teachers guide

Proteins 5: Defective proteins

Components

	NAME	DESCRIPTION	AUDIENCE
	*Defective proteins* teachers guide	What happens when the process of protein formation goes wrong? A case study about Kuro disease explains some implications.	teachers
	*Cannibalism causes fatal disease?* fact sheet	Unravelling the story of kuro disease in Papua New Guinea's Highlands led to two Nobel prizes and a deeper understanding of the importance of protein folding.	students
	*Protein folding* fact sheet	This fact sheet describes transcription and folding errors that may occur during protein synthesis. Links between protein problems, prions and disease are explained.	students
	*Problems with proteins* worksheet	This student worksheet uses fact sheets, *Cannibalism causes fatal disease?* and *Protein folding,* to test student understanding of the processes involving proteins.	students

Purpose

To **Elaborate** on students' understanding of protein structure and function, by analysis of a story that focuses on a rare fatal disease that emerged in a cultural group in New Guinea. After reading the story and a fact sheet, students appreciate how misfolding of proteins can result in disease and that new discoveries in science often require time to be validated and accepted.

Outcomes

Students:

- apply their knowledge of protein structure and function to new information; and
- draw conclusions about the nature of misfolded proteins and their potential impact on animal and human health.

Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students read story, *Cannibalism causes fatal disease?* about an outbreak of kuru disease, and fact sheet, *Protein folding*, on how consequences of errors during protein production can result in diseases in humans and animals.	individual case study
Distribute the worksheet, *Defective proteins*. Students work individually. Further information can be obtained from textbooks or references provided.	individual, possible assignment work

More information

The following useful references for students are included in the fact sheet, Defective proteins:

- CJD Support Network (nd). http://www.cjdsupport.net/
- Marchant, J. (2012). *Prion diseases hide out in the spleen*. Retrieved 9 May 2012 from http://www.nature.com/news/prion-diseases-hide-out-in-the-spleen-1.9904
- Prusiner, S.B. (1998). *Prions. Proc. Nat. Acad. Sciences U.S.A., 95*(23), 13363–83. Retrieved 14 May 2012 from http://www.pnas.org/content/95/23/13363.full
- Reynaud, E. (2010). Protein misfolding and degenerative diseases. *Nature Education 3*(9):28, retrieved 9 May 2012 from http://www.nature.com/scitable/topicpage/protein-misfolding-and-degenerative-diseases-14434929

Technical requirements

The teachers guide and worksheet require Adobe Reader (version 5 or later), which is a free download from www.adobe.com. The worksheet is also available in Microsoft Word format..

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SPICE resources and copyright

All SPICE resources are available from the Centre for Learning Technology at The University of Western Australia (UWA). Selected SPICE resources are available through the websites of Australian State and Territory Education Authorities.

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Associated SPICE resources

Proteins 5: Defective proteins may be used in conjunction with related SPICE resources to teach the topic of proteins.

DESCRIPTION	LEARNING PURPOSE
Proteins (overview) This learning pathway shows how a number of SPICE resources can be combined to teach the topic of proteins.	
Proteins 1: The importance of proteins A video highlights the essential role played by proteins in living organisms.	**Engage**
Proteins 2: Looking at proteins Students complete a practical activity to isolate and visualise proteins in tissue samples, using gel electrophoresis.	**Explore**
Proteins 3: Protein molecules Students work through an interactive learning object that explains the molecular structure of proteins.	**Explain**
Proteins 4: Making proteins Students work through an interactive learning object that explains how proteins are made by living organisms. A fact sheet summarises the main stages of transcription and translation.	**Explain**
Proteins 5: Defective proteins What happens when the process of protein formation goes wrong? A case study about Kuro disease explains some implications.	**Elaborate**