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Genetic discrimination arising from cancer risk assessments: A societal dilemma

LONG BEFORE physicians and patients see any payoffs from research in the human genome such as better treatments or diagnostic tests, I fear that other people will put this knowledge to a sinister use: to deny insurance or employment to people who, on the basis of their genes, are at increased risk of developing major diseases.

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**Genetic
information
might be used
before its
relevance is
understood**

Genetic discrimination is a highly complex issue that touches on issues of privacy rights, patient confidentiality, and equal access to new medical technology. It is a term and concept filled with emotion and great fear. What exactly does genetic discrimination mean, and why the controversy?

■ KNOWLEDGE OUTPACES UNDERSTANDING

We are witnessing a revolution in our understanding of the human genome and in our ability to define an individual on the basis of her or his genetic roadmap.

However, it will be remarkably complex to determine the role of specific genes and their products (eg, proteins) in the context of normal physiology, and how abnormalities in genetic structure and function may lead to human disease. Our understanding of these important questions will evolve, but it might take decades.

It is reasonable, however, to envision a situation in which genetic data can be used as a marker for a specific medical condition, for either an individual or population, even if

nobody knows what role the variation or abnormality plays in the development, maintenance, or progression of that condition.

Thus, unique genetic patterns may serve as fingerprints for specific medical conditions long before we have any real understanding of the direct relevance of the findings.

Furthermore, and of great importance to the discussion that follows, this information often does not help the individual person or society at all, and it may actually be harmful.

■ CASES IN POINT: HEREDITARY BREAST AND OVARIAN CANCERS

A small subgroup of cancers of the breast and ovary develop in people with a strong familial association. For example, approximately 5% to 10% of women with ovarian cancer have one or more relatives in one or several generations who also had this malignancy.¹ Furthermore, women with a family member with breast or ovarian cancer have a significantly increased lifetime risk for developing the malignancy, and the age of onset is often earlier than in patients in whom a hereditary component is not apparent.

Specific genetic abnormalities (eg, *BRCA-1*, *BRCA-2*) have now been discovered that explain most cases of hereditary breast and ovarian cancers.^{2,3} Although considerable controversy exists about the reported lifetime risk for these malignancies in the presence of *BRCA-1*, studies suggest that as many as 85% of women with this variant develop breast cancer and 40% develop ovar-

ian cancer. In contrast, the lifetime risk of breast cancer in women without these genetic abnormalities is about 12%, and for ovarian cancer only 1.5%.

BRCA testing may be helpful

Therefore, testing for these genetic abnormalities may be of value to the patient—but only...

- If enhanced surveillance can lead to earlier detection of the cancer (ie, at a lower stage at diagnosis), resulting in less severe treatment (eg, limited rather than radical surgery) or a superior outcome (eg, higher 5-year survival rates), or
- If prophylactic interventions (eg, surgical removal of the breasts or ovaries; chemopreventive treatment) can prevent the cancer or at least substantially delay its onset, or
- If the information is used for making life decisions or family planning, or
- If, in a family in which one or more people test positive, others who test negative may be spared unnecessary surveillance, interventions (eg, surgery), and anxiety associated with knowing their family history.

Prophylactic surgery reduces risk

Increasing evidence shows that women with *BRCA-1* and *BRCA-2* abnormalities may benefit substantially from medical interventions that reduce their risk of cancers of the breast and ovary.⁴⁻⁷

For example, one study found that women with either of these defects can reduce their risk of breast cancer by more than 90% by undergoing prophylactic bilateral mastectomy, compared with their predicted risk without this procedure.⁵ Two other studies found that prophylactic bilateral oophorectomies reduced the risk of both ovarian and breast cancers.^{6,7}

Although the long-term follow-up of these patients remains limited, and it is not yet proven that prophylactic surgery actually reduces the lifetime risk of developing these malignancies as opposed to simply delaying their onset, the data are very provocative. Patients and their health care providers will need to consider these data when there is a strong familial association for either of these cancers.

Patients want answers

The medical community often has little time to carefully consider and reflect on the highly complex implications of new genetic markers—our patients often know about them as soon as we do. Patients read about laboratory and preliminary clinical findings on the Internet, and they want answers before any good answers exist about appropriate use of the data for avoiding and managing genetic risk.

