

THE POSITIVE AND NEGATIVE EFFECTS  
OF DNA PROFILING

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Genetic engineering has developed and blossomed at a frightening rate in the last decade. Originating as merely an area of interest for scientists, genetic engineering has now become an area of which all people should be somewhat knowledgeable.

DNA profiling has many uses, both positive and negative, in our society. Aside from its usefulness in many legal investigations, DNA profiling can be used in the workplace to discriminate against employees whose profiles could pose a financial risk. For example, genetic technology can and has been used to determine the capacity of a person to contract certain diseases, such as sickle-cell anemia, which could cause many employers to hesitate in the hiring and training of such people. In the early 1970's, the United States began a carrier screening for sickle-cell anemia, which affects 1 in 400 African-Americans. Many of those

identified as carriers mistakenly thought they were afflicted with this debilitating disease. Furthermore, confidentiality was often breached, and in some cases, carriers were discriminated against and denied health insurance. Nevertheless, genetic profiling has been beneficial in paternity suits and rape cases, where the father or the assailant could be identified. However, despite its growing number of utilizations, DNA profiling is extremely hazardous when results are inaccurate or used to discriminate.

The frequency of genetic testing in criminal investigations (more than 1,000 in the U.S. since 1987) has been increasing dramatically despite the inconclusive testing by the scientific community in many aspects of forensic identification. A correlation between DNA patterns taken from a crime scene and taken from the suspect has often been enough to charge a person with the offense in spite of proof that some procedures for testing DNA are fallible by legal and scientific standards.

The complexity of scientific evidence, especially DNA profiling, has also caused many problems within the legal profession. It is no longer enough for attorneys or members of the jury to merely be knowledgeable about the law. People need to familiarize themselves with today's scientific research rather than relying on the credentials of a scientific expert witness. Too often, jury members become in awe of the complicated, scientific terms used in court and take a scientist's testimony as fact. Lawyers need to increase their scientific knowledge and keep up with ongoing research in order to competently question and understand scientific evidence put forth.

But these do not represent the only possible downfalls of DNA profiling in criminology. The involuntary seizure of one's blood or hair undermines the constitutional rights guaranteed to all citizens by the Fourth Amendment (protection from unreasonable searches and seizures). Nevertheless, many argue that a DNA sample taken from a suspect could lead to an indictment or release of the individual and, thus, warrants an exception from the Fourth Amendment. Besides, one could make a plausible argument that, once held in custody, the seizure of a person's strand of hair does not violate a suspect's Fourth Amendment rights or rights of privacy because the hair is visible.

However, the use of DNA profiling does not end in criminal investigations. DNA testing has ventured out of the courtroom in an effort to show a genetic link between race and violent tendencies. If successful, this link will do nothing but justify prejudice attitudes toward minorities, particularly the black race. Furthermore, such biological approaches towards criminality do not take into account sociological factors, such as poverty, and would inevitably lead to the practice of controlling minority children with the use of therapeutic drugs or worse. For this and other reasons, courts of all levels must implement harsher scrutiny in the area of genetic profiling and its uses.

There is also a current effort to create a national database of DNA, much like the existing database of fingerprints. Supposedly, the use of numerical codes will allow huge databases to search for a match of a individual DNA band. However, these matches are not 100 percent. This inconclusive correlation between DNA patterns has led to a heated debate which has culminated in federal court with *Daubert vs. Merrel Dow Pharmaceuticals Inc.* The ruling in the *Daubert* case said that the acceptance by the scientific community is not enough by itself to allow certain scientific techniques into court as evidence, especially given the reality that a suspects entire future could hang in the balance of a scientific finding.

Many people have argued that the use of a national DNA database infringes on the individuals constitutional rights to privacy. However, law officials have claimed that the advantages this database presents for society supercede the individual's rights. This dilemma can easily be associated to the "social contract" presented by Thomas Hobbes. In this contract, Hobbes believed that each individual should give up certain individual rights in order to achieve protection from the whole. The forfeit of the right to privacy of one's DNA can thus be considered one of these forfeited rights. A person must weigh the advantages of having a past, present, or future criminal's DNA profile on database with the

disadvantages of having one's own. But the disadvantages will outweigh the advantages when private institutions develop access to this database and use the information for discriminatory purposes.

The impending usage of a national DNA database poses many possible risks of political and commercial abuse of such information, along with the danger this information falling into the hands of unfriendly parties, are unpredictable. Such unpredictability, certainly, is a violation of people's rights to privacy. For instance, if a private institution, such as a bank, an employer, or an insurance company, receives access to this information, it could influence decisions on loans, hiring practices, insurance rates, etc. Society, then, is faced with a conflict between an individual's right to privacy in one's genetic composition and the employer's or insurance company's interest in knowing about a person's health problems. This conflict will constitute the remainder of this paper.

Over the next ten to fifteen years, scientists involved in the federal government's "human genome project" will try to identify in detail each of the human cell's estimated 100,000 genes. The knowledge derived from the project will enable physicians to detect an increasing number of diseases and predispositions for diseases.

When Frank married at age 31, he decided to take out a life insurance policy. A swimmer and avid racquetball player with no previous hospitalizations, he felt certain his low premiums would be a worthy investment for his family.

Weeks later, after a routine physical exam, he was shocked by the insurance company's response. Sophisticated DNA testing had revealed in Frank's tissues a single missing copy of a so-called RB antioncogene and minor variations in two other genes. Computer analysis showed the molecular misprints more than tripled his risk of getting small-cell lung cancer by age 55. His application was rejected.

