KETOGENIC DIET IN SEIZURE DISORDERS

Attached are several of the many hundreds of studies in the scientific literature supporting the benefits of the Ketogenic Diet in seizure disorders.

We are sending you these not just for your own information, but more importantly to share with any other doctors you are working with. It is important they realize that the Ketogenic Diet for seizures is not some alternative treatment from the lunatic fringe, but has been extensively studied and written up in all the most prestigious medical journals.

To benefit completely from the Ketogenic Diet, a patient must start fresh by skipping the first 2 meals on the first day, then for the evening meal eat nothing but steak or beef roast or chicken roast or baked fish --- as much as desired. On the second day, nothing but bacon or beef or chicken or fish should be eaten for each of three meals. On the third day begins the on-going Ketogenic Diet. --- Each day there will be 2 or 3 substantial meals with a large serving of meat, fish, poultry, eggs, or cheese, along with non-starchy vegetables such as celery, broccoli, cauliflower, spinach, etc. Food will enter the mouth never more than 3 times daily, and 2 meals daily is even better.

Urine test strips for ketones (available at most large drug stores) will be used to test the urine beginning the 4th day to be certain there are ketones in the urine. On the 5th day, a small serving of bread, pasta, or potato can be added to one of the meals. If ketones no longer appear in the urine, then more carbohydrate has been eaten than can be handled. Any time there are <u>not</u> ketones in the urine there is risk for a seizure. After a few days of self-testing, the patient will have determined his quantitative tolerance for carbohydrates.

To maximize the protective benefits of a ketone-generating diet the ideal carbohydrates (to the <u>small</u> extent carbs can be eaten without slipping out of ketosis) are: carrots, turnips, and winter quash (acorn, butternut, etc.) All non-starchy vegetables can generally be eaten without limitation as long as they accompany a serving of meat, fish, poultry, eggs, or cheese of sufficient size.

Many NUTRI-SPEC supplements, particularly Oxy Tonic, Taurine, Complex P, Oxygenic G, Magnesium Chloride, and/or Phos Drops are beneficial for those with seizure disorders, depending on what Metabolic Balances underlie those seizures.

1. Epilepsia. 2008 Nov;49 Suppl 8:53-6.

Does the effectiveness of the ketogenic diet in different epilepsies yield insights into its mechanisms?

Hartman AL.

Source

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Abstract

The ketogenic diet (KD) has been used successfully in a variety of epilepsy syndromes. This includes syndromes with multiple etiologies, including Lennox-Gastaut syndrome and infantile spasms; developmental syndromes of unknown etiology, such as Landau-Kleffner syndrome; and idiopathic epilepsies, such as myoclonic-astatic (Doose) epilepsy. It also includes syndromes where genetics play a major role, such as Dravet syndrome, tuberous sclerosis, and Rett syndrome. Study of the KD in humans and animals harboring various genetic mutations may yield insights into the diet's mechanisms. Comparison of the diet's effectiveness with other treatments in specific syndromes may be another useful tool for mechanistic studies. The diet's utility in epilepsy syndromes of various etiologies and in some neurodegenerative disorders suggests it may have multiple mechanisms of action.

PMCID: PMC2676569 **Free PMC Article**
PMID: 19049588 [PubMed - indexed for MEDLINE]

1. Front Neurosci. 2012;6:33. Epub 2012 Mar 26.

The nervous system and metabolic dysregulation: emerging evidence converges on ketogenic diet therapy.

Ruskin DN, Masino SA.

Source

Neuroscience Program, Department of Psychology, Trinity College Hartford, CT, USA.

Abstract

A link between metabolism and brain function is clear. Since ancient times, epileptic seizures were noted as treatable with fasting, and historical observations of the therapeutic benefits of fasting on epilepsy were confirmed nearly 100 years ago. Shortly thereafter a high fat, low-carbohydrate ketogenic diet (KD) debuted as a therapy to reduce seizures. This strict regimen could mimic the metabolic effects of fasting while allowing adequate caloric intake for ongoing energy demands. Today, KD therapy, which forces predominantly ketone-based rather than glucose-based metabolism, is now well-established as highly successful in reducing seizures. Cellular metabolic dysfunction in the nervous system has been recognized as existing side-by-side with nervous system disorders - although often with much less obvious cause-and-effect as the relationship between fasting and seizures. Rekindled interest in metabolic and dietary therapies for brain disorders complements new insight into their mechanisms and broader implications. Here we describe the emerging relationship between a KD and adenosine as a way to reset brain metabolism and neuronal activity and disrupt a cycle of dysfunction. We also provide an overview of the effects of a KD on cognition and recent data on the effects of a KD on pain, and explore the relative time course quantified among hallmark metabolic changes, altered neuron function and altered animal behavior assessed after diet administration. We predict continued applications of metabolic therapies in treating dysfunction including and beyond the nervous system.

