Keto Diet May Boost Chemotherapy for Pancreatic Cancer

In a mouse study, a ketogenic diet tripled survival time compared with chemotherapy alone.

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A ketogenic diet in combination with chemotherapy tripled survival time in a mouse model of pancreatic cancer, according to results published in the journal Med.

“There’s been real progress against pancreatic cancer over the past two decades,” Joshua Rabinowitz, MD, PhD, of Princeton University, said in a press release. “The problem is that, while a number of patients now see their tumors stabilize or shrink, the benefits of chemotherapy are very short lived. It often extends patients’ lives six months to a year, but way too rarely do we see the three-plus years of extension in survival that people would, at a minimum, hope for.”

Prior research suggests that fasting or fasting-like diets may influence the efficacy of cancer treatment. A ketogenic diet—consisting of high fat, moderate protein and very low carbohydrate consumption—reduces levels of glucose and suppresses insulin. Both glucose and insulin prompt tumor growth. Rabinowitz’s earlier research showed that pancreatic ductal adenocarcinoma tumors which are glucose-deprived may be even more susceptible to diet-driven glucose starvation.

In this study, the researchers used mice with tumor grafts similar to those found in people with pancreatic cancer. The mice were put on one of three diets: regular, carbohydrate-heavy or ketogenic. The mice were treated with a chemotherapy combination of nab-paclitaxel (Abraxane), gemcitabine and cisplatin.

The ketogenic diet alone did not alter tumor growth, but together with chemotherapy, it tripled the average survival time. “We found in this study that the diet decreases levels of glucose more profoundly in the tumor than in healthy tissues and that it dramatically suppresses levels of insulin,” said Rabinowitz.

In the absence of sugar, the body turns to fats to create energy through ketone bodies such as the 3-hydroxybutyrate molecule. “One thing we noticed is that 3-hydroxybutyrate acts like a supercharged fuel that dumps electrons into cells, and tumor cells are wired for other reasons to be extra-good at taking up this fuel,” said Rabinowitz. “Fortuitously, too much of this supercharged fuel may be toxic to cancer.” This electron dump leads to redox stress, which is also caused by

chemotherapy, leading to the death of cancer cells.

“I think that the most exciting thing here is that we can take chemotherapy regimens that we know to be active, that offer patients the best chance in the clinic right now and, at least in mice, make them work substantially better by pairing them with a ketogenic diet,” said Rabinowitz. “We hope that we’ll see the same types of benefits in patients.”

These results are being studied in a clinical trial evaluating a ketogenic diet in people receiving chemotherapy for pancreatic ductal adenocarcinoma (ClinicalTrials.gov NCT04631445).

Click here to read the study in Med.

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