Furthermore, companies marketing the genetic tests often make the situation more difficult by including misleading statements and information about the value of the tests in their advertisements, while minimizing any risks.⁸

WHY BE CONCERNED ABOUT GENETIC DISCRIMINATION?

Although *BRCA* testing is an important advance in our knowledge of the epidemiology of malignant disease, a landmark contribution to the dramatically expanding field of cancer risk assessment, and a truly spectacular early success story in our desire to use genetic information to benefit society, it has other, profound but disturbing implications.

The brave new world in which our genes will soon be on public display may present an enormous threat to individuals and our entire society. Simply stated, we must be concerned that organizations may use this information in ways that do not benefit the individual or her or his family. The eugenics movement in the United States during the last century showed us only too well the potential harm that can result from the naive and inappropriate use and poor understanding of genetic concepts.⁹

Just as a woman may wish to know her specific genetic profile in hope of reducing her personal risk for developing cancer or improving her chance of a favorable outcome if the malignancy develops, so may insurance companies and employers who provide health care benefits wish to obtain the identical individual genetic data to reduce the financial risk they perceive to be associated with the development of the same conditions.

Consider the following possible examples:

- In deciding on whether to issue life insurance or long-term disability insurance to a

Our genes will soon be on public display

woman, a company may consider it important to know if she has a family history of breast cancer or a documented *BRCA-1* abnormality.

- In an effort to minimize risk, an insurer may elect to deny coverage for any female cancers developing within a 5-year period following the initial issuing of a policy to any woman who has a confirmed *BRCA-1* defect or who has a family member with this abnormality.
- Employers with a large female work force who provide workers with medical insurance may wonder if they can help control their company's rapidly escalating health expenditures by not hiring any women known to be *BRCA-1*-positive or who come from a family in which the gene has been documented to be present.¹⁰

The implications of these examples are particularly chilling in that genetic discrimination may relate both to the person with the specific abnormality and to the person's family members (eg, daughters of women with the *BRCA-1* gene).

■ REASONS NOT TO WORRY

Several arguments suggest that we need not be overly concerned with the potential for abuse of individual genetic information.

- State and federal laws, such as the Americans with Disabilities Act and the Health Insurance Portability and Accountability Act (HIPPA), can be brought to bear on offenders (eg, insurers and employers).¹⁰
- Employers and insurers may be reluctant to base underwriting and employment decisions on the results of genetic testing because the quality of genetic testing and accurate interpretation of its results will remain uncertain for many years.
- Perhaps the strongest argument is that insurance companies and employers will have little interest in obtaining and using this information because of the substantial time and effort required to gather and analyze these data and the limited financial impact resulting from denial of coverage or employment to a single individual.

Any cost-benefit analysis would almost certainly have concluded that it is not cost-effective to obtain a detailed family history for

cancer or other serious condition with the aim of denying coverage or employment to anyone with a family history. This will not be true for genetic testing, however, for the following reasons.

■ REASONS TO WORRY

The tests are good and getting better. For cancers of the breast and ovary, current genetic tests can, from a simple blood sample, define a level of risk with greater precision than that achieved through the time-consuming and frequently unreliable method of obtaining a family history. We anticipate that future genetic tests, based on anticipated basic laboratory discoveries and subsequent detailed epidemiologic evaluations, will strengthen the power of the statistical associations between genetic profiles and cancer risk.

Furthermore, it is probable that such testing, at least for some malignancies, will also suggest the potential for good vs poor prognosis at the time of cancer diagnosis, thus refining the actuarial calculations insurers use in determining their potential financial exposure when issuing a policy.

Testing is easy. Compared with the time, effort, and discomfort (for both those answering and asking the questions) required to obtain a family history, a simple blood test seems far less intrusive, although in reality this drop of blood can reveal dramatically more intimate and potentially damaging information to those who have access to it.¹¹

Financial incentives are present. With more extensive and reliable data available to assess risk for cancer and many other conditions (eg, heart disease, stroke, Alzheimer disease, diabetes), who would blame the insurance industry for wanting to learn what they can to maximize their profit? After all, isn't that what they are in the business to do? Further, since it is often the insurance companies who pay for the testing, they will know it has been performed.

And large employers, faced with the dramatic and apparently unstoppable escalation in the costs of health care coverage, may feel they can get relief from these financial pressures by not hiring people with a statistically increased risk of developing cancer within a

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right



poorly defined period of time.¹¹ Why hire a woman with an 85% lifetime risk of developing breast cancer based on genetic testing when another candidate for the job does not possess this laboratory finding?

