Predictive Testing for Huntington’s Disease: A New Paradigm of Patient Care

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ABSTRACT

Radical changes have occurred in America's health care system in the last twenty years. Technological and research advances have given medicine the knowledge to treat and to cure diseases once only dreamt about. But in the race to cure, the focus of health care has shifted from treating the patient to treating the disease. Attending to the psychological and psychosocial aspects of disease has been lost, leaving patients feeling increasingly afraid, ignored, neglected, and bureaucratically managed.

This honor's thesis presents a new program of care to bridge the existing gap between the treatment of the disease and the treatment of the patient by examining the problems currently facing Huntington's disease patients in respect to prediagnostic testing, and suggest ways to improve the protocol for testing and for patient care.

The study will be presented in five parts: Part One examines the nature and scope of Huntington's disease; specifically, the nature of the disease, advances in research in technology, the impact of the disease on patients and patients' families, and issues surrounding pre-diagnostic testing for the disease. Part Two traces the development of protocols that are currently prescribed for the pre-diagnostic testing of Huntington's disease by the International Huntington Disease Society (IHDS) and the Huntington's Disease Society of America (HDSA), and examines how Shodair Children's Hospital in Helena, Montana, has revised and adopted them for use. Part Three examines the strengths and weaknesses of Shodair's protocol through a random survey of Helena physicians. Based on these analyses, Part Four proposes revisions to all the existing protocols that will enhance the treatment of patients. Part Five concludes the study with a discussion of the implications of the revised protocol for health care.
INTRODUCTION

The medical profession is slowly coming to grips with the obvious: modern medicine has taken a wrong turn. For more than a century, medicine has moved toward the technical and scientific, toward eradicating disease through research and through advances in technology. The advantages of this move are substantial. The scientific/technical shift in medicine has led to advances that provide for better management of many catastrophic diseases, and has made possible effective treatment for such dreaded killers as cancer and heart disease, and more recently, AIDS. But in the quest to overcome such diseases, many physicians have forgotten some of the fundamentals of patient care. Increasingly, patients find themselves rushed through an expanding series of routine procedures that often leave them feeling afraid and confused.

This trend in medicine has not gone unnoticed by some physicians. Dr. Matthew A. Bud, Assistant Professor of Medicine and Director of Behavioral Medicine Program at Harvard Medical School, observes:

In health care, we are out of touch with what gives us meaning. At a time when the power of our technology makes possible undreamed-of interventions in the diseases of mankind, the very relationship between the doctor and patient has become a battleground. Distrust and disrespect prevail where alliance and intimacy are most needed. What we as physicians have lost in this process is almost too much to acknowledge the dreams that guided us into a profession combining Hippocratic diligence with Samaritan obligation (Adams & Mylander, 1998).
Clearly, the time has come for medicine to move in a new direction, toward a more holistic approach to patient care that treats the patient as well as the disease. I believe this move requires returning to some basic principles of medical ethics that have become lost in health care's technical, scientific, and managed care shuffle. First, modern health care needs to institute the "beneficence principle of provision" which obligates healthcare to promote and prevent harm as well as promoting the welfare of patients (Beauchamp, and Childress, 1989). According to this principle, "The harms to be prevented, removed, or minimized include pain, suffering, disability, and death from injury or disease" (Beauchamp, and Childress, 1989). To accommodate these obligations health care professionals need to be ready to take on many different and challenging roles that require different modes of patient care, such as critical, curative, chronic, and preventive care (Beauchamp, and Childress, 1989). This component is necessary to treating patients holistically, and needs to be actively recognized in the development and use of treatment plans. The current scientific and technological approach to medicine often ignores the welfare component of beneficence.

Second, modern medicine needs to reconsider the sanctity of the doctor/patient relationship. In health care, most obligations of positive beneficence rest on fidelity-generating contracts and role relationships (Beauchamp, and Childress, 1989). By establishing relationships with patients, physicians make implicit and explicit promises to seek their patients welfare (Beauchamp, and Childress, 1989). The significance of the doctor/patient
relationship may be acknowledged; however, modern medicine currently pushes patient relations aside. As more time is emphasized for patients' procedures, less time is available to allow patients to develop trust in their physicians, and for communicating their questions and concerns. Clearly the absence of more fully developed patient relations creates a gap in health care that needs to be filled.

For this honors thesis, I intend to put these basic ethical principles to work and to show how a more holistic approach to medical care might be accomplished through examining the problems currently facing Huntington’s disease patients. The study will be presented in five parts: Part One examines the nature and scope of Huntington’s disease; specifically, the nature of the disease, advances in research in technology, the impact of the disease on patients and patients’ families, and issues surrounding pre-diagnostic testing for the disease. Part Two traces the development of protocols that are currently prescribed for the pre-diagnostic testing of Huntington’s disease by the International Huntington Disease Society (IHDS) and the Huntington’s Disease Society of America (HDSA), and examines how Shodair Children’s Hospital in Helena, Montana, has revised and adopted them for use. Part Three examines the strengths and weaknesses of Shodair’s protocol through a random survey of Helena physicians. Based on these analyses, Part Four proposes revisions to all the existing protocols that will enhance the treatment of patients. Part Five concludes the study with a discussion of the implications of the revised protocol for health care.
PART ONE: THE NATURE AND AFFECTS OF HUNTINGTON'S DISEASE

Huntington's disease (HD), also known as Huntington's Chorea, is a devastating brain disorder that afflicts people of all races all over the world. Named after Dr. George Huntington, who first described the disorder in 1872, Huntington's disease is an incurable, late onset disorder defined as, “an inherited autosomal dominant neuropsychiatric disorder characterized by abnormal involuntary movements, psychiatric disturbances, and dementia” (Lam, Bloch, Jones, Marcus, Fox, Amman, & Hayden, 1998).

Pathological findings show that the disease produces neuronal degeneration in the caudate nucleus and the putamen (Lam, et al., 1988). The degeneration of cells in these areas affects cognitive ability (thinking, judgment and memory), movement, and emotional control (Huntington's, 1996). The clinical signs of Huntington's disease initially appear as subtle mental changes in personality, including moodiness, irascibility, and impulsiveness (Hayden, 1981). The earliest signs are choreiform, or dance movements, which are involuntary complex movements. Affected people may lose their ability to whistle and frown, and may experience facial apraxia (Hayden, 1981).

Clinical signs usually develop between the ages of 30 and 50, but can begin as early as 2 years or as late as 80 years (Quaid, 1992). Tragically, the disease strikes in the prime of life when social, personal, and financial responsibilities are greatest (Hayden, 1981). Indeed, the average age of onset is 40 years old (Tibben, Frets, van de Kemp, Niermeijer, Vegt, van der Vlis, Roos, - 4 -
Rooymans, van Ommen Gert-Jan, & Verhage, 1993; and Brinkman, Mezei, Theilmann, Almqvist, & Hayden, 1997). Fortunately, the disease is rare, affecting only 1 in 10,000 people in the United States. Currently, 30,000 people have Huntington's disease and a further 150,000 are at risk in the United States (Huntington's, 1996).

Huntington's disease is often described as a family disease because it is transmitted from parent to child, generation after generation. The disease is autosomal dominant, that is to say, a child whose parent has Huntington's disease has a 50% chance of developing the disorder. Male and female children possess the same risk for developing the disease. However, researchers have observed what is called the "paternal transmission effect." They discovered that if the disorder is inherited from the mother, the age of onset is approximately the same age as the mother; if inherited from the father, the clinical signs are shown 5-7 years earlier than the father (Quaid, 1992). Once Huntington's disease skips a generation the ties are broken, and individuals, as well their future generations, are forever freed from the disorder (Tibben, et al., 1993).

The Development of Predictive Testing for Huntington's Disease

In recent years, breakthroughs in research have made predictive testing for Huntington's disease possible. In 1985, a genetic marker that localized the Huntington's disease gene to the short arm of chromosome four was discovered (Guidelines for Genetic, 1994). Soon after the marker was isolated, a test was
developed that determined whether individuals at risk for Huntington's disease had an increased or a decreased risk of inheriting the disease.

The test was based on the process of "linkage analysis," which required tracing the inheritance of markers linked to the gene, rather than actually locating the gene itself (Guidelines for Genetic, 1994). Using DNA probes, with the linkage analysis approach, the number of markers identified for Huntington's disease increased and the test became increasingly more accurate. The accuracy of risk modification increased to 98% for increased or decreased risk (Tibben, et al., 1993).

Actual testing began in 1986 in accordance with a research paradigm at John Hopkins Hospital, Baltimore, MD, and at Massachusetts General Hospital, Boston, MA (Guidelines for Genetic, 1994). Although the test reflected genuine progress, it was far from perfect. One problem was that the test was extremely complex and only offered 95% accuracy in results (Guidelines for Genetic, 1994). Moreover, the test required samples from multiple family members for DNA analysis. This complicated the test considerably because some family members did not wish to be tested and would not give their consent. Nevertheless, by 1993, twenty-three centers were offering pre-diagnostic testing (Quaid, 1992).

After these initial advancements in predictive testing, little was published about the disease's causes and effects until March of 1993, when, after ten years of research, the Huntington's Disease Gene Collaborative Research Group announced that the Huntington's disease gene had been isolated (Guidelines for
This led to a new method of predicative testing called the “direct gene” test. This method was more accurate and less complex because it required blood from only the testing individual. The new test identified the altered or mutated CAG repeat in the Huntington’s disease gene.

Researchers discovered that at the 5’ end of the Huntington’s disease gene, a CAG trinucleotide base repeats itself in all cases (Shodair Children’s Hospital, 1997). A normal gene contains 11-30 copies of the CAG trinucleotide repeat. Affected and unaffected individuals were found to have CAG trinucleotide repeats between 36-39 times (Shodair Children’s Hospital, 1997). Individuals having a CAG repeat greater than 40 times are predicted to develop Huntington’s disease in 100% of the cases. People identified with this number of CAG repeats will eventually develop Huntington’s disease unless they die prior to onset.

One problem with direct testing is that it cannot predict the age of onset; however, there is a correlation with the repeat size and the age at which symptoms first appear (Brinkman, et al., 1997), although with broad variation. At this point in the research, no definite prediction can be made for a single individual.

Issues Surrounding Pre-diagnostic Testing

With these advancements in testing, at-risk individuals were suddenly faced with the difficult choice of deciding whether to be tested for the
Huntington's disease gene. Researchers have found that the experience of being at risk varies from person to person, situation to situation. Some individuals become preoccupied with Huntington's disease, constantly thinking and obsessing about their risk, checking and rechecking themselves for signs and symptoms of the disease (Huntington's, 1996; Hayden, 1981). Others remain in a state of denial; they choose not to think about the possibility of being at risk and have taken their ignorance to the point of shunning affected family members (Huntington's, 1996). Still others wish to know their status and look at genetic testing as the key to providing them with the information they need to make important life decisions in a controlled, educated manner.

