

1-2001

## Genetic Disease, Genetic Testing and the Clinician

Kelly C. Smith

*Clemson University*, [kcs@clemson.edu](mailto:kcs@clemson.edu)

Follow this and additional works at: [https://tigerprints.clemson.edu/phil\\_pubs](https://tigerprints.clemson.edu/phil_pubs)

---

### Recommended Citation

Please use publisher's recommended citation.

This Article is brought to you for free and open access by the Philosophy & Religion at TigerPrints. It has been accepted for inclusion in Publications by an authorized administrator of TigerPrints. For more information, please contact [kokeefe@clemson.edu](mailto:kokeefe@clemson.edu).

This was an invited paper for the *Journal of the American Medical Association*, and appeared in the Jan 3, 2001 edition, V 285(1): 91.

## **Genetic Disease, Genetic Testing and the Clinician**

Kelly C. Smith

Modern medicine emphasizes treatment of the sick. It is often said that the widespread genetic testing soon to follow the completion of the Human Genome Project will usher in a new era of preventive medicine. Such changes require new ways of thinking, however. For example, there may be nothing clinically wrong with a healthy patient who requests genetic testing, even if the tests reveal disease genes. Since all individuals have genetic skeletons in their closets, it is important to be careful not to confuse having disease genes with having the diseases that they cause. Unfortunately, many in the public have adopted a kind of genetic determinism that sees genes as destiny: for example, having the gene associated with colon cancer means they will develop colon cancer. Physicians tend to be more careful, yet even they are not immune to subtle versions of genetic determinism.

One example of this is the uncritical categorization of certain diseases as “genetic”. In fact, an adequate concept of genetic disease is extremely difficult to come by. The simplest notion would require a 1:1 correspondence between a disease and its genes, but this is the exception rather than the rule. For example, cystic fibrosis (CF) is often put forward as a good example of a genetic disease, since it seems to result from mutations in a single gene, CFTR. Even in this case, however, the exact relationship between CFTR mutations and disease is not clear, as virtually every possible combination of sweat chloride test results, genetic test results, and symptoms has been observed.[1] If a patient

presents with the classic symptoms of CF and is found to have a mutation in the CFTR gene, the physician might understandably infer that the mutation caused the disease. But if an asymptomatic patient is tested and it is discovered that he or she has a CFTR mutation, it is unclear what this means. The doctor might tell the patient the gene is abnormal and that he or she is likely to develop pulmonary problems, etc., but it's not really known whether even this qualified prognosis is true. This is because current knowledge of CF is based largely on studies of people who have the disease. It is not yet known how likely it is that someone would test positive for a CFTR mutation and remain healthy all his or her life. The claim that these situations are rare is thus based on an implicit genetic determinism and is not supported by the data. Such assumptions may be harmful if, for example, they cause patients to make inappropriate treatment decisions. Nevertheless, because they remain tacit and thus escape critical scrutiny, assumptions like this are quite common.

Moreover, the causal role of a gene is typically less direct than in CF. Suppose a woman from the general population, who is not otherwise at risk for breast cancer, tests positive for the BRCA1 gene. She is likely to be told that she has an 85% lifetime risk of developing breast or ovarian cancer. This is serious news, especially since it is offered in the seemingly unassailable, quantitative language of science. However, the 85% figure is actually based on cancer-gene covariance in families that have an unusually high incidence of early onset breast cancer.[3] It's an open question to what extent such families accurately represent the general population. In these circumstances, should the patient being tested even be given a numerical estimate of risk, knowing that quantitative results relayed by a physician are often taken as absolute? The common intuition that

information is always harmless and desirable is defensible only if the information can be used to make appropriate decisions. Surely, if a genetic test results in a patient undergoing what later turns out to be an unnecessary radical mastectomy, the test information can not be considered harmless.

One thing physicians can do for patients is direct them to trained genetic counselors who will discuss the desirability and interpretation of genetic tests in detail. Unfortunately, given the dearth of trained counselors and the pressures of managed care, this is not always possible. Primary care physicians forced to deal with these new tests thus have a two-fold responsibility. First, they must keep themselves up to date concerning the complexities of gene-disease relationships, taking careful note of what is still not known as well as what is known. Second, they must communicate this information openly and honestly with the patient. In particular, physicians must be prepared to debunk uncritical notions about the causal power of genes and even to argue against the advisability of genetic testing, especially in situations where there is no clear differential treatment based on what the tests reveal. It is better to admit to patients that medical science can not yet answer their questions than to offer a false sense of certainty through tacit endorsement of information of uncertain quality.

1. Smith, Kelly C. (in press) "A Disease by any other Name" in *The European Journal of Medicine, Philosophy and Health Care*.
2. \_\_\_\_\_ (1998) "Equivocal Notions of Accuracy and Genetic Screening of the General Population" in The Mount Sinai Journal of Medicine, 65(3):178-83.

3. Hall, Jeff M., et. al. (1990) "Linkage of Early Onset Breast Cancer to Chromosome 17q21" in *Science*, 250:1684-89.