

Single-choice quiz

- test your knowledge of protein degradation

We recommend reading the Great Encyclopedia of Protein Degradation before taking the test.

- 1) What is ubiquitination?
 - a) a stage of DNA replication
 - b) a modification involving the attachment of ubiquitin
 - c) a type of extracellular transport

- 2) What is the role of E3 ubiquitin ligase?
 - a) mediates protein ubiquitination
 - b) cuts off ubiquitin from proteins
 - c) activates ubiquitin

- 3) A single ubiquitin may not be enough to target the protein for degradation:

True
False

- 4) How does the proteasome function?
 - a) modifies proteins by adding chemical groups like phosphates
 - b) recognizes ubiquitinated proteins and degrades them
 - c) synthesizes new proteins in the cell

- 5) Adenosine 5'-triphosphate (ATP) is:
 - a) an enzyme that catalyzes reactions in the cell
 - b) a protein with functions similar to ubiquitin
 - c) an energy carrier

- 6) How do PROTAC compounds work?
 - a) they enable targeted ubiquitination of a specific protein, thus leading to its degradation
 - b) they inhibit the activity of deubiquitinating enzymes
 - c) they increase the concentration of ATP in the cell

- 7) PROTAC is composed of two parts, one of which binds the selected protein and the other:
 - a) a specific E3 ubiquitin ligase
 - b) ubiquitin
 - c) ATP

- 8) Various PROTAC compounds that enable, for example, the degradation of cancer-causing proteins are currently in clinical trials.

True
False

- 9) The role of deubiquitinating enzymes is:
 - a) blocking the proteasome
 - b) cutting off ATP
 - c) cutting off ubiquitin

- 10) Proper de-ubiquitination of proteins is just as important as ubiquitination because it allows the cell to maintain a balance between these processes

True
False

11) Ubiquitin is a small protein that occurs:

- a) exclusively in humans
- b) ubiquitin is not a protein
- c) in all eukaryotic organisms

12) PROTAC compounds can only be used against extracellular proteins:

- True
- False

13) Indicate which cellular pathway, in addition to the ubiquitin-proteasome system, is also responsible for protein degradation:

- a) transcription
- b) autophagy
- c) translation

14) Identify the 2004 Nobel Prize in Chemistry winners honored for their discovery of ubiquitin-mediated protein degradation:

- a) Aaron Ciechanover, Avram Hershko and Irwin Rose
- b) Richard Axel and Linda B. Buck
- c) David J. Gross, H. David Politzer and Frank Wilczek

15) Enzyme E1 is responsible for:

- a) DNA replication
- b) transfer of ubiquitin directly to the target protein
- c) activating ubiquitin and transferring it to the E2 enzyme

16) When proteins are degraded by the proteasome, ubiquitin is also generally destroyed

- True
- False

17) How many different types of E3 ubiquitin ligases are estimated to exist in humans?

- a) 30 - 40
- b) 2 - 5
- c) 600 - 1000

18) Indicate a false sentence:

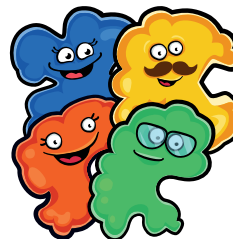
- a) ubiquitin most often forms a bond with the lysine of the target protein
- b) ubiquitin can form a bond with tyrosine, serine or cysteine of the target protein - then we call it "non-canonical" ubiquitination
- c) ubiquitin occurs in bacteria

19) What are the differences between molecular glues and PROTAC compounds?

- a) structure
- b) effect of action
- c) both terms refer to the same compounds

20) The main advantage of targeted protein degradation over traditional drugs is:

- a) more efficient crossing of the blood-brain barrier
- b) lack of side effects
- c) the potential to destroy proteins previously thought impossible to block



Now tally up the points and check your score!

Correct answers

1B; 2A; 3 True; 4B; 5C; 6A; 7A; 8 True; 9C; 10 True; 11C; 12 False; 13B; 14A; 15C; 16 False; 17C; 18C; 19A; 20C

Count your points and check your score

18 – 20 points	Congratulations! Protein degradation has no secrets for you.
15 – 17 points	Great, you have a substantial knowledge about the ubiquitin-proteasome system
10 – 14 points	Good job, you know what ubiquitination is all about
6 – 9 points	Not bad, you have a basic understanding of how proteins are destroyed
< 6 points	Perhaps you might consider checking out the Great Encyclopedia of Protein Degradation?