The complexity of this decision and the drastic psychological effects the results may have on an individual's life led the International Huntington Disease Society (IHDS) and the Huntington's Disease Society of America (HDSA) to design protocols for prediagnostic testing. These protocols were developed to help individuals decide whether or not to undergo predictive testing and, if they do decide to be tested, to help them cope successfully with their test results.

PART TWO: THE DEVELOPMENT OF THE PROTOCOL FOR PREDIAGNOSTIC TESTING

In September of 1985, representatives from the International Huntington Association and the World Federation of Neurology Research Group on Huntington's Chorea met in Lille, France to prepare guidelines for the use of
predictive testing for Huntington’s disease for the IHDS (Guidelines for the Molecular, 1994; Quaid, 1992) (See Appendix A). The guidelines were established to protect at-risk individuals by giving them support and providing information they need to make informed decisions (Guidelines for the Molecular, 1994). The guidelines were also intended to assist clinicians, geneticists, and ethical committees as well as lay organizations to resolve difficulties arising from the application of the test (Guidelines for the Molecular, 1994).

The guidelines were adopted by both organizations at their respective meetings in Vancouver, BC, Canada, between June 30 and July 3, 1989 (Guidelines for the Molecular, 1994). The guidelines were later published in the Journal of the Neurological Sciences (1989;94;327-332) and the Journal of Medical Genetics (1990;27;34-38) (Guidelines for the Molecular, 1994). After the discovery of the Huntington disease gene in March of 1993, the original guidelines were revised to reflect this advance (Guidelines for the Molecular, 1994).

In a separate move, the Huntington’s Disease Society of America (HDSA) produced their own set of guidelines in 1989 (Quaid, 1992), and revised them in 1994. As with the guidelines developed by the IHA-WFN organizations, the guidelines of the HDSA were developed to assist healthcare professionals in administering the genetic test for Huntington’s disease and to protect the well-being of those who choose to undergo testing (Guidelines for Genetic, 1994) (See Appendix B). The HDSA views their guidelines as a framework of
recommended procedures for testing (Guidelines for Genetic, 1994). The
association claims the guidelines are only recommendations and are not
regulations (Guidelines for Genetic, 1994).

For the most part, hospitals in the United States have used both the
national and the international guidelines, revising them to accommodate their
facilities and their resources. An effective case in point is Shodair Children's
Hospital in Helena, Montana. The following statement from, MT GENE, a
publication from Shodair describes their situation:

The Montana Medical Genetics Program at Shodair Hospital has modified
the recommendations of the National and International Huntington
Disease Societies for the unique geographical and logistical
circumstances encountered in Montana (1997).

The protocol was implemented to provide Montana's at-risk individuals
with a procedure that takes their well-being into consideration. Shodair's adapted
version of the protocols aims to assist individuals in making educated decisions
concerning their future, and to aid them in maintaining a healthy, balanced life-
style (See Appendix C).

PART THREE: THE STRENGTHS AND WEAKNESSES OF THE PROTOCOL

The protocol used at Shodair Children's Hospital is an excellent example
of how the medical world is responding to the problem of focusing too much on
the disease at the expense of the patient. Shodair's protocol was designed to
"assist health care professionals in administering the genetic test for Huntington's
disease and to protect the well-being of those who choose to be tested"
(Guidelines for Genetic, 1994). The question is whether the protocol was effective in practice. To answer this question, I studied the protocols, consulted numerous journal articles and a couple of publications by Shodair Children’s Hospital, and conducted a short, random survey of practicing physicians in the Helena, Montana area. Due to geographic restrictions, the survey was limited to the Helena area, and only inquired about the protocol in use at Shodair.

The survey entitled, “A Survey concerning the protocol for pre-diagnostic testing of Huntington’s Disease” was sent to 70 physicians currently practicing in the Helena area (See Appendix D). Of the 70 physicians who received the postal survey, 58.6 % (41) responded; however, 8 surveys were excluded because they were either incomplete or had been returned unanswered because the physician had retired. This left 47.1% (33) for analysis. As well as gathering socio-demographic data, the survey assessed the physicians’ in the following areas:

1) Physicians’ familiarity and attitudes concerning counseling
2) Physicians’ familiarity with Huntington’s disease, and with the protocol adapted for use by Shodair
3) Extent of agreement with the existing protocol
4) Opinion of physicians regarding the protocol’s strengths and weaknesses
5) Physicians’ recommendations for revision

Frequencies were determined using SPSS—Statistical Package for Social Sciences (See Appendices E & F).

Overall, physicians believed the protocol has many strong points. When asked to what extent they agreed with Shodair’s protocol, 34.4% strongly agreed and 42.4% agreed with it. In implementing the protocol, clinicians at Shodair
make use of psychological assessments to determine whether patients are prepared for testing. They also conduct one-on-one discussions with patients about the consequences of test results, provide counseling and psychological support, and offer follow-up to see how patients are coping with the results. Several Helena physicians responding to the survey identified these procedures as strengths of the protocol.

These procedures reflect Shodair's commitment to a more holistic and comprehensive approach to patient care. Developing this protocol was a step in the right direction and I applaud the efforts of those who have worked so diligently towards developing these guidelines. My research indicates, however, that there are weaknesses in Shodair's protocol that need to be addressed. Some of these weaknesses include: failure to include the primary care physician, a vague, casual, and non-mandated follow-up, a lengthy waiting period for the disclosure of results, and a lack of coordination and development of a testing/wellness team. Many Helena physicians also noted these weaknesses in their responses to the survey.

In light of this research, I have discerned several areas among the protocols that need to be revised in order to grant patients their right to adequate healthcare and to continue meeting the biological, psychological, and psychosocial needs of the 150,000 individuals at risk today. The next section will detail the nature of these revisions.
PART FOUR: PROPOSED REVISIONS OF THE PROTOCOLS

In light of my research, I propose revising current protocols in five major areas:

1) Consistency among protocols
2) The role of the primary care physician
3) The waiting period for test results
4) The length of follow-up
5) Development of a testing/wellness team

Consistency Among Protocols

Variations exist between the guidelines presented by the International Huntington Disease Society (IHDS) and the Huntington Disease Society of America (HDSA). The information presented by one organization, for example, is not presented by the other. In other cases, the data is presented by both protocols, but the recommendations are different. Conflicting recommendations regarding the length of follow-up is one case in point.

These kinds of inconsistencies have lead to confusion and uncertainty as hospitals around the country attempt to abide by the guidelines in developing their own protocols. Clearly, the medical community needs to combine the two sets of guidelines into a common source that can be used to establish uniform requirements for every testing center.
Role of the Primary Care Physician

In a surprising omission, both the IHDS and the HDSA failed to mention the role of the primary care physician in the testing process (See Appendices A & B, respectively). In following these accepted guidelines, the protocol adopted by Shodair Children's Hospital also excludes any mention of the primary care physician, thus overlooking an important player in the testing process. Several Helena physicians who responded to the survey noted this omission, identifying the exclusion of the primary care physician as one of the protocol's weaknesses.

There are several reasons why a primary care physician's involvement should be stated as a guideline. First, the primary care physician is knowledgeable about the patient's medical history as well as the medical histories of the patient's family. This makes the physician a perfect mediator, providing accurate data that has either been forgotten or is extremely difficult to communicate clearly during the stressful pre-test period. Moreover, as mediator, the primary care physician is in a position to advise patients about information they receive from clinical geneticists, as well as to inform the protocol's clinician how a particular patient is coping with the testing situation.

Second, the primary care physician's experience with individual patients can minimize feelings of novelty and isolation that may accompany working with the new clinicians during the testing process, if a sound doctor/patient relationship exists. The comfort of a familiar face among the crowd may be the key to opening up patients who may be more apt to speak freely with their
primary care physician about questions and concerns they may have about the testing.

Third, after the predictive testing occurs, it is the primary care physician who remains in close contact with patients through routine check-ups, thus providing an opportunity for long-term follow-up. Through this doctor/patient relationship, the primary care physician would be able to spot warning signs that indicate whether patients are having psychological difficulties. For example, often patients either experience attitudes of denial or they overestimate their ability to cope with the test results (Tibben, et al., 1993).

The psychological state of denial often allows carriers the opportunity of unconsciously working through the painful results they have received. According to a publication from the *American Journal of Medical Genetics*, "this form of adjustment may be maladaptive when the actuality of a positive result is ultimately avoided and is not integrated into daily life" (Tibben, et al., 1993). When the reality of the results hit home, various problems may arise. For example, the primary care physician may observe obsessive behavior due to experiencing the uncertainty and concern for how and when the disease will manifest itself (Tibben, et al., 1993). They may also observe marital conflict, as well as suicidal depression (Tibben, et al., 1993; Schoenfeld, Myers, Cupples, Berkman, Sax, & Clark, 1984; Farrer, 1986). Studies suggest that individuals often seek their physician's support after the disclosure of their results (Thomassen, Tibben, Niermeijer, van der Does, & van de Kamp 1993).
Guidelines for Follow-up

As noted above, the Huntington's Disease Society of America (HDSA) and the International Huntington Disease Society (IHDS) present vague or overly general guidelines that fail to address many of the problems and issues surrounding follow-up. The HDSA simply states that "regularly scheduled follow-up is a necessary and important part of testing" (See Appendix B). The IHDS provides more rigid guidelines. They advise the counselor to make contact with the applicant within the first week after results are disclosed, stress the importance of the availability of counseling to those who cannot afford it, and recommend that lay organization's support be offered regardless of membership status (See Appendix A). Granted, these recommendations are more specific than the HDSA, but neither organization provides the kind of specific concrete guidelines needed for adequate follow-up.

Follow-up is a crucial part of the testing process, because it gives clinicians the opportunity to assess how patients and their families are coping with the situation and to identify high-risk situations that may lead to psychological crisis. Many times families try to hide from the reality of the disorder, which leads to generations of secrets and lies about Huntington's disease (Huntington's, 1996; Wexler, 1990). Follow-up provides an excellent opportunity to clear up any misconceptions about the disease that patients may have learned through experiencing the disease in their families. Even though the
effects Huntington’s disease may have on patients’ lives are discussed on the first visit, after results are received, reality may force their perceptions to change. Follow-up also aids patients in dealing with their new perceptions so they can make responsible decisions when dealing with marriage, family planning, employment, insurance, healthcare, and other issues. For these reasons and for reasons not yet discussed, follow-up needs to be aggressive and sustained.

Currently, the guidelines for follow-up offered by the IHDS and the HDSA are too vague to be effective. In order to respond to the substantial problems that can occur to an individual dealing with predicative testing, a mandatory follow-up schedule should be developed and implemented that begins prior to the disclosure of test results and that follows the progress of patients regardless of the outcome (Quaid, 1992).