PMCID: PMC3312079 **Free PMC Article**
PMID: 22470316 [PubMed - in process]

1. Seizure. 2011 Oct;20(8):640-5. Epub 2011 Jul 16.

Long-term follow-up of the ketogenic diet for refractory epilepsy: multicenter Argentinean experience in 216 pediatric patients.

Caraballo R, Vaccarezza M, Cersósimo R, Rios V, Soraru A, Arroyo H, Agosta G, Escobal N, Demartini M, Maxit C, Cresta A, Marchione D, Carniello M, Paníco L.

Source

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Abstract

PURPOSE:

In this Argentinean retrospective, collaborative, multicenter study, we examine the efficacy and tolerability of the ketogenic diet (KD) for different epilepsy syndromes.

MATERIALS AND METHODS:

We evaluated the clinical records of 216 patients started on the KD between March 1, 1990 and December 31, 2010.

RESULTS:

One hundred forty of the initial patients (65%) remained on the diet at the end of the study period. Twenty-nine patients (20.5%) became seizure free and 50 children (36%) had a 75-99% decrease in seizures. Thus, 56.5% of the patients had a seizure control of more than 75%. The best results were found in patients with epilepsy with myoclonic-astatic seizures, Lennox-Gastaut syndrome, and West syndrome. Good results were also found in patients with Dravet syndrome, in those with symptomatic focal epilepsy secondary to malformations of cortical development, and in patients with tuberous sclerosis. Seizures were significantly reduced in four patients with fever-induced refractory epileptic encephalopathy in school-age children and in two patients with epileptic encephalopathy with continuous spikes and waves during

slow sleep. The median period of follow-up after discontinuation of the diet was 6 years. Twenty patients who had become seizure free discontinued the diet, but seizures recurred in five (25%). Of 40 patients with a seizure reduction of more than 50% who discontinued the diet, 10 presented with recurrent seizures.

CONCLUSION:

The ketogenic diet is a good option in the treatment of refractory epilepsy. After discontinuing the diet, seizures recurrence occurred in few patients.

PMID: 21763159 [PubMed - in process]

1. Epilepsy Res. 2012 Mar 14. [Epub ahead of print]

Is the ketogenic diet effective in specific epilepsy syndromes?

Nangia S, Caraballo RH, Kang HC, Nordli DR, Scheffer IE.

Source

Children's Memorial Hospital Epilepsy Center, 2300 Children's Plaza, Box 29, Chicago, IL, 60614-3363, United States.

Abstract

Is the ketogenic diet (KD) more effective in certain epilepsy syndromes? The KD has been shown to be effective in treating multiple seizure types and epilepsy syndromes. We review the effectiveness of the KD in Dravet syndrome, epilepsy with myoclonic-atonic seizures, mitochondrial disease, tuberous sclerosis, late infantile and juvenile neuronal ceroid lipofuscinosis, and febrile infection-related epilepsy syndrome. In certain epilepsy syndromes, like epilepsy with myoclonic-atonic seizures, the diet should be considered early in the course of treatment.

PMID: 22424762 [PubMed - as supplied by publisher]

1. Rev Neurol (Paris). 2009 May;165(5):430-9. Epub 2008 Nov 21.

[The ketogenic diet and its variants: state of the art].

[Article in French]

Porta N, Vallée L, Boutry E, Auvin S.

Source

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Abstract

The ketogenic diet is a high-fat, low-protein, low-carbohydrate diet that has been employed as a nonpharmacologic therapy for intractable epilepsy. Several multicenter or randomized studies have demonstrated the anticonvulsive properties of the ketogenic diet. The reports on the clinical efficacy have described a greater than 50% reduction in seizure frequency for about 60% of patients on a ketogenic diet. Efficacy has been reported both for child-teenager and adult patients. Patients who were responders to the ketogenic diet exhibited a decrease in seizure frequency within two months of treatment onset. Underlying mechanisms remain unknown. The current hypotheses are: anticonvulsive properties of ketone bodies, variation in excitatory or inhibitory brain neurotransmissions, modulation of cell excitability or implication of polyunsaturated fatty acids. Ketogenic diet is a fastidious and restrictive therapy. Moreover, side effects have been reported. In order to facilitate patient tolerability and palatability, the diet protocols are gradually modified including changes in ratios of the fat versus non fat components, initiation of the diet with or without fasting, fatty acids composition. A modified Atkins diet seems to be a possible alternative diet with a comparable efficacy on intractable epilepsy. This diet induces ketosis without fluid, calorie or protein restriction, nor the requirement for fasting and food weighing. Furthermore, 10 to 20 grams carbohydrates are allowed per day to increase patient tolerability and palatability. New data suggest that ketogenic diet and its variants should not be considered like a "last chance" treatment.

