

**GENETIC MAPPING AND CRIME FIGHTING
GO HAND IN HAND**

by

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The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

The views and conclusions expressed in the Command College Futures Project and journal article are those of the author, and are not necessarily those of the CA Commission on Peace Officer Standards and Training (POST).

The mapping of the human genome and related advances in genetics has opened entirely new fields and approaches to addressing complex problems with the human race. After thousands of years of fusing, melting, soldering and forging, we are now splicing, recombining, inserting, and stitching living material to decipher the human genome. Our lives are likely to be more fundamentally transformed in the next few decades than in the past, 1,000 years.

In the near future, genetic changes could be made in a human fetus to correct deadly diseases and disorders, as well as enhance mood, behavior, intelligence and physical traits. Research is increasingly linking a large number of mental diseases to genetic disorders. Furthermore, an increasing amount of food will be grown indoors and tailored to match the needs of people. Animal and human cloning will be commonplace, with replication replacing reproduction. Individuals will be able to obtain detailed genetic readouts of their genome, allowing them to gaze into their own biological future and plan their lives in a way never before possible. The question is which genetic engineering uses will society accept and which ones will be rejected.¹ The question for law enforcement is how to deal with these challenges, and how best to police a society where the nature and sources of life are changing beneath our feet.

Linkage

Human genetic information is like a large phone book. In that phone book, we may be interested to locate a person named Bob. If Bob's last name and address are not known, the linkage allows researchers to take the whole phone book, and narrow the search down to a couple of pages, thus allowing them to make conclusions that can

change peoples lives.² What may be more amazing than the fact we can do this is the breathtaking pace with which we have acquired that ability.

In 1989 the Human Genome Project was started with the goal of sequencing and identifying all three billion chemical units in the human genetic code set, finding the genetic roots for disease and then developing treatments. With the sequence in hand, the next step was to identify the genetic variations that increase the risk for common disease like mental illness, cancer and diabetes. Using this data, the National Institute of Health looks at sites on the genome where many people have variations in their genome. The underlying belief in this research is since the major diseases are common, so too would be there genetic variations which caused the disorder. Natural selection keeps the human genome free of variations that damage health before children are grown, but fails against variations that strike later in life which would lead one to believe the disease is environmental and not hereditary.³

One of the outcomes of this research has led scientists to conclude that vulnerability to mental illnesses (such as schizophrenia, manic depressive illness, early onset depression, autism and attention deficit hyperactivity disorder) all have a genetic component.⁴ As a result of the Human Genome Project in July 26, 2000, it was found that this vulnerability is not due to a single defective gene, but to the joint effects or linkage of many genes acting together with non-genetic factors. Despite the daunting complexity, progress is being made. Researchers are hunting genes because they are likely to be a vital key to deciphering what goes wrong in the brain in mental illness. A

¹ The Biotech Century. August 15, 2010, from Genetic Commerce and the Dawn of a New Era.

² John Hopkins Medicine. July 10, 2011, www.hopkinsmedicine.org/epigen/what_is_geneic_mapping.htm

³ The Human Genome: Retrieved August 20, 2010, from <http://www.usatoday.com/cleanprint>

recent study released by the American Journal of Psychiatry notes that serious mental illnesses, which afflict about 6% of American adults, costs society \$193.2 billion in lost earnings per year. Beyond the realm of human tragedy, the cost data alone compels us to devote attention to the possibility of intervening to alleviate this suffering.

Many scientists are committing a great deal of resources and tools to better understand the molecular mistakes that produce mental illness. A vital resource for doing this is now under development and will share scientific infrastructure called the Brain Molecular Anatomy Project. The goals of this multidisciplinary effort are to catalog the genes that are active in various parts of the brain at different developmental stages, and to make this information available to scientific researchers.⁵ Through this continued research, specialists will discover and unravel the many mysteries that currently exist related to the human genome and brain function. This will in turn provide many new treatments associated with early detection of mental illness or deviant behavior and provide a positive approach to dealing with crime before it occurs.

