A Guide to Genetics and Health
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### Diseases that run in the family

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### Resources

- Read “Book 1: A Guide to Family Health History” to learn more about how to collect, organize, and share your family health history.
Why is genetics important to my family and me?

Genetics helps to explain:

- What makes you unique, or one of a kind
- Why family members look alike
- Why some diseases like diabetes or cancer run in families
- How learning your family health history can help you stay healthy
- Why you should bring your family health history to your healthcare provider

Taking time to learn about health and diseases that run in your family is worth it! It will help you understand your own health and make healthy choices.
What makes me unique?

Every person is unique. Part of what makes you unique is your genes. **Genes are the instructions inside each of your cells.** They control how you look and how your body works. Since everyone has slightly different genes, everyone has a different set of instructions. **Genes are one reason why you are unique!**
Tell me more about my genes

- A person has two copies of each gene, one from the mother and one from the father.
- Genes carry instructions that tell your cells how to work and grow.
- Cells are the building blocks of the body. Every part of your body is made up of billions of cells working together.
- Genes are arranged in structures called chromosomes. Humans have 23 pairs of chromosomes. Copies of the chromosomes are found in each cell.
- Chromosomes are made up of DNA. DNA is the special code in which the instructions in your genes are written.
Why do family members have things in common?

Children inherit pairs of genes from their parents. A child gets one set of genes from the father and one set from the mother. These genes can match up in many ways to make different combinations. This is why many family members look a lot alike and others don’t look like each other at all. Genes can also increase the risk in a family for getting certain health conditions.

Families also share habits, diet, and environment. These influence how healthy we are later in life.
You share a lot with your family—including what can make you sick.
Why do some diseases run in families?

Some diseases are caused when there is a change in the instructions in a gene. This is called a mutation. Every person has many mutations. Sometimes these changes have no effect or are even slightly helpful. But sometimes they can cause disease.

Most common diseases are caused by a combination of mutations, lifestyle choices, and your environment. Even people with similar genes may or may not get an illness if they make different choices or live in a different environment.

Common Disease: Cancer
Changes in your genes passed on by your parents may make you more likely to develop cancer. If you are active and eat a healthy diet, you may be able to lower your risk.

Visit page 10 to learn about some
Thousands of diseases are caused by a specific change in the DNA of a single gene. Many of these diseases are rare. These conditions usually develop when an individual is born with a mutated gene.

If a rare disease runs in your family, be sure to write it down. Do not forget to learn about common conditions that affect your family’s health.

**Single Gene Disorder: Hereditary Cancer**

Hereditary cancer is caused by a mutation in a single gene passed from one or both parents.
How can knowing my family health history help me stay healthy?

Your family health history tells you which diseases run in your family. Health problems that develop at a younger age than usual can be a clue that your family has a higher risk. Though you cannot change your genes, you can change your behavior.

Knowing your family health history will help you:
- Identify risks due to shared genes.
- Understand better what lifestyle and environmental factors you share with your family.
- Understand how healthy lifestyle choices can reduce your risk of developing a disease.
- Talk to your family about your health.
- Tell your healthcare provider about the diseases that run in your family.

Remember

1. Share your family health history with your healthcare provider.
2. Ask if you can be screened for a disease that runs in your family.
Why should I take my family health history to my healthcare provider?

Your healthcare provider (doctor, nurse, or physician’s assistant) may use your family health history and current health to figure out your risk for developing a disease. Your provider can then help decide which screenings you get and which medicines you might take.

Based on your family health history, a healthcare provider may order a **genetic test** or refer you to a genetic counselor or geneticist. Genetic tests can show if you have a gene change that increases your risk for disease. They can also tell if you have a gene change that you might pass on to your children. Your healthcare provider can help you:

- Understand the results of your tests.
- Learn of any treatments for a disease found by the test.

All newborn babies born in the U.S. and many other countries are tested for certain genetic diseases that may make them sick. This is called **newborn screening**. If the screening test finds a problem, a healthcare provider will help you understand what can be done to help the baby.
Diseases that run in the family

In the rest of this booklet, we give you examples of some common diseases that affect our communities and families. For each disease, we include information under the following headings:

• What is the disease?
• Who is at risk?
• Hints for health
Heart disease

Heart disease is the main cause of death in America in both men and women. There are many types of heart disease. Two of the most common types are coronary artery disease (CAD) and high blood pressure (hypertension).

**WHAT IS CORONARY ARTERY DISEASE (CAD)?**

- In CAD the arteries that supply blood to the heart muscle can get hard and narrow. The arteries narrow, or get smaller, because plaque and cholesterol build up on the inner walls.
- CAD gets worse over time. As the arteries get smaller, less blood gets to the heart, and less oxygen gets to the heart muscle. Very low levels of oxygen can cause chest pain or a heart attack.
- CAD is the most common cause of heart attacks among Americans.

**Who is at risk?**

- About 13 million Americans have CAD. In 2008 CAD killed 29,019 Michiganians.
- Everyone has some risk for developing heart disease.
- For some people, a healthier diet and increased activity can change cholesterol level and lower risk. Other people need more help, such as medicine, to lower their risk of having a heart attack.

