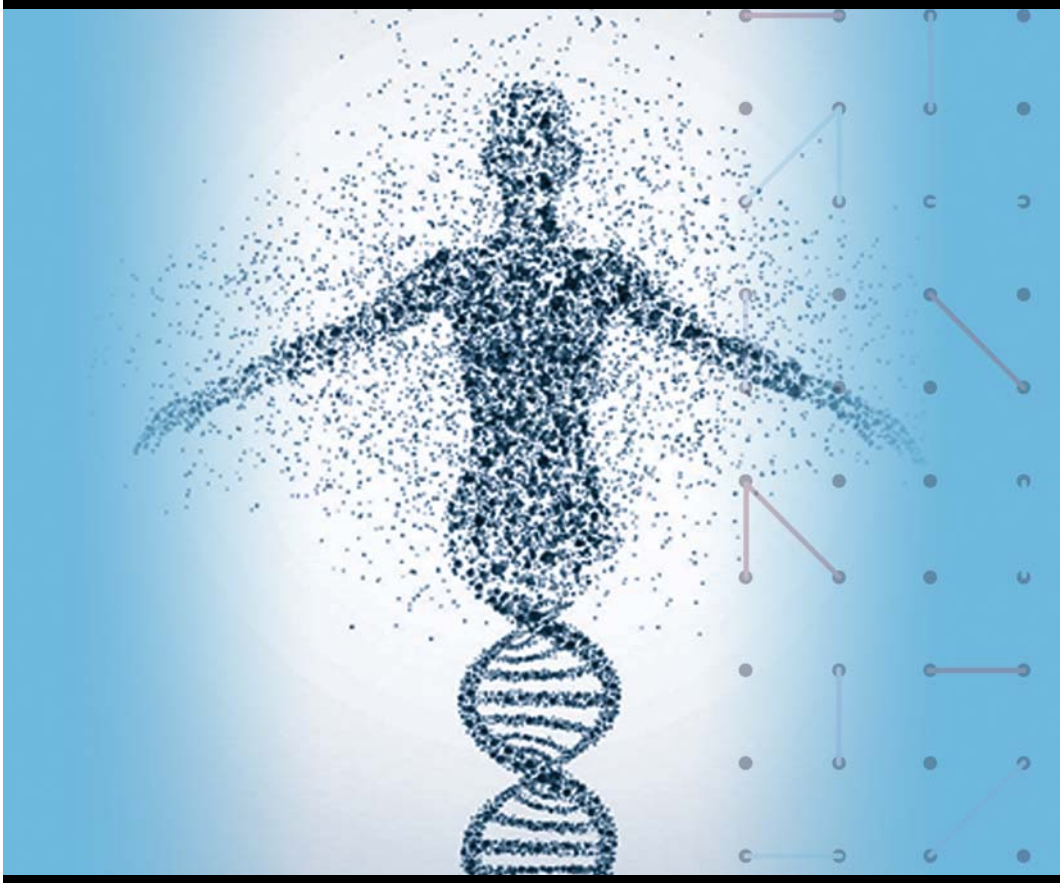
DNA Home Banking Solution

Information Manual

“Our DNA is a genealogical record and although it's written in a language we don't much understand, that capability is growing. Just as you wouldn't throw out a family history written in a language you don't understand neither should you throw out your DNA record or those of your loved ones.”



325 South Archibald Street, Suite 107
Thunder Bay, Ontario, Canada P7E 1G6
www.dnamemorial.com

Toll free number: 1-844-623-4891
help@dnamemorial.com

dna. memorial

Learn more at dnamemorial.com

Contents

Introduction

Congratulations! You have made an important investment in protecting your family's future. We inherit wonderful things from our loved ones. Crystal blue eyes or a curly head of hair. Intelligence, athleticism, and so much more. But we inherit weaknesses as well, including increased risks for hundreds of serious health problems. DNA can be used to make genealogical connections across thousands of years. DNA is a rich repository of useful, transformative and potentially life saving information for you, current family members, and descendants to come. For the first time, you have access to profound medical and genealogical knowledge. This booklet provides comprehensive information about DNA, the home banking solution and what to do if you wish to pursue testing. The DNA technology revolution is in its infancy and the information gained from DNA is exponentially growing every day.

> *DNA is a rich repository of useful, transformative and potentially life saving information.*

Why Store DNA?

