



CDC Science Ambassador Lesson Plan Index

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ADHD

Focus On This: The Biology of ADHD

<https://www.cdc.gov/careerpaths/scienceambassador/documents/focusonthisadhd.pdf>

This lesson is for a standard level high school biology course and is meant to review and strengthen the concepts of neuron physiology and neurotransmission, and connect these concepts to attention-deficit/hyperactivity disorder (ADHD). In order to complete these activities students should have prior knowledge of nervous system terminology and function.

ADHD - A Focus on the Brain

https://www.cdc.gov/careerpaths/scienceambassador/documents/adhd_hayes.pdf

This lesson is designed to be a supplemental activity for brain anatomy for a mid-level high school biology class. It allows students to apply their knowledge of the brain in understanding how neurochemical imbalances are thought to affect behavior and how different medications are used to treat the symptoms of ADHD. At the conclusion of this lesson, students will be able to discuss differences in brain anatomy and resulting behavior among youth with ADHD, and the different treatment options available for individuals with ADHD.

Alzheimer's Disease

The Aging Brain: A Lesson on Alzheimer's Disease

<https://www.cdc.gov/careerpaths/scienceambassador/documents/theagingbrain.pdf>

This lesson is for a standard-level high school biology course and is meant to review and strengthen the concepts of brain anatomy and memory and link these concepts to Alzheimer's disease. To complete the activities in this lesson, students should have prior knowledge of nervous system terminology and function.

Alzheimer's Disease

https://www.cdc.gov/careerpaths/scienceambassador/documents/valo-wabler_alz.pdf

This lesson is designed for the high school biology classroom and fits into the broader study of populations and disease demographics. The lesson teaches students about the symptoms, risk factors, and prevalence of Alzheimer's disease.

Autism

Autism and the Brain

<https://www.cdc.gov/careerpaths/scienceambassador/documents/autism-and-the-brain.pdf>

This lesson may be used to introduce the concept of autism spectrum disorders in middle school and introductory high school biology or life science classes. It will allow students to explore brain structure and function, investigate emerging research, and write a letter to the Centers for Disease Control and Prevention (CDC) identifying new research they think is needed in the area of autism. To complete these activities, the students should be familiar with basic biology and the scientific method.

Autism - What Is It?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/thornton-autism-lesson-plan.pdf>

Students will use resources from the Centers for Disease Control and Prevention (CDC) to investigate the symptoms of Autism Spectrum Disorders (ASDs) and compare expected child development to development that might indicate a diagnosis of ASDs. A final project will be the preparation of posters

showing the signs of ASDs. These posters will be displayed in a community library, clinic or other public building.

What's Really True? Discovering the Fact and Fiction of Autism

<https://www.cdc.gov/careerpaths/scienceambassador/documents/maclehose-autism-lesson-plan.pdf> and <https://www.cdc.gov/careerpaths/scienceambassador/documents/maclehose-autism-presentation.pptx>

In this lesson, students will learn about a topic that has been in the news a lot recently—autism and autism spectrum disorders (ASDs). During the course of this lesson, they will evaluate information on several websites about ASDs and then make an informed decision about the truth of what they have read.

Autism Spectrum Disorders: The New Rainbow

<https://www.cdc.gov/careerpaths/scienceambassador/documents/autism-spectrum-disorders-the-rainbow.pdf>

This lesson is designed for use in a 9th- or 10th-grade biology class to introduce students to autism spectrum disorders (ASDs). The lesson gives a basic overview of ASDs through literature, lecture, and group discussion. It concludes with a creative-writing activity where students demonstrate what they have learned about ASDs.

Autism and Autism Spectrum Disorders: Disorders Extending Beyond the "Norm"

<https://www.cdc.gov/careerpaths/scienceambassador/documents/day-autism-lesson-plan.pdf>

Students develop an understanding of autism and autism spectrum disorders (ASDs) by being exposed to and making observations about items that create sensory extremes. Using an inquiry-based discussion, students discover the wide range of defining characteristics of ASDs. Then, students create posters about developmental characteristics that might occur in children with developmental disorders.

Birth Defects

You Gotta Have Heart: Congenital Heart Defects and Heart Surgery

<https://www.cdc.gov/careerpaths/scienceambassador/documents/johns-heart-defects-lesson-plan.pdf>

Congenital heart defects are one of the most prevalent types of birth defect and the largest contributor to infant mortality in the United States (Centers for Disease Control and Prevention, 1998). In this lesson students will A) learn heart anatomy by doing an on-line investigation, B) dissect a sheep heart and learn about congenital heart defects, and C) perform “cardiac surgery” to correct a septal defect on a sheep heart. The target age group for this lesson plan is students in the 11th or 12th grade.

Causes of Birth Defects: An Epidemiological Mystery

<https://www.cdc.gov/careerpaths/scienceambassador/documents/strohfeltd-birth-defects-lesson-plan.pdf>

In this lesson students will be presented with a problem – a cluster of unexplained neural tube birth defects are occurring in a town. Students will take on different roles (physician, parent, epidemiologist, lab technician, etc.) to investigate possible causes of the increased occurrence of birth defects, and then use the evidence gathered to propose the most probable cause. The focus of the lesson is to better understand the process of investigating a scientific problem and the many risk factors associated with birth defects.