Although such figures regarding lifetime risk are, in reality, not very helpful in defining short-term financial exposure of an insurer or employer, most people have a limited understanding of this epidemiologic concept and may incorrectly assume the diagnosis is almost imminent. In addition, if a subsequent refinement of the blood test for a genetic susceptibility to breast cancer can reliably identify a population of women who will develop breast cancer within the next 5 to 10 years, or whether the malignancy will more likely be advanced at initial diagnosis, the pressure to know this information to reduce the financial risk of both insurer and employer will intensify greatly.

Current laws may not apply. It is unknown if current laws dealing with discrimination against people with disabilities pertain to those predisposed to a condition as opposed to someone who actually has the disease.¹¹ The US Supreme Court has yet to rule on this extremely important issue.⁹

Computers make it easy. The task of obtaining, analyzing, storing, and retrieving genetic data for extremely large populations is becoming increasingly simple and less expensive with highly sophisticated computers.^{10,11} Thus, in the not-so-distant future, it should be relatively easy for an insurer or employer to search a previously assembled massive database that contains the genetic profiles of all citizens who had previously provided a blood sample to be analyzed for this purpose.

These data may have been gathered with or without the person's consent or full understanding of its implications. However, once this information is in the public (or "private") domain, is there any reason to believe it will not somehow become available (at a price) to those with a specific interest in its content?

■ THE RIGHTS OF CORPORATIONS VS THE RIGHTS OF PEOPLE

As egregious as the preceding examples may appear, why should an insurer or employer be

required to do anything other than attempt to maximize its profit and minimize its financial risk?

In particular, an insurance company could reasonably argue that if a person knows he or she has an increased risk for developing cancer, elects to purchase additional insurance on the basis of this information, and knows this information is not available to the company issuing the policy, then the company itself is being discriminated against by not being permitted to conduct its business on a "level playing field." According to this argument, to deny the company access to this information would be to treat it differently than any other business in our free enterprise system.

Do insurance companies exist to provide a societal good? Or are they like any other commercial enterprise that encourages innovation to enhance revenue, decrease costs, and optimize return on investment?

Similarly, a publicly traded company that employs a large work force is considered successful when revenue is enhanced and expenses (including health care and disability costs) are reduced or minimized. If potential medical expenses can be reduced by not hiring workers with projected higher levels of medical need, is it not in the company's best interest to attempt to do so?¹¹

Who is responsible for assuming the burden of the care for someone at a heightened risk for developing cancer—the individual, the individual's employer, or society?

I would strongly argue that access to basic levels of health care is, and should be, a fundamental right. If this tenet is accepted, it follows that insurers should not be permitted under any circumstances to use genetic information to deny medical coverage, or substantially increase medical premiums to individuals or families with genetically defined increased risks for cancer or other medical conditions.

It's not like smoking, a voluntary behavior that insurers commonly and appropriately ask about to determine health care premiums. People have no influence over their genetic makeup. For the sake of basic fairness and justice within our society, this information should not be allowed to influence payment for and availability of medical services.

Do insurance companies exist to provide a societal good? Or to make money?



■ THE FUTURE IS NOW

There are no good guys or bad guys in this remarkably complex picture we loosely label genetic discrimination, but society must begin to appreciate the truly profound implications associated with the generation of individual genetic data.

As noted by Geetter: "Genetic testing will not be happening to others, it will be happening to us. Experts estimate that we all have five to seven genetic mutations that predispose or condemn us to disease. We will all face adverse insurance consequences, even though for now, only an unlucky few face them."⁹

Genetic discrimination has already occurred.^{10–13} One report found that about 40% of 332 people who participated in a genetic support group stated they, or a family

member, had experienced genetic discrimination in health insurance, life insurance, or both.¹³

Fortunately, this message appears to be beginning to reach the public's consciousness. In one national survey, 80% of the people polled stated they did not want insurance companies to receive any information regarding genetic findings of policy holders.⁹

It is reasonable to hope that through the process of honest, thorough, and spirited public debate, and the passage of necessary and well-considered state and federal legislation,¹¹ the fundamental rights of individuals to maintain the privacy of their most intimate biological secrets will be affirmed, and the spectacular promise that knowledge of unique genetic patterns can reduce the burden of cancer and other conditions for the individual and society will be achieved.



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