A predetermined follow-up schedule is beneficial because it frees the patients from deciding whether they need or can afford further counseling, thus removing the embarrassment of having to admit that they are having trouble coping and that they need help (Quaid, 1992). In many cases, by the time individuals realize they are having trouble coping, they have suffered considerably, are extremely depressed, and are causing great harm in their family relationships. For example, marital conflict may occur due to the defense mechanisms individuals display while anticipating the burden of having Huntington’s disease (Tibben, et al., 1993). Defensive behavior can leave their
spouses feeling alone and isolated with no one to talk to, which only worsens family conflict (Tibben, et al., 1993).

An aggressive and sustained follow-up program can also help with the significant problem of suicide among Huntington's patients. One study reported that in comparison to the general population, Huntington's patients between the ages of 10 and 49 years are three times more likely to commit suicide; patients between the ages of 50-69 years are twenty-three times more likely to commit suicide (Schoenfeld, et al., 1984).

If these rates seem alarming, consider that the prevalence of suicide in individuals who suspect they may have Huntington's is four times higher than among those who are actually diagnosed (Schoenfeld, et al., 1984). For this reason, immediate and sustained follow-up needs to be mandated. It is imperative that clinicians use aggressive follow-up to monitor how patients are coping psychologically; otherwise, patients may be lost to suicide.

Adequate follow-up not only includes patients who receive a positive result, but also includes those who have a negative result. The reason for this may not seem immediately obvious, but it has been found that patients' initial sense of relief is often followed by feelings of depression and guilt because they have escaped the fate of affected family members. In fact, one-half of those identified as non-carriers found no relief from their results and one-third sublimated feelings of guilt by exaggerating their attention to affected family members (Tibben, 1993).
Although non-carriers are free from the horrible effects of the disease, they are still greatly affected by it. Relationships with parents and siblings are often strained as non-carriers fall into playing the role of the caretaker. Taking care of affected family members, watching them suffer, coping with the financial burden of medical costs, and living with the stigma of being plagued with “that disorder” are just a few of the problems.

Huntington's disease also puts a great deal of strain on marriage and family roles. Not only does the role of the affected individual change, but the spouse's role changes as well. As the disease progresses, the affected individual is less apt to fulfill once effortless tasks leaving the spouse with more and more responsibilities. In addition to taking on the role of primary care giver, the spouse is also left to make the majority of the decisions that affect the family, do more of the housework, make up for lost wages, and take on more of the parenting.

These pressures are often destructive for the family. Statistics show that 18% of the Huntington’s disease patients surveyed were involved with legal proceedings on charges ranging from cruelty to child abuse, and 19% were alcohol dependent (Hayden, 1981). Studies indicate that Huntington's disease patients manifest antisocial behaviors that lead them to commit major crimes with greater frequency than the general population. This result is no doubt due to a diminished inhibitions regarding aggressive impulses, which is a result of the disease's degenerative process (Hayden, 1981).
Considering the range of problems confronting non-carriers who live with Huntington’s disease patients, it is essential that they be included in the follow-up program. It provides them with the support they need to cope with the disease and to help them lead balanced, guilt-free, healthy lifestyles.

The appropriate length of the follow-up program is still undetermined. Each individual is different, and will experience the testing situation differently. Studies illustrate that adverse reactions occur at various times after the test results are given. Kimberly Quaid of the Department of Medical Genetics at the Indiana University School of Medicine, reports that individuals with decreased risk are likely to encounter depressive symptoms at least two months after disclosure (Huggins et al, 1992), whereas those with increased risk experience a critical period within the first month (Bloch et al, 1992). Arend Tibben, a forerunner in the study of the psychological affects of Huntington’s disease, suspects stress may be present for periods longer than six months, and that longer observation periods are required to study changes of distress over time (Tibben, 1993). Preliminary findings of long-term studies showed that 2 out of 4 identified carriers attempted suicide and all 4 had depressive feelings and two other carriers requested psychiatric hospitalization after one year (Tibben, 1993). These carriers had coped well with test results until shortly after 6 months (Tibben, 1993).
Clearly the evidence supports the need for aggressive long-term follow-up. What is needed now is research that investigates patient experience more fully so a defined timeline can be developed.

The Waiting Period for Test Results

The information provided by the recommended guidelines of both the International and the National Huntington's Disease Societies, present the same information regarding the waiting period (See Appendices A & B). These vague instructions include advising that "results should be delivered in person as soon as reasonably possible after the completion of the test, on a date agreed upon in advance among the center, the counselor, and the individual" (See Appendices A & B). Again, these guidelines do little to aid centers in developing individual protocols. Shodair Children's Hospital has adopted a one-month waiting period between the time of the actual blood test and the disclosure of test results. Disclosure is made personally in a one-hour clinic visit (See Appendix C).

But the findings from my research indicate that one month is far too long of a waiting period for individuals facing such potentially life-changing results. One survey of individuals who had completed predicative testing found that they claimed the waiting period to be the absolute worst time of their lives (Tibben, 1993). One woman recalls:

I never imagined the emotions I've been through these last days, thinking about my entire life and my character and would I be able to stand this knowing. I picked up the phone to call you and cancel at least twice. It was so hard and so personal, so very, very, personal (Quaid, 1992).
Helena physicians also identified the extended waiting period as a weakness in the protocol and several advised shortening the waiting period. The appropriate interval for the waiting period, however, has yet to be determined. Further studies need to be conducted to investigate how well individuals cope with various waiting periods and to establish the appropriate interval that will provide the patient with the care and support they deserve.

**Staffing and Operation of the Testing/wellness Team**

In respect to the staffing of the testing/wellness team, the guidelines provided by the International Huntington Disease Society and the Huntington’s Disease Society of America are inconsistent and inadequate. The IHDS simply suggests a multi-disciplinary team that consists of "a geneticist, a neurologist, a social worker, a psychiatrist, and someone trained in medical ethics questions" (See Appendix A). No specific guidelines regarding the operation of the team are suggested.

The HDSA does not even mention integrating healthcare professionals into a treatment team. They do, however, recognize the important role an allied team of professionals plays in patient care. Their pamphlet, entitled *Huntington’s Disease: A Guide for Families*, recognizes that adequate treatment involves various professionals. The HDSA has taken one step in the right direction by recognizing the importance of a team approach; now they need to take another step by implementing a team approach from the beginning, starting with testing.
Helena physicians responding to the survey noted that "undefined personnel" was a definite weakness, as well as a lack of coordination among health care providers. Clearly, a specific list of healthcare providers needs to be defined and integrated into a testing/wellness team coordinated in such a way as to accommodate the testing individual's psychological, psychosocial, and biological needs. The following two sections propose a set of criteria for staffing and for the coordination of the testing/wellness team.

Staffing of the Testing/wellness Team

According to Kimberly Quaid, successful programs are directed by professionals from diverse backgrounds, including neurology, psychology, medical genetics, and genetic counseling (1992). Diversity is the key if the protocol is going to address adequately the many needs of individuals in the process of testing. But this diversity must extend beyond those who direct the programs. An alliance of health care professionals should be implemented to provide psychological support, medical care, and knowledge to inform and to answer patients' questions. The following criteria for the development of a testing/wellness team are proposed:

Criterion #1: The testing/wellness team should include professionals with knowledge about genetics and the long-term effects of the disease.

Fundamental to the wellness team is the neurologist, who has skills to perform the neurological examination called for in the protocol and is
knowledgeable about Huntington’s disease as a neuropsychiatric disorder. Neurologists are also valuable in cases where individuals who may already exhibit Huntington’s disease symptoms present themselves for testing, because they can treat the disease. If a diagnosis is made, predictive testing is bypassed and the applicant is already supplied with a doctor knowledgeable about their disorder.

In addition to a neurologist, a genetic counselor is needed to help patients explore the positive and negative ramifications that follow from testing either positive or negative. A medical geneticist is also needed to:

1) Keep the wellness team updated on new advances and to answer any questions patients may have about the hereditary nature of their disease.
2) Explain where the gene is located, what the mutation is, and specifics about the DNA analysis.
3) Examine family and medical histories to determine if there is significant factors putting patients at risk for carrying the Huntington’s disease gene.

Criterion #2: The testing/wellness team should include professionals who can provide psychological support and guidance over an extended period of time.

As noted above, Huntington’s disease often results in serious psychological trauma. Because of this aspect of the disease, psychiatrists, licensed counselors, and/or psychologists are needed to help individuals cope with the testing situation and with the pressures that attend the disease. Licensed counselors and/or psychologists also have the skills required to perform the psychological evaluations called for in the protocol. These evaluations determine
whether the applicant is mentally prepared to deal with the ramifications of predictive testing. In cases where a patient is experiencing extreme difficulties, a psychiatrist will be available to prescribe psychoactive drugs.

Criterion #3: The testing/wellness team should be staffed with professionals who can assist patients with the social and financial burdens of the disorder.

Support professionals such as social workers, community activists, and social service workers may prove beneficial in helping Huntington's disease families advance their social conditions by providing guidance and assistance in the form of social services. Connecting patients with social services regardless of their results is necessary to help them and their family finding assistance in providing and caring for their sick loved ones. Some resources for patients include:

1) The mailing list for Huntington's Disease which can be located at http://www.lib.uchicago.edu/~rdl3/hd/mailing.html.
2) HDSA Email: curehd@idt.net
3) HDSA question line: 1-800-345-HDSA
4) HDSA web page at http://neuro-www2.mgh.harvard.edu/hdsa

Criterion #4: The testing/wellness team should be staffed with professionals who function as mediators, providing prolonged support and contact between the testing individual and clinicians.

The importance of the primary care physician has been discussed above and need not be repeated here. It is important to note, however, that the primary care physician, in concert with nursing support, is in a unique position to keep the wellness team up-to-date on patients' psychological well-being, and on the
progress, if symptoms are shoeing, of the disease. The primary care physician can notify colleagues when the individual needs their assistance, while encouraging patients to seek help.

Criteria #5: The testing/wellness team should include professionals who can provide useful information about how patients can adapt to the disease as it runs its course.

There may not be an immediate need for these professionals; however, patients testing positive need to be made aware of their availability and of the services they are equipped to provide so when symptoms manifest, they are already knowledgeable as to the support available. Professionals armed with knowledge of the possibilities of adapting to the disease may provide a source of hope for the patients. Another reason it is imperative these professionals are included in the protocol is for cases in which testing individuals are already affected by the disease. In these situations, testing is bypassed, and patients need to make contact with these professionals immediately. Physical and occupational therapists and speech-language pathologists may serve these purposes by showing patients how they can overcome some of the debilitation by learning new ways to accomplish tasks.

