the FDA, National Institutes of Health, and Federal Trade Commission (“FTC”) of the results, the GAO referred all of the companies investigated to the FDA and FTC for appropriate action related to their claims. This report by the GAO is a further demonstration of the potential harms that can be caused by the DTC genetic testing industry, as well as validates the need for regulation.

D. Secretary Advisory Committee

The Secretary’s Advisory Committee for Genetics Health and Society (SACGHS) is a public forum for deliberation on policy issues raised by the development and use of genetic tests and, as warranted, to provide advice on these issues.¹⁴³ In 2001, the SACGHS determined that the current oversight of genetic tests was insufficient to ensure safety, accuracy, and validity.¹⁴⁴ Then, in 2008 and in 2010, it was tasked with “investigating specific questions related to the adequacy and transparency of the current oversight system for genetic testing.”¹⁴⁵

In the most recent 2010 report, the SACGHS identified gaps such as: (1) federal oversight of DTC testing, specifically the lack of review by FDA and FTC of genetic-testing claims and promotional materials made by DTC genetic-testing companies; (2) the evidence of clinical validity and utility for most DTC genetic tests; (3) privacy and research protections for consumers using DTC genetic services given the potentially limited applicability of federal laws and inadequacy of state law protections; and (4) inadequate knowledge of DTC testing by

¹⁴² At Home DNA Tests: Marketing Scam or Medical Breakthrough: Hearing Before the S. Special Comm. on Aging, 109th Cong (2006).

¹⁴³ Sec’y’s Advisory Comm. on Genetics, Health, and Society, *Enhancing the Oversight of Genetic Tests: Recommendations of the SACGT* 1,1 (July 2000), available at http://www4.od.nih.gov/oba/sacgt/reports/oversight_report.pdf (last visited Oct. 26, 2007).

¹⁴⁴ *Id.*

¹⁴⁵ Sec’y’s Advisory Comm. on Genetics, Health, & Soc’y, U.S. Dep’t of Health & Human Servs., U.S. System of Oversight of Genetic Testing: A Response to the Charge of the Secretary of Health and Human Services (Apr. 2008), available at http://osp.od.nih.gov/sites/default/files/SACGHS_oversight_report.pdf.

healthcare providers who are asked about their patients.¹⁴⁶ The Committee then provided a number of action-guiding recommendations, the most important being that the FDA and CMS “should develop the necessary guidance and/or regulations that close gaps in the oversight” of DTC genetic testing.”¹⁴⁷ In addition, in both the 2010 and 2008 approach, SACGHS recommended the use of a risk-based approach by the FDA.

V. RECOMMENDATIONS FOR THE FDA’S FUTURE ROLE IN DIRECT-TO-CONSUMER GENETIC TESTING REGULATION

A. Issue Clear Regulations for the Industry

The DTC genetic testing industry is in disarray. The negatives of marketing health related genetic tests directly to the consumer outweigh the positives, with patient safety at the forefront of the risks. This increased risk to the patient to make a rash decision affecting their health, such as stopping a medication or drastically changing their diet, without ever speaking with a healthcare professional, not only poses a risk to that patient, but to the future healthcare system in its entirety. The FDA, the GAO, and other agencies and policymakers have recognized the magnitude of the risk posed by the DTC genetic testing industry. These issues have been around since the earlier part of the decade yet has remained unresolved. Although the FDA has taken some action to stop DTC genetic testing companies from marketing their products, they have not given the companies the chance to comply.

Federal regulation of genetic tests is not clearly defined. The inadequacy of regulation has resulted in no oversight or enforcement as to ensure the validity and accuracy of the information provided to the consumers through the results of genetic tests. In the absence of clear

¹⁴⁶ Sec’y’s Advisory Comm. on Genetics, Health, & Soc’y, U.S. Dep’t of Health & Human Servs., *Direct-to-Consumer Genetic Testing* (Apr. 2010), *available at* http://osp.od.nih.gov/sites/default/files/SACGHS_DTC_Report_2010.pdf.

¹⁴⁷ *Id.*

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regulations, companies that offer DTC genetic tests are left astray and unsure about what they can do to comply. The companies who market and sell DTC genetic tests do not know how to comply and cannot complete their mission of sharing genetic information with individuals and spreading the evolution of science and personalized medicine.

The FDA is the agency with the best legal authority and resources to ensure the safety and efficacy of DTC genetic tests.¹⁴⁸ The FDA already has pushed for stricter regulation of LDTs and IVDs, but when the FDA will decide to act precisely in regards to DTC genetic testing is unclear. We know they are currently accepting submission from companies, such as 23andme, to review for approval, but other companies are holding back waiting for clear guidance from the FDA. These companies wanted to arm themselves with what information and data that the FDA is exactly looking for in approval and what types of products they may approve to be sold.

Thus, to assure the safety and effectiveness of DTC genetic tests, the FDA must promulgate regulations that will subject these tests to the same requirements as other medical devices, including test kits and LDTs. By using the authority already granted to them to regulate medical devices under the FDCA, the FDA can protect the safety of consumers and advise companies on how to comply with regulations. The FDA has the most potential for providing a comprehensive regulatory scheme for DTC genetic testing services, and they should use the authority granted in them.

As an alternative to promulgating regulations, the FDA could issue guidance documents that would give insight to DTC genetic testing companies on what the FDA prefers when it comes to how these tests are made, marketed, and monitored. However, guidance documents do not have the force of law that regulations do and are merely advisory. This means that companies

¹⁴⁸ Anny Huang, *FDA Regulation of Genetic Testing: Institutional Reluctance and Public Guardianship*, 53 FOOD & DRUG L.J. 555, 591 (1998).

