

#InspiredByLife to Create 'living drugs' that treat cancer

Over millennia, living organisms and biological systems in nature and the human body have developed a resourceful toolbox of biochemical capabilities, cellular and biomolecular processes and genetic resources. Inspired by a deeper understanding of these tools, life sciences researchers have studied nature to create new biotech solutions, in sectors including healthcare, agriculture and industry that help people and the planet.

Today, modern biotechnology provides breakthrough therapeutic treatments and biofortified nutrition that save lives and improve wellbeing. It enables new technologies that support a circular bio-economy, the European Green Deal and more sustainable agriculture that reduces the impact of human activity on our climate and ecosystems. It has inspired the development of new cutting-edge industrial manufacturing processes that are safer, cleaner and more efficient.



CAR T-cells are 'living drugs' that offer new treatments for certain cancers

Treatment for certain cancers has taken a huge leap forward thanks to new "living drugs", created through biotechnology. These drugs, which use patients' own immune cells, target cancer cells and can lead to remission for cancer patients in cases when traditional treatments, such as chemotherapy, have failed.

Learning from living organisms and the human biological system

CAR T-cell therapy is a type of immunotherapy called adoptive cell transfer (ACT). CAR T-cells are created by collecting and using patients' own immune cells to treat their cancer. CAR T-cells are a "living drug".



The source of inspiration for this treatment is the human biological system. T-cells are often called the workhorses of the immune system because of their critical role in orchestrating the immune response and killing cells infected by pathogens. A sample of a patient's T-cells are collected from the blood, then modified to produce special structures called chimeric antigen receptors (CARs) on their surface. When these CAR T-cells are reinfused into the patient, the engineered cells further multiply in the patient's body and, with guidance from their engineered receptor, recognise, latch on to and kill cancer cells that harbour the antigen on their surfaces.

Improving human lives, health and wellbeing

For years, the foundations of cancer treatment were surgery, chemotherapy, and radiation therapy. Over the



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Over the last two decades, through intensive research and clinical trials by bio-scientists, targeted therapies using CAR T-cells have cemented themselves as standard treatments for many cancers.

While research has been ongoing in this area for several decades, it is only recently that the treatment has seen big investment and results following the remarkable responses they have produced in some patients—both children and adults—for whom all other treatments had stopped working.

The treatment has seen particular success in blood cancers, for example Acute Lymphoblastic Leukaemia (ALL) – the most common cancer in children. For those patients that are not cured by intensive chemotherapy, who otherwise would have very little

option in terms of further treatment, CAR T-cells treatment has proved to be a lifesaver. Promising results have also been seen in adults with blood cancers and aggressive lymphomas, which – up until now – were thought of as “untreatable”.

Creating promising new biotech solutions that are #InspiredByLife

Research into this life saving treatment is continuing at a fast pace. An area of particular focus is on solid tumours, where so far, its use has been limited.

In addition, other developments and refinements in CAR T cell-therapy are being researched, for example one approach is to use CAR T-cells from healthy donors, so that “off the shelf” drugs can be created and ready for immediate use, rather than manufacturing them from the cells from each patient.

Further work is also being done on mitigating the side effects of the treatment on patients which can be severe and life threatening.

This case study including sources and references is available at <https://www.europabio.org/inspiredbylife/case-studies>