A professional trained in medical ethics would also be beneficial. As an advisor to the wellness team, a medical ethicist could help the team assist patients in untangling the continuing issues surrounding family planning, career choices, family relationships, and medical care.
Given these criteria, the testing/wellness team should consist of a core team that is responsible for the protocol basics (testing). The team should also include a support group of professionals to assist the core team in treating the patient and not just the disease (wellness). The combined testing/wellness team should thus include the following staff on a full-time, part-time, or consulting basis, dependant upon the patients' specific situations:

1) A genetic counselor and/or medical geneticist to explain the accuracy and other specifics concerning predictive testing
2) A neurologist to perform the neurological examination and provide knowledge concerning Huntington's disease as a brain disorder
3) A psychologist responsible for performing the psychological screening and for assisting the applicant in maintaining mental health while coping with testing
4) The patient's primary care physician who can aid in compiling medical and family histories, and provide a familiar face and source of support for the patient.
5) Physical therapists, speech-language pathologists, and occupational therapists
6) Support professionals such as social workers, community activists, social service workers, etc.

Operation of the Testing/Wellness Team

The testing team would be present for the initial meeting to allow introductions themselves and to provide patients with a list of the members of the wellness team. A wellness team contact list including each of the professionals' names, specialties, addresses and telephone numbers, as well as the resources they are equipped to provide, offers patients tangible evidence of the support available for them; not only for the time being, but for later, when their status develops to "affected," and they must start coping with the symptoms. This list
should also include addresses of lay organizations that have organized to inform and to support Huntington's disease families.

Upon completing the medical and family history evaluation, psychological screening, and neurological examination, the treatment team is responsible for presenting its discoveries to the wellness team. Together, they decide which staff members should become directly involved with the patient. A new committee is developed to best serve the patient's needs, and when the patient is ready, testing occurs.

The staffing of the committee will vary with each patient. For example, a patient may already exhibit symptoms of the disease. In this case, the introduction of a group of professionals is immediate: the neurologist, psychologist, genetic counselors, physical therapists, speech therapist, and occupational therapists should be called upon immediately to help the individual cope with the progression of the disease. Though the presence of symptoms before predictive testing is not the standard case, it does occur and the team must be flexible enough to accommodate such a patient.

Clearly, the protocols for prediagnostic testing and the proposed revisions provide physicians with guidelines for the practice of holistic medicine. But I believe these guidelines can have a beneficial impact on the medical profession as a whole. By way of conclusion, I shall discuss some of the implications of the revised protocol for healthcare, as well as some problems that may arise in expanding its application to treating other diseases.
PART FIVE: THE IMPLICATIONS OF THE REVISED PROTOCOL FOR HEALTHCARE

As noted at the beginning of this study, the medical world's scientific and technological focus has led to incredible advances in the diagnosis and treatment of disease. For example, the development of sophisticated computer controlled diagnostic technology and advanced surgical procedures now give doctors a means of looking inside the body in various ways to determine how it is functioning under various conditions (Kabat-Zinn, 1990).

These new diagnostic technologies include:

1) Sonography
2) CAT scanning
3) PET scanning
4) MRI scanning (Kabat-Zinn, 1990).

Recent surgical advances include:

1) Laser technology to preserve vision
2) Artificial joints to restore mobility and relieve pain from arthritis
3) Organ transplants to replace organs that are otherwise useless and lethal with healthy functioning replacements (Kabat-Zinn, 1990).

While these advances give the medical world knowledge for improving the way it diagnoses and treats many diseases, information regarding many more illnesses, including Huntington's disease, remains undeveloped (Kabat-Zinn, 1990).

When it comes right down to medicine's ability to treat certain diseases and the people who have them, we discover very real limits and major areas of ignorance (Kabat-Zinn, 1990). At present, there are few medical cures on the
horizon for chronic diseases even though they are a major cause of suffering,
disability, and death (Kabat-Zinn, 1990). There are also many diseases with
origins that are completely mysterious or, as in the case of Huntington's disease,
are intimately linked to factors outside the direct influence of medicine and
science as they are presently organized. These factors include:

1) Social factors such as poverty and social exploitation
2) Dangerous working conditions
3) Stressful and poisonous environmental conditions

Despite these limitations, the common perception is that modern
medicine's knowledge is so powerful that patients' understanding, cooperation,
and collaboration in treatment are of minor value (Kabat-Zinn, 1990.)

Technological and scientific sophistication has lead medicine to an impersonal
approach to health care. Patients are made to feel inadequate, or ignorant, or in
some way to blame for their condition; especially when there is a lack of
response to treatment. This impersonal and insensitive approach has been
displayed in the doctor/patient relationships and has created instances of
inadequate medical care (Kabat-Zinn, 1990). Focusing on science and
technology rather than on patient service leaves patients feeling afraid, ignored,
neglected and bureaucratically managed.

A cardinal aphorism of traditional medicine is that, "care of the patient
requires caring for the patient" (Kabat-Zinn, 1990). To reclaim this fundamental
tenet of patient care, this study has argued that the medical profession needs to
return to the “beneficence principles of provision,” which obligates healthcare to promote and to prevent harm, and to promote the welfare of patients. To that end, this study has proposed a revised protocol for predictive testing for Huntington’s disease that focuses on the wellness aspect of patient care.

With this shift in emphasis, the revised protocol not only serves the welfare of the patient, but it also preserves the sanctity and centrality of the physician/patient relationship—a necessary component of patient care that is often left out of treatment plans altogether. The team approach is the best way to provide the comprehensive patient care needed when treating catastrophic disease, because it not only encourages, but it demands physicians and other health care professionals be fully present to their patients. The one-on-one interaction called for by the revised protocol fosters physician/patient relationships necessary for opening lines of communication and also for building patients’ trust and confidence in the professionals involved in their treatment. This interaction also allows the team to evaluate how patients are coping with their illnesses, identifying any factors with which they may need help coping. From there, the team can offer psychological support, guidance, and referral many patients need to combat their illnesses.

Although the revised protocol was designed specifically with Huntington’s disease patients in mind, I believe it provides the medical profession with a practical model for treating patients facing any terminal, chronic, and/or acute disease, such as Parkinson’s disease, AIDS, and the more virulent forms of
cancer. The revised protocol re-institutes service into medicine by actively acknowledging that the “care of a patient requires caring for the patient” as it demands honoring and preserving the dignity of patients throughout their entire encounter with medicine, regardless of the outcome.

Attending to the complexity of human disease with compassion and care can produce dramatic results. In 1989, David Spiegel and colleagues at Stanford Medical School published an article about a study that tried to disprove the notion that psychosocial interventions could prolong the life of women with breast cancer (Ornish, 1998).

In this study, women with metastatic breast cancer were randomly assigned to two groups. Both groups received conventional medical care such as chemotherapy, surgery, radiation, and medications. In addition, one group of women met together for ninety minutes once a week for a year. Patients were encouraged to regularly visit and to express their feelings about the illness and its effect on their lives in a supportive environment, safe enough for them to express fears of disfigurement, of dying, of being abandoned by their friends and spouse, and so on. The groups continued meeting once per week for just one year (Ornish, 1998).

David Ornish reports, “the only variable found to affect survival time was participation in the weekly group sessions” (1998). The study found that all of the women who did not have a support group died after five years; and the only women who were still alive at the time, had received the weekly psychological support (Ornish, 1998). The time interval from first metastasis to death was also significantly longer in those receiving weekly support (Ornish, 1998).

Despite these positive results, many patients let the psychological effects of disease fall by the way side because support groups are considered an “extra”
that are not an integral part of disease management. The study of the breast
cancer patients provides solid evidence against such a view and shows how
effective a holistic approach to patient care can be in respect to survival rates
and quality of life for patients. Thus, healthcare professionals should provide and
strongly advocate the use of support groups for all patients who wish to utilize
psychological therapy in their treatment plans.

The revised protocol could also be used as a model for treating
physiological disorders that may be controlled if psychological factors are taken
into account. Consider a physician treating a patient with cirrhosis of the liver.
The patient is an alcoholic and so any progress made in treating the disease is
quickly reversed due to the underlying problem. If the doctor has fostered a
trusting relationship with the patient, the patient may either confide with the
doctor about the drinking habit, or the doctor may be able to identify clues and
discover the maladaptive behavior. Either way, the physician would be able to
refer the patient to the proper health care professionals needed to combat the
alcoholism. Unless the alcoholism is addressed, there is no real hope of treating
the disease, because though the symptoms are relieved, the cause remains
untouched. In this case, the protocol could facilitate physician/patient
communication needed to not only treat the disease, but to identify confounding
variables that otherwise hinder treatment.
Potential Problems with the Revised Protocol

It should be noted that although the revised protocol adds many benefits to patient care, there are some potential problems that may challenge expanding the revised protocol across the medical world. Two primary obstacles are: (1) the cost of launching and maintaining the revised protocol, and (2) organizing and sustaining a testing/wellness team of healthcare professionals who are already strapped for time.

In this age of managed care, launching and maintaining the revised protocol will no doubt be costly. A testing/wellness team that accommodates the diverse needs of the patient, and that conducts long-term follow-up and oversight may seem to be an expensive luxury. Although proposing methods of funding for the revised protocol lies beyond the realm of this thesis, I believe the costs of the program could be offset in part by the efficient use of community resources that a testing/wellness team would bring. Essentially, the team functions as a clearinghouse for the community, directing patients to resources for dealing with problems that if left untreated can lead to greater costs—both in money and in human suffering.

Producing, organizing, and coordinating the staff of a testing/wellness team are problems that may be difficult to solve, but the quality of care it provides is well worth the effort. Clearly, strong administrative leadership and community outreach are two elements crucial for the long-term success of the team. Hospital administrators, for example, could mandate participation in the testing/wellness
team, with appropriate compensation to staff. Outreach coordinators could elicit the support for community leaders and activists, advocate for the necessity of pro bono work, and explore outside sources for staffing and for funding the staff.

Though these and other problems may arise from expanding the revised protocol across the medical profession, the degree of patient care possible from its application is worth far more than any effort exerted in making it's principles the basis for a holistic approach to medicine.

In summary, we need to consider far more than just the biological components of disease when treating patients. The revised protocol provides a model for the medical world to build from, and once its principles become the foundation of patient care, patients will become happier and healthier. By actively treating patients and not just their diseases, as exemplified by the revised protocol, medicine will restore quality once lost to patients' lives.
Works Cited


Farrer Lindsay A. Suicide and attempted suicide in Huntington’s disease: implications for pre-clinical testing of persons at risk. *American Journal of Medical Genetics* 1986; 24:305-311.


APPENDIX A
GUIDELINES PRESENTED BY THE INTERNATIONAL HUNTINGTON'S DISEASE SOCIETY
Guidelines for the Molecular Genetics Predictive Test in Huntington's Disease

FOREWORD: Recommendations concerning the use of a predictive test for the detection of Huntington's disease (HD) were drawn up by a committee consisting of representatives of the International Huntington Association (IHA) and the World Federation of Neurology (WFN) Research Group on Huntington's Chorea. The establishment of a committee with the specific task of preparing such guidelines was agreed upon at the WFN and IHA conferences in Lille, France, in September 1985. The first recommendations were adopted by each of the organizations at their respective meetings in Vancouver, BC, Canada, June 30 to July 3, 1989, and published in the JOURNAL OF THE NEUROLOGICAL SCIENCES (1989;94;327-332) and the JOURNAL OF MEDICAL GENETICS (1990;27;34-38).

