



Let's Go Pens!

PIC QUESTION OF THE WEEK: 1/04/10

Q: Please describe the role of the ketogenic diet in the management of childhood seizures.

A: In the 1920's, it was theorized that epilepsy might be related to an accumulation of toxins in the central nervous system (CNS). By completely eliminating food intake (the theoretical source of the toxins) over a period of time, some physicians noted a sizeable reduction in seizure activity in a number of children. In succeeding years, there was additional study of the diet and the role of ketone bodies in epilepsy. This continued until phenytoin (Dilantin) was introduced in 1938. Thereafter, research efforts centered on the identification and availability of new anticonvulsants. In 1997, the film *First Do No Harm* was released and described the true story of a child with severe epilepsy and his dramatic improvement when placed on the ketogenic diet (KD). The movie sparked new interest in the KD for management of the 20-30% of epileptic patients who do not respond to standard anticonvulsant therapy. A study conducted at Johns Hopkins Hospital evaluated the value of the diet in 68 children. Nearly 60% of the patients continued the diet for more than a year and 32% did not experience a single seizure episode. Poor compliance was attributed to difficulty in maintaining the diet and adverse effects such as kidney stones as well as vomiting and dehydration. The KD is designed to strictly provide a *high* fat, *low* carbohydrate, and adequate protein intake. The traditional KD, described as a 4:1 ratio, provides 4 grams of fat for every 1 gram of *combined* protein and carbohydrate. Alternatively, some less restrictive and complex diets have also been studied and provide promising results in selective patients. These include the modified Atkins, low glycemic index, and medium-chain triglyceride diets. Currently, there is no evidence-based study that supports the enhanced efficacy of combining a KD with anticonvulsant medications. The KD is, however, reserved for use by *experienced* physicians for drug treatment refractory children. The exact mechanism(s) by which the KD reduces seizure activity is unknown; however, its benefits are undoubtedly the result of multiple and complex alterations in cellular metabolism and neuronal activity within the CNS. Ketone bodies produced by the liver serve as an alternative energy source to glucose and function to increase synthesis of gamma aminobutyric acid (GABA), reduce generation of reactive oxygen species, and exert numerous inhibitory effects on brain tissue. Since carbohydrate intake is precisely controlled in these patients, pharmacists should be aware that many drugs, including anticonvulsants and over-the-counter products, contain carbohydrates that may reduce efficacy of a patient's KD. An abbreviated list of the carbohydrate content of various pharmaceuticals has been published (McGhee B, Katyal N. Avoid Unnecessary Drug-Related Carbohydrates for Patients Consuming the Ketogenic Diet. *J Am Diet Assoc* 2001;101:87-101).

References

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Samantha K. Adams and Brian R. Lohr, Pharm.D. Candidates

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