

# Ubiquitin-proteasome system/history

Ubiquitin is primarily associated with the mechanism of protein degradation, which was described in the early 1980s by **Avram Hershko**, **Aaron Ciechanover** and **Irwin Rose**. All three scientists received the 2004 Nobel Prize (<https://www.nobelprize.org/?p=16843>) in the field of chemistry for their discovery. Professor Hershko's Nobel lecture will be used in the following text to describe the history of the discovery UPS<sup>[1]</sup>.

In the years 1969–1971, Hershko was on a postdoctoral stay in the laboratory of prof. G. Tomkins in California, where he noticed during experimental work that the degradation of the protein, which was the subject of his study, required energy (ATP consumption). This mysterious process, requiring energy, was highly specific (only that particular protein was degraded) and Hershko was so intrigued that he decided to devote his attention to it even after returning to Israel. At that time, an ATP-dependent proteolytic system from reticulocyte lysates was already known, described by Harvard scientists J.D. Etlinger and A.L. Goldberg <sup>[2]</sup>.

Hershko, his student Ciechanover, and their friend Rose from Fox Chase Cancer Center (<https://www.foxchase.org/>) (Pennsylvania) set out to biochemically fractionate this system in order to describe its components. They discovered that ATP-dependent protein degradation requires ubiquitin chains. These ubiquitins are attached one by one to the protein to be degraded, as a "kiss of death", signaling to proteasomes that the protein is to be destroyed. However, how are ubiquitin chains attached to proteins? Between 1980 and 1990, Hershko's group found an answer to this question as well (C.M. Pickart also returns to the history of this discovery in <sup>[3]</sup> from the point of view of the research group of A. Varshavsky, who according to the opinion of many scientists <sup>[4]</sup> the Nobel Prize, awarded to Hershko's group, was wrongfully missed).

## Links

### Related Articles

- Proteins
- Protein degradation
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- Proteasome inhibitors
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### Source

- CVEK, Boris. From ubiquitin to antabuse. *Britské listy: a daily about everything that is not talked about much in the Czech Republic* [online]. 2011, y. -, p. -, Available from <<https://blisty.cz/legacy.blisty.cz/art/56680.html>>. ISSN 1213-1792.

### Reference

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