With the newfound ability to reveal an individual's molecular secrets come significant new possibilities for discrimination. The medical records of people who apply for insurance are stored by the Medical Information Bureau, a data bank shared by a consortium of hundreds of insurers. Ethicists warn that genetic tests could tempt insurers to discriminate against the "healthy ill;" people who are not yet sick but who carry genetic traits predisposing them to future illness, such as in Frank's case. However, these people may not be denied health insurance totally. Rather, they may be guaranteed a basic level of treatment and rationed out of more costly procedures. For example, someone who carried the cystic fibrosis gene, even if asymptomatic, could be denied a lung transplant. The competitive nature of the industry may compel insurance companies to use genetic information, since the fundamental principle of the insurance business is "pooling uncertainty." The concept of adverse selection also causes insurers much dismay. Adverse selection refers to the probability that people privately aware of a medical problem are more likely to seek medical insurance. This negates the insurers policy of setting premiums with accordance to statistical information on the rates of illnesses and sicknesses in society. "The whole foundation of insurance is based on the fact that we and the insurance applicant are operating with equal levels of knowledge and ignorance." Without this level of ignorance, insurance companies will lose their social value as a means of spreading risk across groups of people.

Genetic engineering with respect to insurance does not stop here. Further development could lead to a complete knowledge of who will develop a disease and when. This will drastically effect the practicality of life insurance policies. "I can see 20 or 30 years from now that life insurance policies will be essentially accident policies, because everything else will be foreseeable. The essence of insurance is you assess a risk against the unknown; if there's no medical unknown, the only unknown is whether you're going to get hit by a bus."

Another striking danger of insurance companies discriminating with respect to a person's DNA profile is with infants. The companies may become extremely hesitant in insuring babies who have a high susceptibility to certain diseases. In fact there have been some cases where the insurers actually demanded the parents to abort the fetus or risk losing insurance. This obviously constitutes a blatant violation of people's rights. Plus, it dangerously causes the insurance companies to begin to play the role of God, that is, in deciding who should live and who should not. "By agreeing to pay for some infants and not for others, insurance companies could inadvertently practice a form of economic eugenics, based not on grand designs for a superrace but on who requires the least expensive medical care." Perhaps, some form of national health insurance is the only remedy for these problems. "Genetic testing may provide the best reason yet for a nationalized health-care policy."

But insurance companies are not the only private entities with the potential to discriminate against people with unfavorable genetic profiles. Employers, too, have a substantial financial risk in hiring an employee with an above average propensity for illness or early death.

Ellen spent four years completing her PhD in industrial and chemical engineering. Now, wincing as a company doctor drew a few drops of blood for her preemployment physical, she could hardly contain her excitement about the job she'd been offered at one of the country's foremost metallurgical research institutes. Two days later the phone call came. You are perfectly healthy, the young doctor said. But tests have revealed you harbor a gene that can result in decreased levels of a blood enzyme, glucose-6-phosphate dehydrogenase. Without the enzyme's protection, you have a slightly increased risk of developing a red blood cell disease if you come into contact with certain chemicals in our laboratory. I'm sorry, he said. The job has been offered to someone else.

As Ellen's case shows, the danger of discrimination certainly does not end with health insurance. There is also a grave danger of discriminatory hiring practices in the workplace. In 1989, Jonathan Beckwith, a geneticist at Harvard, and Dr. Paul Billings, director of the division of genetic medicine at Pacific Presbyterian Hospital in San Francisco, completed a small-scale study of genetic discrimination. Of 55 responses, Billings and Beckwith could document 29 people who reported multiple instances of discrimination by adoption agencies, employers and insurers.

And the percentages will only get worse as more and more companies implement genetic screening policies. In a survey of 400 U.S. firms conducted in 1990, 15 percent of companies responded that by the year 2000, they planned to check the health status of not only their prospective employees, but their dependents as well before making a job offer. These statistics show all too well the impending problem with genetic discrimination in the workplace.

Employers will have a number of potential justifications for genetic testing in the workplace. In some cases, there may be an argument in favor of testing for public health reasons. Fortunately, judges and juries have predicted these justifications and have begun to make the necessary rulings to ensure true justification for discrimination. The relevant judicial opinions indicate that there will have to be a significant or reasonable likelihood of harm to others from having the individual employed. Hopefully, rulings such as these will serve their purpose in protecting the right of all citizens.

With the balance of interests laid out (individuals concerned about confidentiality and discrimination, and insurers and employers concerned about adverse selection and fiscal liability), it will fall upon legislators and the

courts to define the proper use of genetic information. Policy makers will have to confront an apparent discrepancy between the reality of genetic variability and the democratic ideal that all citizens are "created equal." The information itself is not the problem. What matters is how the knowledge is

used. Scientific advancements are not to blame. "What science does is give society opportunities. What we have to do is look at these opportunities and then set up the constraints and the rules that will allow society to benefit in appropriate ways." Without the proper constraints, the price of glimpsing one's medical future is high indeed.

DNA profiling can be an extremely beneficial tool in the war against crime. However, when used for discriminatory purposes, this tool becomes a crime in itself. The ability to compare and contrast a person's genetic code with another should not be taken lightly, for with this great knowledge comes great responsibility. If not used wisely, this ability of the few... will develop into a disability for the many.

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