Full Circle Advertising: A Look at Teen Alcohol Use and Fetal Alcohol Syndrome

<https://www.cdc.gov/careerpaths/scienceambassador/documents/garcia-fas-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/garcia-fas.pptx>

This lesson introduces students to one consequence of alcohol abuse, Fetal Alcohol Syndrome (FAS). Students will also investigate alcohol advertisements and determine the impact these advertisements have on their behavior. Finally, the students will use what they have learned about advertising to develop new advertisements aimed at preventing FAS.

How to Change the World

<https://www.cdc.gov/careerpaths/scienceambassador/documents/maclehose-fas-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/maclehose-improving-health.pptx>

This presentation will talk about a very important topic – health. How can we improve the health of the public? We will talk about some examples of improvements, discuss how we figure out ways to improve health, and learn about prevention and intervention – the ways that we improve health. We'll also learn about four tools for improving public health – health communication, policy development, providing services, and engineered solutions.

Folic Acid Health Campaign

<https://www.cdc.gov/careerpaths/scienceambassador/documents/cheung-folic-acid-lesson-plan.pdf>

In this lesson students learn about the importance of folic acid in birth defects prevention. Students apply the information they gain through this lesson to design a public awareness campaign. They then present their designs to the class.

Human Embryo Development and Birth Defects

<https://www.cdc.gov/careerpaths/scienceambassador/documents/day-ntd-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/day-ntd-presentation.pptx>

Students will research the different stages of human embryo development. Next, the teacher will give a PowerPoint presentation about a category of birth defects known as neural tube defects (NTDs) and the relationship between NTDs and embryo development. Students then work in groups to research other birth defects and create and present a PowerPoint presentation to the class.

Brain-eating Ameba (*Naegleria fowleri*)



Brain-eating Ameba

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-brain-eating-ameba-2013.pdf>

This lesson plan demonstrates how microorganisms normally found in environments, such as the bottom of warm freshwater ponds and lakes can cause illness when they enter the human body. Students engaged in this lesson plan will learn about *Naegleria fowleri* (the scientific name of the brain-eating ameba), where it lives, how it can cause infection, and how persons can protect themselves from this infection. Students will also have the opportunity to identify other organisms living in local freshwater reservoirs, such as ponds and lakes. At the end of the lesson, students should have an enhanced understanding of the environment's role in disease transmission and ways to reduce the risk for contracting waterborne infections. This material is suitable for use in high school biology or environmental science classes and can be included as part of lessons on aquatic ecosystems.

Child Development

Does Early Intervention Make a Difference

<https://www.cdc.gov/careerpaths/scienceambassador/documents/thornton-child-development-lesson-plan.pdf>

Students will analyze and describe graphs relating to early childhood development programs and use this analysis to formulate conclusions and inferences based on the data. Students will investigate risk factors for early childhood development and use this information to prepare a calendar of activities to enhance early development.

Cholera

Don't Drink the Water: Investigating a Cholera Epidemic

<https://www.cdc.gov/careerpaths/scienceambassador/documents/johns-epi-lesson-plan.pdf>

Students will learn about the scientific method and the characteristics of life by assuming the role of epidemiologists. The scenario that they will investigate is that many individuals in the school have recently become ill with gastrointestinal symptoms (vomiting, diarrhea, dehydration, and headache).



Masters of Disaster

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-masters-of-disaster-2014.pdf>

Students learn how to coordinate a basic response to a public health disaster by exploring of the cholera outbreak in Haiti after an earthquake. Students use patterns in public health surveillance data to characterize a public health emergency. Then, students tailor strategies in consideration of social, economic, ethical, environmental, cultural, and political needs to develop an action plan.

Dating Violence

Crunching the Numbers on Dating Violence

<https://www.cdc.gov/careerpaths/scienceambassador/documents/choose-respect-crunching-numbers.pdf>

This lesson plan gives middle-school students the opportunity to examine dating violence data, provide them with a chance to challenge preconceived notions, develop analytical skills using the data and then, it is hoped that students are able to gain positive attitudes about forming their own positive dating relationships in the future. Students will need to be familiar with the scientific method and be able to identify the components of line and bar graphs prior to taking part in this lesson. This lesson discusses a sensitive topic.

RESPECT — The Data: A Closer Look

<https://www.cdc.gov/careerpaths/scienceambassador/documents/choose-respect-respect-data.pdf>

This lesson is designed as a real-life application of the scientific method. It is appropriate for any high school science class. Students should have prior knowledge of the basics of the scientific method before beginning this lesson. Students will use their knowledge of the scientific method to analyze and evaluate data about teen dating violence. At the conclusion of the lesson, students will be asked to draw conclusions from the scientific process that could guide behavioral modifications to prevent teen dating violence. The authors recognize the sensitivity of the sample data discussed in this lesson. Teen dating violence and the behaviors that could lead to violence might be too sensitive for some younger students. School policies should be reviewed before using this lesson. Students need to be familiar with basic scientific investigation before proceeding.

Diabetes

Diabetes: A National Epidemic

<https://www.cdc.gov/careerpaths/scienceambassador/documents/diabetes-a-national-epidemic.pdf>

This lesson is for a general biology or anatomy and physiology class. The lesson emphasizes the importance of glucose homeostasis in the body, and the effects of type 1 and 2 diabetes on glucose homeostasis by using a classroom enactment of glucose regulation in the body.

Sugars and Fats in Our Food, Oh My!

