# Therapies, Vaccines and Nanotechnology: New Weapons in Cancer Fight

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More effective therapies, nanotechnology and even the prospect of vaccinating for certain tumours: battles may slowly be starting to turn in the never-ending war against cancer.

The second leading cause of death globally, cancer accounted for an estimated 9.6 million deaths, or one in six deaths, in 2018. Ahead of World Cancer Day on Thursday, here is a look at some of the more promising developments in treating and preventing the disease.

## Immunotherapy breakthroughs

Immunotherapy drugs, which prime the immune system to recognise and destroy cancerous cells, have shown huge promise against previously untreatable cancers over the last decade.But they vary greatly among different forms of cancer and only work in around a quarter of all patients.

A main focus of research now centres on "increasing the percentage of patients that respond well to immunotherapy," according to Christophe Le Tourneau, director of clinical research at France's Curie Institute.

One promising avenue is the development of antibodies capable of recognising a specific protein found in cancerous cells, "which would help the body to destroy those cells," Axel Kahn, president of the League Against Cancer, told AFP.

He said research had shown that administering medication or toxins helped destroy cancer cells after antibodies discover them.

Research is also ongoing into immunotherapy after chemotherapy, with the initial treatment creating mutations in cancer cells that may render them easier for the immune system to

spot and hunt down. Another technique known as checkpoint inhibitor therapy has also shown promise.

When proteins contained within cancer cells bind with immune cells, they send an "off" signal to the rest of the immune system, disabling the body's natural defences.

Checkpoint inhibitor therapy essentially blocks this binding, allowing killer immune T-cells to seek and destroy the pathogen. This technique has already significantly improved prognoses for some melanomas and lung cancers, and other trials are underway.

Such treatment may offer also hope to the 10-15 percent of breast cancer sufferers who receive a so-called "triple-negative" prognoses – tumours that contain neither hormonal nor HER2 protein receptors.

HER2-positive breast cancer tends to grow more quickly than other forms but it is equally more treatable. Triple-negative breast cancer is however "usually more aggressive (but) the treatment options available today are not sufficiently effective", according to the Arc Foundation cancer research centre near Paris.

One study with the drug durvalumab published this month in Nature Medicine showed that the antibody was somewhat effective at shutting off tumours' ability to evade the immune system.

**'Vaccinate' for tumours?**

Trials are also underway exploring the efficacy of certain candidate vaccines that can help treat tumours. The French biotech firm Transgene is developing a treatment combining immunotherapy and a viral vector vaccine – a modified virus that delivers anti-cancer instructions to the body.

A similar trial is underway to treat patients with cancer of the ear, nose or throat. The Oncopole Toulouse cancer treatment centre, conducting the research, said the treatment acts as a kind of "facial recognition service" for the immune system to detect cancerous cells and learn how to destroy them – similar to how some vaccines work.

## Predicting effective treatment

Analysing the structure and, increasingly, the genetic make-up of cancer plays a major role not only in prognosis – how likely it is that a patient will recover – but also in what treatment options are available.

It's really the main issue: it's not worth giving certain treatments to people who won't benefit from them and it's absolutely crucial that those who will benefit receive them, said Eric Solary, scientific director at the Arc Foundation.

Better understanding of certain mutations in cancer cells as well as how immune cells behave are helping doctors make ever-more accurate treatment choices.

## Nanotechnology

Another area of growing interest is the possible use of nanocapsules – microscopic coatings of metal or fat on existing drug molecules.

The idea according to Solary is to better distribute medicine around the patient's body by allowing it to "go directly into tumour cells and avoiding damaging normal cells".

In the same vein, researchers are also looking into using genetically modified salmonella bacteria to destroy tumours from the inside out – where more traditional treatments, notably chemotherapy, cannot penetrate.

Read the original article on France24.