Teaching Unit 8

Protein structure and synthesis

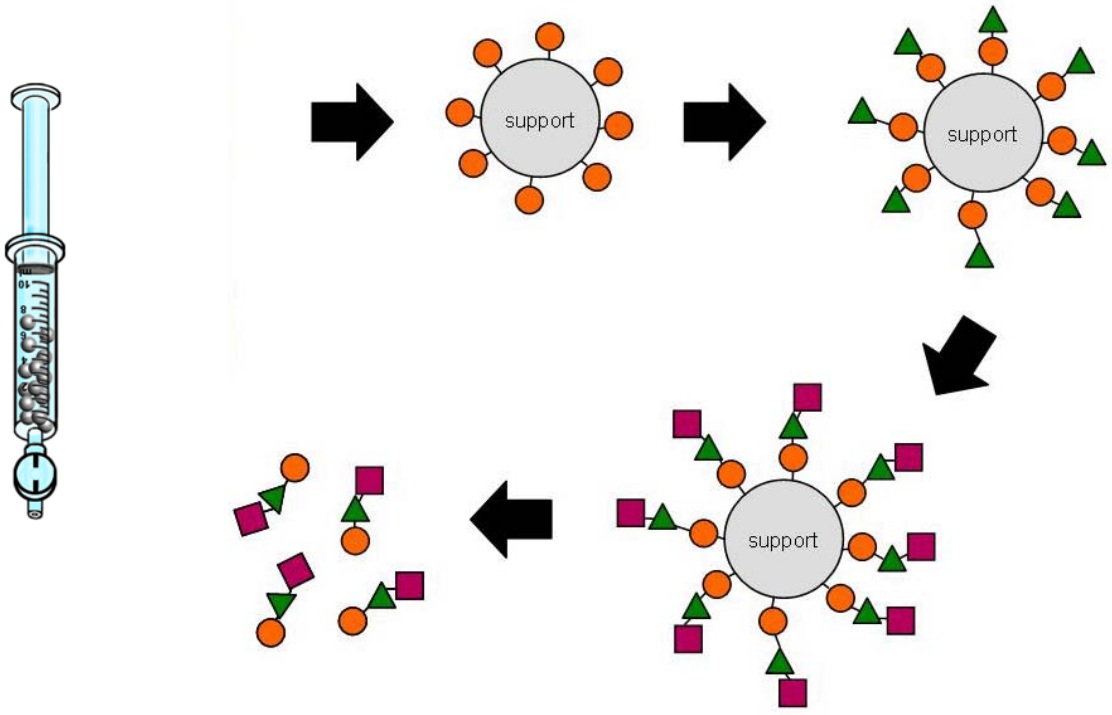
Keywords and concepts: Proteins. Protein synthesis. Amino acids. Peptides.

'Xplore Health related tools: Virtual experiment: *Develop a drug!*

Introduction: Proteins and peptides are organic compounds made of amino acids. In nature, proteins are synthesised from the information codified in genes, but proteins can also be synthesized in the lab by means of chemical methods. In this unit you will learn about amino acids and protein synthesis.

ACTIVITY 1

The following drawing represents one of the stages of the virtual experiment *"Develop a drug";* find a title for it. Next, explain the process depicted in the drawing and write the names of the different components that appear in the drawing.



ACTIVITY 2

The POP inhibitor that you have synthesized in the virtual experiment is a peptide made of three amino acids: Ala-Gly-Cis.

a) Find the structures of Alanine, Glycine and Cysteine and draw them. To what groups of amino acids do they belong? Why?

b) Which bond binds them together?

c) **Draw the Ala-Gly-Cis tripeptide.**

d) **How many different peptides could you build with these 3 amino acids?**

ACTIVITY 3

Construct a representation of the POP inhibitor with recycled materials, with objects that you find at home, with plasticine, with paints, etc. Your representation must be original and it must help understand the process that you want to depict. Take a photograph and send it with an explanation to the following email address: *xplorehealth@pcb.ub.cat*. The photographs will be published in Xplore Health.

ACTIVITY 4

Complete the following Sudoku puzzle with the missing amino acids. Please remember that each row, each column and each square must contain the 9 amino acids: Ala, Gly, Cis, Thr, Ile, Leu, Phe, Val and His.

	Ile				Thr			
			Cis			Leu		
Phe			Leu		Val		Gly	Ala
Ile	Cis	Phe	Thr		Leu	Val		
Gly		Val				Ile	Thr	Leu
					Ile			Cis
		Cis	Ile		His	Phe		
Thr	His	Ile			Gly			
Leu		Gly						Ile

Answer:

Cis	*Ile*	*Leu*	*Gly*	*Ala*	*Thr*	*His*	*Val*	*Phe*
Val	*Gly*	*Ala*	*Cis*	*His*	*Phe*	*Leu*	*Ile*	*Thr*
Phe	*Thr*	*His*	*Leu*	*Ile*	*Val*	*Cis*	*Gly*	*Ala*
Ile	*Cis*	*Phe*	*Thr*	*Gly*	*Leu*	*Val*	*Ala*	*His*
Gly	*Ala*	*Val*	*His*	*Phe*	*Cis*	*Ile*	*Thr*	*Leu*
His	*Leu*	*Thr*	*Ala*	*Val*	*Ile*	*Gly*	*Phe*	*Cis*
Ala	*Val*	*Cis*	*Ile*	*Thr*	*His*	*Phe*	*Leu*	*Gly*
Thr	*His*	*Ile*	*Phe*	*Leu*	*Gly*	*Ala*	*Cis*	*Val*
Leu	*Phe*	*Gly*	*Val*	*Cis*	*Ala*	*Thr*	*His*	*Ile*