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# Epileptic Seizures and Hyperventilation

Hyperventilation is an effective method often used to activate a seizure for monitoring in a clinical setting. So, it is surprising that breathing retraining to reverse hyperventilation is not more widely researched for its application in controlling seizures.[1]

Robert Fried in *Breathe Well Be Well* Wiley & Sons 1976, refers to studies dating back to the 1930s that have researched the role of over-breathing in seizures. Fried confirmed, as did many others before him, that hyperventilation preceded each seizure, and he devised a method for biofeedback assisted breathing retraining to reduce the frequency and severity of seizures.[2]

For a novel perspective on seizures consider the observation that acute hyperventilation precedes most attacks. It has been suggested that seizures may be an involuntary response to low arterial $CO_2$, depleted by hyperventilation. Reid and other observed that spasms are self-limiting and stop when the arterial $CO_2$ threshold is regained, muscle spasms being the suggested mechanism to generate $CO_2$. So, epileptic seizures, like asthma and sleep apnoea, may be another compensatory mechanism in response to hypocapnia ($CO_2$ deficit) brought about through over-breathing. The high incidence of disordered breathing reported in sufferers of epileptic seizures attests to this relationship.

**Some quotes from the research literature**

*In persons who are predisposed to epileptic fits, simply over-breathing, often results in an attack.* [3]

*Considering all those links between carbon dioxide and epilepsy, namely that (1) the influence of carbon dioxide on the EEG, (2) the abnormal values of carbon dioxide in arterial and jugular blood of patients with petit mal and grand mal and (3) the abnormal variation of carbon dioxide preceding grand mal seizures in such a way as to indicate a causal relationship, we may conclude that carbon dioxide plays a significant role in the aetiology of epileptic convulsions.* [4]

*Hyperventilation elicits changes in the EEG and seizures in epileptic patients by causing a partial reduction in brain blood circulation due to the brain blood vessel constriction that accompanies the lowered carbon dioxide concentration.* [5]

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[1] Guaranha MS, et al Epilepsia 2005;46(1):69–75

[2] Fried R, et al Psychosomatic Medicine Vol. 46, No. 4 (July/August 1984) 331

[3] Guyton AC Human Psychology and mechanisms of Disease. WB Sunders Co Philadelphia 1982 p 286

[4] Gibbs EL, Lennox WG, Gibbs FA. Variations in the carbon dioxide content in the blood in epilepsy. Arch. Neurol Psychiat. 1940 43. Pp 223-239

[5] W. Penfield and H.Jasper, Epilepsy and the functional Anatomy of the Brain (Boston: Little, Brown, 1964).