**Hints for health**

- Eat healthy, nutritious meals.
- Get active and exercise regularly. Obesity increases your risk.
- Take your prescribed medications to control high cholesterol, high blood pressure, and diabetes.
- If you smoke, talk with your healthcare provider about quitting.

For more information, call the American Heart Association at 800-242-8721 or visit the Michigan Department of Community Health (MDCH) at www.michigan.gov/mdch and click on "prevention"
WHAT IS HIGH BLOOD PRESSURE?

• Blood pressure is a measure of how hard your heart is working to push the blood through your arteries, the blood vessels leaving your heart.

• There are two numbers in a blood pressure reading. A normal reading is about 120/80 (read as “120 over 80”). The first number is the force your heart uses to pump the blood. The second number is the pressure between heartbeats.

• High blood pressure means that your heart is working too hard. Over time, high blood pressure can cause kidney failure, heart attacks, strokes, and other health problems.

Who is at risk?

• Approximately one in three adults has high blood pressure. Many do not even know it because there are no clear symptoms.

• A family history of high blood pressure increases your risk for developing it at a younger age.

• Greater risk comes with increasing age, being overweight, or having a family history of hypertension.

Hints for health

• Decrease the amount of salt you eat.

• Maintain a healthy weight.

• Manage your stress.

• Get active and exercise regularly.

• Limit the alcohol you drink.

• Get screening regularly.

For more information, call the American Heart Association at 800-242-8721 or visit the Michigan Department of Community Health (MDCH) at www.michigan.gov/mdch and click on "prevention".
Chronic kidney disease

WHAT IS CHRONIC KIDNEY DISEASE?

• Chronic kidney diseases impair the kidney’s ability to make urine. Inherited diseases such as gout, kidney stones, diabetes, high blood pressure, and IgA nephropathy can increase risk of kidney disease. Gout causes kidney damage by impairing urine filtration, as well as by creating kidney stones that block urine excretion.

Who is at risk?

• People with gout, kidney stones, diabetes, high blood pressure, or heart disease.

• People with a family history of such issues and people of African American, Hispanic, Asian American or Native American Ancestry.

Hints for health

• Eat a diet low in fat and protein.

• Avoid dehydration. Drink plenty of water but limit alcohol.

• Maintain a healthy weight and control blood pressure.

• Avoid medications that increase uric acid levels.

For general information, visit www.kidney.org. The National Kidney Foundation provides a free, community-based health program called the Kidney Early Evaluation Program (KEEP).
Diabetes (sugar disease)

Diabetes is a serious, chronic disease in which blood sugar levels are above normal. Many people learn about their diabetes after problems develop. According to the American Diabetes Association, one out of three people who have type 2 diabetes do not know that they have the disease.

Symptoms occur when the body fails to change sugar and other food into energy. This happens when the body cannot make or use a hormone called insulin. Serious problems from diabetes can include blindness, kidney failure, and death. Diabetes can be detected early and treatment can prevent or delay these serious health problems. Both genetic and environmental factors such as diet and exercise play an important role in getting the disease.

**WHAT IS TYPE 1 DIABETES?**
- Type 1 diabetes usually develops in young children or young adults.
- People with type 1 diabetes stop making their own insulin.

**WHAT IS TYPE 2 DIABETES?**
- Type 2 diabetes usually develops in people over 30 years of age. In recent years, more young people are getting it due to poor diet.
- Scientists are learning more about the specific genes involved in this type of diabetes.
Who is at risk?

- Diabetes affects approximately one in 14 people in the United States. Just over 9% of adults in Michigan have been diagnosed with diabetes, with many who are likely affected but have not yet been diagnose.
- Five to 10 percent of Americans who are diagnosed with diabetes have type 1 diabetes.
- Children or siblings of individuals with diabetes are more likely to develop it themselves.
- Obese people have a greater risk for type 2 diabetes.
- Women who had a baby that weighed more than 9 pounds or who had gestational diabetes while pregnant are at risk.

Hints for health

- Eat more fruits and vegetables, less sugar and fat.
- Get active and exercise regularly.
- Lose weight if necessary.

For more information, the National Diabetes Education program at visit www.ndep.nih.gov or visit the MDCH at www.michigan.gov/mdch and click on "prevention"
Cancer

There are many types of cancer. Cancer is caused by the growth and spread of abnormal cells. Though your risk of getting cancer increases as you get older, genetic and environmental factors also cause people to be at a higher risk for certain types of cancer.

What is Breast Cancer?
- Breast cancer is a type of cancer that forms in the tissues of the breast, usually the ducts.
- Breast cancer is one of the most common cancers among women. Although it is rare, men can also get breast cancer.
- Most breast cancer is treatable if found early.

Who is at risk?
- One out of eight American women will develop breast cancer in their lifetime.
- Among Hispanic/Latina women, breast cancer is the most common type of cancer.
- Breast cancer risk is higher among women whose close blood relatives have had this disease. Both your mother’s and father’s family history of breast cancer is important.