<https://www.cdc.gov/careerpaths/scienceambassador/documents/sugar-and-fats-in-our-food-oh-my.pdf>

This lesson can be included in a unit about nutrition and health for middle school students. Students will learn about the amount of sugars and fats in typical foods they consume. They will use food labels and various measuring instruments to determine the amount of sugar and fat in serving sizes. This activity gives students a hands-on opportunity to explore food composition in the forms of sugars and fats. At the end of the lesson, students will begin to explore the association between food choices and health outcomes like obesity and diabetes.

Why Can't I Have Sugar? All About Diabetes

<https://www.cdc.gov/careerpaths/scienceambassador/documents/dejulio-diabetes-lesson-plan.pdf>

This lesson is designed to be part of a unit about how the body works. Students will learn about diabetes and glucose metabolism through skits and class discussion. They will assume the role of doctor and develop scripts to explain diabetes to patients and construct models of glucose metabolism to demonstrate how diabetes works. This lesson also serves as an opportunity to educate students about an important public health concern—the worldwide epidemic of diabetes.

Diabetes in the Family: A Case Study

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hardtke-family-history-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hardtke-family-history-and-diabetes.pptx>

Students examine a case study of a woman with a family history of type 2 diabetes and create a “family health portrait” that will assess her risk of developing diabetes. Using the family health portrait to record the woman’s family history, students identify her genetic, behavioral, and environmental risk factors for type 2 diabetes and make recommendations for lifestyle changes.

Driving

Teen Driving: Skills, Responsibilities and Reactions

<https://www.cdc.gov/careerpaths/scienceambassador/documents/teen-driving-skills-responsibilities.pdf>

Teens are more likely to die in a car crash than from any other cause. In order to best understand good driving skills, students should be introduced to the principles of good driving at both middle and high school levels. This lesson plan is arranged to spiral from introductions to reinforcement. It is recommended that teachers choose one or two activities as well as one or two minilabs.

Distracted Drivers

<https://www.cdc.gov/careerpaths/scienceambassador/documents/distracted-drivers.pdf>

This lesson is geared toward high school students. Students will generate a list of behaviors that may distract drivers. Students will be given simple tasks to perform with and without distractions to simulate driving; the ability to focus on one task while distracted by something else will be measured. Students will investigate leading causes of death among teenage children using WISQARS™. This data will open students' eyes to the impact motor vehicle accidents have on the teen population. Students will create banners and slogans encouraging safe driving and raise awareness of the problem. Students will be able to make connections between motor vehicle injury data, brain development, and mortality rates. These lessons include basic math and graphing, computer simulations, teacher lectures, and activities.

Confident Commute: Increasing Safety for Teen Drivers

<https://www.cdc.gov/careerpaths/scienceambassador/documents/teen-driving-confident-commute.pdf>

This lesson is designed for a high school biology course addressing science in personal and social perspectives by investigating the factors that impact teen driving. Students will be introduced to survey development and design by generating a survey to assess the specific risks impacting teen driving. Students will also be introduced to national teen driving data and asked to develop awareness materials to influence positive teen driving behavior. Teachers should be aware of the sensitivity of this topic for students who have been personally affected by a motor vehicle crash (or possibly among family members or close friends).

Ebola



Something Wicked This Way Comes: The 2014 Ebola Response

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-something-wicked-ebola-response-2015.pdf>

The 2014 Ebola epidemic in West Africa is the first in history. Not only has this epidemic been unprecedented, but so has the public health response. In this lesson, students use information from the initial Ebola outbreak to justify each step of an outbreak investigation. Students then identify strategies to implement a public health response infrastructure that allows for effective management of national and international partnerships, allocation of personnel and resources, sharing of data, and the creation of a unified front against Ebola. The target grade level for this case study is an upper middle school to high school audience.

Enterovirus D-68



No Cure for the Summertime Blues: Enterovirus D68 Case Study

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-summertime-blues-2015.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/summertime-blues-2015.xlsx>

In this case study, students will analyze data and information about the outbreak as if it were happening in real time. They will use this information to make decisions about how to effectively monitor and respond to an enterovirus D-69 (EV-D68) outbreak. Students will classify increases in numbers of persons with EV-D68 as a cluster, outbreak, epidemic, or pandemic to help justify planning decisions for conducting a field investigation. Students will apply a case definition to collect data needed to characterize an outbreak by using correct graphs and tables. Oral and written communication skills will be used to communicate findings to the public. Note: Excel data for the case study is available.

Environmental Awareness

Environmental Awareness — Think Global, Act Local

<https://www.cdc.gov/careerpaths/scienceambassador/documents/envt-health-think.pdf>

This lesson is designed for a high school physical science, environmental science, or biology class to explore hazardous materials found at the local, state, and national level. Students will become familiar with federal agencies responsible for the cleanup of hazardous substances and related health issues associated with these substances.

Escherichia coli



I Have a Gut Feeling...*E. coli* O157:H7 Case Study

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-i-have-a-gut-feeling-2014.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-i-have-a-gut-feeling-2014.pptx>

Students use graphing and modeling skills to analyze surveillance data from an *E. coli* O157:H7 outbreak. Through the use of a case study, students identify how health-related phenomena can be characterized by person, place and time. To aid in the formulation of evidence-based hypotheses about the possible cause of disease, students learn how to identify priority health-related phenomena, collect reliable public health data through surveillance systems, and use appropriate models (e.g., charts, figures, graphs, or maps).

