Genetics to Genomics

Improving the Health of Today's Youth Through Science

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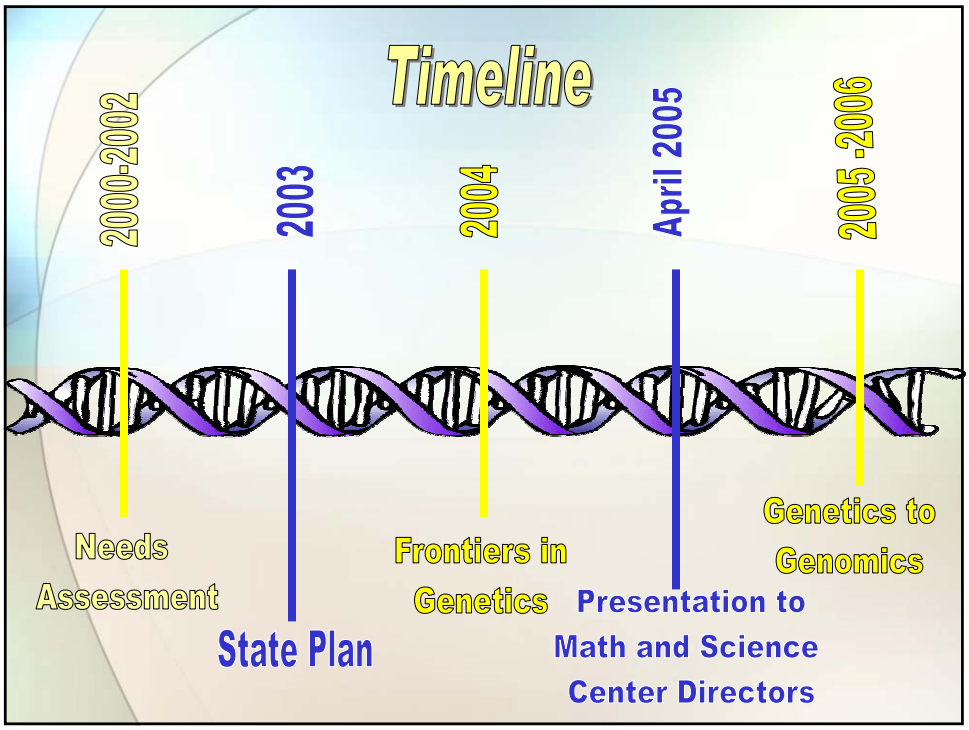


"Applied to public health, genomics offers the potential to better understand the role of genes, environment and behavior as risk factors for complex chronic disease."

(State of Michigan Genetics Plan, p. 8)

Criteria for a Public Health Problem

- ✓Problem occurs frequently and widely
- ✓Problem causes severe disability and suffering
- ✓There are effective methods of dealing with the problem
- ✓Treatments are acceptable to patients, their family, and society

Ten Leading Causes of Michigan Deaths

2003 data

1. Heart Disease *
2. Cancer *
3. Stroke *
4. Chronic Lower Respiratory Disease*
5. Accidental Death
6. Diabetes*
7. Alzheimer's*
8. Influenza/Pneumonia*
9. Kidney Disease*
10. Suicide*

* Indicates causes with a genetic component.

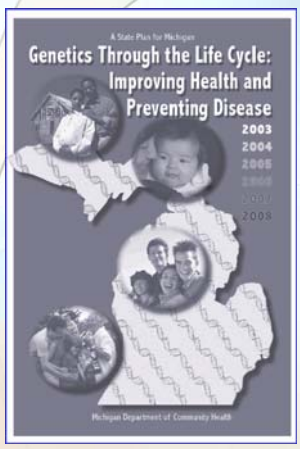
www.mdch.state.mi.us/pha/osr/deaths/causrankcnty.asp

Why are you here?

"Genes impact Michigan's public health in significant ways, yet the role of genetics in health and disease is often not appreciated"

-State of Michigan Genetics Plan p.8

As a teacher you have the opportunity to change that.



Goal One:

Increase genetic literacy in the State of Michigan.

Objective Two:

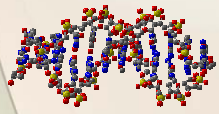
Integrate human genetics into curricula throughout the educational system.

"*Genetic literacy* implies the ability to understand, interpret and apply genetic information to health and lifestyle decisions and to the ethical, legal and social issues faced by individuals and society." -State Genetics Plan, p. 13

What is Genomics?

Genetics

The science of heredity; refers to a single gene and its effects.



Genomics

The study of the entire genome* including the complex interactions among multiple genes as well as between genes and the environment.

* A *genome* is all of an organism's genetic material.

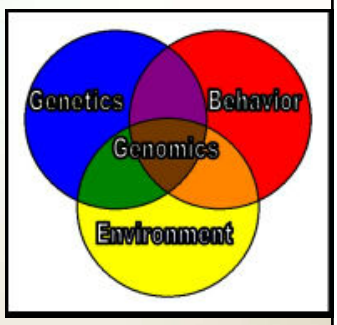
Genetics in Public Health

Future Directions

- Old" Genetics
  - Conditions wholly genetic: chromosomal, single gene mutations
  - Relatively rare; most people not directly affected
  - Small role in health care and public health
- "New" Genetics (Genomics)
  - Conditions partly genetic: caused or prevented by single or multiple gene mutations
  - Common; most people directly affected
  - Potential for environmental modification; prevention
  - Large role in health care and public health

Genetics to Genomics Project Goals

- To encourage biology and health science teachers to progress from teaching single gene disorders to introducing their students to genomics and its implications for health
- To increase awareness in teachers and students that behavioral choices made early in life are important for chronic disease prevention



Hands-On

- 45 sequenced activities
- Majority of the content from existing resources
- Experienced teacher consultant used own activities to fill in the gaps

The 3 R's

- **Relevant** – relates to the real world
- **Rigorous** – challenges every student so they can reach their full potential
- **Reachable** – carefully sequenced tasks so each student can work to reach their full potential

Chronic Disease

Curriculum highlights:

- Heart Disease
- Cancer (specifically skin cancer)
- Diabetes
- Osteoporosis

Address http://www.migeneticsconnection.org/genomics/

FROM GENETICS TO GENOMICS FOR TEACHERS

(under construction)

Home | MIGenetics Connection | Family History | Multifactorial Traits | Genetic Variation | Additional Resources

As teachers you have the task of designing curriculum that reflects the advancements in science as well as the needs of your students. This requires time for you to update your own knowledge in your field as well as translating that knowledge for your students while addressing the Michigan Benchmarks and the "3 Rs."