Genetic decoding is leading to a tsunami of information in medicine, ancestry and creating living legacies. Medically, DNA supports the prevention, diagnosis, and treatment of hundreds of diseases. Because DNA sequences are passed on with very little variation from one generation to the next, a DNA test of a 95 year old great-grandmother is of immediate and direct relevance to the health of her six-month-old great-grandson. DNA Banking is an important step towards preserving that history and improving the health of future generations. A family medical history helps document familial patterns which may impact your health, such as trends towards specific types of cancer, early heart disease, or even simple skin conditions.

Creating a family library of Generational DNA allows doctors to use past genetics to predict future family medical patterns. This information can assist with the following:

- Securing a DNA vial capable of being tested many times over multiple generations. Access to generational DNA is key in predicting hereditary conditions.
- Diagnosing a medical condition.
- Determining whether you may benefit from preventive measures to lower your risk of a specific disease.
- Deciding what medical tests to run /medications to prescribe/medication dosage.
- Identifying other members of your family who are at risk of developing certain diseases.
- Calculating your risk of certain diseases.
- Calculating your risk of passing certain conditions to your children.
- Selecting effective therapies (gene therapy rapidly becoming a viable option).
- Measuring mutation rates over generations (which can now predict health problems before they happen).
- Implementing personalized treatment plans.
- Identify disease triggers and the most effective interventions.

Generational DNA:
Connecting the dots of the past, to predict the future.

Secondly, DNA Memorial allows you to create a "living" family tree to gain unique insights into your past, to better understand your present. Ancestry is a hot topic and for good reason. The power of ancestral DNA allows you to:

- Discover your ethnic mix.
- Find new family connections.
- Adoptees can find relatives.
- Learn origins of inherited traits.
- Verify requirements for citizenship/immigration.

Thirdly, survivors, spouses and partners have the one-of-a-kind opportunity to create living legacies of their loved one's. The DNA vial contains the blueprint of all that made your loved one special. It cannot be duplicated and there is no other like it. The DNA Memorial vial is a celebration of your loved one's life.

The DNA Memorial Home Banking Solution

The DNA Vial

The DNA sealed inside the vial is desiccated and bound to microscopic beads, which are then sealed under nitrogen gas. The DNA will remain viable in this state indefinitely. The DNA vial is made of glass and should be handled and stored with care.

Handling and Storage:

Storing the vial is very simple, but a few precautions are recommended:

1. The DNA within the vial is in a stable state. It can withstand typical handling and room temperature conditions. Gentle handling of the box and the DNA vial will not damage the DNA.
2. Direct sunlight exposure for long periods of time is discouraged. Prolonged exposure could cause the DNA to unbind from the microscopic beads.
3. Suggested places to store are: in a safety deposit box, a drawer with important papers, etc. You may consider notifying loved one's of its location and/or outlining the location in your will.
4. Do not immerse the vial in hot liquids. It contains inert gas within and could cause the vial to crack or break.
5. Do not remove the sealed lid or remove contents. To maintain quality/viability of the DNA, the contents must be handled under sanitary laboratory conditions.

Vial Damage

Should the vial become damaged (crack or break), do not panic. The DNA is bound to the microscopic beads and DNA Memorial has the expertise to remove contaminates. Simply wrap the vial in plastic wrap and return to us for cleaning and processing. Be sure to collect all glass pieces and all powder. Put all the contents into a plastic bag and package appropriately to ship to our laboratory in Thunder Bay, Ontario, Canada. The full l aboratory address is outlined on the front cover.

The Certificate

The Certificate of Authenticity is an important document detailing the name, date of sampling, and most importantly the quantity/concentration of DNA present in the vial. The quantity or yield of DNA is represented in micrograms and is important information for testing laboratories. Within each vial there is enough DNA present to allow for many tests over generations. Since different test will require different amounts of DNA, the amount of DNA indicated on your certificate of authenticity will give you an idea of how many tests can be ran. For example, a paternity test can be successfully completed with merely 0.250 ug/mL .

DNA Remembrance Pieces

Any of the DNA jewelry and keepsakes can be purchased at a later date. Simply speak to your funeral home and they can outline the options and prices. To view jewelry and keepsake options, please visit our **website: http://dnamemorial.ca/products-public/**

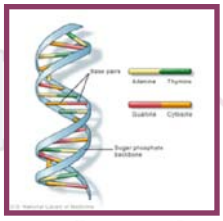
DNA

Genetic Similarity: We All Have the Same Genes

Each person has almost the same set of genes - about 20,000 in all. The differences between people come from slight variations in these genes. For example, a person with blond hair doesn't have the "blonde hair gene" while a person with brown hair also doesn't have the "brown hair gene." Instead, all people have genes for hair color, and different versions of these genes dictate whether someone will be a redhead or a brunette.

