

*“Woman cured of advanced breast cancer using own immune cells.”*

Judy Perkins, a 49-year-old engineer from Florida, was selected to undergo the cutting edge treatment after several chemotherapy sessions had failed to kill the tumour, which had begun to spread to her liver. Before the new treatment, doctors had given her **3** years to live.

She was treated by a team led by **Dr Steven Rosenberg** at the National Cancer Institute (NCI) in Maryland using immunotherapy.

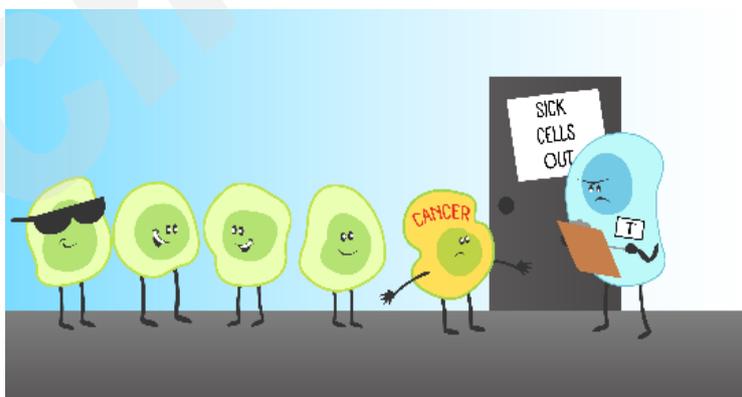
What is **cancer immunotherapy**?

It is the treatment that uses certain parts of a person’s immune system to fight cancer. Checkpoint blockade is one of t

What is **checkpoint blockade**?

It is important that our immune system can tell between normal cells in the body and those it sees as “foreign”. This let our immune system attack the foreign cells while leaving the normal cells alone.

To do this, our immune system uses **“checkpoints”** molecules on certain immune cells that need to be activated to start an immune response. Cancer cells sometimes find ways to use these checkpoints to avoid being attacked by the immune system.



## Glossary

**Cancer:** an abnormal growth of cells

**Tumour:** a swelling part of a part of the body, caused by abnormal growth of tissue, whether benign or malignant

**Benign:** it does not invade nearby tissue or spread to other parts of the body

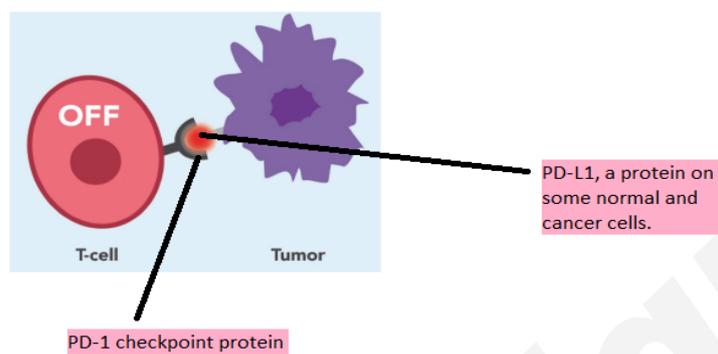
**Malignant:** abnormal cells divide without control and can invade nearby tissues

**T-lymphocytes:** a subtype of white blood cell that protect body against pathogen

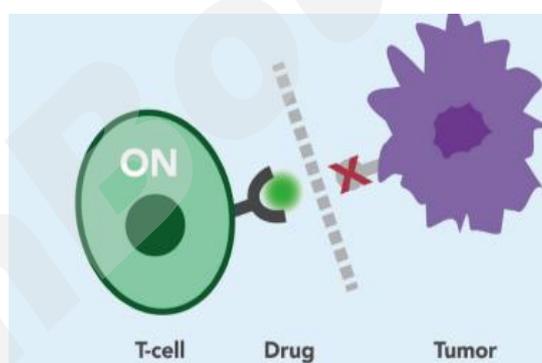
**Chemotherapy:** it is a way to treat cancer that uses drugs to kill cancer cells

**Melanoma:** the most dangerous form of skin cancer

**Hodgkin lymphoma:** it is cancer that start in white blood cells called lymphocytes



**PD-1** is a checkpoint protein on T lymphocytes. It normally acts as a type of “**off switch**” that helps keep the T cells from attacking other cells in the body. It does this when it attaches to **PD-L1**, a protein on some normal and cancer cells. When PD-1 binds to PD-L1, it basically tells the T cell to leave the other cell alone. Some cancer cells have large amounts of PD-L1, which helps them **evade immune attack**.



Drugs that target either PD-1 or PD-L1 can block this binding and boost the immune response against cancer cells. These drugs have shown a great deal of promise in treating certain cancers.

The examples of drugs that target PD-1 include:

- i. Keytruda
- ii. Opdivo

These drugs have been shown to be helpful in treating several types of cancer, including melanoma of the skin, non-small cell lung cancer, kidney cancer, bladder cancer, head and neck cancers and Hodgkin lymphoma.

The examples of PD-L1 inhibitors include:

- i. Tecentriq
- ii. Bavencio
- iii. Imfinzi

These drugs have also been shown to be helpful in treating different type of cancer, including bladder cancer, non-small cell lung cancer, and Merkel cell skin cancer.

The only concern with all of these drugs is that they can allow the immune system to attack some normal organs in the body, which can lead to serious side effects in some people. Common side effects of these drugs include:

- (i) Fatigue
- (ii) Nausea
- (iii) Cough
- (iv) Loss of appetite
- (v) Skin rash
- (vi) Itching

### **If you found this article interesting, you are interested in Oncology!**

The term of oncology literally means a branch of science that deals with tumours and cancers. Medical professionals who practice oncology are called cancer specialists or oncologists, these oncologists have specific roles. They help in diagnosis of the cancer, help in staging the cancer and grading the aggressive nature of the cancer.

You will understand the scientific basis of cancer and its treatments and how to evaluate the potential effectiveness of new treatments. In addition, you will cover the clinical and research aspects of cancer care and you will have access to an exceptional wide range of research projects in basic cancer biology, translational areas and clinical cancer care and imaging.

### **What are the entry requirements for Oncology degrees?**

Minimum of AAA/AAB/ABB in A-Level:

- Chemistry
- Biology
- Physics
- Mathematics

### **What are the course structure and assessment methods?**

Students are assessed through oral presentations, single best answer exams, written reports and a dissertation.

## What careers are possible with an Oncology Degree?

Graduates from Oncology can go into a range of careers:

**Academic:** Teaching, work in scientific research and development (may require significant postgraduate study, usually a PhD)

**Industrial:** Research and development scientist (pharmaceutical industry, clinical trials management and medicine).

## Top Ten Universities (2018) that specialise in Oncology:

1. Harvard University
2. University of Cambridge
3. University of Oxford
4. Massachusetts Institute of Technology (MIT)
5. Johns Hopkins University
6. Stanford University
7. University of California, San Francisco (UCSF)
8. Yale University
9. Karalinska Institutet
10. University of California, Los Angeles (UCLA)



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