1. Relevant - curriculum that relates to the real world for your students
2. Rigorous - curriculum that challenges every student so they all can reach their potential
3. Reachable - curriculum that includes carefully sequenced tasks so each student can work to reach their potential

You may be frustrated because you have a very full plate with little or no time to address this issue. This website is designed to support you and help you save time as you make the transition from ***Genetics to Genomics,*** hoping to make an impossible task, possible.

But, "what is *genomics*", you ask, "and why would I want to make the transition from genetics?"

Genomics is a "spin-off" from the Human Genome Project. Instead of looking at one gene at a time, isolated from the environment, genomics looks at many genes, how they interact with each other and how they are affected by their environment.

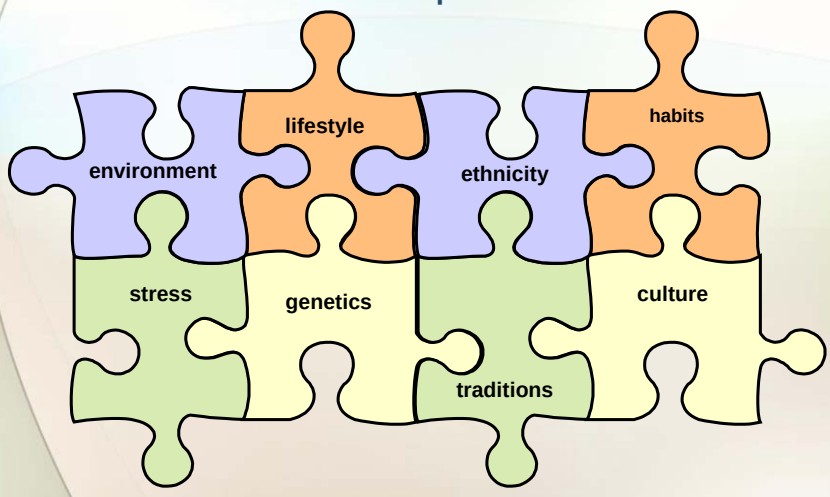
"Why would we want to move in this direction, it s

www.MIGeneticsConnection.org/genomics

Most of our traits are controlled by multiple genes that interact with each other as well as the environment (Very few genes actually function in isolation). These would include traits that vary slightly from individual to individual such as height and hair color, as well as chronic disorders like heart disease, cancer, and diabetes. These common chronic conditions will affect all of us or our families at some time. As scientists learn more about chronic conditions they will be better at diagnosing, treating, and preventing these common problems that are caused by multiple factors, not single genes. It has been said, "Ignorance about health has been called the 'silent epidemic.'" Fortunately, we can use the same concepts (or Benchmarks) we currently

Family Health History

- Pieces of the health puzzle



What information do you need?

- Major medical conditions and causes of death
- Age family member developed disease and age at death
- Ethnic background
- General lifestyle factors like heavy drinking and smoking

Example:

Uncle Bill – smoked cigarettes since he was a teenager, had a heart attack at age 52

Who are the most important relatives to include?

- ✓ you
- ✓ children
- ✓ siblings
- ✓ parents
- ✓ grandparents
- ✓ aunts and uncles
- ✓ nieces and nephews

Questions to Ask

1. Has anyone in your family been diagnosed with a chronic disease (for example: diabetes, cancer, heart disease or asthma)?
2. What is their relationship to you?
3. At what age were they diagnosed? What was the age at death?
4. Did they smoke (how much/how long) or have any other behaviors that should be noted?

FAMILY HISTORY

Genomics at the Organism Level

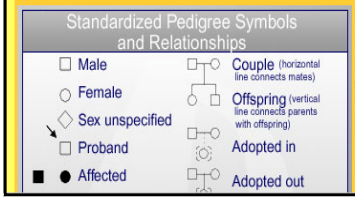
home | MIGenetics Connection | Family History | Multifactorial Traits | Genetic Variation | Additional Resources

As we help our students understand how characteristics of living things are passed from generation to generation we often use a family tree or pedigree to illustrate the movement of the characteristic through each generation. To be useful as a tool, the family tree or pedigree must become easy for the students to construct as they organize data involving characteristics in families. The data may involve single gene inheritance or the inheritance of multifactorial traits (multiple gene and environment interaction).

ACTIVITY SEQUENCE

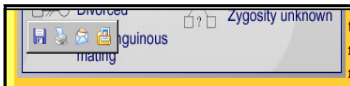
STEP ONE: Understanding Pedigree (Family Tree) Design

Students must first become familiar with the symbols and how they are connected to form a pedigree. (For more information about the recommended universal pedigree symbols click here. They have symbols that reflect all of the new technology involved with reproduction.)



Modeling Pedigree Design: As the teacher you can model how to use the symbols when constructing a pedigree. Begin with a simple family of four: mother, father, son, daughter. Then have the students suggest different relationships to make the family pedigree expand to four generations while trying to include all the possible relationships that can exist with the given symbols. (As another modeling activity you may have them help you diagram the family trees for the characters in a popular soap opera or TV show)

Practicing Pedigree Design: Watching you sketch a pedigree is not enough of an experience for the students to master this skill. They will need to practice designing pedigrees for themselves. This is a time



twist. By the time they are finished with these, constructing pedigrees will be a breeze and they can focus more on the traits being followed through the family and how they are inherited. Your students will naturally want to design their own family tree. Here is a website to help them.