The Basics of DNA

The long molecules of DNA in your cells are organized into pieces called chromosomes. Humans have 23 pairs of chromosomes. The number of chromosomes doesn't determine how complex an organism is for example bananas have 11 pairs of chromosomes, while sea horses have 24. There is a lot of DNA in our chromosomes which have not yet had their function identified.



Simplified structure of a DNA Strand

DNA is Organized Into Chromosomes

The long molecules of DNA in your cells are organized into pieces called chromosomes. Humans have 23 pairs of chromosomes. The number of chromosomes doesn't determine how complex an organism is for example bananas have 11 pairs of chromosomes, while sea horses have 24. There is a lot of DNA in our chromosomes which have not yet had their function identified.

Chromosomes are Organized into Genes

Chromosomes are further organized into short segments of DNA called genes. If you imagine your DNA as a cookbook, then your genes are the recipes. Written in the DNA alphabet - A, T, C, and G - the recipes tell your cells how to function and what traits to express. For example, if you have curly hair, it is because the genes you inherited from your parents are instructing your hair follicle cells to make curly strands.

Genes Make Proteins

Cells use the recipes written in your genes to make proteins - just like you use recipes from a cookbook to make meals. Proteins do much of the work in your cells and your body as a whole. Some proteins give cells their shape and structure. Others help cells carry out biological processes like digesting food or carrying oxygen in the blood. Using different combinations of the A's, C's, T's and G's, DNA creates the different proteins - just as you use different combinations of the same ingredients to make different meals. Mutations, which are variations in these recipes, are what cause diseases and cancers.

Short Tandem Repeats (STRs)

The human genome is full of repeated DNA sequences. These repeated sequences come in various sizes and are classified according to the length of the core repeat units, the number of contiguous repeat units, and/or the overall length of the repeat region. DNA regions with short repeat units (usually 2-6 base pairs in length) are called Short Tandem Repeats (STR). STRs are found surrounding the chromosomal centromere (the structural center of the chromosomes). STRs have proven to have several benefits that make them especially suitable for human identification.

STRs have become popular DNA markers because they are easily amplified by polymerase chain reaction (PCR) without the problem of differential amplification; that is, the PCR products for STRs are generally similar in amount, making analysis easier. An individual inherits one copy of an STR from each parent, which may or may not have similar repeat sizes. The number of repeats in STR markers can be highly variable among individuals, which make these STRs effective for human identification purposes.

STR alleles also have lower mutation rates, which make the data more stable and predictable. Because of these characteristics, STRs with higher power of discrimination are chosen for human identification in forensic cases on a regular basis. It is used to identify victim, perpetrator, missing persons, and others.

Beginning in 1996, the FBI Laboratory launched a nationwide forensic science effort to establish core STR locations (loci) for inclusion within the national database known as CODIS (Combined DNA Index System). The 13 CODIS loci are CSF1PO, FGA, TH01, TPOX, VWA, D3S1358, D5S818, D7S820, D8S1179, D13S317, D16S539, D18S51 and D21S11.
These loci are nationally and internationally recognized as the standard for human identification and are used to obtain your unique genetic profile.

Single Nucleotide Polymorphisms (SNPs)

SNPs are Copying Errors

To make new cells, an existing cell divides in two. But first it copies its DNA so the new cells will each have a complete set of genetic instructions. Cells sometimes make mistakes during the copying process - kind of like typos. These typos lead to variations in the DNA sequence at particular locations, called single nucleotide polymorphisms, or SNPs (pronounced "snips").

SNPs are Copying Errors

SNPs generate biological variation between people by causing differences in the recipes for proteins that are written in genes. Those differences can in turn influence a variety of traits such as appearance, disease susceptibility, or response to drugs.

SNPs as a Measure of Genetic Similarity

DNA is passed from parent to child, so you inherit your SNPs versions from your parents. You will be a match with your siblings, grandparents, aunts, uncles, and cousins at many of these SNPs. But you will have far fewer matches with people to whom you are only distantly related.
The number of SNPs where you match another person can therefore be used to tell how closely related you are. It is fast becoming the best way to judge ancestry for recent ancestors.