Ethics



RAGE Outbreak: Making Grueling Public Health Decisions

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-rage-outbreak-cleared.pdf>

This lesson plan is based on a fictional outbreak scenario. It is designed to address choices made by different stakeholders in the context of public health ethics. The introductory Four Corners questions activity and presentation provides students with the background knowledge necessary to successfully complete the jigsaw activity. The activity has students examine and analyze scientific literature to develop a statement on the basis of their stakeholder's viewpoint. During this process, students develop research skills, debate strategies, and practice their public speaking skills. By evaluating different stakeholder's statements, each student will complete a summative writing assessment that outlines a strategy for vaccination, in response to the outbreak.

Genetics

Am I a Carrier of Cystic Fibrosis?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/am-i-a-carrier-for-cystic-fibrosis-complete.docx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/cystic-fibrosis-fact-sheet.pdf>

After being introduced to the idea that individuals can be tested to see if they are carriers for the genetic disease, cystic fibrosis, students engage in a simulated testing for carrier status and then discuss all of the bioethical implications of such information.

The Clark Family Story: Tracing the Cause of Hemophilia

<https://www.cdc.gov/careerpaths/scienceambassador/documents/strohfeltd-hemophilia-lesson-plan.pdf>

This lesson is for a senior level biology course and emphasizes the relationship between DNA sequences, mutations in DNA and the change in the resulting protein structure and function. Hemophilia A will be used as a real life example of how a mutation in DNA results in a change in a protein's structure and resulting ability to function. In order to complete these activities, the students should have prior knowledge in DNA structure and mutations, protein synthesis, Mendelian genetics and sex-linked traits.

Chromosomal Abnormality Investigation?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/chromosomal-abnormality-investigation-complete.doc>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/tay-sachs-example-presentation.pptx>

Students research a variety of chromosomal abnormalities and resulting syndromes to determine risk factors for and contributors to the abnormalities, and characteristics of the syndrome. Students use the Internet, especially resources from the National Center on Biotechnology Information, to do research and create a PowerPoint presentation.

Cytogenetics

<https://www.cdc.gov/careerpaths/scienceambassador/documents/cytogenetics-complete.docx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/chromosomal-karyotypes.pptx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/chromosomal-variations.pptx>

This lesson plan will enable students to learn karyotyping as part of cytogenetics and all the information that can be supplied by karyotyping.

Genetic Screening: Who Should Be Tested?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/genetic-screening-complete.docx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/genetic-disorders-step2.pptx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/genetic-screening-and-testing-step3.pptx>

Students will address the bioethics of genetic screening through lecture and three learning modules. The three learning modules will investigate the incidence of a gene related to breast cancer within a family and different issues the family could face.

Making Connections between Genes and Diseases

<https://www.cdc.gov/careerpaths/scienceambassador/documents/making-connections-between-genes-and-diseases-compl.docx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/class-chromosome-chart2-step3.xlsx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/genome-project-intro2-step1.pptx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/sample-genome-slides2-step1.pptx>

Individual student research will be pooled to create one class PowerPoint presentation entitled, "The Human Genome: 23 Chromosomes in 23 Chapters". Each student will choose a different chromosome on which to research one gene associated with a particular condition or disorder.

Sex-Linked Chromosomal Disorders

<https://www.cdc.gov/careerpaths/scienceambassador/documents/sex-linked-chromosomal-disorders-complete.docx>

Pedigrees showing heredity and family traits of sex-linked chromosomal disorders will be discussed to understand how these disorders are inherited. Based on this information, students will create projects on the different types of muscular dystrophy.

Life Does not Live by Bread Alone: A Lesson in Micronutrient Deficiencies

<https://www.cdc.gov/careerpaths/scienceambassador/documents/global-nutr-fuller-jones.pdf>

This lesson is designed for an introductory-level biology course or a food science course. The focus of the lesson is the relationship between micronutrients and the proper metabolic function of plants and humans. This lesson could also be taught as an introductory lesson in biochemistry, nutrition, botany, or ecology. Micronutrients specific to plants and to human metabolic function will be explored through research, observation, and discussion.

Operation MINI (Micronutrient Need Intervention)

<https://www.cdc.gov/careerpaths/scienceambassador/documents/operation-mini-micronutrient-need-intervention.pdf>

This lesson is designed for a high school biology, food science, or anatomy class and emphasizes the real-world applications of human nutrition. Student groups will play the part of aid organizations competing for funds to assist a fictitious village that has experienced a natural disaster and is now in a food crisis. They will research various aspects of micronutrient deficiencies and the logistics involved in delivering emergency rations to a village in crisis. They will then work in groups to develop and present an intervention plan. To complete these activities, students should have prior knowledge of macronutrients (carbohydrates, proteins, and fats) and how they help the body to function.

Hantavirus

Rodent Borne Diseases: Getting the Facts Out There

<https://www.cdc.gov/careerpaths/scienceambassador/documents/rodent-borne-diseases-getting-the-facts-out-there.pdf>

In this lesson, students will research one aspect of either hantavirus pulmonary syndrome (HPS) or lymphocytic choriomeningitis (LCMV). Students will use what they learn during their research to produce a public service announcement in the form of a brochure, poster, radio announcement or television commercial. This lesson is for use after students have covered the basics of viruses, viral infection, and immunology. Students should know what a virus is, the basic methods of transmission, and how the human immune system reacts to infection by a virus. This lesson is suitable for students in grades 6–10 and could be used in a science, health, or health science technology course.