Step Two: Using the Pedigree as a Tool to Trace Characteristics from Generation to Generation

Michigan Benchmarks
AAAS Benchmarks 5B, 11A
National Standards A and C

Now your students are ready to trace characteristics controlled by single genes from generation to generation using their pedigrees. There are many modes of inheritance for single genes. As students practice assigning genotypes to individuals in a pedigree for a particular mode, they should notice a pattern that is true for that particular mode of inheritance and not true for others. Help them see the pattern in the first one and then see if they can identify the patterns in the ones to follow. Below are examples of pedigrees for different modes of inheritance for single gene traits. Included on each page is a list of the patterns students will discover for each mode of inheritance as well as areas of difficulty for students. Each of these pedigrees was designed to show the patterns for this mode of inheritance and may not be typical for rare single gene conditions. However, each page also has some real examples of human traits that we believe follow this mode of inheritance. Some will also have examples of more realistic pedigrees for specific conditions. Remember, when assigning genotypes to pedigrees always begin with the individuals who have only one possible genotype and work from there by looking at their relationship to the other members of the family.

As the students get better at doing this, try giving them a pedigree exhibiting a new mode of inheritance without telling them what it is and see if they can hypothesize what the possible mode could be. This will be a challenge, but it allows them to use their understanding of how genes move from generation to generation in a different way. You may decide to study only a couple of modes of inheritance or you may have the time to do them all as you look at different conditions throughout your genetics unit or class. These are designed to support what you already have developed.

Autosomal Recessive
Autosomal Dominant
Sex(X)-linked Recessive
Sex(X)-linked Dominant
Sex Influenced female dominant

Family History Benchmarks for Michigan

Heredity (HS1) **Explain how characteristics of living things are passed on from generation to generation.**
Key concepts: Traits-dominant, recessive. Genetic material-gene pair, gene combination, gene sorting.
Real-world contexts: Common contexts-inheritance of a human genetic disease/disorder, such as sickle cell anemia; a family tree focused on certain traits; examining animal or plant pedigrees.

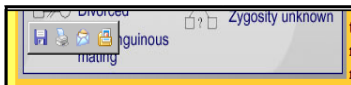
Heredity (HS2) **Describe how genetic material is passed from parent to young during sexual and asexual reproduction.**
Key concepts: Types of cell division--mitosis, meiosis, DNA replication, chromosome. Types of reproduction--sexual, asexual. Genetic variation. Real-world contexts: Fruit flies, yeast, reproduction by spores, cloning.

Organization of Living Things (HS4) **Explain how living things maintain a stable internal environment.**
Key concepts: Related systems/cells/chemicals--excretory system, endocrine system, circulatory system, hormones, immune response, white blood cell, bacteria, virus. Factors/mechanisms under control--temperature, disease/infection, homeostasis.
Real-world contexts: Mechanisms for maintaining internal stability, such as body temperature, disease control.

Organizations of Living Things (HS5) **Describe technology used in the prevention, diagnosis, and treatment of diseases, and explain its function in terms of human body processes.**
Key concepts: Available technologies--sanitation, adequate food and water supplies, inoculation, antibodies, biochemistry, medicines, organ transplants.
Real-world contexts: Common contexts for these technologies--health maintenance and disease prevention activities, such as exercise and controlled diets; health monitoring activities, such as cholesterol and blood pressure checks and various tests for cancer.

Reflecting (HS1) **Justify plans or explanations on a theoretical or empirical basis**.
Key concepts: aspects of logical argument, including evidence, fact, opinion, assumptions, claims, conclusions, observations.
Real-world contexts: any in the sections on Using Scientific Knowledge.

Reflecting (HS2) **Describe some general limitations of scientific knowledge.**
Key concepts: understanding of the general limits of science and scientific knowledge as constantly developing human enterprises; recognizing that arguments can have emotive, economic, and political dimensions as well as scientific.



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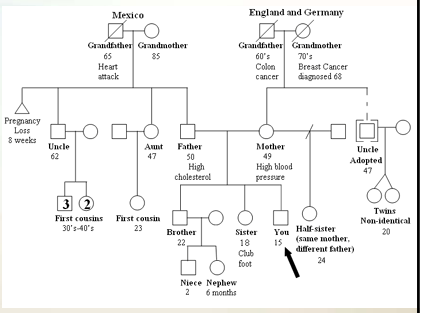
Autosomal Recessive
Autosomal Dominant
Sex(X)-linked Recessive
Sex(X)-linked Dominant
Sex Influenced female dominant

Family Health History

- Genomics at the organism level
  - Pedigrees – The Ultimate Challenge (I am My Own Grandpa)
  - Patterns of Inheritance
  - Chronic Disease and Family History (does not follow pattern of inheritance previously learned)
  - "What is your Risk for Disease" using the Harvard Disease Risk web site



What is Your Risk for Disease?