Genetic Mutations and Disease

How Gene Defects Work

A certain gene will code for “Make Healthy Heart Cells”. This is a very simplistic representation as each gene has thousands of base letters (ACGT) and codes for many proteins, which combine to form a system that creates these cells. Mutations occur over a person’s lifetime and as they accumulate the code starts to misread “Make ealthy Heart Cells”. A person’s body is very good at still functioning well even though the instructions are not perfect. Think of leftover parts when you build a barbeque. It still works fine even though there are a few screws and bolts missing here and there. So there is no heart disease because the body can still make sense of the code. That code is passed to children with these accumulated changes (mutations) who acquire more mutations and the code now reads “Make ealthy eart cels ” and again no heart disease as the body still can make sense of the code. Now a grandchild inherits the code containing more mutations from its parents and grandparents. The grandchild has a few minor mutations happen and now the code reads “ake alalthy qart wals ” the body can no longer read the code and grandchild dies of early onset heart disease at age 20.

Some of these mutations can take multiple generations to cause symptoms or disease. The rate at which these mutations are occurring is the most important and can only be measured over several generations accurately. Someone who has a code that is recognizable by the body but is only a few mutations away from disease needs to know so they can take preventative steps. In the example case of the grandchild if they would have taken preventive screening and had different choice in diet they would have been able to prevent that disease even though they were living what would be considered a normal lifestyle. They would not have contracted heart disease if they were not predisposed to it genetically.

The number of mutations that were passed to children at conception and the number and location of mutations when the person died can be measured. This gives an indication what diseases are possible several generations down the line by measuring the speed and location of these mutations.Gene therapies can now slow or even correct some mutations. This is fast becoming a very viable option and could save someone from disease such as cancer by keeping their code just readable by the body.

Medical Disease Inheritance

A genetic disease is any disease that is caused by an abnormality in an individual's genome. The abnormality can range from minuscule to major -- from a discrete mutation in a single base in the DNA of a single gene to a gross chromosome abnormality involving the addition or subtraction of an entire chromosome or set of chromosomes. Some genetic disorders are inherited from the parents, while other genetic diseases are caused by acquired changes or mutations in a pre-existing gene or group of genes.

Single Gene Inheritance

This type of inheritance is caused by changes or mutations that occur in the DNA sequence of a single gene. There are more than 6,000 known single-gene disorders, which occur in about 1 out of every 200 births. These disorders are known as monogenetic disorders (disorders of a single age).

Multifactorial Inheritance

Multifactorial inheritance disorders are caused by a combination of environmental factors and mutations in multiple genes. For example, different genes that influence breast cancer susceptibility have been found on chromosomes 6, 11, 13, 14, 15, 17, and 22. Some common chronic diseases are multifactorial disorders, such as cancer.

Chromosomes

Distinct structures made up of DNA and protein, are located in the nucleus of each cell. Because chromosomes are the carriers of the genetic material, abnormalities in chromosome number or structure can result in disease. Abnormalities in chromosomes typically occur due to a problem with cell division. For example, Down Syndrome or Trisomy 21 is a common disorder that occurs when a person has three copies of chromosome 21. There are many other chromosome abnormalities.

Ancestry

Using specific DNA markers can also trace ancestry over thousands of years. More recently, some DNA markers have been used to link persons to individuals as far back as 5000 years ago (Breakthrough DNA study links

B.C. woman, 5,500-year-old “grandmother” By Randy Boswell, Postmedia News July 5, 2013). This technology is in its infancy. Most people don’t realize that DNA analysis was only invented in 1986 with a technique called PCR (Polymerase Chain Reaction). There are also specific DNA types that have interesting applications for ancestry and heritage research including STR (short tandem repeats) mtDNA (mitochondrial DNA), Y DNA, and some rare DNA mutations. Mitochondrial DNA (mtDNA) is contained in the cytoplasm of the cell, rather than the nucleus. Mitochondrial DNA is passed by a mother to both male and female offspring without any mixing, so your mtDNA is the same as your mother's mtDNA, which is the same as her mother's mtDNA. mtDNA changes very slowly so it cannot determine close relationships as well as it can determine general relatedness. If two people have an exact match in their mtDNA, then there is a very good chance they share a common maternal ancestor, but it is hard to determine if this is a recent ancestor or one who lived hundreds of years ago. It is important to keep in mind with this test that a male's mtDNA comes only from his mother and is not passed on to his offspring.

Example:

The DNA tests that identified the bodies of the Romanovs, the Russian imperial family, utilized mtDNA from a sample provided by Prince Philip, who shares the same maternal line from Queen Victoria. Y chromosomal DNA - is being used to establish family ties. The Y chromosomal DNA test (usually referred to as Y DNA or Y-Line DNA) is only available for males, since the Y chromosome is only passed down the male line from father to son. Tiny chemical markers on the Y chromosome create a distinctive pattern, known as a haplotype that distinguishes one male lineage from another. Shared markers can indicate relatedness between two men, though not the exact degree of the relationship. Y chromosome testing is most often used by individuals with the same last name to learn if they share a common ancestor.