The Hantavirus Haunting: Solving The Case

<https://www.cdc.gov/careerpaths/scienceambassador/documents/the-hantavirus-haunting-solving-the-case.pdf>

This lesson is for a high school introductory biology class. Students will take part in a scientific investigation of a 1993 hantavirus outbreak and learn how to prevent hantavirus infection.

Healthy Water

Got Water?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/got-water-2010.pdf>

Natural disasters affect human population on multiple levels. They can cause immediate death, injury, destruction of property and infrastructure, and disruption of services and mechanisms that protect persons from illness. This lesson plan specifically addresses the implications of a natural disaster and its effects on water quality and a community's health. Students will learn methods used during an emergency response to test and treat water that has been contaminated by pathogenic microorganisms. Water treatment options introduced can vary depending on the location and type of emergency involved, but have the same goal to reduce human illness and death. After completing this lesson, students will have an improved understanding of which organizations are involved in emergency response and why safe drinking water is a substantial health concern after a natural disaster.

Get a Clue From the Poo

<https://www.cdc.gov/careerpaths/scienceambassador/documents/get-a-clue-from-the-poo.pdf>

In this activity, students will determine the agent and the source of the agent causing a hypothetical outbreak of diarrheal illness. The activity is modeled after the 1993 outbreak of *Cryptosporidium* infections that involved a public water system in Milwaukee. It provides opportunities for students to use analytical thinking skills to determine the cause of the outbreak. This activity is targeted for high school students. It can be used as an introduction to epidemiology using internet and printed resources learn terminology and basic principles. It can also be used as a wrap up activity after having learned some epidemiology in the classroom.

Hearing loss

Cochlear Implants: The Complex Debate

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hardtke-cochlear-implants-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hardtke-cochlear-implant-lesson-plan.pptx>

In this lesson, students examine issues surrounding the use of cochlear implants as an intervention for infant hearing loss. They will represent the perspective of advocates, parents, audiologists, and physicians in a group discussion about a parent's choice to have his or her child receive a cochlear implant. A cochlear implant is a surgically placed electronic device designed to stimulate hearing in children and adults who have severe to profound hearing loss and can derive little or no benefit from hearing aids. Through research and discussion, students will explore the social, medical, and psychological impacts of infant hearing loss and cochlear implant use

What Did You Say? How Hearing Works

<https://www.cdc.gov/careerpaths/scienceambassador/documents/dejulio-ehdi-lesson-plan.pdf>

This lesson serves as an extension of a unit on waves that links the science of sound to the way that we hear. This lesson also investigates the role of hearing loss prevention as a way to improve public health. Students will wear earplugs while taking notes on vocabulary words, and then take a short vocabulary quiz as an exercise designed to show students what it might be like to have hearing loss. Next, students will generate a model of the process of hearing, and then complete a short group presentation on one of several hearing-related topics. This lesson is designed to be embedded within a unit on waves. This lesson should be introduced after students have an appropriate amount of background knowledge about waves.

1-3-6 Plan! Early Hearing Detection and Intervention Fan!

<https://www.cdc.gov/careerpaths/scienceambassador/documents/westerling-ehdi-lesson-plan.pdf>

Students learn about the Early Hearing Detection and Intervention Program (EHDI) at the Centers for Disease Control and Prevention (CDC), build a simple ear model, and use the ear model to observe how otoacoustic emission (OAE) screening can detect some types of hearing loss. This lesson would be a good addition to a unit on how the ear works.

HIV / AIDS

HIV Infection and AIDS: Get the Facts

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hiv-infection-aids-2011.pdf>

This lesson plan is designed for middle school biology or life science classes and introduces human immunodeficiency virus (HIV) infection and (acquired immune deficiency syndrome (AIDS) as a public health problem, including its modes of transmission, treatment, and prevention. Students should have covered lessons in human anatomy and physiology — specifically, organ systems, blood circulation, and immunity as a prerequisite for this lesson. Material in this plan can also be used to supplement teaching of such human biology topics.

Myth Busters: HIV Transmission

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hiv-myth-busters.pdf>

This lesson is designed for 5th and 6th grade students as a scientific introduction to HIV/AIDS. Due to the sensitive nature of this topic and age of the audience, emphasis has been placed on the communicability of viruses, the distinction between a virus and a disease, and correction of misinformation associated with HIV/AIDS. This lesson plan is activity driven with quick checks for understanding throughout and a final product-based assessment.

HIV/AIDS

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hiv-hiv-aids.pdf>

This lesson is designed for a 10th grade biology course. The lesson uses scientific research information to correct misconceptions, answer learning guides, and present posters on topics associated with HIV/AIDS. A review activity will then allow students to work together to summarize key points about HIV/AIDS, while simulating the contagiousness of a virus throughout the class.

