Summary of findings:

Our project analyzed the challenges raised by complex genetic disorders in genetic counseling, for clinical practice, for public health, for quality assurance and for protection against discrimination. Our research found that, in some settings, solutions created in the context of single gene disorders are more difficult to apply to complex disorders. In other settings, the single gene solutions actually backfired and created additional problems when applied to complex genetic disorders. We also evaluated in-depth the literature of five common, complex genetic disorders: Alzheimer's, asthma, coronary heart disease, diabetes and psychiatric illnesses.

Methodology:

We started our project by collecting medical, legal, epidemiological, psychological, and ethical articles dealing with complex genetic disorders. A second stage of the project focused on the extent to which the medical, legal, ethical, and psychological articles acknowledged the range of ethical issues raised by complex genetic disorders and the aspects of those issues that are unique. In that analysis, we collected all articles related to genetic testing for five complex genetic disorders (Alzheimer's, asthma, coronary heart disease, diabetes and psychiatric illnesses) and analyzed the extent to which the articles acknowledged, compared, or analyzed the existence of ethical, legal, or social challenges present when testing for complex genetic disorders.

We then analyzed the way in which courts in cases involving negligence law and discrimination law have addressed genetic testing and genetic disease. This aspect of the study attempted to predict whether complex genetic diseases would be handled differently than single gene disorders.

Findings:

Background Concerns with Complex Disorders

Obtaining informed consent in the realm of complex genetic diseases is complicated by the potential for multiple diagnoses. Patients seeking testing for one specific complex disease may find in the process that they are at increased risk for another complex disease for which they were not inquiring. The presence of a variant of the apolipoprotein E (ApoE) allele, for example, is a marker for coronary heart disease but the ApoE-4 variant is also a marker for Alzheimer's disease. Is the clinician ethically obliged to inform the patient of the presence of the predisposing gene for Alzheimer's disease when the patient did not consent to the test or knowledge of the information? This is a concern because the patient did not provide informed consent to test for several genes.
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The discovery of one's genotype through genetic testing has profound implications for individual self-esteem and self-perception. Much research has been conducted within the single gene diseases assessing the individual's psychosocial risks based on the results of genetic tests. These risks are simply magnified in the arena of multifactorial disease. Knowing the presence of one "defective" gene can lead a person into severe depression, but the knowledge of several "defective" genes without a clear sense of their meaning and implication for future disease has the potential for devastating results. Genetic knowledge, despite its nuances and inaccuracies, can alter people's ideas of self-efficacy, esteem, personal locus of control and even risk-taking behaviors. But information about complex genetic disorders may have a lesser impact on individuals because the predictive value of a test is so much lower than the predictive value of the test for a single gene disorder.

Information about complex genetic disorders may have little impact on actual decisions. For example, despite the hypothesis that smokers who knew they had a higher risk for cancer based on genetic test results would be more inclined to quit smoking, the early data from smoking research shows no greater likelihood among smokers who were informed of their genetic cancer risk to quit smoking. Research reveals that the genetic information provides no great motivation, but also does not undermine a person's desire to quit. Given the interplay between genetic factors, environmental influences and risk-taking behaviors in the development of complex disease, the belief among many public health experts that the knowledge of one's genetic information will lead to a more informed lifestyle and will be an important catalyst for preventive medicine may be unrealistic.

In analyzing the writings on complex, genetic disorders we found that none addressed the full range of potential ethical issues involved and only a few pointed out the unique issues that genetic complexity raised.

Legal Ramifications

In our legal analysis, we found that under the American with Disabilities Act (ADA), people who have a record of, are regarded as having, or do have a disability are protected from discrimination in employment and in the provision of health care services. More controversial are conditions that might make the person less likely to want to reproduce, bringing that person within the protection of the ADA since reproduction has been interpreted by courts to be a major life function. AIDS is such a condition, but so, too, might be some untreatable dominant single gene disorders, such as Huntington's disease. Courts' focus in interpreting the ADA has been on the severity of the disorder. Thus the ADA has application for complex multifactorial diseases where the manifestation is severe, such as coronary artery disease.

As people begin to undergo genetic testing for complex, common disorders, however, questions have been raised as to just what constitutes a disability under the ADA. For example, whether an alleged genetic predisposition to develop carpal tunnel syndrome should be considered a disability under the ADA is an issue currently being litigated.

In the context of negligence, when people seek genetic testing, genetic counseling or other genetic information, health care providers have an obligation to provide it in a high quality way. When patients might benefit from genetic services, physicians have a legal obligation to offer them. Medical malpractice cases have held health care providers liable
for not informing patients they were in a high-risk group with respect to certain genetic risks and for not performing genetic tests accurately. In the negligence context, some courts have only allowed recovery if the disorder at issue was severe, but they have set a different standard for severity than in the ADA context.

The rationale for finding physicians liable for negligence is that such liability deters low quality genetic services. However, the vast majority of these cases deal with single gene disorders such as Tay-Sachs disease or chromosomal abnormalities such as Down syndrome. The courts in the cases involving malpractice liability in the genetic testing arena have assumed that the test not offered or undertaken incorrectly was highly predictive. The harm in the case was in not providing the patient with highly predictive genetic information. How then will low quality genetic services be deterred in the arena of complex, common disorders if such precedents are followed and courts refuse to find liability for failure to offer a test or failure to perform it correctly?

We found that, at the federal level, the Equal Employment Opportunities Commission has interpreted the Americans with Disabilities Act to cover individuals with genetic predispositions to later develop particular diseases. The focus is on the phenotype, and whether it constitutes a disability. A disability is a condition that interferes with a major life function, such as blindness, paralysis, or coronary artery disease. In contrast, negligence law uses a different standard for disability. For example, one court has suggested that blindness would not be a sufficiently severe disability for parents to recover damages if the obstetrician failed to advise them of a genetic test to predict blindness or a laboratory failed to undertake the test accurately.

Courts have primarily dealt with single gene disorders and chromosomal abnormalities in instances where the probability of a disorder manifested is highly predictive. One court indicated that negligence would not be found if a physician fails to offer a test that would only have predicted 20% of the instances of the disorder. Yet, when dealing with complex, common disorders, a particular genetic test may not predict more than 20% of the cases.

This led us to consider whether a new policy might need to be instituted in the negligence area that is closer to the ADA approach that focuses on the nature of the disorder rather than the nature of the genetic test for the disorder.

We also found that there were particular difficulties in the intellectual property arena in applying the rationales from the single gene context to the complex genetic disease context. This led to publication of an article and a further grant submission.


Any new notes concerning the project: (5,000 characters or less)