

# Clinical EEG and Neuroscience

<http://eeg.sagepub.com/>

---

## Is There a Chronic Change of the "Mozart Effect" on Epileptiform Activity? A Case Study

John R. Hughes, John J. Fino and Michelle A. Melyn

*Clin EEG Neurosci* 1999 30: 44

DOI: 10.1177/155005949903000204

The online version of this article can be found at:

<http://eeg.sagepub.com/content/30/2/44>

---

Published by:



<http://www.sagepublications.com>

On behalf of:



[EEG and Clinical Neuroscience Society](#)

**Additional services and information for *Clinical EEG and Neuroscience* can be found at:**

**Email Alerts:** <http://eeg.sagepub.com/cgi/alerts>

**Subscriptions:** <http://eeg.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.com/journalsPermissions.nav>

>> [Version of Record](#) - Apr 1, 1999

[What is This?](#)

# Is There a Chronic Change of the "Mozart Effect" on Epileptiform Activity? A Case Study

John R. Hughes, John J. Fino and Michelle A. Melyn

## Key Words

Epilepsy  
Epileptiform Discharges  
Mozart Effect  
Seizures

## INTRODUCTION

In 1998 Hughes et al<sup>1</sup> published the results of the "Mozart Effect" on patients with epilepsy, demonstrating that Mozart music (K.448) was usually associated with an acute decrease in the amount of epileptiform activity, both ictal and interictal and both generalized and focal in origin. The goal of this study on one patient was to see if a chronic effect could be found, by repeatedly exposing the patient to the music during wakefulness over a 24-hour period. Both clinical seizures and epileptiform activity were assessed.

## METHOD

EEGs were originally recorded in this patient on 18-channel instruments, utilizing the standard International 10-20 System of Electrode Placement. For this study on the chronic effect, an 8-channel Ambulatory EEG instrument was used with electrodes on F<sub>3,4</sub>, C<sub>3,4</sub>, F<sub>7,8</sub>, T<sub>3,4</sub>, and T<sub>5,6</sub> positions. The recording was begun at 0900 on 10/15/98 and continued for 24 hours. Since previous records (5) had shown both many bilateral spike and wave complexes at 1-2/sec (Lennox-Gastaut Syndrome) and many focal discharges on the right posterior temporal area (T<sub>6</sub>), the number of seconds with the generalized discharges and separately with the focal discharges was counted over the 24-hour period.

The number of seizures (drop attacks) was also counted by the mother and also by the teacher while the child attended school. The typical pattern of attacks throughout the day was determined by reviewing the previous 45 days, counting the number of attacks within three time periods (0900-1400, 1400-1800, and 1800-2200 hrs) during the waking periods of the patient.

Every hour on the hour for 10 min during wakefulness over a 24-hour period, Mozart music was played (Sonata for Two Pianos in D Major - K.448, as performed by Murray Perahia and Radu Lupu). The music was continued at the school attended by the patient.

The patient was an 8-year-old female who had had an arteriovenous malformation on the right posterior temporal area. A neurosurgical operation had been performed 2 years earlier to remove the malformation since many seizures had occurred. For the past 2 years many focal EEG discharges on the right posterior temporal area and also many bilateral spike and wave complexes at 1-2/sec had been seen. Many combinations of antiepileptic drugs had been given and at the time of this recording the patient was taking Topamax and Klonopin. The study was done at a time when the patient's seizures had clearly increased over the usual number.

