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| **TGC Fellow Unit** | | |
| Prepared by: Mark Cowley School/Location: Sky View High School / Smithfield, Utah | | |
| Subject: Biology/Genetics Grade: 9-12 Unit Title: Why Me? Time Needed: 65 minute class periods | | |
| Unit Summary: Student will learn how genetics play a key role in the development of certain diseases. Students will be learning about major diseases that are inherited with the focus of research on genetic diseases that are specific to ethnic/racial groups from around the world. By learning the difference between environmental factors and genetic predisposition, student will understand how best to provide treatment. | | |
| **Stage 1 Desired Results** | | |
| ESTABLISHED GOALS:  (Goals G1-G4 are from Utah State Science standard 4 Objectives 2d, 3b, 3d, and 3f)  G1: Analyze bioethical issues and consider the role of science in determining public policy at a local and global level.  G2: Explain how genetic material is inherited.  G3: Research genetic diseases and the ethnic group they impact.  G4: Understand what factors affect the major diseases  G5: Research how different countries identify risk factors for genetic diseases and possible treatment options for potential carriers.  GLOBAL COMPETENCY:  GC1: Evaluate data collected through research and critique the reliability of that data.  GC2: Collaborate with a scientist currently doing research on one or more of the genetic disease that affect them personally.  GC3: Think critically about ways to limit the impacts of genetically transferable diseases? Is there a cure?  RESOURCES:  <http://www.mountsinai.on.ca/care/pdmg/genetics/ethnicity-based-conditions>  <http://en.wikipedia.org/wiki/Race_and_health>  <http://www.patient.co.uk/doctor/Diseases-and-Different-Ethnic-Groups.htm>  <https://www.jewishgenetics.org/jewish-genetics>  <http://www.nchpeg.org/index.php?option=com_content&view=article&id=142&Itemid=64>  <http://nkdep.nih.gov/learn/are-you-at-risk/race-ethnicity.shtml>  <http://www.foodnavigator-usa.com/Markets/Celiac-disease-may-vary-by-ethnicity-study-suggests>  <http://mydoctor.kaiserpermanente.org/ncal/specialty/genetics/screening_programs/ebsgeneticscreening.jsp>  <https://familysearch.org/>  <http://www.ancestry.com/>  <http://genealogy.familyeducation.com/browse/origin/>  <http://www.searchforancestors.com/surnames/origin/> | ***Transfer*** | |
| *Students will be able to independently use their learning to…(real world purpose)*  T1: Research and investigate connections between ethnicity and disease prevalence.  T2: Analyze the links between family heritage and inherent genetic risks.  T3: Respect the different cultures and factors involved in genetic heredity. | |
| ***Meaning*** | |
| UNDERSTANDINGS  *Students will understand that…*  U1: Information passed from parent to offspring is coded in DNA (deoxyribonucleic acid) molecules.  U2: The sequence of DNA differs between each organism and each species.  U3: Changes in the DNA sequence may alter genetic expression.  U4: There are predictable patterns of inheritance.  U5: Genetic diseases affect other countries, cultures, and individuals in a negative way. | ESSENTIAL QUESTIONS  E1: What can be done to minimize the impact now and in the future for genetic transferable diseases?  E2: What genetic transferable diseases are prevalent in your heritage/ethnicity?  E3: How do you identify individuals with genetic transferable diseases? |
| ***Acquisition*** | |
| *Students will know… (Content)*  K1: That their genetic makeup comes from both parents.  K2: What their risk factors are for cultural genetic diseases.  K3: The basic structure of DNA.  K4: How current technology is used to identify and diagnose genetic diseases.  K5: Environmental factors such as pollution, economics, toxins, diet, and sun and influence the likelihood of certain genetic diseases and not just heredity. | *Students will be able to… (Skills)*  S1: Explain the connections that exist between ethnicity and disease.  S2: Make the connections between ethnicity and predisposition to genetic diseases.  S3: Publishing a public service announcement video to inform a target ethnicity of possible genetic diseases.  S4: Analyze and discriminate between useful and relevant data. |
| **Stage 2 - Evidence** | | |
| **Assessment** | **Evaluation Criteria (Learning Target or Student Will Be Able To)** | |
| Assessments **FOR** Learning: (ex: kwl chart, exit ticket, observation, draft, rehearsal)   1. Students will create a kwl chart the first day of the unit with main focus on DNA, Genetics and heredity. 2. Using personal family history and internet family history sites, student will generate a 5 generation family tree that will include country of origin and ethnicity for each individual. 3. Chose 5 ethnic groups to focus your research on (your ethnicity can be one of these) and list the major genetic disorders/diseases that are prevalent within each group. Include in your summary of each ethnic group the increase probability of developing the disease, what symptoms are associated with each it and the possible health side effects. A work cited page will need to be attached. | 1. Recognize and identify what they know and don’t know. 2. Identify the ethnic group(s) they belong to. and the disease that they may have an increased risk of developing. 3. Analyze scientific information and data and be able to restate that information in their own words. Predict and interpret patterns of inheritance with regard to dominance/recessive, incomplete dominance and co-dominance. | |
| Assessment **OF** Learning: (ex: performance task, project, final paper)   1. **Public Service Announcement**: Work collaboratively in groups to create a 5 minute video that targets a specific ethnicity and at least one of the diseases that that group is at higher risk to develop. They will include instructions for individual testing and possible symptoms associated with that disease. This video will need to be uploaded to the Sky View Science home page. 2. Reflecting on what you have learned about your own ethnicity, write a letter to an ancestor to inform them of potential health risks they may face. Explain to them what steps should be taken to avoid complications should they develop a genetic disease. | 1. Communicate clearly to their target audience the increased risk they are at for developing ethnic specific diseases and give instructions for testing and diagnosis. 2. Whether or not the paper is reflective and   Complete. | |