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do not have to follow them, but can and should due to the deference given by the court. However, the FDA can avoid this issue by promulgating regulations that clearly layout the rules and steps for companies who are marketing DTC genetic tests.

B. Risk Based Approval by the FDA

A genetic test is only subject to the FDA regulation if it is a medical device and if it has an intended for use in the diagnosis of disease, or in the cure, mitigation, treatment, or prevention of disease. Therefore, it does not matter on whether a test is classified at nutrigenetic, pharmacogenetic, or predictive, as long as it has an intended use that is going to involve results that are used in the cure, mitigation, or treatment of any diseases. This will cover all three classifications of genetic tests because each tests offers information which a person will base a health related decision. For example, a test that determines a persons risk to developing lung cancer is a device because of the health related decisions a consumer can make based on the results. One aspect that the companies offer, ancestral, is not a device, and should remain to not be classified as one. These tests are educational and informative in nature only. The FDA should classify each test based on its intended use to bring more tests in as medical devices.

Next, the FDA should tailor the degree of regulation based on the condition being tested. The current medical device regulation under the FDCA allows for the FDA to require pre market approval for the proof of safety and effectiveness where necessary, but also allows for flexibility via the medical device classification system. The FDA should use a risk-based approach to decide the level of regulation. This takes into account the type of service being offered and the results being given to the consumer. This approach was already recommended by the SACHS, and already utilized when it comes to IVDs and LDTs. The FDA must generate a risk based classification system for genetic tests that are offered directly to consumers. This should, as

explained in the LDT Guidance, coincide with the medical device classification system of the FDCA. The FDA can then amend the regulatory process based on the possible effects of each test, giving more regulation to higher risk tests. This means, as in the medical device statute that Class II genetic tests being offered to consumers will have to submit through the 501(k) and Class III will have to complete the extensive process for PMA. This will ensure the safety and effectiveness of each genetic test without over burdening the system.

The one size fits all approach will not achieve the proper balance between the harms of that these genetic tests pose when placed in the consumers hands alone and promoting the development of genetic sciences in the United States. The risk based tiered approach is necessary and will be efficient in finding the proper balance for the regulation of genetic testing. The risk based approach will put companies on notice of what steps they must take to gain FDA approval and will allow the FDA to be in the loop about the intended uses of the products being sold. All of this, it is important to note, can occur under the existing regulatory framework, with some clarification on the part of the FDA. Consumer safety is right under the nose of the FDA, they just have to lay out the framework and enforce the regulations.

The mission of 23andme is to help people “access, understand and benefit from the human genome,” and this should not be taken away simply because regulations are not clear.¹⁴⁹ 23andMe is unsure on what they have to do in order to be in compliance and approved by the FDA. Since being shut down, they have moved into the United Kingdom and Canada to sell their tests, and this almost seems like they are going to give up on the United States market. This, in turn, promotes the fear that America is going to be left behind in the genetic revolution. All of this can be avoided if the FDA used the power and authority it already has, and issues a risk based approach in regulations to ensure no genetic test marketed direct to consumers is falling

¹⁴⁹23andMe, *About*, <https://www.23andme.com/about> (last visited Dec. 7, 2014).

into any gaps.

C. Create a CLIA Genetic Test Specialty

The FDA cannot do it alone. CMS and FDA regulations complement one another and this should be taken advantage of. CLIA regulations focus on the quality of the clinical testing process, and the FDA address the safety and effectiveness of the test themselves. If the two agencies work together, there can be transparency for all genetic testing and assurance that the people who receive the test, the process the test goes through, and the product itself is safe and effective for public use. Companies like 23andMe already ensure that their lab partners adhere to the standards of CLIA. But when the CLIA standards are not meeting the need of the industry is where the problems occur.

The failure of CMS to create a genetic testing specialty has resulted in adequate oversight of the laboratories conducting genetic tests. As the demand in genetic testing continues to increase and more consumers are put at risk, there is a need to ensure that laboratories are properly regulated. This is why CMS should follow through and create a genetic testing specialty under CLIA. By creating a CLIA genetic testing specialty, proficiency standards for labs will be clear, as well as quality control standards. Genetic tests are not waived because they have the potential of risk and need skill behind them to be executed properly. As they are moderate or high complexity tests, they should be treated as other tests of that stature, and go through the necessary proficiency standards. CMS could then ensure the compliance of the labs if a specialty is created, and, in turn, ensure the accuracy and consistency of the tests before reaching the consumer.

This action, along with the FDA action to regulate will create a clear, transparent, and effective tool for regulation DTC genetic tests and help promote of the goals of the genetic

revolution.

VI. CONCLUSION

The current system of regulation for the DTC genetic testing industry is not sufficient to ensure public safety from the harms of these tests. Tests marketed directly to consumers are falling into the gaps of unregulated and companies cannot comply because of the unclear regulatory system. Individuals should be able to take advantages of genetic science, but instead the United States is falling behind. The access to genetic information has the potential to save lives, but not if the results are misleading and inaccurate. The results, and the industry as a whole, must be regulated to ensure transparency, reliability, and accuracy. Companies and labs must clearly understand how the tests they produce are going to be regulated. All tests should be regulated under a risk-based approach, with genetic tests falling under the medical device classification system of the FDCA, with the help of CMS regulation of laboratories. This approach will ensure the public can purchase tests from their homes that are safe and effective.