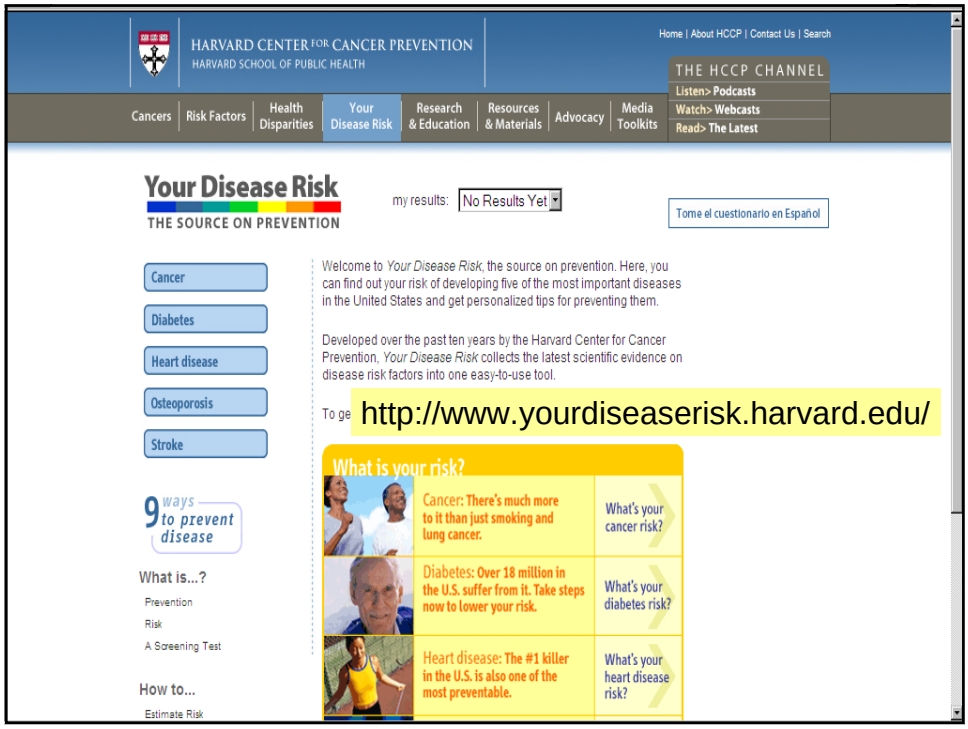
1. As homework, have each student read the story about the Genomisons, a family afflicted with many chronic diseases. As they read they should:

- sketch the family tree including name and age for each individual (if they are deceased, include age at death). (See Completed Tree)
- make a list of any ideas the Genomisons have about their health that lead to their making poor choices.

2. In groups, the students will use the website: *Your Disease Risk* (developed by the Harvard Center for Cancer Prevention) to investigate a chronic condition affecting this family. (See List Below) Each group should:

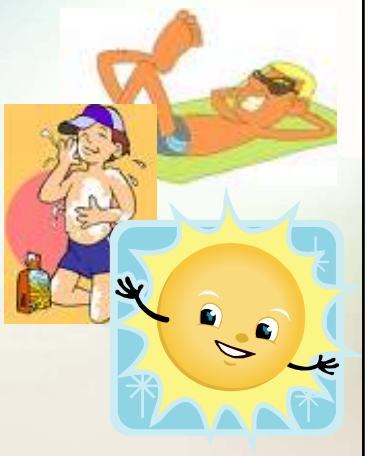
- Enter the data (found in the story) for the specific member of the family they are assigned by answering the questions on the website and have the website calculate disease risk for that family member
- Study the list of lifestyle choices that are increasing and decreasing the risk for disease presented by the website, and note how the risk changes as the lifestyle choices are altered
- Make a list of recommendations for this individual that would decrease their risk for this particular chronic disorder.
- Report your findings and recommendations to the class as the teacher collects information on a chart, comparing the chronic conditions.
- As each group presents their findings, the class should look for patterns of behavior or lifestyle choices that affect the overall health of this family.
- Possible assessment items to check for student understanding - Using all of the information they now understand about chronic disease:
  - Have each student write a letter to the Genomisons informing them how changing their lifestyle will impact the expression of these chronic conditions.
  - Have each student answer the following question: What recommendations do you have for yourself, Janice Genomison, now that you have looked into your family history for these chronic conditions?
  - Have the students design an advertisement for a magazine that focuses on the prevention of one or more common chronic conditions

Family Member	**Calculate Disease Risk for this Chronic Disorder** (click on each disorder for more information)
Matt Genomison	Heart Disease
Matt Genomison	Skin Cancer (melanoma)
Lisa Genomison	Diabetes
Lisa Genomison	Osteoporosis



Multifactorial Traits

- Genomics at the cellular and gene level
  - Are You Susceptible?
  - 3 Gene Cell Cycle/Cancer Model
  - Sun exposure and skin cancer



MULTIFACTORIAL TRAITS

Genomics at the Cellular and Gene Level

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Multifactorial traits are exactly like they sound, traits controlled by multiple factors, or in this case, traits controlled by multiple genes and the environment. Most of our traits fall into this category. They are traits that often vary slightly from individual to individual, such as height and hair color as well as the common chronic conditions such as heart disease, diabetes, and cancer that we looked at in the activity What is Your Risk for Disease, with the Genomisons.

The following sequence of activities is designed to help your students continue their investigation into how characteristics of living things are passed on from generation to generation, but this time we are looking at multifactorial traits and how the genes and environment play a role in the final expression of the trait. As you look through the activities you may decide to use just a few along with your current curriculum or you may decide to use them all. Just be sure to include enough experiences for you students so they can see a pattern behind the inheritance of multifactorial traits. This will help them apply these ideas later as they encounter new phenomena. This sequence also investigates a common topic in biology classes, the cell cycle. Here the students learn about the cell cycle in the context of cancer, or a loss of cell cycle control. The cancer we focus on is skin cancer because we felt it was the most relevant one for high school students who are always searching for that perfect tan.

Activity Sequence

"Alike, But Not the Same," NIH Curriculum Supplement Series, ***Human Genetic Variation,*** activity 1.

This activity introduces the idea of multifactorial traits by allowing the students to see that humans share many basic traits but that there is a wide range of variability in most human traits. This is because they are influenced by genetic and environmental factors. The students will collect data about certain human traits in their classroom, construct graphs from the data, and play a quick game showing how each of us is unique.