During the next decade we will see over 7000 diseases documented properly and completely and other mutations will be discovered and shared. We may quickly see the difference as families and communities will be able to plan for the future. We might even carry our genome code around with us. Some say it will be just another application for our very smart phones.⁶ As we meet, fall in love our thoughts will turn to having a family

⁴ Genetic Mapping Studies. Retrieved July 25, 2011, <http://www.redalyc.uaemex.mx/pdf>

⁵ Gene Hunting, national Institute of Mental Health. Retrieved August 20, 2010, from <http://www.bipolar.about.com>

⁶ Mapping the World of Genomes. June 1, 2011, <http://www.smh.com.au/action>

and we will compare our similarities and differences in a new and unique way, providing us with choices of how to manage our families and communities.

Ethical and moral choices

As we move forward in this new and exciting field many people will need to make hard choices about looking into the future and any related problems they may have with their genetic makeup. A glimpse into the near future may help illustrate this with a young man named Cory. Cory and his father are nervously waiting for their tests at the genetic testing center. Cory is concerned he might carry the schizophrenia gene and he does not want to pass it on to his children. Cory tells his father he would rather not have children if it means sentencing them to a life of hardship and disappointments. Cory's father privately shares the same concern. He knows mental illness has been passed down in their family over the years, and many family members have suffered from various forms of mental illness.

Although the scenario could come true almost any day, the key question remains: What should we do with the genetic test information? What does each genetic test mean personally, medically and socially? If we can, should we intervene to correct or enhance an individual's genome? As an example, since it became possible to test for the Huntington's gene, an incurable disease impacting people later in life, less than 15 percent of those at risk have taken the test even when it was offered for free. One could conclude that most people would rather not know if they carry a gene that, at some point in their lives, will activate and shorten their lives considerably. As society and law enforcement deal with many unacceptable social behaviors, though, knowing who may or may not generate significant behavioral problems would be an undeniable benefit. If this

information can be obtained through genetic screening, there is a compelling argument it should be made mandatory for all.

Treatment or Incarceration

Suppose through required genetic testing law enforcement agencies could identify those individuals with a genetic disorder linked to mental illness which would make the individual more likely to be involved in criminal behavior. California's prison system is currently in crisis. The State's 33 prisons hold 143,565 inmates in space designed for fewer than 80,000, more than 180 percent of their design capacity. In an order late last month, the Supreme Court gave California two years to remove more than 33,000 inmates after the justices ruled easing congestion is the only way to improve unconstitutionally poor inmate medical and mental health care.⁷ Clearly the benefits of early identification through genetic testing and effective treatment far outweigh possible objections to its collection and use.

Genetic aspects of mental illness disorders are being identified through human genome and family research. Gene discovery makes diagnosis and treatment possible. When genetic screening is offered through testing centers, a multi-visit approach is used including education and counseling which assists a person considering the option offered for the specific issue.⁸ The advantages of gene therapy treatment far outweigh the disadvantages. The advantages are to give someone that is born with a genetic disease or who develops a mental illness the chance at a normal life. Giving someone a chance at a

⁷ California Overcrowding. July 26, 2011, <http://www.huffingtonpost.com>

⁸ Genetic testing and mental health. July 25, 2011, <http://www.nursingworld.org>

normal life should be enough evidence to convince many people who currently oppose this type of treatment.

Gene therapy is an aggressive approach to correct a medical issue and should not be opposed because it is misunderstood and seen as something foreign or scary. Robert Sapolsky, Ph.D., a professor of neurology and neurological sciences at Stanford University School of Medicine in the 2001 annual meeting in New Orleans, during a talk titled “Gene Therapy and Its Potential Application to Psychiatry” supported the use of gene therapy in treatment of phychiatry patients. As we continue to educate our society, many people will change their opinions of this treatment. As this treatment becomes more main stream society will come to understand its contribution to the countless number of people suffering from genetic related illness. In the coming future, gene therapy will play an important part in many people's lives.⁹

Expert Insight

An expert panel from law enforcement, politics, criminal law, and civil rights advocates was convened to provide insight into the possibility of using genetic testing to enforce laws and provide treatment to individuals before they become a greater burden on society. The panel members focused on how a program to collect and use genetic information might be successfully implemented. They concluded a new government agency would be best-suited to the task. It would be a large agency which would need to include the cooperation of all citizens in the State of California; one of the primary initial tasks would be to overcome suspicion and objections by those who might object to this

⁹ Gene Therapy Revolutionizing Medicine. July 26, 2011, <http://www.ndsu.edu>

new program. It would also help advocate for laws necessary to enhance the success of collection and analysis efforts.