Revision of these guidelines was necessary in view of the report, published in March 1993, of the detection of the gene defect. Present and original members of the committee are as follows in alphabetical order: Jytte Broholm (Denmark), Jean-Jacques Cassiman (Belgium), David Craufurd (UK), Arthur Falek (USA), Carys Farmer-Little (France/UK), Michael Hayden (Canada), Robyn Kapp (Australia), Kai Krahnen (Germany), Ascuncion Martinez-Descals (Spain), Marion Mol (Belgium), Nitnos Myrianthopoulos (USA), Henry Petit (France), Kimberly Quaid (USA), Chris De Somviele (Belgium), Elaine Taylor (Canada), Audrey Tyler (UK), Ralph Walker (Canada), Loe Went (Holland), and Nancy Wexler (USA)

Introductory Remarks
1. The present document provides realistic, ethical principles based on current knowledge and techniques in molecular genetics.
2. We are convinced that the different sections of these recommendations are inextricable parts of a whole. The test should be offered only if all the recommended provisions are available.
3. These recommendations are set forth by members of the HD family organizations and the biomedical community as guidelines to protect at-risk individuals; therefore, it is of the utmost importance that the guidelines are at all times available to these individuals so that they can freely make informed decisions.
4. The guidelines are also intended to assist clinicians, geneticists, and ethical committees as well as lay organizations to resolve difficulties arising from the application of the test. The committee is willing to provide advice on problems related to the interpretation of these guidelines.
5. In these guidelines, use of the DNA test for diagnostic purposes - eg. in the case of a suspicious or uncertain clinical picture - has not been
considered. But it may have a profound (predictive) effect on siblings and other relatives.

**Recommendations**

1. All individuals who may wish to take the test should be given up-to-date, relevant information so that they can make an informed, voluntary decision.

2. The decision to take the test is solely the choice of the individual concerned. No requests from third parties - family members or otherwise - shall be considered.

   2.1 The test is available only to individuals who have reached the age of majority (according to the laws of the respective country).

   2.2 Each participant should be able to take the test regardless of his or her financial situation.

   2.3 Individuals should not be discriminated against in any way as a result of genetic testing for HD.

**Comments**

1. Counseling of the highest standards should be available in each country. It is recommended that, as a standard medical practice, informed consent for the test be documented with the signature of the person to be tested and the professional responsible for the counseling.

2. The individual must choose freely whether to be tested and must not be coerced by family, friends, partners or potential partners, physicians, insurance companies, employers, governments or others.

   2.1 A prenatal test may constitute an exception to this role. Testing for the purpose of adoption should not be permitted, since the child to be adopted cannot decide for himself or herself whether to be tested. It seems appropriate and even essential, however, that the child be informed of his or her at-risk status upon reaching the age of reason.

   2.2 Each national lay organization should use its influence with government departments, public and private health insurers, and other organizations to reach this goal.
2.4 Extreme care should be exercised when testing would provide information about another person who has not requested the test.

2.4 This issue will arise when a child at 25% risk requests testing with full knowledge that his or her parent does not want to know his or her own status. Every effort should be made by the counselors and the individuals concerned to arrive at a satisfactory resolution of this conflict. A considerable majority of representatives from the lay organizations feel that if no consensus can be reached, the right of the adult child to know should have priority over the right of the parent not to know.

2.5 For applicants with evidence of a serious psychiatric condition, it may be advisable that testing be delayed and support services put into place.

2.6 Testing for HD should not be part of a routine blood investigation without the specific permission of the subject.

2.6 Such specific permission should in principle also be required for symptomatic individuals.

2.7 Ownership of the test results remains with the individual who requested the test. Legal ownership of the stored DNA remains with the person from whom the blood was taken.

2.7 The consent form should address this issue. Local legal opinions may be helpful.

2.8 All laboratories are expected to meet rigorous standards of accuracy. They must work with genetic counselors and other professionals providing the testing service.

2.8 The lay organizations can provide an inestimable service in inquiring about the standards of the laboratory and can assist individuals who want to be or have been tested with their inquiries and concerns.

2.9 The counselors should be specifically trained in counseling methods and form part of a multi-

2.9 Such multi-disciplinary team should consist of, eg, a geneticist, a neurologist, a social worker, a
3. The participant should be encouraged to select a companion to accompany him or her throughout all stages of the testing process: the pretest stage, the taking of the test, the delivery of results, and the post-test stage.

3.1 The counseling unit should plan with the participant a follow-up protocol that provides for support during the pre- and post-test stages regardless of whether the participant chooses a companion.

4. Testing and counseling should be provided within specialized genetic counseling units knowledgeable about molecular genetic issues in HD, preferably within a university department. These centers should work in close collaboration with the lay organizations of the country.

4.1 The laboratory performing the test should not communicate the final results to the counseling team until very close to the time such results are to be revealed to the participant.

4.2 Under no circumstances shall any member of the counseling team or the technical staff communicate information concerning the test or its results to third parties without the written permission of the applicant.

4.3 Neither the counseling center nor the test laboratory should establish direct contact with a relative whose psychiatrist, and someone trained in medical ethical questions.

3. This companion may be the spouse/partner, a friend, a social worker, or any individual who has the confidence of the participant. It may not be appropriate for the companion to be another at-risk individual.

3.1 Support should be available close to the individual's community.

4. Often the test will be conducted at a site other than the counseling center. If no lay organization exists in the country, the center should contact the IHA.

4.1 The aim is to protect the participant from the possibility of counseling bias at any time (see also comment 5.2.5).

4.2 Only in the most exceptional circumstances (i.e., prolonged coma, death, and the like) may information about the test results, if so requested, be provided to family members.
DNA may be needed for the purpose of the test without permission of the applicant. All precautions should be taken when approaching such a relative.

5. Essential information

5.1 General information

5.1.1 On HD, including the wide range of its clinical manifestations, its social and psychological implications, its genetic aspects, options for procreation, availability of treatment, and so forth.

5.1.2 On the implications of nonpaternity (and nonmaternity).

5.1.3 On support and information available from lay organizations, including their documentation on HD, addresses for help and social contacts, and so forth.

5.1.4 Psychosocial support and counseling must be available before the test procedure commences.

5.2 Information pertaining to the test.
5.2.1 How the test is done.

5.2.2 Possible need for DNA from one other affected family member and the possible problems arising from this.

5.2.2 Asking an affected individual, who may be unaware of or unwilling to acknowledge his or her symptoms, to contribute a blood sample may be an invasion of privacy.

5.2.3 The limitations of the test (error rate, the possibility of an uninformative test, and so forth).

5.2.3 Asking a family member who may be unaware of or unwilling to acknowledge his or her symptoms, to contribute DNA may be an invasion of privacy.

5.2.4 Much more information will be needed about the implications of the number of repeats.

5.2.4 The counselor must explain that, although the gene defect has been found, at the present time no useful information can be given about age at onset or about the kind of symptoms, their severity, or their rate of progression.

5.2.5 The predictive test indicates whether someone has or has not inherited the gene defect, but it does not make a current clinical diagnosis of HD if the gene is present.

5.2.5 The predictive test indicates whether someone has or has not inherited the gene defect, but it does not make a current clinical diagnosis of HD if the gene is present.

5.3 Information on consequences.

5.3.1 For the participant himself or herself.

5.3.1 For the participant himself or herself.

5.3.2 For the spouse/partner and children.

5.3.2 If the companion of the participant is not his or her spouse/partner, special consideration should be given to such...
5.3.3 For the affected parent and his or her spouse.

5.3.4 For the other members of the participant's family.

5.3.5 Socioeconomic consequences of the test results, including potential employment, insurance, social security, data security, and other problems.

5.4 Information on alternatives the applicant can consider.

5.4.1 Not to take the test for the time being.

5.4.2 To deposit DNA for research.

5.4.3 To deposit DNA for possible future use by family and self.

5.4.4 DNA deposited under 5.4.2 above would be made available to the donor's family members at their request after the death of the donor if it is essential to obtain an informative result.

5.4.5 In the case of DNA deposited under 5.4.2 or 5.4.3 above, the unit collecting the DNA must provide a written declaration that samples will not be used for purposes other than those specified in the said declaration with the exception of the provisions of 5.4.4.

6. Important preliminary investigations.

6.1 It is important to verify that the diagnosis of HD in the family of the individual is correct.
6.2 Neurologic examinations and psychological appraisal are considered important to establish a baseline evaluation of each individual. Any other specialized tests are always noncompulsory; refusal may not affect participation in the test.

7. Antenatal diagnosis

7.1 It is essential that antenatal testing for the HD mutation be performed only if the parent has already been tested. For a possible exception, see recommendation 7.3.

7.2 The couple requesting antenatal testing must be clearly informed that if they intend to complete the pregnancy if the fetus is a carrier of the gene defect, there is no valid reason for performing the test. Furthermore, this situation is contrary to recommendation 2.1, since a child thus born with the gene defect cannot elect not to take the test upon reaching majority.

7.3 Test centers may still perform an exclusion test for a future pregnancy if a 50% at-risk person specifically requests it. For this test, the at-risk individual and the partner, parents, and fetus are tested only with adjoining DNA probes.

8. The test and delivery of results.

6.2 Refusal to undergo these and other additional examinations will not justify the withholding of the test from applicants.

7.1 It is highly desirable that both parents agree to an antenatal test. If there is a conflict, every effort should be made by the counselors and the couple to reach an agreement. Exceptional circumstances (eg. rape or incest) may justify deviating from this recommendation.

7.2 Testing a fetus carries with it a small additional risk of miscarriage and, possibly, of congenital abnormality.

7.3 The purpose of the exclusion test, which was frequently performed before the gene defect itself had been found, is to permit a 50% at-risk person to exclude the possibility of having affected children without changing his or her 50% at-risk status. This includes the termination of pregnancies where the fetus is 50% at-risk and continuation of pregnancies where the fetus is only at low risk.
8.1 Excluding exceptional circumstances, there should be a minimum interval of 1 month between presentation of the pretest information and the decision whether or not to take the test. The counselor should ascertain whether the pretest information has been properly understood and should take the initiative to be assured of this. However, contact will be maintained only at the applicant's request.  
8.2 The result of the predictive test should be delivered as soon as is reasonably possible after completion of the test, on a date agreed upon in advance by the center, the counselor, and the participant.  
8.3 The manner in which results will be delivered should be discussed by the counseling team and the individual.  
8.4 The participant has the right to decide, prior to the date fixed for the delivery of the results, that these results shall not be revealed to him or her.  
8.5 The results of the test should be revealed in person by the counselor to the individual and his or her companion. No result should ever be revealed by telephone or by mail. The counselor must have sufficient time to discuss any questions with the individual.  
8.6 All post-test provisions (see section 9) must be available from the moment the test results are revealed.  

