

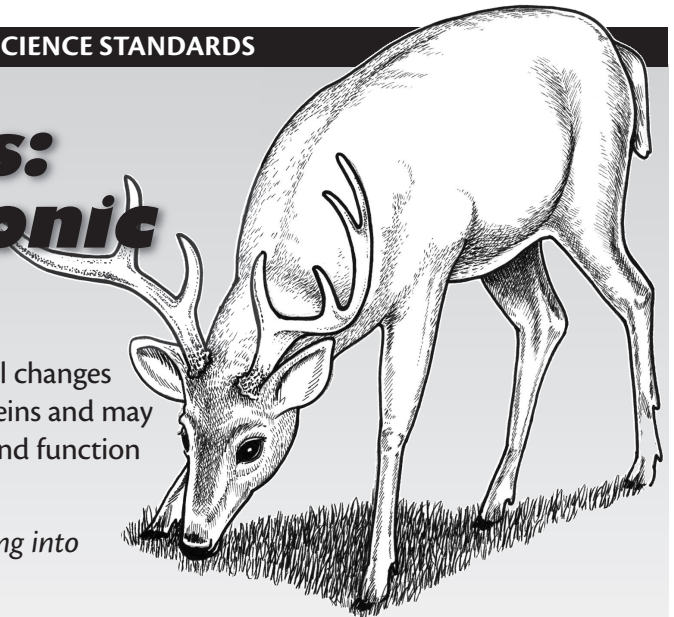
Prying into Prions: Investigating Chronic Wasting Disease

MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

BACKGROUND: See the background information in the *Prying into Prions: Investigating Chronic Wasting Disease* lessons.

OBJECTIVE: Students will review and evaluate experimental design while exploring the role proteins play in organisms, the chemistry and behavior of proteins and the genetic code that creates protein.

MATERIALS: *Prying into Prions: Investigating Chronic Wasting Disease* DVD, *Illinois Wild Mammals* poster, Lesson Demonstration Video Podcasts for Lessons 2, 3 and 5 (See the “Resources” section of this Web site to learn how to obtain or access these items.)



Suggested Activities

The *Prying into Prions: Investigating Chronic Wasting Disease* unit contains six lessons, a video and other supplemental resources that help students understand the nature and transmission of prion diseases, particularly chronic wasting disease, a transmissible spongiform encephalopathy that is affecting the white-tailed deer herd in Illinois and other states. The information can be incorporated into units about the chemistry of life, DNA and the genetic code, protein synthesis, wildlife management, human genetic diseases and other topics. The materials in this unit are inquiry based, develop critical thinking skills, supply evidence to support each concept and include data from actual research projects. The lessons are designed to be taught in sequence. Lessons 2, 3 and 4 are most appropriate for this Performance Expectation.

Lesson 1: A Brain Wreck – Students read an article about a group of emerging diseases, transmissible spongiform encephalopathies (TSEs). They reflect upon and discuss what they already know and understand about disease to prepare themselves to study TSEs.

Lesson 2: Pathological Proteins? – Students read about the discovery of protein as the pathogen for TSEs and about the important roles of protein in organisms. They construct paper models of α -helix and β -sheet

secondary protein structures. Students then create Silly Putty®, a cross-linked polymer, and test its bounce under various temperatures. Students infer how temperature might affect the function of a protein, which is also a cross-linked polymer.

Lesson 3: We Moose Crack the Code – Students read an article that explains how proteins are made from genetic information in the cell. They then complete an activity that simulates transcription and translation in order to decode a humorous message in a “gene.”

Lesson 4: Cannibalism, Forgetfulness and Sleepless Nights – Students review the process of forming proteins from DNA. They read an article that links changes in DNA to changes in protein shape and disease. Then, using information gained from the Human Genome Project, students identify some changes in the human prion gene, PRNP, associated with inherited human prion diseases.

Lesson 5: Oh. . .Deer – Students read an article that chronicles the discovery of chronic wasting disease and the disease’s emergence as a public concern. They then compare the 14 domains of the prion protein sequence for nine mammalian species and predict the susceptibility of each species to different prion diseases.

Lesson 6: Here to Stay, Not Gone Tomorrow –

The first step in controlling and possibly eradicating chronic wasting disease (CWD) is to learn as much as possible about the transmission of the disease. Students read about three experiments that examine the transmission of CWD in deer, elk and moose. They then consider how results from those studies influence wildlife managers in minimizing the disease's impact on wild, free-ranging deer, elk and moose populations and protecting the public welfare. The activity focuses on efforts in Colorado because the disease has been studied longer there than in Illinois and affects at least three species. The information is applicable anywhere that CWD is found.

STEM Connections: Evaluations

Science: Science-based evaluations are provided with each lesson.

Technology: Students can use the Internet to obtain the latest statistics regarding the spread of chronic wasting disease in Illinois and the rest of the United States.

Engineering: Students can design a barrier to prevent the spread of CWD within a specified area.

Mathematics: Students can collect information about the number of CWD infections since first discovery for a minimum of five states and graph that information. They can look for and attempt to explain any trends that are evident.

Training

Training about *Prying into Prions: Investigating Chronic Wasting Disease* can be obtained through an ENTICE (Environment and Nature Training Institute for Conservation Education) workshop from the Illinois Department of Natural Resources (IDNR). There are also video tutorials on the IDNR Division of Education's Web page. See the "Resources" page for more information.



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