

# Gut Microbiome and Cancer Treatment

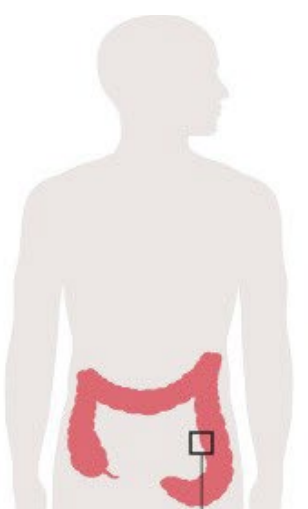
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## INTRODUCTION

The gut microbiome or gut flora consists if a collection of bacteria, fungi and other microbes that live mainly in the large intestine. The functions of the gut microbiome include control of digestion and maintenance of overall health. A recent breakthrough has led to the discovery of the gut microbiomes relationship with the immune system. Our research mainly focuses on the role of the gut microbiome in immune responses to cancer.

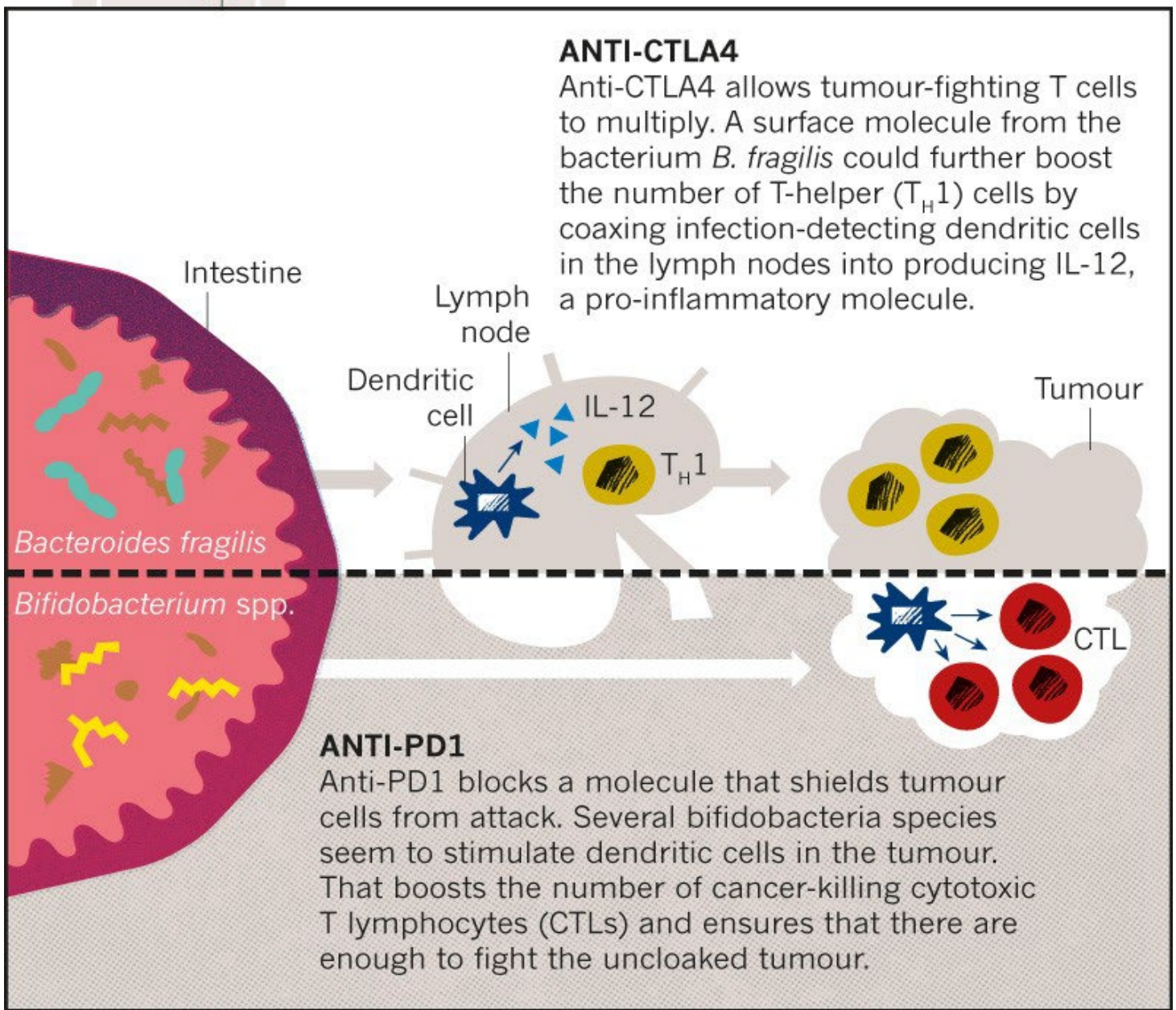
## OBJECTIVES OF THE RESEARCH

The objective of gut microbiome research is to learn more about how the bacteria in our intestines can affect cancer treatment and the immune system of cancer patients. The aim is to be able to use the gut microbiome as a biomarker, which means based on the present bacteria doctors and researchers could determine what treatments will be the most effective for the patient.