8.1 Antenatal testing may be one such exceptional circumstance. Such an interval is necessary to give the individual sufficient time to assimilate the pretest information in order to make an informed decision. During this interval, specialists from the test center must be available for further consultation.
participant prior to performance of the test, but the participant has the right to modify the planned program. Although the intensity and frequency will vary from person to person, post-test counseling must be available at all times.

9.2 The counselor should have contact with the individual within the first week after delivery of the results, regardless of the nature of the results.

9.3 If there is no further contact within 1 month of the delivery of the test results, the counselor should initiate the follow-up.

9.4 It is essential that post-test counseling be made available regardless of the participant's financial situation.

9.5 The lay organization has an important role to play in the post-test period. The information and support that it can provide should always be offered to the participant regardless of whether he or she belongs to that organization.

http://www.hdfoundation.org/testing.htm
http://www.hdfoundation.org/testing.htm<-- back to the Testing section
http://www.hdfoundation.org/index.html<-- directly to the home page
APPENDIX B

GUIDELINES PRESENTED BY HUNTINGTON DISEASE SOCIETY OF AMERICA
Guidelines for Genetic Testing for Huntington's Disease
(Revised 1994)
Huntington's Disease Society of America, Inc.

Preface

The following guidelines have been produced by the Huntington's Disease Society of America to assist health care professionals in administering the genetic test for Huntington's disease and to protect the well-being of those who choose to be tested.

These guidelines should be viewed as a framework of recommended procedures for testing; they are not regulations. Nevertheless it is strongly recommended that pre- and post-test counseling be incorporated in any program of pre-symptomatic testing for Huntington's disease along with the other preliminary screening sessions detailed herein.

The Huntington's Disease Gene Marker Discovery and the Advent of Pre-symptomatic Testing

In a surprise breakthrough in 1983, a genetic marker was discovered which localized the Huntington's disease gene to an area close to the tip of the short arm of chromosome four. This discovery paved the way for a pre-symptomatic test for Huntington's disease using DNA linkage analysis.

In 1986, testing for Huntington's disease began on a research basis at the Johns Hopkins Hospital, Baltimore, and at Massachusetts General Hospital, Boston. Because it relied on tracing the inheritance of markers linked to the gene rather than the gene itself, the test required the analysis of DNA samples from multiple family members and was 95% accurate at best. As more and more markers for the Huntington's disease gene were identified, the test became more accurate. It also became commercially available and was soon offered at over 20 centers across the United States.

The Huntington's Disease Gene

Ten years after the marker discovery, the Huntington's Disease Gene Collaborative Research Group announced in March 1993 that the Huntington's disease gene had been isolated. At one end of the gene, a pattern of three DNA bases (CAG), or nucleotides, repeats itself in all
cases. In normal individuals, this tri-nucleotide, or triplet, repeat occurs between 11 and 29 times. In people with Huntington's disease, the repeat occurs over and over again, from 40 times to more than 80.

In between the normal range of repeats and the Huntington's disease range lies an indeterminate gray area. Data continues to be collected in hopes of illuminating the significance of a repeat count in this gray area. As of May 1993, a repeat count between 30 and 39 constitutes a non-informative result.

It has been shown that a weak correlation exists between the number of repeats and the age of onset, such that those having the very highest number of repeats develop the juvenile form of Huntington's disease. Generally, however, this correlation is not tight and should not be used to attempt estimates of age of onset.

**A Direct Gene Test for Huntington's Disease**

As a result of the gene discovery, a direct genetic test for Huntington's disease has replaced the indirect linkage marker test. The new test analyzes DNA directly for the presence of the Huntington's disease mutation, obviating the need for collection and analysis of samples from multiple family members. However, a sample from an affected relative, preferably a parent, is usually required for the purposes of confirmation.

While the Huntington's disease gene discovery alters the technical aspects of predictive testing for Huntington's disease, there is still no cure for Huntington's disease and no available treatment to delay its onset or to slow, stop or reverse the disease's relentless progression. The personal, family and ethical issues surrounding the test remain unchanged, and the importance of counseling undiminished.

**Reasons for Taking the Test**

Those who choose to be tested usually do so in order to be able to make informed plans for the future regarding marriage, reproduction, career, finances and so on. Others may simply crave relief from the anguish of being "at risk." For them, knowing, whatever the outcome, is better than not knowing.

At risk women who are pregnant may wish to take a prenatal test to permit the selective abortion of a fetus found to be a gene carrier for Huntington's disease. A non-disclosing prenatal test (which is an indirect RFLP test for markers close to the gene and requires multiple samples from relatives) is
also an option for the at risk woman who does not wish to know her own
gene carrier status.

Experience has shown that while many at risk individuals indicate a desire
to know their gene carrier status, far fewer actually undergo testing. When
confronted with the opportunity for testing, the majority find that the
emotional toll or risks to confidentiality outweigh the benefits of learning
their gene carrier status.

The decision to take a pre-symptomatic test for Huntington's disease
should always be an informed, carefully considered and freely chosen
personal decision. Individuals should not be coerced into testing, whether
by a spouse, another family member, a physician, an insurance company
or an employer.

Timing

Predictive testing should take place during a time of low stress in other
areas of life and in an environment that can provide adequate support.
Except during pregnancy, testing does not involve a sense of urgency or
emergency, and indeed should be considered in a cautious manner.

The fact that it is now technically possible to obtain test results in a few
weeks rather than several months can have the effect of encouraging
individuals to rush the process. However, having enough time to really
think about the implications of testing is crucial, as evidenced by the
number of individuals who drop out of testing before receiving their test
results.

The Importance of a Team Approach

The testing program usually involves several sessions. It is recommended
that the following components be included:

Initial phone contact should include a pre-screen interview with the at risk
individual

Three pre-test, in-person sessions (genetic counseling, neurological
evaluation and psychological evaluation). Reading materials should be
given to participants to assure that they know about the testing procedure.

A fourth session for disclosure of results.

Post-test counseling sessions over a two year period.
The introduction of a direct gene test for Huntington's disease and the likely proliferation of labs offering the test will expand access to testing beyond the confines of a select group of genetic centers.

As with testing based on genetic linkage, direct gene testing will have a significant impact on individuals and their families, especially spouses and parents. Sensitivity to this fact remains an important prerequisite for testing. Each element of the testing process outlined above is necessary for a specific reason based on current knowledge of Huntington's disease and sound psychological principles. Experience has shown this process to be effective in minimizing serious outcomes resulting directly from testing. This should not be interpreted as suggesting that testing has little impact on those who take the test and their families. Rather, professionals with the most experience of testing, as well as people who have been tested, continue to urge caution.

Wherever possible, physicians are strongly advised to refer applicants for testing to the nearest designated Huntington's disease testing center. These centers are staffed with the personnel necessary to administer the counseling and other sessions outlined above.

Confidentiality

Professional-patient confidentiality is governed by individual state laws. For example, in some states, although there is professional-patient "confidentiality," patient records may be subpoenaed by a court of law and must be provided. The person being tested may wish to have his or her test results classified in a psychiatric record rather than a general medical record, as in some states this can increase the level of confidentiality of test results. The individual at risk for Huntington's disease should be aware of the laws of the particular state in which he or she is tested.

Test results should not be divulged to anyone other than the participant without the written consent of that individual. No names or identifying materials should be computer-coded. It is conceivable that the director of a particular test site may wish to use individual findings for reports or research purposes. In these instances, identifying numbers, not names, should be used to do test score analysis.

Only in the most exceptional circumstances, i.e., prolonged coma, death, etc., may information about the test result, if so requested, be provided to family members.

Test centers requesting a sample from an affected family member in addition to the at risk applicant should not establish direct contact with the
relative without the applicant's permission. All precautions should be taken when approaching such a relative.

**The Companion and Local Counselor**

At the outset, the testing participant should be encouraged to identify a companion - a spouse or a close friend - to accompany him or her to all of the testing sessions. Another at risk individual, such as a sibling, may not be a good choice as a companion. Being present throughout, he or she will gain a special insight into what the participant is going through and will thus become a uniquely valuable source of moral support.

Early identification of a counselor close to home is also recommended, particularly if the person taking the test lives some distance from the testing site. The counselor may be a psychologist, social worker, psychiatrist or another mental health professional. He or she should agree at the start to be available for emotional support and/or counseling at any time throughout the testing process, should the need arise. The counselor close to home needs to have standardized packets of information available and a consulting relationship to the testing center staff if at all possible.

**Pre-test Counseling**

Pre-test counseling is still considered the single most important aspect of testing. The goals of counseling are fairly simple:

6. To inform the individual about Huntington's disease, including the wide range of its clinical and psychological implications, the genetic aspects, and reproductive options. It must be pointed out that neither prevention nor cure is possible at this time. Palliative treatment to provide therapy for behavioral problems, nutritional concerns and physical therapy are available to maintain the best possible wellness.

7. To inform the individual about his or her current level of risk.

8. To inform the individual about his or her options for testing.

9. To inform the individual of the limitations (especially the ambiguity of a result in the intermediate repeat range - the gray area) and the level of accuracy of the procedure. The counselor should explain, for example, that although the gene defect has been found, in the event of a positive result no useful information can be given at the present time about age of onset, the kind of symptoms, their severity or the rate of progression. In addition, while the predictive
test may indicate whether someone has or has not inherited the
genome defect, it does not confirm the onset of illness when the gene
is present. Onset of the disease can only be established by
neurological examination.

10. To insure that the individual is aware of the potential negative
consequences of testing. For non-disclosing prenatal testing only,
which is carried out by RFLP linkage analysis, genetic testing may
show that the putative parent is not the biological parent. It is
unlikely that the direct DNA test will reveal non-paternity.

11. To insure that the individual has carefully thought through the risks
and benefits of testing. If possible, testing experiences of others
could be included. The implications of the testing outcome for the
future, either positive or negative, should be discussed.

It is also recognized that all individuals differ, and that persons might need
more or less time to achieve these goals depending on their experience,
previous knowledge of testing, preparation and number of years they have
been aware of their risk. Persons having only recently learned of their risk
may not have had an opportunity to fully appreciate the implications of the
test, and may not have developed defense mechanisms to deal with an
adverse outcome.

Neurological Examination

The purpose of the neurological examination is to make certain that the
individual at risk for Huntington’s disease is not showing symptoms of the
disease and is actually pre-symptomatic. Every effort should be made to
distinguish the difference between a diagnosis of Huntington’s disease
based on clinical symptoms and the finding that an individual is a gene-
carrier. A person for whom a positive clinical diagnosis has been made
may feel that he or she does not need testing. Another individual may
want confirmatory testing. However, refusal to undergo this examination
does not justify withholding the pre-symptomatic test from an at risk
applicant.

