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## Ketosis and Diabetes

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Nutritional ketosis is effective to contrast seizure disorders and other acute and chronic neurological disorders. Glucose is the primary metabolic fuel for cells, however many neurodegenerative disorders have been recently associated with impaired glucose transport and metabolism causing energy deficits, such as in Alzheimer's disease, Parkinson's disease, general seizure disorders, and traumatic brain injury. Ketone bodies and tricarboxylic acid cycle intermediates can bypass the rate-limiting steps associated with impaired neuronal glucose metabolism. After prolonged periods of fasting or ketogenic diet (KD), the body utilizes energy obtained from free fatty acids (FFAs) released from adipose tissue. Hepatic ketogenesis converts FFAs into ketone bodies-hydroxybutyrate and acetoacetate, while a percentage of acetoacetate spontaneously decarboxylates to acetone. This represents a state of normal physiological ketosis and can be therapeutic. Therapeutic ketosis leads to metabolic adaptations that may improve brain metabolism, restore mitochondrial ATP production, decrease reactive oxygen species production, reduce inflammation, and increase neurotrophic factors' function. It has been shown that KD mimics the effects of fasting and the lack of glucose/insulin signaling, which promotes a metabolic shift towards fatty acid utilization. KD can only induce a modest blood ketone level elevation and requires extreme dietary carbohydrate restriction for maintaining sustained levels of ketosis. Prior to the advent of exogenous insulin for the treatment of diabetes mellitus in the 1920's, general guidelines for therapy were represented only by dietary modifications. For example, Dr. Elliot Joslin's Diabetic Diet in 1923 consisted of "meats, poultry, game, fish, clear soups, gelatin, eggs, butter, olive oil, coffee, tea" and contained approximately 5% of energy from carbohydrates, 20% from protein, and 75% from fat. A similar diet was advocated by Dr. Frederick Allen.The aim of this work is to analyze the current literature on therapeutic ketosis and its successful clinical applications in diabetes type I and II.

## Biography

Raffaele Pilla, Pharm.D., Ph.D., Doctor Europaeus, received his Master's degree in Pharmacy at G. d'Annunzio University in Chieti-Pescara, Italy in 2005, where he also served internships at the Cell Physiology Laboratory and Molecular Biology Laboratory. Prior, he was an Erasmus Student at Faculté de Pharmacie de Reims in Reims, France. He received his Doctor Europaeus in 2010 from Pitié-Salpétrière Institute in Paris, France. Also in 2010, he received his Ph.D. in Biochemistry, Physiology, and Pathology of Muscle at G. d'Annunzio University in Chieti-Pescara, Italy. He was hired as a Postdoctoral Scholar in the Department of Pharmacology and Physiology at the University of South Florida in Tampa, on two research grants funded by the Office of Naval Research (US Navy) and Divers' Alert Network. He has written and lectured widely worldwide. He has been involved in ongoing research at the University of South Florida with the use of ketone esters.