



Recruiting Divers to Study the Ketogenic Diet and Central Nervous System Oxygen Toxicity Symptoms



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Abstract:

Introduction: A ketogenic diet has been proposed as a method to decrease oxygen toxicity on the central nervous system and reduce the frequency of seizure episodes during deep-sea dives with Closed Circuit Rebreathers (CCR). A study is underway requiring the participation of technical/CCR divers that will compare divers in ketosis to those under normal metabolic conditions in order to evaluate the neuroprotective benefits of ketosis on CCR diving. This study requires the recruitment of active technical divers willing to complete a survey after each completed dive.

Methods: A list of active divers from the International Association of Nitrox and Technical Divers (IANTD) was used as a database of contacts to solicit participation in the study. Active technical divers that showed interest were e-mailed the participation consent form as well as a copy of the background pilot study and encouraged to reach out if questions arose. Alternative contacts (of divers as well as dive shops) not listed on the IANTD database were obtained during phone calls of divers on the IANTD database as well as through research on Google.

Results/Summary: 106 phone calls were made directly to divers listed on the IANTD database. 9 contacts expressed interest in the study and further information was sent via e-mail. On 29 calls, a message was left on voicemail. 15 contacts no longer participated in technical diving or were not interested. On 53 calls, the person listed at the number was no longer available or the phone numbers were no longer serviceable. Additionally, 30 calls were made to dive shops and dive clubs not listed on the initial IANTD database. Three technical diving instructors were most effective, and personally provided divers who agreed to participate. Data will be presented. 175 DIVES were successfully logged thus far, and social media (i.e. Facebook) strategies are also being employed to further enhance recruitment.

Background:

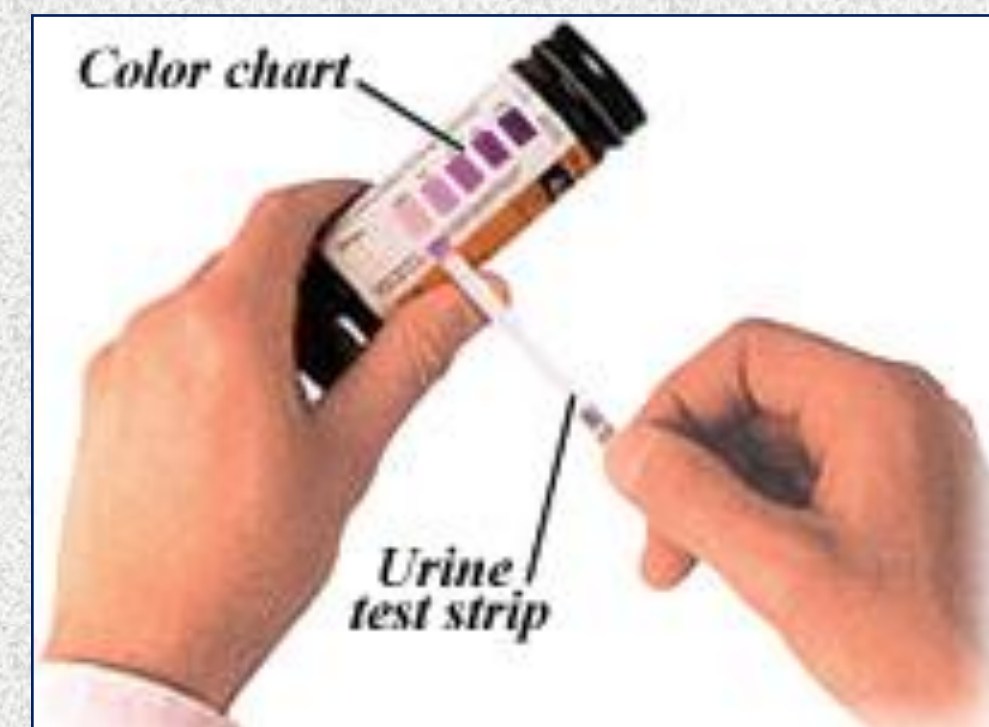
- Ketogenic diet (KD) designed to simulate ketosis of starvation
- Supply fat, restrict protein and carbohydrates
- High PO₂ can have many deleterious effects, both pulmonary and CNS
- Number of oxygen radicals is increased with increased pressure, thus resulting in increased propensity for oxygen toxicity seizures with diving
- O₂ toxicity is variable in both symptoms and thresholds
- Proposed neuroprotective effects of KD include antioxidant activity, prevention of mitochondrial damage, and anti-inflammatory mechanism activation
- Prior feasibility/pilot study found protocol was well tolerated, quickly implemented, and easily maintained

Purpose:

- To determine whether the ketogenic diet is efficacious in alleviating CNS oxygen toxicity and oxygen seizures in closed circuit rebreather (CCR) dives

Methods:

- Healthy divers certified to perform CCR dives are currently being recruited with the goal of 150 divers to build a database of 2600 CCR dives
- Those willing will eat a ketogenic diet prior to their dives; no other changes will be made to their dives
- Ketosis level will be confirmed using a Ketostix©
- The diver will record each dive using an online survey, documenting as positive or negative for oxygen toxicity events
- Following the mission, subjects are permitted to resume a normal diet, but warned to avoid sweets and simple sugars to prevent edema



<http://www.lowcarbluxury.com/ketostix.html>

SAMPLE DIET

Breakfast

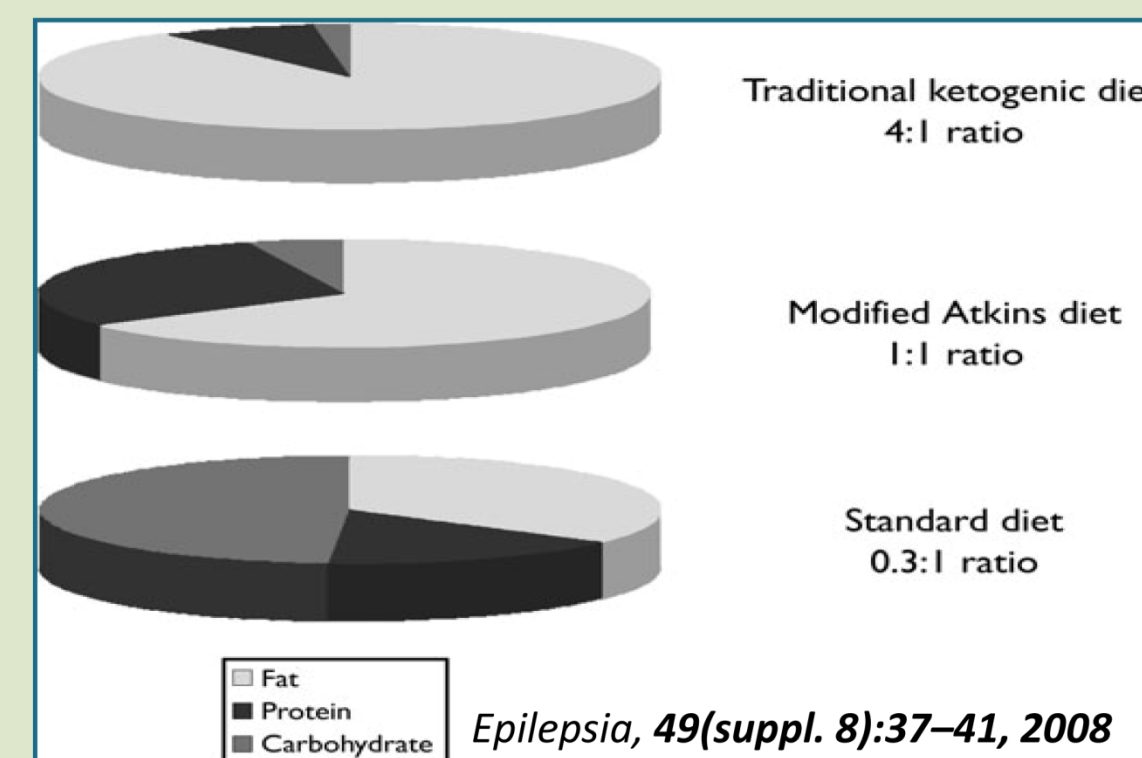
- 2 eggs fried in butter
- 1 oz onion or other vegetable
- 1 oz cheese
- 4 slices bacon
- Coffee + 1 oz cream

Lunch

- 3c salad greens
- 6 oz chicken, cooked in butter
- 4T high fat, low carb dressing
- 1celery stalk + 1 oz cream cheese
- Water or unsweetened beverage

Dinner

- 6 oz grilled steak
- Mushrooms sauteed in butter
- Broccoli or other low carb vegetable
- Water or unsweetened beverage
- Coffee + cream



Recruitment:

- A list of active diving instructors from the International Association of Nitrox and Technical Divers (IANTD) was used as a database of contacts to solicit participation
- Additional contacts were obtained while contacting IANTD divers
- www.padi.com was used to regionally identify dive shops that may participate in technical diving

Results:

- 106 phone calls were made directly to divers listed on the IANTD database
- Out of 106 calls, 9 people expressed interest and were sent additional information including a consent form and preliminary proof of concept study
- The remaining calls resulted in leaving a message with information, individuals who were not interested/no longer dive, or numbers no longer in service
- Additionally 30 dive shops were called
- 4 performed tech diving and were sent additional information
- 175 DIVES were successfully logged thus far, and social media (i.e. Facebook) strategies are also being employed to further enhance recruitment.

Discussion:

- Recruitment of divers has proved to be challenging
- Identified obstacles include convincing divers over the phone/communicating the goals of the study succinctly and identifying high yield populations
- We look to expand recruitment to print ads/presence at diver meetings
- 175 DIVES were successfully logged thus far, and social media (i.e. Facebook) strategies are also being employed to further enhance recruitment.

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