Rolling the Dice

http://science-education.nih.gov/supplements/nih1/genetic/guide/pdfs/ACT4M.PDF

Imagine that you are going to live your entire life—your teen years, your adult years, and your senior citizen years—in the next 10 minutes and that your choices in life are going to be made by a roll of the dice. Begin with your teen years and roll one die to discover your behavioral choices in each category for each life stage. Use the information provided to determine how many points you receive for each behavior. Record the result in the blanks provided.

By the way, the object of this game is to stay alive to a ripe old age. You do this by keeping your "heart points" below the threshold level of 85. Once you exceed 85 points at any life stage, you're out (you've had a fatal heart attack).

Life Stage 1: Choices as a Teenager		**Heart Points**
1. Diet. Roll one die. If you rolled:		
1 or 2	You eat a well-balanced, low-fat diet (subtract 10 points).	_____
3 or 4	You eat some high-fat fast food and junk food (add 5 points).	_____
5 or 6	You eat a lot of high-fat fast food and junk food (add 10 points).	_____
2. Exercise. Roll the die again. If you rolled:		
1 or 2	You're a couch potato! You get little or no exercise beyond walking from the TV to the refrigerator (add 15 points).	_____
3 or 4	You get a moderate amount of exercise (subtract 5 points).	_____
5 or 6	You exercise regularly (subtract 15 points).	_____
3. School/Job/Relationships. Roll the die again. If you rolled:		
1	You feel that your life is pretty stress free (subtract 10 points).	_____
6	You are under a great deal of stress at home, at school, and at work (add 10 points).	_____
For any other rolls, add no points.		_____
4. Smoking. Roll the die again. If you rolled:		
1 or 2	You don't smoke and are rarely exposed to those who do (subtract 20 points).	_____
3 or 4	You don't smoke, but you are around many people who smoke (add 10 points).	_____
5 or 6	You smoke one or more packs of cigarettes a day (add 20 points).	_____
Total risk points from choices made as a teenager:		_____

If the total is more than 85, you've had a fatal heart attack.

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Master 4.1a

Low tech activity that can be used for middle school also.

THREE GENE CELL CYCLE/CANCER MODEL

In this activity, we will work with the two groups of genes that control the cell cycle, **proto-oncogenes** and **tumor suppressor genes**. We will also add a new group of genes that are in charge of the maintenance of our DNA, or the **DNA repair system**. Every cell's DNA is under constant attack from chemicals or radiation they are exposed to in the environment as well as chemicals that are the result of their own chemical reactions. DNA even becomes damaged during replication. (more detail about DNA damage) This system detects and repairs the errors in the DNA. There is a chance however, that the genes that are involved i the DNA repair system may get damaged themselves. This can lead to an increase in the mutation rate for that cell and a greater possibility that you will accumulate the mutations needed to cause cancer. For this activity, we will assume that we are focusing in on our own **skin cells**.

REMEMBER:

Proto-oncogenes are like the gas peddle of the cell cycle. They produce proteins that signal a cell to divide. Some cells divide often (those found in an embryo or wound healing) and would use this gene frequently, while others divide less frequently or not at all (muscle cell, neuron). If this gene were to mutate in such a way that it continually signals a cell to divide and we start accumulating too many cells, it is now an **oncogene,** and could be thought of as a gas peddle stuck in the dow position.

Tumor Suppressor Genes are like the brake peddle of the cell cycle. When DNA is damaged, the tumor suppressor gene will stop the cell cycle so that repairs can be made. If the damage is beyond repair, it will signal the cell to commit suicide, apoptosis. This prevents the replication of cells with mutated DNA or cells tha do not have a complete set of functioning genes, which are needed to maintain healthy cells. Cells die everyday and go unnoticed. We have probably all experience massive apoptosis or cell suicide however, when our skin peels following a sunburn.

Step 1: Cell Cycle Model with Students Acting as the Genes that Control the Cycle

(This activity is done as a skit in front of the class to introduce new genes as well as review the students understanding of genes they have worked with previously. I this activity we will introduce the students to the genes involved in the DNA repair system or the genes in charge of maintenance. They will also work with the genes from the previous activity, proto-oncogenes and tumor suppressor genes, as they apply what they know to this new situation involving the interaction of more than one gene to produce a phenotype.)

WHO: One student will represent each of the following groups of genes (Wear sign or hat with the name of the group of genes they represent). Proto-oncogenes, tumor suppressor genes, DNA repair system, DNA synthesis system. The teacher or group leader will act as UV Radiation when needed.

Genetic Variation

- Genomics at the molecular level (DNA, proteins and mutations)
- The Genetic Science Learning Center, University of Utah
- Alternative Splicing: Getting more than one protein from a gene
- Mutate a DNA sentence
- Microarray – Wet Lab (DNA sequencing activity) and Computer activity (University of Utah)

GENETIC VARIATION

Genomics at the Molecular Level

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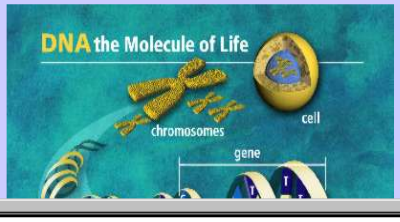
DNA is only as powerful as the proteins it produces. Proteins are products of gene expression that create our phenotype. Some genes work alone producing a protein that results in a phenotype for a single gene trait. Other genes work together along with the environment to create a phenotype for multifactorial conditions. In this situation, a certain combination of proteins (gene products) causes one phenotype while a different combination of proteins from the same genes can cause a different phenotype, resulting in genetic variation for that trait or a trait that varies slightly from individual to individual. (Developed in the previous section, Multifactorial Traits) How can one gene produce different proteins for a given trait? One answer is that each gene has multiple alleles, or variations in the DNA sequence at that gene locus, that are probably the result of mutations for that gene. Let's begin with DNA and look at how it directs the formation of proteins. Then let us look at what happens when DNA mutates, what effect it has on the protein it produces, and how all of this leads to genetic variation for a single or multifactorial trait. Finally, let's look at microarrays, a wonderful technology that can identify genetic variation for a gene or group of genes, and will aide scientists in the diagnosis, and treatment of those common chronic conditions such as heart disease, cancer, and diabetes. Let's begin with DNA.



