"First biomarker-driven approval exemplifies cancer immunotherapy progress"

ChemistryWorld, July 2017: A Merck & Co drug has gained the first approval to **treat cancer according to its genetic character**, rather than type and location in patients' bodies. This latest marketing go-ahead from the US Food and Drug Administration (FDA) for **Keytruda (pembrolizumab)** (for more details: https://www.keytruda.com/) underlines the growing importance of a cancer's genetic details for **targeted** treatments.

Keytruda (pembrolizumab) may use to treat

i. Melanoma
ii. Non-small cell lung cancer
iii. Head and neck squamous cell cancer,
iv. Classical Hodgkin lymphoma
v. Bladder or urinary tract cancer.

Keytruda (pembrolizumab) treats cancers by working with patients' immune system. **HOWEVER**, it can cause patients' immune system to attack normal organs and tissues in any area of the body and can affect the way they work. These problems can sometimes become serious or life-threatening and can lead to death.

Glossary

Genetic: the study of genes, genetic variation and heredity in living organisms.

Biomarker (immunology): a substance whose detection indicates a particular disease state. For instance, the presence of an antibody may indicate an infection.

Melanoma: The most dangerous form of skin cancer, most often caused by UV radiation from sunshine triggers mutation (genetic defects) that lead the skin cells to multiply rapidly and form malignant tumour.

Head and neck squamous cell cancer: Begin in the squamous cells that line the moist, mucosal surfaces inside the head and neck

Classical Hodgkin lymphoma: A cancer of the lymphatic system, which is part of immune system (cells in the lymphatic system grow abnormally and spread beyond.

What is immunotherapy?

Immunotherapy is a treatment that **uses patient's body's own immune system to help to attack cancer cells**.

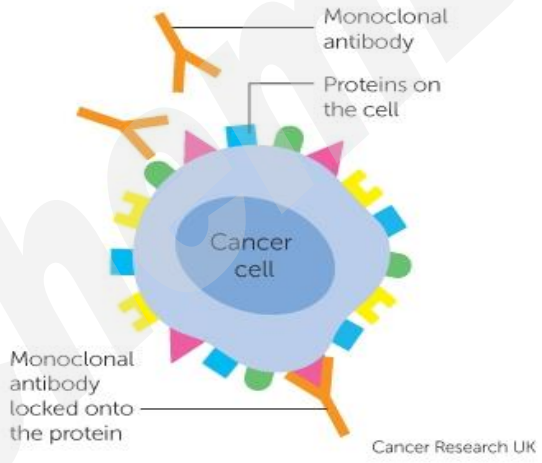
The immune system keeps track of all of the substances normally found in the body. Any new substance that immune system doesn't recognise raises an alarm, causing the immune system to attack it. The immune response can destroy the foreign substance such as germs.

The immune system has a tougher time targeting cancer cells, this is because cancer starts when normal cells become altered and start to grow out of control. The immune system doesn't always recognise cancer cells as foreign as the cells aren't different enough from normal cells.

To overcome this, researchers have found ways to help the immune system recognise cancer cells and STRENGTHEN its response so that it will destroy them.

The main types of immunotherapy now being used to treat cancer include:

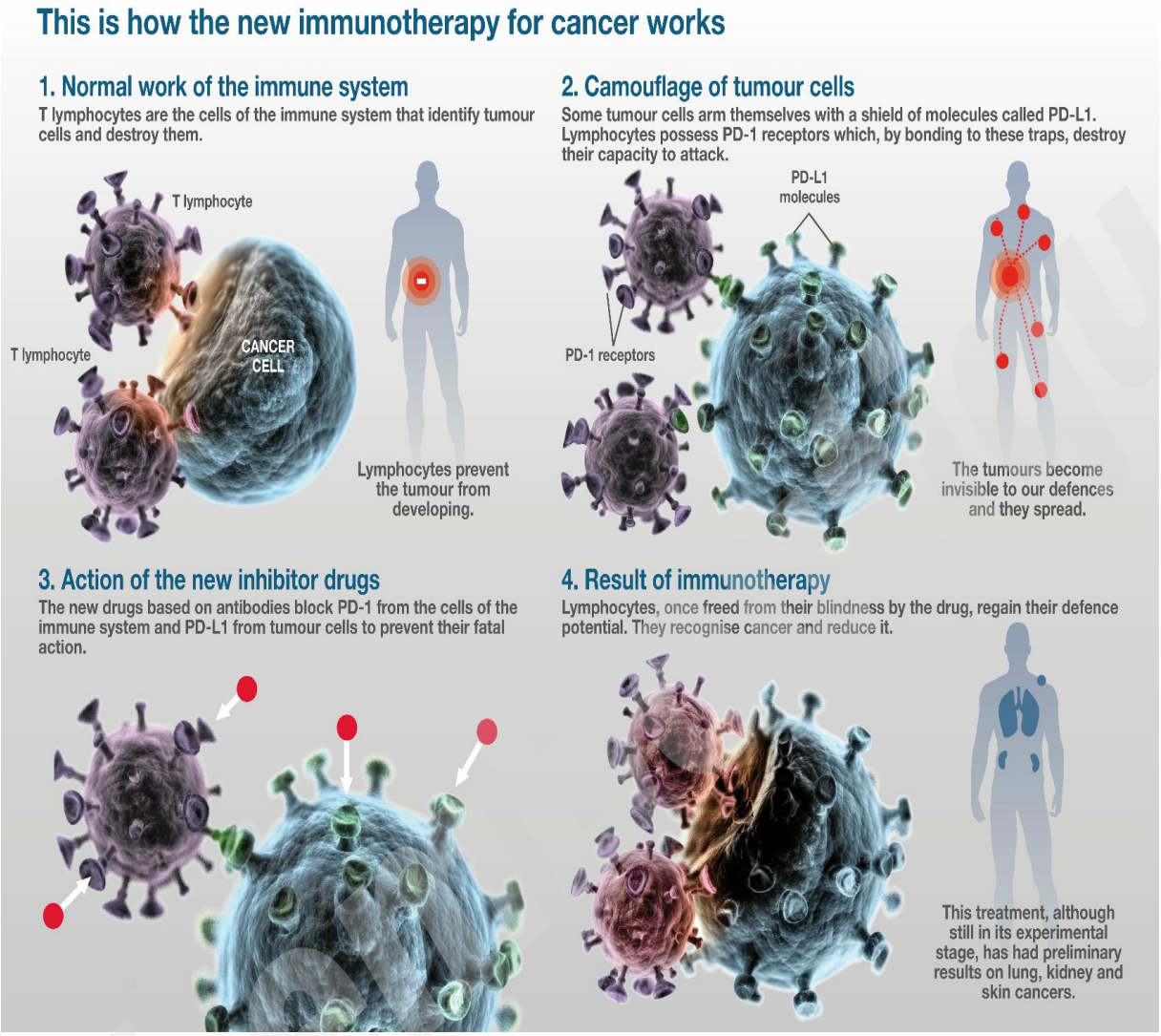
- **Monoclonal antibodies**: antibodies can be very useful in treating cancer as they can be designed to attack a very specific part of a cancer cells.



DESTRUCTION OF CANCER CELLS

- **Immune checkpoint inhibitors**: these drugs basically take the "brakes" off the immune system, which helps it recognise and attack cancer cells.

How does Keytruda (pembrolizumab) work in patients' bodies?



If you found this article interesting, you are interested in Biochemistry!

Biochemistry is the chemistry of the substances and processes occurring in living cells and tissues. This subject forms the basis of virtually all of the biological sciences, and many exciting discoveries made in this area have contributed to our understanding of life, the solving of medical problems, and to the discovery and production of safe and effective drugs.

What are the entry requirements for Biochemistry degrees?

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

- Chemistry
- Biology
- Physics
- Mathematics

What are the course structure and assessment methods?

Biochemistry course is broad in scope, with topics including: the structure of biomolecules and how they interact in essential processes and pathways in our cells, the action of enzyme and how they can be inhibited by drugs, genetic engineering and molecular biology. Assessment is based on tutorials, practical, written exam, oral and written presentation and research projects.

What careers are possible with a Biochemistry Degree?

Graduates from Biochemistry go into a range of careers:

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

Industrial Biochemistry: Research and development scientist (Biotechnology Company, Cancer Research Institute, Pharmaceutical Company, etc.)

Top Ten Universities (2017) that specialise in Biochemistry

1. Harvard University
2. Massachusetts Institute of Technology (MIT)
3. University of California (Berkeley)
4. Stanford University
5. University of California (San Francisco)
6. University of Oxford
7. University of Cambridge
8. University of California (San Diego)
9. John Hopkins University
10. Cornell University

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