The expert panel indicated the primary function of the testing program would be to facilitate the testing, collection, interpreting and tracking of individuals requiring treatment. The agency (which could be named the California Genetic Testing Agency, or CGTA) would be deployed Statewide, and need to be staffed sufficiently to create standardized outcomes. The benefit of having personnel statewide to run this program would allow local agencies the flexibility to be proactive in their approach to law enforcement. The statewide genetic testing program would provide impartial and consistent enforcement throughout the entire State of California. Local police departments would be able to avoid highly charged political or alleged civil rights violation accusations associated with this program.

Privacy was also identified as a main concern in this modern era with communication and data proliferation. In a hospital setting there are hundreds of people who have access to a patient's medical records. The information is also passed along to insurance carriers and health organizations. Given that complete privacy is not possible, it is critical to consider who has access to genetic information and for what purpose.

The expert panel did identify additional concerns regarding a partnership between local agencies and a statewide agency. Would a statewide agency provide consistent services throughout the State? What issues would be considered local or a statewide responsibility? Who would be responsible for maintaining security of the database? Who determines the level of importance of complex and in-depth issues throughout the

state? In spite of these questions, the panel supported the formation of a statewide agency as a logical means to sustain necessary levels of law enforcement across the state.

Policing in the Near Future

As we move forward in this challenging environment our society must continue to improve in the way we address difficult issues. Given the pace of unlocking the secrets of the human genome, one can envision a near-term future where these tools are put to use. It is Summer 2017; Assembly Bill 1460 was overwhelmingly passed and signed into law to make genetic testing mandatory for all citizens in the State of California. As a result, screening was implemented immediately, with no exceptions to the process. The California Genome Testing Agency (CGTA) is created to handle all aspects of the screening process and tracking of test results through a main database. The agency is required to ensure all citizens receive genetic screening, review those test results and provide direction and treatment to identified individuals with genetic abnormalities. As technology improves, the accuracy and dependability of genetic screening improves as well, which results in individuals receiving treatment prior to committing acts unacceptable to society.

Life continues and crimes of violence decrease due to the success of the genetic testing program. Individuals with genetic abnormalities receive gene therapy treatment. Interestingly, this work serves to substantially reduce calls for service and demands on law enforcement. Domestic violence drops to very low levels, and some women's shelters are able to close due to lack of business. Jail overcrowding drops significantly, especially where the testing and treatment is able to reach larger populations. Many illnesses identified through the screening program are treated and managed, including

addictions, mental illness and a predisposition to violence. Crime detection using genetic trace evidence is also increased, allowing the police to reduce costs associated with providing service to the public. Law enforcement agencies are able to deploy personnel to address community outreach programs and assist the communities in a more efficient manner. Much of the funds saved through the success of the genetic screening program allow local municipalities to expand other social programs, providing more services to the citizens of California.

As the genetic testing program gains credibility, the courts accept the accuracy of the testing process, and a study is commissioned to evaluate the feasibility of prosecuting crimes based on the results of genetic testing. The program continues to gain momentum and support from the general public.

The future vision and implementation of a genetic testing program monitored and facilitated by a state agency is a concept that can become a reality. Government officials, at all levels would need to be receptive to the joint efforts of state and local police departments to impact crime within California. This concept continues to gain support from doctors, educators, politicians and the public as technologies improve and more is discovered about the human genetic combinations that result in violent behaviors. Furthermore, the concept of a state agency is essential to the success of the genetic testing program.

The California Department of Justice and the Highway Patrol (even with jurisdictional restrictions and limitations) are state law enforcement agencies and are in place to handle law enforcement equal and consistent throughout the state. Identifying violent behavior and other criminal traits would result in significant cost savings and

improve quality of life for the people of California. The assistance to local agencies would further provide a cost savings to the local communities. The municipalities would be able to reduce their expenditures while focusing on community outreach. This concept would eventually reduce crime rates in communities throughout the entire state.

Conclusion

The future vision and implementation of a genetic testing program monitored and facilitated by a statewide agency is a concept that can become a reality. It would create a technology-driven alternative to traditional means of crime control; one that could address the increasing problems and difficulties facing our society and law enforcement.

Regardless of the current fiscal constraints, providing law enforcement services effectively and efficiently should be the measure for a law enforcement agency. Given all of the prior information, it is apparent that California law enforcement at all levels could improve their operations while maintaining the basic mission of safety, service, and security.