

Colorectal cancer patients may benefit from breakthrough EU research

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Scientists in Spain have developed a potentially life-saving strategy against a disease that spreads from the gut to other vital organs.

Cancer of the colon and rectum is a pernicious killer. A colorectal tumor, for example, can be removed completely from a patient but then pop up elsewhere in the body in another guise.

Researchers in Spain believe they're on the right track to stop this type of cancer from spreading.

Deadly wanderers

A colorectal tumor can be removed from the gut with surgery and chemotherapy and some patients will never again get the disease.

Yet this type of cancer is capable of a shape-shifting trick. A small number of cells often leave the main tumor in the gut and can seed a new cancer in [vital organs](#) such as the liver and the lungs—a process known as metastasis.

"This is a reason why patients die of colorectal cancer," said Dr. Eduard Batlle, head of the cancer-science program at the Institute for Research in Biomedicine in Barcelona, Spain. "Metastasis is very difficult to treat."

Colorectal cancer is the second-leading cause of cancer deaths in the EU, where more than 156 000 people are [estimated](#) to have died from the disease in 2020. One in 22 men and one in 35 women are at risk of developing this illness during their lifetimes, with a total of more than

340 000 new cases in EU countries in 2020 alone.

Such statistics have helped prompt the EU to make the fight against cancer a top policy priority. Two broad initiatives—the EU Mission on Cancer and Europe's Beating Cancer Plan—aim to make major inroads this decade and highlight the political commitment in Europe to the matter.

When a patient comes to hospital with a colorectal tumor, it's impossible to know whether a small number of rogue cells have already journeyed around the body and set up tiny cancer time bombs in the liver or lungs.

This is no minor matter. Up to 40% of patients who have their colorectal cancer surgically removed will suffer a relapse elsewhere in their body.

Battle leads a research project to learn which cells exit the main tumor and how they might be eliminated. The initiative, called ResidualCRC, is scheduled to wrap up in August 2025.

Revolutionary cure

Battle's laboratory made surprising discoveries about the wandering cancer cells and his team believes it has a strategy to remove the deadly seeds.

"We identified a previously unknown cell type that is capable of migrating out of the primary tumor," he said.

A tumor in the colon may have lots of these cells or just a limited number of them. Battle thinks they can be rooted out using a revolutionary new treatment: immunotherapy. It involves "checkpoint inhibitors," which block proteins that prevent the [immune system](#) from fighting off cancer cells.

Normally, a few rogue cancer cells are tackled by T cells, an arm of the immune system that specializes in this task. But cancer cells can fight back. For example, they make a protein that tells T cells to stand down, giving the cancer the opportunity to go on spreading.

"They develop ways to escape the immune system," said Batlle.

Checkpoint inhibitors essentially turn patients' T cells back on so that they become hyper-aware of cancer cells. This encourages the T cells to find and kill the hidden cancer timebombs.

Seek and destroy

While T cells face a tough battle against the tumor itself, which is hard to penetrate, it can be removed as usual with surgery and chemotherapy.

Batlle plans to treat colorectal cancer patients with checkpoint inhibitors even before a surgeon removes the main tumor. The hope is that patients will be cured of their cancer and be protected from metastasis.

The Barcelona lab worked on mice with colorectal cancer and used immunotherapy to treat any wandering cancer cells in the rodents.

"This gave us a chance to investigate a phase of the disease that is invisible in humans," said Batlle. "We showed that, at the micro-metastatic stage of the disease, these cells are vulnerable to immunotherapy."

The goal is for the same treatment to work for cancer patients.

Cancer in a dish

Another way to investigate cancer outside a patient's body is to grow mini organs, or organoids.

Batlle has collaborated with Dr. Xavier Trepatri at the Institute for Bioengineering of Catalonia, or IBEC, in Spain. Trepatri received patient [cancer cells](#) from Batlle's lab and used them to grow organoids in a dish.

"We can test several drugs on a tumor from one patient," said Trepatri. "That way you are not doing trial and error in the patient but on tissue in the lab grown from the patient."

He has a particular interest in how physics and physical forces can influence biology. For example, tumors are often stiffer than surrounding tissue and are physically different.

"We build these intestinal organoids and study how the tissues adopt the shape that they do," said Trepatri, who is a group leader at IBEC.

Biological robots

This research is part of a separate project to learn more about a type of cell that could allow for future biological robots.

Called EpiFold, the five-year project runs until the end of 2025.

The cells in question belong to the epithelium, which is a thin tissue that covers all internal and external surfaces of the body. They play a key role in protecting the body and controlling entry into tissues and organs.

EpiFold aims to use 3D organoids to understand how this protective layer takes on its proper shape. Discoveries could inspire new biohybrid devices, creating microrobots surrounded by living epithelial tissue. Some day such biological robots could self-repair, as living tissue does,

or target the tough defenses of tumors by drilling inside and releasing a cancer-killing cargo.

Meanwhile, colorectal cancer will remain a complex and deadly disease. Diagnosing and treating patients more effectively will require not just [medical doctors](#) but also many types of scientists to improve understanding of the disease.

Researchers like Batlle and Trepac are helping show the way ahead for dealing with [colorectal cancer](#) and its lethal spread.

"We are now discussing our strategy with clinicians and we are hopeful that it will benefit patients," said Batlle.

Europe accounts for a quarter of the world's cancer cases while representing 10% of the global population. In the EU in 2020, 2.7 million people were diagnosed with cancer and another 1.3 million people died from the disease.

More information:

- [ResidualCRC](#)
- [EpiFold](#)

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