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EDITORIAL

A Note from the Editor-in-Chief

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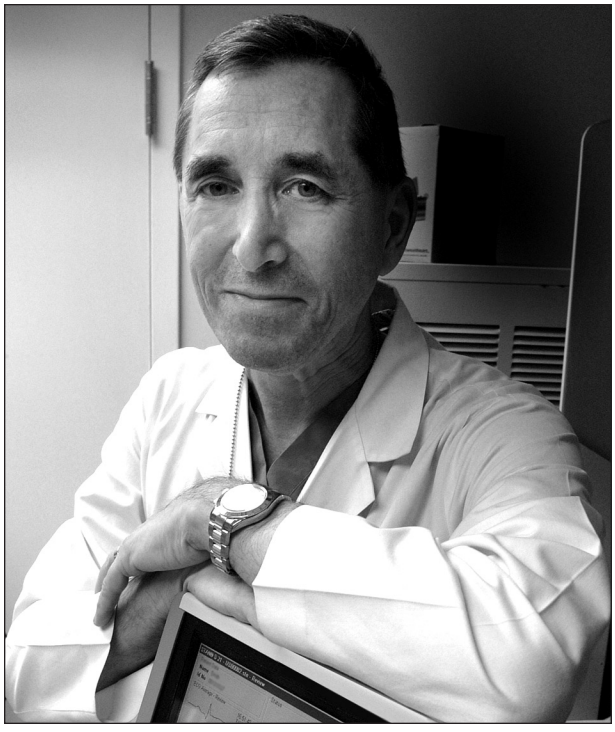
Welcome to the May-June 2017 Editor-in-Chief's page. This editorial column focuses on implications for patients and healthcare providers following the recent decision by the US Food and Drug Administration (FDA) to grant approval for direct-to-consumer (DTC) genetic health risk screening. The Editor would like to thank Mark I. Evans, M.D., Comprehensive Genetics, New York, NY, for his assistance in the preparation of this column.



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Reversing a previous decision and setting a bellwether precedent, the genetic testing company "23andMe" recently received approval from the FDA to sell DTC Personal Genome Service Genetic Health Risk tests for the following 10 conditions:

- Parkinson's disease
- Late-onset Alzheimer's disease
- Celiac disease
- Alpha-1 antitrypsin deficiency
- Early-onset primary dystonia
- Factor XI deficiency
- Gaucher disease type 1
- Glucose-6-phosphate dehydrogenase (G6PD) deficiency
- Hereditary hemochromatosis
- Hereditary thrombophilia

In brief, the 23andMe testing methodology uses DNA isolated from a patient's saliva sample. The DNA is applied to a chip from which a single nucleotide polymorphism microarray analysis can be performed for up to 500,000 genomic variants. The linkage between identified variants and their fre-

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quency in individuals already diagnosed with one of the above conditions enables the calculation of their risk in asymptomatic individuals who, at the time of screening, have not been diagnosed with any of these disorders. Some of the 10 disorders have autosomal recessive inheritance; others have multifactorial inheritance patterns. These 10 disorders are chronic illnesses and, while some can be palliated, none is currently curable. Patient behavior may modify the risks for some but not all of these disorders.

Screening test results often confuse both physicians and their patients, who may panic as they equate a positive screen with diagnosis of a disease while it may only reveal an increased risk of its occurrence. A "positive" screen, denoting an "at risk genotype" alone, is not sufficient to make a clinical diagnosis. Such "positive" results only alter the odds of getting one of these diseases but do not mean that the "clients" (as there is no medical supervision) will ever develop them. A further confounding issue is a test's positive predictive value or the percent of individuals testing positive that will actually have the disease. Positive predictive value is related to the prevalence of the disease in the population, and the above disorders have generally low prevalence in unselected populations, increasing the likelihood of a false positive test.

There is a principle in the practice of medicine originally attributed to Hippocrates: above all, do no harm. Will screening for future genetic health risks in any individual adhere to that principle? In its April 2017 press announcement the FDA also indicated that it plans to exempt 23andMe from submitting 510(k) applications for additional genetic risk screening tests in the future. As this proceeds, the medical community is already overwhelmed with another problem: the shortage of qualified geneticists and genetic counselors to help those who have screened "positive" understand what their test results really mean. As increasing numbers of such tests become available, the increasing demands for counseling may result in longer waiting periods and many patients receiving inadequate, if any, counseling.

There are outspoken patient advocates who view DTC genetic health risk screening without the need for a healthcare professional intermediary as a victory for patients that will enable them to seize control of their medical futures. Even after reading the company online brochures (available on the website www.23andme.com), patients may still poorly understand what these tests can and cannot do. Screening tests for more genetically complex conditions will eventually become available, creating more difficult, challenging test results for many patients and physicians to interpret in the future. Patients who lack or do not receive adequate counseling may, in turn, make ill-informed life decisions regarding marriage or childbearing. A balance must be struck between providing patients more information about future genetic health risks and the assurances of access to high-quality counseling and follow-up. Pursuant to the recent FDA decision, it becomes incumbent on our various related professional societies, including the American College of Medical Genetics and Genomics, American Society of Human Genetics, American College of Obstetricians and Gynecologists, and American Academy of Pediatrics, to develop and issue updated consensus guidelines for physicians and patients alike that address present and future issues related to DTC genetic health risk screening.