Influenza



Keep Calm and Get Vaccinated

<https://www.cdc.gov/careerpaths/scienceambassador/documents/ms-keep-calm-get-vaccinated-2014.pdf>

Students will learn about the influenza virus, vaccine, and possible effects of an influenza pandemic. Through an interactive PowerPoint and Webquest, students will learn how the influenza virus can change, spread, and, possibly result in a pandemic. They will also learn about influenza surveillance. Students will collect data about influenza transmission and analyze data from two influenza pandemics. In a lesson extension, students will create a public service announcement for the seasonal influenzavaccine



Have You “Herd”? Modeling Influenza’s Spread

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-have-you-herd-modeling-influenza-2014.pdf>

Students use mathematical modeling and perform a laboratory test simulation to explore infectious disease. Through the use of various models, students learn how to predict the infectious disease transmission and spread in populations. Then, students evaluate the effectiveness of countermeasures implemented to prevent pandemics, such as vaccination campaigns.



Seasonal Flu Costs How Much?!

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-seasonal-flu-costs-how-much-2015.pdf>

Seasonal influenza (flu) can be a serious disease that leads to hospitalization and occasionally death. Every flu season is different because the types and subtypes of influenza viruses can change each year. CDC recommends that everyone aged 6 months and older should get a seasonal flu vaccination every year. This lesson examines the economic effects associated with seasonal flu and vaccination decisions. Students will use a systematic, public health approach to learn about influenza and prevention effectiveness, also called public health economics. By using data and scientific estimates of the direct and indirect cost of the flu, students refine mathematical skills and apply them to a real-world scenario. Analyzing scientific evidence through the eyes of students provides them with the insight as to how social and economic factors can often substantially influence decision making and oftentimes outweigh scientific evidence. Developing a tailored vaccination program for their school helps students think strategically about how to construct a winning argument.

Lead

The Lead Placemat: Understanding Lead Exposure

<https://www.cdc.gov/careerpaths/scienceambassador/documents/environment-lead-placemat.pdf>

Middle school students will design and construct a two-sided placemat looking at both the physical and chemical properties of lead and the adverse effects of lead on humans. The completed laminated placemat will provide information and an opportunity to incorporate interactive activities.

Take the Lead — Get the Lead Out

<https://www.cdc.gov/careerpaths/scienceambassador/documents/lead-take-the-lead.pdf>

This lesson is for a high school environmental science or introductory chemistry class and emphasizes the leaching of inorganic lead [Pb+2] compounds as found in association with historic building sites. Students will collect soil, water, and paint chip samples from their homes and use a qualitative precipitate laboratory to locate geographic lead hot spots, correlated with the historic construction of building episodes in their community. Associated with this lesson will be the construction of a word wall detailing the physiological effects of prolonged exposure to inorganic lead, culminating in a writing assignment outlining a fictional case study of a child afflicted with lead poisoning.

Lung Cancer



Lurking Radon and Lung Cancer

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-radon-lurking-and-lung-cancer-2015.pdf>

In this lesson plan, students will use public health surveillance data to investigate radon levels and lung cancer rates at the national level and in their local counties. Students will identify geographic patterns in data, graph radon levels and lung cancers rates, and then calculate lung cancer rates associated with high levels of radon. Students will learn about EPA recommendations for radon, how to test for radon, and have in-depth discussions about the social and political implications to control and prevent future exposure, specifically in schools and day care centers.

Muscular dystrophy

Create-a-Medical-Chart: Duchenne Muscular Dystrophy

<https://www.cdc.gov/careerpaths/scienceambassador/documents/wortmann-md-lesson-plan.pdf>

Students will play the role of medical residents and collaborate to create a medical chart for a patient with Duchenne muscular dystrophy (DMD). Each group will perform guided Internet research to learn about DMD and participate in a simulated case study review session.

Muscular Dystrophy: A Walk in Their Shoes

<https://www.cdc.gov/careerpaths/scienceambassador/documents/garcia-md-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/garcia-md.pptx>

This lesson focuses on empathy. Students in the classroom will be exposed to what it feels like to have muscular dystrophy through a modeling activity. They can then gain knowledge about the symptoms, prognosis, and treatment of muscular dystrophy through teacher presentation as well as Internet research.

Obesity



Food for Thought: Making Healthy Food and Physical Activity Choices

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-food-for-thought-2015.pdf>

Making healthy choices about food and physical activity are not always just a personal choice. Society often plays a role. In this lesson, student will explore how individual choices about healthy eating and physical activity can be influenced by societal factors such as access, affordability, and availability of healthy foods and access to safe places to be active. Then, using a formal debate format, students will create and defend a viewpoint regarding the influence of society on individual choices that reflects scientific knowledge and student-generated evidence. At the end of the lesson, students will be able to actively and accurately engage in conversations about a priority public health concern of the 21st century.

Obesity — Know Your Facts

<https://www.cdc.gov/careerpaths/scienceambassador/documents/obesity-2010.pdf>

This interactive lesson is for high school students and helps students to understand obesity and identify risk factors associated with obesity. Students will study risk factors for obesity and explore the effects of obesity on the human body. Finally, each student will determine their own obesity level and create an obesity prevention plan for teens. Obesity is a sensitive subject, and all precautions should be taken to ensure that student privacy is respected and information is kept confidential. This lesson should be introduced after students have had a unit about human body systems, or this lesson can also be incorporated into such a unit.

Obesity, Nutrition, and Physical Activity

<https://www.cdc.gov/careerpaths/scienceambassador/documents/we-are-what-we-eat.pdf>

This lesson is for high school students and can be used as part of a unit about nutrition. It will help students understand the critical role that certain nutrients play in human health. Students will work in groups to analyze sample diets, each of which has too much or not enough of a particular nutrient. Additionally, students will analyze the prevalence of specific nutrition-related behaviors among youth in the United States. They will summarize their research and present their findings to the class through a skit.

