Gut Check! Antibiotics and Bacteria Alter Response to Immunotherapy.

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What is the link between gut bacteria and cancer treatment? A study reported in January 2018 has found that 'good' microbes in the gut make cancer immunotherapy work better. Researchers were specifically looking at an immune checkpoint inhibitor- an antibody that targets an immune-regulator protein - PD-1.

Because humans have many bacteria living on them and in them, it is possible that harming 'good' microbes with antibiotics could harm the patients as well. The study addressed 3 main questions: 1) What was the relationship between antibiotic use and patient response to immunotherapy? 2) What type of gut bacterium is the most abundant in patients who responded to treatment? 3) How does the presence or absence of gut microbes (dependent on antibiotic treatment) affect the response to immunotherapy?

The study examined patients with lung cancer and kidney cancer. They also looked at mice lacking gut bacteria. The patients were using antibiotics for dental, urinary or pulmonary infections. Those on antibiotics had significantly shorter progression-free survival and worse overall survival. Further, when patient stool (feces) was analyzed, it was found that those who responded to immunotherapy had an abundance of bacteria known as *A. muciniphila*; these bacteria were present in over half of patients showing a partial response, compared to only 34% patients whose disease progressed.

And the germ-free mice? After being subjected to antibiotic treatment, they were then administered fecal matter (through a process known as fecal matter transplantation- gross, but scientific!) from patients who were responsive or non-responsive to the cancer treatments. This was followed by tumor cell inoculation and then PD-1 treatment. Mice who had received fecal matter from responsive patients were sensitive to PD-1 blockade activity, while fecal matter from non-responsive patients was linked to drug resistance. The fecal matter from responsive patients also delayed tumor growth in the mice.

The researchers also found that re-*introducing A. muciniphila* into the intestines of germ-free mice subjected to antibiotic treatment restored the effectiveness of PD-1 treatments. *A. muciniphila* also restored sensitivity to PD-1 blockade in mice who had received fecal matter from patients who were not responsive to treatment. Taken together, the results provide a new perspective on how our bodies interact with these cancer treatments. It is becoming clear that the microbes hanging around in our gut can help us win the fight against cancer.

Source
http://science.sciencemag.org/content/early/2017/11/01/science.aan3706
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