| **Stage 3 – Learning Plan** | | |
| *Summary of Key Learning Events and Instruction ( Make this a useful outline or summary of your unit, your daily lesson plans will be separate)*  Lesson 1: **Introduction to DNA, Heredity, dominance/recessive, incomplete dominance, and genetic diseases.**  Students will start by filling out a KWL with DNA, Heredity, dominance/recessive, incomplete dominance, and genetic makeup. Open class discussion with students to find out what they know and share with each other what they need to know. Direct instruction will be used to help students build the knowledge they need and or are missing.  Lesson 2: **Research family ancestry including: country of origin, ethnicity and race.**  Students will be using websites like ancestry.com, familysearch.org, and searchforancestors.com to fill in a 5 generation family tree. Along with this, students will include the countries of origin, ethnicity, and race for each ancestor.  Lesson 3: **Research 5 ethnic/racial groups and the prominent genetic disease with in each ethnic group.**  Students will choose at least 2 of their ethnic and racial groups to research. They will be looking for information about testing, likelihood of diagnosis, heath affects, and symptoms specific to the disease. They will need to answer the following questions about each ethnic/racial group: Are there any other explanations for the disease like environmental, pollution, diet, economics, etc.? Is there a cure? What treatment options are available in country and out of country? Student will create a presentation of their findings and be ready to share them with the class.    Lesson 4: **Share finding with the class regarding their own ancestry.**  Students will present their family tree with countries of origin ethnicity, race, and potential genetic diseases. The class will be given the opportunity to ask questions to each presenter.  Lesson 5: **Skype or video conference with a scientist who is working on a genetic research project.**  I will arrange a video conference or Skype with a scientist who is currently working on ethnic specific genetic diseases. Here in Utah we have the Huntsman Cancer Research Center that has on going genetic testing. I’m hoping to partner with them as a local resource.  Lesson 6: **Make a 5 minute Public Service Announcement video. (small groups with the same ethnicity/race)**  Students will write a script and make a video for a PSA focusing on one of the genetic disease that is inherent to the work group’s ancestry. The video should include information about testing, likelihood of diagnosis, heath affects, prevalence, symptoms specific to the disease, and potential treatment options.  Lesson 7: **Share videos with the class.**  These videos will be posted on the Sky View science website. Students will view the PSA in class and will have a chance to ask questions to one another regarding their disease.  Lesson 8: **Write an ancestor.**  If you could send a letter back to just one of your ancestors informing them of the potential health effects that their genetic disease will have, who would you pick and why? Now knowing what you know, write that person a letter with the help they need to live a longer, better life. You can include in the letter diet and life style changes that may help them.  *\*adapted from Understanding by Design Model* | | |

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| **TGC FELLOWS UBD Lesson Template** | | |
| Lesson Title: Roots and Branches Subject: Biology Prepared by: Mark Cowley  Materials Needed: 5 generation family tree paper, Ipads, Personal family history.  Global Competency: Investigate the world, Recognize perspectives | | |
| **W**here is the lesson going?  (Learning Target or SWBAT) | LT: Students will be able find 5 generations of ancestors, their country of origin, and ethnicity.  LT: Students will research genetic diseases that are specific to their ethnicity or race. | |
| **H**ook: | | **T**ailored Differentiation: |
| Start class by telling the story of my Irish ancestry.  The Centers for Disease Control now calls hemochromatosis (too much iron in the body) the most common genetic disorder in the United States, one that affects 33.5 million Americans. An estimated 32 million are silent carriers, meaning they exhibit no symptoms, while 1.5 million have a double gene mutation because both parents carried the mutant gene, which puts them at high risk. Yet many doctors still believe what they were taught in medical school — that hemochromatosis is a rare disorder that only strikes middle-aged or elderly white men. Those with Irish, Scottish or British heritage have a significantly higher chance of carrying the gene mutation that may cause them to develop the potentially deadly disorder. | | -Allow students to complete the 5 generation by personally interviewing one or more of their ancestors.  -Provide a list of websites for ethnic and genetic diseases.  -Instead of sharing with the class, student can create a chart or powerpoint showing country of origin, ethnicity/race and genetic diseases. |
| **E**quip: | |
| Student will start with themselves and identify their ethnicity. They will then fill in the names, ethnicity, and country of origin of their parents, grandparents, great grandparents, great-great grandparents. If students are unsure of any information they can search the internet for help using sites like ancestry.com, familysearch.org, and searchforancestors.com. Students will then search for genetic disease prominent to each ethnicity of their ancestors. | |
| **Rethink and revise:** | |
| Are there any surprises with your ancestry? Do you have more than one ethnicity? Do you have the ethnicity that you thought you did? What are the genetic diseases specific to your ethnicity? Are there any overlapping genetic diseases? | |
| **Evaluate:** | |
| Share with the class the country of origin and ethnicity of ancestors and possible genetic disorders. | |
| Notes: | |
| **O**rganization: |
| Have handouts ready and Ipads charged. |