A neurological exam may also reveal soft signs suggestive of Huntington’s
disease but not sufficient to warrant a diagnosis. In some instances, what
are interpreted as soft behavioral signs, such as anxiety or depression,
may not be related to Huntington’s disease at all. The frequency of
inherited affective and anxiety disorders is considerably greater than the
frequency of Huntington’s disease. Thus, in many instances the soft
behavioral signs point to an independently inherited genetic disorder not
linked to Huntington’s disease.
A person with subtle dysfunctions may be at a slightly increased risk of being a gene-carrier or may be relatively close to more overt symptomatology. The neurological exam can provide the test facility with information about how closely an individual may need to be followed in the time immediately following the test outcome.

**Psychological and/or Psychiatric Screening**

Psychological and/or psychiatric screening is still strongly recommended based on the high levels of depression found in those at risk.

The risk of adverse emotional response remains the single greatest risk of the test. It is important that psychological evaluation of emotional stability not be viewed as a hurdle to be jumped in order to qualify for testing, but rather as a method of identifying persons likely to need greater emotional support in follow-up. In some instances, such as overt risk for suicide and/or major depressive symptoms, it is appropriate to delay testing, initiate psychiatric treatment and stabilize the individual before proceeding with the test.

**Neuropsychological Testing**

Neuropsychological testing is used by some centers as part of the pre-test evaluation. Many centers prefer to use neuropsychological evaluations after testing to establish baseline performance and to be better able to monitor the onset of symptoms or the emergence of problems that might significantly impact functioning. This testing is often very expensive and the relative importance of the additional information to be gained from it should be considered on an individual basis.

**Delivery of Results**

Excluding prenatal non-disclosing testing or exceptional circumstances, there should be a minimum interval of one month between the pre-test information and counseling sessions and the final decision to take the test. The counselor should ascertain that the pre-test information has been properly understood and should take the initiative to be assured of this.

The result of the predictive test should be delivered in person as soon as reasonably possible after completion of the test, on a date agreed upon in advance among the center, the counselor and the individual.

The manner in which results are delivered should previously have been discussed and agreed upon by the counseling team and the individual.
The participant has the right to decide, prior to the date fixed for the delivery of results, that these results shall not be given to him/her.

The results of the test should be given in person by the counselor to the individual in the presence of his/her companion. No result should ever be given by telephone or by mail. The counselor should allocate sufficient time for discussion of the test result and its implications and to provide whatever support may be necessary.

**Follow-up/Post-test Counseling**

Regularly scheduled follow-up is a necessary and important part of testing. The psychological impact of a test result - a good or a bad result - varies considerably and is difficult to predict. Some centers have found it extremely helpful to have individuals identify a local professional support person in addition to regularly scheduled follow-up with the testing center. If an individual then finds it difficult to return to the testing center, professional support is still available.

**Testing of Minors**

Minors should not be tested unless there is a medically compelling reason for doing so, i.e., an at risk child is believed to be showing symptoms. However, under no circumstances is testing a substitute for a thorough neurological and neuropsychological work-up, for the reasons mentioned previously. Parental anxiety concerning a child's risk does not constitute a medically compelling reason.

The reluctance to test minors includes situations in which prospective adoptive parents wish to have a child at risk for Huntington's disease tested prior to agreeing to the adoption. Such testing is not considered in the child's best interest. Although a result indicating that the child does not carry the Huntington's disease gene may facilitate an adoption (albeit one in which the adoptive parents have demonstrated less than wholehearted acceptance), a positive test result may consign a child to permanent foster care.

Some professionals feel that there are no circumstances which would justify testing a minor, as the genetic test does not confirm that the symptoms are Huntington's disease and not, for example, a seizure disorder in a 5-year-old. Others feel that if the biological father had onset at age 18-20, testing the child would be akin to testing for muscular dystrophy or cystic fibrosis, where the family knows that there is high risk for early demise. This is an extremely sensitive area which could even be open to litigation, i.e., a child taking a parent and testing facility to court.
There is great difference of opinion on this issue, and centers are advised to formulate their own policies regarding testing of minors.

**Confirmatory and Diagnostic Testing**

The genetic test for Huntington's disease may prove helpful in the following situations:

1. Confirmatory testing in an individual with clear symptoms of Huntington's disease and a documented family history.

   Confirmatory testing by direct DNA test may be offered as an option to individuals who are given a clinical diagnosis of Huntington's disease. For some individuals, the extra cost may be an issue and needs to be weighed against the information to be gained. The difference between being clinically affected and carrying the gene for Huntington's disease needs to be clearly explained to patients and their families. A clinical neurological examination remains the definitive means by which to recognize the onset of the disease.

   It should be emphasized that clear symptoms do not include soft signs of Huntington's disease when there is a family history of Huntington's disease, and invoking confirmatory testing on this basis merely to circumvent pre-symptomatic counseling is not only a disservice to the individual, but may have severe behavioral consequences interrupting the individual's and his or her family's life, which may be more costly in the long run than the counseling process itself.

2. Diagnostic testing when an individual presents with clear neurological symptoms that appear to be Huntington's disease, but there is no family history.

   Experience has shown that many families are either unclear or entirely ignorant about the history of Huntington's disease in their family. An extensive family history should be taken. Direct gene testing can be extremely helpful in determining the differential diagnosis of movement disorders, and the fact that new mutations have now been documented, although still rare, suggests that testing is appropriate in this circumstance.
Pre-symptomatic Testing of Individuals at 25% Risk When Their at Risk Parent is Still Living

In reality this is a test which is very rarely requested. An adult grandchild of an affected person does not usually experience extraordinary anxiety about his or her risk when the parent is normal. Rather, this is most often requested when the parent is exhibiting suspicious symptoms.

Testing an individual at 25% risk may reveal information about his or her at risk parent. The potential impact on other family members needs to be considered. For some parents, the prospect of this information is not particularly anxiety provoking. For other parents in other families, however, the impact of this information may be substantial. Professionals offering this type of testing should explore the family dynamics and try to assess the implications for other family members. A consensus on testing among those individuals who are directly affected is the ideal situation, although this will not always be possible.

Prenatal Testing

Individuals or couples considering prenatal testing are advised to seek genetic counseling prior to becoming pregnant. Prenatal testing is usually requested in one of two circumstances:

1. The first situation is where a prospective parent has been diagnosed with Huntington's disease or has been found to be a gene-carrier by genetic testing. Prenatal testing can be used to increase the fetal risk from 50% to virtually 100% or to decrease the fetal risk from 50% to virtually zero. Options for decision making, including the option of termination should the fetus be found to be a gene-carrier, should be discussed prior to testing. The potential difficulties of having a child identified as a gene-carrier from birth (expectations, discrimination, insurance problems, psychological problems) should also be discussed.

2. The second circumstance is where the parent is at 50% risk and is not showing symptoms. In this case, to find that the fetus carries the gene for Huntington's disease automatically reveals that the parent is a gene-carrier as well. A very common and problematic circumstance involves an at risk woman who is pregnant and who undergoes pre-symptomatic and prenatal testing simultaneously. If the outcome is positive for both tests, the impact is overwhelmingly traumatic. Prospective parents should be clearly counseled about the emotional ramifications of this potential double whammy. A two-step process by which the at risk parent is tested first and prenatal...
testing is done second if necessary, is probably the preferred option.

Non-disclosing Prenatal Testing

The prospective parent who is at 50% risk and who does not wish to know his/her gene-carrier status may opt for non-disclosing prenatal testing. Using linkage analysis, this test may reduce the fetus' risk from 25% to virtually zero or it may increase the risk from 25% to 50%. The parent remains at 50% risk, but if he or she later develops Huntington's disease, then any child(ren) shown to have an increased (50%) risk will probably also develop Huntington's disease.

Since non-disclosing prenatal testing relies on genetic linkage analysis and therefore requires DNA samples from several family members, it is particularly important for couples seeking this type of test to seek counseling and to prepare for the test prior to conception. If possible, the necessary blood samples should be obtained and DNA analysis initiated in advance of the pregnancy. Fetal DNA samples are obtained by chorionic villus sampling (CVS) or amniocentesis.

Repeat Testing of Those Already Tested with Linkage

Individuals should be offered the opportunity to have their tests rerun if they so choose. Informed consent for repeat testing should be sought before rerunning any samples, although some centers have already started checking previously tested samples. Offering repeat testing and obtaining informed consent avoids the possibility of discovering that an incorrect test result has been disclosed and not being able to share that information because no permission was sought.

Anonymous Testing

The advent of direct gene testing makes it possible to determine whether a blood sample sent anonymously to a lab has an expanded number of CAG repeats. While the confidentiality of genetic test results is of great concern, anonymous testing would not increase the protection for a person at risk for Huntington's disease and could pose a danger. Labs are advised not to accept anonymous samples for testing.

If national health insurance with universal coverage becomes the law, then the main reason for anonymous testing will disappear.
Sample Informed Consent Form for the Huntington's Disease Direct Genetic Test

I would like to participate in predictive testing for the presence of the Huntington's disease gene. I understand that the gene for Huntington's disease has been found and it is located on Chromosome 4. It has been described as having a trinucleotide (CAG) repeat mutation. It is the size of this trinucleotide repeat which determines whether or not Huntington's disease will be expressed. The blood test will determine the size of this CAG repeat.

I understand that there can be three outcomes to my test:

1. Negative: I will be told that the CAG repeat size is in the normal range (30 or less repeats), and that I am not at risk for developing Huntington's disease.

2. Positive: I will be told that the CAG repeat size is expanded into the Huntington's disease range (40 or more repeats), and that I will develop Huntington's disease at some point in my life.

3. Uninformative: I will be told that the CAG repeat size is in the intermediate range (31-39 repeats), and that it is unclear whether I will or will not develop Huntington's disease at some point in my life.

I understand that a positive test result cannot tell me when I will begin showing signs of Huntington's disease. I understand that the diagnosis of the onset of Huntington's disease can only be made through a neurological exam.

If available, it is recommended that this blood test first be performed on an affected family member in order to confirm the presence of Huntington's disease in my family.

I agree to participate in the counseling sessions and neurologic exam required for the test. Sessions will last from one to three hours. Time between sessions will vary depending upon my own desire for space between visits and the number of other people scheduled for the testing and neurologic consultation. I understand that during this time I will take part in psychological evaluations, including an in-depth interview regarding my attitude toward predictive testing, how I could react to various test outcomes, my personal relationships, how I would handle these and other aspects of psychological functioning which have a bearing on the testing procedure.
I am fully aware that my decision to seek testing in the program is wholly voluntary and that I can choose to terminate at any time without jeopardy. I also understand that the test program staff may decide to postpone my testing. The reasons for doing this will be fully explained to me.

I understand that I am encouraged to have a companion of my choice accompany me through the entire program or parts of it as I choose.