PMID: 19027128 [PubMed - indexed for MEDLINE]

1. Epilepsia. 2012 Mar;53(3):e55-9. doi: 10.1111/j.1528-1167.2011.03394.x. Epub 2012 Feb 6.

Efficacy of the ketogenic diet: which epilepsies respond?

Thammongkol S, Vears DF, Bicknell-Royle J, Nation J, Draffin K, Stewart KG, Scheffer IE, Mackay MT.

Source

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Abstract

We report the efficacy of the ketogenic diet in refractory epilepsies focusing on outcomes with regard to epilepsy syndromes and etiology in children and adults with refractory epilepsy. Sixty-four consecutive children and four adults were prospectively enrolled from 2002 to 2009; seven were excluded from analysis. The classical ketogenic diet was initiated on an inpatient basis with dietary ratios ranging from 2:1 to 4:1 fat to carbohydrate and protein. Patients were classified according to syndrome and etiology using the 1989 and more recent 2010 International League Against Epilepsy (ILAE) classification systems. Responders were defined as >50% reduction in seizure frequency compared to baseline. Syndromes included symptomatic generalized (52), genetic (idiopathic) generalized (7), and focal epilepsies (2) and etiologies included structural (24), genetic (18), and unknown (19). Twenty-nine (48%) of 61 patients were responders at 3 months. Two children became seizure-free: one with focal epilepsy of unknown etiology and another with refractory childhood absence epilepsy. Responsive syndromes included migrating partial epilepsy of infancy, childhood absence epilepsy, focal epilepsy, epilepsy with myoclonic-atonic seizures, and Dravet syndrome. Children with lissencephaly and hypoxic ischemic encephalopathy had surprisingly good responses. The ketogenic diet is an effective treatment for children and adults with refractory epilepsy. The response is predicted by type of epilepsy syndrome. Accurate characterization of the electroclinical syndrome is an important factor in decisions about timing of initiation of the ketogenic diet.

PMID: 22310062 [PubMed - indexed for MEDLINE]

1. Nutr Neurosci. 2003 Apr;6(2):67-79.

The ketogenic diet for the treatment of epilepsy: a challenge for nutritional neuroscientists.

Stafstrom CE, Bough KJ.

Source

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Abstract

The ketogenic diet (KD) is a high-fat, low-carbohydrate, adequate-protein diet that has been used for more than eight decades for the treatment of refractory epilepsy in children. Despite this long history, the mechanisms by which the KD exerts its anti-seizure action are not fully understood. Questions remain regarding several aspects of KD action, including its effects on brain biochemistry and energetics, neuronal membrane function and cellular network behavior. With the explosion of the KD use in the last 10 years, it is now imperative that we understand these factors in greater detail, in order to optimize the formulation, administration and fine-tuning of the diet. This review discusses what is known and what remains to be learned about the KD, with emphasis on clinical questions that can be approached in the laboratory. We encourage scientists with a primary interest in nutritional neuroscience to join with those of us in the epilepsy research community to address these urgent questions, for the benefit of children ravaged by intractable seizures.

PMID: 12722982 [PubMed - indexed for MEDLINE]

1. Epilepsia. 2008 Feb;49(2):329-33. Epub 2007 Nov 19.

When do seizures usually improve with the ketogenic diet?

Kossoff EH, Laux LC, Blackford R, Morrison PF, Pyzik PL, Hamdy RM, Turner Z, Nordli DR Jr.

Source

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Comment in

- Epilepsy Curr. 2009 Mar-Apr;9(2):40-1.

Abstract

PURPOSE:

Parents often expect immediate seizure improvement after starting the ketogenic diet (KD) for their children. The purpose of this study was to determine the typical time to seizure reduction as well as the time after which it was unlikely to be helpful in those children started on the KD.

METHODS:

Records of all children started on the KD at Johns Hopkins Hospital, Baltimore (n = 83) and Children's Memorial Hospital, Chicago (n = 35) from November 2003 to December 2006 were examined to determine the first day in which seizures were reportedly improved.

RESULTS:

Of the 118 children started on the KD, 99 (84%) had documented seizure reduction. The overall median time to first improvement was 5 days (range: 1-65 days). Seventy-five percent of children improved within 14 days. In those children who were fasted at KD onset, the time to improvement was quicker (median 5 vs. 14 days, $p < 0.01$) with a higher percentage improving within 5 days (60% vs. 31%, $p = 0.01$). No difference was identified between fasting and nonfasting in regards to long-term outcomes, however.

DISCUSSION:

The KD works quickly when effective, typically within the first 1-2 weeks. Starting the KD after a fasting period may lead to a more rapid, but equivalent long-term seizure reduction, confirming prior reports. If the KD has not led to seizure reduction after 2 months, it can probably be discontinued.

PMID: 18028405 [PubMed - indexed for MEDLINE]