

Nobel Prize Lessons 2018

Speaker's manuscript – the 2018 Medicine Prize

The Nobel Prize in Physiology or Medicine

- The Nobel Prize in Physiology or Medicine is one of the five prizes founded by Alfred Nobel and awarded on December 10 every year. Before Alfred Nobel died on December 10, 1896, he wrote in his will that the largest part of his fortune should be placed in a fund. The yearly interest on this fund would pay for a prize given to “those who, during the preceding year, shall have conferred the greatest benefit to humankind.”



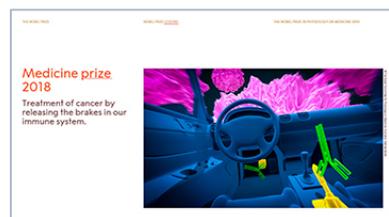
Who is rewarded with the medicine prize?

- The Nobel Prize in Physiology or Medicine is thus awarded to people who have either made a discovery about how organisms work or have helped find a cure for a disease.
- This is May-Britt Moser, 2014 Nobel Laureate in Medicine. In 2005 she and Edvard Moser discovered a type of cell in the brain that is important for determining one's position. They also found that those cells cooperate with different nerve cells in the brain that help us to navigate. You can say that the Laureates discovered and explained a kind of GPS system in the brain.
- Other Medicine Laureates include:
- Francis Crick, James Watson and Maurice Wilkins, who received the 1962 Prize for their discoveries and descriptions about the structure of DNA molecules.
- Alexander Fleming, Ernst Chain and Howard Florey, who received the 1945 Prize for the discovery of penicillin and its curative effects on bacterial diseases.



Medicine Prize 2018

- The 2018 Nobel Prize is about a new way of treating cancer.
- By strengthening the inherent ability of our immune system to attack tumour cells, this year's Nobel Laureates have established an entirely new principle for cancer therapy.



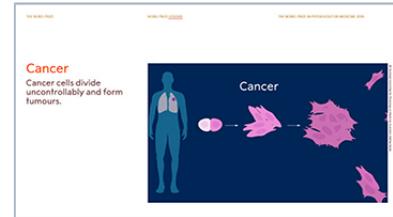
The Nobel Laureates

- Both Laureates are in their 70s and made their discoveries during the 1990s.
- Both have personal experience of people close to them who developed cancer.
- James P. Allison, was born in Alice, Texas, USA.
- Tasuku Honjo is from Kyoto, Japan.



Cancer

- Curing cancer is a major challenge.
- Cancer is a collective name for many different diseases.



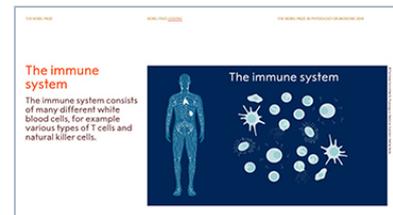
Methods of cancer therapy

- There are three established ways of treating cancer: surgery, radiotherapy (radiation) and chemotherapy (anti-cancer drugs), but more methods of treatment are needed.
- By strengthening the ability of our own immune defence system to attack alien cells such as viruses, bacteria and cancer cells, Allison and Honjo discovered and developed a fourth method of cancer therapy, known as “immune checkpoint therapy”.



The Immune System

- All mammals, including us humans, have a complex immune system that – among other things – can tell the difference between our own healthy cells and foreign ones such as viruses, bacteria or cancer cells. Among the important cells in our immune system are a kind of white blood cells called “T cells” that act like police officers, circulating around the body and searching for enemies such as cancer cells.
- T-cells have receptors (proteins) on their surface that recognise and bind to alien substances, much like the way a spaceship docks at a space station. The T cells send signal molecules throughout the body, telling it that they need reinforcements. Then other white blood cells known as natural killer cells are sent out, like an internal human SWAT team.
- Researchers discovered earlier that to prevent these killer cells from getting out of control, there are also proteins that function as brakes and counteract immune defences. This enables the immune system to be regulated, so that only foreign substances are destroyed, not the body’s own healthy cells.



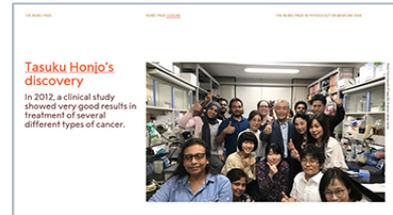
James P. Allison’s discovery

- Allison studied a previously known receptor protein on the surface of T cells and discovered that they functioned as a brake on the immune system.
- He developed an antibody that released the T cell brakes, thus unleashing the immune system and fully activating the natural killer cells.
- In 1994 the first experiments using these antibodies were performed on mice, and mice with cancer were cured. In 2010 an important clinical study was published, showing good results in human patients with melanoma, a form of skin cancer.



Tasuku Honjo's discovery

- This year's other Laureate, Tasuku Honjo, discovered an unknown protein on the surface of T cells.
- After a series of experiments, he and his colleagues were able to explain the function of this protein. It turned out that this protein also had a braking effect on the immune system, similar to the effect of the protein Allison had worked with.
- Tasuku's research group performed animal experiments which showed that the blocking effect of this protein had promising results in cancer therapy. The next step was to develop therapy for cancer patients.



The benefit

- Now we have an additional way of treating cancer. By combining this with traditional cancer therapy, we can cure more cases of cancer.