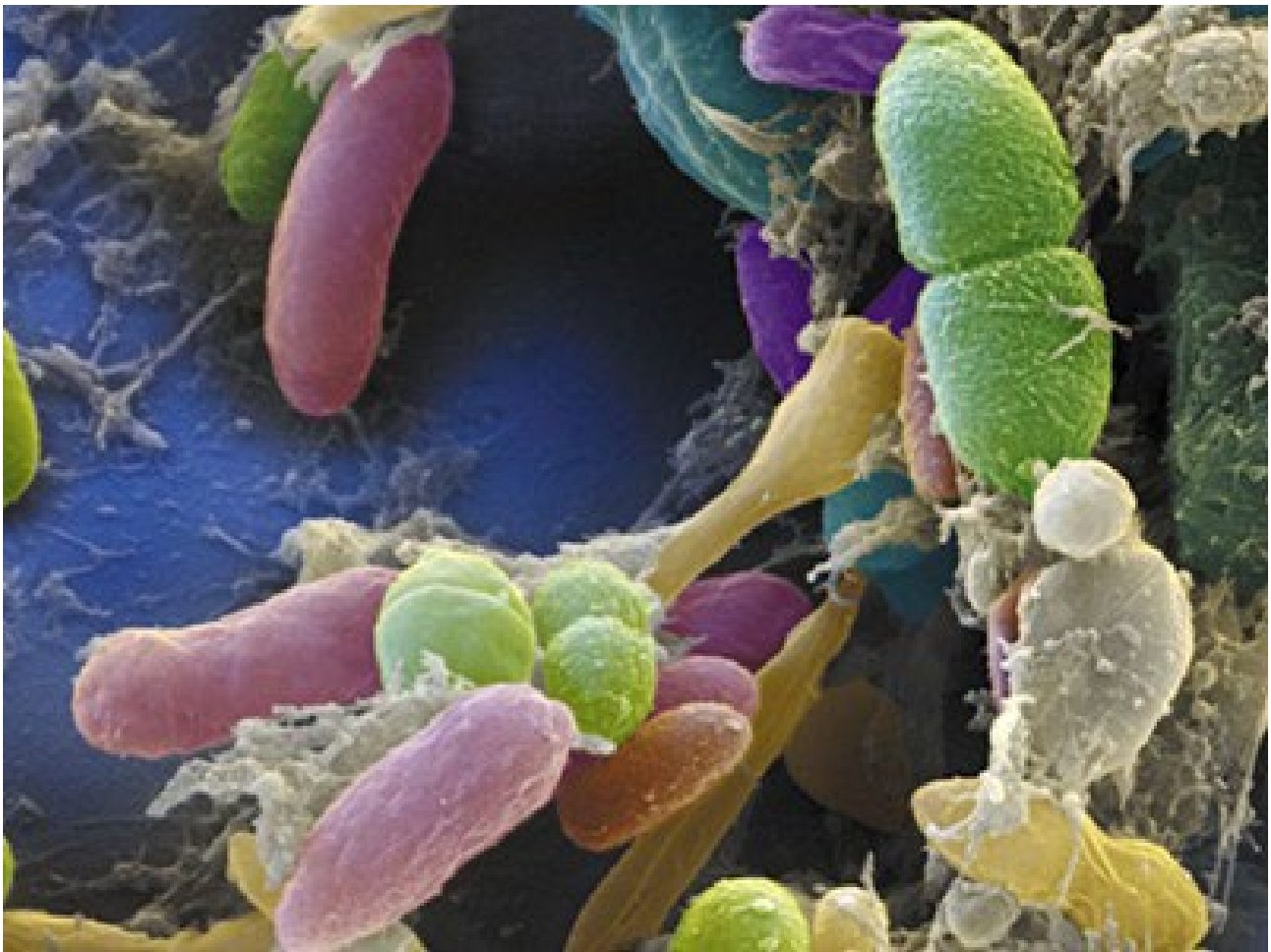
### A LITTLE HELP FROM THEIR FRIENDS

The cancer immunotherapies anti-CTLA4 and anti-PD1 remove certain natural barriers to immune activity. But they don't work in every patient. Gut bacteria might provide signals to immune cells that help to supercharge their tumour-fighting efforts.



## METHODS

The original link between gut microbes and immunotherapy cancer drugs began with methods of treating mice with a certain chemotherapy drug called cyclophosphamide. The mice that lacked gut bacteria and antibiotics did not display anticancer effects. The methods used by researchers in finding promising results directed to the human gut microbiome included fecal transplants, which provided a positive result but, also posed risks to patients. To overcome these risks, a pill containing spore-forming bacteria can be safely administered to patients.



## FURTHER RESEARCH

Further research is required to develop a better understanding of how the gut microbiome works in relation to cancer treatment as well as which bacteria are beneficial. Proposed solutions for research in the future will be to standardize how all these different studies are conducted and to increase the amount of stool samples. A full review of the studies already done to determine which bacteria are safe to use is also needed in order to make new strides in the immunotherapy field.