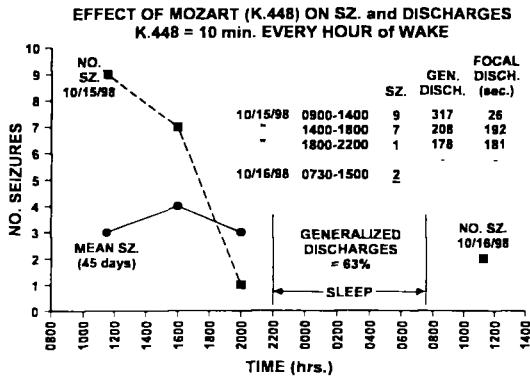
## RESULTS

Figure 1 shows that the number of clinical seizures on 10/15/98 decreased from 9 to 7 to 1 over the 3 periods of wakefulness. This decrease from 0900 AM to 2200 PM contrasts with the typical pattern over the day, usually showing a steady number (3-4) from 0900-1400, also from 1400-1800, and finally from 1800-2200 hr. The number of attacks on the next day (10/16/98) was 2 from 0730-1500 hours, in contrast with the 9 on the previous day over the similar time period. The figure also shows the number of seconds with generalized and with focal discharges over the 24-hr period. Throughout 10/15/98 the number of seconds with bilateral spike and wave complexes at 1-2/sec, responsible for the patient's drop attacks, decreased from 317 to 208 to 178. The number of seconds with focal discharges did not change in any orderly way. During sleep from 2200 PM to 0800 AM on the next day, for 63% of the time, generalized discharges appeared, usually resembling electrical status epilepticus of sleep (ESES), seen nearly continuously for long periods but followed by relatively normal activity also appearing for long periods.

From the Department of Neurology, University of Illinois Medical Center at Chicago, Illinois 60612.

John R. Hughes, M.D., Ph.D., is Director of the Epilepsy Clinic, Director of Clinical Neurophysiology, and Professor of Neurology in the Department of Neurology; John J. Fino, B.S.E.E., is a Senior Research Specialist in Health Sciences in the same Department; Michelle A. Melyn, M.D., is Director of Pediatric Neurology in the Department, University of Illinois Medical Center, Chicago, Illinois.

Requests for reprints should be addressed to Dr. John R. Hughes, University of Illinois Medical Center, M/C 796, 912 S. Wood Street, Chicago, IL 60612.



**DISCUSSION**

The major finding in this patient was that a chronic change of the "Mozart Effect" did appear. From presenting the music every hour for 10 minutes during wakefulness the number of clinical attacks significantly decreased and the number of related generalized discharges also decreased. Furthermore, on the next day the number of attacks decreased, compared to the number during the same time period on the previous day. This decrease in clinical attacks throughout the first day was uncharacteristic since other data on the patient showed a relatively steady number of seizures that usually appeared throughout the day, although at the time of the recording the number of attacks had generally increased for the previous week.

One unexpected result was that, even though clinical

and electrographic improvement had appeared, the majority (63%) of the sleep record showed ESES. A tentative conclusion would be that the latter pattern does not have a direct relationship with the number of clinical attacks before or after the night with ESES. Thus, a patient may show improvement in the number of clinical attacks, both the night before and during the next day, and still show the ESES pattern. This latter pattern is known to "look much worse than the patient" with its nearly continuous generalized spike and wave complexes in sleep, but without any obvious clinical attacks, either during the day or night. One common finding in children with ESES is that they have a diminished capacity to learn.<sup>2</sup> Although our patient was unexpectedly found to be bright and intelligent, further inquiry has shown that the patient has a clearly diminished cognitive status now, compared to a year ago, as would be expected with the Lennox-Gastaut Syndrome.<sup>3</sup>

Further studies are required to see how often such a chronic change of the "Mozart Effect" might be found, as appeared in this patient.

**SUMMARY**

This report shows that a patient with the Lennox-Gastaut Syndrome had fewer clinical seizures and also fewer generalized bilateral spike and wave complexes over a 24-hour period while exposed to Mozart music (K.448) for 10 minutes every hour during wakefulness.

**ACKNOWLEDGMENT**

The authors wish to thank Gordon Shaw, Ph.D., for his support.

**REFERENCES**

- Hughes JR, Daaboul Y, Fino JJ, Shaw GL. The "Mozart Effect" on epileptiform activity. *Clin Electroencephalogr* 1998; 29(3): 109-119.
- Patry G, Lyagoubi S, Tassinari CA. Subclinical "electrical

- status epilepticus" induced by sleep in children. *Arch Neurol* 1971; 24: 242-252.
- Niedermeyer E. The Lennox-Gastaut syndrome: a severe type of childhood epilepsy. *DZ Nervenheilk* 1969; 195: 263-283.