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Cocktail of bacteria and broccoli may keep cancer at bay



The research team from NUS' Synthetic Biology for Clinical and Technological Innovation - (from left) research fellow Ho Chun Loong, and associate professors Matthew Chang, Lee Yung Seng and Yew Wen Shan - believe the treatment will be particularly helpful for people who are at a higher risk of developing colon cancer. ST PHOTO: NG SOR LUAN

🕒 PUBLISHED 6 HOURS AGO

NUS researchers find a way to turn bacteria residing in human gut into a probiotic

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A day when taking a probiotic drink and eating vegetables could stave off colon cancer may just be closer.

Scientists in Singapore claim to have found a way to turn a harmless cocktail of the common gut bacteria *E. coli* Nissle and broccoli into a potent anti-cancer mix.

The concoction has been proven in the laboratory to kill off 95 per cent of lab-cultured colon cancer cells. Now, trials on actual colon cancer cells from patients in Singapore are on the cards.

At the heart of the breakthrough is a class of compounds called glucosinolates, commonly found in cruciferous vegetables such as broccoli, bok choy and cabbage.

It is known that they can be converted into a cancer-killing agent by a particular enzyme.

The problem, however, was that this conversion cannot happen naturally in the human body as human cells do not produce this enzyme.

But some clever engineering by the research team from the National University of Singapore's (NUS) Synthetic Biology for Clinical and Technological Innovation has turned things around.

They altered the DNA of the E. coli Nissle bacteria that reside in the human gut, turning it into a probiotic with the ability to not only produce the enzyme but also home in on and attach itself to colon cancer cells.

To test its effectiveness, the researchers added a mixture of the modified bacteria and broccoli extract to colon cancer cells in a petri dish and found that 95 per cent of the cancer cells were killed.

Further tests on mice found that the mixture killed three-quarters of the cancer cells and reduced the size of tumours by three times.

The findings were published in the prestigious Nature Biomedical Engineering journal last month.

"The day may come when a weekly dose of the engineered probiotic drink with a healthy diet of cruciferous vegetables would suffice to prevent colorectal cancer or reduce recurrence after surgery," said research fellow Ho Chun Loong from NUS' Department of Biochemistry, who led the study.

Associate Professor Matthew Chang, also from the biochemistry department, said: "One exciting aspect of our strategy is that it just capitalises on our lifestyle, potentially transforming our normal diet into a sustainable, low-cost... regimen."

Colon cancer, the most common cancer in men and second most common in women here, can hide for a decade before showing its wrath.

Associate Professor Lee Yung Seng, clinical lead of the research and head of paediatrics at the National University Hospital, said: "The beauty of this (strategy) is that you can potentially prevent cancerous polyps from developing or if they do develop, this can restrain it from growing too quickly.

"This might solve the problem even before you realise you had cancer cells in your colon."

Prof Lee said this treatment will be particularly helpful for people who are at a higher risk of developing colon cancer, such as those with a family history of the disease.

On why the anti-cancer agent cannot simply be turned into a pill, the researchers said the compound will be destroyed by gastric acid before it reaches the intestines.

While it could take 10 years for this to become a standard treatment, the team wants to apply the technique to treat stomach cancer. "Mothers are right, after all - eating vegetables is important," said Dr Ho.

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