WHAT HAPPENED TO THE DNA?

(How mutations lead to variation within a gene)

The idea for this activity originated with Ricki Lewis, ***Human Genetics, Concepts and Applications,*** second edition, 1997, p.198, and was modified by Lori Buwalda and Barb Neureither.

In this activity, we will use the three letter words in a sentence to model the effect of different mutations on a sequence of DNA and its resulting protein. In each sentence:

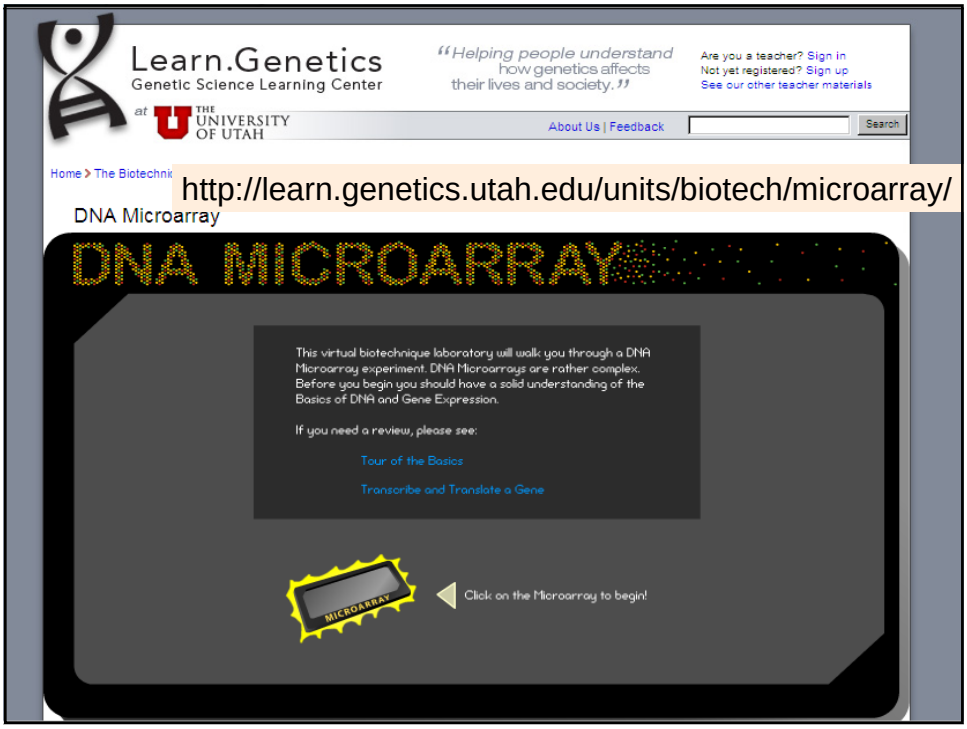
- 1 letter = 1 nucleotide
- 3 letters in a word = codon
- 1 word (and its meaning) = amino acid
- 1 sentence = 1 protein
- meaning of the sentence = protein's function

Compare each of the following mutations to the original to discover the change in the DNA sequence or mutation that has occurred.

Original:
THE BIG FAT BUG BIT THE BIG FAT CAT

Mutation A:
THE BIG FAT BUG MIT THE BIG FAT CAT
Describe the change (mutation):

Mutation B:
THE BIG FAT BUG BIT GTH EBI GFA TCA
Describe the change (mutation):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Genetic Science Learning Center
"Helping people understand how genetics affects their lives and society."
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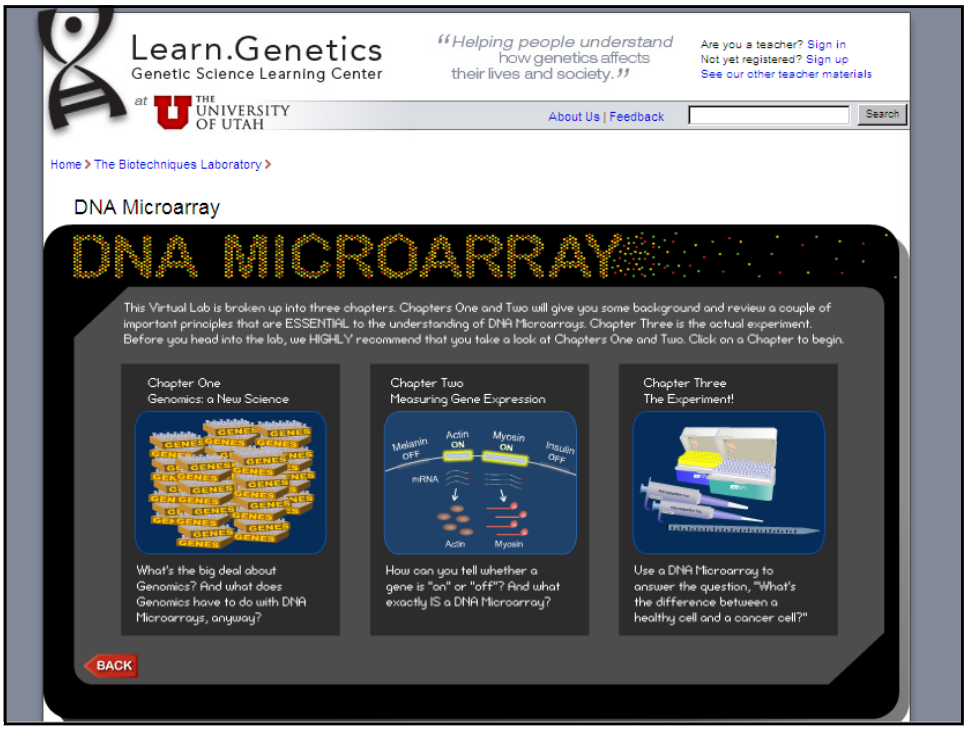
Home > The Biotechnic
http://learn.genetics.utah.edu/units/biotech/microarray/
DNA Microarray
DNA MICROARRAY
This virtual biotechnique laboratory will walk you through a DNA Microarray experiment. DNA Microarrays are rather complex. Before you begin you should have a solid understanding of the Basics of DNA and Gene Expression.
If you need a review, please see:
Tour of the Basics
Transcribe and Translate a Gene
MICROARRAY
Click on the Microarray to begin!