The risks of such testing are primarily of a psychological nature. A non-informative outcome can be frustrating and can intensify the ambiguity of the risk situation or can provide relief. A negative result can produce feelings of guilt as well as of joy. A positive result, i.e. that the Huntington's disease gene is present, could lead to serious psychological consequences including feelings of depression, futility, despair and severe stress. Counseling provided during the test is designed to help me adjust to uninformative, positive and negative information as best as possible. Counselors will discuss with me other possible risks such as difficulties with confidentiality, employment or insurance.

Physically, risks include the discomfort of a needle prick and the possibility that a black and blue mark may form as a result of blood being drawn, a mark which will fade in a few days.

I understand that I will be responsible for the costs of testing which will be about $1,000 on average. Some of these costs may be covered by third-party coverage, but insurance payment may interfere with confidentiality.

I understand that all information will be held strictly confidential. The results of testing will be given only to me and to no one else without my written consent.

Information obtained from the test may be used in scientific publications, but the identity of all persons in the test will not be revealed in such publications or in any other report.

My signature on this form signifies that I have decided to participate in this testing program after reading the above information.

I have been given the opportunity to discuss pertinent aspects of the testing program, to ask questions and hereby consent to participation in the testing outlined above.
directly to the home page
APPENDIX C

SHODAIR CHILDREN'S HOSPITAL'S PROTOCOL
GENETIC TESTING FOR HUNTINGTON DISEASE (HD)

Because being tested to see if you carry the HD gene can be stressful and have an effect on your family and others, the National Huntington Disease Society has decided that testing should take place over several visits and has made the following recommendations: First, a neurological evaluation should be done to see if you are showing signs of HD, a psychiatric evaluation should be done to help you decide if you are ready for the testing, and records should be gathered to confirm the diagnosis of Huntington disease in your family. To be tested, you usually must have a parent affected with HD and be 18 years of age or older. You should be accompanied to all visits by a support person to assist you in dealing with the test results. Testing and visits should be arranged through a center (usually a genetics clinic) familiar with HD and laboratory and psychological aspects of testing.

You are then allowed time to consider the impacts of presymptomatic testing. Concerns include whether your job or health or life insurance will be affected as a result of a diagnosis. If you are comfortable with these concerns, you then are tested (by a blood sample). Testing is not to be done directly by a laboratory without counseling, and results must be delivered in person. Visits after testing should be arranged to see how the results have affected your life.

The Montana Medical Genetics Program at Shodair Hospital has modified the above recommendations and simplified the protocol as follows:

You must be at least 18 years of age, at risk for HD, and the diagnosis of HD in your family must be confirmed. We use the following schedule:

2. The first visit is scheduled for one hour, and allows us the opportunity to evaluate your medical and family history and to explain the accuracy and other specifics of the genetic testing. **YOU SHOULD BRING A SUPPORT COMPANION (OR COUNSELOR) TO ALL THE VISITS.** This support person should not be at risk for developing HD. You should also identify a counselor (psychologist or licensed counselor) and plan a visit with them before the second genetics clinic visit.

3. The second two hour clinic visit, usually one month later, allows us to perform a neurological examination and administer psychological screening questionnaires. If there are significant neurological signs and symptoms, then the testing may be indicated to confirm your diagnosis, instead of to see if you carry the gene (predictive testing). If there are significant psychological issues, counseling may be recommended before proceeding further. Possible outcomes of the testing and potential impact on your personal and family life are discussed, as are insurance and employment issues. If you then desire testing, a blood sample is obtained and sent to the laboratory.
4. One month later, results are given and discussed in person in a one hour clinic visit to include your support person.

5. At a later date, usually a few months after testing, you will be offered a free one hour follow-up visit. This visit is to provide support and guidance in adjusting to test results. Further clinic visits can be arranged as needed.

I have read and agree to the above procedures:

Signature

Date

Witness

Hl)prot.rev 4/97
APPENDIX D

THE SURVEY
A SURVEY CONCERNING THE PROTOCOL FOR PREDIAGNOSTIC TESTING
OF HUNTINGTON’S DISEASE

Instructions:
Please take a few minutes to answer the following questions. Your responses will remain
anonymous and are solely for the purpose of this honor’s thesis. They will never be made public.

Part I - Please circle the response that best describes you.

1. Sex:
   Male  Female

2. Ethnic Background:
   Caucasian  Hispanic  African American  Asian/Pacific Islander  Other

3. Community in which you were raised:
   Rural  Urban  Suburban

5. Religious Affiliation:
   Protestant  Catholic  Jewish  None  Other________

6. Professional Specialty:

Part II - Please rate the following statements according to the strength in which you agree with each of
them. Indicate your opinion by circling the number that matches it’s strength.

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<td>7. I often refer patients for genetic counseling...............</td>
<td>1 2 3 4 5</td>
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<td>8. When treating a patient diagnosed with a disease which often leads to suicidal impulses (e.g., Huntington’s disease), a physician should always recommend that the patient seek counseling...............................</td>
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Part III - Please circle answer the following questions by circling the choice that best describes you.

9. Number of Huntington’s disease patients treated:
   None  1-3  4-6  7-10  more than 10

10. Have you heard about the DNA diagnosis for Huntington’s disease?
    Yes  No
Part IV - Please answer the following questions by indicating how familiar you are with their situation by circling the number that matches your opinion.

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<td>11. How familiar are you with Huntington's Disease?</td>
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<td>12. How familiar are you of the protocol used in prediagnostic genetic testing of Huntington's Disease?</td>
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<td>4</td>
<td>5</td>
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<td>13. Because it is difficult to know the protocol in its official language, it is provided below. Please quickly review the protocol to ensure your answers to the following questions will represent the protocol in its true form.</td>
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After confirming that the patient is at least 18 years old, at risk for Huntington’s disease, and that there has been a confirmed diagnosis within the family, the following schedule is used. The first one-hour visit involves an informal evaluation of the patient’s family and medical history. Accuracy and other specifics about genetic testing are also discussed and the patient is encouraged to bring a support person. The second two-hour visit includes a neurological and psychological screening and an evaluation of the positive and negative impacts the testing may have on personal and family life. Further counseling may be recommended if significant psychological issues are observed. If testing is then desired, a blood sample is then obtained and sent to the laboratory. One month later the test results are discussed in person in a one-hour clinic with support person. A few months later, a free one-hour follow up visit is offered to provide support and guidance in adjusting to the results. Further clinic visits can be arranged as needed.

14. To what extent do you agree with the protocol?
   Strongly Agree 1 2 3 4 5 Strongly Disagree

15. What do you think the protocol’s strengths are?

16. What do you think the protocol’s weaknesses are?

17. If you could, how would you revise the protocol?

18. Do you think similar protocols should be used for other prediagnostic genetic testing for which treatments exist (e.g., breast cancer)?
   Yes No
19. If yes, why?

20. If no, why?

Would you be willing to participate in a brief in-person interview? If you would, please provide your name, phone number, and e-mail address.

Name __________________________
Phone Number ____________________
E-mail __________________________

THANK YOU FOR YOUR TIME AND CONSIDERATION!
APPENDIX E

SURVEY RESULTS-SPSS FREQUENCY TABLES
## Frequencies

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## Frequency Table

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APPENDIX F

SURVEY RESULTS-DESCRIPTIVE
Results

Sociodemographic Data

81.1% of the respondents were male and 18.2% were female. Regarding ethnic background: 96.9% were Caucasian, 0% Hispanic, 0% African American, 3.0% Asian/Pacific Islander, and 0% Other. 34.4% of the respondents were raised in a rural community, 21.9% in an urban community, and 43.8% in a Suburban community. Regarding religious affiliation: 48.4% of the respondents were Protestant, 22.6% Catholic, 0% Jewish, 19.4% none, and 9.7% other.

Professional Specialty

The responses varied greatly. 30.3% Claimed specialty in internal medicine, 3.0% medicine, 3.0% neurology, 3.0% radiology, 24.2% family practice, 3.0% orthopedics, 6.1% pediatrics, 9.1% anesthesiology, 3.0% obstetrics, 3.0% urology, 3.0% oncology, 6.1% psychiatry, and 3.0% opthamalogy.

Counseling

In response to the statement ‘I often refer patients for genetic counseling:’ 21.2% claimed they strongly disagreed, 27.3% disagreed, 12.1% had no strong opinion, 24.2% agreed, and 15.2% strongly agreed (appendix).

42.4% responded that they strongly agreed that when treating a patient diagnosed with a disease which often leads to suicide impulses, a physician should always recommend the patient seek counseling, 45.4% agreed, 9.1% had no strong opinion, and 3% disagreed (appendix).
Huntington's Disease

9.1% of the physicians reported they were completely unfamiliar with Huntington's disease, 33.3% somewhat unfamiliar, 6.1% undecided, 48.5% somewhat familiar, and 3.0% very familiar (appendix).

75.8% had treated no Huntington's disease patients and 24.4% responded that they have treated 1-3 Huntington's disease patients. None of the physicians claimed they had treated over four Huntington's disease patients (appendix).

78.8% responded that they had at least heard about the DNA diagnosis for Huntington's disease. 21.2% had not.

3.0% said they were very familiar with the protocol used in prediagnostic genetic counseling of Huntington's disease; 15.2% somewhat familiar, 21.2% somewhat unfamiliar, and 60.6% were completely unfamiliar with the protocol (appendix).

When asked the extent to which they agreed with the protocol, 34.4% strongly agreed, 42.4% agreed, 12.1% were undecided, 3% disagreed, and 6.3% strongly disagreed with the protocol (appendix).

When asked if similar protocols should be used for other prediagnostic testing for which treatments exist, 72.2% said yes and 24.4% opposed the idea.

Strengths

Many points of strength were observed in the protocol exemplified by the physicians' responses to an open answered question. The documented strengths include: emotional support provided to the patient; counseling provided,
face to face discussion of the risks and benefits of testing positive or negative; thoroughness of the protocol; directness of the protocol; added support given by the chosen support person; time allowed to adjust to the many possible ramifications of the results; preparation the patient experiences to deal with the test results, informed consent and the aid it gives patients in making choices; frequent visits and the good pretesting; and finally good follow-up.

Weaknesses

Many weaknesses were documented in response to an open answered question. The weaknesses included: too many visits; one month is too long of a waiting period to obtain results; vocabulary of the protocol is too sophisticated for the average patient to comprehend and is deterable, biased explanations; cost; absence of referral to primary care physician; long-term commitment to counseling; lack of spiritual direction; and finally lack of coordination with other health care providers.

Recommended revisions

In response to an open answered question, recommended revisions included suggestion for: mandating follow up a few months after the test results are given; including the primary care physician; creating an undeterable explanation; defining needed personnel; shortening the time patients wait for their results, shorter visits, introducing the support person at the first visit and combining first and second visits; rewriting the protocol using language at a 4th to 8th grade level; increasing the time between counseling and actual blood test to allow appropriate time for meditation and confidence in test choice; and involving a psychotherapist in the cases of positive tests.