Healthy Eating and Physical Activity for Teens

<https://www.cdc.gov/careerpaths/scienceambassador/documents/healthy-eating-pa.pdf>

This lesson is for an upper-level middle school biology class or an introductory high school biology class. Students will analyze food intake and physical activity and explore the relationship between the two. Students will also discover ways to improve diet and increase physical activity. Students will share this information with their peers in the form of posters that will point out simple steps to become healthier.

Choose Your Own Adventure: School Nutritional Policy

<https://www.cdc.gov/careerpaths/scienceambassador/documents/wortmann-policy-lesson-plan.pdf>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/wortmann-public-health-policy.pptx>

<https://www.cdc.gov/careerpaths/scienceambassador/documents/wortmann-hyperlinked-policy.pptx>

Students will use current obesity research to choose a new school nutritional policy with the goal of improving student health. Once a policy has been chosen, the students will “go on an adventure” and investigate the outcome of the policy’s implementation. A hyperlinked PowerPoint tool will enable students to discover the consequences, both intended and unintended, of different policy options. The students’ policy choices will then be evaluated based on policy processes and outcomes.

**Spatial Analysis of Obesity: GIS and descriptive epidemiology**

<https://www.cdc.gov/careerpaths/scienceambassador/documents/ms-spatial-analysis-of-obesity-2014.pdf>

Students use the geographic inquiry process to explore potential relationships among obesity, income level, and physical inactivity in the state of Georgia. Students use ArcGIS, a geographic information system (GIS), to layer data and analyze data to observe potential patterns. Students explore the role of epidemiologists from asking questions and testing hypotheses to identifying causes of health and disease. Then, based on the information collected, students design public health promotion strategies.

Other – Infectious Disease



Spreading Sickness in Middle School

<https://www.cdc.gov/careerpaths/scienceambassador/documents/ms-spreading-sickness-in-middle-school-2015.pdf>

Pathogens such as viruses and bacteria can cause diseases, many of which are vaccine-preventable. Many infectious diseases are spread from person to person. In this lesson plan, students will learn how an increase in the number of persons vaccinated for a certain disease reduces the potential for that disease to spread. Students will participate in a modeling activity to identify transmission patterns with and without vaccination. Then, students gather information and data to conduct a cost-analysis on being sick versus being vaccinated. Students will present their cost-analysis using an infographic, a 21st century communication tool, to frame a public health message.

Inquiry into Infectious Disease: It's a Germy World After All

<https://www.cdc.gov/careerpaths/scienceambassador/documents/germy-world.pdf>

This lesson engages high school students in a demonstration of how germs are transmitted from person-to-person and involves them in an inquiry-based activity and webquest. Using these tools, they will determine the abundance and types of microbes that are found around them.

Have You Heard About Herd Immunity?

<https://www.cdc.gov/careerpaths/scienceambassador/documents/herd-immunity-2013.pdf>

This lesson demonstrates the concept and importance of herd immunity. It uses hands-on classroom activities to present information on how immunizations protect groups of people from vaccine-preventable diseases and explains the importance of immunizations and why some people are not immunized. The lesson assumes that students have prior knowledge of diseases, vaccines, and the immune system. The concept and activities are appropriate for grades 5-8 but may be used for older students.

Rabies

Rabies – The Global Connection!

<https://www.cdc.gov/careerpaths/scienceambassador/documents/rabies-global-connection.pdf>

This lesson is designed for high school students in grades 9–12 in a biology or health class. In this lesson, students will explore the impact of rabies at both the local and global level. Students will understand the epidemiology of rabies, including how to prevent and treat the disease. Students will also learn the problem-solving skills required related to controlling disease transmission by following protocol. The lesson will conclude with the students creating educational materials to raise awareness about rabies and distribute within the school and community.

Radon



Lurking Radon and Lung Cancer

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-radon-lurking-and-lung-cancer-2015.pdf>

In this lesson plan, students will use public health surveillance data to investigate radon levels and lung cancer rates at the national level and in their local counties. Students will identify geographic patterns in data, graph radon levels and lung cancers rates, and then calculate lung cancer rates associated with high levels of radon. Students will learn about EPA recommendations for radon, how to test for radon, and have in-depth discussions about the social and political implications to control and prevent future exposure, specifically in schools and day care centers.



Lung Cancer at Peachstate Community Center

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-lung-cancer-at-peachstate-community-center-2015.pdf>

Students use epidemiology to investigate a potential lung cancer cluster. Epidemiology is the study of the distribution and determinants of health conditions among populations and the application of that study to control health problems. Students apply descriptive epidemiology to describe the occurrence by person, place, time, and exposure to risk factors. Using data collected through in-person interviews of lung cancer patients, students then apply analytic epidemiology to evaluate the cluster using statistical approaches. They use evidence to determine if there was an increase in cases compared to what was expected and how to establish a causal link between exposure and disease (i.e., that the exposure was the cause of the disease). Students will discover the importance of community relationships in making decisions and apply it by creating a multifaceted public service announcement.