Learn.Genetics
Genetic Science Learning Center
"Helping people understand how genetics affects their lives and society."
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Home > The Biotechniques Laboratory >
DNA Microarray
DNA MICROARRAY
This Virtual Lab is broken up into three chapters. Chapters One and Two will give you some background and review a couple of important principles that are ESSENTIAL to the understanding of DNA Microarrays. Chapter Three is the actual experiment. Before you head into the lab, we HIGHLY recommend that you take a look at Chapters One and Two. Click on a Chapter to begin.
Chapter One
Genomics: a New Science
What's the big deal about Genomics? And what does Genomics have to do with DNA Microarrays, anyway?
Chapter Two
Measuring Gene Expression
Melanin OFF
Actin ON
Myosin ON
Insulin OFF
mRNA
Actin
Myosin
How can you tell whether a gene is "on" or "off"? And what exactly IS a DNA Microarray?
Chapter Three
The Experiment!
Use a DNA Microarray to answer the question, "What's the difference between a healthy cell and a cancer cell?"
BACK

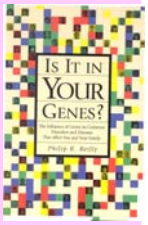
Address http://www.migeneticsconnection.org/genomics/AdditionalResources.htm

ADDITIONAL RESOURCES

Home | MIGenetics Connection | Family History | Multifactorial Traits | Genetic Variation | Additional Resources

Is It in Your Genes? by Philip R. Reillly
Book and companion website

NIH Curriculum Supplements
(they are free and support inquiry, highly recommended)
http://science-education.nih.gov/supplements



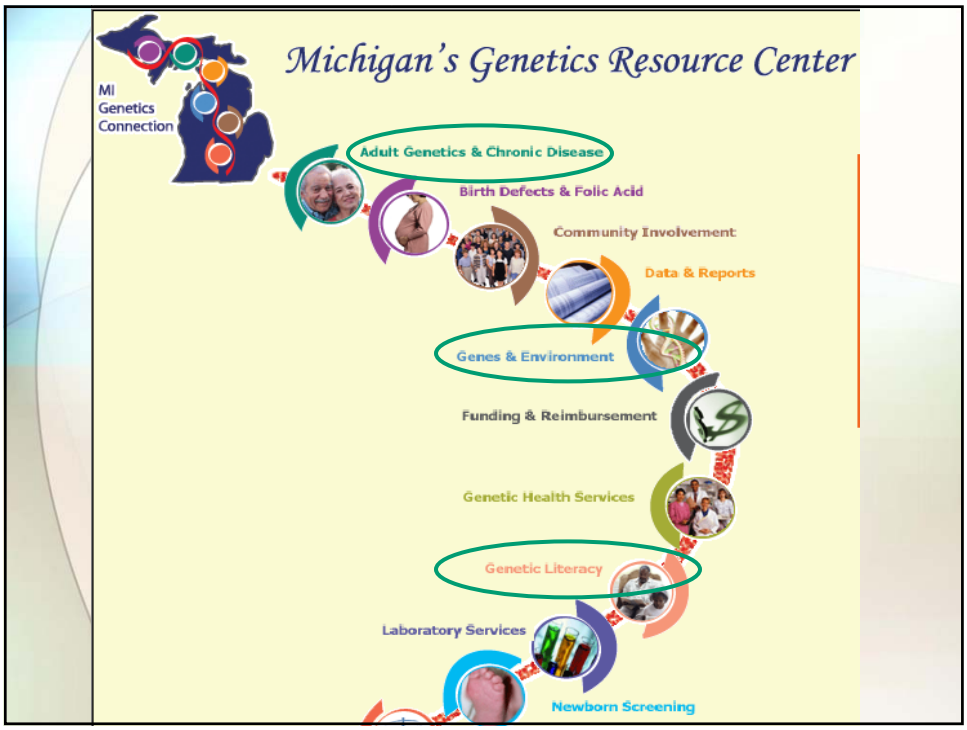
Educational Materials from the National Human Genome Research Institute
Educational materials about genetics and genomics for students, teachers and the general public
http://www.genome.gov/Education/

Human Genome Project Education Kit
http://www.genome.gov/Pages/EducationKit/

Human Genome Landmarks Poster: Chromosome Viewer
Order you free poster on line or view each chromosome and its genes by just clicking on it.

Bioinformatics and the Human Genome Project
(Download this module at this site)
http://www.bscs.org/page.asp?pageid=0|31|53|308|77&id=0|bioinformatics_and_the_human_genome_project

Other Genetics and Genomics Modules
(they can be downloaded as PDF Files)
http://www.ornl.gov/sci/techresources/Human_Genome/education/education.shtml#downloads



MI Genetics Connection

Google Search Search

Adult Genetics & Chronic Disease
Birth Defects & Folic Acid
Community Involvement
Data & Reports
Genes & Environment
Funding & Reimbursement
Genetic Health Services
Genetic Literacy
Laboratory Services
Newborn Screening
Policy & Law
Research in Michigan
Support Group Directory
State Plan

Adult Genetics & Chronic Disease

Many Michigan families are affected by adult-onset genetic disorders (genetic disorders that appear in adulthood) or other chronic diseases. A chronic disease is a disease that lasts a long time or recurs often. Chronic diseases account for the leading causes of death to Michigan residents.