Example:

The DNA tests supporting the probability that Thomas Jefferson fathered the last child of Sally Hemming’s were based on Y-chromosome DNA samples from male descendants of Thomas Jefferson's paternal uncle,

since there were no surviving male descendants from Jefferson's marriage. Markers on both mtDNA and Y chromosome tests can also be used to determine an individual's haplogroup, a grouping of individuals with the same genetic characteristics. This test may provide you with interesting information about the deep ancestral lineage of your paternal and/or maternal lines. As more ancestral markers are identified, DNA ancestry testing will become much more powerful than it is today. By keeping a record of your family's DNA, you are opening new doors and creating exciting new opportunities that were never before available.
New markers are being used and new tests developed. It is now possible to trace ancestry not only to certain regions but also to individuals thousands of years ago using the new SNPs as markers.

What Next?

Storing for the Future

DNA testing is rapidly advancing in quality, reduced volume requirements, and price availability. The tests offered a few years ago pale in comparison to the depth and breadth of today's tests. New technologies are coming into the market every year, reducing the cost and revealing more meaningful information. For these reasons, preserving familial DNA will have greater and more impactful insights in the year's ahead. The process of DNA testing destroys the DNA. Therefore the number of tests that can be performed on a given vial of DNA is finite. An important point to remember is that the current knowledge of DNA can only explain the purpose of approximately half of our total DNA, leaving the door open for exciting developments as research continues forward.

Testing post-mortem and living DNA is apples and oranges. Many labs do not accept post-mortem DNA. This is where the experts at DNA Memorial can consult with you and guide you through the process.

Testing Questions

Where can I go for testing? At DNA Memorial we are dedicated to making connections. We would be happy to connect you with any of our testing partners. We will support you in navigating a complex and confusing testing industry. For example, many labs do not accept post mortem DNA due to its intricacy. In order to test the DNA in the vial, the DNA must first be unbound from the silica beads. Further, due to DNA Memorial's proprietary processes, we are experts in unbinding just enough DNA required for a given test and providing it to the testing lab. DNA Memorial's scientists then rebound the DNA to the silica beads immediately, preventing degradation and importantly preserving the remaining DNA for future testing and generations. You are welcome to source and use your own testing facility and we will provide detailed instructions to the lab of your choosing. DNA Memorial does not assume responsibility if such a lab damages any, or all of the vial DNA. Through our parent company, CG Labs, (www.cglabscorp.com) DNA Memorial can offer a range of testing options as well as guide you with specialty testing options.

Common tests include:

1. Genetic Predisposition

You will receive an extensive, understandable, report reviewing you results. The report shows the multiple single nucleotide polymorphisms (SNP) markers that were tested, the findings, and your logarithmic, statistical, relative, level of risk, as well as internal stress level potential problems. The information in the report is based on the latest scientific research.

2. Ancestral Heritage Report

The genetics of ancestral origins are long-held associations of who we are and where we came from. Recent genetic developments have examined the intermingling of European, Mid-eastern, and African populations. The geographical genetic profiles of about 1500 years ago are still evident and detectable in current migratory populations.

Should you wish to explore further detailed testing or genetic counseling, please visit CG Labs website at:
www.cglabscorp.com

Consultation

The scientific team at DNA Memorial are available for one-on-one consultations with you for an in depth exploration of your situation. The consultation will focus on what condition(s) you would like to explore, what questions you are interested in answering and supporting you in understanding fees charged by testing facilities.

Historically, most testing facilities have been built to service the healthcare community. As such, test results and reports are often delivered in technical, medical language making it difficult to understand in layman's terms. Our team is available to connect the dots, we will interpret and explain technical reports.

Our contact details are:
DNA Memorial a subsidiary of CG Labs Inc.
Toll Free in North America 1-844-623-4891
Monday to Friday 9am to 4 pm EST.
Or email help@cglabscorp.com

In Summary:

Your family's entire story is recorded in the genetic blueprints called DNA. Medical science advances everyday. DNA research and testing is increasingly important and becoming a major component in healthcare of the future. When it comes to your health and medical care, DNA offers one-of-kind solutions, individualized for you. DNA also provides unique insights into your past heritage to better understand your present.
You have made an important investment connecting generations to come.

Connect the dots. One generation at a time.

325 South Archibald Street, Suite 107
Thunder Bay, Ontario, Canada P7E 1G6
www.dnamemorial.com

Toll free number: 1-844-623-4891
help@dnamemorial.com

Learn more at dnamemorial.com

dna.
memorial