Sexual Health

Do I or Don't I? A Lesson in Making Healthy Sexual Choices

<https://www.cdc.gov/careerpaths/scienceambassador/documents/do-or-dont.pdf>

This lesson is designed for a middle or high school biology class. Students are presented with scenarios in which choices about sexual health must be made. The lesson is designed to give students some practice in making choices that will influence their future sexual health. In doing so, it is hoped students will gain knowledge about the consequences of their choices and be empowered to make the healthiest choice possible.

Let's Talk about STIs

<https://www.cdc.gov/careerpaths/scienceambassador/documents/lets-talk.pdf>

This lesson is designed for a high school biology or health class to learn about sexually transmitted infections (STIs), understand and evaluate the risks of STIs among teenagers, and discuss the leading strategies to prevent STIs. The culminating activity for this lesson is the creation of informative posters or brochures aimed at the prevention and treatment of STIs in the local community

Skin Cancer

Protect the Skin You're In

<https://www.cdc.gov/careerpaths/scienceambassador/documents/skin-cancer-lp-adams-caraballo.pdf>

This lesson is designed for a high school biology, anatomy, or health class to explore the importance of sun safety in relationship to skin cancer prevention. Students will begin with an inquiry based lab regarding sunscreen effectiveness. After analyzing the relationship between lab results and common student practices regarding sun screen use, students will administer and analyze a simple survey to their peers. This lesson will culminate with students developing and implementing a public service campaign designed to increase student use of sunscreen and sun safety awareness. In order for these activities to be most effective, the students should have prior knowledge of skin cancer.

UV: Use Caution

<https://www.cdc.gov/careerpaths/scienceambassador/documents/uv-use-caution.pdf>

This lesson has been developed for a general biology class to look at skin cancer risk factors and ways to reduce those risk factors. The use of tanning beds will be surveyed. Based on this information, as well as information drawn from existing materials from the Centers for Disease Control and Prevention and the Food and Drug Administration, students will compose public service announcements (PSAs) highlighting the links between artificial UV exposure and skin cancer.

Unaccompanied Minors



Making Room: The Public Health Response to Unaccompanied Minors Crossing the U.S. Borders

<https://www.cdc.gov/careerpaths/scienceambassador/documents/hs-making-room-unaccompanied-minors-2014.pdf>

Students will learn about a public health response to a manmade public health problem and its implications. By law, unaccompanied minors crossing the U.S. borders are retained in U.S. custody while immigration processing occurs. Students will identify the services the U.S. Department of Health and Human Services (e.g., medical checks, vaccination, and shelter) provides to unaccompanied minors crossing the U.S. borders. By identifying the needs of this population, students will discover the various professionals (e.g., doctors, nurses, biologists, epidemiologists, social workers, financial officers, border security personnel, engineers, law enforcement personnel, international agency staff, lawmakers, lawyers) needed for an effective public health response.

Vision Health

The Eyes Have It

<https://www.cdc.gov/careerpaths/scienceambassador/documents/eyes-have-it.pdf>

This lesson is designed for a high school biology class. It will help to introduce the importance of vision health to students. Students will investigate how it feels to be visually impaired, understand different types of visual impairment, and learn how to treat and prevent visual impairments. It is expected that students already have an understanding of eye anatomy and physiology.

West Nile Virus

Entomologists on Safari: On the Hunt for Mosquitoes

<https://www.cdc.gov/careerpaths/scienceambassador/documents/west-nile-entomologists-on-safari.pdf>

This lesson is designed for a middle school science course. West Nile virus is an infectious disease in the U.S. Although most people infected with the virus are asymptomatic, West Nile disease can be serious, particularly among older people. In this lesson, students will assume the role of entomologists in a case study to investigate increased mosquito activity and the possibility of West Nile virus

transmission in the fictional community of Anywhereville. Students will then present the community with ways to prevent West Nile virus infection by creating a West Nile prevention poster.

West Nile Virus Strikes Again

<https://www.cdc.gov/careerpaths/scienceambassador/documents/west-nile-strikes-again.pdf>

This lesson is designed for a junior or senior level high school biology course and emphasizes the history of the West Nile virus (WNV) event in the U.S. This lesson highlights the issues associated with disease spread and prevention. Students will work to develop a prevention plan for an American Indian reservation that is experiencing a new occurrence of West Nile virus infection, while taking into consideration the cultural and environmental implications relevant to this population. To successfully complete these activities, the students should have some knowledge of enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), and gel electrophoresis.

Zoonotic Disease

Pets and People

<https://www.cdc.gov/careerpaths/scienceambassador/documents/healthy-pets-pets-and-people.pdf>

This lesson is designed for 6th-8th grade students to explore the health benefits and risks involved in pet ownership and interaction. Zoonoses will be introduced, and students will examine the safety of their interactions with household pets.

What is Wrong with My Pet? — An Introduction to Zoonoses

<https://www.cdc.gov/careerpaths/scienceambassador/documents/healthy-pets-whats-wrong.pdf>

This lesson is designed for 6th–8th grade life science students and focuses on the transmission of diseases between animals and humans. Ringworm and roundworm will be used as examples of zoonoses (infectious diseases that are transmitted to humans by animals). Students will be assigned specific roles within a group and complete research to identify the organism causing disease, how the disease presents in humans, treatment, and presentation strategies. Through an interview style presentation, students will communicate what they have learned with the class. This lesson integrates science research and uses language arts, drama, and art to apply research to a real life situation.