

Transcript Details

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Ketogenic Diets: An Effective Therapy for Brain Cancer?

RESEARCH INTO KETOGENIC DIETS FOR CANCER THERAPY

Brain tumors are almost always a death sentence. Is there a way to use diet to change that.

Welcome to the Clinician's Roundtable on ReachMD XM 157. I am your host, Dr. Bruce Bloom and joining us to discuss research into ketogenic diets for cancer therapy is Dr. Thomas Seyfried, Associate Editor of the journal of Nutrition and Metabolism and professor of Biology at Boston College.

DR. BRUCE BLOOM

Dr. Seyfried, welcome to ReachMD.

DR. SEYFRIED

Thank you very much Bruce, it is a real pleasure to be here.

DR. BRUCE BLOOM

So, what is a ketogenic diet?

DR. SEYFRIED

Ketogenic diets are simply diets that have a greater proportion of total calories coming from fat than from protein or carbohydrate. Generally, carbohydrates are greatly restricted in ketogenic diets. Proteins are maintained with adequate amounts, but carbohydrates are either absent or present in very low amounts relative to fat. So, you have a 4:1 or 3:1 fat to protein carbohydrate ratio. So, it is any diet that would have a lot of fat and very little carb.

DR. BRUCE BLOOM

And there are some specific diets that are actually out in the market that people would know or call by a name that would be a ketogenic diet?

DR. SEYFRIED

Well, I guess the closest one might be an Atkins Diet where carbs are also restricted, but proteins are not restricted and fats and proteins. It comes close; it can have some of the same effects as a ketogenic diet, but it is not actually considered a ketogenic diet, although it is in that kind of direction.

DR. BRUCE BLOOM

And how would you create a healthy ketogenic diet if you had to put the patient on this or if you are doing some research on the ketogenic diets?

DR. SEYFRIED

This is an important question because many people think of fat and think of cardiovascular disease and other kinds of ailments. The key thing about using ketogenic diets for disease management is that they are consumed in very restricted amounts. So, most patients whether they have epilepsy or brain cancer do not eat large amounts of the ketogenic diet. It is a restricted diet. The calories are coming in, in restricted amounts and in large amounts from fat; so small amount of fat consumption is not harmful to either animals or patients.

DR. BRUCE BLOOM

So, when we use the shortcut ketogenic diet, are we talking about a combination of ketogenic diet and reduced calorie diet?

DR. SEYFRIED

That is exactly right. Now, there is some debate about this, but our research has clearly shown that ketogenic diets do not have therapeutic efficacy if consumed in the same caloric content as standard high-carb diets. The efficacy from ketogenic diets come largely from caloric restriction. The problem of course is caloric restriction is not looked upon favorably by a lot of people. The ketogenic diet is a way to get the power and therapeutic efficacy of caloric restriction without having to completely abstain from caloric intake.

DR. BRUCE BLOOM

So if we were doing a glucogenic diet and calorie restriction, what would happen to the patient versus a ketogenic diet and calorie restriction?

DR. SEYFRIED

Most of the conditions are essentially the same. There are some slight differences, which we think are important for therapeutic efficacy. The first major change is the reduction in circulating glucose levels, blood glucose levels. That is an indication that the body has to seek alternative fuels. The body will then transition to fats, which are then broken down into the ketones and the ketones then replace the glucose as the energy. The difference between a restricted high-glucose diet and a restricted ketogenic diet is that the circulating ketone bodies are actually higher in the ketogenic diet than in the glucose diet and ketones have anti-inflammatory activity. So you get elevated ketones in both diets, but the ketone elevation is a little bit higher with the ketogenic diet and we think that is important for the therapeutic efficacy.

DR. BRUCE BLOOM

How are these two diets metabolized differently in the various cells of the body?

DR. SEYFRIED

Our interest is in neurology, neurological, neurodegenerative diseases, and brain cancer. The brain uses glucose almost exclusively for its energy metabolism. As an evolutionarily conserved process, the brain will use ketone bodies when outside sources of glucose are restricted during periods of fasting or food deprivation. The brain will then turn towards ketone bodies. So, ketones bodies and glucose are the only major fuels that the brain will use for energy. Brain does not burn fatty acids. When patients fast or during periods of starvation and fasting are actually two different kinds of phenomenon, but people sometimes group them together, but they are not the same; but nevertheless, the liver, heart, muscles, and other organs will metabolize fatty acids for energy along with ketone bodies whereas the brain, what little glucose or what levels of glucose might be present, will be spared for the brain. So there is a hierarchy within the body. The brain must always have a source of glucose, but will burn ketones where other organs can switch almost entirely over the fatty acids and ketones for energy and of course the proteins would be metabolized to make more glucose during gluconeogenesis.

DR. BRUCE BLOOM

So, when were you first involved in the scientific research to evaluate whether calorie-restricted ketogenic diets could be a potential therapy?

DR. SEYFRIED

Well, we had been studying epilepsy for many years from my days at the Yale University and we have developed some very good epilepsy models and we decided to put the ketogenic diet therapy on these models and it became clear that we were able to get the same level of efficacy with the calorically restricted diet, as we could with the epilepsy diet. At the same time, we were investigating, caloric restriction as a therapy for brain cancer and found it to be very powerfully anti-angiogenic and it is re-written we have not yet found a therapy as more powerful anti-angiogenic than caloric restriction for brain cancer. So, we kind of then took the ketogenic diet from our epilepsy studies, restricted it, and put it on to the mice that had the brain tumors and we were able to get as well management with the calorically-restricted ketogenic diet as we were getting with caloric restriction alone and we know that the ketogenic diet is an acceptable medical use in the field of epilepsy research. So, we thought that this would be a really nice way to manage or approach brain cancer and there had been some prior studies to suggest this already.

DR. BRUCE BLOOM

So where else is this kind of research being done and what is the group data showing?

DR. SEYFRIED

Most of the research on the ketogenic diet is done in epilepsy centers. Johns Hopkins is probably one of the leading centers on the ketogenic diet for epilepsy research. There are number of other Neurology Departments scattered throughout the nation and now in other countries where ketogenic diet is being recognized as a legitimate and effective therapy for epilepsy. The idea that the ketogenic diet could be equally as effective if not more effective for brain cancer is just being recognized and to my knowledge there are some ideas of setting up centers to consider this, but there are no clinical trials as far as I know underway using the diet for brain cancer. Most individuals are doing this on their own.

DR. BRUCE BLOOM

When we talk about the ketogenic diet, describe this for the mouse and then also describe what it would look like for human?

DR. SEYFRIED

Well, we initially formulated the mouse diet to match the human diet with respect to the ratio of lipids to proteins and carbohydrates. We then chose actually another, there is commercially prepared ketogenic diet from certain nutritional companies and we have used that as well as what we called standard ketogenic diet formulated exactly as it is for humans. I think the only thing we did not do in our mouse is put artificial sweeteners in some of the ketogenic diets. In the human clinics.

DICTATION ENDS ABRUPTLY.