## RESULTS

Results from the different studies done on the gut microbiome differ significantly as to which bacteria or group of bacteria can assist in boosting the immune system or improving treatment. The exact mechanism of how gut bacteria boost the immune system's reaction is unknown, however, it involves the use of chemical signals between the bacteria and the immune system that stimulate it. Studies and trials were kicked off in this field due to Bertrand Routy's research where he collected stool samples from cancer patients and his results confirmed a link between certain bacteria and an increased response to cancer treatment. Laurence Zitvogel is a major researcher in this field.

- Zitvogel found in her 2013 study that there is a link between the drug cyclophosphamide and the movement of bacteria to the spleen and lymph.
- Her 2015 study confirmed the effect of the gut microbiome on checkpoint inhibitors.

## CRITICAL THINKING QUESTIONS

- How can the gut microbiome be used to improve cancer therapy?
- How can bacteria contribute to cancer progression?
- What is the benefit of using a microbiome-based pill instead of a fecal transplant to modify gut bacteria?

## CONCLUSION

- There are promising new trials.
- Some researchers feel it is too soon for clinical trials.
- Precautions are being taken in the clinical trials.
- Gut microbiome treatment has already been seen to be useful for non cancer treatments.
- A pill instead of fecal transplant.
- How the gut microbiome works is still a mystery.
- Many concerns as well as solutions
- Immunotherapy field is very promising in cancer research.

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