Hints for health
- Women should do monthly breast self-exams and receive annual clinical breast exams.
- Women should get annual mammograms starting at age 40, or earlier if indicated by the family history.
- Ask about genetic counseling if you have a family or personal history of breast cancer.
- Eat a healthy, balanced diet. Get active and exercise regularly.
- Limit the alcohol you drink.

For more information, visit www.cancer.gov/cancertopics and click on Breast Cancer or call 800-4-CANCER (800-422-6237).
What is Colon Cancer?
• The colon is an organ in the body that absorbs water and nutrients from food. It also stores waste. Colon cancer is a cancer that grows within this organ. It can start as a small growth, or polyp. Polyps can sometimes grow over many years. Sometimes they turn into cancer, and sometimes they do not. If you remove a polyp then you keep it from turning into cancer. A colonoscopy is an exam that looks for polyps.

Who is at risk?
• About 145,000 people get colon cancer every year.
• About 25 percent of people who get colon cancer have it running in their family.
• About 75 percent of people who get colon cancer get it by chance (sporadic).

Hints for health
• Share your family health history of colon cancer and polyps with your doctor.
• Colon cancer is preventable with regular screening colonoscopies. Start colonoscopies at age 50, or earlier if indicated by the family history.
• Ask about genetic counseling if you have a family or personal history of colon cancer.
• Eat a healthy diet and exercise at least 30 minutes, five (5) times a week.
• Do not smoke, and limit the alcohol you drink.
For more information visit www.cancer.gov/cancertopics and click on "colon and rectal cancer" or call 800-4-CANCER (800-433-6237)
Cancer continued

What is Prostate Cancer?

• Prostate cancer is a disease in which cancer develops in the male reproductive system, specifically in a small gland near the bladder called the prostate.

• Scientists do not yet know what causes prostate cancer, but doctors can use certain tests to determine whether a man might have prostate cancer.

Who is at risk?

• Men of all ages can develop prostate cancer. However, more than eight out of 10 cases occur in men over the age of 65.

• Prostate cancer is the most common type of cancer diagnosed in Hispanic/Latino and African American men.

• Having a father or brother with prostate cancer more than doubles a man’s risk of developing this disease. The risk increases with the number of relatives who have it, especially if the relatives were young (less than 50 years old) when they got it.

• Prostate cancer has been linked to some inherited cancer syndromes.

Hints for health

• Follow a healthy diet and exercise regularly.

• If you have an increased risk for prostate cancer, ask your doctor about early screening.

For more information, visit www.cancer.gov/cancertopics and click on Prostate Cancer or call 800-4-CANCER (800-422-6237).
Cancer genetics

What other cancers can be familial?
Approximately 5-10% of cancers are due to a genetic disorder caused by a change (mutation) in a single gene. Certain features in a family may suggest an inherited predisposition to cancer.

Who is at risk?
If any of the following are present in a family history, meeting with a genetic counselor may help to clarify the risks for cancer in the family:

- Cancer diagnosed under the age of 50 years (with or without a family history of cancer)
- Three or more relatives with the same cancer (at any age) on the same side of the family
- Individuals with more than one cancer diagnosis (such as bilateral breast cancer, or colon cancer and uterine cancer)
- Ovarian cancer at any age
- Male breast cancer at any age
- Rare cancers, such as pancreatic cancer, at any age
- Individuals with Ashkenazi Jewish ancestry and a personal or family history of cancer
- A previously identified genetic condition in the family

For more information on Genetic Counseling and Family History please contact Genetic Alliance at www.geneticalliance.org or Beaumont Cancer Genetics program at www.cancer.beaumont.edu/genetics
Cancer genetics

continued

Family History and Genetic Counseling: Frequently asked Questions

Q: Can genetic counseling really make a difference?
• Yes. Genetic counseling with an expert can help you and your doctor understand your true risk so you can make the best choices for preventive medical care.

Q: Is genetic counseling and genetic testing expensive?
• Most insurance companies pay for genetic counseling and genetic testing. For individuals without insurance various options exist to support these services.

Q: Can my family history or genetic testing be used to discriminate against me by my employer or my insurance company?
• No. Many state and federal laws prohibit discrimination based on family history and genetic information. Congress passed a law in 2008, called the Genetic Information Nondiscrimination Act (GINA), to protect against health insurance and employer discrimination.
The “Does It Run In the Family?” toolkit includes two pieces that can help you summarize your health information for your provider—the family health portrait and healthcare provider card. You may also hear your healthcare provider call a Family Health Portrait a “pedigree.”

Each family and individual is unique and may have genetic diseases other than the major diseases listed here.

For more information visit:

**Disease InfoSearch**
www.geneticalliance.org

**National Library of Medicine**
www.nlm.nih.gov/services/genetics_resources.html

**National Society of Genetic Counselors**
www.nsgc.org

**Michigan Association of Genetic Counselors**
www.magcinc.org
Beaumont Cancer Genetics Program
http://cancer.beaumont.edu/genetics

3577 W. 13 Mile Road, Suite 140
Royal Oak, MI 48073-6769
248-551-3388
Covenant Community Health Center
http://www.covenantcommunitycare.org

The goal of the Beaumont Cancer Genetics Program is to identify high risk individuals, and implement state of the art technology to prevent cancer.