

Ketogenic Diets and Cancer – A Review of The Research

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A [ketogenic diet](#) is a very low-carb, high-fat diet.

This diet changes what the body uses as a main source of energy.

Instead of using carbs for fuel, it starts to break down fat into fatty acids and ketone bodies.

This metabolic state is called [ketosis](#). For that to happen, most people need to eat fewer than 50 grams of [carbohydrates per day](#).

A ketogenic diet has been used to treat people with epilepsy, especially children who don't respond to medication (1).

It is also useful [against diabetes](#), and for people who [need to lose weight](#) (2).

But there is emerging evidence suggesting that ketogenic diets also have benefits for the treatment of cancer.

This article explores the current state of research on ketogenic diets and cancer.

Cancer Cells Need Glucose to Survive and Grow

The growth of cells in the body is tightly regulated.

Various transcription factors and molecular mechanisms ensure that cells only grow and divide when appropriate.

But cancer cells are in many ways different than other cells.

Something in the regulatory mechanism breaks and they start growing and dividing rapidly.

The cancer cells start hoarding energy from the blood, then they manipulate their surroundings to support their rapid growth.

One interesting fact about the metabolism of cancer cells, is that most of them rely solely on blood sugar as a source of fuel. This is called the [Warburg effect](#) (3).



Bottom Line: Cancer cells grow and divide at a rapid and irregular pace and most of them use glucose as a primary source of energy.

Cancer Cells Lack Metabolic Flexibility

Normal cells of the body have a certain metabolic flexibility. If [insulin](#) is low, they can start using either fatty acids or ketone bodies to provide energy.

Most cancer cells are unable to do this because of damaged mitochondria, the cell organ responsible for energy production. Therefore, they need glucose (4).

This has led to speculation about whether a carb restricted diet can reduce the available fuel for the cancer cells, partly starving them and perhaps being of use alongside other more conventional therapies like radiation and chemo.

But it's important to realize that even though dietary intake of glucose is low, the body will still make plenty of glucose via [gluconeogenesis](#), and cancer cells are particularly efficient at "stealing" the little glucose available from the blood.

So a carb restricted diet won't completely starve the cells in this way.

However, it may reduce their available fuel slightly, while still providing plenty of energy for the other healthy cells of the body via fatty acids and ketones.

Bottom Line: Unlike normal cells, cancer cells can usually only use glucose for fuel. However, although a ketogenic diet will limit the access of cancer cells to glucose, the body can still produce it via gluconeogenesis.

Other Potential Mechanisms

[Low-carbohydrate diets](#) also lead to lower blood levels of the hormones insulin and [IGF-1](#).

This may cause the cancer cells to get less signals to grow and divide.

Additionally, ketone bodies have been shown to inhibit the growth of cancerous cells in culture (5).

It is an interesting concept and ketogenic diets are currently being studied as potential treatments for cancer alongside other conventional treatments.

Bottom Line: Blood levels of the hormones insulin and IGF-1 go down on low-carb diets, which may have negative effects on cancer cell growth. Ketone bodies may also restrict their growth.

Current Research on Low-Carb, Ketogenic Diets and Cancer

There was a pilot study in 10 advanced cancer patients published in 2012. The patients did a very low-carb, ketogenic diet for 28 days.

According to a [PET scan](#), 4 of the patients continued to have progressive disease, while 5

remained stable and 1 had a partial remission.

The patients who had the best metabolic response to the diet (that is, lowest insulin and highest ketone levels) saw the most improvement (6).

Another study, published in 1995, described a case report of two girls with brain cancer (7).

After 7 days on a ketogenic diet, blood glucose levels decreased and glucose uptake at tumor site decreased by 21,8%.

One of the girls had significant improvement in symptoms and her disease did not progress for the next 12 months.

Yet another study, a pilot trial of 16 advanced-stage cancer patients found that a ketogenic diet improved quality of life and stopped the progression of cancer for the 5 patients who completed the 12 week study (8).

Bottom Line: There is some promising data on ketogenic diets and cancer. Several studies have reported improvement in symptoms and the disease even stopped progressing in some cases.

What About Prevention?

Many types of cancer are associated with other diseases of civilization, such as obesity and type 2 diabetes (9).

Given that low-carb diets can in many cases drastically improve some of these diseases, it doesn't take a big stretch of the imagination to see how this diet may reduce chances of developing cancer later in life (4).

Elevated blood sugar and insulin levels, high circulating IGF-1, these are all risk factors for cancer and are all improved on a low-carb, ketogenic diet.

Bottom Line: As ketogenic diets have been proven to be effective against other common Western diseases, it seems reasonable that they may also be useful to prevent cancer.

This Needs a Lot More Research

Cancer is a resilient disease. You can cut it away, radiate it and overload it with poison, but somehow it often still manages to survive and spread.

Ketogenic diets may turn out to be a useful weapon in the arsenal against this foul disease, but it is definitely premature to make any recommendations based on the current research.