Using genetically modified salmonella bacteria to treat cancer

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Salmonella is commonly linked to food poisoning, and as such, usually not good news. However, researchers may have found an important exception: a genetically engineered form of the salmonella bacteria that could be used to treat cancer. Researchers from Duke University, North Carolina, have genetically adjusted and detoxified the salmonella bacteria in such a way that they actively seek out cancer cells from the aggressive brain cancer glioblastoma and then instruct these cells to effectively self-destruct. The tumor-specific localization was enabled by a mutation in a certain gene, making the bacteria deficient in synthesizing purine (a compound needed to form DNA). Because purine is necessary for its survival and replication, the bacteria are in need of external sources of purines. Tumors are a rich source of purines, and thus the bacteria exhibit a tumor-seeking propensity. Once derived, the bacteria can induce the cancer cell to self-destruct. In rats with glioblastoma, this led to significant increases in lifespans, with 20% of the rodents surviving an extra 100 days compared to control animals - the equivalent of 10 years in human terms. Since the survival rates of patients with glioblastoma are low, with 1 out of 4 patients that live for more than two years after diagnosis, these are very encouraging results.

In addition, scientists from South Korea have engineered a safe form of salmonella that can strengthen the immune response to cancerous cells. In many cases, the immune responses are not sufficient to kill cancer cells. Cancer immunotherapy focuses on the use of the immune system to treat cancer, for example by enhancing existing anti-tumor responses. The team discovered by change that the protein flagellin b (FlaB), which is produced by some bacterial species, causes a strong immune response. That led them to genetically modify the salmonella bacteria in such a way that they produce this protein as well. The engineered FlaB-secreting bacteria effectively suppressed tumor growth and metastasis in mouse models and prolonged survival. Moreover, in test on mice with colon cancer, more than half were completely cured without any side effects. While these findings still need to be confirmed in humans, treatment with genetically modified salmonella bacteria may offer a fascinating new way to tackle cancer.

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