Some conditions have a known pattern of inheritance or a common gene that gets passed from generation to generation. There are other conditions where there is no clear pattern but a person's risk may be higher due to their family history. Links to information and key resources about adult genetic issues are included here.

What resources are available for families with adult-onset genetic disorders?

- Michigan Support Group Directory
- Genetic Clinic Services
- Fact sheets on specific disorders

Where can I learn more about chronic diseases in Michigan?

Asthma | Diabetes

MI Genetics Connection

Google Search Search

Adult Genetics & Chronic Disease
Birth Defects & Folic Acid
Community Involvement
Data & Reports
Genes & Environment
Funding & Reimbursement
Genetic Health Services
Genetic Literacy
Laboratory Services
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Policy & Law
Research in Michigan
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State Plan

Genetic Literacy

The need to increase genetic literacy was identified as an important goal of the Michigan State Genetics Plan. In order to make the best use of genetic information for preventing disease, improving health and increasing the quality of life for individuals with special health needs, Michigan residents need to understand the role of genetics in health. This page provides links to educational resources including publications, courses and web sites.

Michigan Events C

Check the events calendar for educational opportunities, or post your organization's upcoming conference or workshop related to any topic involving genetics, birth defects, developmental disabilities, or chronic disease. Need more information? You can also call the Genetics Information Line toll-free at 1-866-852-1247 or e-mail genetics@michigan.gov.

Information is available for

- General Public
- Health Professionals
- Patients and Families
- Teachers and Students

General Public

1. 'B' Your Best with Folic Acid pamphlet O
2. Newborn Screening pamphlet *Order*
3. Family History Newsletters *Order*
4. Preventing Birth Defects pamphlet *Order*
5. Family Health History Poster (11 x 17)

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Centers for Disease Control and Prevention
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Search:
Genetics & Genomics
Sequencing the human genome has generated new interest in examining the role of genetic variation in health and disease. Until recently, human genetics was useful mainly for clinical diagnosis of hereditary disorders. Now genomics - the science of the human genome - promises to provide new insight into the interactions of genetic susceptibility with environment and lifestyle that maintain health or cause disease. Family history bridges genetics and genomics by encompassing the effects of shared genes, shared environments, and complex gene-environment interactions.
View by Topic
Genomics and Population Health
Family History and Genetics
Genomics in Practice
Genomics for the Public
Genetic Testing
Workforce Genomics Competencies
Featured Items:
Genomics and Health Weekly Update
This weekly update provides information about the impact of human genetic research on disease prevention and public health...more
The Surgeon General's Family History Initiative
Learn more about collecting your family history....more
Genomics and Population Health 2005
CDC's Office of Genomics and Disease Prevention presents the second periodic publication on genomics and population health.....more
Public Health Genomics at CDC: Accomplishments and Priorities 2004
Summary briefing book that establishes priorities, accomplishments, and future directions in human genomics...more
for public health professionals...more
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Office of Genomics and Disease Prevention
National Center on Birth Defects and Developmental Disabilities
Assuring The Quality of Laboratory Practices in Genetic Testing
Newborn Screening Quality Assurance Program
Key Resources
GDP Info
HuGENet™
Regional and State Genetics
Genomics Calendar of Events
Contact Info
genetics@cdc.gov
http://www.cdc.gov/node.do/id/0900f3ec8000e2b5

My Family Health Portrait
A tool from the U.S. Surgeon General
Help with this page
Welcome to My Family Health Portrait
My Family Health Portrait allows you to create a personalized family health history report from any computer with an Internet connection and an up-to-date Web browser. Information you provide creates a drawing of your family tree and a chart of your family health history. Both the chart and the drawing can be printed and shared with your family members or your healthcare professional. Used in consultation with your healthcare professional, your family health history can help you review your family's health history and develop disease prevention strategies that are right for you.
New users can click on Create a Family History to begin creating a personalized family health history. Returning users can click on Load a Saved Family History to edit or update an existing personalized family health history.
Create a Family History
Load a Saved Family History
My Family Health Portrait has been tested on following browsers on Windows: Internet Explorer 5.0+, Netscape 7.0+ and Mozilla Firefox 1.0+. It has also been tested on the following browsers on Mac: Safari 1.3+, Netscape 7.0+ and Mozilla Firefox 1.0+. Internet Explorer 5.2 or lower on Mac is not a supported browser. To update your browser, visit the Browser Update page.
Additional Information
Since My Family Health Portrait is Web-based, no additional software needs to be downloaded or installed. The health information you provide is stored only on your computer and not on a U.S. government server. You own the file and can choose what to do with it at any time.
With My Family Health Portrait, you can:
Edit or update your health information at anytime.
Save your health information to a disk and take it with you if you are using a public machine
www.hhs.gov/familyhistory

Genetics to Genomics email group

If interested, leave your name and email with me.

Resource Packet

- Given to each participant, includes:
  - Hard copies of workshop activities
  - US Surgeon General's Family History Initiative, print version
  - MDCH Family History and Your Health newsletters
  - UV Beads
  - Chronic disease information

Funding

- Workshops were **very** well received but…..
- No funding currently for further workshops

Teacher Comments

- "I like the way of looking at the genome rather than individual genes"
- "Just the kind of cutting edge stuff we teachers need!"
- "Thank you for keeping it fast paced, taking our questions and actually walking us through one or more activities for each level."
- "I can't really think of anything least useful- but I could have used some chocolate." ☺

Thank you!!

Keep in touch!

Don't forget we are here!

This presentation is supported in part by Cooperative Agreement #U58/CCU522826 from CDC. Its contents are solely the responsibility of the presenter and do not necessarily represent the official views of CDC.